

Hunter Declaration

EXHIBIT 10

MONTANA BOARD OF ENVIRONMENTAL REVIEW

IN THE MATTER OF:)
APPEAL AMENDMENT AM4)
WESTERN ENERGY)
COMPANY, ROSEBUD STRIP)
MINE AREA B)
PERMIT NO. C1984003B)
_____)

CAUSE NO. BER 2016-03 SM

DECLARATION OF PENNY HUNTER

I, Penny Hunter, declare under the penalty of perjury as follows:

1. I, Penny Hunter, am a biologist and ecologist with 16 years’ experience in human health and ecological risk assessment, permitting, aquatic toxicology, biological monitoring, and wildlife toxicology.

2. I have a B.A. in Biology from the University of Colorado and an M.S. in Rangeland Ecology from Colorado State University. I am a Program Manager at Environmental Resources Management (ERM), an environmental, health, safety, and risk consulting company. Previously, I worked for ARCADIS, another consultancy, where I performed similar work.

3. I have extensive experience in all steps of the environmental risk assessment process, including field sample collection, laboratory testing, modeling and statistical analysis, and risk characterization. I have lead the development of risk-related guidance, permitted discharge criteria, and clean up criteria for human and ecological receptors and have authored over 15 site-specific risk assessments for private industry clients, the U.S. Environmental Protection Agency (“U.S. EPA”), federal facilities, and state programs. I have particularly extensive experience in studying and mitigating ecological risk factors related to extractive industries such as mining. I have authored articles published in scholarly journals related to assessing health and ecological

risk from chemical and mineral substances and have expertise in assessing risk from ecological factors to human health, aquatic life, wildlife, and livestock.

4. I am familiar with Western Energy Company's ("Western Energy") Rosebud Coal Mine, located near Colstrip, Montana and Western Energy's application to the Montana Department of Environmental Quality ("DEQ") for a fourth amendment to the Rosebud Strip Mine Area B Permit ("AM4 Permit").

5. Western Energy engaged me to conduct an aquatic life survey of the East Fork Armells Creek in relation to the AM4 Permit application. The aquatic life survey was conducted in 2014 in response to a deficiency notice issued by DEQ on June 3, 2014. I also lead a hydrologic conditions assessment of East Fork Armells Creek in 2013 and another aquatic life survey in 2015. I conducted all of these studies in accordance with accepted scientific principles, DEQ protocol and standard operating procedure, and my own best scientific judgment.

6. I am familiar with the Cumulative Hydrologic Impact Assessment ("CHIA") document issued by DEQ in approving the AM4 Permit and with the contentions of the Petitioners in this contested case in challenging the CHIA and AM4 Permit approval. I am familiar with petitioners' contentions related to the current condition of East Fork Armells Creek as it relates to aquatic life and livestock, impacts on East Fork Armells Creek from mining activity to date, and the potential effects of future mining on East Fork Armells Creek. In addition, I am familiar with the hydrology and ecology of East Fork Armells Creek, having observed it and conducted studies of the stream, including the aquatic life surveys cited above. I have also reviewed other scientists' and DEQ's sampling and studies of the stream.

Evidence of Effects of Mining on East Fork Armells Creek

7. I do not believe there to be any biological evidence to show that, as petitioners' state, "[f]orty years of strip-mining have hammered East Fork Armells Creek." Pet'rs' Br. at 28.

There is extremely limited evidence of any effects of mining on the biological conditions of East Fork Armells Creek, the absence of which, combined with the myriad of other factors affecting the biodiversity of the stream, make it impossible to conclude with scientific certainty that mining has degraded the biological community in East Fork Armells Creek or contributed to its impairment, if, indeed, it is impaired.

8. As a scientific principle, one cannot attribute an effect to a specific cause without eliminating all other possible causes. In the case of East Fork Armells Creek, and especially its lower reach, downstream of Colstrip, there are many different factors influencing aquatic life. Therefore, conditions in East Fork Armells Creek cannot, without further evidence, be attributed solely to mining.

9. As with other ephemeral and intermittent streams, the single greatest factor influencing the aquatic life community in East Fork Armells Creek is the amount and flow of water at different times and in different locations on the stream. In addition, livestock, agriculture, golf courses, and runoff from the town of Colstrip may have significant effects on East Fork Armells Creek and subsequently its aquatic life.

10. Furthermore, my aquatic life survey and a subsequent studies I conducted in 2014 and 2015 found that the aquatic life community in East Fork Armells Creek is typical for ephemeral and intermittent streams in the region and is comparable to the communities in the West Fork Armells Creek, suggesting that mining – which does not occur near those other streams – does not have a significant effect on East Fork Armells Creek's biological community.

11. In summary, I am not aware of any evidence showing that mining negatively affects aquatic life in East Fork Armells Creek.

The 303(d) Attainment Report and Impairment of East Fork Armells Creek

12. I do not believe petitioners' statement that "DEQ's own testing reveals significant impairment of East Fork Armells Creek that is linked to coal mining" to be accurate. *See* Pet'rs' Br. at 29. Moreover, regardless of DEQ's conclusion, in my opinion there is insufficient data in DEQ's proposed draft biennial water quality attainment report ("303(d) list") to draw any conclusion regarding the existence or causes of aquatic life impairment in East Fork Armells Creek.

13. Most of the data cited by DEQ in the 303(d) list are not specific to East Fork Armells Creek. DEQ did not study any aquatic life or habitat data collected along the upper segment of East Fork Armells Creek in preparing the 303(d) list. In fact, to my knowledge, no aquatic life data had been collected from upper East Fork Armells Creek since the 1970's until I conducted an aquatic life survey in 2014.

14. Benthic (i.e., bottom-dwelling) invertebrate samples were collected on one occasion on the lower segment of East Fork Armells Creek in 2005; however, the sampling was conducted far downstream of Colstrip, where water could be affected by many other factors besides mining, including runoff from agriculture, cattle, a golf course, the town of Colstrip, and the Colstrip Power Plant.

15. The 303(d) list does not consider other aquatic life studies that have been conducted along East Fork Armells Creek and nearby analogous streams since at least 1976. Data on nearby analogous streams in the same basin would provide baseline information about aquatic life communities in the absence of some land uses currently occurring in the EFAC drainage. In

my opinion, all available studies should be considered before reaching a conclusion as to the status and potential cause(s) of impairment in East Fork Armells Creek.

16. The composition of the macroinvertebrate communities found in East Fork Armells Creek reflects the low-gradient, ephemeral nature of the stream, similar to analogous streams in the region.¹ For instance, petitioners point to the observation that blackfly larvae and midges made up a large portion of macroinvertebrates collected by DEQ in their sampling of lower East Fork Armells Creek as a sign of poor water quality, *see* Pet'rs'. Br. at 29, but, as demonstrated by Klarich et al. (1980a, b), such organisms commonly make up the majority of the benthic macroinvertebrate community in intermittent and ephemeral streams in the region, not just East Fork Armells Creek.

17. Furthermore, benthic macroinvertebrate communities in intermittent and ephemeral streams in the region naturally vary greatly by season, making it difficult to attribute variation to human factors, such as mining. Seasonal studies on East Fork Armells Creek have noted the lack of consistency in sampling results from one season or year to the next.² Klarich et al. (1980a, b) observed the same variability in community indices in other analogous streams throughout southeast Montana.

18. Benthic macroinvertebrate samples can be further affected by patchy distribution and low flow situations leading to inadequate sample size and inability to sample all microhabitats in a

¹ See Klarich, D.A., Regele, S.M, Bahls, L.L., 1980. Structure, General Characteristics, and Salinity Relationships of Benthic Macroinvertebrate Associations in Steams Draining the Southern Fort Union Coalfield Region of Southwestern Montana. USGS Grant #14-08-0001-G-053 ("Klarich, 1980a"); Klarich, D.A., Regele, S.M. Bahls, L.L., 1980. Data Report for Benthic macroinvertebrate and periphyton community inventory of streams draining the southern Fort Union Coalfield Region of Southwestern Montana. USGS Grant #14-08-0001-G-053 ("Klarich, 1980b"); Clancy, C.G. 1978. The Fish and Aquatic Invertebrates in Sarpy Creek Montana. Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science. Montana State University.

² See Schwer, D.J. 1979. The Ecology of East Fork Armells Creek and Some Ponds Near Colstrip, Montana. Final Report. December; Schwer, D.J. 1981. The Ecology of East Fork Armells Creek and Some Ponds Near Colstrip, Montana. Final Report. November.

stream equally.³ Data collected in studies I recently conducted also demonstrated the same phenomenon: sample sites frequently change due to lack of water, and results from one microhabitat to the next, and between years, are variable in terms of species diversity and community composition. This natural variability and dynamic nature of the benthic macroinvertebrate community means that a monitoring system, such as DEQ's, that relies on benthic macroinvertebrate community sampling is more apt to incorrectly attribute changes in the community to human causes – such as mining – when such changes are actually the result of natural conditions and events.

19. As an expert in this field, I believe that a review of all available data shows that macroinvertebrate communities in East Fork Armells Creek upstream of mining are comparable to those found downstream of mining. In short, the data show no evidence of mining having affected the composition of aquatic animal communities in East Fork Armells Creek.

Water Levels and Vegetation on Upper East Fork Armells Creek

20. The DEQ 303(d) list gives different potential causes for impairment of the lower and upper segments of East Fork Armells Creek. For the lower, or downstream, segment, DEQ suggests there may be impairment due to salinity, nitrate/nitrogen, total dissolved solids (“TDS”), and specific conductance, due to agriculture, mining, and hydromodification. For the reasons discussed above, the DEQ data is incomplete and does not provide any reasonable basis upon which to form a scientific opinion as to whether aquatic life is impaired in that segment of East Fork Armells Creek or what the causes of such impairment would be.

21. As noted by petitioners, DEQ lists the potential cause of impairment of the upper segment of East Fork Armells Creek as alteration in streamside or littoral vegetative covers, with

³ See Schwer 1981.

mining as a possible cause of that alteration. However, as noted, the 303(d) list is not based on any recent data from the upper segment of East Fork Armells Creek. On the other hand, surveys I led in 2014 and 2015 found an aquatic habitat in the upper reach of East Fork Armells Creek very different from that described in the 303(d) list.⁴

22. In those surveys, I found the aquatic habitat in the upper reach of East Fork Armells Creek to contain prevalent emergent vegetation along riparian zones. Aquatic habitat measures indicated an abundance of large woody debris, silty substrate, and low flow conditions. During the hydrologic conditions assessment in 2013 (ARCADIS 2014b), I observed the bottom of the channel of upper East Fork Armells Creek to be vegetated by upland grass species: either crested wheat (*Agropyron cristatum*) or western wheatgrass (*Pascopyrum smithii*), with a mixture of riparian and upland vegetation along the banks (e.g., boxelder (*Acer negundo*), cottonwood (*Populus angustifolia* and *Populus deltoids*), and sagebrush (*Artemesia* spp)). At times, trees and sagebrush were also noted to be growing in the bottom of the channel. These characteristics are consistent with an intermittent or ephemeral flow regime.

23. East Fork Armells Creek is intermittent in certain sections and ephemeral in others. During both the aquatic survey and hydrologic conditions assessment, I observed that some areas of East Fork Armells Creek were wet while others were dry. The photographs below, taken in October 2014 and included in ARCADIS (2014a), for instance, show water in areas of the upper reach of East Fork Armells Creek, near Rosebud Mine Area B.

⁴ ARCADIS. 2014a. Western Energy – Rosebud Aquatic Survey Assessment. December; ARCADIS. 2014b. Western Energy – Rosebud Hydrologic Conditions Assessment. May 3; ERM. 2016. 2015 East Fork Armells Creek Benthic Macroinvertebrate Survey. January 14.



My team visited upper East Fork Armells Creek again in November 2014 and again observed water in several segments of the stream (ARCADIS 2014b).

24. I am aware that petitioners point to a photograph taken in July 2014 (below) of a reach in upper East Fork Armells Creek as evidence of mine-related dewatering of the stream. Pet'rs' Br.

at 32. Although petitioners suggest the photograph shows that a formerly wet segment of East Fork Armells Creek is now dry, my scientific opinion is that the photograph shows evidence that the stream was wet not long before the photograph was taken.



25. I base my opinion upon the following factors: Although the photograph shows an abundance of vegetation along the banks and upland areas, there is no vegetation along the creek bottom. This is highly suggestive of water having recently flowed along the bottom. Had the stream really been dry since 1999, as petitioners claim, Pet'rs' Br. at 31, the creek would have been covered by typical upland vegetation as seen with other intermittent or ephemeral segments

of stream in the region. In addition, the bare ground and stippling along the bottom suggest that cattle have recently used this area to congregate. When cattle congregate in a stream bed such as this, they typically drink and wallow in mud. Cattle could not do so if there were not water in this segment of the stream.

26. In summary, the evidence I have collected shows that the sections of East Fork Armells Creek petitioners point to, including Section 15, are sometimes wet, as is characteristic of ephemeral or intermittent streams.

Narrative Water Quality Standards

27. Upper East Fork Armells Creek meets applicable narrative water quality standards for aquatic life. Surface waters of upper East Fork Armells Creek are designated C-3 Ephemeral for the purposes of MPDES discharge permits. Ephemeral streams are not subject to specific numeric water quality standards but are, rather, subject to narrative standards, including for sulfates, chlorides, nitrite, nitrate, and total nitrogen. Furthermore, Montana does not have numeric aquatic life standards for sulfates or chlorides for any stream classification.

28. For the purposes of the CHIA, DEQ applied material damage criteria made up of a combination of applicable narrative standards, numeric guidelines, and livestock beneficial use guidelines. Specifically, DEQ used:

- a. Livestock guidelines listed in Table 2-2 of the CHIA. These guidelines are not enforceable standards but are, rather, used as guidance in evaluating the suitability of pre- and post-mine water quality for livestock watering. It is common in the area for water quality to naturally exceed the livestock guidelines and, as DEQ noted in the CHIA, surface water and shallow groundwater in eastern Montana are highly variable and locally may be marginal for supporting livestock. Yet, as stated in the

CHIA, surface and shallow groundwater have supported ranching in Montana for more than a century.

- b. Aquatic life criteria. As with the livestock guidelines, the sulfate, chloride, and other constituent guidelines listed in the CHIA for aquatic life are not enforceable standards and serve only as guidance for evaluating the suitability of pre- and post-mine water quality for aquatic life use.
- c. Other data. DEQ also used aquatic surveys from the 1970's and the aquatic life survey I conducted in 2014 to assess whether East Fork Armells Creek met its beneficial uses. Both the 1970's surveys and my 2014 survey showed a diverse community of macroinvertebrates using the stream reach, thereby satisfying the narrative standard of providing a beneficial use for aquatic life.

29. In my scientific opinion, it is therefore misleading to simply state that water in East Fork Armells Creek "exceeded thresholds for harm to aquatic life." *See* Pet'rs' Br. at 40. CHIA at 9-8.

No Water Quality Violation for Sulfates

30. Regardless of the concentration of sulfates found in sampling, upper East Fork Armells Creek met the narrative water quality standards for aquatic life.

31. I also note that a study petitioners cited in their objections to the permit, M.F. Raisbeck, et al., *Water Quality for Wyoming Livestock & Wildlife: A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants* (2008), is not in my opinion reliable as a source for establishing reasonable sulfate threshold guidelines for livestock. The Raisbeck study, which was a non-peer reviewed review of other studies, came up with sulfate (and other constituent) thresholds anomalous among the consensus of studies on this subject. Although commissioned

by the U.S. Geological Survey (“USGS”), the study was never completed nor did the USGS adopt the interim findings reported by Raisbeck.

No Water Quality Violation for Chlorides

32. As for sulfates, Montana’s chloride standard is narrative. The 230mg/L “chronic aquatic life limit” petitioners cite is but one metric considered in assessing surface water suitability for aquatic life. That EPA aquatic life criteria (“AWQC”) is based on a 1986 EPA document that reviewed an extremely limited set of toxicity data for chlorine. Although it is commonly understood that high concentrations of major ions (Ca, MG, K, Na, Cl, SO₄) can be toxic to aquatic organisms, precise thresholds of effects are site specific as the constituents’ toxic effects are highly dependent on the combination of ions in solution. For instance, increased hardness (as CaCO₃) and chloride in solution are both known to reduce toxicity of sulfate to aquatic organisms. DEQ considered such interactions in the CHIA. *See, e.g.*, Table 2-3.

33. Assessing the effects of chlorides on aquatic life is complex, and relying on a single number from a limited review in 1986 is not a scientifically accurate means of determining chloride toxicity to macroinvertebrates in upper East Fork Armells Creek, particularly when sulfate and hardness levels are greater than zero. As with sulfate, the existence of a diverse macroinvertebrate community in upper East Fork Armells Creek demonstrates that chloride concentration in the stream does not prevent it from supporting its use by aquatic life.

The Aquatic Life Survey Methods and Protocol

34. I conducted an aquatic life survey of East Fork Armells Creek (ARCADIS 2014a) on October 9, 2014. As noted in the December 2014 report on that survey, my survey protocols and taxonomic identification of organisms followed both DEQ’s sampling and analysis protocols, *Sample Collection, Sorting, Taxonomic Identification, and Analysis of Benthic*

Macroinvertebrate Communities Standard Operating Procedure (MDEQ 2012), and the U.S. EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers* (Barbour et al. 1999).

35. In initial email correspondence with DEQ, I asked if the Standard Operating Procedure for determining 303(d) status for surface water bodies (MDEQ 2006) was appropriate for the scope of the benthic macroinvertebrate sampling event, and DEQ responded that "The document you sent is designed for assessment of water quality for impairment decisions." This response references a formal 303(d) determination process, and that was not the scope of the request of DEQ. They then referred me to the *Sample Collection, Sorting, Taxonomic Identification, and Analysis of Benthic Macroinvertebrate Communities Standard Operating Procedure* (MDEQ 2012), which was the protocol that I followed. DEQ agreed that the protocol I followed for the aquatic life survey was the appropriate protocol for the circumstances and purpose.

36. The only modifications to the DEQ protocol were made in the field when following the protocol to the letter was impossible because the geometry of the sampling location could not accommodate the standard protocol of sampling 11 transects along a 100 meter reach (e.g., when the wetted reach was less than 100 meters long), and when riffle habitats were lacking. In all cases, scientifically representative samples were collected in all microhabitats at each location.

37. In short, it is inaccurate to state, as petitioners do, that the study did not follow DEQ protocols. *See* Pet'rs' Br. at 42-43. It is further inaccurate to state that the protocol I followed would not determine East Fork Armells Creek's compliance with water quality standards. *See id.* As discussed above, the aquatic life study identified a diverse macroinvertebrate community in East Fork Armells Creek analogous to those found previously in East Fork Armells Creek and

in other analogous streams in the region. On that basis, the DEQ determined that East Fork Armells Creek was meeting its beneficial uses for aquatic life. *See* CHIA at 9-8.

38. Petitioners' statement that the aquatic life survey did not follow DEQ's assessment metrics is similarly misleading and, furthermore, irrelevant to the accuracy or quality of the survey. *See* Pet'rs' Br. at 43. Such metrics are not part of the survey itself, but, rather, interpretive tools applied to the samples and data gathered in the survey. The application or non-application of metrics had no connection to the methods and protocols I used in conducting the survey, and had no effect on the content or accuracy of the samples and data obtained in the survey.

39. In summary, I followed DEQ protocol, as well as my best scientific judgment, in conducting the aquatic life survey. Not applying metrics to the survey results had no effect on the survey methodology or the accuracy of the survey results themselves.

The HBI

40. Nonetheless, I did calculate one metric, the Hilsenhoff Biotic Index ("HBI"), based on the data collected in the aquatic life survey, obtaining index measurements of 6.98 and 7.90.

41. It is important to note that the HBI was originally developed in 1982 to evaluate organic stream pollution based on studies performed in Wisconsin. Although the HBI was calculated based on a Montana-specific species list (as stated in the DEQ SOP), the basis of the HBI rankings (e.g., "poor" or "good") originate from the Wisconsin-based research program. Because the rankings associated with HBI were based on Wisconsin stream conditions, its qualitative rankings (e.g., "poor" to "very poor" for scores of 6.98 and 7.90) are not always applicable to other regions of the country.

42. I believe the HBI is useful to compare relative conditions between analogous streams in the same region (e.g., between East Fork Armells Creek and other streams in the southeastern Montana) but not as an absolute measurement. The quality of aquatic life communities in East Fork Armells Creek cannot reasonably or usefully be judged by comparison with the aquatic life communities found in streams in Wisconsin.

43. I have never concluded, and the aquatic life survey does not say, as petitioners assert, that HBI scores from the 2014 survey are indicative of any level of organic pollution. *See Pet'rs' Br.* at 44.

The September 2015 PowerPoint Presentation

44. I prepared the “Aquatic Study Review” (Sept. 21, 2015) PowerPoint presentation referenced by petitioners as Exhibit 10. It shows and discusses data collected on East Fork Armells Creek from 1975 to 1978 in an attempt to explain that exceedances of water quality criteria on East Fork Armells Creek are not predictive of macroinvertebrate diversity or abundance in East Fork Armells Creek. This is because the criteria are based on different types of streams and macroinvertebrate communities.

45. Comparison of current macroinvertebrate sampling results to baseline (i.e., past) conditions is a better indicator of changes in water quality on East Fork Armells Creek (keeping in mind the caveat that ephemeral streams naturally experience high variability in macroinvertebrate samples due to changes in water conditions and variability of microhabitats).

46. The line quoted by petitioners from the presentation, that “[a]lthough [East Fork Armells Creek] supports aquatic life, aquatic life criteria are not met,” does not indicate that East Fork Armells Creek is not currently meeting its beneficial uses for aquatic life. Rather, it addressed sampling from the 1970s and was meant to demonstrate, as explained immediately below on the

same slide, that “[a]quatic life monitoring will likely demonstrate natural variability [and is] unlikely to demonstrate impacts from mining.” Ex. 10 to Pet. Br. at 12.

47. In summary, the September 2015 presentation did not reflect any conclusion that current water quality in East Fork Armells Creek does not support aquatic life and, in fact, was meant to demonstrate that sampling of aquatic life is unlikely to show effects from mining.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 7/21, 2016.


s/ Penny Hunter
Penny Hunter