

# *SB4 Model Criteria for Groundwater Monitoring: The Expert Consultation Process*

Public Stakeholder Meeting to Develop Groundwater Monitoring Model Criteria for Oil and Gas Areas

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**Brad Esser (LLNL)**

 Lawrence Livermore  
National Laboratory



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# SB4 Pavley. Oil and gas: well simulation.

## Section 7. Groundwater Monitor Plan

- (a) Groundwater protection

- *The Legislature finds and declares that protecting the state's groundwater for beneficial use, particularly sources and potential sources of drinking water, is of paramount concern.*

- (b) Scientifically-based groundwater monitoring

- *The Legislature further finds and declares that strategic, **scientifically based groundwater monitoring** of the state's oil and gas fields is critical to allaying the public's concerns regarding well stimulation treatments of oil and gas wells.*

**SB4 explicitly discusses scientifically-based groundwater quality monitoring**

# Groundwater quality monitoring

## Section 7. Groundwater Monitor Plan

- (c) Development of model groundwater monitoring criteria

*In order to assess the potential effects of well stimulation treatments on the state's groundwater resources in a systematic way, the State Board shall develop model groundwater monitoring criteria.*

*The State Board shall prioritize monitoring of groundwater that is or has the potential to be a source of drinking water, but **shall protect all waters designated for any beneficial use.***

**The Water Board is responsible for developing “model criteria” for groundwater quality monitoring**

# Expert advice

## Section 7. Groundwater Monitor Plan

- (d) Requirement for expert advice

- *The state board ... **shall seek the advice of experts on the design of the model groundwater monitoring criteria.** The experts shall assess and make recommendations to the state board on the model criteria.*

**The Water Board is responsible for seeking expert advice.**

# SWRCB has contracted LLNL as an expert advisor

- **Lawrence Livermore National Laboratory**

- Helped State develop both Geotracker and the GAMA program
- Expertise in
  - aqueous, isotope & gas geochemistry;
  - groundwater transport & contaminant attribution;
  - seismology & rock mechanics;
  - geothermal resources & carbon sequestration;
  - contaminated site characterization and conceptual models;
  - environmental monitoring and compliance

<b>Contract PI:</b>	<b>Bradley K. Esser (“Brad”)</b>
LLNL staff scientist	<i>Technical Lead:</i> GAMA Special Studies <i>Group Lead:</i> LLNL Environmental Radiochemistry Group <i>Capability Lead:</i> LLNL Environmental Monitoring Radioanalytical Laboratory
Contact Info	Brad Esser bkesser@llnl.gov

**The Water Board has a long relationship with LLNL  
for its technical expertise**

# LLNL will provide expert advice on both design criteria and conceptual models for groundwater monitoring

- **Model groundwater monitoring criteria:**
  - Recommendations for model criteria to be considered for groundwater monitoring of current and past oil and gas field related activities on spatial scales from individual well to regional groundwater basin.
- **Conceptual model evaluation:**
  - The report will also include Contractor's review the State Water Board's conceptual model for groundwater monitoring in areas of current and past oil and gas production.

**LLNL will be responsible for the recommendations delivered to the Water Board.**

# Public meetings

Date & Location	Event	Description
August 2014	<b>This meeting</b>	Presentations to public & stakeholders explaining process and presenting a conceptual monitoring plan. Input from public & stakeholders
Fall 2014	<b>Input to experts</b>	Stakeholder & public presentations to LLNL.
Early 2015	<b>Presentation to Water Board of Directors</b>	Water Board Meeting Informational Item to allow presentation of recommendations to Directors.

**The Water Board develops criteria by July 2015.**

## LLNL will use both internal and external expertise

- **LLNL will subcontract external experts**
  - Chosen for technical expertise
  - Will not be stakeholders
  - Will be made publicly available
- **LLNL will be reaching out for relevant information**
  - Will have access to information and data collected by the SB4 Scientific Assessment
    - California Council on Science & Technology  
(under contract with the California Natural Resources Agency)
  - **Agency meetings**
  - **Stakeholder meetings**

**LLNL will alone be responsible for recommendations and evaluations delivered to the Water Board.**



# More than one plan required

- (7c) Development of model groundwater monitoring criteria
  - *The model criteria shall address a **range of spatial sampling scales** from methods for conducting appropriate monitoring on individual oil and gas wells subject to a well stimulation treatment, to methods for conducting a regional groundwater monitoring program.*

Scale	Responsibility	What
Well by well	Well Operator	Nearby water well
		An individual or small set of oil & gas wells
Regional	SWRCB	Groundwater basin
		Oil & gas field

**The threshold for transitioning from well-by-well to regional monitoring is one of the criteria to be developed**

# Operator-Required Groundwater Monitoring

- **Groundwater monitoring & analysis requirements**
  - Laboratory analytical methods?
  - How frequently and how long?
- **Groundwater monitor well design**
  - How many wells? What types of wells?
  - What depth intervals?
  - How close to the stimulated well?
  - What information will be required to support the monitoring design?
- **Data accessibility**
  - What should the requirements be for reporting and data sharing?
  - What other types of information should be required or requested?
- **Limitations or exemptions?**
  - Lack of protected water
  - Significant vertical separation
  - *Presence of hydrocarbon zone or UIC-exempted aquifer*
  - *Presence of unrelated groundwater contamination*

**Operator-required groundwater monitoring targets an individual stimulation well or a small number of wells**

# Regional Scale Groundwater Monitoring

- **What should a regional program look like**
  - Groundwater analysis
  - Groundwater monitor well design
  - Data accessibility
  - Limitations or exemptions?
  
- **When and where should regional-scale monitoring be conducted**
  - Criteria for transition from local to regional monitoring?
  - Area prioritization for regional-scale monitoring?
  - Limitations or exemptions?

**Regional-scale groundwater monitoring targets  
an oil & gas field or a groundwater basin**

# Conclusion

- ***The intent of LLNL's expert advice is***
  - to provide scientifically-credible recommendations that are protective of groundwater, clearly written, and technically feasible*
  
- ***The State Board shall***
  - take into consideration the recommendations received, and*
  - develop model groundwater monitoring criteria...*

**LLNL makes recommendations.  
The Water Board develops criteria & plans.**