Singh, Angela K (DOA)

From: Colombie, Jody J (DOA)
Sent: Tuesday, April 02, 2013 8:43 AM
To: Singh, Angela K (DOA)
Subject: FW: Sierra Club comment on AOGCC Proposed Hydraulic Fracturing Regs
Attachments: Sierra Club Comment on AOGCC fracturing regs.pdf

From: Nathan Matthews [mailto:nathan.matthews@sierraclub.org]
Sent: Monday, April 01, 2013 3:57 PM
To: Colombie, Jody J (DOA); Pamela.Brodie@sierraclub.org
Subject: Sierra Club comment on AOGCC Proposed Hydraulic Fracturing Regs

Please see the attached comments on Proposed 20 AAC §§ 25.280, 25.283, and 25.990. If you have any difficulty with this attachment feel free to contact me at the address or number below. I also ask that you confirm receipt of this message.

Thank you,

Nathan Matthews

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April 1, 2013

Alaska Oil and Gas Conservation Commission
333 West 7th Avenue
Anchorage, Alaska 99501
Submitted online to jody.colombie@alaska.gov and by fax to (907) 276-7542

Re: Proposed regulations on hydraulic fracturing and workover operations: 20 AAC §§ 25.280, 25.283, and 25.990

To Whom This Concerns:

The Sierra Club thanks the Alaska Oil and Gas Conservation Commission for the opportunity to comment on the proposed regulations concerning workover operations, hydraulic fracturing, and definitions for hydraulic fracturing applications, operations, and reporting.

Production of unconventional (also known as "nonconventional") oil and gas resources using hydraulic fracturing is a new phenomenon. Although hydraulic fracturing has been used to enhance production of conventional vertical wells in Alaska and elsewhere for some time, the combination of horizontal drilling, hydraulic fracturing, and other technologies to extract oil and gas from shale, "tight" sandstone, coalbed methane, and other unconventional sources is new. Such unconventional production has only been occurring for a few years outside of Alaska.[1] In Alaska, large scale unconventional production is only at the

[1] As Energy Information Administration data demonstrate, the rise in production driven by unconventional resources commenced in the late 2000s. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPUS2&f=A (crude oil production) and http://www.eia.gov/dnav/ng/hist/n9070us2a.htm (natural gas).

proposal stage, as with the proposed Great Bear Petroleum, LLC project on the North Slope.[2]

Although unconventional production using hydraulic fracturing is new, it is already clear that it presents risks and challenges beyond those presented by conventional production. As explained below, unconventional production poses additional threats to groundwater, surface water, and air quality, and has induced earthquakes. A substantial body of scientific evidence documents these significant threats. The literature further demonstrates, however, that we do not yet know the full extent of unconventional production's impacts or the techniques, if any, that may fully limit or mitigate these impacts. To use Donald Rumsfeld's famous epistemological framework, the "known knowns" about hydraulic fracturing demonstrate significant risks to environment and to human health, but there are "known unknowns" indicating still further potential and severe problems.

Because the available evidence demonstrates that unconventional production poses significant risks but it has not been demonstrated that these risks may be adequately controlled, the most responsible course of action is for the Commission to place a moratorium on unconventional production until these questions can be answered. In the face of this uncertainty, permitting unconventional production would be inconsistent with the Commission's mission of ensuring "protection of health, safety, [and] fresh ground waters."[3] Indeed, the legislature has recognized the special risks posed by "nonconventional" resources, and has specifically prohibited the Commission from allowing production of these resources unless the Commission has affirmatively determined that production will not threaten water quality.[4] Because the Commission has not made such an affirmative determination—and on the available evidence, cannot do so—a moratorium is the only appropriate policy to comply with the legislature's directive.

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[2] A search of voluntary disclosures on the website fracfocus.org identified only 34 wells to have been hydraulically fractured in Alaska, none of which were completed prior to 2011. All of these wells are on the North Slope.

[3] http://doa.alaska.gov/ogc/WhoWeAre/mission.html, *see also* A.S. §§ 31.05.027, 31.05.095, 31.05.100, 31.05.110, 31.05.030.

[4] AS § 31.05.030(j), *see also* AS § 31.05.170 (incorporating A.S. § 38.05.965(14)). Although section 31.05.030(j) refers to "nonconventional gas," the Commission should apply this heightened scrutiny to unconventional oil as well.

If the Commission nonetheless decides to permit hydraulic fracturing now, the Commission must adopt stringent regulations to limit its harmful effects and provide adequate information to the public. Sierra Club endorses the measures recommended in the separate comments submitted by The Wilderness Society *et al*. We incorporate that comment here by reference.

I. Risks to Groundwater

Hydraulic fracturing and unconventional oil production present serious risks to ground and surface water. Contaminants include chemicals added to fracturing fluid and drilling muds as well as naturally occurring chemicals mobilized or released by oil and gas production.

Hydraulic fracturing has already contaminated groundwater in several documented instances, as confirmed by the Department of Energy subcommittee on shale gas resources and the Environmental Protection Agency. One study "documented the higher concentration of methane originating in shale gas deposits . . . into wells surrounding a producing shale production site in northern Pennsylvania."[5] By tracking certain isotopes of methane, this study—which the DOE Subcommittee referred to as "recent, credible, [and] peer-reviewed"—determined that the methane originated in the shale deposit, rather than from a shallower source.[6] The Subcommittee discussed two other reports that have documented or suggested the movement of fracturing fluid from the target formation to water wells linked to hydraulic fracturing in wells. Thyne (2008)[7] found bromide in wells 100s of feet above the fractured zone. The EPA (1987)[8] documented fracturing fluid moving into a 416-foot deep water well in West Virginia; the gas well was less than 1000 feet horizontally from the water well, but the report does not indicate the gas-bearing formation. More recently, EPA

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[5] DOE, Shale Gas Production Subcommittee First 90-Day Report at 20 (citing Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner, and Robert B. Jackson, *Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing*, Proceedings of the National Academy of Science, 108, 8172-8176, (2011)).

[6] *Id.*

[7] Geoffrey Thyne, *Review of Phase II Hydrogeologic Study* (2008), prepared for Garfield County, Colorado, *available at* http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/(1_A)_ReviewofPhase-II-HydrogeologicStudy.pdf.

[8] Environmental Protection Agency, *Report to Congress, Management of Wastes from the Exploration, Development, and Production of Crude Oil, Natural Gas, and Geothermal Energy*, vol. 1 (1987), *available at* nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20012D4P.txt.

has investigated groundwater contamination in Pavillion, Wyoming and Dimock, Pennsylvania. In the Pavillion investigation, EPA's draft report concludes that "when considered together with other lines of evidence, the data indicates likely impact to ground water that can be explained by hydraulic fracturing."[9] In particular, hydraulic fracturing operations were the likely source of inorganics (potassium, chloride), synthetic organic (isopropanol, glycols, and tert-butyl alcohol), and organics (BTEX, gasoline and diesel range organics) in deeper test wells,[10] and surface pits previously used for storage of drilling wastes and produced/flowback waters were the likely source of "high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons" found in shallower wells.[11] As to Dimock, Pennsylvania, EPA and the Pennsylvania Department of Environmental Protection provided evidence that hydraulic fracturing led to contamination of home water supplies.[12] Although EPA ultimately concluded that the five homes with potentially unsafe levels of hazardous substances had water treatment systems sufficient to mitigate the threat, the Dimock example indicates the potential for gas development to contaminate groundwater.

There are several reasons to believe that such contamination is—or will be—more frequent than these five investigations might suggest. First, even where fluid is mobilized, migration will often be a slow process. Because unconventional production using hydraulic fracturing is a relatively recent phenomenon, wells completed in the past few years may have set in motion contamination that has not yet manifested or been detected.[13] Second, in cases where contamination of private water is alleged, the oil and gas production company frequently settles the claim in exchange for a confidentiality and/or

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[9] EPA, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming, at xiii (2011), available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf. EPA has not yet released a final version of this report, instead recently extending the public comment period to September 30, 2013. 78 Fed. Reg. 2396 (Jan. 11, 2013).

[10] *Id.* at xii-xiii.

[11] *Id.* at xi.

[12] EPA Region III, Action Memorandum - Request for Funding for a Removal Action at the Dimock Residential Groundwater Site (Jan. 19, 2012), available at http://www.epaosc.org/sites/7555/files/Dimock%20Action%20Memo%2001-19-12.PDF; EPA, *EPA Completes Drinking Water Sampling in Dimock, Pa.* (Jul. 25, 2012),

[13] *See, e.g.*, Tom Myers, *Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers* (Apr. 17, 2012).

nondisclosure agreement, preventing the public and the scientific community from learning of the potential contamination.[14]

The best available science indicates that the likelihood of such contamination can be reduced, but even with such measures, the magnitude of the residual risk is unknown. Perhaps the most common or significant vector for groundwater contamination is failure of the casing or cementing of the vertical well bore.[15] Pennsylvania Department of Environmental Protection data indicate that from 2010 to 2012, over 6% of all wells drilled reported a violation of standards relating to well casing or cementing.[16] The comment submitted by The Wilderness Society *et al.* identifies casing and cementing standards that reduce the risk of casing failure. Nonetheless, given the continuing high rate of casing failure even in states, like Pennsylvania, where unconventional production has been occurring for several years, even these measures may be inadequate to fully protect against the danger of casing failure. Even when the well casing and cementing perform exactly as intended, contamination may occur as a result of fluid migration through the surrounding rock, separate from the well bore. Rapid migration can occur when the zone of fractured rock intersects natural conduit in the rock or an abandoned well.[17] One recent study concluded, on the basis of geologic modeling, that frack fluid may migrate from the hydraulic fracture zone to freshwater aquifers in less than ten years.[18]

Once an aquifer is contaminated, removing the contamination can be prohibitively expensive if not truly impossible. Because the impact of contamination is so high, even a small likelihood of such contamination presents

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[14] *See, e.g., Hallowich v. Range Resources Corp.*, Brief of Amici Curiae Philadelphia Physicians for Social Responsibility *et al.*, Appx. B (Apr. 27, 2012) (enumerating 27 such cases which settled with confidentiality and/or nondisclosure agreements), *available at* http://earthjustice.org/sites/default/files/Hallowich_Brief.pdf.

[15] DOE, Shale Gas Production Subcommittee First 90-Day Report, at 20.

[16] Anthony R. Ingraffea, Physicians, Scientists, and Engineers for Healthy Energy, *Fluid Migration Mechanisms Due To Faulty Well Design and/or Construction: An Overview And Recent Experiences In The Pennsylvania Marcellus Play* (Jan. 2013), available at http://psehealthyenergy.org/data/PSE__Cement_Failure_Causes_and_Rate_Analaysis_Jan_2013_Ingraffea1.pdf.

[17] Tom Myers, *Technical Memorandum Review and Analysis, Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program Well Permit Issuance for Horizontal Drilling and High Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs* (Jan. 5, 2011), at 12-15.

[18] Tom Myers, *Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers* (Apr. 17, 2012).

an unacceptable risk to Alaska's groundwater resources, whether those resources are currently being used or may be used in the future. Until the problems of well casing and fluid migration are better understood, the Commission should not allow hydraulic fracturing to occur in the state. Alternatively, the Commission should impose a more narrow moratorium on hydraulic fracturing of oil and gas plays overlapping any aquifer that is currently being used for drinking water or agricultural purposes, or that is likely to see such use in the foreseeable future. Such a precautionary approach is consistent with the statutory command of A.S. § 31.05.030(j), as explained above.

II. Potential for Induced Seismicity

Unconventional oil and gas production can cause earthquakes. Such events are well documented, with reports going back to the 1920s.[19] Earthquakes in Ohio,[20] Arkansas,[21] and Texas[22] have been attributed to disposal of hydraulic fracturing wastewater in underground injection wells, and earthquakes in British Columbia have been attributed directly to the hydraulic fracturing process itself.[23]

Induced seismicity can compound the other dangers presented by hydraulic fracturing, because underground equipment such as well casing is especially susceptible to seismic events. Whereas a relatively small earthquake may present little threat to a surface structure that can, in essence, 'ride out' an earthquake, a well bore or pipeline is exposed over a wider area (miles for a well bore, potentially hundreds of miles for a pipeline) and, when located underground, bears the full brunt of any seismic event. Such infrastructure is therefore particularly susceptible to earthquakes. The potential for damage to these

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[19] National Research Council, Induced Seismicity Potential in Energy Technologies (2012) ("NRC 2012") at 3.

[20] Ohio Department of Natural Resources, Executive Summary: Preliminary Report on the Northstar 1 Class II Injection Well and the Seismic Events in the Youngstown, Ohio, Area (2012) ("Ohio DNR Northstar"); Fountain, Henry, *Disposal Halted at Well After New Quake in Ohio*, New York Times (January 1, 2012).

[21] Arkansas Oil and Gas Commission, Class II Commercial Disposal Well or Class II Disposal Well Moratorium (Aug. 2, 2011), available at http://www.aogc.state.ar.us/Hearing%20Orders/2011/July/180A-2-2011-07.pdf

[22] Frohlich, Cliff, Two-year survey comparing earthquake activity and injection-well locations in the Barnett Shale, Texas, Proceedings of the National Academy of Sciences (2012).

[23] BC Oil and Gas Commission, Investigation of Observed Seismicity in the Horn River Basin (Aug. 2012) ("BC Oil and Gas Commission").

structures from earthquakes compounds other environmental risks, such as the risks of groundwater contamination described above.

Although it is likely possible to reduce the risks of induced seismicity by avoiding hydraulic fracturing or underground injection of waste fluids near existing faults, the process of induced seismicity is still imperfectly understood. The Commission should not put Alaska's environment and existing infrastructure at risk until the seismic effects of hydraulic fracturing are better understood.

III. Air Impacts

Unconventional oil and gas production also poses significant risks to air quality. Some of these risks are well understood, whereas others, such as the extent of leakage from unconventional gas production, are the subject of significant uncertainty. Perhaps most relevant for Alaska, however, is uncertainty regarding how associated gas produced in connection with unconventional oil will be managed. Sierra Club joins in full the suggestions made by The Wilderness Society *et al*. regarding an appropriate framework for the Commission to use in managing this issue.

IV. Pending Research Regarding Hydraulic Fracturing

Several studies are already underway that will seek to resolve many of the questions posed above. For example, at Congress's request, the federal Environmental Protection Agency is currently engaged in a study on the potential impacts of hydraulic fracturing on drinking and ground water.[24] This study will be subject to peer review. Geisinger Health System, a Pennsylvania physician-led health care system, is currently undertaking a study of the health impacts of hydraulic fracturing, based on the health histories on hundreds of thousands of people who live near the Marcellus Shale.[25] Accordingly, the

[24] *See* http://www.epa.gov/hfstudy/.

[25] Geisinger Research Connections, *Geisinger Leads Marcellus Shale Initiative* (2013), available at http://www.geisinger.org/research/cx/73809-1-ResearchCnxWinter2013WEB.pdf; *see also* Jon Hamilton, *Medical Records Could Yield Answers on Fracking*, NPR (May 16, 2012), available at http://www.npr.org/2012/05/16/151762133/medical-records-could-yield-answers-on-fracking;

Commission will be in a better position to understand and regulate hydraulic fracturing in the foreseeable future.

V. Disclosure of Chemical Constituents

Because of the uncertainties regarding the effects of hydraulic fracturing and unconventional production, it is vital that, if the Commission allows fracturing in Alaska, that the Commission require full disclosure of all chemical constituents used in drilling mud, fracturing fluid, and elsewhere. A crucial aspect of the Commission's proposed regulations is the requirement that all constituents be disclosed, without any exemptions for trade secrets. Full disclosure is necessary to enable study and public discussion of hydraulic fracturing's impacts. Accordingly, the public interest in disclosure outweighs any public policy interests in maintaining trade secrecy for chemicals operators choose to use in hydraulic fracturing operations. Other Alaska agencies have recognized their authority to make public information that satisfies the definition of trade secrets where public policy concerns outweigh the importance of trade secrecy.[26] If the Commission allows hydraulic fracturing to occur, the Commission should *categorically* determine that the public interest outweighs the need for secrecy in this context.

VI. Conclusion

Unconventional oil and gas production using hydraulic fracturing presents numerous risks to human health and the environment. Many of these risks are already well documented. For example, there are clear mechanisms by which hydraulic fracturing threatens air quality, surface water, ground water, and habitat. The measures identified by The Wilderness Society *et al.* both provide ways to meaningfully reduce many of these impacts and provide necessary information to the public regarding the hydraulic fracturing process. If the Commission decides to allow hydraulic fracturing, the Commission should require each of these measures. We note that where

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[26] *See, e.g.*, 3 Alaska Admin. Code § 48.045(b)(2) (Regulatory Commission); 18 Alaska Admin. Admin Code § 31.015 (Department of Environmental Conservation).

Nonetheless, because of other uncertainties regarding hydraulic fracturing, such as the potential for groundwater contamination even in the absence of casing failure, the Commission cannot conclude at this time that *any* hydraulic fracturing can be conducted without imposing an unacceptable risk to Alaska's environment.

Sincerely,

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