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September 22, 2009

Mr. Jim Ruby  
Executive Secretary  
Environmental Quality Council  
Wyoming Department of Environmental Quality  
122 West 25<sup>th</sup> Street  
Herschler Building, Room 1714  
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**FILED**  
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Jim Ruby, Executive Secretary  
Environmental Quality Council

**Via: Overnight Delivery & Email (kwarin@wyo.gov)**

**Re: Comments on the Expert Scientific Opinion on the Tier-2 Methodology**  
**Docket: 08-3101**

Dear Mr. Ruby:

Yates Petroleum Corporation (Yates) would like to take this opportunity to provide comments on the *Expert Scientific Opinion on the Tier-2 Methodology*, dated May, 2009, drafted by Dr. Hendrickx and Dr. Buchanan. Specifically, the conclusions reached in the Expert Scientific Opinion on the Tier-2 Methodology (the "Expert Report") and stated by Drs. Hendrickx and Buchanan demonstrate that proceeding forward with a final rulemaking at this time with respect to the Tier 2 approach is premature. Given the concerns raised by the experts, some factual assumptions that appear to have been made and the lack of a viable alternative, the most appropriate action at this time is to remand the rule to the Department of Environmental Quality (DEQ) for review, recommendation and revision by the Water and Waste Advisory Board and appropriate stakeholders.

In addition, eliminating the Tier 2 approach in its entirety from the rule at this late stage of the proceedings would not be consistent with the recommendations of the DEQ or the advisory board, as required under the Wyoming Administrative Procedure Act (WAPA) and Environmental Quality Act (EQA). Yates is also concerned that the DEQ has not complied with the EQA in that it has not properly considered all of the factors required during the rulemaking process. Yates supports the experts' conclusion that the landowner waiver provisions in the proposed rule should be maintained as an appropriate option.

These comments are discussed in detail below.

## **The Expert Report Demonstrates that a Final Decision Regarding the Tier 2 Process is Not Appropriate at this Time**

It does not appear that, based upon the Expert Report prepared and testimony given by Drs. Hendrickx and Buchanan, the EQC can proceed with rulemaking on the proposed Section 20, Appendix H at this time. Drs. Hendrickx and Buchanan have identified potential issues with the proposed Tier 2 approach but have not identified how CBNG water specifically, as opposed to the mere presence of any water, including natural water, causes a “measurable decrease” in agricultural production. In essence, the Expert Report concludes that it is the mere presence of water on irrigated land, regardless of source (natural or otherwise), that can affect soil salinity and crop production. This presents a significant issue in attempting to draft regulations under Chapter 1, Section 20 due to the requirement that the existing water supply must be maintained at a quality allowing for continued agricultural use.

As the EQC is aware, Section 20 provides:

All Wyoming surface waters which have the *natural water quality potential* for use as an agricultural water supply shall be maintained at a quality which allows continued use of such waters for agricultural purposes.

Degradation of such waters shall not be of such an extent to cause a measurable decrease in crop or livestock production.

In other words, where the natural water quality is of a quality that supports at least some agricultural production, the water quality in the receiving stream is to be protected such that no decrease in production occurs, regardless of the source of the water.

The main issue with the Expert Report drafted by Drs. Hendrickx and Buchanan is that natural water quality in many receiving streams does not meet an “ideal” irrigation water quality. Further, the Expert Report does not identify *only* CBNG water as failing to meet the Section 20 standard and, in fact, concludes that the mere presence of *any* water may cause an increase in soil salinity and a corresponding decrease in agricultural production. The Expert Report states:

- Since even good-quality irrigation waters contain some salts, soil salinization will be certain unless sufficient water is supplied to leach the salts below the root zone. Expert Report, p. 9.
- As a matter of fact 100 cm of good-quality irrigation water, i.e., a typical amount normally applied in a single irrigation season, contains about 5 tons of



salt per hectare which is sufficient to salinate an initially salt-free soil (Hillel, 1998). *Id.*

- Most irrigation projects need a drainage infrastructure to accomplish the leaching necessary to keep the root zone at salt levels that are tolerable for the crops (Hoffman and Durnford, 1999). *Id.*
- The soil salinity of irrigated fields *depends mainly on the farmer's management. Id.* (italics added).
- These mean values are significantly different at the 5% level (Hendrickx et al., 1992) and demonstrate that irrigation management influences soil salinity to a much greater extent than irrigation water quality.

Ultimately, the experts conclude that

(i) effluent water quality *that is better than the pre-existing background water quality* could still cause severe soil alkalinity (Hillel, 1998); (ii) effluent water quality *that is worse than the pre-existing background water quality* may be used beneficially on artificially irrigated lands (Rhoades, 1999; Tanji, 1997), and (iii) soil salinity varies with time and can even change suddenly when riparian areas flood or when farmers irrigate fallow or abandoned lands.

Expert Report, p. 10 (italics added). Essentially, Drs. Hendrickx and Buchanan conclude that there is no direct link between the quality of water and soil salinity. Importantly, this is true regardless of the *source* of the water, whether it is produced water, precipitation runoff or other effluent utilized for irrigation. In fact, Drs. Hendrickx and Buchanan conclude that the *quantity* of water has more effect on soil salinity than the *quality* does. See Expert Report, p. 22 (use of the conservative Tier 1 approach can still result in increased soil salinity especially when the quantity of water is substantial). Hence, any water applied for irrigation uses, including natural runoff, may adversely impact soil salinity and result in a “measurable decrease” in agricultural production.<sup>1</sup>

Finally, in testimony before the EQC, Drs. Hendrickx and Buchanan stated that “the way [the Tier 2 approach] works out in practice seems to be quite reasonable.” Transcript of Conference Call Meeting Proceedings (April 8, 2009), p. 7, ll. 15 – 17. In

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<sup>1</sup> It is important to note that the vast majority of water used to irrigate “naturally irrigated lands” and “artificially irrigated lands,” is precipitation and sidehill runoff -- not in-channel flow or CBNG produced water. Stream flow data collected by Lowham Engineering demonstrates that even large scale in-stream flow events resulting from precipitation events do not produce enough water to provide adequate irrigation. See Lowham Engineering, LLC, *Bankfull Discharge on Ephemeral Channels in the Powder River Basin – Watershed Monitoring Program Results*, dated September 15, 2009 (submitted under separate cover).



fact, when asked by Chairman Boal whether Tier 2 was a “reasonable approach to regulating coalbed methane water,” Dr. Henrickx responded simply “yeah.” Tr. Conf Call., p. 13, l. 19 – p. 14, l. 5. During this testimony, the experts agreed that the Tier 2 approach was a reasonable approach to regulating produced water.<sup>2</sup>

Based on the Expert Report, written by EQC’s own experts, and their testimony, it is clear that it is not the quality of the CBNG produced water that is discharged into a stream, but rather the mere presence of water—natural water, CBNG effluent water, well water, it doesn’t matter—that may affect soil salinity. The Expert Report thus makes it clear that there is not a causal correlation between CBNG produced water discharge and the concerns expressed by some landowners. The Expert Report thus undermines the legal basis for limiting EC and SAR in CBNG discharges at less than acute levels because the EC and SAR in the produced water have little direct impact on salinity and sodicity of irrigated soils; rather, it is the management practices used (or not used) in applying water to those soils.<sup>3</sup>

Despite misgivings about the details of Tier 2, Dr. Hendrickx conceded that the general approach of adjusting effluent limits to actual conditions in the watershed was appropriate. Tr. Conf. Call, p. 13, 1.19-p.14, 1.5. EQC should remand the proposed Appendix H rule back to the Department and Water and Waste Advisory Board to develop an appropriate adjusting rule that accounts for existing field salinities and sodicities, the estimated quality and quantity of water that may actually spread or irrigate a field (which will depend on how and when the water is spread), the amount of precipitation or overland runoff the fields receive, and the typical cropping pattern. So long as a discharge would not cause a measurable decrease in production considering these factors, the adjusted rule should allow discharge.

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<sup>2</sup> The experts’ conclusion that the Tier 2 approach is reasonable, in light of real-world circumstances, is supported by water quality data gathered over the last decade in streams where CBNG development has occurred. This data demonstrates that CBNG discharges have had no negative effect on water quality of channel flows associated with natural irrigation during precipitation runoff events and that effluent limits derived from the existing Tier 2 approach are not impacting water quality in such a manner as to impede agricultural productivity. See InterTech Environmental & Engineering, LLC, *An Evaluation of Storm Flow Chemistry in Ephemeral Streams in the Coal Bed Natural Gas Production Area of the Powder River Basin*, dated, September, 2009, pp. 6-7 (submitted under separate cover).

<sup>3</sup> The Expert Report does not distinguish between “naturally irrigated bottomlands” or “artificially irrigated lands” with respect to its conclusions (i.e., that the presence of water alone can have an adverse impact on soil salinity and that “management” is required). This means that, with respect to “naturally irrigated bottomlands,” small-scale storm events – on those rare occasions when out-of-bank flows occur -- could adversely impact soil salinity. While during those flooding events produced water contained within the total flow could also impact soil salinity (due to its presence, *not* its quality), such an impact would be no different than that of in-channel flows from precipitation runoff. However, data demonstrates that even “considerable” CBNG production has had no impact on water quality of channel flows associated with natural irrigation during storm events. See *An Evaluation of Storm Flow Chemistry in Ephemeral Streams in the Coal Bed Natural Gas Production Area of the Powder River Basin*, pp. 6-7.



## Factual Concerns with the Expert Scientific Opinion on the Tier-2 Methodology

Yates has the following concerns with respect to apparent factual assumptions made by Drs. Hendrickx and Buchanan in preparing the Expert Report. Specifically, Yates has the following concerns:

- 1) The EQC Experts do not recognize the fact that there is no documented and substantiated evidence of “measurable decreases” in agricultural production due to permitted CBNG produced water discharges in the PRB over the last 10 years. The Expert Report does not provide any evidence (or other offering) that there has been a “measurable decrease” in crop production due to the *quality* of CBNG water. The only evidence they provide is anecdotal testimony which indicates that it is the quantity of water which causes concerns for landowners. *See* Expert Report, at p. 18 (“testimony of landowners typically refers to water quantity rather than water quality;” and Dr. Munn’s observations that in “many cases, you’re going from ephemeral to a perennial flowing system”). There is no empirical evidence, after more than a decade, that permitted CBNG discharges have caused a “measurable decrease” in crop production due to the water *quality*.
- 2) The EQC Experts do not recognize the fact that the Tier 1 approach for deriving default EC limits is based on the same principles as Tier 2. Tier 1 limits are simply the lowest, most conservative EC values because they are based on the assumption that the least salt tolerant crops are growing in all fields. The Expert Report concludes that “the use of Tier 1 can be continued since it is conservative and has been accepted by the community.” Expert Report, p. iii. The EQC must recognize that the Tier 1 “default limits” are derived using the same methodology as that used in the Tier 2 approach. That is, Tier one assumes that a specific plant’s presence in a drainage means that the soil in that drainage is of a certain salinity and water quality is derived from that soil salinity. (For example, Tier one assumes that the presence of alfalfa indicates a soil EC of 2,000  $\mu\text{mhos}$ . The water quality is derived by dividing soil salinity by 1.5 to establish a limit of 1,330  $\mu\text{mhos}$ . This is substantially the same methodology used in the Tier 2 approach with the exception that Tier 2 looks at site-specific factors, such as soil salinity and plant species.
- 3) The EQC Experts make the assumption that irrigation is actively managed in Wyoming. As stated above, the Expert Report concludes that there is no direct correlation between water quality and soil salinity, regardless of the source of the water. In addition, the experts concluded that all sources of water, even “good rainwater,” would have to be managed to ensure that there was no adverse impact on soil salinity. Tr. Conf. Call., p.12, l. 14 – p. 13, l. 13 In addition, the Expert Report provides that, even with “100 cm of good-

quality irrigation water... [which] is sufficient to salinate an initially salt-free soil... most irrigation projects need a drainage infrastructure to accomplish the leaching necessary to keep the root zone at salt levels that are tolerable for the crops.” Expert Report, p. 9. In other words, all irrigation would need to be “managed” in order to prevent increases in soil salinity, regardless of the source of the water. This position would be true, according to the report, regardless of whether the Tier 1 or Tier 2 approach is utilized in determining the appropriate water quality. The Expert Report essentially provides that management practices are the only way to minimize impacts of irrigation on soil salinity, despite the fact that, in Wyoming, very little irrigation management is in practice.

- 4) The EQC Experts appear to assume that all flows of water in the Powder River Basin are of sufficient amount, frequency and duration to sufficiently irrigate upland areas. Lowham Engineering has conducted a fieldwork and flow sampling associated with a basin-wide Watershed Monitoring Program (WMP) that looked at all flow events in ten watersheds since 2001. The WMP demonstrates that of 145 flow events, only fifteen percent “result in overbank flow.” Lowham Engineering, *Bankfull Discharge on Ephemeral Channels in the Powder River Basin – Watershed Monitoring Program Results*, p. 2 (submitted under separate cover by Lowham Engineering). In addition the flow events contributed only an average of “0.4 to 1.8 inches of infiltrated water every four years” and that these overbank flows “do not deliver adequate water for irrigation.” *Id.*
- 5) The Expert Report provides that the Tier 2 approach should be refined (i.e., with the addition of monitoring and management) but does not propose a solution-oriented alternative. The experts stated in the April 8, 2009 conference call with the EQC that “Tier 2 could work quite well if the sampling procedure is changed” (Tr. Conf. Call, p. 8, ll. 21-22) and that Tier 1, Tier 2 and Tier 3 would be “very successful” if they are “properly monitored and properly managed” (Tr. Conf. Call, p. 11, ll. 1 -1 11). However, they do not provide any specific strategy for going forward. Because no specific strategy was recommended by the experts, the EQC must remand the rule back to the DEQ and Water and Waste Advisory Board.

### **Unilateral Removal of Tier 2 Provisions from Appendix H**

The deletion of Tier 2 from Appendix H at this late stage of the rulemaking process would be inconsistent with the Environmental Quality Act (EQA), the Wyoming Administrative Procedure Act (WAPA) and the DEQ’s Rules of Practice and Procedure. Essentially, removing the Tier 2 approach from Appendix H would significantly depart



from the rule as it was considered by the Waste and Water Advisory Board and recommended by the DEQ and commented on by the public.

Proposed Appendix H represents a comprehensive approach to addressing the issue of EC and SAR in waters of the State. This comprehensive approach was adopted by the administrator, the director, and the advisory board after one of the most comprehensive and extensive rulemakings in history. The tiered approach set forth in Appendix H represents a carefully considered and negotiated solution to the unique issues presented by EC and SAR. In large part, the Department, through the administrator and director, consented to the stringent Tier 1 limits because of the existence of the Tier 2 and, to a lesser extent, Tier 3 provisions allowing for relaxed limits where adequate technical justification was presented. If the Council were now to reject Tier 2, the resulting Appendix H becomes much more stringent than recommended by the administrator, director and advisory board. In fact, there is no assurance that proposed Appendix H would, if Tier 2 were to be stricken, emerge in its present form as the recommendation because of the increased stringency and the increased reliance on the little discussed, and relatively sparse, provisions governing Tier 3. Striking Tier 2 would thus constitute a substantial departure from the proposed rule and warrant remand of the entire rule package back to the Department and the advisory board. Such a remand of the entire rule is also required by the applicable statutes and rules.

First, all versions of Appendix H, including the most recent version, presented to the EQC for consideration allow for the use of the Tier 2 approach. *See* Draft Chapter 1 Wyoming Water Quality Rules and Regulations, submitted November 17, 2008. The DEQ submitted these versions (including the most recent version) based on recommendations from the Waste and Water Advisory Board and public comment.

WAPA outlines a specific set of procedures to be followed during the rulemaking process. This includes the requirement that an agency must provide notice of its intended action and provide reasonable opportunity to submit comments. *See* W.S. 16-3-301. As stated above, thus far, the only public notices issued by DEQ have included versions of the proposed rule allowing for the Tier 2 approach. *See* DEQ Public Notice, dated July 3, 2008; DEQ Public Notice, dated September 5, 2008. Even after all the rounds of public notice, the Tier 2 approach is being recommended by DEQ to the EQC, as is clear in the rules package submitted to the EQC by Mr. Waterstreet in November, 2008. Since November, 2008, the EQC has received the Expert Report (discussed above) from Drs. Hendrickx and Buchanan. No re-proposed rule has been provided for public comment. In addition, no indication regarding what changes to the proposed rule may be considered at the September 30, 2009 hearing. In other words, no notice has been given to interested persons concerning any changes in the proposed rule.

Because there has been no public notice of agency action with respect to the deletion of Tier 2 in Appendix H, the EQC cannot unilaterally remove that approach from the rule.



Second, the EQA specifically prescribes the rulemaking procedure for the DEQ and EQC. It is the purview of the advisory board to recommend to the EQC “through the administrator and director the adoption of rules.” W.S. § 35-11-114(b). The Administrator of the Water Quality Division is then to recommend rules to the Director of the DEQ *after* receiving public comment and consultation with the Waste and Water Advisory Board. *See* W.S. § 35-11-302(a). In other words, the Waste and Water Advisory Board consults with and recommends to the Administrator a rule; the Administrator then recommends the rule to the Director; the Director then recommends the rule to the EQC.

The EQA provides the EQC’s authority in rulemaking actions. The EQC is to “promulgate rules and regulations necessary for the administration of this act, after recommendation from the director of the department, the administrators of the various divisions and their respective advisory boards.” W.S. § 35-11-112(a)(i). The EQC is also mandated to conduct hearings “for the adoption, amendment or repeal of rules... recommended by the advisory boards through the administrators and the director.” W.S. § 35-11-112(a)(ii). Hence, the EQA provides that the EQC may promulgate rules after the proper rulemaking procedures are followed. However, the EQA caveats the EQC’s authority in that it is the advisory boards, administrators and directors who recommend rules for adoption, amendment or repeal.

This process is important with respect to this rulemaking for two reasons. First, any rule that is subject to promulgation by the EQC must be recommended by the advisory boards, administrators and the director. If the EQC were to make a substantial substantive change to the rule (i.e., the deletion of the Tier 2 process), the rule would no longer be substantively the same as the rule that had gone through the process. Second, the EQA restrains the EQC’s authority in the rulemaking process to holding hearings on the adoption, amendment or repeal of rules that are recommended by the boards, administrators and the director. Importantly, the statute does not grant the EQC the authority to unilaterally make changes to the recommended rule but, rather, only to hold hearings and, at most, deny the promulgation of the rule.

The removal of the Tier 2 approach in Appendix H by the EQC would constitute a substantial substantive change to the Section 20 rule as a whole. Removal at this late juncture in the process would circumvent the public notice requirements set forth under WAPA. In addition, the EQA limits the EQC’s rulemaking authority to acting on rules recommended by the boards, administrators and the director; the EQA does not provide that the EQC may unilaterally amend rules on its own. For these reasons, if the EQC determines that the Tier 2 approach is questionable, it should remand the rule back to DEQ so that it may be amended as required under the EQA.<sup>4</sup>

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<sup>4</sup> For the same reasons outlined in this section, the provisions regarding the livestock watering standards should not be unilaterally changed at this point in the rulemaking process. The current iteration of the rules



## Factors to be Considered

Finally, we are concerned that, in developing Appendix H, neither DEQ nor the EQC has considered certain criteria as required during rule promulgation under the EQA. Chiefly, no formal evidence has been provided (in fact, DEQ stated, and EQC has acknowledged, that only unhelpful “anecdotal” evidence had been considered by DEQ during a conference call on November 8, 2008) by DEQ in considering those factors required under the EQA.

As stated above, under the EQA, the administrator of the Water Quality Division is to recommend rules to the director after consultation with the Waste and Water Advisory Board and receiving public comment. W.S. 35-11-302(a). In recommending any rules “the administrator and advisory board shall consider all the facts and circumstances bearing upon the reasonableness of the pollution involved including... the social and economic value of the source of the pollution.” W.S. § 35-11-302(a)(vi). (As an example of the “economic value of the source,” if the Tier 2 option is eliminated from Section 20, at least 11,000 WYPDES permitted wells will likely be adversely impacted (i.e., may not be drilled or may be shut-in). *See* Spreadsheet from InterTech Environmental & Engineering, LLC, 2009 *Sept. Sec 20 Tier 2 Affected Wells and WYPDES Permits* dated September, 2009 (submitted under separate cover). This represents a substantial loss of tax revenue for counties and the State.) Hence, the EQA *requires* that the administrator and the advisory board consider the social and economic value of the discharge of produced water. In this case, DEQ has admitted that it has failed to do so.

Because the Section 20, Appendix H rule package was submitted to the EQC without first undergoing the required steps in the rulemaking process (i.e., “all the facts and circumstances bearing upon the reasonableness of the pollution” were not considered prior to recommendation to the director), the entire package should be remanded to DEQ with instruction to fulfill the requirements set forth under W.S. 35-11-302(a)(vi).

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package submitted by Mr. Waterstreet includes livestock watering standards for total dissolved solids (5,000 mg/L), sulfate (3,000 mg/L) and chloride (2,000 mg/L). Rule Package submitted on November 17, 2008, p. H-2. These are the same limits that have gone through the rulemaking process (these limits were recommended by the Water and Waste Advisory Board to the Administrator who, in turn, recommended these to DEQ for promulgation. *See* Transcript of Public Meeting on Proposed Revisions to Chapter 1 Related to Section 20 Agricultural Use Protections, March 28, 2008, pp. 97 – 101. The advisory board’s recommendations concerning the livestock watering limits were adopted in whole by the DEQ in the rule package. An attempt to remove those provisions from the rule at this point would be in contravention of the EQA rulemaking provisions. Hence, if these provisions are not satisfactory to the EQC, it must remand the rule to DEQ for recommendation by the advisory board and stakeholder comment.

## Expert Support of Waiver Provisions

Yates agrees with the experts' support of the waiver provisions in the existing Section 20 proposed rule. The Expert Report provides that the "if the water quality requirements of Tier 1 cannot be met, the Irrigation Waiver seems the preferred alternative since it requires an irrigation management plan that provides reasonable assurance that the lower water quality will be confined to the targeted lands." Expert Report, pp. iv & 23.

## Additional Comments

Finally, Yates reiterates its request that a "non-severability" clause be included in the final rule when the revised Chapter 1 rule is submitted to the U.S. Environmental Protection Agency for final approval. This will ensure that the rule and policies under the rule, as recommended by the Water and Waste Advisory Board, the Water Quality Division Administrator, the DEQ and the EQC will remain intact.

## Conclusions

The Tier 2 approach should be remanded to the DEQ for proper rule development through the Water and Waste Advisory Board and stakeholder input, given the conclusions set forth in and assumptions made in preparing the Expert Scientific Opinion on the Tier-2 Methodology. This is even more true given that the DEQ failed to consider the economic reasonable of the source and, hence, did not give due consideration to all of the factors, as required under the EQA. If the Tier 2 process is eliminated from the rule in its entirety, the finalization of the rule without the approach would be inconsistent with the EQA, which requires recommendations from the Water and Waste Advisory Board, the Water Quality Division and the Director, during the rulemaking process. Finally, Yates agrees with the experts' support of the waiver provisions in the proposed rule.

As always, Yates appreciates this opportunity to provide these comments and looks forward to working with DEQ in developing an appropriate regulatory approach under Section 20. Please give me a call at 575-748-4185 if you have any questions.

Sincerely,



Lisa Norton  
Yates Petroleum Corporation  
Environmental Division Director