Transmitted via DEQ's Public Comment Portal and Email

June 19, 2019

Kevin Frederick
Administrator, Water Quality Division
Wyoming Department of Environmental Quality
200 West 17th Street
Cheyenne, Wyoming 82002

Re: Request to Defer Action on WYPDES Permit No. WY 0002062 (Aethon Energy Operating, LLC)

Dear Mr. Frederick:

We are writing to request that you defer further administrative action on the above-referenced permit application until such time that Aethon Energy Operating, LLC (Aethon) provides essential water quality information required by the agency's rules governing the processing and issuance of Wyoming Pollutant Discharge Elimination System (WYPDES) discharge permits.

Aethon's permit application lacks basic and critical information preventing the Wyoming Department of Environmental Quality (DEQ) from meeting its legal obligations to protect the waters and the citizens of the state. Such missing information includes: (1) a description of the treatment processes that will be used to remove well treatment chemicals; (2) evidence that the produced water is of good enough quality to be used for wildlife or livestock watering or other agricultural uses; (3) evidence that the discharge will actually be used for wildlife or livestock watering or other agricultural uses; and (4) water quality and flow data for Alkali and Badwater creeks necessary to ensure that Wyoming water quality standards will be met.

Our organizations all have members who use and rely on the waters affected by the proposed discharges. We are not opposed to the expansion of the Moneta Divide oil and natural gas field, but development must be carried out in a manner that protects the health and safety of

Wyoming's residents, meets water quality standards, and respects the rights of downstream water users.

I. Applicable Law

The Clean Water Act (CWA) prohibits the discharge of any pollutant from a point source into navigable waters of the United States without a National Pollutant Discharge Elimination System (NPDES) permit. 33 U.S.C. §§ 1311(a), 1342. The U.S. Environmental Protection Agency (USEPA) has delegated responsibility for issuing NPDES permits to DEQ. Wyoming, Discharges of Pollutants to Navigable Waters; Approval of Program, 40 Fed. Reg. 12987, 13026 (Mar. 24, 1975). Wyoming must implement its discharge program consistent with minimum federal requirements. 33 U.S.C. § 1342(b).

Federal regulations prohibit the discharge of oil and gas waste. 40 C.F.R. § 435.52(a). The regulations provide a limited exception for discharges of produced water west of the 98th meridian that is "used for agriculture or wildlife propagation." 40 C.F.R. § 435.50. Wyoming regulations incorporate these requirements. *See,* Wyo. Rules & Regs. Dep't of Envtl. Quality, Water Quality, Ch. 2, App. H(b)(ix) ("There shall be no discharge of waste pollutants into surface waters of the state from any source (other than produced water) associated with production, field exploration, drilling, well completion, or well treatment (i.e., drilling muds, drill cuttings, and produced sands))." DEQ's regulations define produced water simply as "underground water which surfaces through oil and/or gas wells." Ch. 2, Sec. 3(b)(1xxx). This limitation is included as "boilerplate" language in all produced water discharge permits issued by the DEQ, and appears, as required, in the Statement of Basis (SOB) prepared by the DEQ for this permit: "This permit does not cover activities associated with discharges of drilling fluids, acids, stimulation waters or other fluids derived from the drilling or completion of the wells." SOB at 1.

Federal regulations define the term "use in agricultural or wildlife propagation." To qualify for the exception to the prohibition on discharges, the produced water must be: (1) "of good enough quality to be used for wildlife or livestock watering or other agricultural uses" *and* (2) "actually put to such use during periods of discharge." 40 C.F.R. § 435.51(c). Wyoming regulations explicitly incorporate 40 C.F.R. Part 435. Ch. 2. Sec. 1(b). *See also,* Ch. 2, App. H (a)(i) (stating that "The produced water shall be of good enough quality to be used for wildlife or livestock watering or other agricultural uses and actually be put to such use during periods of discharge").

II. DEQ Lacks Information Needed to Process the Proposed Discharge Permit

The Department's rules state: "The Director shall not process or issue a permit before receiving a complete application for a permit and all requirements of this section have been met." *See* Chapter 2, Section 5(b)(iii). As discussed below, Aethon's application is incomplete, and all requirements have not been met.

Given the general prohibition on the discharge of oil and gas waste, DEQ is responsible for making several findings before it can lawfully authorize the proposed discharge. Ch. 2. Sec. 5(b)(iii). The Department must have evidence to support these findings. Wyo. Stat. § 16-3-114(c)(2). To support its proposed permit, DEQ must demonstrate that: (1) the discharges will not contain oil and gas waste; (2) the discharges are of good enough quality to be used for wildlife or agriculture; (3) the discharges will in fact be put to use by wildlife or agriculture; and (4) the discharges will not violate Wyoming water quality standards. Neither Aethon's permit application nor DEQ's Statement of Basis for its draft permit contains such evidence.

A. Aethon's Permit Application Fails to Include Information Needed to Ensure No Well Treatment Wastes are in the Discharge.

Included among the general information requirements contained in the DEQ's rules is the requirement that each application for a discharge permit include a "[d]escription of each treatment process that will be used to reduce pollutant concentrations in effluent. Ch. 2 Sec. 5(a)(v)(L). The application is missing two categories of information. First, the application lacks the information DEQ needs to ensure that the discharge that is not treated does not contain chemicals used in activities performed in an oil and/ or gas well, including but not limited to stimulation operations (e.g. hydraulic fracturing, matrix acidizing) and well maintenance. Second, the application lacks information about the method and effectiveness of the treatment process to be used for the discharge that is treated.

1. The application lacks information to authorize discharge of untreated flow.

DEQ lacks the information needed to authorize the discharge of untreated waste waters. Information provided about existing discharges is insufficient to ensure that well treatment chemicals are absent. The single sampling report included in Aethon's permit application fails to address what oil and gas well treatment chemicals might be present. The report represents a single moment in time which may be significantly removed in time from any well treatment event.

Monitoring reports from the facility fail to include information to detect the oil and gas well treatment chemicals. The monitoring is limited to criteria relevant to basic water quality standards. It does not address other potentially harmful constituents that may be naturally present in formation water or that have been added and may be included in the discharge from drilling, completion (including hydraulic fracturing), or maintenance.

Hydraulic fracturing is employed as a completion method on wells located within the Frenchie Draw Field/Moneta Divide natural gas and oil project. Within the project area as identified in the proposed WYPDES permit, 70 hydraulic fracturing operations have been disclosed to the FracFocus Chemical Disclosure Registry ("FracFocus") from 2011 to present. However, reporting to FracFocus is not required under Wyoming law and therefore its records are likely incomplete. Wyoming Oil and Gas Conservation Commission (WOGCC) records

indicate that approximately 350 wells in the WYPDES permit project area have undergone stimulation operations.[1] In its 2019 Draft Environmental Impact Statement (DEIS) for the Moneta Divide Natural Gas and Oil Development Project, which generally covers the same project area as the WYPDES permit, the Bureau of Land Management (BLM) also notes that hydraulic fracturing is used, stating, "[i]n most cases well completion operations would involve hydraulic fracturing (perforation and stimulation) and testing of potentially productive zones."[2]

A wide range of chemicals are used for hydraulic fracturing operations, including chemicals that are toxic or otherwise hazardous, as well as many chemicals with unknown environmental and public health profiles. The U.S. Environmental Protection Agency (EPA) identified 1,084 chemicals that were reported to have been used in hydraulic fracturing fluids nationwide between 2005 and 2013.[3] EPA's FracFocus analysis included 1,457 disclosures from Wyoming, with a median number of additive ingredients per disclosure of 10, with a range of 5 to 24 (5th to 95th percentile).[4] EPA also analyzed the chemicals most frequently reported as being used in Wyoming, which are listed in the table below.

Additive Ingredients in Fracturing Fluid Most Frequently Reported to FracFocus 1.0

EPA standardized chemical name	CAS Registry Number	Number of disclosures	Median of max concentration by mass in HF fluid	Median of max concentration by mass in additive
Guar gum	9000-	823	0.24%	60%
Peroxydisulfuric acid, diammonium	7727-	771	0.0098%	100%
Sodium hydroxide	1310-	688	0.024%	30%
Distillates, petroleum, hydrotreated	64742-	612	0.0067%	30%
Isopropanol	67-63-0	516	0.035%	30%
Methanol	67-56-1	460	0.029%	35%
Solvent naphtha, petroleum, heavy	64742-	415	0.0087%	10%
Naphtha, petroleum, hydrotreated	64742-	384	0.21%	60%
Acetic acid	64-19-7	375	0.0042%	30%
Formic acid, potassium salt	590-29-	361	0.050%	60%
Quartz	14808-	356	0.0011%	15%
Ammonium acetate	631-61-	323	0.013%	100%
Tetramethylammonium chloride	75-57-0	315	0.094%	40%
Sodium persulfate	7775-	308	0.0035%	100%
Ethanol	64-17-5	298	0.047%	60%
Sodium hypochlorite	7681-	282	0.0094%	30%
Sodium chloride	7647-	274	0.031%	30%
Sodium chlorite	7758-	271	0.0095%	10%
Sodium tetraborate decahydrate	1303-	265	0.048%	30%

[1] This may include both hydraulic fracturing stimulation and matrix stimulation, such as acidizing.
[2] U.S. Department of the Interior Bureau of Land Management. (2019). Moneta Divide Natural Gas and Oil Development Project Wyoming – Wind River/Bighorn Basin District and High Plains District April 2019. BLM/WY/PL-18/012+1310. p. 2-31. [hereinafter "DEIS"].
[3] U.S. EPA, *Hydraulic Fracturing For Oil And Gas: Impacts From The Hydraulic Fracturing Water Cycle On Drinking Water Resources In The United States* (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-16/236F, 2016.
[4] *Id.*

Glutaraldehyde	111-30-	260	0.0070%	25%
Bronopol	52-51-7	255	0.0015%	100%
Methenamine	100-97-	252	0.092%	2.0%
N,N-Dimethyldecylamine oxide	2605-	236	0.023%	10%
Naphthalene	91-20-3	227	0.0035%	5.0%
Triethanolamine	102-71-	224	0.088%	100%
Tetrakis(hydroxymethyl)phosphonium	55566-	220	0.0072%	100%

Our analysis of FracFocus data specifically for wells in the WYPDES permit project area indicates that a wide variety of chemicals are used for hydraulic fracturing including but not limited to those listed in the table below, as well as numerous chemicals labeled as trade secrets.

Chemical Name	**CAS Number**
Inorganic Borate	10043-35-3
Ethane-1,2-diol	107-21-1
Glutaraldehyde	111-30-8
Gum, xanthan	11138-66-2
Ethylene Glycol Monobutyl Ether	111-76-2
Nonyl Phenol Ethoxylated	127087-87-0
Boric Anhydride	1303-86-2
Potassium hydroxide	1310-58-3
Sodium Hydroxide	1310-73-2
Sodium Tetraborate	1330-43-4
Sorbitan monooleate	1338-43-8
Amine	141-43-5
Magnesium silicate hydrate (talc)	14807-96-6
Thiocyanic acid, ammonium salt	1762-95-4
Modified amine	2002-24-6
Poly (oxy-1,2-ethanediyl)	24938-91-8
Vinylidene chloride/methylacrylate copolymer	25038-72-6
Acrylamide sodium acrylate copolymer	25085-02-3
Poly(oxy-1,2-ethanediyl)	25322-68-3
Ethoxylated propoxylated 4- nonylphenol-formaldehyde resin	30846-35-6
Formaldehyde	50-00-0
Tetrakis(Hydroxymethyl) Phosphonium Sulfate	55566-30-8
Tetrasodium ethylenediaminetetraacetate	64-02-8
Ethanol	64-17-5
Formic Acid	64-18-6
Hydrotreated Light Distillate	64742-47-8
Heavy aromatic naphtha	64742-94-5
Solvent Naptha (pet) heavy aliphatic	64742-96-7
Methanol	67-56-1
Isopropanol	67-63-0
Oxyalkylated alcohol	68002-97-1

Alkyl Dimethyl Benzyl Ammonium Chloride (C12-16)	68424-85-1
Terpenes and Terpenoids, sweet orange-oil	68647-72-3
Organophosphonate	68649-44-5
Quaternary Ammonium Compounds bis[Hydrogenated Tallow Alkyl] Dimethyl Salts With Bentonite	68953-58-2
Quaternary ammonium compounds chlorides derivatives	68989-00-4
Cured Acrylic Resin	700842-79-1
Quaternary Ammonium Chloride	7173-51-5
Non-crystalline silica	7631-86-9
Hydrochloric acid	7647-01-0
Sodium Chloride	7647-14-5
Aqueous Ammonia	7664-41-7
Ammonium Persulfate	7727-54-0
Solvent	7732-18-5
Cetylethylmorpholinium ethylsulfate	78-21-7
Alcohol, C7-9-iso, C8, ethoxylated	78330-19-5
Alcohol, C9-11-iso, C10, ethoxylated	78330-20-8
Alcohol, C11-14, ethoxylated	78330-21-9
Sesquioleate	8007-43-0
Guar Gum	9000-30-0
Phenolic resin	9003-35-4
Polyethylene glycol sorbitan monolaurate	9005-64-5
Poly(oxyethylene) sorbitol monostearate	9005-67-8
Nonyl Phenyl Polyethylene Glycol Ether	9016-45-9
Polylactide resin	9051-89-2
Naphtalene (impurity)	91-20-3

Wastewater from wells that are hydraulically fractured contain:

1) chemicals used in the hydraulic fracturing operation;
2) chemicals that naturally occur in subsurface fluids, including salts (e.g., chloride, bromide, sulfate, sodium, magnesium, and calcium), metals (e.g. barium, manganese, iron, and strontium), naturally occurring organic compounds (e.g. benzene, toluene, ethylbenzene, xylenes (BTEX), and oil and grease), and naturally occurring radioactive material (NORM) (e.g. radium, uranium); and,
3) chemical byproducts of the reactions between the fracturing fluid and the rock formation and subsurface fluids.

Paragraph 13 of the DEQ's application for oil and gas production unit discharges requires the applicant to "[p]rovide a list of all potential pollutants expected to be in the discharge and an explanation of their presence in the discharge." In this instance, Aethon merely indicated that "[t]race amounts of Petroleum Hydrocarbons due to oil production and Total Dissolved Solids" would be present, without disclosing any other constituents.

Aethon has failed to disclose information regarding hydraulic fracturing activities at the Frenchie Draw facility. Without such information, DEQ cannot satisfy its legal obligation to ensure that well treatment chemicals are absent from the discharge it proposes to authorize.

2. The application lacks information that control measures are sufficient to remove all well treatment wastes.

DEQ lacks information needed to ensure that the proposed control measures will remove all oil and gas well treatment wastes. Paragraph 10 of the permit application requires a description of "the control measures that will be implemented to achieve water quality standards ane effluent limits." Aethon has failed to include one sufficient for DEQ to meet its legal obligations. Attachment C provides a diagram of the flow process of the Neptune Water Treatment Facility but no information about the process used and a justification of how it will ensure removal of any and all chemicals used in drilling, completion (including hydraulic fracturing), and maintenance of the wells and discharged through the permitted outfalls.

B. Aethon's Permit Application Fails to Include Information Needed to Ensure Discharge is of Good Enough Quality to be Used for Wildlife or Agriculture.

Aethon's permit application fails to provide DEQ the information it needs to establish that the proposed discharge is "of good enough quality to be used for wildlife or livestock watering." Given that the applicable effluent limitations (and the permit itself) prohibit the discharge of oil and gas waste, DEQ has an affirmative obligation to establish that the criteria for an exception to this prohibition are met. DEQ cannot meet this obligation without information about well treatment chemicals that may be used. Neither the proposed permit nor the application provides such information.

DEQ cannot reasonably rely on a blanket determination by Wyoming Game and Fish from 2002 that all produced water from existing permitted wells in Wyoming enhances wildlife propagation and habitat. This defeats the purpose of the limited exception to the prohibition on the discharge of oil and gas waste. 44 Fed. Reg. 22069, 22072 (April 13, 1979). Specific documentation is required under Wyoming regulations to authorize the exception in each instance. Ch. 2, App. H (c)(i), (ii). Such requirements flow from the applicable federal regulations. 40 C.F.R. § 435.51(c). Aethon's application lacks the required documentation.

Moreover, a 2007 report commissioned by the DEQ suggests, among other things, that sulfate effluent limits contained in Appendix H (3,000 mg/L) and included in the draft permit may be harmful to livestock. The report concluded that "[a]ssuming normal feedstuff [sulfur] concentrations, keeping water [sulfate] concentrations less than 1,800 mg/L should minimize the possibility of acute death in cattle. Concentrations less than 1,000 mg/L should not result in any easily measured loss in performance." *See,* Water Quality for Wyoming Livestock and Wildlife, A Review of the Literature Pertaining to Health Effects of Inorganic Contaminants, at 48, available at ttp://www.wyomingextension.org/agpubs/pubs/B1183.pdf

With respect to Total Dissolved Solids, the authors of the report concluded: "We do not recommend relying upon TDS to evaluate water quality for livestock and wildlife; however, if no other information is available, TDS concentrations less than 500 mg/L should ensure safety from almost all inorganic constituents. Above 500 mg/L, the individual constituents contributing to TDS should be identified, quantified, and evaluated." Wildlife Report at 50. Despite this, the draft permit proposes to grandfather a TDS limit of 6,400 mg/L, more than twelve times greater than the limit recommended in the report. The DEQ should follow the advice of the experts, and identify, quantify and evaluate the individual constituents comprising the TDS discharged from Aethon's facility. Based on the findings presented in the wildlife report, the effluent limits for sulfate and TDS contained in the draft permit may be harmful tolivestock and wildlife. Additional information is needed to characterize the TDS in the produced water and evaluate the individual constituents before making a determination as to the suitability of the produced water for livestock and wildlife use.

No lawful basis exists for excusing the proposed discharges from the documentation requirements to assess the quality of the currently proposed discharges. The Clean Water Act does not authorize a blanket grandfathering of existing facilities. Even if there were justification for continuation of the original discharge, the proposed discharges are dramatically different– both in quality and in quantity- than what may have been discharged in 1978. Hydraulic fracturing was not occurring to the same extent it is being used now. The proposed permit authorizes almost double the existing volume of permitted discharge including from a new point source.

C. Aethon's Permit Application Fails to Include Information Needed to Ensure that Discharge Will Be Put to Wildlife or Agriculture Use During Discharge.

Aethon's permit application also fails to include documentation that the authorized discharges will in fact be put to use for wildlife or agriculture. The exception was not intended as an authorization for all produced water based on a generic benefit that the water might have for wildlife and agriculture. In fact, in many places oil and gas produced water is toxic and harmful to wildlife and agriculture. *See, e.g.,* DEQ Wildlife Report. If a specific individual is going to use a specific amount of the discharge and attests to this fact in writing, DEQ may authorize the discharge. Here, such documentation is absent.

D. Aethon's Permit Application Fails to Include Information Needed to Ensure that Discharge Will Comply with State Water Quality Standards.

Finally, Aethon's permit application fails to include the information DEQ needs to ensure that the discharges the agency proposes to authorize will meet Wyoming's water quality standards. To meet its legal obligations, DEQ must have additional data about: (1) the chemical

composition of the proposed discharges[5] and (2) the existing water quality and condition of Alkali and Badwater creeks.

Prior to issuing a discharge permit, DEQ must have evidence that the permit limits will ensure compliance with state water quality standards. Ch. 2, Sec. 5(b)(i)(B) & (D). *See also*, 33 U.S.C. § 1342(a)(1). In cases such as this where modification to effluent limits are being proposed, Appendix H further specifies that: "In no case will a modification as described in paragraph (c)(i) or (c)(ii) of this appendix be permitted which would result in a violation of Wyoming Water Quality Rules and Regulations, Chapter 1." App. H (c)(iii). If the DEQ determines that the effluent limits contained in Appendix H are not sufficiently protective for stock and wildlife consumption, "[l]imitations on additional parameters or limitations more stringent will be imposed when such limitations are necessary to assure compliance with Wyoming Water Quality Rules and Regulations, Chapter 1." App. H (b)(vii).

A permit application must include information "the administrator may request in order to assess potential impacts to designated uses of surface waters of the state as a result of the proposed discharge, to develop permit conditions in compliance with regulations adopted pursuant to Section 304 of the CWA, or to determine whether to issue a WYPDES permit. The additional information may include additional quantitative data and bioassays to assess the relative toxicity of discharges to aquatic life and requirements to determine the cause of the toxicity." Ch. 2, Sec. 5(a)(v)(V). This information is critical to ensuring compliance with Appendix H's requirement that "In no case shall any produced water discharge contain toxic materials in concentrations or combinations which are toxic to human, animal or aquatic life." App. H (b)(i).[6]

The specific information needed and absent from the permit application includes, but is not limited to, the following:

- Water quality data for Alkali Creek and Badwater Creek (both above and below the Aethon produced-water discharge).
- Stream flow data for Alkali Creek and Badwater Creek.
- Water quality data from 1979 (especially TDS and chloride) to establish baseline water quality information for the Class 1 segment of the Wind River below the Boysen Dam.
- Total TDS loading from other WYPDES and NPDES permits in Badwater and Boysen Reservoir drainages.
- Comprehensive effluent data at end-of-pipe for each outfall, including temperature, alkalinity and bicarbonate ion (HCO_3^-) measurements, potassium (K^+), pH, benzene and BTEX (Benzene, Toluene, Ethylbenzene, Xylene). *See* App. H (b)(x).

[5] WDEQ regulations provide that effluent data must be made available to the public. Ch. 2, Sec. 18(b)(ii).
[6] The term, "toxic materials" is defined in Ch. 2, Sec. 3(b)(xciii).

- Specifications regarding Neptune treatment facility including reliability, excursions, and planned shut downs (including water chemistry measurements for treated outflow) as required by Chapter 2, Section 5(a)(v)(L).
- Expected quality and quantity of effluent proposed for discharge as required by Ch. 2, Sec. 5(a)(v)(K).
- Flow information about the discharge at each outfall as required by Ch. 2, Sec. 5(a)(v)(P).
- List of all permits currently issued or required by Aethon, including stormwater and injection permits as required by Ch. 2, Sec. 5(a)(v)(T).
- Professional engineer certificate on ERM model report.
- Name and signature of responsible person, as required by Ch. 2, Sec. 5(a)(vi).

CONCLUSION

For the foregoing reasons, Aethon's permit application is incomplete. Without the information identified above, DEQ is unable lawfully to make the determinations necessary to support the permit as proposed. Consequently, we request that DEQ defer action on the permit until Aethon provides further information as identified above.

Thank you in advance for considering this request.

Sincerely,

Dan Heilig,
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Wyoming Outdoor Council

Jill Morrison, Executive Director
Powder River Basin Resource Council

Sharon Buccino, Senior Attorney
Briana Mordick, Senior Scientist
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