



December 22, 2017

Via e-mail

Department of Conservation
801 K Street, MS 24-02
Sacramento, CA 95814
Comments@conservation.ca.gov
ATTN: Aquifer Exemption

Re: December 8, 2017 Arroyo Grande Oil Field Aquifer Exemption Supplemental Information

Dear Department of Conservation:

The Center for Biological Diversity (“the Center”) submits these comments in continued opposition to the recommendation of the Department of Conservation, Division of Oil, Gas and Geothermal Resources (“DOGGR”) to EPA to exempt the Dollie Sands of the Pismo Formation in the Arroyo Grande Oil Field in order to allow Sentinel Peak Resources California, LLC (“Operator”) to inject oil wastewater into this aquifer.

We have reviewed the supplemental material and feel that it still does not address the concerns we raised in our previous comment letters to DOGGR, the State Water Resources Control Board (“Water Board”), and EPA. Based solely on those previous concerns, EPA must deny this aquifer exemption. However, the most recent supplemental data, rather than providing more credibility to the proposed exemption, instead casts further doubt on the claims made by the Operator that fluids injected will not threaten drinking water. The need for supplements from the Operator shows how ineffective it continues to be in assessing the threat its actions may pose to public health. With the Operator’s inadequacies thus far, we cannot trust that additional risks from oil and gas activities in the Arroyo Grande Oil Field will not be discovered in the future.

The Arroyo Grande Aquifer Exemption Application fails to satisfy the criteria for exempting an aquifer from California and federal SDWA protections and, for the reasons discussed below, the application should be rejected.

The Latest Supplement Casts Further Doubt on the Feasibility of Wastewater Containment

The most notable change to the aquifer exemption application discussed in the supplemental material is the redrawing of the proposed exemption boundary on its eastern side. This was done because it was found that the capture zones for drinking water wells #38 and #41 overlap the oil

field along this boundary.¹ The Operator redrew the proposed exemption boundary to avoid this overlap, but still claims that the tar seal alone in this area would be enough to protect these two drinking water wells. According to the supplemental material:

The Division does not have evidence that the capture zone actually crosses the tar seals to the east of the proposed aquifer exemption area. Wells #38 and #41 are not expected to draw water from the Arroyo Grande oil field due to the impermeable nature of the seals.²

However, the question should not be whether there is evidence that the capture zone crosses the tar seal, but rather whether there is evidence that the capture zone does not cross the tar seal. Such a precautionary approach is in the best interest of those who may see their drinking water threatened by continued—and likely expanded—activity in the Arroyo Grande Field. By opting to redraw the exemption boundary, the Operator and DOGGR are tacitly agreeing that the capture zone analysis itself is evidence that the capture zone could cross the tar seal. It further raises doubt about the validity of the Operator’s assertions that the tar seal is sealing along its entire extent or that it is ubiquitous along the proposed exemption boundary.

Yet, the tar seal is still relied upon in the supplemental information to prove that injectate will be contained in various areas of the field, including along the western boundary of the proposed exemption:

The Edna member sands this far west are also water sands with immobile tar. The prevalence of the tar seal seen to the west and the evidence that there is only mobile oil to the east of the tar seal indicates that the tar seal serves as a barrier for fluid migration.³

This reliance on the tar seal along the western boundary is troubling considering the lack of confidence the Operator and DOGGR have in the tar seal’s integrity along the eastern boundary. Further doubt is raised by the fact that the Operator bases its conclusions about the ubiquity of the tar seal on an admitted lack of data from a paucity of wells:

The interpretation of the geologic model depends on the wells that have been drilled in the area, and because of the lack of mobile oil, there have not been a lot of wells drilled to delineate the facies change.⁴

The Operator cannot be sure of either the outer or surface tar seals defended as evidence of injectate containment given the uncertainties expressed in the application. The tacit acknowledgement by the Operator of the tar seal’s inadequacy along the eastern flank of the proposed aquifer exemption further detracts from its arguments about that tar seal’s integrity. Without confidence from the Operator in the primary proposed containment mechanism for Arroyo Grande Oil Field, an aquifer exemption in this field should not be approved.

¹ Aquifer Exemption Supplemental Information (“Supplement”), Arroyo Grande Oil Field, San Luis Obispo, California (December 2017), p. 15.

² *Ibid.*

³ *Id.* at p. 7.

⁴ *Ibid.*

Previous Concerns about This Aquifer Exemption Remain Inadequately Addressed

The Operator and DOGGR seem more convinced that the Arroyo Grande Fault Zone (AGFZ) is a seal since they claim that the capture zone of a well to the north of the fault does not extend south into the field, even though the capture zone analysis suggests it does. However, the Center previously expressed concerns about the AGFZ as a containment mechanism, and many of these concerns remain unaddressed. Previous application materials claim that the Arroyo Grande Fault Zone serves as a barrier to fluid flow because there is evidence that groundwater is forced upward into the surface flow of the Pismo Creek when it encounters the fault zone. This is based on comparisons of flow and salinity north and south of the fault zone. The possibility of the fault zone halting some fluid flow but allowing some to continue is not considered. Furthermore, Pismo Creek crosses the fault at one location, so assuming that the behavior of the creek is evidence that the fault is a complete seal relies on the assumption that the fault behaves uniformly as a seal along the extent of the proposed exemption boundary. Analysis of the fault at various points along its extent is the only way to definitively prove its sealing status.

Furthermore, fault gouge identified on the “Silva” 1 well mud log in the fault zone is put forth as solid evidence of a fault sealing mechanism in the AGFZ.⁵ This fault gouge is not discussed in terms of its composition. To confirm that this gouge is evidence of sealing requires information on the grain size of this gouge material and knowledge of its permeability. Otherwise, we are expected to take the word of the Operator as true without quantitative evidence. Furthermore, evidence of gouge appears to only be based on the one “Silva” 1 well mud log, which is not enough to confirm the ubiquity of gouge material along the fault.

Also, the material reprises the recurrent argument that if the fault were not sealing, then we would already see evidence of fluid migration across the fault. High oil saturation south of the AGFZ compared to low oil saturation to the north, hundreds of economic oil wells south of the fault compared to eight uneconomic wells to the north, and a lack of updip hydrocarbon migration across the AGFZ are all cited as evidence of the fault serving as a seal.⁶ Yet, one concern with this argument is that the mechanisms of oil emplacement and movement are portrayed as equivalent to those for water; a lack of movement of oil does not necessarily preclude the possibility of water migration.

The supplemental information actually discusses a previous public comment in which a commenter provided evidence of a surface breach on property north of the AGFZ from injection operations to the south. This breach occurred in 1981 and is attributed to steam injection above the fracture gradient in the Arroyo Grande Field. Even considering that injection in this instance was in excess of the fracture gradient, the fact that activities south of the fault influenced property north of the fault calls into question the strength of the AGFZ as a seal.⁷ It is clear that there are circumstances under which fluids can flow across the fault, and the Operator has not done enough to preclude pathways for fluid flow. With a drinking water well just north of the

⁵ Letter from DOGGR to Michael Montgomery, US EPA (August 18, 2016) (“Response”); in response to letter from Michael Montgomery, Assistant Director, US EPA, to Ken Harris, State Oil and Gas Commissioner, DOGGR (April 19, 2016) (“EPA Request”), p. 3.

⁶ *Ibid.*

⁷ Supplement, at p. 4.

fault zone, the Operator and DOGGR have a responsibility to make absolutely certain the fault is a complete seal.

Perhaps hydrocarbons have not migrated updip across the AGFZ simply because it is updip. Updip motion requires acting against the force of gravity and the state of current reservoir pressures may simply not be enough to overcome that force. It is important to note that the Operator in its “Hydraulic Analysis for the Arroyo Grande Syncline” concludes that a spillover of injected fluid will not lead to a loss of containment.⁸ So, the synclinal structure of the aquifer itself may be responsible for variable oil content across the fault rather than the fault itself, as is inferred from the Applicant’s hydraulic analysis. The possibility of spillover may change if injection and fluid extraction dynamics change, however, and relying on the operator to maintain current dynamics is not an acceptable method of protection.

EPA and DOGGR Should Declare a Moratorium on Aquifer Exemptions

The Center continues to urge DOGGR and EPA to stop granting aquifer exemptions due to the fact that the criteria for granting such exemptions are wholly outdated. They fail to account for technologies developed in the last few decades for purifying and desalinating groundwater, or for the fact that the state’s need for water will only rise as droughts increase in frequency and severity due to anthropogenic climate change.⁹

Only last year, Stanford University researchers released a study documenting more freshwater in California’s aquifers than previously assumed, but noting that a significant amount of oil and gas activity has occurred within freshwater zones and USDWs.¹⁰ The authors’ conclusions included the fact that California does not have complete or current data on its groundwater resources, noting that “[g]roundwater volume estimates in California are uncertain and require additional studies.”¹¹ The authors further noted that “[c]urrent technologies and growing water demands have made water wells deeper than 1,000 ft more common. . . . As deeper groundwater resources become increasingly important, additional studies are needed for evaluating subsurface activities that could contaminate these resources,” including “wastewater disposal, CO₂ storage, and enhanced oil/gas recovery. . . .”¹²

In addition, in 2016, the Government Accounting Office released a report updating its 2014 Report on EPA’s management of underground injection. The 2016 Report noted that since the early 2000s, increased domestic oil and gas production has resulted in a “corresponding increase in wastewater that must be managed, reused, or disposed of properly.”¹³ At the same time, the

⁸ Aquifer Exemption Application, Arroyo Grande Oil Field, San Luis Obispo, California (December 2015), p. 9.

⁹ See e.g., Williams, Park A. et al., Contribution of Anthropogenic Warming to California Drought During 2012-2014, 42 Geophysical Research Letters 16 (2015), doi:10.1002/2015GL064924.

¹⁰ Kang, Mary & Robert B. Jackson, Salinity of Deep Groundwater in California: Water Quantity, Quality, and Protection, Proceedings of the National Academy of Sciences (2016), doi: 10.1073/pnas.1600400113, available at: <http://www.pnas.org/content/early/2016/06/21/1600400113.full>.

¹¹ *Id.* at 1.

¹² *Id.* at 2.

¹³ Government Accounting Office (GAO), Drinking Water: EPA Needs to Collect Information and Consistently Conduct Activities to Protect Underground Sources of Drinking Water (February 2016) (“2016 GAO Report”), at 1.

growth in production “has also raised concerns about potential effects to human health and the environment, including the potential contamination of underground drinking water sources by injecting wastewater associated with the production of oil and gas.”¹⁴ At a minimum, these potential impacts indicate EPA’s responsibility to conduct environmental review under the National Environmental Protection Act or an equivalent review prior to approving any exemptions.

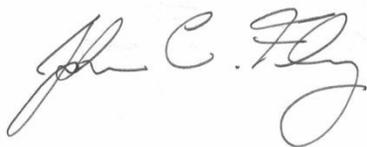
Like the 2014 Report, the 2016 Report also found, however, that EPA has failed to completely and consistently oversee and enforce the nation’s underground injection control programs. For instance, the 2016 Report found that EPA “does not have the location or supporting documents necessary to identify the size and location of all aquifers for which it has approved exemptions from protection under the Act.”¹⁵ The Report continued, “[u]ntil it has a complete aquifer exemption database and a way to update it periodically, EPA does not have sufficient information on aquifer exemptions to oversee state and EPA-managed programs and assess whether programs are protecting underground sources of drinking water.”¹⁶ Unless and until EPA can effectively protect the nation’s groundwater from wastewater and other oil and gas-related injection by, at a minimum, meeting all of the recommendations outlined in the two GAO Reports, EPA should not approve any further exemptions.

Thus, rather than continuing to allow injection and pollution of our state’s most precious resource, the state should invest in understanding and protecting it.

Conclusion

The supplemental information only raised further doubts about containment mechanisms discussed in the Arroyo Grande aquifer exemption proposal. It also made clear that the Operator intends to continue to push forth an application that lacks the data and study required to justify an exemption. In order to put public health and drinking water quality first, this exemption application must be rejected.

Respectfully submitted,



John C. Fleming, Ph.D.
Staff Scientist | Climate Law Institute
Center for Biological Diversity

See also GAO, Drinking Water: EPA Program to Protect Underground Sources from Injection of Fluids Associated with Oil and Gas Production Needs Improvement (June 2014).

¹⁴ 2016 GAO Report at 1.

¹⁵ *Id.* at 24-25.

¹⁶ *Id.* at 27.

REFERENCES CITED AND ATTACHED

- Aquifer Exemption Supplemental Information, Arroyo Grande Oil Field, San Luis Obispo, California (December 2017)
- Aquifer Exemption Application, Arroyo Grande Oil Field, San Luis Obispo, California (December 2015)
- Department of Conservation: Division of Oil, Gas and Geothermal Resources Letter to Michael Montgomery, U.S. EPA (August 18, 2016)
- Government Accounting Office (GAO), Drinking Water: EPA Needs to Collect Information and Consistently Conduct Activities to Protect Underground Sources of Drinking Water (February 2016)
- Government Accounting Office (GAO), Drinking Water: EPA Program to Protect Underground Sources from Injection of Fluids Associated with Oil and Gas Production Needs Improvement (June 2014).
- Kang, Mary & Robert B. Jackson, Salinity of Deep Groundwater in California: Water Quantity, Quality, and Protection, Proceedings of the National Academy of Sciences (2016),
- US EPA, Letter from Michael Montgomery, Assistant Director, Ken Harris, State Oil and Gas Commissioner, Division of Oil, Gas and Geothermal Resource (April 19, 2016)
- Williams, Park A. et al., Contribution of Anthropogenic Warming to California Drought During 2012-2014, 42 Geophysical Research Letters 16 (2015)

