



November 7, 2017

Tim Shular, Regulations Manager
Department of Conservation
801 K Street, MS 24-02
Sacramento, CA 95814
VIA EMAIL: comments@conservation.ca.gov

RE: Proposed Aquifer Exemption, Basal Sespe Formation
Sespe Oil Field, Ventura County, California

Dear Mr. Shular:

Thank you for this opportunity to submit comments on the request by Seneca Resources, Inc. ("Seneca") to expand the aquifer exemption for the Basal Sespe Formation in the Sespe Oil Field, which underlies portions of the Los Padres National Forest in Ventura County. Specifically, Seneca is seeking permission to inject wastewater into new areas of the aquifer that are currently protected under the federal Safe Drinking Water Act.

We have carefully reviewed the *Production Limit Update and Aquifer Exemption Request for the Basal Sespe Formation in the Tar Creek Topatopa Area of the Sespe Oilfield* ("AE Request") prepared by Seneca; the *Statement of Basis for the Expansion of the Aquifer Exemption at the Sespe Oil Field* ("Statement of Basis") prepared by the California Division of Oil, Gas & Geothermal Resources ("DOGGR") and the State Water Resources Control Board ("SWRCB"); and other pertinent records. Our review indicates that Seneca has not satisfied the federal aquifer exemption criteria outlined in 40 C.F.R. § 146.4, nor has it satisfied the State of California's exemption criteria set forth in Pub. Res. Code § 3131.

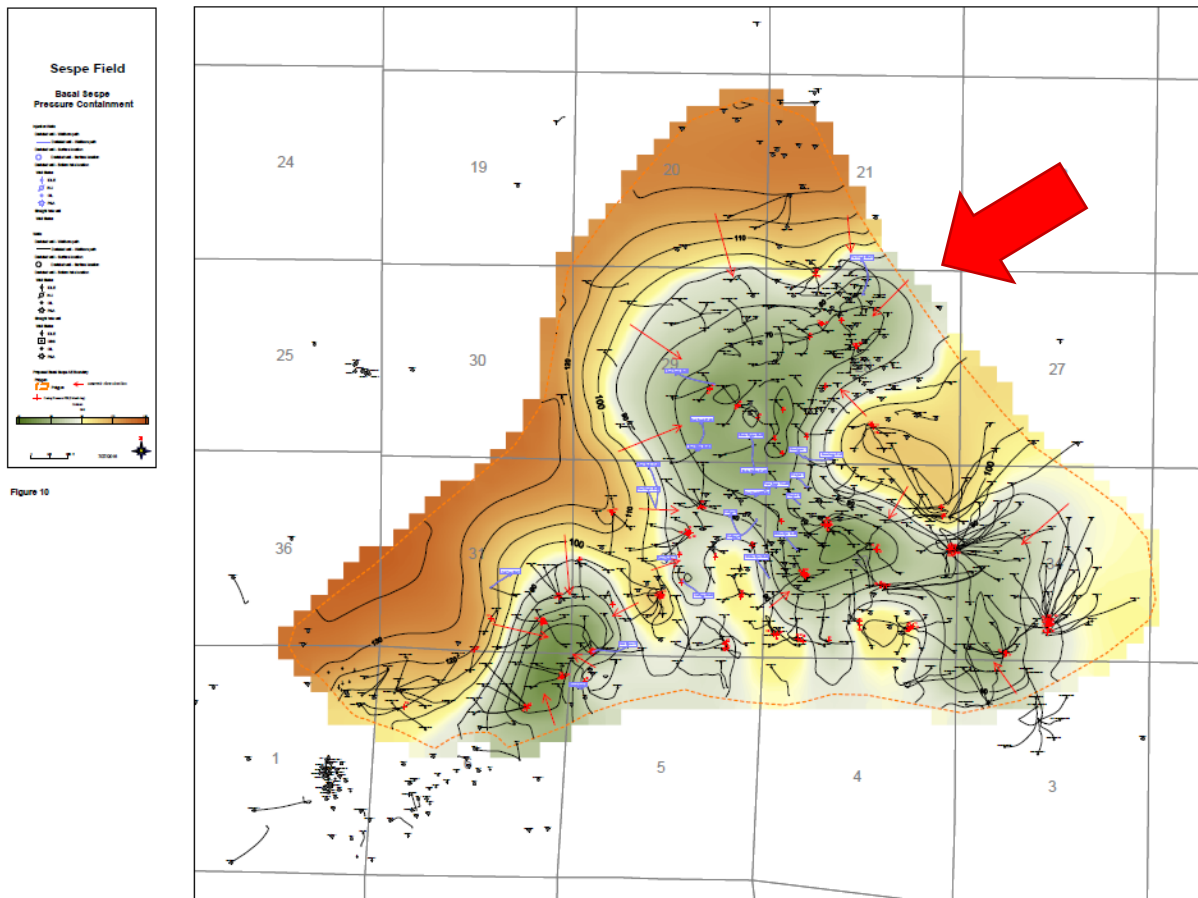
To assist in our review, we retained the professional services of Dr. Bradley Newton, Ph.D., P.G. of Newton Geo-Hydrology Consulting Services. His *Technical Memorandum* is submitted under separate cover, and is hereby incorporated by reference. Dr. Newton's findings are summarized as follows:

Additional information is required to demonstrate that the portion of the Basal Sespe Zone of the Sespe Formation (Basal Sespe Formation) proposed for Aquifer Exemption (AE) does not currently serve as a source of drinking water, in that water contained in the Basal Sespe Formation may be hydraulically connected to drainage areas northwest of Tar Creek and may contribute flow to the Sespe Creek, an important source of recharge to the Fillmore groundwater subbasin. In addition, further clarification is needed for the basis for specific exemption boundaries proposed and more technical information demonstrating the injected fluids will not flow beyond these proposed boundaries.

For these reasons – and as outlined in detail below – we urge your agencies to (1) withhold your preliminary approvals of Seneca's aquifer exemption, and (2) request additional information from Seneca prior to forwarding the application to the U.S. Environmental Protection Agency ("EPA") for further review.

1. Seneca Has Failed to Demonstrate Adequate Containment

Under Pub. Res. Code § 3131(a)(3), Seneca must prove that “[t]he injected fluids are expected to remain in the portion of the aquifer proposed for exemption.” The Statement of Basis claims that this criterion is fulfilled because “the net withdrawal of fluids from the aquifers proposed for exemption due to historic oilfield operations has created hydraulic gradients towards the production centers of the Sespe Oil Field, contributing to the containment of injected fluids in the Proposal Area.” This is based on a survey of well casing pressures performed by Seneca in 2016, the results of which are provided in Figure 10 (“Basal Sespe Containment Map”) of Seneca’s AE Request. As Seneca explains in its AE Request, “This pressure gradient is the mechanism that contains fluids (both oil and water) in the produced reservoirs to the area of the proposed Aquifer Exemption.”



Seneca’s pressure survey results as presented in its AE Request do not provide your agencies with an adequate basis to support an aquifer exemption, for the following reasons. First, the survey should extend well beyond the boundary of the proposed exempt area to ensure that pressure gradients outside of the area are sufficient to contain fluids. Second, Figure 10 shows a large area of low pressure in Section 28 that intersects with the proposed exemption boundary. Without evidence of higher pressure gradients outside of this area, this area could serve as a conduit for fluids to escape to outlying areas, and as such there is no basis to conclude that fluids will be contained within the proposed aquifer exemption boundary. And third, it is unclear what methodology was used in the survey, and what operating conditions were present during those surveys. It is unclear whether the pressures detected

during the surveys are typical of the area, and whether these pressures are variable depending on oil field operations.

The SWRCB has acknowledged the challenges associated with relying on hydraulic containment to support an aquifer exemption. Specifically, a Regional Water Quality Control Board (“RWQCB”) Staff Report dated January 5, 2017 states:

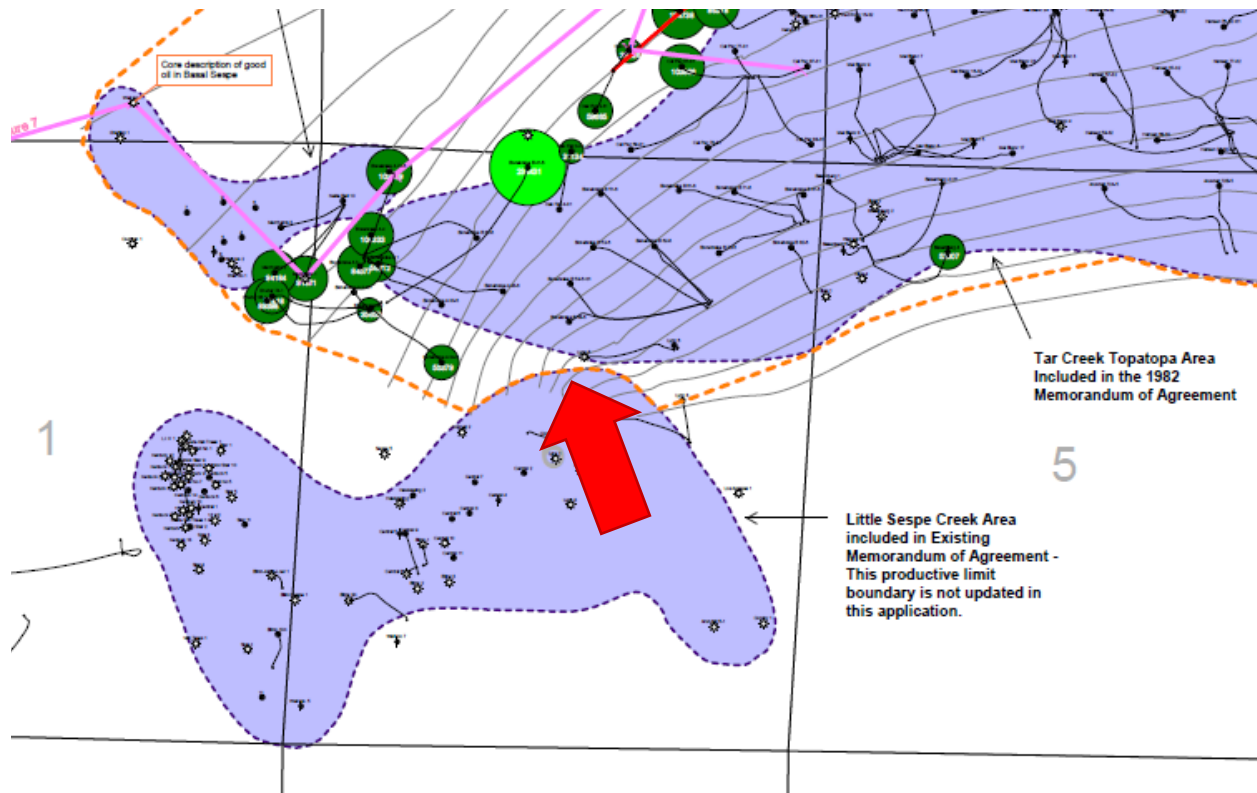
Hydraulic containment is more difficult to document and is challenging to ensure beyond the operational life of the oil field because it is primarily induced by the oil field operations that change over time (e.g., changes in extraction and injection locations and volumes), although it can also be induced by natural conditions. As discussed in more detail within the challenges discussion below, uncertainties regarding containment, particularly hydraulic containment or poorly defined structural containment, may require controls at the UIC project level to ensure and document compliance with the aquifer exemption containment criteria.

More often than not, the complex nature and uncertainties of the geology and hydrogeology of the formation and oil field operations requires the identification of multiple lines of evidence to validate concurrence with the proposed aquifer exemptions. This multiple lines of evidence approach often warrants documenting, as part of the aquifer exemption process, that monitoring or other conditions will need to be required for subsequent UIC projects to ensure containment of injected fluids within the exempted area into the future.

To address this challenge, the Staff Report states that DOGGR and the SWRCB will incorporate conditions into approvals of future injection projects such as “requiring the implementation of a water quality and/or pressure monitoring program in and/or in proximity to the proposed exempted areas. However, the Statement of Basis only suggests that “The Division and State Water Board staff will *consider* incorporating conditions into approvals of injection projects to verify that injected fluids remain in the proposed exempted areas.” (emphasis added).

We suggest that your agencies commit to incorporating *mandatory* conditions as part of the aquifer exemption process. This would ensure that the conditions are implemented immediately for all current injection operations, instead of relying on a site-specific injection well application at some unknown time in the future. If you wait to impose such conditions as part of future injection projects, then current injection operations may be allowed to continue indefinitely without the benefit of any pressure and/or water quality monitoring.

Finally, the proposed exemption boundary at the southwestern tip is drawn in a manner that raises doubts about whether that section is geologically contained. Here – as shown in Figure 4 – the boundary is drawn to exclude the Little Sespe Creek Area, along with a notation stating “Little Sespe Creek Area included in Existing Memorandum of Agreement – This productive limit boundary is not updated in this application.” Simply drawing the new boundary to exclude an existing exempt area does not provide an adequate basis for granting the AE Request.



Recommendation: We urge your agencies to require Seneca to conduct additional pressure surveys inside and outside of the proposed exemption area, and to provide a detailed description of the survey methods and protocol. In addition, we recommend that conditions be placed upon any aquifer exemption to ensure that pressure and water quality monitoring are implemented immediately. In addition, Seneca should submit a plan for how it intends to maintain the pressure gradient, in the likely event that its operations in the Sespe Oil Field change or cease over time.

2. Additional Water Quality Testing Must Be Performed

As we pointed out in a letter to your agencies dated October 25, 2017, two wells (Red Rock 67-29 and Red Rock 68-29) are currently injecting wastewater into non-exempt portions of the subject aquifer.

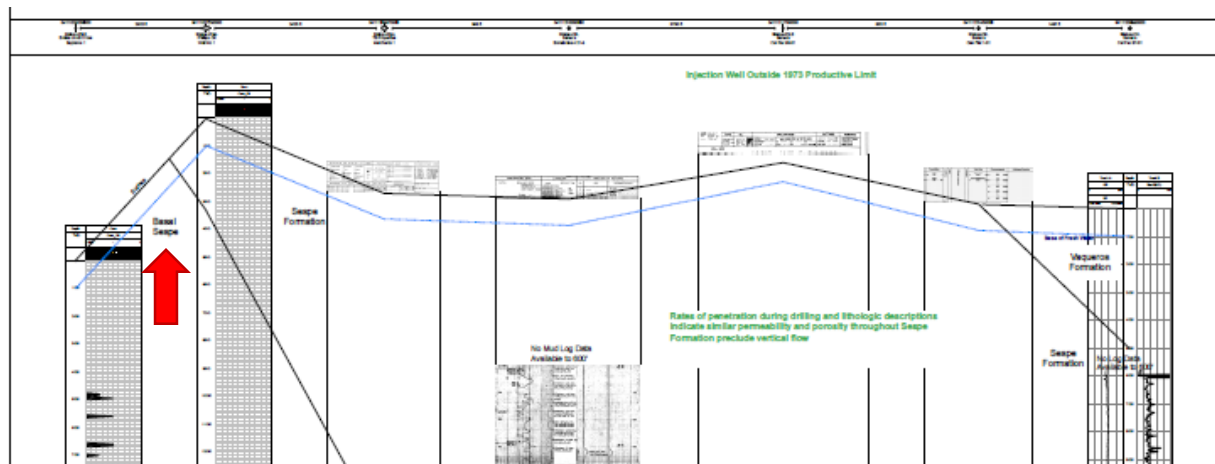
In November 2015, the SWRCB ordered Seneca to prepare a Formation Water Sampling Work Plan to describe procedures and reasoning for collecting representative formation water samples from the injection zones for these two wells, along with a third idle injection well (Cal-Pac 65-31). Seneca prepared the Work Plan and submitted it to the SWRCB in January 2016, and according to a SWRCB letter dated February 19, 2016, implemented the Work Plan without approval by the Regional Board. In addition, according to a letter from SWRCB dated June 10, 2016, "Additional sampling and analysis is required to determine the accurate TDS for the Cal Pac injection well. As noted in the February 19, 2016 correspondence, the formation water samples were collected without Regional Board approval." To the best of our understanding, this additional sampling and analysis was never completed, and we can find no evidence that the SWRCB ever approved the Work Plan.

In addition, the SWRCB June 10, 2016 letter concludes, "The native formation water collected from nearby production wells and within the injection zone has been determined to have less than 10,000

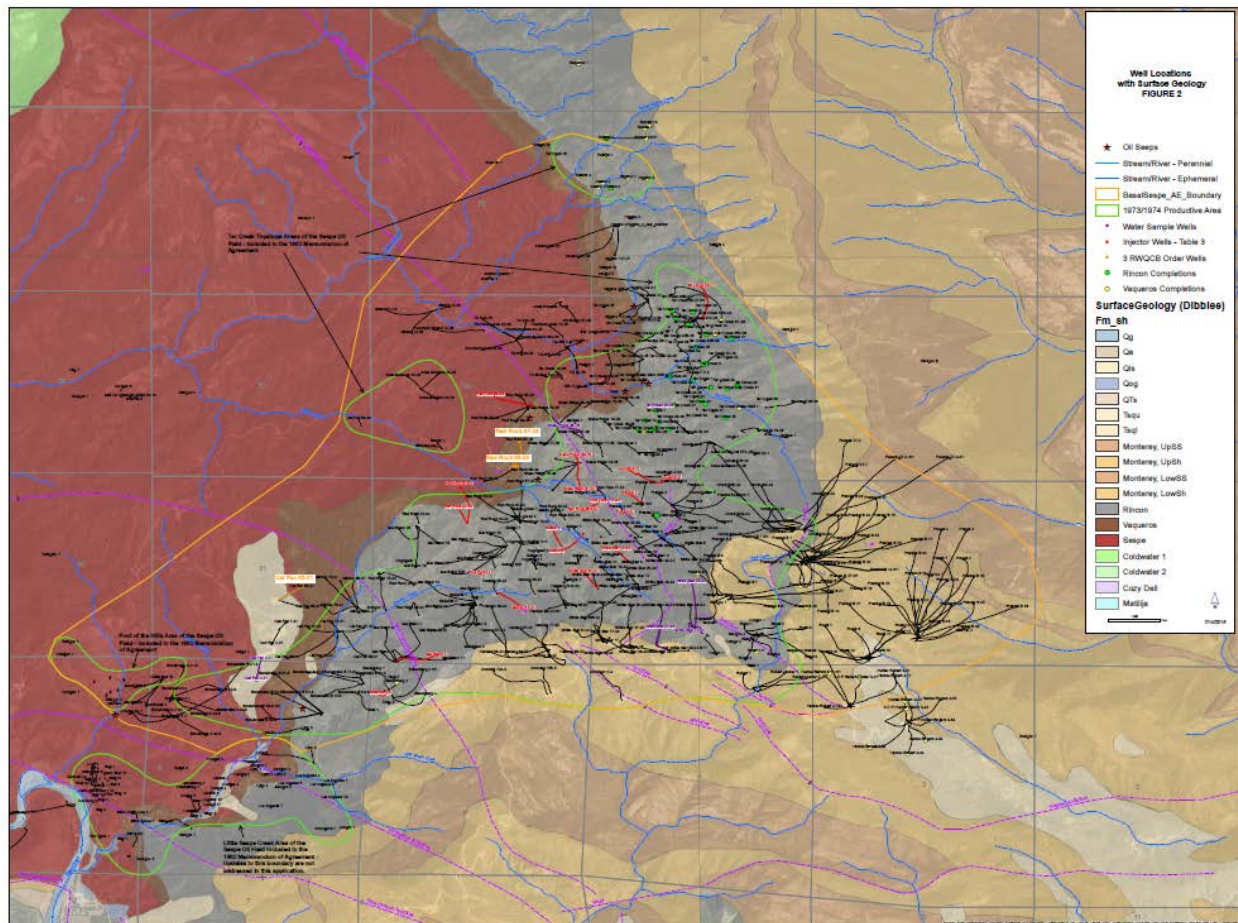
Seneca's AE Request does not contain any water testing data based on its own Work Plan as mandated by the SWRCB. Instead, Seneca relies on samples collected in December 2015, prior to the development and approval of the water sampling Work Plan. In addition, the AE Request relies on data that formed the basis of the SWRCB's opinion last year that the aquifer has beneficial uses.

3. The AE Request Should Disclose the Surface Connectivity of Basal Sespe Aquifer

Figure 7 in the AE Request indicates that the Basal Sespe intersects the surface. Specifically, the area between wells Supreme 1 and Phillips Oil Well No. 1 shows the Basal Sespe extending to the surface. This is significant because (1) the cross-section is located approximately one-half mile from Sespe Creek, and (2) encompasses a tributary to Sespe Creek. We are concerned that injected wastewater could migrate to this portion of the aquifer and contaminate the base of fresh water that underlies the area, as well as the surface water in Sespe Creek and its tributaries.



5



There are no defined barriers (e.g. confining silt or clay layers) precluding fluid flow between the Basal Sespe zone, the Sespe zone above, and the Coldwater zone below. Similarly low porosities and permeabilities amongst the layers are supposed to prevent fluid flow. However, without definite barriers, interactions between these zones can occur. Moreover, there is not a defined boundary between the Basal Sespe and the Sespe zone, so injection in the Basal Sespe zone can potentially impact the Sespe zone, which also intersects the surface.

Given the risk of potential surface water contamination in this area, it seems prudent to require Seneca to provide more information about the intersection of the Basal Sespe with the surface geology, and the relationship between these areas and Sespe Creek, and tributaries thereto.

Recommendation: Disclose more information about the Basal Sespe surface geology, base of fresh water, and surface waters in and near the proposed exemption area.

4. Acknowledge that Faults Can Act as Conduits to Groundwater Contaminants

The AE Request discloses the presence of two faults in and around the proposed exemption area – the San Cayetano thrust fault, and the Oak Ridge thrust fault – and concludes without any supporting documentation that these faults act as barriers to hydrologic flow.

While faults can act as barriers to hydrologic flow, the AE Request should also consider that “faults can also form preferential flow paths for vertical fluid flow where lateral hydraulic head gradients suggest

they impede flow. See, e.g., *Bense, V.F., and M.A. Person (2006)*, Faults as conduit-barrier systems to fluid flow in siliciclastic sedimentary aquifers, *Water Resour. Res.*, 42, W05421, citing extensive mineralization patterns [e.g., *Mozley and Goodwin, 1995*; *Garven et al., 1999*], leakage of contaminated groundwater along faults [e.g., *Nuclear Energy Agency, 1996*; *Mal'kovskii and Pek, 2001*; *Ofoegbou et al., 2001*], preferential oil migration via faults [e.g., *Link, 1952*; *MacDonald et al., 1993*; *Moretti, 1998*] geothermal anomalies [e.g., *Person and Garven, 1992*; *López and Smith, 1995*; *Bredehoeft, 1997*; *McKenna and Blackwell, 2004*] expulsion of overpressured fluids along faults [e.g., *Roberts et al., 1996*] and few detailed hydraulic head data [*Bense et al., 2003a*].

Recommendation: Evaluate the possibility that the faults identified in the AE Request may serve as conduits for contaminants to enter adjacent aquifers that serve as sources of clean drinking water.

5. The AE Request Fails to Disclose All Nearby Drinking Water Wells

The AE Request identifies several water wells located inside and outside of the proposed aquifer exemption boundary, and explains the methodology that Seneca used to identify the water wells. Specifically, the AE Request is based on Well Completion Reports provided by the California Department of Water Resources, DOGGR files for water supply wells inside the study area, and the GeoTracker GAMA website, focusing on wells within one mile of the proposed aquifer exemption boundary.

This survey omitted several known water wells in and near the study area, including but not limited to wells operated by the Goodenough Mutual Water Company and the Fillmore Irrigation Company.

The RWQCB has identified how an applicant can best substantiate exemption criteria 1 (targeted formation does not currently serve as a source of drinking water) and criteria 3 (adverse effect to existing/future beneficial uses):

Items 1 and 3 above are primarily substantiated by the inclusion of a comprehensive well survey identifying the location and depth of all existing wells in an area extending at least one-quarter mile beyond the proposed aquifer exemption boundary.

Comprehensive well surveys require the review and compilation of well information from multiple sources (e.g., Department of Water Resources, county level well and drinking water permitting agencies, local water agencies/districts, GeoTracker and USGS databases, etc.) as well as aerial photography and in-field “windshield” surveys as needed to confirm well locations and identify potential well locations based on land uses and associated structures. In cases where there are significant uncertainties regarding containment of injected fluid, Water Board staff typically recommend extending the required well survey beyond the one-quarter mile minimum to ensure at-risk wells are identified and protected.

Central Coast Regional Water Quality Control Board, 2017. Staff Report dated January 5, 2017. The AE Request is not based on a review and compilation from multiple sources of well records, aerial photography and in-field surveys. In addition, given the uncertainties regarding hydraulic containment, contaminant conduits along fault lines, and surface exposure of the Basal Sespe in close proximity to Sespe Creek tributaries, the water well survey area should extend much beyond one mile to ensure that all downstream wells are identified and protected from possible contamination.

Recommendation: Conduct a thorough inventory of well records along with aerial photography and in-field surveys to ensure that all potentially affected water wells are identified. Expand the study area to include downstream portions of Sespe Creek.

6. Conclusion

For the reasons stated above, the AE Request and the Statement of Basis fail to provide the evidence necessary to satisfy the criteria for an exemption to the Safe Drinking Water Act. As DOGGR, the SWRCB, and the RWQCB further consider this AE Request, we hope that you will account for the concerns and recommendations outlined above. Given the environmental sensitivity of this area underlying the Los Padres National Forest – along with its proximity to Sespe Creek, residential and agricultural water wells, and groundwater supplies in the City of Fillmore – any request to exempt this area from the protections of the Safe Drinking Water Act must be evaluated with the highest level of scrutiny. Thank you for taking all steps necessary to ensure that aquifers underlying our national forest lands are protected from contamination so that they can continue to provide sources of clean water for nearby communities.

Sincerely,



Jeff Kuyper
Executive Director

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