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Re: Effluent Limitations Proposed In PRBRC Petition For Rulemaking, Chapter 2, Appendix H

Dear Members of the Environmental Quality Council:

The Petroleum Association of Wyoming (PAW) would like to take this opportunity to submit comments, on behalf of members of the oil and gas Industry, on the proposed Chapter 2, Appendix H rulemaking presented by the Powder River Basin Resource Council ("PRBRC" or "the Petitioners"). Specifically, PAW objects to the Petitioners' proposed effluent limitations for Barium, total dissolved solids (TDS) and sulfates. Petitioners' request that existing effluent limitations be revised purportedly to "more protective" levels simply is not supported by the weight of scientific evidence and on-the-ground practices in Wyoming.

PAW hereby submits these comments and the full report entitled *Water Quality Effects and Beneficial Uses of Wyoming Produced Water Surface Discharges* prepared by Geomega, Inc, dated July 16, 2007.

I. Background

The PRBRC Petition for rulemaking proposes more stringent effluent limitations for sulfates, total dissolved solids and barium on the grounds that the proposed

limitations are protective of livestock. The proposed limits are not supported by factual and scientific evidence and should be denied. First, there is no support for Petitioners' proposed effluent limitations in *any* peer-reviewed scientific literature and their position is belied by their own sources of information. In fact, a review of the scientific literature demonstrates that the current effluent limitations are protective of livestock and wildlife, will not cause a measurable decrease in livestock production, and that the proposed standards will result in no measurable difference in livestock production. Second, the proposed effluent limitations fail to take into account natural water quality, the fact that existing effluent limitations more accurately reflect ambient surface and ground water quality (which is traditionally used by ranchers for livestock watering) and that the mere existence of produced water contributes to beneficial uses including livestock watering, irrigation and wildlife propagation. Third, the proposed limits would, by themselves, cause a measurable decrease in livestock production due to loss of currently available produced water sources as a supply for livestock watering. Finally, PRBRC objected to the effluent limitations during the Triennial Review process and WDEQ and EQC rejected those objections on the grounds that the existing effluent limitations were protective of livestock and agricultural uses. EQC should not allow the Petitioners a "second bite at the apple", but should require them to proceed through the standard triennial review process.

II. PRBRC's Proposed Effluent Limitations Are Not Supported by Scientific Evidence.

PRBRC alleges that the current effluent limitations are not protective of livestock. When promulgating standards, rules, regulations, or permits, the WDEQ "shall consider all the facts and circumstances bearing upon the reasonableness of the discharge

including... the character and degree of injury to or interference with the health and well being of the people, animals, wildlife, aquatic life and plant life affected.” W.S. 35-11-302(a)(vi)(A). In this case, Petitioners have failed to demonstrate any “degree of injury to or interference with” livestock which may result from the use of water meeting the existing effluent limitations. Without this demonstration of harm, the EQA factors weigh against imposition of new effluent limitations.

PRBRC’s proposed effluent limitations are not supported by the weight of scientific evidence. In essence, Petitioners’ have selected four non-peer reviewed articles to support their position. Strangely, Petitioners fail to inform the Council of the large body of data, many peer reviewed, that fail to support or contradict their position. There are a significant number of peer reviewed sources that can be used to determine appropriately protective levels. In addition, even among the scant few sources Petitioners cite, there is little or no agreement from source-to-source for each of their proposed limitations. Essentially, Petitioners cite an article where it favors their position and disregard the article where it does not. This is not science, and the Council should not be misled into thinking it is. Science requires consideration of all available evidence, assessing its weight and credibility in a rigorous fashion, and reaching a result based on the weight of the evidence. No such process is discernable in Petitioners’ selection of quotations.

In contrast, Geomega Inc. has undertaken both an extensive scientific literature review and compiled data from Wyoming ranchers to determine protective levels of barium, TDS and sulfate. Geomega’s report analyzed the effects of varying concentrations of barium, TDS and sulfates on reproduction and physiological health of

ruminants (cattle), non-ruminants (rats) and birds. Reproductive effects studied included eggshell thinning (for birds), low birth weights, and reduced litter sizes or number of offspring. Physiological effects studied included weight loss or gain and physiological impairment. See Water Quality Effects and Beneficial Uses of Wyoming Coal Bed Natural Gas Produced Water Surface Discharges, Geomega Inc., p. 14 (dated January 16, 2007) (attached hereto as Exhibit A). Geomega computed concentrations of constituents based on levels of the constituents which resulted in no observed adverse effect levels (NOAELS) and lowest observed adverse effect levels (LOAELs) for ruminant mammals, non-ruminant mammals and birds. Geomega carefully evaluated each study to assure methodological soundness, comparability, scientific rigor and applicability. Based on this review, Geomega determined a best weight of the evidence value as a recommended benchmark. All was done in accordance with EPA procedures and protocols. Petitioners have demonstrated no such study and followed no such protocol.

Geomega also interviewed several Wyoming ranchers who use both produced and natural water sources for livestock watering to determine the “real-life” effect of TDS and sulfate constituents in produced and natural water sources on cattle health and reproduction. This is critical because water exists as part of the larger Wyoming environment and the Council is charged with protecting Wyoming’s environment and not some laboratory environment. Geomega then compared effects of TDS and sulfates on livestock from produced water and natural water sources in several drainages. Geomega used this empirical data to determine whether Geomega’s “recommended benchmarks” were consistent with results from typical livestock operations in Wyoming.

Once again, nowhere do Petitioners undertake any similar rigorous proof testing of their recommended values.

The results of both Geomega's literature review and empirical study demonstrate that, based on the scientific literature and Wyoming practice, WDEQ's existing effluent limits for TDS and sulfate are protective of livestock (and do not result in a measurable decrease in livestock or agricultural production). In addition, Geomega's study demonstrates that an effluent limit for Barium of 13.0 mg/L would be more than adequately protective of livestock and wildlife use of the water. The results are summarized below.

A. Barium

There is currently no effluent limit for produced water containing barium. Petitioners propose a standard of 0.2 mg/L based on two sources, neither of which is peer-reviewed. First, the Colorado State University document (Petitioners' Ex. 23) upon which Petitioners rely in support of their proposed barium limit has been updated since Petitioners proposed the barium effluent limitation. The updated version *does not* propose *any* limit for barium for livestock drinking water. (CSU Cooperative Extension, Livestock Drinking Water Quality, updated July 31, 2006, attached hereto as Exhibit B.)

Second, Geomega reviewed the other non-peer reviewed article relied on by Petitioners (Petitioners' Exhibit 19, Utah State University Analysis of Water Quality for Livestock) and could not identify *any* recommendation that barium in livestock drinking water be limited to less than 0.2 mg/L in the articles cited in the Utah State document. See, Ex. A, at p. 29. In fact, Geomega could not locate a *single* study supporting a 0.2 mg/L effluent limit. *Id.* Moreover, WDEQ conducted an extensive study concerning

barium which concluded that a 2 mg/l barium limit (based on the human health drinking water maximum contaminant level) was protective of all other uses, including agriculture. See Antidegradation Review, Analysis and Findings – Concentrations of Barium in the Surface Waters in Northeastern Wyoming Related to Discharges of Coal Bed Methane Produced Water (December 1, 2000), p. 8.

While Geomega could not find any support for a 0.2 mg/L limit in the works cited by Petitioners or any other source, it did determine, based on an analysis of eight peer-reviewed scientific sources, that a barium limit of 13 mg/L would be protective of livestock and wildlife. See Ex. A, at pp. 28-29. This limit is based on studies conducted on non-ruminant mammals with an uncertainty factor included to provide additional protection for livestock. See *Id.* at 28. In addition, 13 mg/L is consistent with Canada's lowest recommended water quality criteria for livestock and the limit determined by the NRC to be protective for horses, poultry and swine. *Id.* at 29.

In summary, the Geomega report finds no credible scientific support for a barium effluent limitation of 0.2 mg/L. It finds no credible scientific support for WDEQ's general limit of 2.0 mg/L for livestock watering. It finds some scientific support for a limit of 13 mg/L. Accordingly, the Council should either set the barium limit at 13 mg/l or else defer action on barium until the next triennial review, when more data may be available.

B. Total Dissolved Solids

Petitioners have proposed a revision to the TDS effluent limitation from 5,000 mg/L to 2,000 mg/L. Petitioners again rely on two non-peer reviewed documents in support of this position. Petitioners' interpretation of these "sources" is against the weight of the scientific evidence.

First, Petitioners' own materials belie their position. The Utah State University Extension Fact Sheet explicitly states that waters with TDS concentrations from 5,000 – 6,999 ppm (mg/L) "can be used with reasonable safety for dairy and beef cattle." Petitioners' Exhibit 19, at p.2. Also, the Utah State Fact Sheet incorrectly cites a South Dakota State University Extension Services Bulletin in support of a 2,000 mg/L TDS concentration. The South Dakota Bulletin actually provides that 3,000 mg/L *sulfate* – *dominant* TDS is acceptable for livestock consumption, which speaks more to the sulfate issue (and is consistent with the existing effluent limit for sulfate). Ex. A, at 36. In addition, Petitioners' Exhibit 20 (Wyoming Department of Agriculture Analytical Services Explanation of Standard Potable "Water Supply Series" of Analysis) states that water containing 5,000 mg/L TDS is suitable for consumption. See Petitioners' Ex. 20, p. 2.

Second, Geomega reviewed over 39 scientific studies and concluded that there are no observed adverse effects on ruminants (growing cattle) at 7,380 mg/L and, for non-ruminant mammals and birds at 4,750 mg/L. Based on the values determined in the literature, Geomega derived a benchmark at 5,600 mg/L for TDS. This result is consistent with the existing effluent limitation set forth in the regulations.

Finally, the empirical evidence collected from ranchers supports Geomega's recommended benchmark and, hence, the existing effluent limitations, for TDS. Interviews with ranchers documented that water with TDS ranging from 2,310 mg/L to 5,390 mg/L TDS was suitable for livestock drinking. See Ex. A, at pp. 22 – 25. Furthermore, no adverse effects were noticed by ranchers to livestock using produced water versus natural water. *Id.* at pp.23 – 24. Thus, under Wyoming conditions, the

existing effluent limits are adequately protective and result in no measurable decrease in livestock production. Based on the peer reviewed literature evaluated in the Geomega risk assessment, further reductions in the TDS effluent limit are not anticipated to cause any measurable difference in cattle production. There is no basis for the Petitioners' request.

C. Sulfate

Petitioners propose that the sulfate effluent limitation for discharges from coal bed natural gas facilities be reduced from 3,000 mg/L to 500 mg/L. Petitioners again rely on two non-peer reviewed articles in support of their position. There is no support for this proposed limit in any peer reviewed literature. Importantly, the materials referenced in Petitioners' Exhibit 19 do not support the proposed sulfate limit. See Exhibit A, at p. 32-33. Furthermore, the Wyoming Department of Agricultural Analytic Services document relied on by Petitioners provides no scientific basis for a sulfate limit of 500 mg/L other than merely stating that such water is acceptable. Clearly, any water with sulfate below the no observed adverse effect level is acceptable and such a conclusion adds nothing to the debate on where a limit should be established.

After reviewing over 28 peer reviewed studies, Geomega determined that the average concentration of sulfate that resulted in no observable adverse effects (NOAELs) for growing heifers was 3,660 mg/L. After taking into account water quality concentrations which relate to no observed adverse effect levels (NOAELs) for birds and other mammals, the scientific literature supports a benchmark concentration of 3,010 mg/L sulfate. See Ex. A, at p. 31. This recommended benchmark has been

adjusted to take into account the fact that the “upper end of acceptable WQCs for sulfate is much lower for the growing heifer than the adult steer.” Ex. A, at p. 31.

The empirical evidence again supports Geomega’s recommended benchmark and WDEQ’s effluent limitation of 3,000 mg/L for sulfate. Ranchers typically utilized water ranging from 1,180 mg/L to 3,100 mg/L with no adverse health effects noted. Furthermore, there was no difference in health between cattle using produced water or natural water. Once again, in Wyoming, both the peer reviewed literature and field proofing show that the existing standard is protective and will cause no measurable impact on cattle production. Petitioners’ proposed effluent limit will make no measurable difference. Hence, there is no basis for adopting the Petition.

D.

Conclusion

Petitioners have failed to provide any basis for their proposed effluent limitations. Peer reviewed scientific literature not only does not support Petitioners’ proposed limits but, in fact, supports the existing effluent limitations set forth in the regulations. Because there are no valid scientific data supporting Petitioners’ proposed limits, those limits should be denied.

In response to prior objections to their proposed effluent limitations on these same grounds, Petitioners have failed to provide any additional documentation in support of their proposed effluent limits. *See generally* Petitioners’ Responses to Comments (dated June 26, 2006). In that same response, Petitioners merely urged WDEQ to “impose limits on the more protective, rather than less protective, end of the spectrum.” Petitioners’ Responses to Comments, p. 12. There is no measurable decrease in livestock production when one compares the existing effluent limitations

with the proposed effluent limitations. See Ex. A, at p. ES-1; p. 42. Petitioners' are following the tautology that "lower is better" regardless of the scientific evidence. The EQA requires more to support an effluent limitation.

III. The Proposed Effluent Limitations Fail to Take in to Consideration Ambient Surface and Ground Water Quality

As stated earlier, Petitioners' proposed effluent limitations are more stringent than ambient water quality. Joint Response in Opposition to Petition to Amend Wyoming Water Quality Rule, Chapter 2, Appendix H, pp. 22-24. Ambient water has been used for decades by ranchers in Wyoming for livestock watering. It makes no sense to impose more restrictive effluents solely on oil and gas producers when no net environmental benefit will be achieved and existing users will be harmed by loss of water upon which they rely. Appendix A of the Geomega report gives specific examples of such uses and examples of landowners who will be harmed by adoption of the Petition.

WDEQ has determined that groundwater is acceptable for livestock watering purposes if it meets the standards for Class III groundwater. Significantly, the Chapter 8 Class III groundwater standards for sulfate, TDS and barium are identical to the existing effluent limitations prescribed in Appendix H. See WWQRR Chapter 8, Section 5, Table I. Again, ranchers have relied on groundwater for decades to provide water to livestock. Requiring oil and gas operators alone to meet effluent limits more stringent than what is considered by WDEQ to be acceptable for livestock watering is overly burdensome and inconsistent with water quality standards.

IV. The Petition Will Cause a Loss of Livestock Production by Limiting Water Available for Stock Production

The Geomega risk assessment compares produced water quality in a number of Wyoming production basins to the barium, TDS and sulfate proposed standards in the Petition. As the Geomega risk assessment outlines, many of those typical produced water qualities would not meet the standard proposed in the Petition. As such, surface discharge of water from these basins would not be permissible – even where a local landowner or rancher requests the water – unless the water is treated to meet the proposed effluent limitations. The Petitioners have failed to consider the measurable loss of livestock production from the resulting water curtailment at produced water sources that cannot meet the proposed effluent limits. See Ex. A, at pp 50-52. As a result, the Petition may, by itself, be inconsistent with the Agricultural Use Protection standard of Section 20 of the Wyoming Water Quality Rules and Regulations.

The importance of this test should not be underestimated. The Geomega risk assessment indicates *no measurable difference* in livestock production would be anticipated if the proposed Petition effluent limitations were met. Because there is no measurable gain in livestock production from adopting the Petition, any corresponding loss in livestock production due to curtailment of water sources will constitute a “measurable decrease in livestock production” that is inconsistent with the spirit, and possibly the letter, of Section 20. As industry representatives have testified and will testify, produced water discharges will be curtailed where treatment is not economical. If even one such produced water discharge is curtailed and a rancher presently using such water suffers a loss in livestock production as a result, then the Council’s adoption

of the Petition will violate the spirit of Section 20 and its responsibilities to balance the needs of all Wyoming citizens under W.S. 35-11-302.

V. Petitioners' Proposed Effluent Limitations Have Already Been Rejected by the WDEQ and EQC During the Triennial Review Process

As stated previously, Petitioners sought revisions to the barium and sulfate effluent limitations during the WWQR&R Chapter 1 Triennial Review process in 2005. WDEQ and EQC considered Petitioners' objections and rejected them based on the scientific data available and ranching practices in Wyoming. (Joint Response in Opposition to Petition to Amend Wyoming Water Quality Rule, Chapter 2, Appendix H, pp. 19-22). This recent rule-making effort by Petitioners is nothing more than an attempt to get a "second bite at the apple" with respect to the triennial review process. The Council should direct Petitioners to resubmit their concerns, with scientifically-defensible data, during the next triennial review

VI. Conclusion

The thinly veiled purpose of the Petitioners' proposed effluent limitations is to eliminate all surface discharges of produced water under the guise of livestock protection. In support of such an extreme demand, Petitioners present no scientifically defensible data review, omit peer-reviewed studies that contradict their conclusions, fail to consider the statutory factors or the harms that will result to existing uses. The Council should reject the attempts by Petitioners to get a "second bite at the apple", reject the Petition, and direct the Petitioners to participate in the triennial review process, where this discussion properly belongs.

For the foregoing reasons, PAW requests that PRBRC'S proposed effluent limitations not be adopted by the Council. As always, PAW appreciates this opportunity to provide these comments to the Council.

Sincerely,

A handwritten signature in cursive script, appearing to read "John Robitaille".

John Robitaille

Petroleum Association of Wyoming