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BEFORE THE BOARD OF ENVIRONMENTAL REVIEW OF THE STATE OF MONTANA

IN THE MATTER OF:
APPEAL AMENDMENT AM4, WESTERN ENERGY COMPANY, ROSEBUD STRIP MINE AREA B PERMIT NO. C198400B

CASE NO. BER 2016-03 SM

Petitioners' Appendix of Record Citations

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INTRODUCTION

1. Western Energy Company's (Western's) Rosebud Mine Area B was originally permitted on January 18, 1978. A total of three amendments to the original permit area have been previously approved. Additionally, the permit area has been adjusted with a couple of incidental boundary changes (surface disturbance only – no additional mining). The amendment area does not include any new federal surface or coal that was not in the existing federal mine plan (Permit Number MT-0002, 12/80).

2. Western applied to the Montana Department of Environmental Quality (DEQ) for the fourth amendment to Area B of the Rosebud Mine (AM4) surface mining permit (the permit) on June 15, 2009. The application was ruled complete on August 7, 2009. After eight rounds of acceptability deficiencies the application was ruled acceptable on July 8, 2015.

3. AM4 proposes the following changes to the permit: a 49 acre increase in the area permitted; a 146 acre increase in the proposed amount of surface disturbance limit (5,531 to 5,677); 8.6% increase in the minable coal reserve (approximately 12.1 million tons); 306 more acres of coal removal or 8.3% increase in the amount of coal aquifer disturbed (3,686 to 3,992); re-calculation of the performance bond to account for current practices and future conditions (increase from $48,403,696 to $73,650,000); and, changes to the postmine topography (PMT). The additional proposed disturbance and mining will be a continuation of existing operations to the south and east.

4. Mining and reclamation operation under AM4 will not deviate substantially from what was previously approved. As coal is removed, the operator will proceed with reclamation according to the requirements of the Reclamation Plan, as described in Section 17.24.313 of the currently approved permit. Topsoil will be removed prior to mining and either direct-hauled to areas graded to the approved PMT or stockpiled. Soil stockpiles will be marked with an identification sign and stockpiles will be protected from erosion. Currently approved permit maps depicting vegetation plans will need to be reviewed and updated as a general course of permit renewal, mid-permit review or an additional minor revision to the permit. Regardless of future permit revisions, the vegetation plan will be monitored over time and adjusted as necessary to achieve successful establishment of plant communities which will support the approved postmine land use.

5. These written findings and permit decision are based on information provided by Western (Amendment application AM4 and existing permit C1984003B), the Checklist Environmental Assessment completed by DEQ dated July 2015 and updated December 2015, and the Cumulative Hydrologic Impact Assessment (CHIA) completed by DEQ dated December 2015.

Exhibit 1

6. Table I - Introductory Table

Applicant	Western Energy Company
Name of Mine	Rosebud Coal Mine Area B
MSHA Number	24-01747
Type of Mine	Strip
Type of Application	Amendment
Area within existing permit boundary (acres)	6,182
Proposed Increase in Permit Area (Acres)	49
Total proposed permit area (acres)	6,231
Anticipated Annual Production	4 million tons

FINDINGS

7. Permit and Review Chronology

December 8, 1980	Surface Mine Permit C1984003B is issued.
June 11, 2009	Various permitting actions December 1980 to June 2009.
June 15, 2009	Application 00184 (AM4), Area B Permit Amendment is submitted to DEQ by Western Energy.
June 25, 2009	Western submits the revised Application Form for the Area B Permit Amendment.
August 7, 2009	DEQ determines that Application #00184 (AM4) is complete and that an environmental impact statement is not necessary.
August 21, 2009	DEQ sends out the notice of application.
September 22, 2009	DEC received the affidavit of publication from Western. The public notice was published on August 27, September 3rd, 10th and 17th, 2009.
December 22, 2009	DEQ sends first round technical comments to Western.
March 18, 2010	DEQ receives Western's response to the first round technical comments for Application 00184 (AM4).
June 1, 2010	DEQ sends the second round deficiency letter to Western.
July 16, 2010	DEQ receives the Area B-East; Hydrological Control Plan and

assessment, DEQ has determined that this amendment will not result in material damage to the hydrologic balance outside the permit area.

13. Western has paid all reclamation fees from previous and existing operations as required by 30 CFR Chapter VII, Subchapter R, as verified through the Applicant Violator System (AVS check of 11/25/15).

14. The proposed amendment is not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) (*see* ARM 17.24.751)(*see* letter of 11/13/01 from USFWS).

15. Western has obtained all required air quality and water quality permits (*see* 82-4-231(2), MCA).

16. There are no pending MSUMRA violations for Western at the Rosebud Coal Mine Area B. No other strip- or underground-coal-mining operation that is owned or controlled by the applicant or by any person who owns or controls the applicant is currently in violation of Public Law 95-87, as amended, any state law required by Public Law 95-87, as amended, or any law, rule, or regulation of the United States or of any department or agency in the United States pertaining to air or water environmental protection, the department may not issue a strip- or underground-coal-mining permit or amendment, other than an incidental boundary revision, until the applicant submits proof that the violation has been corrected or is in the process of being corrected to the satisfaction of the administering agency (82-4-227(11), MCA) (AVS check of 11/25/15).

17. Records of DEQ and OSMRE show that the applicant does not own or control any strip- or underground-coal-mining operation that has demonstrated a pattern of willful violations of Public Law 95-87, as amended, or any state law required by Public Law 95-87, as amended, when the nature and duration of the violations and resulting irreparable damage to the environment indicate an intent not to comply with the provisions of the Montana Strip and Underground Mine Reclamation Act (82-4-227(12), MCA) (AVS check of 11/25/15).

18. Western is in compliance with all applicable federal and state cultural resource requirements, including ARM 17.24.318, 1131 and 1137, and as explained in the conditions listed below.

19. The current bond for the Rosebud Area B permit is $48,403,696. The bond was recalculated as part of the permit renewal application submitted on April 8, 2015. DEQ determined that a bond in the amount of $73,650,000 would be required for both the renewal and AM4 to account for current practices and future conditions. DEQ received adequate bond on December 3, 2015.

PRIVATE PROPERTY TAKINGS

23. The 1995 Montana state legislature passed House Bill (HB) 311, which requires a state agency to prepare an assessment of whether a proposed agency action will result in a taking of private property. DEQ prepared the assessment which concludes that the action approval of AM4 does not result in the taking of private property. The Private Property Takings Assessment is attached to these Written Findings as Attachment 4.

DECISION

20. Based on the information found in Western's Amendment Application 4 and these findings, DEQ hereby approves Amendment Application 04 as revised through March 10, 2015, and DEQ grants the amendment subject to the following conditions:

21. 17.24. 318, 1131[1]: Treatment of cultural resources within SMP C1984003B and the amendment area is covered by a MOA developed under the provisions of Section 106 of the National Historic Preservation Act and pursuant regulations (36 CFR 800). Treatment of all cultural resources, including incidental discoveries during the course of mining, must be handled according to the provisions of this MOA.

22. 17.24.304(1)(e); 17.24.417(1): The stream bottom of all named drainages must be surveyed in a manner acceptable to DEQ. The data must be submitted by the operator via a minor revision for incorporation into the permit by June 30, 2016.

23. 17.24.645(3); 17.24.646(1): Groundwater monitoring must be expanded in order to adequately determine the potential effects of mining to the hydrologic balance outside the permit area. Additional monitoring wells will be required to monitor potential down gradient movement of the affected water to ensure that it does not leave the permit boundary. Additional monitoring wells are also required inside the south permit boundary of Area B to monitor the quality of spoil water once the backfill becomes saturated and follows the natural flow direction to the southeast. This must be accomplished via a minor revision to the MQAP that is approvable by DEQ. The minor revision must be submitted to DEQ for review within 90 days of permit issuance.

24. 17.24.646(1) and (3): Surface water monitoring must be expanded at all streams downstream of mining in order to adequately determine the effects on mining on the hydrologic balance inside and outside the permit area. This must be accomplished via a minor revision to the MQAP that is approvable by DEQ. The minor revision must be submitted to DEQ for review within 90 days of permit issuance.

[1] The number preceding each permit condition is a reference to the provisions of the permit that is the subject of the condition.

257. 17.24.723(1) and (2): Macroinvertebrate monitoring on all intermittent reaches of all streams affected by mining must be performed on a schedule approved by the DEQ (every five years to be submitted with renewal). The proposed monitoring plan must be submitted to DEQ via a minor revision for incorporation into the wildlife monitoring plan.

RESPONSES TO PUBLIC COMMENTS

1. Western Energy is ineligible for a permit because of current violations of environmental laws at the Absaloka Mine.

DEQ Response: See AVS discussion at Written Finding nos. 16 and 17.

2. Western Energy is ineligible for a permit because of current violation of environmental laws at the Rosebud Mine.

DEQ Response: See AVS discussion at Written Finding nos. 16 and 17.

3. According to DEQ's 2014 Final Water Quality Integrated Report, the principal stream impacted by the strip-mining operation, East Fork Armells Creek, is currently not meeting water quality standards…DEQ has determined that the upper portion of the creek is not meeting water quality standards due to "alteration in stream-side or littoral vegetative covers," caused by "surface mining."

DEQ Response: DEQ's Waterbody Assessment Record for East Fork Armells Creek (MT42K002_170.pdf) was conducted in 2006, and no substantive updates have been conducted since this initial assessment. The Assessment Record identifies 'aquatic life' as an unsupported use, with the cause being 'alteration in stream-side or littoral vegetative covers' resultant from surface mining.

Regarding habitat impairments identified in the Assessment Record, the record states that:

a) Grazing is occurring throughout the reach with little impact. The riparian vegetation is mostly grasses and shrubs. Trees are generally missing, but are not required for sustainability.

b) Mining activity has, at a minimum, moderately impaired the habitat in this segment.

c) Because the habitat is impaired, aquatic life is partially supporting, despite the fact the stream is ephemeral.

The Assessment Record makes the claim that 'because the habitat is impaired, aquatic life is partially supporting'. In 2014, Western Energy Company, under the direction of the DEQ, conducted an aquatic survey with the objective of evaluating aquatic life support in upper

EFAC (waterbody segment MT42K002_170). The results of this survey show that the aquatic environments in upper EFAC support a diverse assemblage of aquatic insects, and consist of taxa commonly found in eastern Montana prairie streams. The recent aquatic survey provides empirical evidence that Aquatic Life support is not adversely impacted by mining activity.

4. DEQ has also determined that the lower portion of East Fork Armells Creek is not meeting water quality standards for Nitrate/Nitrite, nitrogen, specific conductance (SC), and total dissolved solids (TDS) and that the cause of these violations of water quality standards includes "coal mining."

DEQ Response: The lower portion of EFAC receives nitrogen-rich effluent from numerous sources including: runoff from the town of Colstrip, the water treatment plant, infiltration and runoff from the golf course (with fertilized and irrigated greens), agriculture, and grazing. The relative contribution from "surface mining" can be evaluated by examining water quality analyses from surface water and alluvial groundwater. Exceedances for nitrate-nitrite nitrogen are discussed in the CHIA (Attachment 1) in Section 9.2.4.4.4 and Section 9.2.6.10. Examination of the Table 9-7 and Table 9-8 in the CHIA (Attachment 1) indicates that the exceedance of nitrate-nitrite nitrogen is uncommon.

The sources listed above as contributors of nitrate-nitrite nitrogen along with leaking power plant ponds, also contribute to SC and TDS in the downstream section of EFAC. Water quality samples taken from EFAC surface and alluvial groundwater below the Highway 39 bridge and the town of Colstrip typically report much higher SC and TDS concentration (as well as nitrate-nitrite) than samples taken upstream of the bridge. Please refer to water quality data in the comprehensive Rosebud Mine database that was previously requested by and submitted to MEIC. The Colstrip power plant also has sampled EFAC south of the Highway 39 bridge and has regularly submitted stream water quality data to the DEQ that is available to the public for review and compare with data from the mine.

5. Indeed, WECo acknowledges that an upper section of the creek in Section 15 was intermittent in 1986 and that recent surveys indicate that it is now dry.[4] "Given the decreased water levels in alluvial wells between Areas B and C, it is possible that the change in flow is a result of mine related dewatering."[5]

DEQ Response: It is unknown whether there was baseflow in the stream section in question, and the premine quantity of water is also unknown. Statements as to the nature of this section premine are anecdotal. Since the nature of this section was not well documented in the 1970's, material damage to this section cannot be determined. While macroinvertebrates were documented using the water in Section 15 in the 1970s, it is unknown if water was present every year or only after wet years when runoff accumulated behind the instream dam, or only after years where the alluvium was saturated to the point of baseflow. Without knowing the true nature of the stream flow and the interaction between groundwater and surface water, a determination of material damage cannot be

APPENDIX I

Western Energy Company
Rosebud Mine

Cumulative Hydrologic Impact Assessment

Amendment AM4

Exhibit 2

The interruption or diminution of a surface water or groundwater supply to the extent that an existing use is precluded is considered material damage. When material damage occurs mitigation is required; mitigation would include dependable, long-term replacement of a resource [ARM 17.24.314(1)(c) and 17.24.648] or treatment to return water to the quality needed for the designated use or to meet numeric state standards, if exceeded [ARM 17.24.631(4)].

2.1.1 Surface Water Material Damage Criteria

Material damage to surface water occurs when, because of mining, any of the following are met:

- Surface water quality standards outside of the permit area are violated
- Land uses or beneficial uses of water outside of the permit area are adversely affected to the extent that an existing use is precluded
- A surface water right is adversely impacted

Material damage criteria for surface waters[2] include the numeric water quality standards established in Circular DEQ-7 (where applicable) and water use criteria established for parameters where specific numeric standards have not been developed. Beneficial uses of surface waters are established according to stream water use classification. Specific water quality standards (along with general provisions) protect the established beneficial uses for each classification [ARM 17.30.620]. Surface water quality standards contained in ARM 17.30.620 through 17.30.670 vary according to stream classification. Surface waters in the Colstrip area are classified as C3 surface waters [ARM 17.30.611(1)(c)].

Beneficial uses of C3 waters are given in ARM 17.30.629:

> *"Waters classified C-3 are to be maintained suitable for bathing, swimming, and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply. Degradation which will impact established beneficial uses will not be allowed."*

As defined by 82-4-203(18), MCA, ARM 17.24.301(39), and ARM 17.30.602(10), an ephemeral stream ("ephemeral drainage way") flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice, and which has a channel bottom that is always above the local water table. As defined in 82-4-203(29), MCA, ARM 17.24.301(61), and ARM 17.30.602(61), an intermittent stream is a stream or reach of a stream that is below the local water table for at least some part of the water year, and obtains its flow from both surface runoff and ground water discharge. According to ARM 17.30.637(4), ephemeral streams are not subject to the specific water quality standards of ARM 17.30.620 through 17.30.629 (including Circular DEQ-7, Montana Numeric Water Quality Standards). Applicable water quality standards for ephemeral surface waters are therefore narrative standards and also include the General Treatment Standards (ARM 17.30.635), General Operation Standards (ARM 17.30.636), General Prohibitions (ARM 17.30.637), and other descriptive portions of the surface water quality standards.

[2] "Surface waters" means any waters on the earth's surface including, but not limited to, streams, lakes, ponds, and reservoirs; and irrigation and drainage systems discharging directly into a stream, lake, pond, reservoir, or other surface water. Water bodies used solely for treating, transporting, or impounding pollutants shall not be considered surface water. [ARM 17.30.602(31)]

All surface water in the greater Colstrip area, with the exception of ponds used for treating and impounding pollutants, are state waters as defined in 75-5-103(34), MCA. A subset of state waters are classified as high quality waters under 75-5-103(13), MCA. High-quality waters are state waters that support one or more of the designated uses for their classification and have flow or surface expression for more than 95 days during most years. Under the definition of high quality waters in 75-5-103(13), MCA, many wetlands and premine ponded features would be considered high quality waters. The requirement of high quality waters to have flow or surface expression for more than 95 days would result in a subset of state waters that would be similar to but not identical to the subset of state waters that would be defined as intermittent or perennial streams under 82-4-203, MCA and ARM 17.24.301. As a result, intermittent streams are state waters but not necessarily high quality waters. High quality waters are protected from nondegradation from point sources. Discussion of nondegradation policy and protection can be found in **Section 2.1.3**.

Standards for electrical conductivity (EC) and sodium adsorption ratio (SAR) set forth by ARM 17.30.670(4) apply to tributaries of Rosebud Creek.

Numeric surface water standards for perennial and intermittent streams are in **Table 2-1**. The parameter list includes only selected parameters known to be potentially associated with coal mining impacts monitored by Montana coal mines. These numeric water quality standards apply to perennial/intermittent streams but not to ephemeral streams.

The predominant beneficial use of surface water in the area is drinking water for livestock and wildlife. Water quality guidelines established for livestock use are based on limits for livestock consumption found in documents published by the Montana State University Extension Service (Sigler and Bauder, 2012; Hutcheson, 2001). **Table 2-2** lists the parameters of concern and guideline limits for livestock water quality. These limits are not enforceable standards but are used by DEQ for guidance in evaluating suitability of pre- and postmine water quality for livestock use. It is common for water quality in the area to naturally exceed these livestock water quality guidelines.

In addition to the livestock guidelines, a chronic aquatic life limit of 230 mg/L for chloride is also used in this document to assess the suitability of surface water to support aquatic life. The EPA lists a chloride chronic limit of 230 mg/L and an acute limit of 860 mg/L for freshwater sources, but DEQ does not have a numeric limit for chloride. Recent studies on a small subset of macroinvertebrate species has indicated that toxicity can be caused by sulfate and/or chloride (Elphick et al., 2011; Iowa DNR, 2009; Soucek et al., 2011). The toxicity of sulfate and chloride are interdependent, and are also dependent on hardness. **Table 2-3** lists a water quality guideline for sulfate to protect for aquatic life use. While these toxicity values were developed for macroinvertebrates commonly found the Midwest, some of the indicator species used can also be found in Eastern Montana streams. As with **Table 2-2**, **Table 2-3** is not an enforceable standard, and it serves only as guidance for evaluating the suitability of pre- and postmine water quality for aquatic life use.

Surface water runoff models are also used to assess water quantity impacts to downstream users and uses from the capture and/or attenuation of storm runoff. Runoff from areas disturbed by mining operations is required to be managed in a manner that prevents surface water pollution (e.g. prevents increased suspended solids, changes in pH, increases in metals of concern, etc.) outside the permit area to the extent possible with the best technology currently available (ARM 17.24.633).

5.0 CUMULATIVE IMPACT AREA

A cumulative hydrologic impact area (CIA) is defined by ARM 17.24.301(32): '"Cumulative hydrologic impact area" means the area, including, but not limited to, the permit and mine plan area within which impacts to the hydrologic balance resulting from the proposed operation may interact with the impacts of all previous, existing and anticipated mining on surface and ground water systems'." Anticipated mining" includes the entire projected life through bond release of all permitted operations and all operations required to meet diligent development requirements for leased federal coal for which there is actual mine-development information available. The size and location of a given CIA depends on the surface water and groundwater system characteristics, the hydrologic resources of concern, and projected impacts from the operations included in the assessment. For this CHIA, a surface water CIA and a groundwater CIA are delineated to assess impacts associated within these distinct hydrologic resource areas (**Figure 5-1**).

5.1 SURFACE WATER CUMULATIVE IMPACT AREA

The surface water CIA includes all areas that may see a measurable change in water quantity or water quality due to mining activities at the Rosebud Mine and Big Sky Mine. The cumulative impact area covers upstream portions of West Fork Armells Creek to the confluence with Donley Creek, East Fork Armells Creek to the confluence with Stocker Creek, and Rosebud Creek to the confluence with Spring Creek. The CIA boundaries are established down gradient from potentially affected streams and springs, and include all surface water monitoring stations to allow assessment of impacts to stream water quality and quantity. Only impacts from coal mining are included in the CHIA, and although the power plant, power plant ash ponds, the town of Colstrip, and active agricultural activities are within the CIA, the impacts from these sources are only mentioned when their impacts are measured in data collected by the coal mines.

5.2 GROUNDWATER CUMULATIVE IMPACT AREA

The groundwater CIA includes the limits of all mining-induced groundwater impacts or potential impacts based on the hydrology of the mines and adjacent area. Potential impacts to groundwater include changes to water level or water quality such that the resource is no longer available or suitable for established uses. Results of two transient groundwater flow models in the Rosebud Mine, one for permit areas A, B, and C (Western Energy Company, 2014) and one for Area D (Western Energy Company, 1999), and the currently observed drawdown and recovery at the reclaimed Big Sky Mine are the basis for determining the extent of drawdown impacts for the CIA. Mining-induced water quality impacts are determined and evaluated based on observed changes to baseline water quality and anticipated changes based on location of resources and their potential to be affected.

chosen was immediately upstream of the Area A mine entrance and has been observed to have at least intermittent water since 2011. In the 1981 report, the sampling location was described as having insufficient flow for macroinvertebrate sampling. “The site was located at a point above which streamflow seldom occurred. Standing or slow moving water is usually present below Station No. 3 and reflects the effects of groundwater contribution” (Schwehr, 1981).

In 2014, another macroinvertebrate survey was conducted in the stream reach between the Area A Tipple and SW-55. The sampling methodology, which followed DEQ’s WQPBWQM-009 (2012), differed from the methodologies used in the previous studies so that taxa richness may not be directly comparable. However, the survey demonstrated that a diverse community of macroinvertebrates was using the stream reach. Therefore, the reach currently meets the narrative standard of providing a beneficial use for aquatic life.

Figure 9-93 shows sulfate through time at various intermittent reaches on EFAC, and samples that would violate the guideline sulfate toxicity threshold listed in **Table 2-3** are circled in red. Sulfate limits for aquatic life are typically 2,000 mg/L due to the very high hardness of the stream water. Even in baseline samples, the sulfate thresholds for aquatic life were exceeded. Macroinvertebrate communities in Eastern Montana are likely adapted to high sulfate water.

In the 1980’s, when mining was closest to EFAC and many of the ponds next to EFAC were the most active, water quality samples from ponds near EFAC in the reach between the Area A Tipple and SW-55 routinely had chloride concentrations over 100 mg/L. Chloride concentration in mine pit water is not usually elevated above background levels, and consequently the chloride in these samples from the 1980’s is not attributed to natural groundwater or spoils. As mining moved away from the stream into the basin’s headwaters, the concentration of chloride in the ponds declined. The high chloride at this time was likely from operational activities, such as the use of magnesium chloride on active haul roads. Presently, high chloride concentrations are found in surface water and alluvial water samples in the reach between the Area A Tipple and SW-55. In 2012, chloride concentration in surface water in this reach was as high as 464 mg/L. From 2012 through 2014, 4 out of 5 samples from SW-55 had chloride concentrations above 100 mg/L. SW-55 receives flow from runoff events, MPDES discharges, and baseflow from alluvium (**Figure 9-2**). Groundwater infiltrating from ponds at the power plant flows towards the stream and mixes with alluvial water by SW-55. Bottom ash and flyash ponds within 0.7 miles of SW-55 have had chloride concentration that ranged from 181 mg/L to 807 mg/L (PPL Montana, 2014). The high chloride concentration at this site is likely from flushing of chloride in the soil and alluvium by the WECo Area A facilities in addition to chloride from the leaking power plant ponds. The current uses of the water in the vicinity of the intermittent reaches are for livestock, wildlife, and aquatic life. Further downstream on EFAC, the water is also used for irrigation. Because the stream still maintains its C-3 uses (primarily aquatic life, non-salmonid fishes, and agriculture) per ARM 17.30.629, the beneficial use of the stream is still maintained. The proposed mine plan is designed not to contribute additional chloride to the stream because lignin sulfonate will be used on roads instead of magnesium chloride.

While the reach of EFAC between the Area A tipple and SW-55 has seen an artificial increase in surface water due to mine operations, other reaches have experienced a reduction in intermittent and ephemeral flows. Capture and containment of water in sediment control ponds from ephemeral tributaries in mined areas can decrease the amount of runoff and/or flow delivered to EFAC. The sediment ponds cause a reduction in storm-driven flows in EFAC.

Baseflow in EFAC by SW-55 is predicted to experience a postmine increase in TDS of 13%, elevating the average concentration of TDS to almost 2,600 mg/L (Western Energy Company, 2015). The increase in TDS comes from spoil replacing the Rosebud coal as the aquifer feeding baseflow to the stream. This increase will not occur until the spoil has resaturated and groundwater flows from the spoils to the alluvium of EFAC. The proposed action will increase the volume of spoils generated by the mine, and groundwater from the recharged spoils may ultimately become baseflow in the creek. The postmine water quality should continue to support livestock use, although the water quality in the stream may be diminished from premine quality. Western Energy Company will continue to periodically conduct macroinvertebrate surveys to monitor the vitality of both aquatic life and habitat available in EFAC. Surface water quality and quantity sampling will continue at SW-55 on EFAC. Because the creek should be able to support its designated beneficial uses, even when spoil water contributes to baseflow, the proposed mine plan is designed to prevent material damage.

SP-28, located close to the EFAC channel, was listed as destroyed by mining in the 1986 baseline observations for the Rosebud Mine Area B permit. In November 1979 this spring was estimated to have between 5 and 10 gpm of discharge and was thought to originate from the overburden. The spring was likely destroyed in 1983 when a mine cut went through the area immediately upstream of the spring. While no data was collected on the spring's water quality or quantity (besides the one estimated flow), the discharge from the spring would have likely contributed to surface water flow in EFAC near the Area A tipple. The proposed action will not create additional disturbance to this area.

Two sections of upper EFAC (a reach in T1N R40E Section 8 and a reach in T1N R40E Section 15) were identified in the middle 1980's as possessing intermittent to perennial flow (**Figure 6-3**), and both of these reaches are currently observed as being ephemeral (see **Appendix A**, photos 3 and 17). The reach through T1N R40E, Section 8, is upstream of mining in Areas B and C and directly upstream of a large stock dam (PO-937) on EFAC. The reach through T1N R40E Section 15 is also upstream of an instream dam.

The Section 15 reach contains a premine stock pond built directly into the channel, and the approximately 20-foot thick alluvium. This portion of EFAC has a small segment of alluvium directly on top of the Rosebud Coal; upstream the alluvium sits on overburden and downstream the coal has been eroded away and the alluvium sits on top of interburden (**Figure 9-92**). The Section 15 reach was included in an aquatic and stream water quality survey done prior to mining in the area in 1970's. At this time, the reach was described as follows: "There has always been sufficient flow [below the small impoundment on the creek] to sample for water chemistry, however, flow is often too low to sample for invertebrates… This is one of the few locations on the creek upstream from Colstrip which has at least some flow through most of the year…" (Schwehr, 1981). In the Area B permit, the baseline description of the area was of "A short reach of East Fork Armells Creek in the northwest quarter of Section 15 hav[ing] flow throughout the year. A flow of 12 gpm at the west edge of Section 15 was measured in June of 1984. There was no flow at this point in August of 1984 although approximately 10 gpm was flowing into PO-929" (WECo, 1986). A 1995 wetlands survey identified the reach as having a segment of wetlands (MME, 1995), and water quality samples from this stretch were collected from approximately 1977 through 1983. In field visits in 2014, DEQ staff observed this area as a dry grassy channel bottom with some riparian trees (**Appendix A**, Photo 18 and 19).

Alluvial water levels in EFAC near the Section 15 reach started to steadily decline starting in the mid 1980's and continued to decline through the 1990's (**Figure 9-92**). Mining adjacent to the reach started in 1992 and was as close as 300 feet to the channel. The longest monitored alluvial well, WA-209,

started to decline in water levels in 1989 with the biggest decreases occurring in 1993 and 1995. Water levels in WA-209 dropped a total of approximately 10 feet before going dry in 1999, and the well has been dry ever since. The alluvial water levels indicate that this area experienced both natural (starting in the mid to late 1980's) and mine-related (steep declines in 1993 and 1995) drawdown. The nearest spoil well, WS-191, is located in the B Extension area (the B-extension pit was mined in 1999), and the well has been dry since installation in 2008. There are no spoil wells currently north of the Section 15 reach in the areas that were mined in the early to middle 1990's. No records exist on the historic status of the instream dam in this section through the years, but the dam is currently intact. The dam may have been the source of some of the water in the stream, but from the early descriptions of the reach, the reach may have been a gaining reach for at least some parts of the year during the 1970's and early 1980's. Mining activities such as cutting off tributaries to EFAC could have reduced the amount of runoff reaching the Section 15 instream pond and reach. This section may see a return of some instream ponding once the upstream sediment ponds are removed. The resaturation of the spoils and restoration of the premine groundwater gradient may also help to restore some baseflow. If flow returns, postmine water quality will depend on both runoff water quality from tributaries and possibly on spoil water quality. There are no surface water rights listed with the DNRC for East Fork Armells Creek through Section 15.

In summary, it is unknown whether there was premine baseflow in EFAC in Section 15, nor is the quantity of water known. Statements as to the nature of this section premine are anecdotal. Since the nature of this section was not well documented in the 1970's, past material damage to this section cannot be determined. While macroinvertebrates were documented using the water in Section 15 in the 1970's, it is unknown if water was present every year, only in wet years when runoff accumulated behind the instream dam, or only after years where the alluvium was saturated to the point of baseflow. Without knowing the true nature of the stream flow and the interaction between groundwater and surface water, a determination of material damage cannot be made.

Alluvial wells near the Section 8 reach measured a decline in water levels of approximately 5 feet from 1980 (the earliest measurement) through 1985. The years from 1983 through 1985 were below normal precipitation years (**Figure 4-2**). From 1985 until 2011, water levels were relatively stable and changed by less than 2 feet. After the large 2011 precipitation event, water levels have increased by 8 to 10 feet in the alluvial wells near Section 8. No observations were made of the presence or absence of surface water in the Section 8 reach after the 2011 recharge. The Section 8 reach may only be fed by baseflow after large recharge events and may be normally dry. Since this reach is also upstream of PO-937, the observed water in the 1980's may actually have been ponded water that was backed up into the reach from the instream dam. Alluvial water levels near the Section 8 and 15 reaches are discussed in **Section 9.2.5.1.1**.

Regardless of the nature of the reaches in Section 15 and Section 8, the proposed permitting action will have no effect on the reach. Therefore, DEQ finds that the proposed action is designed to prevent material damage to these reaches.

One spring has appeared in reclamation in Rosebud Mine Area C permit within the EFAC basin. Spring SP-46A has been monitored since 2001 (**Figure 9-3**), and is thought to be sourced from spoil water. TDS in the spring water has generally increased since monitoring began. The increase in TDS is mainly a result of increasing sulfate with minor contributions from small increases in calcium, magnesium, and sodium. In contrast, bicarbonate has decreased in concentration over time.

While changes to EFAC have been seen adjacent to the Rosebud Mine (areas A, B, and C), the magnitude and extent of surface mining impacts to EFAC downstream of mining (Colstrip and beyond) are difficult to quantify because of the contributions of additional industrial and municipal surface and groundwater water impacts in the Colstrip area. Proposed amendment AM4 would not significantly increase anticipated hydrologic impacts to surface water resources within and adjacent to the mine area or downstream in EFAC. Water quality of runoff in well vegetated postmine channels is expected to be similar to premine runoff water quality. During mining and while vegetation is re-establishing, sediment ponds and other best management practices would treat or retain runoff thus preventing excess sediment from entering EFAC. After the final stage of reclamation (phase IV bond release), surface water quality from the disturbed East Fork Armells Creek tributaries should be similar to premine water quality with no water quality changes expected for stock or wildlife use in the reclaimed drainages. Postmine baseflow in EFAC by SW-55 will be influenced by spoil water quality, and the baseflow will have increased TDS, mainly in the form of increased sulfates. The mining from AM4 will create increase the amount of spoils, but groundwater in these spoils will not move to EFAC.

9.2.4.2.3 Lee Coulee

The Lee Coulee drainage flows to the southeast into Rosebud Creek, and is predominantly ephemeral with some intermittent reaches. Mining in the Lee Coulee drainage began at the Big Sky Mine Area B in the early 1990's. The final pit at the Big Sky mine was mined in 2003. The Rosebud mine's Area B has cuts permitted within the Lee Coulee drainage basin along the drainage divide between EFAC and Lee Coulee.

Water quality in Lee Coulee is highly variable due to a mixture of runoff dominated flows and some reaches with groundwater dominated baseflows. The intermittent reach within the permit boundary experiences both types of flow regimes; at station BRTFL on the intermittent reach section, measured TDS (1984 through 1997) ranged from 220 mg/L during a February sampling event to 4,330 mg/L during an October sampling event. Median measured TDS was 2,700 mg/L.

Impacts to Lee Coulee surface water flow from mining are monitored at flume BS33FL which is located downstream of all mining in Lee Coulee (**Figure 9-4**). Starting in the 2000's, large flow events at BS33FL have become less frequent. Upstream of mining, at flume BPSFL, flows have become less frequent in general, although large flow events have become more frequent and larger. The changes in flows at both of these monitoring sites coincide with mining in the area and a climate period where annual precipitation varied widely. The change in flow characteristics in Lee Coulee downstream of mining are a combination of a shift in precipitation patterns as well as reduction in flow due to mining operations. The following paragraphs describe impacts from mining that have been observed in Lee Coulee.

Discharge of water to Lee Coulee from Big Sky ponds B-9 and B-22 began in late 1989 and in 1994, respectively, and ceased in June 1997. Monitoring wells below these discharge points experienced ground water level rises on the order of 10 to 15 feet, peaking in about 1995 to 1996 at wells closest to the discharge point. A 14-foot ground water level rise was observed downstream, outside the permit area, at well BAL2711. At this well, the peak occurred in about 1996 to 1997. The artificially recharged alluvial groundwater moved slowly down Lee Coulee. No significant changes to Rosebud Creek water quality were observed during this time (**Figure 9-5**).

The last of the sediment retention ponds were removed from Lee Coulee in 2013 allowing more runoff to leave the mine. The removal of the ponds will not likely degrade water quality leaving Lee Coulee and entering Rosebud Creek because the reclaimed mine area is well vegetated and flatter than premine.

Two stations on Rosebud Creek upstream (BURCXS) and downstream (BUSGS) of Lee Coulee were used to determine if hydrologic impacts to Lee Coulee could be detected in Rosebud Creek. TDS is shown in **Figure 9-5** as a general indicator of changes in water quality. In general, the variation in TDS between the two stations is usually less than 100 mg/L, and the station downstream of Lee Coulee recorded higher TDS than the station upstream of the creek. Flow measurements were taken on the same day at the two stations from 1989 to 1993, and these measurements indicate that Rosebud Creek may be a losing reach around the confluence with Lee Coulee. Using the flow measurements in conjunction with water quality samples, a total dissolved solids load was calculated for these two monitoring stations. The salt load reveals that Rosebud Creek gains salt between these two monitoring points. The concentration of TDS measured at the downstream station has not increased over time, and similarly no trend can be seen in the difference in concentration between the upstream and downstream stations.

Figure 9-5 shows that most water quality samples collected since 1980 on Rosebud Creek near Lee Coulee have exceeded the water quality standard for specific conductance defined in ARM 17.30.670. While most samples exceed the standard for specific conductance, they also are mostly are below the standard for SAR. One sample collected in 1990 was excessively high for SAR, but analysis of the complete analytical data set indicates that this high SAR is likely due to a reporting error; the sample had an anomalously high sodium and low sulfate indicating that these two analytes may have been transposed during reporting.

The proposed action is designed to prevent material damage to Rosebud Creek because as of 2013, there has not been a change in water quality in Rosebud Creek that can be directly attributable to mining in Lee Coulee, Miller Coulee, Cow Creek, Pony Creek, Hay Coulee, and Spring Creek. The drainage area and volume of water carried by Rosebud Creek is much larger than the volume of water contributed by Lee Coulee, and consequently the water chemistry of Rosebud Creek is dominated by runoff and groundwater contributions upstream of Lee Coulee.

9.2.4.2.7 Spring Creek

The Spring Creek drainage immediately downstream of mining in Rosebud Area D contains seven springs and three stock ponds. Five springs and two stock ponds are currently sampled for water quality: SP-23, SP-43, PO-921 in one tributary and SP-44, SP-90, SP-91, and PO-808 in a more eastern tributary to Spring Creek. Baseline data on these surface water sites mainly consisted of one or two water quality samples before mining which is inadequate to characterize the range of water quality that would have been seen at the springs and ponds in the absence of mining. Flows have not been measured at the springs, but some water depth measurements have been taken.

Impact analysis by Western Energy Company for the Area D PHC focused on spring SP-23 in this drainage. Spring SP-23, in upper Spring Creek just north of Rosebud Area D mining disturbance, is in a narrow canyon bottom below the Rosebud coal outcrop at the base of a 10 foot to 15 foot Rosebud-McKay interburden sandstone headcut. The spring is within the permit boundary. The top of the McKay coal is exposed on an adjacent canyon wall. SP-23 was predicted to be potentially impacted during mining by disturbance of the source aquifer and by interception of upstream surface runoff by the mine. After mining, Spring SP-23 was predicted to possibly experience increases in total dissolved solids from up gradient mine spoils contributions, however, changes to water quality may take decades before they are realized due to the very slow recharge rate in the spoils aquifer. The impacts to SP-23 were predicted to be small because of limited mining impacts expected in the McKay aquifer, and smaller contributions assumed from up gradient Rosebud coal and overburden sources. To date, TDS

9.2.4.4.4 Nitrate (as N)

Due to ambiguity in past methods used by the mines, nitrate plus nitrite as nitrogen and nitrate as nitrogen are shown together in **Figure 9-17**. High nitrogen may be in surface water samples due to residual chemicals from blasting materials, from agricultural activities, or from city runoff and municipal sources. In **Figure 9-17**, samples above the human health limit of 10 mg/L are shown as dark red. Many of the highest values have been detected downstream of active mining and in areas actively used by livestock. Recent samples (2000 - 2013) with the highest nitrate concentrations near mining activities were found in the Spring Creek drainage downstream from Rosebud Mine Area D. EFAC between Rosebud Mine Area A and B had high nitrate concentrations in the 1980's through middle 1990's. This is coincident with the time that mining was active adjacent to the drainage. The drainage bottom is also actively used and historically used by cattle. Most of the high concentrations in surface water have been below the nitrate-nitrite human health limit of 10 mg/L.

The additional mine cuts are along the EFAC and Miller Coulee drainage divide, over 6,000 feet from the nearest major stream channel, EFAC. From past observations in monitoring wells, this distance should be sufficient to prevent (through dilution) high concentrations of nitrate from blasting from entering the stream via spoil recharge and ultimately alluvial contributions to baseflow. Therefore, the proposed action is designed to prevent material damage to surface water resources from high nitrate concentrations.

9.2.4.5 Exceedances of Water Quality Standards

For intermittent and perennial waters, DEQ-7 numeric water quality standards must be met for aquatic life and human health. A summary of exceedances of the current DEQ-7 standards from the earliest sampling events to 2013 is presented in **Table 9-6**, **Table 9-7**, and **Table 9-8**. As stated in **Section 8.1.2**, MPDES currently considers SW-55 and SW-65 to be within an ephemeral stream segment, and consequently MPDES does not currently apply DEQ-7 aquatic life standards to the discharge water quality.

For the purposes of the material damage determination under MSUMRA, SW-55 and SW-65 are included in **Table 9-7** for the purpose of determining if there is material damage to aquatic life. As seen in **Table 9-6**, samples collected before (considered baseline) and after mining commenced upstream both had many exceedances of DEQ-7. Some metals with low DEQ-7 limits, such as cadmium, had a decrease in exceedances after mining started. This decrease is likely an artifact of later sample dates for the data collected after the start of mining. Cadmium detection limits have become progressively smaller, and the analysis results in many earlier samples with reporting concentrations at or near their reporting limit resolution exceeding the 2012 limit. The percentage of exceedances in water quality samples for nitrate plus nitrite in EFAC through Colstrip and total copper in Stocker Creek at SW-65 after the start of mining are both significantly higher than the number of exceedances in other drainages for these analytes. The high nitrate plus nitrite in EFAC through Colstrip is a result of municipal inputs and urban runoff which are not associated with mining. The high total copper in Stocker Creek is associated with high TSS in the water quality samples. The high TSS results in larger concentrations of all metals that were monitored. The baseline samples for Stocker Creek at SW-65 were low TSS samples and consequently had lower total metals. None of these exceedances are attributable to coal mining.

The exceedances listed in in **Table 9-6** are not persistent nor was any trend of increasing concentration through time found for the analytes with DEQ-7 standards. Aluminum and total iron standards were exceeded at higher rates than other metals, but these two metals are naturally occurring at high concentrations in the region, as evident by the high number of exceedances found in the 'baseline'

between the Rosebud Mine and the Big Sky Mine, and eventually to the Big Sky Mine permit areas. The distance between the Rosebud Mine and Big Sky Mine ranges between approximately a half-mile and two miles. Rosebud coal water quality in the area between the two mines (outside the permit areas of both mines) is variable and is currently unaffected by spoil. North of mining in Big Sky Mine Area A, Rosebud coal ranges in TDS concentration from 611 mg/L (SC = 881 µS/cm) in ARCM67 (reported from a single sample in 1996) to an average of 2,056 mg/L (SC = 2,400 µS/cm) in well ARC53. North of Big Sky Area B, Rosebud coal well BRC513 reported a TDS concentration of 4,300 mg/L (SC = 4,100 µS/cm) and BRC1313 has a TDS concentration that has declined with declining water level, from a high of 2,460 mg/L (SC = 2,540 µS/cm) to low of 770 mg/L (SC = 1,100 µS/cm).

Area B spoil water quality, described above, averages 3,686 mg/L and, in general, exceeds the quality of Rosebud coal between the two mines. Mixing of spoil with the background Rosebud coal water will take place as groundwater from the spoil moves to the south. There are no wells identified in the private well inventory that are completed in the Rosebud coal in the area between the Rosebud Mine and Big Sky Mine. No uses are expected to be impacted and numeric water quality standards are not expected to be exceeded based on spoil water quality. Due to the natural spatial and temporal variability of water quality in Area B spoils, the unmined coal between Area B and the Big Sky Mine, and Big Sky Area A spoils there is no generally accepted methodology to predict impacts with any certainty. Due to a large deposit of clinker throughout much of the area between the two mines, enhanced aquifer recharge will serve to dilute spoil water quality impacts in this area, therefore it does not appear that a parameter will increase to a level that renders the water unsuitable for domestic use or livestock and wildlife watering, or harmful, detrimental, or injurious to the beneficial uses listed for Class II and Class III groundwater. As such, no material damage is expected.

Area C

There are eight active spoil wells in Area C (**Figure 9-32**). Most are dry or have little water and, therefore, water quality samples are limited. Area C has been the focus of mining in recent years and has numerous open pits that impair saturation of spoil. Well WS-121 was installed in 1997 and has had a slow but steadily rising trend (**Figure 9-59**). With 14 feet of water, it records the greatest amount of recharge of any well in the central part of Area C. Three other nearby spoil wells register three feet (WS-120), four feet (WS-122) and six feet (WS-186) of water, with most of the recharge taking place since 2011. Well WS-197 is in the west part of Area C and records approximately 18 feet of water.

Only two wells monitor spoil water quality at this time, WS-121 and WS-197; the remaining wells have insufficient water for sampling. TDS concentration in WS-121 has increased with rising water level from 2,150 mg/L to as high as 7,360 mg/L. The most recent TDS concentration in this well is 6,420 mg/L. Average TDS of well WS-121 is 5,722 mg/L and average TDS concentration in WS-197 is 3,733 mg/L. This well also has relatively high concentrations of chloride (up to 58 mg/L). High chloride is typically attributed to use of magnesium chloride on roads. There has been no exceedance of an HHS in any Area C spoil water quality analysis.

Currently, Area C spoil has experienced little recharge. Saturation of spoil in the north part of Area C will depend on vertical infiltration as the mine area is defined on three sides by the coal crop line, including the west, which is the up gradient direction of lateral groundwater flow. This means there is no up gradient recharge from the Rosebud coal into the north part of Area C. Although the drawdown here was relatively small (modeled at 10 feet, see **Section 9.2.7**) because of the small amount of water in the Rosebud coal, it is anticipated that it will take a substantial amount of time to saturate the spoil in this area. The remainder of Area C will receive lateral recharge to coal and spoil. Upon saturation, migration

25 feet), two of the wells (BSM9085 and BSM2615) located in a drainage south of the pit area began to experience an increase in concentration in 1994 characterized by increases in chloride, sodium, calcium, magnesium and sulfate, causing TDS concentration to rise from a premine concentration of approximately 1,500 mg/L to 3,240 mg/L. These wells likely have been influenced by an upstream pond that has concentrated salts due to evaporation and periodically discharged or allowed water to infiltrate downstream. This pond has been recently reclaimed and water quality should return to lower concentrations with time. Well BSM2535 approximately a mile downstream from BSM2615, may also have been affected by the upstream pond, showing increases in TDS beginning at about the same time. Water quality at this well has remained stable with a TDS of approximately 2,300 mg/L since 1998. Well BSM9095, located in the center of the permit area near the coal crop, has increased approximately 1,000 mg/L to 3,710 mg/L in TDS concentration and appears to be on a continuing upward trend. Most of the increase in TDS concentration is attributable to an increase in sulfate. The source of this increase has not been identified and will continue to be monitored.

The proposed mining in AM4 is not anticipated to affect underburden water quantity or quality near Area B. Although some impacts to shallow underburden wells are noted above, all are within the permit boundary and these impacts are not expected to spread outside the permit boundary. No material damage has been observed and none is expected.

9.2.5.2.7 Spoil

Area A

Ten spoil wells are active in Area A (**Figure 9-65)**. They contain water columns of between 10 feet and 76 feet, with the least water in wells near the location of the Rosebud coal crop. All of the wells are showing continued increases in saturation (**Figure 9-76**).

Current TDS concentrations range from 2,250 mg/L (ASP61) to 14,100 mg/L (ASP22). The average concentration is 5,346 mg/L and the median is 3,990 mg/L. In comparison, TDS concentrations in the Rosebud coal ranged from 711 mg/L to 3,820 mg/L, with an average of 2,362 mg/L and median of 2,110 mg/L. Currently, the highest concentration in a spoil well is in ASP22, which contains approximately 18 feet of water and lies in a pre-law mining area. TDS concentrations at this well have been as high as 19,200 mg/L, measured in 1987. A slightly declining trend over the past 22 years has brought current concentrations to 14,100 mg/L. Chloride concentration has been extremely high (156 mg/L - 430 mg/L), along with magnesium (849 mg/L to 1,740 mg/L), sodium (980 mg/L to 2,400 mg/L), and sulfate (4,830 mg/L to 11,400 mg/L). Trace elements and metals that are unusually and persistently high include boron (up to 1.9 mg/L), copper (up to 0.178 mg/L), manganese (up to 5.59 mg/L), and molybdenum (up to 1.3 mg/L). The chemical signature of water from this well suggests that that it is affected by road stabilization materials (magnesium chloride), cleaning compounds (boron, sodium and sulfate) and unknown sources of trace metals such as copper and molybdenum. There is no record of the mining activity in this pre-law area. Spoil well ASPP18 located approximately 30 feet to the southwest has approximately the same completion depth and water level but had a TDS of 4,050mg/L at the last measurement (1999), and no evidence of elevated concentrations in analytes like those in ASP22. This suggests that the poor quality water characteristic of ASP22 is very limited in extent. No impacts to Area A spoil water are expected from the proposed AM4 mining. Mining has been completed in Area A for over 25 years and no migration of spoil water impacts outside of the spoils has been observed, thus future migration of spoil water down gradient is not expected to cause conditions which would render water unsuitable for domestic use or livestock and wildlife watering, are harmful, detrimental, or injurious to listed beneficial uses, or cause exceedances of numeric water quality standards and material damage is not anticipated.

- BRC513 had two exceedances, one each year in 1984 and 1985 of 2.38 mg/L and 8.57 mg/L. The latter sample also was at the standard for lead (0.015 mg/L) and arsenic (0.01 mg/L). This well is north of the permit area and up gradient of mining.
- BSM1015 had exceedances of 3.72 mg/L in 1985 and 40 mg/L in 1997. The remaining analyses are barely above detection (0.01 mg/L).
- BSM1715 had exceedances of 13.1 mg/L and 130 mg/L in 1988 and 1997. More recent analyses are barely above the non-detect limit of 0.01 mg/L.

The exceedances from September 1997 are the last ones reported. A low level of dissolved zinc is generally common in groundwater and a lack of persistent exceedances suggests zinc does not represent a problem in groundwater at Big Sky.

Zinc exceedances are sporadic and appear associated with problems in sampling or laboratory analysis. None of the exceedances reported above for zinc may be attributed to mining operations. Therefore, there is no reason to expect material damage outside the permit boundary due to zinc.

9.2.6.10 Nitrite-Nitrate

Thirty-two samples from the Rosebud Mine have had nitrate concentrations above the human health limit of 10 mg/L. Many represent a single exceedance from a given well that appears to be anomalous when compared to analyses of other samples from the well. No further consideration was given to these wells. Wells that have had persistent exceedances or persistent nitrate near regulatory limits are discussed below.

Three spoil wells have had recent, persistent exceedances of the nitrite-nitrate human health limit:

- Well WS-127 is located in Area D, between the Colstrip power plant and pond 151 and has been monitored for water quality since 1999. This well has high TDS (average 7,882 mg/L), chloride and magnesium concentrations and had nitrate concentrations above the human health standard in five out of six samples collected between 1999 and 2014. The nitrite-nitrate concentration ranged between 7.6 mg/L (Sept. 2011) and 50 mg/L (Sept. 2005) and most recently (2014) was 29.8 mg/L. The well also has an unusually low pH that averages 6.4. The high chloride and magnesium concentrations in this well are most likely related to the application of road stabilization products (magnesium chloride) on the adjacent haul road. A possible source of the persistent nitrite-nitrate concentration in spoil is from blasting agents used during mining. The area is also subject to influences from the power plant and cattle grazing. Groundwater flow in the area is to the southeast. Well WS-126, located southeast of WS-127, serves as a down gradient well to intercept water from WS-127 before it approaches the permit boundary. Nitrate in WS-126 ranges between 0.01 mg/L and 0.06 mg/L, concentrations well below the human health standard. There is no evidence that the proposed expansion of mining in Area B will exacerbate nitrite concentrations in Area E.
- WS-100, located approximately 1,000 feet from the east boundary of permit Area A, has had three samples (2009-2014) that exceed the nitrite-nitrate human health standard of 10 mg/L. The most recent sample (2014) was 24.1 mg/L. Although it is uncertain if the nitrate is associated with mining, agricultural (the reclaimed area is used as grazing pasture) or another unidentified source, ammonium nitrate blasting agents remaining in spoil are a possible source. A stipulation in the approval of AM4 will required expanded monitoring with the expectation that a well will be installed down gradient of WS-100, closer to the permit boundary, to monitor for potential movement of nitrate toward the permit boundary.

- WS-111 is located in the former Pit 6 area. Nitrate concentrations began to rise in 2005 (16 mg/L) and were 12 mg/L in the last two samples (2008 and 2011). Because Pit 6 was a pre-law mine area, it was not subject to current bond release standards, including the requirement to prevent material damage outside the permit area. Pit 6 was released from bond in 2006.

The greatest nitrate exceedance recorded from a monitoring well is 351 mg/L, a highly anomalous value, from WA-113 in 1985. However, this well has a history of elevated concentrations that spans the life of the well. This well is located in a drainage in the town of Colstrip and downstream from a subdivision. Anthropogenic sources such as lawn fertilizer are the most likely source of nitrate in this 15 foot deep well.

A few alluvial wells in the east part of Area B had an exceedance when mining was adjacent to EFAC in the middle 1980's, including well WA-124, and WX-110. Other nearby alluvial wells (e.g. WA-104) showed elevated nitrate below the HHS. The exceedances and persistent elevated nitrate concentrations in alluvial wells from 1982 to 1989 may be attributable to blasting agents used in mining. Use of the stream by cattle is also a potential source of nitrate.

Alluvial well WA-154 was located downstream of Colstrip on EFAC, below the power plant, but showed evidence of elevated nitrate from 1983 until 1995 when monitoring was discontinued. Nitrate here has multiple potential anthropogenic sources other than mining, including the water treatment plant, runoff from the golf course and cattle grazing.

Two Rosebud wells reported nitrate concentrations above the HHS, one (WR-125) in 2000, and another (WR-126) in 2007. WR-125 is up gradient of mining, eliminating mining as the source of the elevated concentrations. WR-126 located along the country road in Area C has shown persistently elevated nitrate since 1987 with one HHS exceedance in 2007. The source is not spoil as water level in the spoil (WS-122) remains 11 feet below the water level in WR-126.

Five samples exceeded the nitrate-nitrate standard in Area A of the Big Sky Mine:

- ASTMW3 and ASTMW4 were the locations of all of the exceedances during the middle 1980's. These wells are known as "truck wash" wells and are located adjacent to the former equipment washing area. The nitrate-nitrogen concentration in four of the samples was over 100 mg/L and ranged as high as 234 mg/L. The source of the nitrate was most likely degreasing and cleaning agents used on equipment at the truck wash.

In Big Sky Mine Area B, fourteen samples had concentrations that ranged from 10.3 mg/L to 54.6 mg/L. The bulk of the samples were from the 1980's and 1990's. Repeated exceedances were from two wells:

- BSM115 (a sub-McKay well) had two exceedances of 11 mg/L and 11.7 mg/L; one in 1998 and one in 2008. This well is located 4,000 feet north and up gradient of mining. Exceedances are due to another land use other than mining.
- BSM2515 (sub-McKay well) is a historic well located below the Rosebud coal crop line in the center of Area B. Both samples with exceedances were 10.3 mg/L and 10.4 mg/L in 1987 and 1995. The reason for the elevated concentration is unclear.

As noted above, elevated nitrate-nitrite have been detected in several locations in both the Rosebud and Big Sky mines. None of these instances are considered material damage because they are either within the permit boundary, or are have a likely source other than coal mining. Because the exceedance at WS-100 is near the permit boundary and could potentially be a result of mining, a stipulation in the

approval of AM4 will require expanded monitoring with the expectation that a well will be installed down gradient of WS-100, closer to the permit boundary, to monitor for potential movement of nitrate toward the permit boundary.

9.2.7 Groundwater Flow Models

The AM4 application included two transient groundwater flow models for permit areas A, B, and C to evaluate potential water level changes caused by mining. The "Rosebud Mine Groundwater Model" evaluates the response of the hydrologic system in and adjacent to the mine area at the end of currently approved mining (Western Energy Co., 2014). The "AM4 Model" evaluates the additional impacts that would result from the mining proposed in application AM4. A flow model was constructed for the Area D permit area in July, 1999 (Western Energy Co., 1999). Mining in Area D concluded in 2012.

Areas A, B, and C
The models simulate flow in all of the shallow aquifers (alluvium, overburden, Rosebud coal, interburden, McKay coal and underburden or sub-McKay) but focus on the Rosebud coal and McKay coal as these are the primary shallow aquifers and the ones most likely to show the greatest effects of mining. Groundwater models are a simplification of the geologic and hydrologic system yet provide reasonable predictions of the local hydrologic function and response to the stresses of mining. After the development of a conceptual groundwater model, a model structure is defined and calibrated. The model is calibrated by comparing model results to measured water levels from monitoring wells and adjusting model parameters to achieve the best simulation of groundwater conditions.

The Rosebud Mine Model simulates drawdown in the Rosebud coal and McKay coal in 2011 (**Figure 9-78** and **Figure 9-79**), and at the end of 2020 (**Figure 9-80** and **Figure 9-81**), the year currently approved mining in Area B is expected to conclude. Drawdown in 2011 was predicted to be greatest in the east part of Area B, with 90 feet of drawdown (including decline in pressure head) in the Rosebud coal and 30 feet in the McKay coal. Because it is confined throughout most of the area, drawdown in the McKay generally extends slightly more than in the Rosebud coal, with the 5-foot drawdown contour reaching slightly less than two miles south of the permit boundary. In 2020, the greatest drawdown in Rosebud coal attributable to currently approved mining is predicted to be 80 feet in the southwest as well as the east half of Area B. In the McKay coal, drawdown in Area B is predicted to be approximately the same as in 2011. In both the Rosebud coal and McKay coal, five feet of drawdown is expected to extend up to two miles outside of the south permit boundary.

Rosebud coal in Area A remains largely unchanged in the amount of drawdown between 2011 and 2020, showing approximately 20 feet of drawdown. Likewise, for the McKay coal, there is approximately 20 feet of drawdown in 2011 and 2020. Area C drawdown is 60 feet in the east part of Area C in 2011, 40 feet in the central part, and 30 feet in the western part. By 2020, drawdown associated with approved mining is 70 feet in the east part, 60 feet in the central part and 30 feet in the west part of Area C. The McKay increases in drawdown by about five feet in 2020 to 30 feet.

The AM4 Model predicts drawdown in areas A, B, and C through 2026 (**Figure 9-82** and **Figure 9-83**), when the additional mining proposed in AM4 is expected to conclude. The largest simulated drawdown at the end of the proposed mining is about 110 feet in the Rosebud coal in the east part of Area B, at the south permit boundary. Five feet of drawdown is projected to extend almost two miles south of the Area B permit boundary. The maximum projected drawdown in the McKay coal is 35 feet in the east half

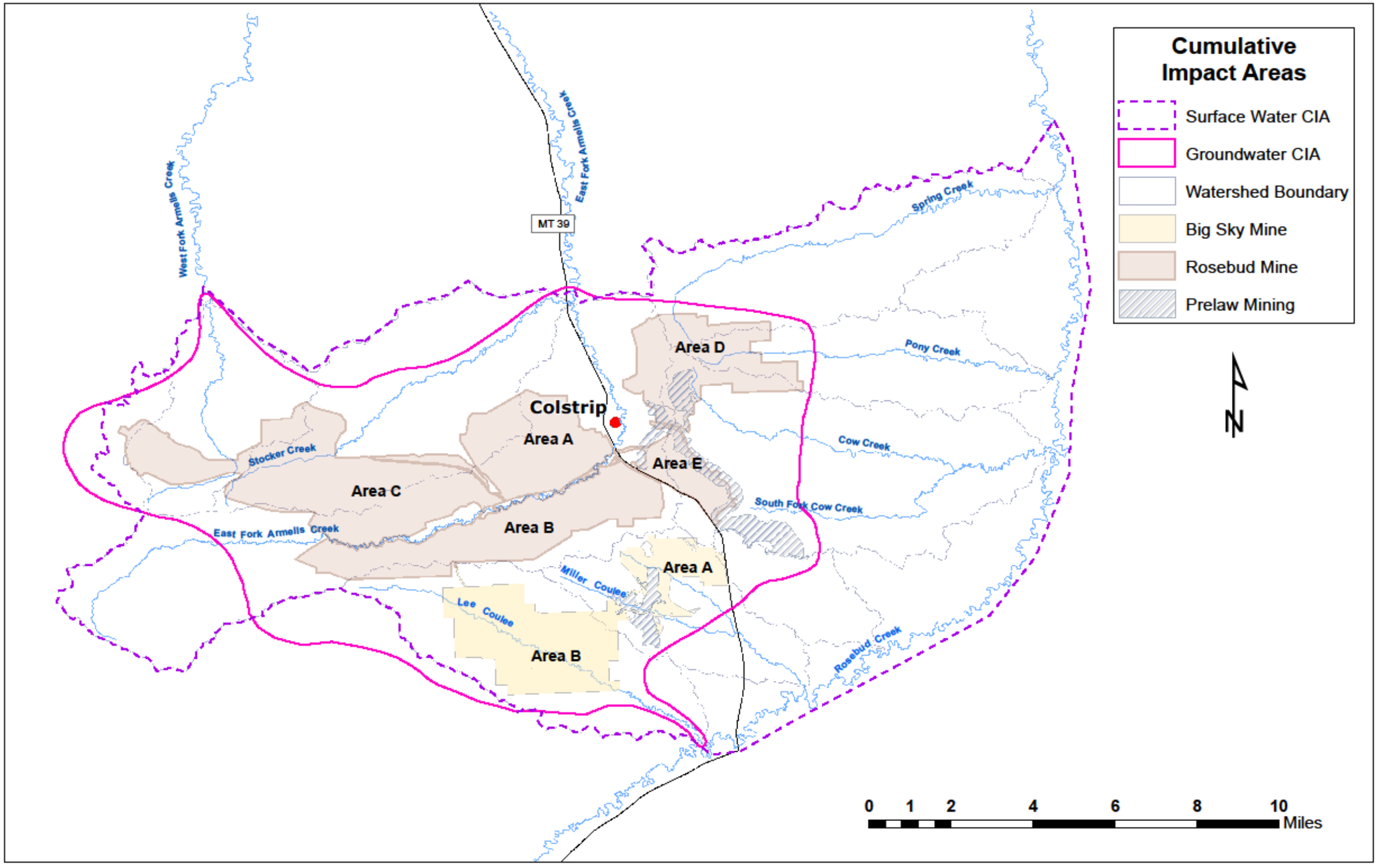
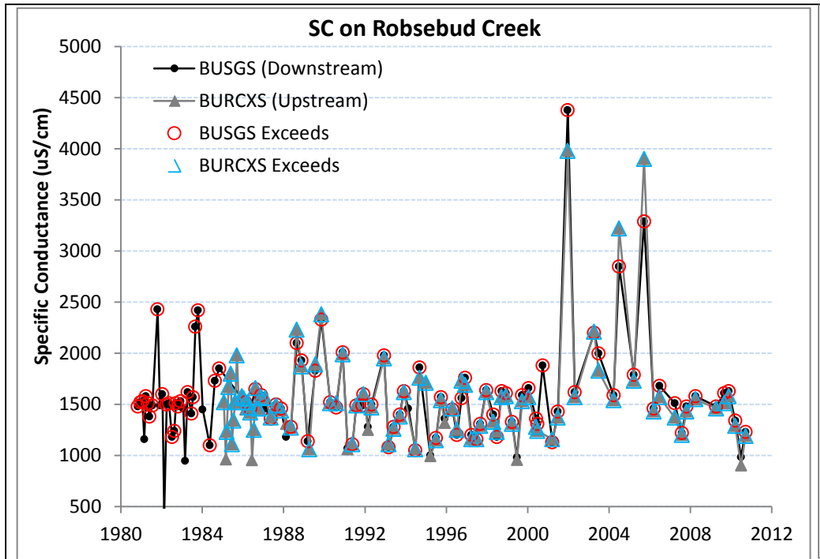
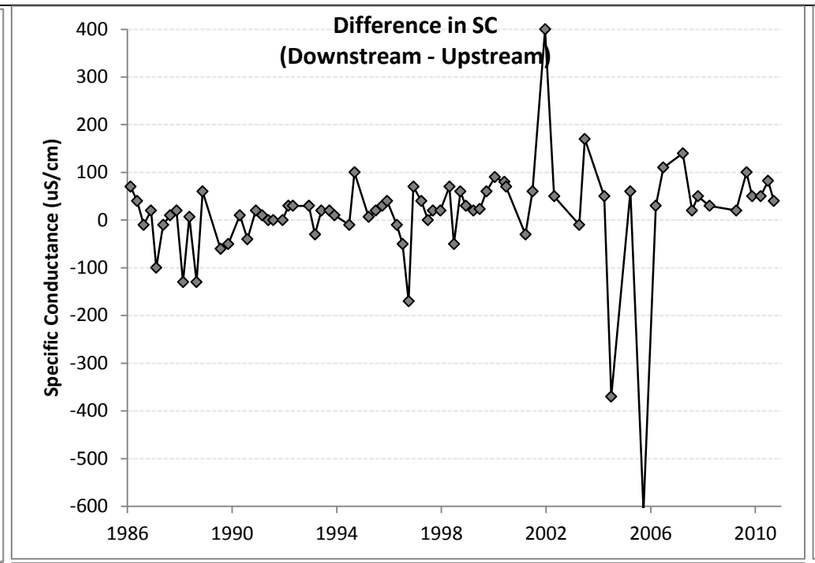
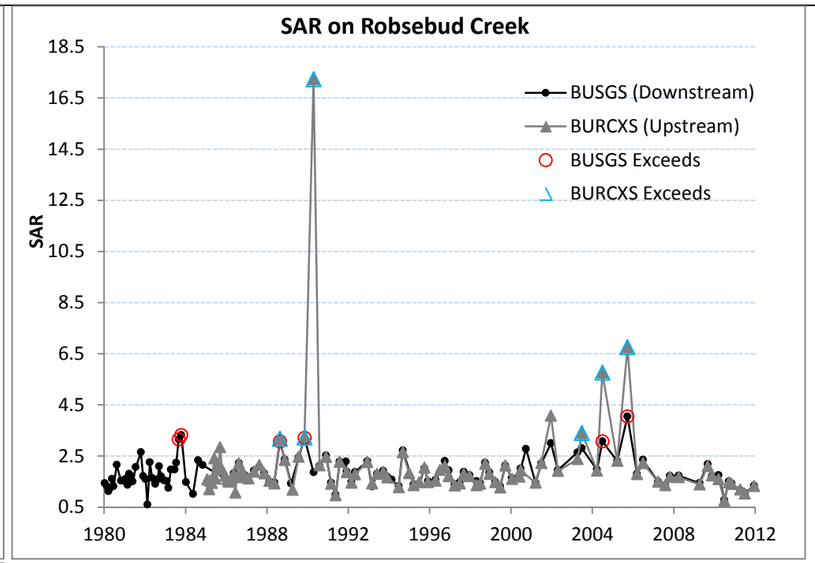
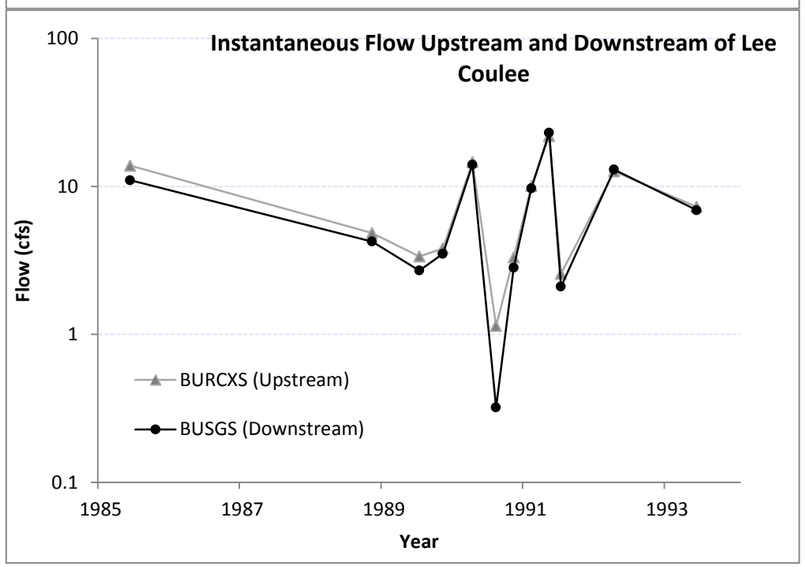


Figure 5-1: Locations and extents of surface water and groundwater cumulative impact boundaries.









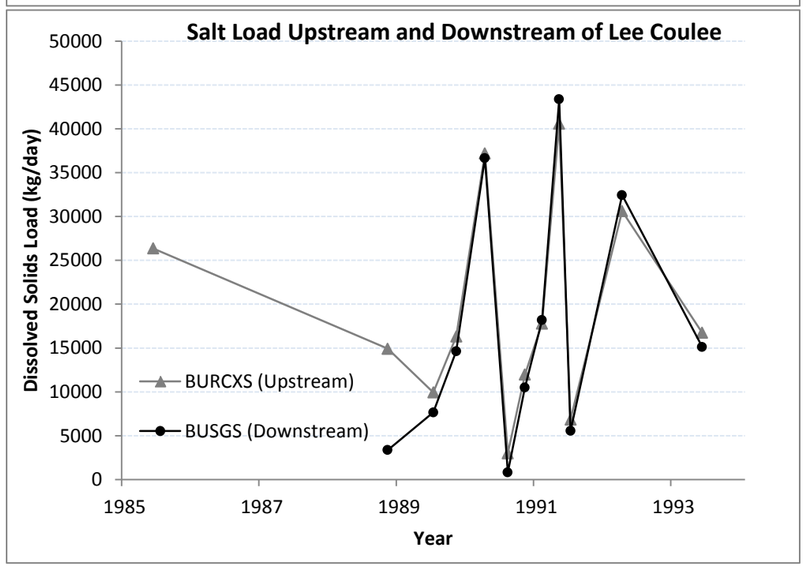


Figure 9-5: SC, TDS, and flow upstream (BURCXS) and downstream (BUSGS) of Lee Coulee on Rosebud Creek and the difference between the two concentrations.
The difference is shown as downstream minus upstream, and consequently positive values indicate that the downstream sample is has a higher Specific Conductance than the upstream sample taken on the same date. Mining started in Lee Coulee in approximately 1989. Exceedances of the monthly average SC (1,500 uS/cm from Nov. through Feb. and 1,000 uS/cm from Mar. through Oct.) and SAR (5 from Nov. through Feb. and 3from Mar. through Oct.) standards are shown in blue and red. Flow measurements taken on the same day indicate that there is a losing reach on Rosebud Creek where Lee Coulee enters.

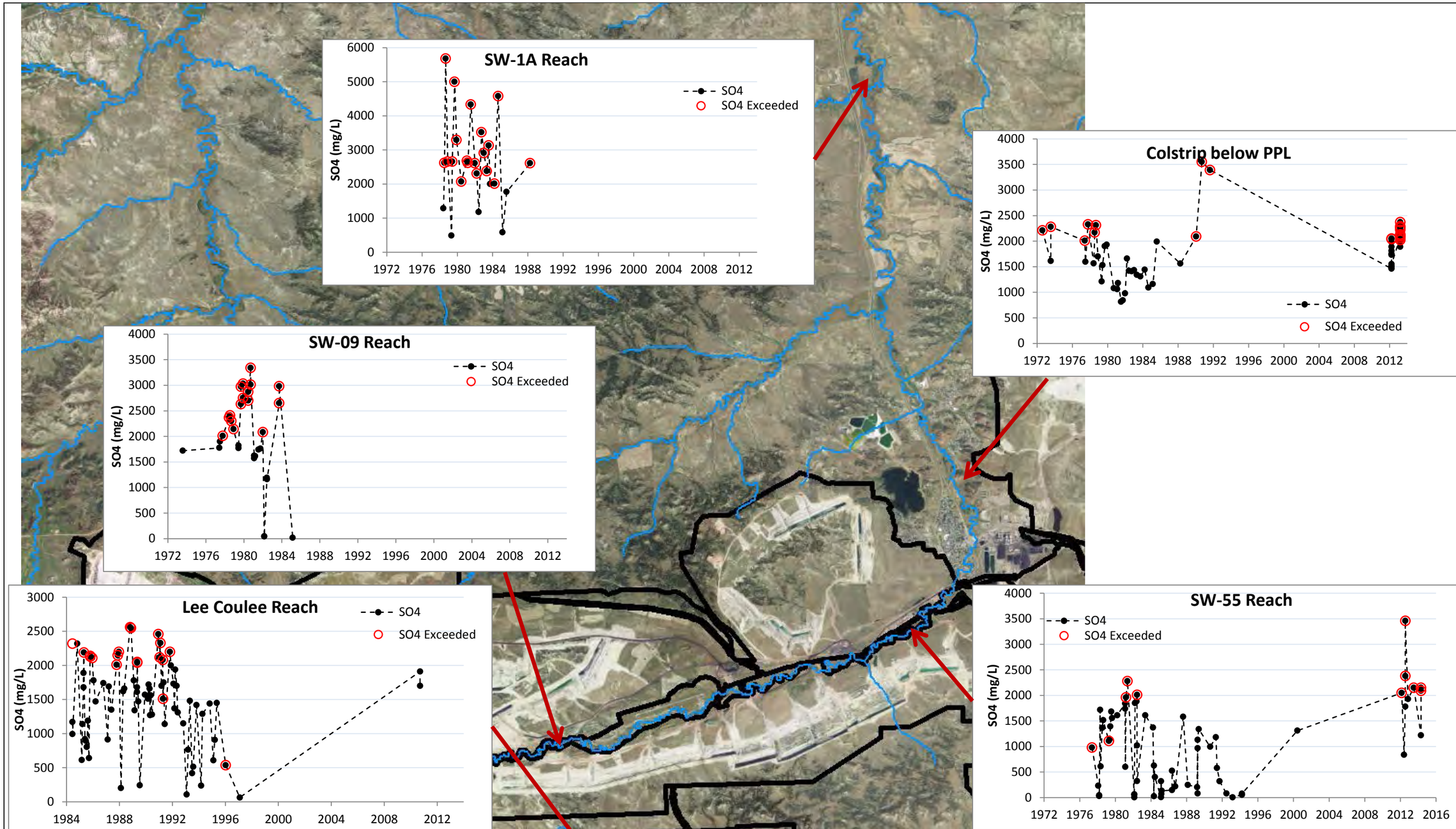


Figure 9-93: Sulfate at intermittent stream reaches along East Fork Armells Creek and Lee Coulee.

Note that the data is a mix of baseflow and runoff domminated events. Low sulfates are indicative of sampling during snow melt events while high sulfates are indicative of sampling during baseflow.

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MONTANA BOARD OF ENVIRONMENTAL REVIEW

MONTANA ENVIRONMENTAL INFORMATION CENTER, and SIERRA CLUB, Petitioner, v. MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY, Respondent.	Case No.: BER 2016-03 SM **RESPONDENT'S RESPONSES TO PETITIONERS' FIRST SET OF REQUESTS FOR ADMISSION, INTERROGATORIES AND REQUESTS FOR PRODUCTION**

Respondent Montana Department of Environmental Quality responds to PETITIONERS' FIRST SET OF REQUIESTS FOR ADMISSION, INTERROGATORIES AND REQUESTS FOR PRODUCTION as follows:

INTERROGATORY NO. 1:

Please identify each person who assisted the answering of these interrogatories.

ANSWER:

The following current employees of DEQ's Industrial and Energy Minerals Bureau: Peter Schade, hydrologist; Martin Van Oort, hydrologist; Melissa Sjolund, technical coordinator/MPDES permit coordinator; Adam McMahon, hydrologist; Robert Smith, permit coordinator; Chris Yde, supervisor, Coal and Uranium Section; Ed Coleman, bureau chief,

Exhibit 5

REQUEST FOR ADMISSION NO. 2:

You are requested to admit that WECo's Area F permit application was pending before DEQ at the time DEQ approved WECo's Amendment AM4 application.

ANSWER: Admit.

REQUEST FOR ADMISSION NO. 3:

You are requested to admit that portions the proposed Area F permit area are within the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4.

ANSWER: DEQ objects to this request for admission to the extent it requires DEQ to characterize the CHIA, a document which speaks for itself. DEQ admits without waiving this objection.

REQUEST FOR ADMISSION NO. 4:

You are requested to admit that DEQ's CHIA for Amendment AM4 did not address any of the potential hydrologic impacts expected from the proposed Area F operation.

ANSWER: DEQ objects to this request for admission to the extent it requires DEQ to characterize the CHIA, a document which speaks for itself. DEQ admits without waiving this objection.

INTERROGATORY NO. 6:

Please state whether any portion of the proposed Area F operation is within the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4.

ANSWER: A portion of the currently proposed Area F operation is within the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4.

INTERROGATORY NO. 7:

Please state whether any hydrologic impacts from the proposed Area F operation may occur within the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4.

ANSWER: Hydrologic impacts from the proposed Area F operation may occur within the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4.

INTERROGATORY NO. 8:

A. Please state whether any person identified in your answers to INTERROGATORY NO. 1, INTERROGATORY NO. 3 or INTERROGATORY NO. 4 has discussed or considered the propriety of considering potential hydrologic impacts from the proposed Area F operation in DEQ's CHIA for Amendment AM4.

B. Please identify any and all documents in which any person identified above in your answers to INTERROGATORY NO. 1, INTERROGATORY NO. 3 or INTERROGATORY NO. 4 discussed or considered the propriety of considering potential hydrologic impacts from the proposed Area F operation in DEQ's CHIA for Amendment AM4.

ANSWER: (A) Yes, it has been discussed internally by DEQ Coal Program staff. (B) No documents exist.

REQUEST FOR PRODUCTION NO. 1:

Please produce any and all documents in DEQ's possession or control identified in your response to INTERROGATORY NO. 8.

RESPONSE: None exist.

REQUEST FOR ADMISSION NO. 8:

You are requested to admit that EC standards from ARM 17.30.670 apply to the following tributaries of Rosebud Creek: Spring Creek, Pony Creek, Cow Creek, South Fork Cow Creek, Emile Coulee, and Lee Coulee.

ANSWER: Admit that the numeric standards for EC contained in ARM 17.30.670(4) apply to the tributaries to Rosebud Creek.

REQUEST FOR ADMISSION NO. 9:

You are requested to admit that a portion of Rosebud Creek is within the cumulative hydrologic impact area identified in the CHIA for Amendment AM4.

ANSWER: Admit.

REQUEST FOR ADMISSION NO. 10:

You are requested to admit that the following tributaries of Rosebud Creek are within the cumulative hydrologic impact area identified in the CHIA for Amendment AM4: Spring Creek, Pony Creek, Cow Creek, South Fork Cow Creek, Emile Coulee, and Lee Coulee.

ANSWER: Admit.

REQUEST FOR ADMISSION NO. 11:

You are requested to admit that DEQ's CHIA for Amendment AM4 did not address whether the cumulative hydrologic impacts of mining and reclamation activities within the cumulative hydrologic impact area would cause violation of EC standards in the following tributaries of Rosebud Creek: Spring Creek, Pony Creek, Cow Creek, South Fork Cow Creek, Emile Coulee, and Lee Coulee.

ANSWER: Deny.

REQUEST FOR ADMISSION NO. 24:

You are requested to admit that pursuant to the review required by section 303(d) of the federal Clean Water Act, 33 U.S.C. § 1313(d), DEQ has determined that coal mining is one source of the pollution causing the lower segment of East Fork Armells Creek to not meet applicable water quality standards for aquatic life.

ANSWER: Deny. The 2014 DEQ Water Quality Standards Attainment Record for lower East Fork Armells Creek (MT42K002_110-Colstrip to the mouth) identifies coal mining as an unconfirmed source of the pollutants. The 2014 DEQ Water Quality Standards Attainment Record lists the confidence in these causes of impairment to aquatic-life-uses as low. This is not a determination that coal mining is a source of this pollution.

INTERROGATORY NO. 18:

Please identify all waters in the cumulative hydrologic impact area identified in DEQ's CHIA for Amendment AM4 that are subject to the nutrient standards in DEQ Circular DEQ-12A.

ANSWER: Perennial and intermittent streams within the cumulative hydrologic impact area are subject to the nutrient standard in DEQ Circular DEQ-12A. West Fork Armells Creek, Stocker Creek, East Fork Armells Creek, unnamed tributaries of East Fork Armells Creek, Spring Creek, Cow Creek, Hay Coulee, Emile Coulee, Lee Coulee, and Rosebud Creek have intermittent or perennial stretches.

INTERROGATORY NO. 19:

Please state whether the nutrient standard for total nitrogen, which includes nitrate + nitrite, from DEQ Circular DEQ-12A that applies to the Class C-3 waters in the cumulative

C. Identify any and all documents in DEQ's possession or control in which such concerns were raised, considered, or discussed.

ANSWER: Yes.

(A) Former employees of DEQ's Industrial and Energy Minerals Bureau: Emily Hinz, hydrologist, now with the Department of Fish, Wildlife, and Parks; and Angela McDannel, hydrologist, retired.

(B) Concerns were raised that potential inputs of additional salinity, sulfate, and chloride to East Fork Armells Creek from the Rosebud Mine may cause material damage to the protected beneficial use aquatic life support for C-3 waters.

(C) See "AM4 Seventh Round Acceptability Deficiency.pdf"

REQUEST FOR PRODUCTION NO. 10:

Please produce any and all documents in DEQ's possession or control that you identified in your response to INTERROGATORY NO. 27.

RESPONSE: None exist.

INTERROGATORY NO. 29:

Please state in detail and with specificity any and all concerns that DEQ personnel have raised about material damage occurring off the Rosebud Mine site that may have been related to the Rosebud Mine.

ANSWER: See answer to Interrogatory No. 28. B.

INTERROGATORY NO. 30:

Please identify any and all documents in DEQ's possession or control in which any individual identified in INTERROGATORY NO. 1, INTERROGATORY NO. 3, or INTERROGATORY NO. 3 discusses the impairment of East Fork Armells Creek, as determined

Montana DEQ - Water Quality Standards Attainment Record

Reporting Cycle: 2014 **Assessment Record:** MT42K002_170.pdf **Status:** Completed

ASSESSMENT UNIT INFORMATION

Reporting Cycle:	2014
Assessment Unit:	MT42K002_170
Waterbody Name:	East Fork Armells Creek
Location Description:	EAST FORK ARMELLS CREEK, headwaters to Colstrip

Water Type:	Size (Miles/Acres)	Use Class:
RIVER	24.67 MILES	C-3

Hydrologic Unit Code:	10100001
HUC Name:	Lower Yellowstone-Sunday
Watershed:	Lower Yellowstone
Basin:	Yellowstone
TMDL Planning Area:	Middle Yellowstone Tributaries
Ecoregion:	Northwestern Great Plains
County:	BIG HORN CO, ROSEBUD CO
Lat/Long AU Start (U/S):	45.813191 / -106.881882
Lat/Long AU End (D/S):	45.886051 / -106.622164

MONITORING INFORMATION

Date Assessment Started: 03/30/2006 **Assessed By:** Stermitz, Mike

Next Scheduled Monitoring Date:

Data Type	Comments	Catalog Number	Citation
	Carbonate=<1.0 mg/L; Sulfate=1722 mg/L; Alkalinity=479 mg/L; Total Hardness as CaCO3=1759 mg/L; SAR=2.39.		
major nutrients	1973: Water hole approx. 2 mi. above town: Nitrate as N= 0 mg/L. Approx. 5 mi. above town: Nitrate as N= 0.97 mg/L.	Common.General.WEB	Montana Bureau of Mines and Geology (nnnn), GWIC Data from http://mbmggwic.mtech.edu/
quantitative physical data	A 40% increase in TDS in the alluvial aquifer observed upstream of Colstrip appears to be directly associated with mining activity.	Yellowstone.Lower Yellowstone-Sunday.DR8	Erbes, Dan (1998), Montana Dept. of Environmental Quality Letter to Office of Surface Mining and Reclaimation
quantitative physical data	1980, 1985: Pond approx. 2 mi. above hwy 39 sampled twice in 1980: Calculated TDS = 2866 and 1725 mg/L. 1985, approx. 5 mi. above town: Flow= 0.22 cfs; Temp= 13.5 °C.	Common.General.0609	Berscheid, Jolene (2006), STORET/Storease Data Archive [Electronic Resource]
quantitative physical data	1973: Water hole approx. 2 mi. above town: TDS= 962 mg/L. Approx. 5 mi. above town: Calculated dissolved solid= 2732.62 mg/L.	Common.General.WEB	Montana Bureau of Mines and Geology (nnnn), GWIC Data from http://mbmggwic.mtech.edu/

ASSESSMENT HISTORY

Cycle 2006

1996 - Listed as partially supporting aquatic life, swimmable, and warm water fishery. The causes were nutrients and suspended solids. The sources were agriculture and range land. Listed for assessment in 2004 due to insufficient credible data.

Cycle 2008

Not assessed this cycle

Cycle 2010

Not assessed this cycle

Cycle 2012

Not assessed this cycle

Cycle 2014

Removed 2B category during 2014 cycle.

Overall Condition of Segment

This segment is ephemeral. Water begins to surface in the channel near highway 93. The stream did not run continually from the top to bottom in spring 2005, despite the heavy rains. Some outdated water chemistry data is available from a pond, a "water hole", and an upstream site. Either the upstream site has dried up since then or the sample was taken after a rain event. The samples are of little use, although there was nothing to indicate impairment. The stream was assessed in 2004. The entire reach was dry with the exception of a human-induced pond in the lower segment. This water is backed up behind a bermed road crossing with no culvert. There are several dikes and road crossings in the reach with no ponded water, and the area is currently being mined for coal. At least 2 huge open pits are located near the channel, and a mine employee said one pit crossed the channel. DEQ employees were unable to confirm this, despite accessing almost the entire stream. 2005 aerial photos show the mine enroaching upon, but not entering the stream channel. At least one observed part of the stream was once obliterated by the mine, but has been reclaimed. As the mine is expanding and moving, it is reasonable to assume the mine will continue to impact the stream channel.

Grazing is occurring throughout the reach with little impact. The riparian vegetation is mostly grasses and shrubs. Trees are generally missing, but are not required for sustainability. It is not known if this stream was intermittent prior to mining activities, which began in the 1920's. Mining activity has, at a minimum, moderately impaired the habitat in this segment. This segment should remain listed until mining activity has ceased, and the entire drainage is reclaimed. DEQ protocol requires ephemeral streams only to be assessed for habitat. Because the habitat is impaired, aquatic life is partially supporting, despite the fact the stream is ephemeral. There is insufficient information to evaluate the warm water fishery beneficial use; it does not support the use likely due to natural conditions (category 5N).

Other: There is very little useful data available in this reach for suspended solids. The habitat is impaired from overall mining activity, but there were no sources identified in the 2005 assessment for suspended solids. It appears that TSS was listed in 1996 before the stream was separated into two reaches. Almost all of the historical data is from the lower segment which, unlike the upper segment, is not ephemeral. There is "good cause" for delisting suspended solids as a cause of impairment in this segment.

Reporting Cycle: 2014 **Assessment Record:** MT42K002_170.pdf **Status:** Completed

USE SUPPORT DECISION

Use Class C-3

Trophic Status: **Trophic Trend:**

Uses	DQA	Method, Data, and Information Used	Assessment Type and Confidence	Use Support	Partial Flag	Use Support Certainty	Threatened
Aquatic Life		110, 240, 310, 375, 860	HABITAT-GOOD, PHYSICAL/CHEMICAL-LOW	Not Supporting	Yes	High	No
Primary Contact Recreation		110, 310, 375	BIOLOGICAL-FAIR, HABITAT-FAIR, PHYSICAL/CHEMICAL-FAIR	Fully Supporting	No	High	No

Method Number and Description

110-Information from local residents
240-Non-fixed station physical/chemical (conventional + toxicants)
310-Ecological/habitat surveys
375-Visual observation, may not quantify some parameters; single season; by prof.
860-Other Agencies/Organizations provided monitoring data

Reporting Cycle: 2014 **Assessment Record:** MT42K002_170.pdf **Status:** Completed

IMPAIRMENT INFORMATION

Uses	Cause (Confidence): Source(Confirmed)	Observed Effects
Aquatic Life	84 (Medium): 127 (N)	
Primary Contact Recreation		

Cause Number and Description	Source Number and Description	Observed Effect Number and Description
84-Alteration in stream-side or littoral vegetative covers	127-Surface Mining	

DELISTINGS

Cause	Delisting Reason	Delisting Date

Montana DEQ - Water Quality Standards Attainment Record

Reporting Cycle: 2014 **Assessment Record:** MT42K002_110.pdf **Status:** Unassigned

ASSESSMENT UNIT INFORMATION

Reporting Cycle:	2014
Assessment Unit:	MT42K002_110
Waterbody Name:	East Fork Armells Creek
Location Description:	EAST FORK ARMELLS CREEK, Colstrip to mouth (Armells Creek)

Water Type:	**Size (Miles/Acres)**	**Use Class:**
RIVER	32.36 MILES	C-3

Hydrologic Unit Code:	10100001
HUC Name:	Lower Yellowstone-Sunday
Watershed:	Lower Yellowstone
Basin:	Yellowstone
TMDL Planning Area:	Middle Yellowstone Tributaries
Ecoregion:	Northwestern Great Plains
County:	ROSEBUD CO
Lat/Long AU Start (U/S):	45.886051 / -106.622164
Lat/Long AU End (D/S):	46.092603 / -106.761847

MONITORING INFORMATION

Date Assessment Started: 03/28/2008 **Assessed By:** Stermitz, Mike

Next Scheduled Monitoring Date:

Data Type	Comments	Catalog Number	Citation
	Sulfate=3440 mg/L; Alkalinity=536 mg/L; Total Hardness as CaCO3=3020 mg/L; SAR=4.3.		
major nutrients	Lower: NO2+NO3= 0.009 mg/L; TKN=1.06 mg/L; TP=0.029 mg/L. Middle: NO2+NO3= 0.012 mg/L; TKN=0.97 mg/L; TP=0.018 mg/L.	Common.General.DR8	(2005), DEQ Field Assessment Form
metals	No standards exceedences at either site.	Common.General.DR8	(2005), DEQ Field Assessment Form
quantitative physical data	Lower, 6/5/05: Flow=1.25 cfs; Temp=18.43°C; SC=4757 µmho/cm; DO=4.15 mg/L; turbidity=turbid; TSS=10.3 mg/L; Substrate: 100% silt. Middle, 6/7/05: Flow= 2.44 cfs; Temp=18.54°C; SC=4594 µmho/cm; DO=9.20 mg/L; turbidity=clear; TSS=11.5 mg/L; Substrate: 100% silt.	Common.General.DR8	(2005), DEQ Field Assessment Form

ASSESSMENT HISTORY

Cycle 2006

1996- 19 miles listed as partially supporting agriculture, aquatic life, swimmable, and warm water fishery. The causes were nutrients, salinity/TDS/chlorides, and suspended solids. The sources were agriculture, natural sources, and range land. Listed for assessment in 2004 due to insufficient credible data.

Cycle 2008

Not assessed this cycle

Cycle 2010

Not assessed this cycle

Cycle 2012

TKN listing is being changed to a TN listing

Reporting Cycle: 2014 **Assessment Record:** MT42K002_110.pdf **Status:** Unassigned

Cycle 2014

Not assessed this cycle

Overall Condition of Segment

Biology: 1 site was sampled in 2001, and 2 fish were captured. Macroinvertebrates were sampled at 3 sites in 2005. At the lower site, too few animals were collected apply matrices. Of those collected, a tolerant dragonfly was dominant, and heavy macrophyte growth was suggested. The middle and upper sites indicated poor and very poor biotic communities, respectivly. Blackfly larvae made up 52% of the middle site, while midges made up 44% of the upper site. Nutrient enrichment was suggested at both sites. The chlorophyll a value at all 3 sites was below criteria. Habitat: The banks are stable vertically and horizontally. Very little active erosion was noted in 1979 and 2005 assessments. The banks are well-vegetated with deep rooted grasses, and cattail stands are common. Trees are generally lacking, but are not required for sustainability. The substrate is 100% silt. Some channel disturbance was noted through town (culverts, rip rap, a golf course) but not enough to impact the overall impairment level. With the exception of "water logging" (see physical/chemical), the habitat is only slightly impaired.
Physical/Chemical: East Fork Armells is typical of most streams in this region. The water is very hard, saline, and high in sulfates. Where TSS data was available (2005), concentrations were low. Mining activities (including water pumped from the Yellowstone River to seeping ponds) likely have contributed to increased TDS concentrations and "water logging" below Colstrip. DEQ correspondence in 1998 estimated a 50% increase in TDS concentrations in the EFAC alluvium from 1977 to 1997. Water logging may not currently be occurring. The elevated SC concentrations make this water unsuitable for irrigation under ordinary circumstances. This water is acceptable for use with livestock accustomed to its use, but is not recommended for pregnant or lactating cows. Data from the 1970's show that NO2+NO3 regularly exceeded criteria, although this was not the case in 2005.
In 2005, TKN at the lower site moderately exceeded the contact recreation criteria, and slightly exceeded the aquatic life criteria. At the middle site, contact recreation and aquatic life criteria were slightly exceeded. The most reliable metals data is from the 2005 assessment, which showed no exceedences.
Other: TSS does not appear to be an accurate cause of impairment. The macroinvertebrate samples, field observations, and historical and 2005 water chemistry data indicate that nutrients may be a source of impairment. The SC values do not appear to be vastly different from other drainages in the region; however, the probable impact from municipal sources and industrial pond seepage cannot be ignored. The past and present impacts from changes in groundwater chemistry, surface flow, and atmospheric deposition merits further investigation. Salinity/TDS/chlorides will remain a cause of impairment.

Reporting Cycle: 2014 **Assessment Record:** MT42K002_110.pdf **Status:** Unassigned

USE SUPPORT DECISION

Use Class C-3

Trophic Status: **Trophic Trend:**

Uses	DQA	Method, Data, and Information Used	Assessment Type and Confidence	Use Support	Partial Flag	Use Support Certainty	Threatened
Aquatic Life		110, 120, 240, 310, 320, 375, 860	BIOLOGICAL-FAIR, HABITAT-GOOD, PHYSICAL/CHEMICAL-GOOD	Not Supporting	Yes	Low	No
Primary Contact Recreation		240, 860	BIOLOGICAL-FAIR, HABITAT-FAIR, PHYSICAL/CHEMICAL-FAIR	Fully Supporting	No	High	No

Method Number and Description

110-Information from local residents
120-Surveys of fish and game biologists/other professionals
240-Non-fixed station physical/chemical (conventional + toxicants)
310-Ecological/habitat surveys
320-Benthic macroinvertebrate surveys
375-Visual observation, may not quantify some parameters; single season; by prof.
860-Other Agencies/Organizations provided monitoring data

Reporting Cycle: 2014 **Assessment Record:** MT42K002_110.pdf **Status:** Unassigned

IMPAIRMENT INFORMATION

Uses	Cause (Confidence): Source(Confirmed)	Observed Effects
Aquatic Life	379 (Low): 152 (N), 165 (N) 399 (Low): 152 (N), 165 (N) 456 (Low): 156 (N) 458 (Low): 156 (N)	
Primary Contact Recreation		

Cause Number and Description	Source Number and Description	Observed Effect Number and Description
379-Specific Conductance 399-Total Dissolved Solids 456-Nitrate/Nitrite (Nitrite + Nitrate as N) 458-Nitrogen (Total)	152-Transfer of Water from an Outside Watershed 156-Agriculture 165-Coal Mining	

DELISTINGS

Cause	Delisting Reason	Delisting Date
Total Kjehldahl Nitrogen (TKN)	Data and/or information lacking to determine water quality status; original basis for listing was incorrect (Category 3)	11/10/2011

Reporting Cycle: 2014 **Assessment Record:** MT42K002_110.pdf **Status:** Unassigned

CATEGORY INFORMATION

Previous Cycle

Cycle	2012
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A

Current Cycle

Cycle	2014
Category	5 - Waters where one or more applicable beneficial uses have been assessed as being impaired or threatened, and a TMDL is required to address the factors causing the impairment or threat.
User Defined Category	N/A

Area B AM4 Permit C1984003B

Comprehensive Evaluation of Probable Hydrologic Consequences Areas A, B and C Western Energy Rosebud Mine

Prepared for

WESTERN ENERGY COMPANY – *Rosebud Mine*
A Subsidiary of WESTMORELAND COAL COMPANY
PO Box 99 Rosebud Lane Colstrip, MT 59323 (406) 748 5100

Prepared by:

Nicklin Earth & Water
670 S Ferguson Ave, Suite 1
Bozeman, MT 59718
406.582.0413

January, 2014

Exhibit 8

equilibrate to near pre-mine water table conditions.

During mining, some tributary surface flow is retained to manage water quality. Runoff from disturbed lands is retained in mine pits, sediment ponds and traps. The retention of this runoff impacts the infiltration of water from channels, such as the East Fork Armells Creek (EFAC), to the underlying alluvial aquifer. Some of the retained water infiltrates from sediment ponds located near the alluvium and recharges the alluvial aquifer. Runoff flows from areas up-gradient of mining and from undisturbed lands continue to recharge the alluvial aquifer.

Following mining and reclamation, the function of ephemeral runoff is restored to mimic the premine conditions and the postmine contribution of runoff to alluvial aquifers should be similar to premine conditions

Groundwater Quality

Groundwater quality, within the mine area, will be impacted. This has been the subject of considerable study throughout the Powder River Basin and elsewhere (Van Voast and others 1975, 1977, 1978, and 1988). TDS concentrations in backfill aquifers generally are greater than in the coal aquifers they replaced. Resaturation of backfill, primarily by lateral groundwater flow from the undisturbed coal aquifers, can be expected to result in temporary increases in TDS concentrations as a result of elevated levels of soluble salts, (primarily calcium, magnesium, sodium and sulfate) leached from the overburden. According to Van Voast and Reiten (1988), average TDS concentrations of groundwater in mine spoils in Decker area mines are 50 to 200 percent higher than the concentrations in the undisturbed coal aquifers. Locally, TDS values may be even higher. Similar geochemical conditions have also been simulated in the laboratory with bench scale column-leach and paste-extract leaching tests using overburden materials representative of those to be disturbed by mining at specific mines. Generally, the dissolved-solids concentrations in the backfill water reach a maximum during initial saturation and then decrease to an equilibrium level after one or more pore volumes of water pass through the backfill. A study suggests that dissolved-solids concentrations may decrease as water moves from the backfill into the un-mined, down-gradient coal (Clark 1995).

As re-saturation of the backfill continues, salt concentrations are expected to be extremely variable and peak at a concentration potentially two to three times that of the

baseline coal groundwater and then decline to some equilibrium value after being flushed by one or more pore volumes of groundwater. The impacts of mining will likely result in deterioration of groundwater quality within some areas of the mine backfill to a degree that will require at least temporary reclassification of the groundwater to a lower usage class.

1.4 Mining Progression

1.4.1 Present Mining Situation

Mining has occurred at the Rosebud Mine since 1975. Active mining at Rosebud Mine is presently occurring in Areas A, B and C. Figure 3B depicts the current permitted mining at Areas A, B and C.

Mining at Rosebud consists of a combination of topsoil removal, overburden removal, and coal removal. Topsoil is salvaged with appropriate mining equipment prior to overburden removal and stockpiled as necessary or hauled directly to regraded areas. Overburden is moved by the dragline and the coal is removed by means of a truck and loader operation.

1.4.2 Area B AM4 (Amendment Application 00184) Mining

The additional proposed mining under this application is shown on Figure 3A. This application provides for the proposed mining to occur from 2013 to 2026

1.4.3 Potential Future Mining

Additional potential future mining (See Figure 3A) includes:

- Application Area B-East AM4 Application 00184

Meeting Notes
Conference Call

To: Daniel Munoz

From: Dicki Peterson

cc: Kent Salitros, Wade Steere, Mike Kegley, John Martin, Penny Hunter, Ben Latham, Dwayne Siler, Michael Nicklin, Stephanie Vandaele

Date: June 13, 2014

Re: Application 00184 (AM 4) – 7th Round deficiency

Discussion on which direction WECo should response to the 7th round of deficiencies, received on June 3, 2014, pertaining to the Area B-East Amendment. Chris Yde with MDEQ has requested a face to face meeting to discuss the deficiencies one on one. (planned for July 7, 2014)

Aquatic Studies –

The big question "is there aquatic life in Armell's Creek?"

Items were discussed which are written into the "IMPACT ON THE PHYSICAL ENVIRONMENT" and the "FACT SHEET FOR MAJOR MODIFICATION" sections, of the Environmental Assessment of the Rosebud Mine's Draft MPDES Permit MT0023965. These items may have basis in which WECo has grounds not to conduct aquatic studies.

"IMPACT ON THE PHYSICAL ENVIRONMENT" section

Resource	[Y/N] Potential Impacts and Mitigation Measures
2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?	[N] All direct receiving waters are ephemeral streams that flow as a result of precipitation. Discharges to receiving waters are infrequent, short in duration, and typically occur as a result of runoff that exceeds the 10-yr, 24-hr precipitation event. All effluent imitations and monitoring requirements in the modified 2012 permit are either equal to or more stringent than those in the previous (I999) permit. Self-monitoring requirements of discharges have been increased substantially to assure compliance with permit conditions and to track levels of pollutants of concern.
5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by imp0l1ant wildlife, birds or fish?	[N] No impacts anticipated from modification of MPDES permit.

Exhibit 9

waters resulting from a new or increased point source discharge are allowed. Receiving waters for the discharges from the facility have not been designated as outstanding resources waters. Therefore this regulation is not applicable.

Proposed Water Quality-based Effluent Limits
The receiving waters are within the Yellowstone River drainage between the Billings water supply intake and the North Dakota state line, and are classified as C-3. ARM 17.30.629 establishes the designated beneficial uses for C-3 waters and prescribes the standards to protect those designated uses. However, all permitted outfalls discharge to receiving waters that hydrologically meet the definition of ephemeral [ARM 17.30.602(12)]. ARM 17 .30.637(4) is specific to ephemeral streams of all classes and prescribes the standards applicable to protect the uses of hydrologically ephemeral streams. Pursuant to ARM 17.30.637(4), the applicable water quality standards for hydrologically ephemeral streams include the prohibitions and treatment requirements in ARM 17.30.637. Therefore, the prohibitions and treatment requirements applicable to ephemeral streams in ARM 17.30.637 will apply to the permitted discharges in addition to the applicable technology based effluent limits.

The specific water quality standards for C-3 waters found in ARM 17.30.629 do not apply to ephemeral streams pursuant to ARM 17.30.637(4). Therefore, evaluation of reasonable potential to exceed the numeric standards in DEQ-7, as adopted by ARM 17.30.629, is unnecessary.

The resulting effluent limitations are summarized in Tables 3 through 9.

Also discussed: Aquatic life studies compare themselves to themselves
Aquatic life studies should be on a regular basis
Aquatic life studies are climatic in nature

John Martin summarized his meeting with John North (MDEQ) and Dana David (MDEQ) in May 2014.

- He feels that MDEQ are trying to do the right thing
- Accessing the cumulative impacts – concerned there is material damage off the mine site and what mitigation would be used if necessary.
- Chlorine issue

Other Discussions -

- Chlorine issue - secondary standard which is aquatic life standards basis. No other livestock or wildlife basis.
- SW-75 and SW-55 are in-conclusive in nature – water quality is subjective at best
- Comparison of well vs SW site?
- Possibly drill another well?
- Water Budget – Michael Nicklin stated the preliminary work for the water budget shouldn't be adverse to the mine and the "Van Voast" evaluation was reasonable.
- Lignin Sulfate – not much information out there on how the substance breaks down – organic – tree sap – MSDS….
- TDS – specifically addressed in detail in the PHC.

Conclusions –

Draft responses should have technical and scientific data clearly demonstrating our view points

- Penny Hunter will write something up for the aquatic study response. Dicki will forward the aquatic studies to Penny.
- Wade will follow up with Michael Nicklin on the water budget.
- Dicki will follow up and find information on the lignin sulfonate.

Exhibit 9

Aquatic Study Review

Penny Hunter

September 21, 2015

The world's leading sustainability consultancy

ERM

Exhibit 10

Conclusions and Recommendations

- The large amount of variability inherent within ephemeral systems, and the low quality of habitat and benthic communities, would not provide a strong indicator of water quality impacts due to mining activity.
  - Flow and natural levels of organic matter are more likely to drive aquatic community dynamic than other factors

- Although EFAC supports aquatic life, aquatic life criteria are not met.
  - Baseline conditions are a better indicator of existing use
  - Criteria are based on different organisms not present in EFAC
- Aquatic life monitoring will likely demonstrate natural variability; unlikely to demonstrate impacts from mining

ERM

Exhibit 10

Written Findings

Prepared by:

Montana Department of State Lands

for

Big Sky Mine
Lee Coulee, Area B

Peabody Coal Company

Rosebud County, Montana

Pursuant to Montana's

Strip and Underground Mine Reclamation Act

November 1988

Exhibit 13

227(3)(a), MCA). The following is a summary of the Department's assessment:

The proposed mining is contained entirely within the Lee Coulee drainage, a minor tributary (20.61 square miles or about 1.6 percent) of Rosebud Creek (1302 square miles). Peabody's Big Sky Mine (Area A) to the northeast of Lee Coulee will include 1699 acres of disturbance by the upcoming completion of permitted mining (see SMP 83004CR). Total permitted area for the Lee Coulee (Area B) proposal would be 5436 acres, of which 3247 would be disturbed by mining (including the mined area, the area upon which spoil is to be deposited and graded, and where final highwalls will be reduced; see Exhibits 12-2, 20-2 and Figure 20-2, Peabody Coal Company Area B Application, 1988). The proposed disturbance represents 33 percent of the upper Lee Coulee drainage (9849 acres above Schmidt's Ditch, the lower limit of mining) and 25 percent of the total Lee Coulee drainage area. The probable hydrologic impacts to the surface water system within the permit area are summarized above (Evaluation of Compliance). Minor impacts are predicted for the surface water system outside the permit area (DEIS, MDSL/OSMRE 1988). This includes an approximate 2 percent increase in TDS at the mouth of Rosebud Creek (based on average annual flow) which could be somewhat higher during low flow months or years.

Impacts are expected to the coal, overburden and alluvial aquifers within the permit area. Average TDS increase in the spoil aquifer is predicted to be 2.3 times the pre-mine values, at a maximum, for the disturbed aquifers. The impact to the Rosebud Creek alluvial aquifer outside the permit area is predicted to be an 11 percent rise in TDS (Draft EIS MDSL/OSMRE, 1988). This increase in TDS may affect land management practices, or cause impacts outside the permit area where the local water table is very near to the surface; existing subirrigated areas consist largely of deep-rooted alfalfa and for this reason, impacts to existing beneficial uses are expected to be minimal.

The upper Rosebud Creek drainage, above the USGS gauge near Colstrip (one mile below the mouth of Lee Coulee), contains approximately 799 square miles (511,360 acres). Of this, approximately 9,800 acres will eventually be disturbed as a result of previous, existing and proposed mining plans. This includes: Peabody Areas A (1699 acres) and B (3247 acres); Western Energy (WECO) Area B Extension (195 acres on the upper Lee Coulee/East Fork Armells Creek divide), part of Area D West and all of Area D East (approximately 2530 acres), Areas E and E Extension (1086 acres), and Pit 6 (approximately 700 acres). The total disturbed area represents approximately 1.2 percent of the total Rosebud drainage, and the Lee Coulee disturbance represents about 0.6 percent of the upper Rosebud Creek drainage.

6. No structures currently exist in Area B. Peabody will construct minor facilities, i.e., mine office and fuel storage to help facilitate the operation. Other mine facilities are contained in Area A, which is under permit and in compliance with 82-4-222(2)(i), MCA, and pursuant regulations. The facilities in Area A will be used to support mining operations in Area B.

Exhibit 13

John F. North
Rebecca A. Convery
Montana Department of Environmental Quality
1520 East Sixth Ave.
Helena, Montana 59601—0901
(406) 444-2018
(406) 444-6347
jnorth@mt.gov
rconvery@mt.gov

Attorneys for Respondent Department of Environmental Quality

MONTANA BOARD OF ENVIRONMENTAL REVIEW

IN THE MATTER OF: **APPEAL AMENDMENT AM4 WESTERN ENERGY COMPANY ROSEBUD STRIP MINE AREA B, PERMIT NO. C1984003B**	Case No.: BER 2016-03 SM RESPONDENT'S RESPONSES TO PETITIONER'S SECOND SET OF REQUESTS FOR ADMISSION, INTERROGATORIES AND REQUESTS FOR PRODUCTION

Respondent, Department of Environmental Quality ("DEQ") responds to PETITIONER'S SECOND SET OF REQUESTS FOR ADMISSION, INTERROGATORIES AND REQUESTS FOR PRODUCTION as follows:

DISCOVERY REQUESTS

REQUEST FOR ADMISSION NO. 44: You are requested to admit that proposed Area F operations will impact water quality and water quantity in the Rosebud Coal seam. If your answer is anything other than an unqualified admission, please state in detail the basis for your answer.

ANSWER: DEQ objects to this discovery request as argumentative to the extent that it requires the assumption that the deficiencies identified by DEQ in WECO's Area F application

Exhibit 16

REQUEST FOR ADMISSION NO. 58: You are requested to admit that there are wadeable streams within the cumulative hydrologic impact area identified in the CHIA. If your answer is anything other than an unqualified admission, please state in detail the basis for your answer.

ANSWER: DEQ admits that Rosebud Creek is a wadeable stream within the CIA identified in the CHIA, and that there are additional stream reaches that are wadeable, but not entire streams other than Rosebud Creek.

INTERROGATORY NO. 34: Please identify any and all streams or stream segments within in the cumulative hydrologic impact area that are wadeable.

ANSWER: DEQ objects to this discovery request on the grounds that is compound and that Petitioner has already propounded the maximum number of 50 interrogatories, including subparts, allowed under Rule 33, Mont. R. Civ. P. DEQ further objects to this discovery request as overly burdensome and oppressive to the extent that it requires DEQ to compile a list or summarize information provided in the CHIA. Without waving its objections, DEQ answers this discovery request as follows: West Fork Armells Creek, Stocker Creek, East Fork Armells Creek, unnamed tributaries of East Fork Armells Creek, Spring Creek, Cow Creek, Hay Coulee, Emile Coulee, Lee Coulee, and Rosebud Creek may contain perennial or intermittent reaches which are wadeable streams. Only Rosebud Creek is wadeable for its entire reach. The remaining streams listed are mostly non-wadeable, with short intermittent/perennial reaches that are wadeable.

REQUEST FOR ADMISSION NO. 59: You are requested to admit that East Fork Armells Creek upstream of Colstrip is impaired and not meeting water quality standards. If your

However, Penney Hunter's conclusion that "aquatic life criteria are not met" is based on data from the 1970s and therefore is not relevant to today's conditions. In order to determine whether aquatic life criteria are currently met, DEQ should conduct an evaluation using the most recent data as well as the most recent methodologies for evaluating this data.

REQUEST FOR ADMISSION NO. 62: You are requested to admit that operations of the Rosebud Mine are contributing to the impairment of East Fork Armells Creek. If your answer is anything other than an unqualified admission, please state in detail the basis for your answer.

ANSWER: DEQ objects to this discovery request as vague and ambiguous. DEQ further objects to this discovery request as unreasonably duplicative of the information requested in RFA No. 24. Without waving its objections, DEQ respectfully refers to and reiterates its answer to RFA No. 24.

INTERROGATORY NO. 36: Your response to INTERROGATORY NO. 28(B) states that "concerns were raised that potential inputs of additional salinity, sulfate, and chloride to EFAC from the Rosebud Mine may cause material damage to the protected beneficial use of aquatic life support for C-3 waters." Please state whether DEQ employees believed that these pollutants were contemporaneously causing material damage in East Fork Armells Creek.

ANSWER: DEQ objects to this discovery request on the grounds that Petitioner has already propounded the maximum number of 50 interrogatories, including subparts, allowed under Rule 33, Mont. R. Civ. P. Without waving its objections, DEQ answers this discovery request as follows: Any concerns that were identified in DEQ's answer to INTERROGATORY NO. 28(A)-(C) were adequately addressed by WECo, and DEQ ultimately concluded, as stated in the CHIA, that there would be no material damage to EFAC as a result of the Area B AM4 mining operations.

May 3, 2013

Ms. Dicki Peterson
Western Energy Company
Rosebud Coal Mine Area B
P.O. Box 99
138 Rosebud Lane
Colstrip, MT 59323-0099

Permit ID: C1984003B
Subject: PHC for AM4 (Amendment Application 184)

Dear Dicki :

Per your request, this letter summarizes the outcome of our phone conversation Tuesday morning (April 30, 2013) between DEQ staff, Western Energy staff, and your hydrology consultant, Michael Nicklin, regarding the PHC necessary to complete review of AM4 (Amendment Application 184).

The PHC needs to comprehensive for areas A, B, and C. The PHC should include analysis of potential hydrologic impacts for all permitted mining in Rosebud Mine areas A, B, and C, as well as the proposed cuts in Area B (AM4). There is no need to complete PHC's for individual areas, as the Rosebud Mine as a whole needs to have a single comprehensive analysis for all surface water and groundwater impacts. The proposed cuts associated with currently unapproved minor revisions for Area A should not be included.

Any deficiencies identified after review in the PHC will be included in the next AM4 response letter.

Please feel free to contact me if questions remain or if I failed to consider some aspect of our conversation.

Sincerely,

Chris Yde, Supervisor
Coal and Uranium Program
Industrial and Energy Minerals Bureau
Phone: 406-444-4967
Fax: 406-444-4988
Email: CYde@mt.gov

FC: 620.112 (AM4)

Exhibit 17

From: John Carstensen
To: Peterson, Dicki
Subject: B AM4 PHC
Date: Thursday, June 06, 2013 11:57:06 AM

Dicki,

It is easy for us to take any of the potential areas off the figure or take the entire figure out. Based on the definition of potential mining below, I think we should only show App 00184. As that is shown on Figure 3a, there is no need for Figure 3c.

That being said, we have no problem showing exactly what you think is best for Western Energy.

It is much more difficult to strip all of the Area F references and boundary from the main Rosebud Mine Groundwater Model Report which is meant to encompass the greater Rosebud Mine.

John

From: Peterson, Dicki [mailto:DPeterson@westmoreland.com]
Sent: Thursday, June 06, 2013 11:04 AM
To: John Carstensen
Subject: RE:

John –

My understanding of the Department's newly defined potential mining is "the proposed action for the area" – my interpretation for Area B… currently approved is the base and then App 00184 is the potential future mining. I don't know how difficult it is on your end, but at the very least B-Extension expansion would need to taken off. The Area A information was submitted as a minor and is under review (which you are aware).

When I talked to Michael this morning he didn't think leaving the line for Area F would be problematic. But I'm sure anything that involving B-Extension would be since they have not seen that information formally.

Dicki

From: John Carstensen [mailto:jcarstensen@earthandwater.com]
Sent: Thursday, June 06, 2013 10:35 AM
To: Peterson, Dicki
Subject:

Hi Dicki,

Exhibit 19

Should I take this figure out of the B AM4 PHC to be consistent with your comments?

Thanks

John

From: Peterson, Dicki
To: Steere, Wade; Munoz, Daniel
Cc: Hunter, Penny
Subject: FW: Macroinvertebrate SOP
Date: Tuesday, July 22, 2014 7:48:24 AM
Attachments: EMAP-macros.pdf
WQPBWQM-009.pdf

FYI

Dicki

From: Hinz, Emily [mailto:EHinz@mt.gov]
Sent: Monday, July 21, 2014 3:31 PM
To: Peterson, Dicki
Cc: Yde, Chris
Subject: RE: Macroinvertebrate SOP

Dicki,

The document you sent is designed for assessment of water quality for impairment decisions. This involves various assessment metrics and protocols that aren't going to be applicable to the Coal Program's needs with regards to macro sampling. The Coal Program wants only to quantify the extent and nature of the aquatic community along the stretch of EFAC bordered by mining. Aquatic use needs to only be assessed in reaches with water at the time of sampling (flowing or ponded).

We suggest you use the sampling procedures from the attached EMAP document in **Section 7.2** and the general considerations in **Section 1.1** from the WQPBWQM-009 document for guidelines on the time frame appropriate for sampling. The reason you have to look at two documents is that the reach-wide sampling procedures referenced by the WQPBWQM-009 document are more for ripple-dominated sites and they didn't include the alternate sampling technique in the document. The following information should be collected along with a macroinvertebrate survey

1) Habitat / reach description including photographs and location
2) Water quality samples at the point of macro sampling
3) Water temperature
4) Flow, if any

Metrics **do not** need to be run by the consultant on the data. Reporting of the taxa alone is sufficient.

Emily Hinz
Hydrologist
Coal and Uranium Program

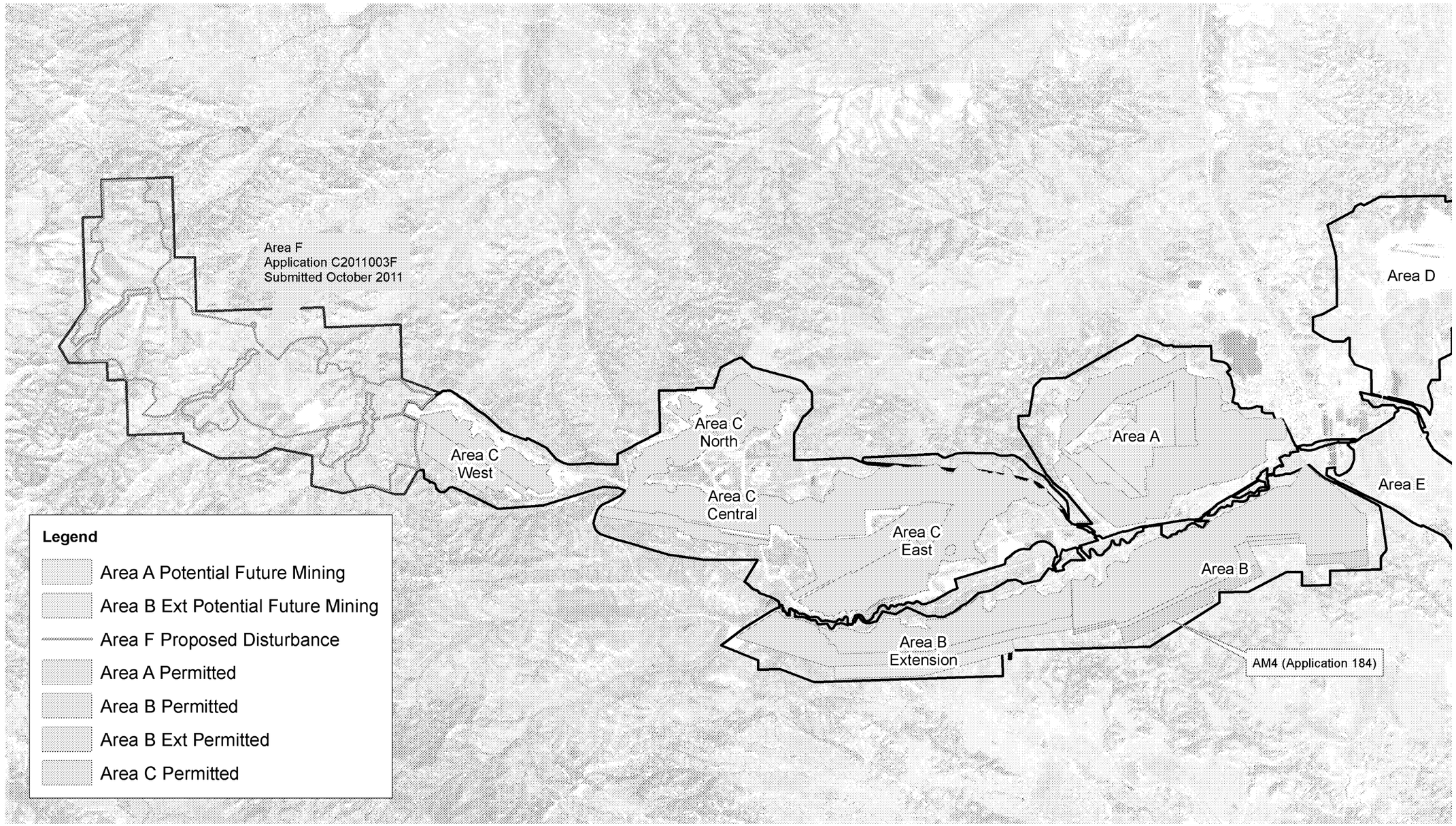
Exhibit 20

5/16/2013 PHC discussion (see agenda)
Daniel M., Rich S., Vicki P., Wade S., Michael N.,
Emily H., Angela M., Chris G.

Discussed what is needed for Area B Amendment
PHC -

- currently mining
- anticipated mining (approved but not mined)
- proposed mining
  - part of application
  - not mining that is not approved or part of the current application
- proposed Area F and additional mining in Area A - not included.

Exhibit 24



NICKLIN EARTH & WATER, INC

Feet
0 4,000 8,000

N

Notes: NAIP Aerial Photo (2011)

Date: 5/21/2013 File: F03C Potential Future

WESTERN ENERGY COMPANY - Rosebud Mine
A Subsidiary of WESTMORELAND COAL COMPANY
PO Box 99 Colstrip, MT 59323 (406) 748-5100

Figure 3C
Potential Future Mining
Areas ABC PHC

Exhibit 26

General Rosebud Mine Modeling Options
Michael Nicklin thoughts (5/15/13)

It is my sense that there is confusion evolving with respect to Rosebud Mine modeling efforts in part because of the different pending permit application runs. I recommend that we restructure the modeling presentation as follows:

1. Define ***one*** Rosebud Mine Groundwater Model for existing permits. Establish it as the baseline groundwater model which will be used for assessing significance of pending permit applications *[note that this modeling effort is effectively completed]*. **This would stand alone as a single report.**

2. Conduct application specific simulations and evaluate this as part of a pending permit.

Options that can be used for application purposes include the following:

Option 1: ***Use the Rosebud Mine Groundwater Model to evaluate significance of a proposed permit. No other pending or proposed permits that have not been approved would be a component of this modeling effort.***

Example: The baseline Rosebud Mine model will consider B-East only for evaluation of the significance of B-East Permit changes.

Advantage: Focuses on the relative significance of a given permit application.

Disadvantage: May not be as helpful to DEQ for developing a CHIA.

Option 2: ***Use the Rosebud Mine Groundwater Model to evaluate significance of all proposed permits, including the permit under consideration.***

Example: For B-East Permit Application all future pending permit applications for B-East, B-Ext, Area A MR62, Area MR66 and Area F permit to be included.

Advantage: Establishes the relative significance of all proposed permit applications and would be helpful to DEQ for developing a CHIA.

Disadvantage: Cannot isolate relative significance of given permit application.

Exhibit 27

Houle, Hillary

From: Schade, Pete
Sent: Friday, May 16, 2014 1:36 PM
To: Feldman, David
Cc: Hinz, Emily
Subject: FW: Aquatics Spreadsheet
Attachments: SW_macroinvertabrates_Rosebud.xlsx

Dave – it looks like we do have some genus-level data (see attached).

Please take a look when you get the chance and give us your thoughts. Is this data set suitable for calculation a bioassessment score with Plains MMI or RIVPACS?

Thanks

Pete

From: Hinz, Emily
Sent: Friday, May 16, 2014 1:15 PM
To: Schade, Pete
Subject: Aquatics Spreadsheet

This only contains data from the 1978 survey. I've yet to add the 76 and yet to be found 73 survey. Some of the genus names may need to be untangled as these could really be family or group names.

Emily Hinz
Hydrologist
Coal and Uranium Program
Montana Dept. of Environmental Quality
Ph (406) 444-7443

Houle, Hillary

From: Schade, Pete
Sent: Friday, May 16, 2014 4:54 PM
To: Feldman, David
Subject: RE: Aquatics Spreadsheet

No, We're not looking for an impairment call.

What we want to do is compare existing assemblages to these historic assemblages using appropriate metrics.

I understand the assemblages indicate lower water quality. The question is…can a bioassessment score (MMI and/or O/E) be calculated on these assemblages? If no, why not? If yes, let's make it happen.

It appears that what I thought was a simple technical request apparently has implications beyond our need to assess condition.

Thanks. I realize it's out of your hands, but I do appreciate your assistance. I spoke with Eric, and will attempt to follow-up at the mgmt level.

P

From: Feldman, David
Sent: Friday, May 16, 2014 3:21 PM
To: Schade, Pete
Cc: Hinz, Emily
Subject: RE: Aquatics Spreadsheet

Hello!

I've reviewed the data, and here's some thoughts:

I've organized the data by sampling location and date to get an idea of what you're seeing in the macroinvertebrate communities at those locations. The samples are not very diverse, and some samples do not have very many inverts. If we were using these data in any kind of macroinvertebrate indicator of water quality, the samples would all be rated low.

I spoke with Eric Urban about this, and he told me that any kind of impairment determination is beyond the scope of what you need in the Coal Program. He told me the best way I can help you is to describe what taxa are there, and that's it.

I hope this helps!

David Feldman
Biological Water Quality Standards Specialist
Montana Department of Environmental Quality
406-444-6764 (phone)
406-444-6836 (fax)
http://www.deq.mt.gov/wqinfo/standards/default.mcpx

WESTERN ENERGY COMPANY

A Westmoreland Mining LLC Company
138 ROSEBUD LANE • P.O. BOX 99 • COLSTRIP, MT 59323
(406) 748-5100

June 13, 2012

Ms. Jenny Chambers
Water Protection Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Permit ID: MPDES Permit MT0023965
Revision Type:
Permitting Action:
Subject: MPDES Proposed Permit – Public Comments

Dear Ms. Chambers:

Nicklin Earth & Water, Inc. (NE&W) and KC Harvey Environmental, LLC (KCH) have been recently retained by Western Energy Company (WECo) to assist with the review of the draft proposed permit MT0023965 prepared by the Montana Department of Environmental Quality (DEQ) Permitting and Compliance Division Montana Pollutant Discharge Elimination System (MPDES) Permit Fact Sheet for Permit No. MT0023965. WECo have also retained the services of Dr. William Hartsog, a specialist in surface water hydraulics and sediment transport to assist in this review.

Draft Permit Table No.	Drainage Basin	Permit Limit Average TDS	Permit Limit Maximum TDS	Calculated Average EC	Calculated Maximum EC	Permit Limit EC
		mg/L	mg/L	µS/cm	µS/cm	µS/cm
	Final Numeric Effluent Limits					
2	E. Fork Armells Ck.	3000	4500	4688	7031	Report
3	W. Fork Armells, Black Hank, and Donley Cks.	2600	3900	4063	6094	Report
4	Stocker Ck.	3950	5925	6172	9258	Report
5	Lee Coulee	2600	3900	4063	6094	500
6	Pony Ck.	2550	3825	3984	5977	500
7	Cow Crk.	3650	5475	5703	8555	500
8	Spring Ck.	2200	3300	3438	5156	500
	Alternate Numeric Effluent Limitations (runoff events)					
9	E. Fork Armells Ck.	-	4500	-	7031	Report
10	W. Fork Armells, Black Hank, and Donley Cks.	-	3900	-	6094	Report
11	Stocker Ck.	-	5925	-	9258	Report
12	Lee Coulee	-	3900	-	6094	500
13	Pony Ck.	-	3825	-	5977	500
14	Cow Crk.	-	5475	-	8555	500
15	Spring Ck.	-	3300	-	5156	500

This comparison indicates that the corresponding EC calculated from the final TDS effluent limit would be in the range of approximately 5,200 to 9,200 µS/cm given the maximum daily limits provided in the draft permit. The EC limit provided in the draft permit is 500 µS/cm (less than 10 percent of the maximum calculated values above). This factor demonstrates that the proposed EC limit is not compatible with the existing limits for TDS. The permit fact sheet indicated that the basis for the EC limit is ARM 17.30.670. This rule was developed to provide an instream water quality standard for the mainstems of Rosebud Creek, the Tongue, Powder, and Little Powder rivers and related tributaries. These standards were adopted to address the potential impacts from coal bed natural gas produced water discharge on crop irrigation. DEQ has incorrectly applied these rules as effluent limits in the draft permit. WECO request that the proposed EC limits be removed from the draft permit since the basis for applying the instream criteria as an effluent limit is flawed. The current TDS limits are adequate for managing EC within the receiving water. This is demonstrated by the TDS measurements in the receiving water where an average (1289) and maximum (5340) TDS mg/L were observed in E. Fork Armells, W. Fork Armells, Stocker, Donley, and Black Hank Creeks. Likewise, monitoring in Spring, Pony and Cow Creeks, and Lee Coulee indicate an average (703) and maximum (4810) TDS mg/L. This factor indicates that the current TSD limits are more in line with the naturally occurring levels in the receiving waters. An average EC value (900 µS/cm) was observed for the two samples of effluent previously tested. The proposed EC limits would not be attainable given the observed effluent concentrations that appear to be below naturally occurring levels. Given these factors, it would not be likely that WECO could comply with the proposed limits using the proposed BPCTCA. In accordance with 75-5-306 (1) , MCA, it is not necessary that wastes be treated to a

Outfall	Mine Area	Latitude	Longitude	Receiving Water	Applicable 434 CFR Subpart
021	B-East	45°51'30.22"N	106°39'54.40"W	East Fork Armells Creek	B
022	B-East	45°51'30.98"N	106°39'56.35"W	East Fork Armells Creek	D
025	B-East	45°51'15.98"N	106°41'10.74"W	East Fork Armells Creek	D
026	B-West	45°51'07.26"N	106°41'36.91"W	East Fork Armells Creek	D
048	B-West	45°51'01.15"N	106°42'20.53"W	East Fork Armells Creek	D
056	B-West	45°50'42.13"N	106°44'04.97"W	East Fork Armells Creek	D
061	B-West	45°50'35.05"N	106°45'10.86"W	East Fork Armells Creek	D
127	B-West	45°50'38.66"N	106°46'49.00"W	East Fork Armells Creek	D
128	B-West	45°50'31.87"N	106°45'32.31"W	East Fork Armells Creek	D
128A	B-West	45°50'34.08"N	106°45'38.26"W	East Fork Armells Creek	D
128B	B-West	45°50'34.81"N	106°45'46.23"W	East Fork Armells Creek	D
128C	B-West	45°50'38.81"N	106°45'54.30"W	East Fork Armells Creek	D
128D	B-West	45°50'47.96"N	106°46'22.90"W	East Fork Armells Creek	D
129	B-West	45°50'38.45"N	106°44'26.24"W	East Fork Armells Creek	D
133	B-West	45°50'36.76"N	106°43'50.01"W	East Fork Armells Creek	D
136	B-West	45°50'38.29"N	106°43'31.85"W	East Fork Armells Creek	D
137	B-West	45°50'52.10"N	106°42'52.53"W	East Fork Armells Creek	D
139	B-West	45°50'59.84"N	106°42'07.16"W	East Fork Armells Creek	D
130	B-West	45°49'55.94"N	106°45'06.47"W	Lee Coulee	D
130A	B-West	45°49'55.93"N	106°44'31.72"W	Lee Coulee	D
130B	B-West	45°49'55.83"N	106°44'26.12"W	Lee Coulee	D
131	B-West	45°49'55.88"N	106°44'02.06"W	Lee Coulee	D
131A	B-West	45°49'55.95"N	106°43'54.32"W	Lee Coulee	D
132	B-West	45°49'56.11"N	106°43'42.38"W	Lee Coulee	D
134	B-West	45°49'56.10"N	106°43'05.84"W	Lee Coulee	D
030	C-East	45°52'36.96"N	106°46'06.14"W	Stocker Creek	D

DEQ EXHIBIT C

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MONTANA BOARD OF ENVIRONMENTAL REVIEW

IN THE MATTER OF: **APPEAL AMENDMENT AM4 WESTERN ENERGY COMPANY ROSEBUD STRIP MINE AREA B, PERMIT NO. C1984003B**	Case No.: BER 2016-03 SM **AFFIDAVIT OF EMILY HINZ, Ph.D. IN SUPPORT OF DEQ'S BRIEF IN OPPOSITION TO PETITIONERS' MOTION FOR SUMMARY JUDGMENT**

I, Emily Hinz, Ph.D., swear (or affirm) under oath that:

1. I am of majority age;

2. I graduated from Boise State University in 2012 with a Ph.D. in Geophysics. I also graduated from the University of Texas at Dallas in 2007 with a Master's of Science in Geosciences and 2005 with a Bachelor's of Science in Geosciences;

3. I am currently employed as a Computer Software Engineer with Montana Fish, Wildlife and Parks ("FWP") and have been employed in that position for less than a year;

4. I was previously employed by the Montana Department of Environmental Quality ("DEQ") as a hydrologist, in the Coal Section of the Industrial and Energy Minerals Bureau. I served in that position for 4.5 years;

impacts to WFAC from Area B or AM4. DEQ included Area C in the boundary because impacts from Area B interact with impacts from Area C on EFAC. Rosebud Creek was included to the confluence with Spring Creek to include impacts from Area D and E of the Rosebud Mine, and impacts from Area A and B of the Big Sky Mine. There is also a small sliver of the Rosebud Mine Area B that crosses into the Lee Coulee drainage that impacts Rosebud Creek;

19. The anticipated mining in Area F did not need to be included in the surface water CIA for AM4 because there was no hydrologic connection between surface water in Area F and surface water in Area B, which includes AM4. Therefore, there would be no interaction between surface water impacts from AM4 and Area F on the hydrologic balance in the area;

20. The lack of hydrologic connection between surface water in Area B/AM4 and Area F results from the surface water divide between EFAC and WFAC that occurs in Area C. Accordingly, surface water from AM4 does not interact with surface water from Area F;

21. The surface water divide for EFAC and the tributaries to Rosebud Creek (Lee Coulee and Miller Coulee) divides AM4 and the majority of Area B from the Big Sky Mine and prohibits surface water from AM4 from reaching tributaries of Rosebud Creek. Therefore, there will be no impacts from operations in AM4 to tributaries of Rosebud Creek;

22. Further, even though a small portion of the existing Area B permit crossed the surface water divide into the Lee Coulee drainage, DEQ required the mine to construct sediment ponds at the edges of permit area to prevent offsite discharges to Lee Coulee from Area B. No additional discharge points were added to the mine's MPDES permit on Lee

flow, other sections have seen an increase in surface flow, which has caused some segments that were previously ephemeral to be intermittent to perennial;

35. Even if there is a reduction in flow to Section 15 as a result of historic mining, mining operations in AM4 will not affect the quantity of water in this ection because any impacts to EFAC surface water flow will occur much further downstream;

36. With respect to coal mining's impact on aquatic life support in the lower segment of EFAC which runs from Colstrip to the mouth at Armells Creek, the surface and alluvial water quality data analyzed by DEQ for the Rosebud Mine indicated that the relative contribution of nitrogen from the Rosebud mine is minimal;

37. The CHIA indicates that "[h]igh nitrogen may be in surface water samples due to residual chemicals from blasting materials, from agricultural activities, or from city runoff and municipal sources[,]" and "samples above the human health limit of 10 mg/L are shown as dark red['] " and "[m]any of the highest values have been detected downstream of active mining and in areas actively used by livestock." (See CHIA p. 9-26);

38. Thus, while the CHIA acknowledges that mining is a potential source of nitrogen in the water samples that exceeded the human health standard, agricultural activities, city runoff and municipal sources were also identified as potential sources of the pollutant;

39. Petitioners mischaracterize DEQ's factual findings contained in the CHIA with respect to violations of water quality standards for nitrogen that protect human health. Petitioners state that these standards were "repeatedly violated." (Petitioners' Br., p. 58). As indicated on p. 12-42 of the CHIA, Table 9-7 (surface water exceedances) indicates that out of 46 samples taken for surface water, there were zero exceedances of the human health standard for nitrogen in upper EFAC. All of the surface water exceedances (12 out of 64

samples) occurred downstream of Colstrip, where potential sources other than mining have been identified;

40. With respect to groundwater exceedances for nitrogen in upper EFAC (segment MT42K002-170), on page 12-48 of the CHIA, Table 9-9 indicates that nitrogen was rarely detected in spoil wells and was not persistent over time in samples from any given well. The fact that groundwater exceedances of the human health standard for nitrogen were not persistent over time indicated that nitrogen in spoils water from the mine is not an issue to be concerned about;

41. As indicated on p. 8-2 of the CHIA, Rosebud Creek is the only stream analyzed within the CHIA that is a wadeable stream for its entire reach. There are additional stream reaches that are wadeable, but not entire streams other than Rosebud Creek. For example, lower EFAC does have reaches with intermittent to perennial flow, but upper EFAC is predominantly ephemeral with only two reaches that have historically been described as having intermittent or perennial flow;

42. The nitrogen standard for the protection of aquatic life contained in DEQ 12-A would only be applicable to those reaches of EFAC that are wadeable, which means that they are perennial or intermittent. They are not applicable to those portions of EFAC or any other stream that are ephemeral;

43. At the time that the CHIA was developed, there was very little Total Nitrogen data available for the streams analyzed within the CHIA, including EFAC. However, since the available data indicated that coal mining was not the source of the nitrogen in lower EFAC, there would have been no reason for DEQ to do further analysis applying the more stringent standards contained within DEQ 12-A;

44. Even if DEQ had applied the more stringent numeric nutrient standards contained in DEQ 12-A, the results of DEQ's analysis would not have changed. The total nitrogen samples taken at SW-55, which is the surface water monitoring station located on that portion of upper EFAC which has recently demonstrated intermittent flow, have not exceeded the DEQ 12-A standard of 1.3 mg/L for nitrogen;

45. In its Seventh Round Acceptability Deficiency letter dated June 3, 2014, DEQ requested that the mine provide additional information, including an aquatic life survey, to address any concerns DEQ staff had regarding the potential for material damage to EFAC from sulfate, chloride, or salinity due to the proposed mining operation in AM4;

46. After DEQ reviewed the additional information provided by Intervenors in the ABC PHC Addendum to Appendix M of the AM4 permit application, no mitigation was required as no material damage was anticipated to EFAC as a result of increased levels of sulfates or chloride from mining;

47. As indicated in the CHIA on p. 9-8, DEQ applied the guideline sulfate toxicity threshold of 2,000 mg/L for aquatic life to account for the very high hardness of stream water. Even in baseline samples, sulfate thresholds for aquatic life were exceeded. However, macroinvertebrate communities in Eastern Montana are likely adapted to high sulfate water. Therefore, based on DEQ's review of the available data, DEQ was satisfied that no adverse impacts to aquatic life in EFAC were anticipated as a result of increased levels of sulfates;

48. Further, it should be noted, that the high chloride concentrations referenced in the CHIA at p. 9-8, between Area A Tipple and SW-55, which is located between Area A and Area B, was "likely from flushing of chloride in the soil and alluvium by the [Intervenor's] Area A facilities in addition to chloride from leaking power plant ponds.";

49. Hence, leaking ponds at the Colstrip Power Plant provided a source of elevated chlorides in addition to the chlorides from facility operations at Area A of the mine. MSUMRA does not require DEQ to consider impacts from non-mining sources, such as the Colstrip Power Plant, in the CHIA;

50. Additionally, regardless of the cause of the existing high chloride concentrations in EFAC, the proposed mine plan for the AM4 Amendment "is designed not to contribute additional chloride to the stream because lignin sulfonate will be used on roads instead of magnesium chloride." Therefore, DEQ concluded that the proposed operations in AM4 are designed to prevent material damage to EFAC from chlorides. Nevertheless, the Written Findings for the AM4 permit amendment contains stipulations for continued aquatic life monitoring in all intermittent reaches of EFAC;

51. With regards to the aquatic life studies conducted in the 1970's, DEQ concluded that the surveys "provide an indication of the presence or absence of aquatic life but cannot be used to assess the quality of the habitat or stream water. The surveys indicate that, in the past, there has been sufficient water at the sites that were sampled to provide aquatic habitat and support a number of aquatic species.";

52. To address any concerns that DEQ had about the impact of surface mining on aquatic life support in EFAC, DEQ required Intervenor to hire a consultant to conduct an updated aquatic life survey for upper EFAC;

53. DEQ hydrologists had observed an increase in EC, sulfates and chlorides in this segment of EFAC, but were not able to confirm the source. Mining operations in Area A were identified as a potential source of chlorides due to the use of magnesium chloride for salting access roads located within and adjacent to the mine plan area. However, the State

of Montana and Rosebud County also used magnesium chloride on state and county roads located within the mine plan area;

54. Additionally, DEQ wanted the mine to collect additional data that could be used to get cursory qualitative measurements of aquatic life use in EFAC. However, DEQ would not be able to use the data collected by the mine to conduct a quantitative analysis, because the methods used to sample and classify the data in the 1970s were different than those used today. Therefore, there could be no direct numeric comparison between the data collected in the 1970s and that collected by the mine in 2014;

55. DEQ also made it a condition of Intervenors' AM4 permit that the mine continue to conduct aquatic life surveys to monitor EFAC for aquatic life support throughout the life of mine;

56. In October 2014, Intervenor hired a consultant to conduct an aquatic life survey with the objective of evaluating aquatic life support in upper EFAC. The results of this survey show that the aquatic environments in upper EFAC support a diverse assemblage of aquatic insects, and consist of taxa commonly found in eastern Montana prairie streams;

57. Based on the updated information, DEQ concluded that the recent aquatic survey provides qualitative evidence that streams impacted by mining can still support a diverse macroinvertebrate assemblage.

FURTHER AFFIANT SAYETH NOT.

DATED this 22nd day of July, 2016.

By: Emily Hinz
EMILY HINZ, Ph.D.

DEQ EXHIBIT E

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MONTANA BOARD OF ENVIRONMENTAL REVIEW

IN THE MATTER OF: **APPEAL AMENDMENT AM4 WESTERN ENERGY COMPANY ROSEBUD STRIP MINE AREA B, PERMIT NO. C1984003B**	Case No.: BER 2016-03 SM **AFFIDAVIT OF ERIC URBAN IN SUPPORT OF DEQ'S BRIEF IN OPPOSITION TO PETITIONERS' MOTION FOR SUMMARY JUDGMENT**

I, Eric Urban, swear (or affirm) under oath that:

1. I am of majority age;

2. I graduated from The University of Montana in 2000 with a Bachelor's of Science in Wildlife Biology, and worked as wildlife biologist for various organizations, including the United States Forest Service and Oregon Department of Fish and Wildlife, for three years prior to working for DEQ;

3. I am currently the Bureau Chief for the Water Quality Planning Bureau ("Water Quality Bureau") at the Montana Department of Environmental Quality ("DEQ") and have been employed in that position for 1.5 years;

4. The Water Quality Bureau is responsible for developing and implementing

Montana's surface and groundwater quality standards; monitoring and assessing surface water quality conditions in the state; developing total maximum daily load ("TMDL") restoration plans for Montana surface waters; identifying impaired streams, lakes and rivers; and managing all data and information systems related to the Montana Water Quality Act;

5. I have been employed by DEQ since 2003, and have held various professional positions within DEQ, including Section Supervisor of the Water Quality Standards Program; Technical Coordinator/Wildlife Biologist of the DEQ Coal Section of the Industrial and Energy Minerals Bureau; Section Supervisor of the Technical Section and Water/Wastewater Certification Program Section of the Public Water Supply Bureau; and Water Quality Specialist within the Monitoring and Assessment Program of the Water Quality Bureau;

6. When I worked in the Monitoring and Assessment Program for DEQ, one of my duties was to develop Water Quality Attainment Records ("Attainment Record(s)") for the Water Quality Bureau;

7. Attainment Records are developed by the DEQ Water Quality Bureau as a mechanism for determining whether a stream is meeting its designated uses;

8. If it is determined from the available water quality data that impairment of a stream is caused by particular pollutants, then all potential sources of the pollutants located in the watershed are identified by Water Quality Bureau staff and noted in the Attainment Record;

9. However, the sources of the pollutants are commonly not "confirmed". In other words, the term "unconfirmed source" as used in the Attainment Records, is really a

"potential source". It does not mean that it is an actual source of the identified pollutants that are causing the "impairment";

10. Likewise, the "cause" of the "impairment" is determined based on available water quality data for a specific parameter such as specific conductance ("SC"), total dissolved solids ("TDS") or nitrogen. If a "cause" of impairment is identified with "low confidence" that generally means that the data used to make that causation determination was either outdated or insufficient to make a more definitive determination with respect to causation;

11. Just because the Attainment Record identifies nitrogen as a "cause" of the impairment of a particular designated use, it does not mean that nitrogen is "actually" causing impairment. Nitrogen is a cause with a low level of confidence means that the assessor had a low level of confidence in the data used to support that determination;

12. The Water Quality Bureau uses the information contained in the Attainment Records to identify streams that require a TMDL to be developed. TMDL's are developed by DEQ for streams that are identified as "impaired" for a particular designated use and a particular pollutant;

13. When a TMDL is developed for a particular stream, the actual cause (pollutant) and source of the impairment is more precisely determined for that segment of stream and the sources of the pollution and the relative contribution of the source for a given pollutant is determined at that time;

14. TMDL's have not yet been developed for the upper or lower segment of EFAC;

15. In 2006, my former colleague, Mike Stermitz, developed the Attainment Records for EFAC, segment MT42K002_110 (headwaters to Colstrip) ("lower EFAC") and

segment MT42K002_170 (Colstrip to mouth) ("upper EFAC") (collectively "EFAC Attainment Records");

16. The EFAC Attainment Records have not been updated since 2006, although they are republished every two years. Accordingly, the information in the 2014 EFAC Attainment Records was eight years old when they were republished;

17. The Attainment Record for lower EFAC , which is a 32.36 mile segment of EFAC located downstream of mining and north of the town of Colstrip, indicates that this segment of the stream is "impaired" for the aquatic life designated use;

18. SC and TDS are identified with "low confidence" as a cause of the impairment of aquatic life, and coal mining and transfer of water from an outside watershed are identified as an "unconfirmed source" of the SC and TDS in the Attainment Record for lower EFAC. It does not mean that coal mining is the actual source of the SC and TDS. It means that Mike Stermitz identified coal mining as a potential source of the SC and TDS;

19. Historically, Attainment Records, including the Attainment Record for lower EFAC, group salinity/TDS/chlorides together as a single cause of impairment. This does not mean that there was an issue with chloride specifically, it simply represented a category for "salts";

20. For example, on page 17 of the Attainment Record for lower EFAC, there is a statement that says "[s]alinity/TDS/chlorides will remain a cause of impairment." This statement was made under the 2006 language, which lumps salinity/TDS/chlorides as a single cause;

21. However, on page 20 of the same record, chlorides are not listed as a cause of impairment. The language used on page 20 identifies causes by individual pollutants.

Salinity and TDS are identified separately as causes of impairment, but chlorides are not identified as a cause of impairment. This language is more precise than the narrative summary provided on page 17;

22. Therefore, the Attainment Record for lower EFAC does not identify chlorides as a cause of impairment;

23. The Attainment Record for upper EFAC, which is 24.67 segment of EFAC that is located upstream of the town of Colstrip, indicates that the stream is "ephemeral";

24. The process for assessing the health of an ephemeral stream in 2006 was to rely solely on the condition of the streamside habitat. According to the assessment record Mr. Stermitz identified mining as an "unconfirmed source" of the "alteration in stream-side or littoral vegetative covers" that was listed as a "cause" of impairment of aquatic life in upper EFAC;

25. This information was based solely on a personal conversation he had with a mine employee, who indicated that the mine had cut through the stream channel in one spot. This information could not be verified through site visits or aerial photographs;

26. As explained above, just because "alteration in stream-side or littoral vegetative covers" is listed as a cause of the impairment with "medium confidence". The level of confidence that Mr. Stermitz placed on this decision was listed as "medium," which was simply a qualitative indication of his confidence in the data/information used for the decision. Likewise, just because surface mining is listed as an "unconfirmed source" of the alteration of stream-side vegetative covers, it does not mean that it is actually the source;

27. It should be noted, that no aquatic life survey was done in 2005-2006 for upper EFAC, because this segment of stream is ephemeral and was predominantly dry at the time

the Attainment Record was developed. Therefore, it was not feasible to collect water samples or aquatic life samples at that time. Only habitat could be analyzed as a result;

28. Additionally, it should be noted that physical habitat is only one of the factors typically considered by the Water Quality Bureau in making an impairment determination. The other two factors that are considered are chemistry and biology;

29. In Eastern Montana, the Water Quality Bureau has found that stream habitat and water chemistry is highly variable, which results in a highly variable biological community due to the harsh conditions of the natural environment;

30. Accordingly, just because an aquatic life survey indicates that a stream segment contains less than desirable macroinvertebrate communities, that does not mean that the cause of this condition is man-made and or that the stream is impaired as a result;

31. In 2014, the DEQ coal program requested that Intervenor hire a consultant to conduct an updated aquatic life survey of EFAC;

32. Prior to conducting the survey, Intervenor's consultant, Penny Hunter from Arcadis, consulted with Dave Feldman, former Macroinvertebrate Specialist with the Water Quality Bureau, who provided Intervenor's consultant with a copy of DEQ's sampling methodology (WQPBWQM-009 (2012)) for how to collect macroinvertebrate samples in different habitats in Montana;

33. At the request of DEQ Coal Program staff, Dave Feldman advised Penny Hunter how to collect samples, but was instructed not to advise her how the sample results could be used to determine aquatic life health;

34. Because of the high variability of the natural system, the DEQ Water Quality Bureau does not believe that the health of aquatic life in eastern Montana streams can be

determined by the composition of a macroinvertebrate sample alone;

35. The 2014 aquatic life survey conducted by Intervenors' consultant was used by DEQ Coal Program staff to make a material damage determination with respect to the impact of the proposed operations of AM4 on the beneficial use of aquatic life support. It was not used by the DEQ Water Quality Bureau staff in making an impairment determination for aquatic life in EFAC;

36. For this reason, Intervenors' consultant was not required to follow DEQ standard operating procedures ("SOPs") for making stream segment impairment determinations.

FURTHER AFFIANT SAYETH NOT.

DATED this 20th day of July, 2016.

MONTANA DEPARTMENT OF
ENVIRONMENTAL QUALITY

By:_____
ERIC URBAN
Bureau Chief, Water Quality Planning

Subscribed and sworn to (or affirmed) before me this 20th day of July, 2016, by ERIC URBAN.

NAME
NOTARY PUBLIC for the State of Montana
Residing in Lewis and Clark County.
My Commission Expires: May 19, 2019

(SEAL)

HILLARY HOULE NOTARIAL SEAL STATE OF MONTANA

HILLARY HOULE
NOTARY PUBLIC for the
State of Montana
Residing at Helena, Montana
My Commission Expires
May 19, 2019