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5/29/2015

State Water Resources Control Board  
Attn: Jeanine Townsend, Clerk to the Board  
1001 I Street, 24<sup>th</sup> Floor  
Sacramento, CA 95814



Via Email Only: [commentletters@waterboards.ca.gov](mailto:commentletters@waterboards.ca.gov)

RE: Comment Letter – Model Criteria for Groundwater Monitoring

Dear Board –

Thank you for the opportunity to submit comments on the “Draft Model Criteria for Groundwater Monitoring in Areas of Oil and Gas Well Stimulation” dated April 29<sup>th</sup>, 2015. We appreciate the importance of protecting our states resources and allowing for the responsible development of those resources. The Termo Company is an 82 year old California based oil and gas producer with a proud history in the state of achieving both those goals. We are a family and employee owned independent company with operations in five counties in the state. We pride ourselves on our California roots.

While Termo engages in very few hydraulic fracture stimulations, we believe it is an important and safe tool to maximize resource production. As such we have concerns about the Model Criteria put forth by Water Resources Control Board. These are outlined below as both general and subject specific concerns.

### General Comments:

- The proposed criteria inordinately burden smaller oil and gas operations and producers that may have isolated single well operations.
- Monitoring criteria will be very difficult for smaller operators wishing to stimulate 1 to 3 wells in an isolated area. For example, the use of 3 monitoring wells to stimulate 1 well will raise the cost of the single well stimulation by approximately \$600,000 (assuming 3 wells to a depth of 1,000’).
- The definition of an aquifer is so broad that any well outside of an exempted aquifer will be subject to the requirements, and all of the expense and burden to prove that protected groundwater exists falls on the operator.
- Other methods of confirming fracture stimulation isolation should be considered viable options for water monitoring. If it can be illustrated that the fracture stayed in the intended zone and was contained, the need for monitoring at the aquifer becomes much less important.
- A geological study based on well log information and known hydrogeology should be sufficient to prove the absence of protected water.
- Sampling requirements for multiple substances is overly broad and should be limited to either markers used in the stimulation or the additives in the fracture fluid.
- We would like to see some language that acknowledges that if well stimulation is proved safe, that the monitoring requirement will be changed to require *less* monitoring by operators and not more.

- Monitoring of multiple aquifer depths can be accomplished through a single well bore using a multi-chamber (multi-depth) completion within that single well bore.
- A risk based analysis and subsequent monitoring design should be allowed. For example, if the risk to groundwater comes from the zone of fracture stimulation, then the monitoring of the deepest protected aquifer should be sufficient.

**Specific Comments:**

**2.0 Area Specific Groundwater Monitoring**

- We find the definition of an aquifer so broad that any well outside of an exempted aquifer will be subject to the requirements, and all of the expense and burden to prove that protected groundwater exists falls on the operator. This burden of proof will greatly increase the cost of every stimulation.
- An aquifer is defined as yielding more than 200 gallons of water per day. This minimum is an incredibly low value (0.14 gallons per minute) that would not adequately provide for the daily water usage of a typical American household. A typical well rate that would sustain a single family home is 5 GPM. We recommend this rate be raised to a minimum of 1 GPM or 1,440 gallons per day.

**2.1.1 Groundwater Monitoring Design**

- Requiring an operator to drill three monitoring wells per aquifer for one stimulation is economically unfeasible. This requirement will raise the cost of a single stage one well stimulation by at least \$600,000 (assuming 3 wells to a depth of 1,000' to monitor a single aquifer zone) and effectively prevent an operator from maximizing the resource recovery.
- The location of a monitoring well should be based on the hydrogeology of the aquifer rather than a cookie-cutter approach.
- Other methods of gaining data should be considered viable options for water monitoring. For example, radioactive tracers can give you a picture of the fracture dimensions after the job, confirming or denying the estimated fracture geometry and whether the fracture stayed in the intended zone. Calculating and plotting the net pressure during the actual stimulation will show the growth patterns and containment of the fracture. If it can be illustrated that the fracture stayed in the intended zone and was contained, the need for monitoring at the aquifer becomes much less important. The best data is the data we collect near the wellbore and the data collected during the stimulation activity itself.

**2.1.3 Sampling and Testing Requirements**

- The sampling and testing requirements should be based on chemicals used in the actual stimulation / and hydrocarbon production operations in the area. As proposed by the Water Board, the constituents are overly broad.

**2.2.1 Exclusion Based on Absence of Protected Water**

- A geological study based on well log information and known hydrogeology should be sufficient to prove the absence of protected water. Our concern is that the Monitoring Criteria will require drilling water monitoring wells in every case just to prove that there is no usable water.

**4.0 Regional Groundwater Monitoring Program**

- If the area-specific water monitoring wells show no evidence of contamination after a period of 2 years, then a regional monitoring program should not be necessary. We would like to see some language that acknowledges that if well stimulation is proven safe and effective and remains isolated, that the monitoring requirement will be changed to require *less* monitoring by operators and not more.

Again, thank you for this opportunity to provide feedback on this important issue. If you have any further questions, do not hesitate to contact Termo. We will continue to work with the Water Board and our industry partners on this issue and ensuring the safe and viable production of oil and gas in the state.

Sincerely -



Ralph Combs  
Manager, Corporate Development



Christi Reid  
Petroleum Engineer