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Please see attached PDF for detail comments.

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Wyoming Department of Environmental Quality
Water Quality Division
Cheyenne, WY

RE: Public Comment on WY0002062 Permit on Water Disposal into Badwater Creek, Wyo

To Whom it may Concern:

I am writing this letter to express my concern with the Wyoming DEQ permit to allow produced oil/gas fluids to be deposited on to the surface and into surface waters at the Moneta Divide area.

I am not writing this as a member of any conservation organization, but just as a concerned citizen. I do have quite a bit of familiarity with oil and gas operations as I worked for Conoco as a production and exploration geologist in the early 1990's. I also have a quite a lot of familiarity with the Moneta Divide area, as I did a lot of my graduate geologic research in the general vicinity. I am very familiar with water issues in Wyoming as a Supervisor on the Clear Creek Conservation District and former member of the Lake DeSmet Counties Coalition.

Please note that I am a supporter of the oil and gas industry in Wyoming. Oil and Gas drilling and production is critical to our state's economy and is an important source of tax revenue for state and local government. Development of domestic petroleum resources is important for many reasons. It can and does coexist with appropriate, common-sense, regulation and protection of critical environmental and wildlife resources. We can have it all, economic benefits of oil and gas production and protection of our air, water, land and wildlife.

It is standard oil and gas industry standard to dispose of produced waste fluids from production activities via permitted disposal wells or via reinjection back into producing horizons. The proper handling and disposal of these "waste" fluids is a major cost in Oil and Gas production, but is an acknowledged and expected expense. When the expense of handling the waste fluids exceeds the revenue generated by production of saleable products then either the field is sold to lower cost operators or in very rare situations is plugged and abandoned and reclaimed.

Oil and Gas production operations are totally dependent on favorable market conditions for their saleable products and managing production costs. If commodity prices are high, then more expensive extractive technology (e.g. secondary and tertiary recovery projects, horizontal drilling, multi-zone

fracking, infrastructure work-overs, improved pumps, etc.) can be employed. When prices are low, most of new investment stops or slows, as economics preclude enhanced development. It is simple economics. But, it is important to remember that the resource (the oil and gas) does NOT go away. When economics and technology become favorable, then a given oil and gas play may become economically viable.

If the Moneta Divide project development, is marginally economic without the disposal of produced fluid onto surface lands and water, (rather than with the costs of traditional disposal wells or reinjection), then it is questionable whether the development is economically feasible at all. It may not be economic to develop at this time. Unfortunate for the current lease holder/operator, but remember the commodities that are in the ground aren't going anywhere, they have been there for millions of years, it will just take more favorable market conditions or new technological developments to make it feasible to produce. One only needs to look at the Jonah Field/Pinedale Anticline to see a similar situation. The gas deposits in that part of the Green River Basin were long known, but it only became economic when new completion techniques were developed.

The estimated recoverable Oil and Gas resources at Moneta Divide are potentially, immense, multiple TCF's of natural gas, and hundreds of millions of barrels of oil. This project has the potential to be one of the largest oil and gas plays in Wyoming's History. It could be a tremendous source of revenue for the State of Wyoming and the Operator and Developer. Surely, if this prospect is to be so significant, there should be more than enough revenue available for the operator to properly dispose of the waste water via re-injection or treatment facilities and still realize tremendous profits. Remember, the Operator is most concerned about maximizing the return on investment, and not so much concerned with developing the resource responsibly and sustainably. Moneta Divide is just another asset in this company's portfolio of assets. Their goals are simply profit and financial gain. They are not legitimately concerned with protection of Wyoming's natural resources or with Wyoming's people and their long term well being.

It is no secret that Wyoming is facing some challenging economic times. Jobs are hard to come by, and many legacy industries are struggling (i.e. coal). There is a great deal of anxiety among our population that our economy and way of life is threatened. There is also a great deal of pressure on Wyoming's Legislature, State and Local Governments to meet funding needs via tax revenue from energy production. There seems to be enough "desperation" by many of these folks, that they are more than willing to compromise basic, common sense, resource protection (in this case surface water quality) in favor of minimally regulated industrial development. It may be somewhat financially beneficial, in the short run, but ignores the long term costs to Wyoming and future Wyoming generations. It appears that the operators/developers at the Moneta Divide are trying to capitalize on this situation, to take some "shortcuts" to cut costs and maximize profits, because no one wants to discourage development.

It is also notable that natural gas commodity prices continue to be relatively low and steady. There is a plentiful supply of Natural Gas in North America. There is so much supply and prices are so low, that many operators in the Powder River and Denver Basins are almost treating natural gas as a waste or nuisance product and continue to vent or flare substantial volumes of natural gas when they can. It

appears that economics preclude developing gathering systems and pipelines for the natural gas vs. just selling oil and liquids from the production in these areas. This begs the question of why is Wyoming trying to facilitate a natural gas prospect in Central Wyoming with marginal economics and significant environmental concerns, while not more strongly forcing operators in eastern Wyoming to gather and sell the natural gas that is produced as a “by-product” of the oil production? There clearly isn’t a strong current demand or shortage for natural gas in North America. So, there really is no need for urgency to develop the resources at Moneta Divide until we have the market and technology to develop economically and environmentally responsibly.

It would be prudent for Wyoming to resist the urge to allow any of these regulatory “shortcuts” to facilitate development. One needs to look at the aftermath of the Coal Bed Methane play in Northeastern Wyoming. There are thousands of abandoned wells that need to be Plugged and Abandoned by the State of Wyoming, and the BLM. The operators are long gone, and now taxpayers are on the hook to pay for this and the reclamation of abandoned infrastructure. Also, State and Local government are faced with delinquent tax payments from operators that have stretched local budgets, and now considered unrecoverable.

Another important example is the ongoing challenges with ozone air pollution in the Green River Basin related to the development in the Jonah Field/Pinedale Anticline. There is a real and serious health threat to many people in that area that may be susceptible to that type of air pollution. Government and taxpayers are paying for this mitigation, and the original developers and responsible parties are out of the picture. Also significant has been the precipitous decline of the Green River Basin Mule Deer herd by 30-50% as a result of this large oil and gas development. This species is increasingly threatened and may not come back to pre-development levels.

Expecting industry to be a “good neighbor” and responsible “corporate citizen” is naïve and unrealistic. Industry will almost always, do the minimum to meet environmental requirements. They are motivated by profit only. Their interest in a region, its people, and resources, is minimal. They are only concerned with their asset and the return on investment. Odds are that the current operators at Moneta Divide will begin development, then, will sell the lease to maximize short-term return. When there is a need for remediation, reclamation, or responsibility in the future these developers will be long gone and the Government and taxpayers will be “on the hook” to clean up and deal with their mess.

State Government is not required to facilitate any and all development in Wyoming. Economic development should be left up to the private sector. However, State Government is required to regulate certain aspects of industries that could negatively affect other Wyoming citizens. Government overreach and over regulation is also wrong, but in cases where public health and welfare are threatened, then it needs to step in.

If the operator is allowed to dispose of waste produced fluids onto surface lands and waters in the Moneta Divide area, then the potential for negative land and water pollution and degradation becomes unacceptable. The risks of environmental and economic damage to many other Wyomingites are too great to grant this permit. Here are some major points to consider:

- If the operator needs this permit to facilitate development, then the overall economics of the project are marginal at best. If oil and gas resources are present at Moneta Divide, in the volumes that are estimated, revenue streams should be more than sufficient to cover proper water disposal costs.
- The current operator is an out-of-state owned enterprise that is just the latest in a long line of lease holders for the oil and gas rights in this area. Lease holders come and go, but the resources are long term. The oil and gas reserves should be developed, but on Wyoming's terms, without degradation of our air, water, land, and wildlife. The people and State of Wyoming owe these operators nothing.
- The short term economic loss of delaying this project until market conditions/economics or technology improves is minimal, versus the risk of degradation of Wyoming's Surface Waters in the Wind / Bighorn River watershed. Wyoming's economy always needs a boost, but the situation is not so desperate that we need to ignore common sense environmental protections. If the current lease holder is unable to go forward with the development now because it can't handle the water disposal costs, the oil and gas in the ground stays in place. Wyoming loses nothing.
- Allowing produced fluids to be disposed onto surface lands and waters is counter to accepted industry standards and practices. Disposing of produced fluids onto surface land and waters is NOT standard practice in the developed world, and is bad operational practice. It also sets a dangerous precedent for future oil and gas developments in Wyoming.

Most importantly, polluted, produced water (and/or increase volumes of such) from Moneta Divide, will continue to negatively affect water quality for the following:

- Badwater Creek and its watershed. Allowance of produced fluids disposed into these surface waters continues to degrade the water quality.
- Boysen Reservoir (major irrigation water storage & significant recreational, and fishing resource)
- Wind River in Wind River Canyon (World class fishery and revenue source for the Wind River Reservation Tribes)
- Big Horn River from the Wedding of the Waters into Big Horn Reservoir (fishing, recreation, irrigation, domestic use, municipal uses, etc.) The Big Horn River is the dominate water source for the eastern half of the Big Horn Basin. There are tens of thousands of Big Horn Basin residents that utilize Big Horn River water for municipal uses. Any degradation of water quality in this watershed threatens all water users in this part of Wyoming.

- Thousands of acres of irrigated agricultural land in the Big Horn Basin. Agriculture is a major component of the economies of Hot Springs, Washakie and Big Horn Counties. If the water quality in the Bighorn River watershed is compromised it will devastate the economy in the Big Horn Basin.
- Create the potential for conflict with other downstream water users (i.e. State of Montana and their water users)

Is this permit and project worth the risk to water quality in the Big Horn River watershed and Wyoming residents? The answer is obvious. It is an emphatic NO! It is amazing to me that the State of Wyoming and the DEQ are even considering this permit. The oil and gas resources aren't going anywhere, and maybe, there will be a day when economics will be favorable for responsible development with adequate and safe waste disposal with much less potential for resource degradation.

It is also notable that the Wyoming Oil and Gas Commission denied the operator a permit to re-inject these same waste fluids into the Madison Formation via disposal wells. The Madison is a known aquifer in Wyoming and other parts of the Intermountain West, and it was deemed too risky to dispose of Moneta Divide waste water into the Madison in this region. It is ironic that the Oil and Gas Commission that is tasked with facilitating and regulating the Oil and Gas industry in Wyoming is apparently more concerned about the potential of degradation of an aquifer with these waste fluids than the Wyoming DEQ (which is tasked with the protection of Wyoming's Air, Water, and Land resources) is with the degradation of surface waters in the same area. Even more ironic is the fact that the Madison Formation in the Moneta area is quite distant from any utilization of Madison water. It is highly improbable that waste water from re-injection would actually migrate to areas where the Madison is utilized as an aquifer for domestic use. Yet, it was deemed as enough of a concern that a re-injection permit into the Madison was denied. The Wyoming DEQ should be seeking ways to improve Wyoming's water, air and land resources not ways to "degrade" them or compromise their integrity.

There are many issues related to the DEQ waste water disposal permit at Moneta Divide that are in question. None of these have been addressed in the industry funded, study of waste water disposal at Moneta Divide. Also, it is important to note that this study was very heavily dependent on elaborate, computer generated modeling, with a relatively small component of real world data points. It is impressive looking on the surface, but relies heavily on assumptions and theoretical conditions, without a lot of empirical test data backing them up. These include:

- The only reason produced water is allowed to be disposed of in the Badwater Drainage is that it was allowed pre-Clean Water Act and the practice was "grandfathered" to allow it to continue in the modern era. It would NOT be allowed to occur under current regulatory standards. Instead of continuing to allow this discharge and to facilitate this practice and future discharge, the Wyoming DEQ and EPA should force this method of disposal to stop in Badwater Creek.
- According to the BLM EIS and Project Plan. There is a great deal of uncertainty with the geology in the proposed project area. This uncertainty brings many pertinent questions.

- Is the chemistry of the waste water consistent, throughout the entire field and in all potentially productive horizons and productive depths?
- Is current /historical production in this area indicative of hydrocarbon and produced water volumes and chemistry coming from any new development?
- Will the chemistry of waste water vary during the lifespan of production?
- There is also great deal of uncertainty about the volumes and production streams of produced wastewater at the Moneta Divide development.
 - It has been stated that each individual well could produce up to 3000 bbls/day of produced water with an overall production of over one Million bbls/day of produced water from the project.
 - According to the DEQ/Aethon study only 68,000 bbls (untreated) to 197,000 bbls (mix of treated and untreated) can be disposed through the Badwater Creek drainage. How is the remaining 800,000 bbls/day waste water production going to be handled?
- How much produced water will be “trapped” into Boysen’s pool vs. how much will be flushed downstream through the system? The published mathematical models in the study may indicate full “pass through” of pollutants, but there appears to be meager real world data to support the model.
- What is the potential for increase in concentration of dissolved solids throughout Boysen and downstream throughout the lifecycle of production of Moneta Divide? Adding more pollutants daily will not do anything to improve water quality in Boysen or the Wind River, it will only serve to further degrade current conditions.
- Is there a threat of precipitation of dissolved solids from the waste water as mixing/dilution occurs? It is interesting that Boysen is defined as having a AB2B water quality designation, yet the water discharge coming out of Boysen into the Wind River below the dam is Class I. What happens to the pollutants and dissolved solids that are in Boysen water vs. water in the Wind River below the dam?
- The water quality study utilized by the Wyoming DEQ was funded by Aethon. There is a potential for conflict of interest, or potential of “spin” of data to be aligned with the goals of the developer, and to minimize publication of any risks. Has this study been peer-reviewed and verified by other objective, professional, organizations?

- Why is it preferable (for Wyoming DEQ) for this waste water to be disposed of into surface waters versus re-injection?
- Why was the Wyoming Oil and Gas commission concerned about unacceptable water quality degradation in the Madison Formation by re-injection of this waste water?
- Who will be responsible for mitigation of the impacts to downstream water users?
 - Will municipalities that utilize Bighorn River water be forced to upgrade or build new water treatment facilities to deal with the increase of pollutants in their water supplies?
 - Who will be responsible for financial losses by the agriculture water users if their production suffers as a result of higher levels of dissolved solids and other pollutants in their irrigation water from the Bighorn River?

Many of the main proponents of this project and those that dismiss the risks to the watershed are in Fremont County which should be noted is upstream of the potential water degradation. It benefits Fremont County with minimal consequences to their residents and resources. The concern is downstream, in Hot Springs, Washakie, and Big Horn Counties and further downstream into Montana. Why should one region of Wyoming benefit to the possible detriment of others? There doesn't need to be "winners" and "losers" here. Just make the Operator dispose of the waste water properly (via reinjection) and everyone wins.

Adding all of these factors up, it should be obvious that allowing Aethon (or any other operator) to dispose of any produced waste water into Badwater Creek, Boysen Reservoir, and the Wind/Bighorn River is a terrible idea. It is not standard oil and gas industry practice, and is not sanctioned by current environmental law (i.e. Clean Water Act). Any continued or additional disposal of produced water into this water system will not maintain or improve water quality in this watershed. It can only lead to more degradation of water quality. There are too many, important, stakeholders that rely on good water quality in this watershed to threaten water quality in the watershed in ANY way. The stakes are simple... The needs of long-term, municipalities, agricultural operations, and individual citizens that need and utilize clean water in the Wind/Bighorn River watershed. vs. Short-term, for-profit, and risk filled, enterprise, out-of-state (and probably temporary) operator, that wants to take cost-saving "short-cuts", to facilitate profits. The path forward is crystal clear, maintain and improve water quality in the watershed and deny continuation of this discharge permit. And make it clear that resource degradation of this type is not to be condoned or encouraged here in Wyoming.

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