



State of California • Natural Resources Agency
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Division of Oil, Gas, and Geothermal Resources
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State Water Resources Control Board

January 17, 2017

Mr. Michael Montgomery
United States Environmental Protection Agency – Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Mr. Montgomery:

The State of California is committed to complying with the federal Safe Drinking Water Act (SDWA) and protecting California's aquifers from any contamination. This letter provides an update on how the State Water Resources Control Board (State Water Board) and the Division of Oil, Gas, and Geothermal Resources (Division) are taking action to ensure that fluids injected in connection with oil and gas production are not impacting water with current or potential future beneficial uses in California. First we provide an update on various categories of wells and aquifers chronologically (by their regulatory deadline for action), followed by a summary of the findings.

Update on Compliance Review

The State's initial review in 2014 and 2015 of the approximately 50,000 class II injection wells in the State identified that as many as 5,625 class II wells had been permitted for injection into potentially non-exempt underground source of drinking water (USDW) aquifers. This initial review employed a conservative screening criteria, and it is now clear that it captured wells that are not properly injecting.

Since that time, the Division and the State Water Board have worked in close coordination in three areas. First, we identified injection operations that pose a potential threat to water of current or potential future beneficial use, and ended such operations. Second, we have more thoroughly reviewed available well records and have found wells that had been mischaracterized as improper injectors. Third, where permitted injection is occurring in aquifers that appear to meet the criteria for exemption under the SDWA, the State has committed substantial resources to investigating these aquifers to determine whether they do in fact meet those criteria. Where we have determined that aquifers do meet the exemption criteria, we have presented proposals for the U.S. Environmental Protection Agency (US EPA) approval to ensure that injection operations in those aquifers are compliant with the SDWA.

As you are aware, the Division's Aquifer Exemption Compliance Schedule (AECS) regulations have been key to all of these efforts because they afford time to complete the work of demonstrating whether aquifers meet the SDWA exemption criteria while ensuring a timely end to injection in aquifers that do not.

Extensive discussions between US EPA, the Division, and the State Water Board led to a corrective action plan with specific deadlines for ending class II injection into non-exempt USDW aquifers. Consistent with that corrective action plan, the State regulations imposed three major deadlines for ending injection into non-exempt USDW aquifers based on the nature of the aquifer: (I) October 15, 2015, for injection in non-exempt USDW aquifers that are not hydrocarbon bearing and that have less than 3,000 milligrams per liter (mg/l) total dissolved solids (TDS); (II) December 31, 2016, for the 11 aquifers historically treated as exempt; and (III) February 15, 2017, for all other non-exempt USDW aquifers. An operator who fails to comply with the deadlines in the AECS regulations for ending injection could be subject to civil penalties of \$20,000 to \$25,000 per well and per day of injection. The following is a discussion of the work that has been completed to address the wells and aquifers under these regulatory deadlines.

I. October 15, 2015, deadline: non-hydrocarbon aquifers with less than 3,000 mg/l TDS

From the outset, our greatest concern has been with class II injection occurring into aquifers that are not hydrocarbon bearing and that contain less than 3,000 mg/l TDS. As discussed in our letter to you on May 15, 2015, the State's well review indicated that there were 155 class II wells permitted to inject into non-hydrocarbon-bearing aquifers with less than 3,000 mg/l TDS that are either not exempt or are one of the 11 aquifers historically treated as exempt. Of these 155 wells, 83 had been permitted to inject into one of the 11 aquifers treated historically as exempt, and the remainder had been permitted to inject into a non-exempt aquifer. Of the wells in non-exempt aquifers, the Division issued emergency orders and worked with the operators to cease injection in 23 of the wells in early 2015, and injection in the remainder of these wells ceased on October 15, 2015, in accordance with the AECS regulations.

II. December 31, 2016, deadline: the 11 aquifers historically treated as exempt

The AECS regulations require that class II injection in the 11 aquifers historically treated as exempt cease on December 31, 2016, unless and until an aquifer exemption is approved by US EPA. The Division has been in regular communication with the operators of wells in the 11 aquifers historically treated as exempt regarding that deadline and, on November 16, 2016, the State Oil and Gas Supervisor sent letters to those operators reminding them that injection must cease no later than December 31, 2016, absent a current aquifer exemption approval by US EPA.

In addition, the Division, in consultation with the State Water Board, has reviewed available data regarding the 11 aquifers historically treated as exempt and has found that, with one exception, the 11 aquifers historically treated as exempt do not appear to meet the State and federal exemption criteria. The one exception is the Walker Formation underlying the Round Mountain Field, which is the subject of an aquifer exemption proposal submitted to US EPA on November 30, 2016. The Division has provided an opportunity for public comment on that determination and will be seeking an amendment to the Memorandum of Agreement between the Division and US EPA to clarify that the remaining ten historically treated as exempt aquifers are not exempt.

The State's current assessment of these aquifers, and the contemplated clarifying amendment to the Memorandum of Agreement with US EPA would not preclude future consideration of exemption proposals within the 11 aquifers historically treated as exempt. If the State receives additional information in the future establishing that any of these aquifers, or a portion thereof, meet the exemption criteria and are appropriate for injection, the State may submit an aquifer

exemption proposal to US EPA following the required legal procedure, including public notice and a public hearing.

III. February 15, 2017, deadline: hydrocarbon aquifers and non-hydrocarbon aquifers with between 3,000 and 10,000 mg/l TDS

This section describes class II wells that must cease injection by February 15, 2017, aquifers that have or are anticipated to have concurrence by the State Water Board by February 15, 2017, and aquifers that are anticipated to have concurrence after that date.

Operations that must cease injection by February 15, 2017

For class II wells that are permitted to inject into a non-exempt USDW aquifer that is hydrocarbon bearing, or that is non-hydrocarbon bearing but contains greater than 3,000 mg/l TDS, the AECS regulations require that injection cease by February 15, 2017, unless and until an aquifer exemption is approved by US EPA. Where operators have not been able to provide data indicating that an aquifer subject to this deadline is likely to meet the exemption criteria under the SDWA, this deadline will be strictly enforced. This will apply to aquifers in at least 23 oil fields statewide.

Where operators have been able to provide data indicating that an aquifer subject to the February 15, 2017, deadline is likely to meet the exemption criteria, the State has worked with operators on the development of well-supported aquifer exemption proposals. Enclosed is a table that identifies and provides status updates for the 42 aquifer exemptions that have been or are being developed by the State. For 13 of the aquifer exemption proposals listed on the enclosed table, operators have not yet provided the State with all of the necessary data to support the aquifer exemption proposal, or the data was provided after the August 15, 2016, submission deadline. Injection into the aquifers covered by these 13 potential aquifer exemption proposals will be required to stop on February 15, 2017, as per the AECS regulations. This will affect more than 460 injection wells.

In addition, there are at least ten oil fields where there has been injection into non-exempt USDW aquifers and where no information was provided by the operators to support an aquifer exemption. There are approximately 15 affected wells in these fields. Injection into those wells must also cease on February 15, 2017.

Aquifer exemption proposals that have been or will be advanced by the State (with preliminary concurrence from the State Water Board) before February 15, 2017

The Division received sufficient data to evaluate 29 aquifer exemption proposals affecting more than 1,650 injection wells, many of them addressing multiple aquifers. The Division deemed these 29 proposals to have sufficient merit to be fully developed and forwarded to the State Water Board for their review and potential concurrence. As of this date, of the 29 possible aquifer exemption proposals forwarded to the State Water Board, the State Water Board has preliminarily concurred on seven of the proposals, and four of those have been finalized and submitted to US EPA for approval. In addition to the seven aquifer exemption proposals that the State has already advanced, we anticipate that by February 15, 2017, another nine aquifer exemption proposals will receive preliminary concurrence from the State Water Board either in whole or in part. Thus, before February 15, 2017, the Division and the State Water Board expect to have at least preliminarily concurred on 16 of these 29 proposals to US EPA.

For wells injecting into aquifers that are subject to an aquifer exemption proposal that has been advanced by the State, the Division intends to allow the operators to continue to conduct injection operations and, at this time, use its discretion not to impose penalties that could be triggered by the requirement in the AECS regulations that the aquifer exemption proposal must have been approved by US EPA in order for injection to continue. The State's evaluation and development of an aquifer exemption proposal includes a survey of any water wells in the area of the subject aquifer, and the State's determination that an aquifer meets the criteria for exemption in each case. This is contingent upon a determination by the Division and the State Water Board that the aquifer is not a source of drinking water, that the aquifer will not be a source of drinking water, that class II injection in the aquifer does not pose an apparent threat to water of current or potential future beneficial use, and that the injected fluid will remain in the aquifer or portion of the aquifer that would be exempted. For this reason, if the Division has concluded that an aquifer does in fact meet the exemption criteria, and the State Water Board has at least preliminarily concurred that all or a portion of the proposed exempted area may merit consideration for exemption, the Division does not intend, at this time, to exercise its discretionary authority to impose civil penalties for injection beyond the AECS deadline. In instances where the State has preliminarily found that injection does not pose a threat to water of current or potential future beneficial use, the Division and the State Water Board believe it appropriate to allow permitted class II injection operations to continue.

Aquifer exemption proposals with sufficient merit that might not be advanced by the State by February 15, 2017

Of these 29 aquifer exemption proposals, we have identified 13 aquifer exemption proposals that the Division and the State Water Board both agree appear to have merit, but that might not receive preliminary concurrence by the State Water Board by February 15, 2017. These are proposals that have taken longer and require more data than most proposals, and therefore will not likely receive preliminary concurrence by that date. Nonetheless, the State has compiled extensive data and analysis supporting these aquifer exemption proposals, including surveys of water wells in the area, and the Division and the State Water Board currently agree that it appears that the aquifer exemption proposals, in whole or in part, meet the criteria for exemption. For injection operations addressed in these 13 aquifer exemption proposals, the Division also intends to allow the operators to continue to conduct permitted class II injection operations while the proposals are being finalized, for the same reasons discussed above. There are approximately 450 injection wells affected by this decision. Prior to the deadline, the State will provide US EPA a timeline and status report to indicate when we expect to advance each of the proposals in this category.

Summary of Updated Findings

We initially estimated in 2015 that of the approximately 50,000 class II injection wells in the State, 5,625 injection wells in more than 75 fields called for further review. The Division adopted regulations establishing a compliance schedule and, in the initial stages of this regulatory schedule, we found 155 wells were injecting into aquifers with no hydrocarbons and less than 3,000 TDS. All 155 of these wells have been brought into compliance.

As a part of our compliance plan, the Division also reached out to operators with injection wells in non-exempt aquifers, providing an opportunity to prepare technical proposals to support exemption of those aquifers under State and federal law. To date, operators have provided proposals for 42 fields, covering more than 2,000 wells, of which:

- For 13 of those 42 fields, the February 15, 2017, deadline will be strictly enforced (impacting approximately 460 wells), because the operators have not provided adequate data to support an exemption proposal, although such data may come forward in the future.
- For 29 of those 42 fields, injection wells (approximately 1,650 wells) will not be shut down because the Division and the State Water Board either currently concur that the exemption proposal meets the State and federal criteria for exemption or agree that the proposal appears to have merit warranting ultimate submission to US EPA.

The Division identified ten additional fields with injection occurring in non-exempt zones, covering approximately 15 wells, which will be subject to strict enforcement under the February 15 deadline because no data has been presented to support an exemption.

In summary, the Division will enforce the February 15, 2017, deadline with respect to injection in aquifers in 23 fields (covering approximately 475 wells) and will allow injection to continue in aquifers in 29 fields (covering approximately 1,650 wells) pending US EPA approval. Again, if an operator were to inject into any non-exempt aquifer other than those in the 29 fields mentioned above after February 15, 2017, that operator would be fined up to \$25,000 per well per day.

We believe that this approach will bring the State into compliance and protect public health and the environment, while avoiding unnecessarily disrupting oil and gas production in instances where the State has already done an evaluation of a proposal and believes the aquifer exemption as submitted by the State (or anticipated to be submitted by the State) will receive US EPA approval. If the State fails to forward any of the anticipated aquifer exemption proposals to US EPA, or US EPA ultimately rejects an aquifer exemption proposal, then the Division will, of course, take immediate action to halt injection in the area addressed in that proposal.

If you have any questions or wish to discuss this matter further, please contact Ken Harris at (916) 323-1777 or Ken.Harris@conservation.ca.gov or Jonathan Bishop at (916) 341-5619 or Jonathon.Bishop@waterboards.ca.gov.



Sincerely
Kenneth A. Harris Jr.,
State Oil and Gas Supervisor
Division of Oil, Gas, and Geothermal Resources



Jonathan Bishop
Chief Deputy Director
State Water Resources Control Board

Enclosure

cc: Saul Gomez, Governor's Office
John Laird, Natural Resources Agency
Matthew Rodriguez, CalEPA
David Bunn, Department of Conservation

STATE WATER BOARD AQUIFER EXEMPTION PROPOSAL REVIEW SUMMARY TABLE

Field	Formation(s)/Units Proposed for Exemption	Anticipated Concurrence Type	Injection Types	Minimum Formation TDS (mg/L)	Maximum Formation TDS (mg/L)	Hydrocarbon Production
Concurrence Letter Issued						
Arroyo Grande	Dollie Sands	Concurrence	SC, SF, WD	980	2,800	Yes
Round Mountain	Jewett Sand	Concurrence	SC, SF	2,800	2,800	Yes
	Pyramid Hill Sand	Concurrence	SC, SF, WF	1,000	2,400	Yes
	Vedder	Concurrence	SC, SF, WF	1,200	4,000	Yes
	Walker	Concurrence	WD	1,400	2,400	Yes
Fruitvale	Santa Margarita	Concurrence	WD	5,630		Eastern Portion
Tejon	Transition Zone	Concurrence	WD	2,231	3,317	Yes
Livermore	Greenville Sands Member of Cierbo Formation	Concurrence	WD	6,600	8,500	Yes
Mount Poso	Pyramid Hill Sand	Concurrence	SF, WF	1,730		Yes
	Vedder	Concurrence	SF, WF	2,520		Yes
San Ardo AE	Lombardi Sands	Concurrence	SF, WD	4,500		Yes
	Aurignac Sands	Concurrence	SC, WF, WD	4,842		Yes
Anticipated Preliminary Concurrence (in Whole or in Part) by February 15, 2017						
McKittrick	Tulare	TBD	EOR, WD	1,412	34,685	Yes
Midway-Sunset	Tulare	TBD	SF, WD	3,588	30,337	Northern portion, Lower Tulare
	Potter Sands	TBD	EOR, WD	1,550	22,347	Eastern Portion
	Spellacy Sands	TBD	EOR, WD	1,200	38,491	Eastern Portion
	Miocene Shale	TBD	EOR, WD	3,000	26,628	Yes
	Lower Antelope Sands	TBD	WD	4,296	24,740	No
Lynch Canyon - Lanigan Sand	Lanigan Sand	TBD	SF and SC	3,439	4,658	Yes
Poso Creek	Basal Etchegoin and Chanac	TBD	SC and SF	260	680	Yes
	Basal Etchegoin	TBD	SC and SF	480	1,300	Yes
Kern Front	Upper Chanac	TBD	SC, SF, WD	320	350	Yes
	Vedder	TBD	WD	3,500	10,700	No
Lost Hills - Phase 1	Tulare	TBD	SF, CS	3,789	11,135	No
	Etchegoin	TBD	WD	>10,000	>10,000	Yes
	Reef Ridge	TBD	WD	>10,000	>10,000	Yes
	Cahn	TBD	WD	>10,000	>10,000	Yes
Edison AE	Chanac	TBD	SC, SF	570	2,000	Yes
	Pyramid Hills and Vedder Fms.	TBD	WF	1,110	20,775	Yes
	Wicker Sands of Fruitvale Formation	TBD	WD	3,300	3,300	Yes
	Santa Margarita	TBD	SC, SF	440	820	Yes
Jasmin AE	Cantleberry Sands member of the Vedder Fm	TBD	EOR, WD	380	410	Yes
Sespe	Basal Sespe	TBD	WD	5,700	33,000	Yes

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Anticipated Preliminary Concurrence (in Whole or in Part) after February 15, 2017						
Elk Hills - Phase 1	Tulare	TBD	WD	4,500	20,000	No
Cymric	Tulare	TBD	SF, WD	1,100	14,100	Southeastern portion
Cat Canyon	Sisquoc	TBD	SC, SF, WF, WD	6,100	26,000	Yes
Kern River	Kern River	TBD	SC, WD	52	1,200	Yes
Elk Hills - Phase 2	Tulare	TBD	WD	4,500	20,000	No
South Belridge	Tulare	TBD	SF, WD	3,498	32,788	No
Lynch Canyon - Santa Margarita	Santa Margarita	TBD	WD	3,700 (estimated)	3,845 (estimated)	No
Jacalitos and Coalinga	Temblor	TBD	SF, WF	3,024	12,730	Yes
Zaca	Monterey	TBD	WD	5,900	7,200	Yes
North Belridge	Tulare	TBD	WD, EOR	8,055	22,540	Yes
Lompoc, Main	Monterey	TBD	WD	4,700	12,100	Yes
Casmalia	Monterey (All Zones)	TBD	WD, EOR	3,700	11,000	Yes
Holser	TBD	TBD	TBD	TBD	TBD	TBD
Proposals under Development						
Edison NE						
Cat Canyon, Gato Ridge						
Kern Bluff						
Kettleman Hills						
Oxnard						
Lompoc, NW Area						
Kreyenhagen						
Chico Martinez						
Lost Hills Phase 2						
Rosedale Ranch						
Round Mountain,S.Area						
Richfield Oil						
Monterey County						

ACRONYMS:

Aquifer Exemption (AE), Enhanced Oil Recovery (EOR), Cyclic Steam (SC), Steam Flood (SF), Water Flood (WF), Waste Disposal (WD), Underground Sources of Drinking Water (USDW), feet below ground surface (ft. bgs), Division of Oil, Gas, and Geothermal Resources (DOGGR), State Water Resources Control Board (SWRCB), To Be Determined (TBD), milligrams per liter (mg/L).

* = AE proposal has not been submitted to the SWRCB.