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

Public Stakeholder Meeting to Develop Groundwater Monitoring Model Criteria for Oil and Gas Areas August 25, 2014 (Los Angeles County Board of Supervisors Chambers; Los Angeles)

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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**

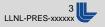
#### **Section 7. Groundwater Monitor Plan**

• (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.



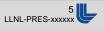
## **SWRCB** has contracted LLNL as an expert advisor

#### 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

Contract PI:	Bradley K. Esser ("Brad")
LLNL staff scientist	Technical Lead: GAMA Special Studies Group Lead: LLNL Environmental Radiochemistry Group Capability Lead: LLNL Environmental Monitoring Radioanalytical Laboratory
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# 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

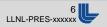
#### Model groundwater monitoring criteria:

 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	This meeting	Presentations to public & stakeholders explaining process and presenting a conceptual monitoring plan. Input from public & stakeholders
Fall 2014	Input to experts	Stakeholder & public presentations to LLNL.
Early 2015	Presentation to Water Board of Directors	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

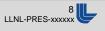
#### LLNL will subcontract external experts

- -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?

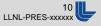
#### Data accessibility

- 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

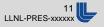


## **Regional Scale Groundwater Monitoring**

#### 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.

