
From: Eddie Paulsgrove <skysoldier3446@gmail.com>
Sent: Monday, November 13, 2017 11:46 AM
To: Sidney Hill
Cc: skysoldier3446@gmail.com
Subject: Comments on the proposed oil & gas development ordinance
Attachments: County O&G ordinance comments.docx

Mr. Hill, please find the attached comments. Also, please return an email to me stating that my comments have been received.

Edward L. Paulsgrove
932 Saratoga Dr NE
Rio Rancho, New Mexico 87144

November 13, 2017

Sandoval County Commission

ATTN: Mr. Sidney Hill

RE: Comments on the Proposed Oil and Gas Ordinance (the Ordinance)

Commissioners:

1. Qualifications - I received a BS in Geology from the University of Tulsa in 1987. I retired from the U.S. Army Corps of Engineers in 2013 as a Senior Project Manager in the Regulatory Division. I have worked in the Geotechnical, Radiological/Hazardous/Toxic Waste, and Environmental Divisions as well. I have lived in Rio Rancho for over 20 years.

2. Existing Sandoval County Oil & Gas Development (O&GD) – Sandoval County is superficially large with an area of over 3,600 square miles. In the County’s northwest corner is a portion of the San Juan Basin (SJB), a large part of the Jemez Mountains including Valle Caldera in the County’s central and north areas, and a north-south reach of the Middle Rio Grande River and Rift Basin is found in the eastern area. This complex geology continues in the subsurface with the exception being the relative simplicity of the SJB. Currently, there appear to be hundreds of active wells in the County, all within the SJB. At least one commissioner has stated that he didn’t know of any County groundwater contamination from O&G fracking/drilling; one reason is that the SJB is a stable structure, not repeatedly faulted as in the rest of the County. A geological map of New Mexico is attached to illustrate that point.

*** Comment: The proposed ordinance should only be applicable to the SJB area. Current nonproductive areas appear structurally unfit for O&GD. Much more data would be required to consider O&GD outside the SJB, much more than is currently contracted to be provided in May 2018.**

3. Data from Wells and Borings - It is this data that illustrate how areas outside of the SJB are inappropriate for O&GD. In 2008, Sandoval County contracted the exploration of deep aquifer water development ⁽¹⁾. Of the 2 borings advanced, only one was completed to its proposed depth [Well 5; 6,460 ft. below ground surface (bgs)]. Well 6 was screened to a depth of 3,840 ft bgs because it was artesian (extreme upwelling) and possibly hazardous to advance further. The briny water from less than 4,000 bgs was found to have a temperature of over 150 degrees and an arsenic (As) concentration of 0.634 mg/L, MORE THAN 60 TIMES the EPA's maximum contaminant limit of 0.01 mg/L. In addition, Well 5 identified the Mancos Shale, the formation identified for fracking by Thrust Energy, on the ground surface and not the extreme depths they have stated. However, Well 6 identified the Mancos at about 2,000 ft bgs. The difference was due to the Moquino Fault. So we know that a single fault has resulted in thousands of feet of vertical movement and that deep water has extremely high As concentrations and water temperatures. And we know that there are many, many faults in the County, most all outside the SJB. A deep well was also advanced in 1974 in what was then southern Sandoval County by Shell Oil ⁽²⁾. That well found the Mancos Shale at approximately 1,500 ft. below the bottom of the Santa Fe Group and Zia Sand Formation – both water bearing aquifers. That boring was also adjacent to a large geologic structure. The ordinance as is would allow O&GD firms to only comply with State standards, not the more stringent standards the County needs, and is ethically and morally obligated, to implement.

*** Comment: The data clearly indicate that faults must be identified and their structural integrity must not be compromised. Also, care must be taken to insure that O&GD does not occur in strata less than 6,000 ft below the bottom of any water supply aquifer. In addition, prior to finalizing an ordinance, a process must be implemented addressing how highly contaminated developed water would be reinjected bgs. Extreme As concentrations are not found in the SJB so this issue has not been addressed in the County.**

4. Water Quality - Ensuring citizens have sustainable high quality water supply in such complex systems has its own challenges. Aquifers within and east of the Jemez Mountains include As concentrations often requiring treatment. A map of As-contaminated water systems is attached. Note that the SJB is a large area but with just one As-compromised system. Numerous faults, fractures and other geologic structures can enhance, or hamper, groundwater movement and quality. Water well drillers have known for decades that developing water wells near faults and fractures frequently yield higher groundwater quantities, a process known as "upwelling" ⁽³⁾. Unfortunately, this same upwelling may also increase As concentrations. The Rio Rancho Source Water Protection Program ⁽⁴⁾ has found that the extensive north-south trending faults function also as barriers to lateral groundwater movement and create aquifer "cells". Based on geologic maps there's reason to believe that these conditions may be common throughout the County, outside of the SJB. Higher temperatures deep below the

surface heat water in deeper aquifers and force the water upwards within fractures and towards the surface, while the near-vertical faults may impede lateral groundwater movement.

*** Comment: As noted by Rio Rancho, aquifers may be “zoned” based on faulting. Areas with higher or lower water quality may currently be separated and likely should remain that way. These conditions are likely common County-wide outside of the SJB. Directionally drilling through the faults may compromise their structural integrity and promote increased contamination in the water supply. Also, fracking through faults/fractures would likely release petrochemical product into the fault system and upwards into water supply aquifers. A site-specific evaluation for each proposed well location must be conducted to include, but not be limited to, ensuring that the structural integrity of faults are not impacted by drilling/fracking. In addition, no less than 2 monitoring wells must be installed downgradient of any well location to establish an aquifer baseline and for water quality monitoring.**

5. County’s Work Order with New Mexico Tech (Tech) - In July 2017, the Commission recognized their lack of science-based expertise and signed a work order with Tech to conduct an assessment of O&GD and the relationship of developing potential resources to groundwater (5). The work order was funded with over \$60,000.

*** Comment: The County’s complex geologic nature necessitated the Tech work order. The County Commission does not have the requisite expertise to finalize an O&GD ordinance. To prevent being found to be arbitrary and capricious, the proposed O&GD ordinance must be based on the scientific data to be provided by Tech in or around May 2018.**

6. My Communication with Tech - Since July 2017, I have been communicating with some of the Tech experts (6). The common theme is that not enough is known about the County’s water supply, more extensive studies will be required if O&GD is proposed to be expanded beyond the SJB, and that it’s unfortunate most of the funding was initially directed to identifying O&GD potential and not enough to our aquifers. Fortunately, we can correct these shortcoming. The following are communications I have received from Ms. Stacy Timmons, Hydrogeologist, Aquifer Mapping Program Manager:

July 27: (as per Arsenic) ***“It can also be transported along faults acting as conduits to flow with deeply circulated, more mineralized waters. Adding to complexity, not every fault may be a conduit, some may be barriers to flow, and it may change along sections of the fault zone.”***

August 25: ***“Presently, the contract our agency has is focused on oil and gas development/potential in that region, and has a very small allotment of the project budget to address the oil/gas locations potential relation to groundwater resources.”***

Also.....*"Unfortunately, groundwater is not the emphasis of the project, and it will be limited in what we can do."*

August 29: *"...And if oil/gas findings are larger, and possible to be developed, then a large scale groundwater assessment would need to be funded."*

Sept. 19: *"Some of the questions you have asked us are hard to answer without doing a in-depth regional study of the groundwater - collecting data with the specific goal of understanding exactly where/why groundwater is upwelling, or seeking a source for arsenic at a particular well, for example. We are currently not funded to do this type of evaluation."*

Also on Sept 19, Tech submitted official answers to questions I had posed over the previous 5-6 weeks. The County should already have a copy of the communication. A common theme in the responses is that the study results due in May 2018 should provide necessary data.

*** Comment:** It is evident that the Tech study was directed by the County to focus more on O&GD potential than the identification and protection of our water resources. That is a disgrace. We can remedy this by increasing the line item funding for water, and reducing the line item for O&GD resources. It is incumbent on the Commission to modify the study priorities, wait for the new study results and, after review and comment of the results by the public, begin from scratch the process of finalizing an O&GD ordinance. Finalizing the proposed O&GD ordinance as it is, in spite of the overwhelming data against the ordinance, would be a knowing and willful, arbitrary and capricious decision.

Thank you,

Edward L. Paulsgrove

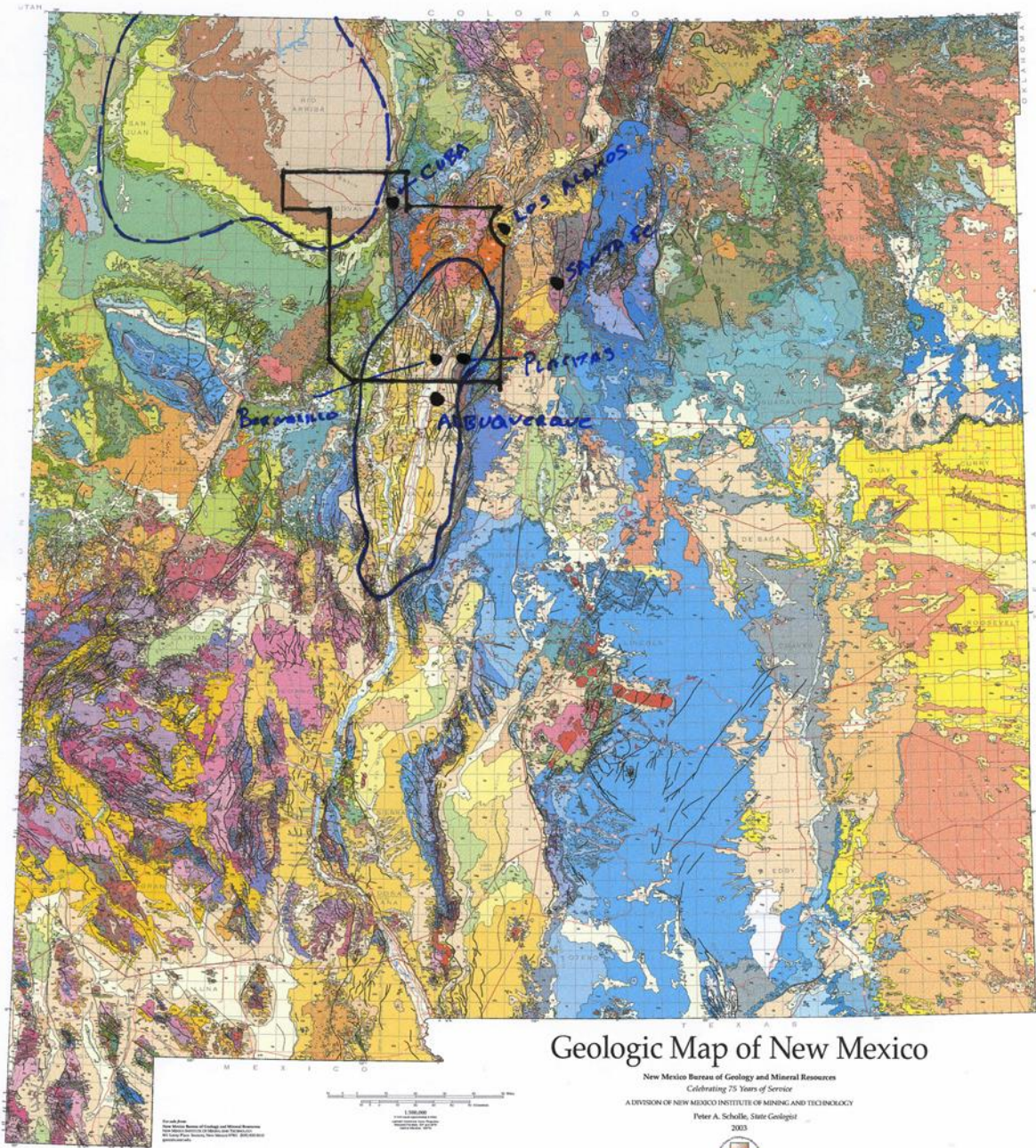
REFERENCES

1. Sandoval County Rio Puerco Basin Water Development Project DRAFT Aquifer Test & Analysis Report; Intera, Dec. 9, 2008
2. Structure and Stratigraphy in the vicinity of the Shell Oil Co. Santa Fe Pacific No. 1 Test Well, Southern Sandoval County, New Mexico; NMGS Guidebook, 25th Field Conference; Hiss and Black, 1974
3. Municipal Water Well Reports; City of Rio Rancho; various authors and years.
4. Source Water Protection Program; City of Rio Rancho, Feb. 22, 2017
5. Oil & Gas Resource Assessment of Sandoval County and Relationship of Potential Resources to Ground Water; July 2017
6. Personal Communications with Ms. Stacy Timmons, Hydrogeologist & Aquifer Mapping Program Manager; from July 2017 to Present

ATTACHED MAPS

Geologic Map of New Mexico; New Mexico Bureau of Geology and Mineral Resources; Scholl, 2003

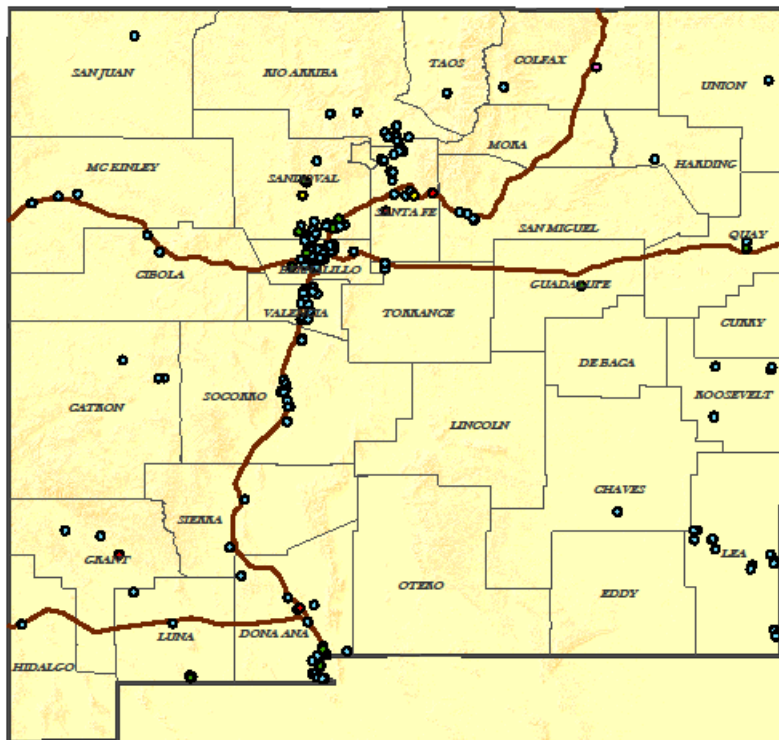
Arsenic Impacted Water System – Wells, Springs, and Infiltration Galleries; New Mexico Environment Department; December 2007



9/11

Arsenic Impacted Water System

Wells, Springs & Infiltration Galleries*



Arsenic Concentrations	
mg/l	
●	0.01 - 0.05
●	0.06 - 0.10
●	0.11 - 0.50
●	0.51 - 1.00
●	1.01 - 3.50



* concentrations are the highest measured from each source

December, 2007