

# Proposed Draft Model Criteria for Groundwater Monitoring



State Water Board Workshop

May 19, 2015 (Item 6)

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# Workshop Overview

- DOGGR Statement
- Staff Overview of Draft Model Criteria
- Stakeholder Input
- Public Comment
- Board Member Discussion

# DOGGR Statement

# Presentation Overview

- Requirements of Senate Bill 4 (SB 4 Pavley, statutes of 2013)
- Project Timeline
- Proposed Draft Model Criteria for Groundwater Monitoring



# Background History

- **DOGGR Draft Regulations** released (Jan 2013)
- **Public concern about water quality**
- **Senate Bill 4** (SB 4 Pavley, statutes of 2013)
  - Oil and Gas Well Stimulation – including hydraulic fracturing and acid well stimulation



# Requirements in SB 4

- Consult with DOGGR during DOGGR's development of regulations
- Enter into a formal agreement with DOGGR
- Designate third-party contractors to perform property owner requested water sampling
- **Develop “model criteria” for groundwater monitoring**
- Implement regional groundwater monitoring program

# Model Criteria as Outlined in SB 4

- **Water Boards to oversee groundwater monitoring**
  - Develop “model criteria” for groundwater monitoring July 2015
  - Implement regional groundwater monitoring January 2016
- **The model criteria are to:**
  - Protect all waters designated for beneficial uses
  - Prioritize monitoring that is or has the potential to be a source of drinking water

# Model Criteria as Outlined in SB 4 (cont.)

## ➤ Components:

- Groundwater monitoring near stimulated wells (Operators)
- Regional-scale monitoring (State Water Board)

## ➤ Model Criteria to include:

- Monitoring methods
- Chemicals to analyze
- Frequency/duration
- Areas to monitor

# Model Criteria Development Team

- Lawrence Livermore National Laboratory (LLNL) to provide recommendations
- Model criteria is being developed in consultation with:
  - DOGGR
  - Technical Experts
  - Public Stakeholders
- U.S. Geological Survey collecting and analyzing data to help develop model criteria

# Project Timeline



# Project Timeline

- August 2014 - Stakeholder meetings
- December 11, 2014 - LLNL hosted meeting with technical experts and stakeholders
- April 8, 2015 - State Water Board Informational item
- April 29, 2015 - Released Draft Model Criteria
- May 19, 2015 - State Water Board Workshop

# Project Timeline (cont.)

## Moving Forward....

- **May 29, 2015** - End of public comment period for draft Model Criteria
- **June 19, 2015** - Release of final draft Model Criteria
- **July 7, 2015** – State Water Board adoption meeting
- **January 1, 2016** - State Water Board to implement regional groundwater monitoring

# Proposed Draft Model Criteria for Groundwater Monitoring



# Protected Water Is Defined As...

- Water with less than 10,000 milligrams per liter (mg/L) of total dissolved solids (TDS);
- Within an aquifer of sufficient volume (yields more than 200 gallons per day); and
- Outside an exempt aquifer (pursuant to the Code of Federal Regulations, title 40, part 146.4).

# Main Elements of Draft Model Criteria

- Area-Specific Groundwater Monitoring (conducted by well operator)
- Requests for Exclusion from Area-specific Groundwater Monitoring
- Designated Contractor Sampling and Testing
- Regional Groundwater Monitoring

# Area-Specific Groundwater Monitoring

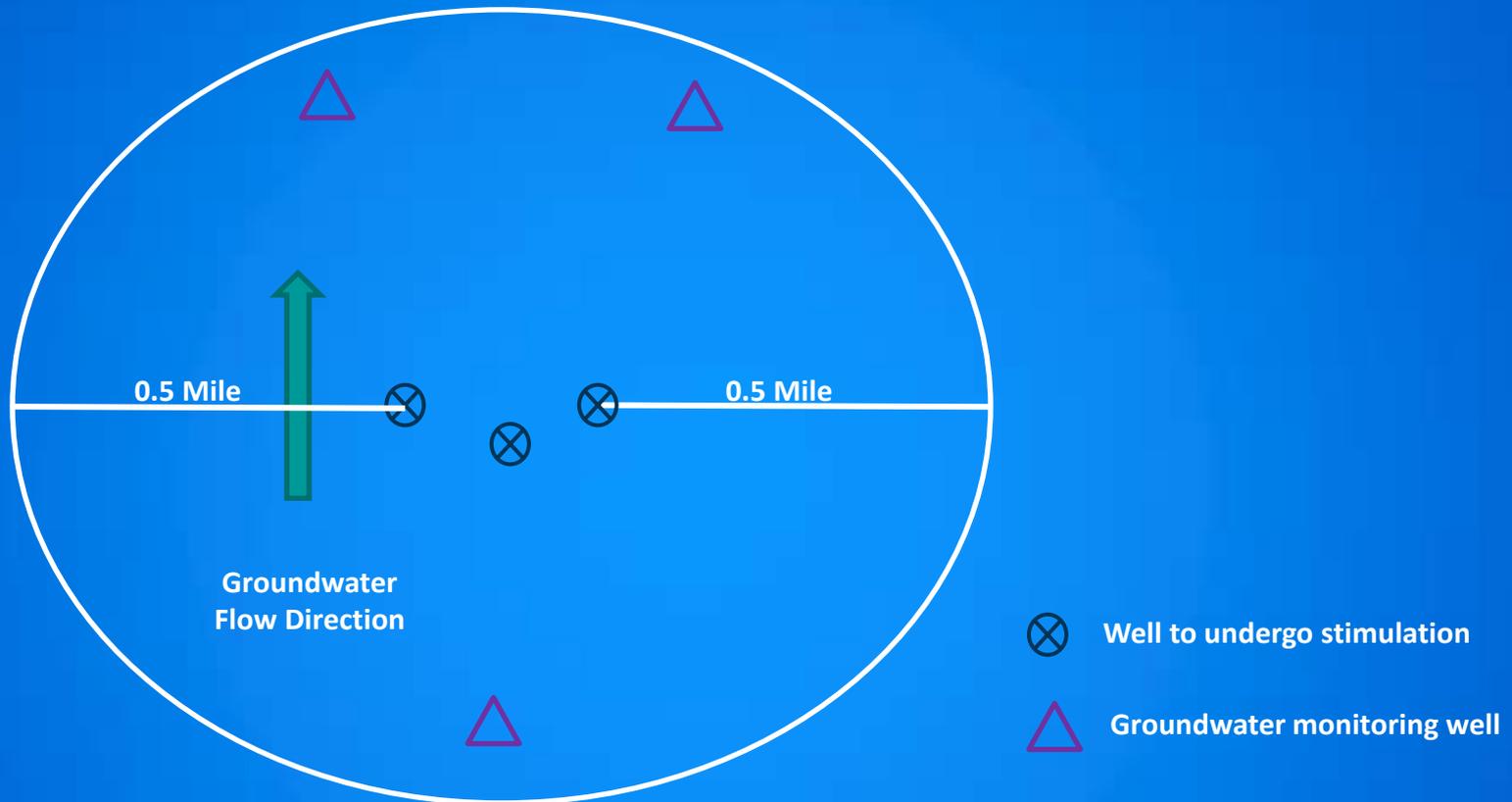
- A groundwater monitoring plan may be developed for a single, or group of oil and gas wells to undergo well stimulation
- Water supply wells and Regional Monitoring Program wells may be used as monitoring wells.
- Monitoring wells to be located within 0.5 mile from surface projection of zone of stimulation

# Single Stimulation Well Scenario



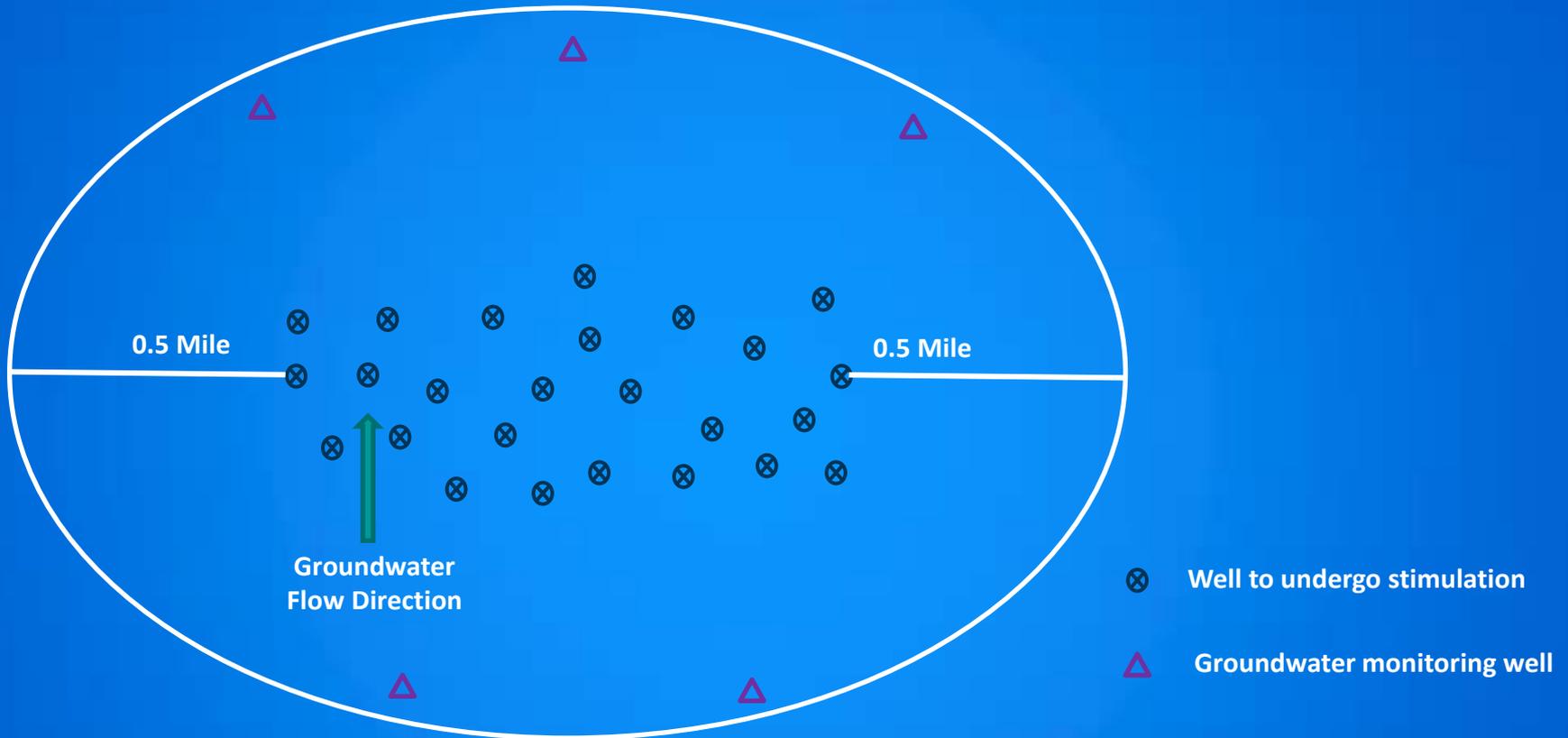
At a minimum, one upgradient and two downgradient monitoring wells for each protected aquifer that is penetrated by a stimulated well

# Multiple Stimulation Well Scenario I



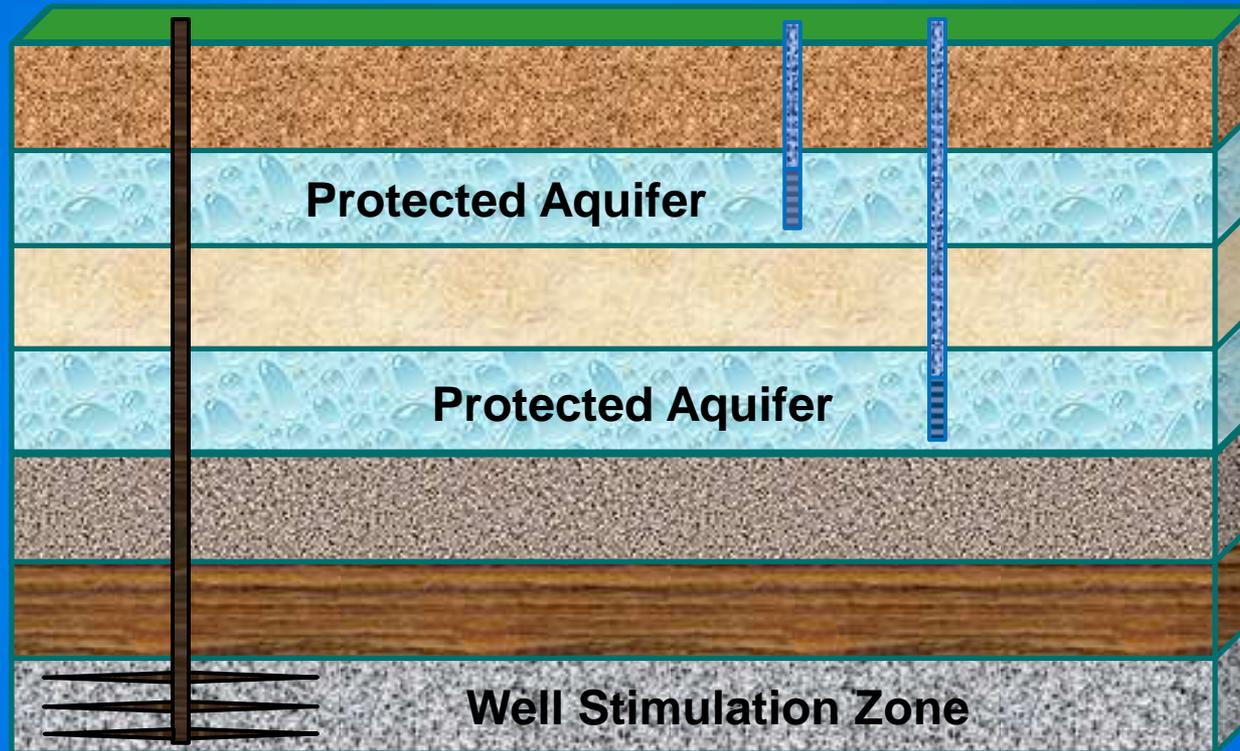
At a minimum, one upgradient and two downgradient monitoring wells for each protected aquifer that is penetrated by a group of stimulated wells

# Multiple Stimulation Well Scenario II



For larger areas, multiple upgradient and downgradient monitoring wells may be required for each protected aquifer that is penetrated by a group of stimulated wells

# 1. Area-Specific Groundwater Monitoring (cont.)



Monitoring wells will be required for each protected aquifer that is penetrated by the stimulated well, or group of stimulated wells

## Area-Specific Groundwater Monitoring (cont.)

- Sentry/guard monitoring wells if nearby water supply wells are present within 1 mile
- Samples collected prior to and post well stimulation, then semi-annually thereafter
- Data uploaded to GeoTracker by operator

## Analytes to be Monitored

1	Total dissolved solids
2	Major and minor cations, including sodium, potassium, magnesium, calcium, and ammonium
3	Major and minor anions, including nitrate, nitrite, chloride, fluoride, sulfate, bromide, iodide, and total inorganic carbonate (bicarbonate + carbonate)
4	Trace elements, including iron, manganese, lithium, strontium, boron and uranium
5	Metals, including arsenic, barium, cadmium, chromium, lead mercury, and selenium
6	Radionuclides listed under California Code of Regulations, title 22, Table 64442;
7	Radon
8	Hydrogen Sulfide
9	Methane, ethane, propane, butane, pentane, hexane
10	Dissolved organic carbon
11	Benzene, toluene, ethylbenzene, and xylenes
12	Total petroleum hydrocarbons for crude oil and gasoline ranges; polynuclear aromatic hydrocarbons (including acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo[ghi]perylene, chrysene, dibenzo[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, naphthalene, phenanthrene, and pyrene)
13	Stable carbon isotopes in dissolved methane (if present)
14	Stable isotopes of oxygen and hydrogen in water
15	Guar gum sugars (if guar is used in the well stimulation)
16	At least two analytes from well stimulation additives selected by the applicant

# Requests for Exclusion from Area-specific Groundwater Monitoring

Area-specific groundwater monitoring is required unless:

- An operator has received “written concurrence” from State Water Board staff for an exclusion from the monitoring requirement based on absence of protected water; or
- The stimulated well is located within the boundary of an approved and fully implemented regional groundwater monitoring program

# Requests for Exclusion from Area-specific Groundwater Monitoring (cont.)

Absence of Protected Water must be technically demonstrated:

- Stimulation wells do not penetrate protected water
- Stimulation wells solely penetrate exempt aquifers

Requests shall be in a defined geographic area, typically no larger than a map section (one-square mile)

# Designated Contractor Sampling and Testing

- Well operators are to notify (via third-party) nearby property owners of a well to undergo well stimulation
- Property owners may request water quality sampling and testing on any water well or surface water suitable for drinking or irrigation
- State Water Board designates third-party contractors to perform sampling at request of property owner

# Requirements for Designated Contractor Sampling and Testing (cont.)

Draft Model Criteria include:

- Information on how to become a designated contractor for water sampling
- Water quality testing standards, protocols, and data submittal
- Water quality information uploaded to GeoTracker

# Regional Groundwater Monitoring

Three main components:

1. Characterizing and Monitoring Groundwater Risk Zone
2. Surface activity effects
3. Well integrity

# Regional Groundwater Monitoring

## 1. Characterizing and Monitoring Groundwater Risk Zone

- Beneficial use waters located near oil and gas well production activities
- Establish monitoring networks to provide early warning in higher risk zones

# Regional Groundwater Monitoring Program (cont.)

## 2. Surface activity effects

- Characterize legacy and currently regulated activities
- Characterize risks to shallow water users from chemical constituents associated with well stimulation

## 3. Well integrity

- Assess potential risks to water quality from well bore integrity issues and inadequate seals

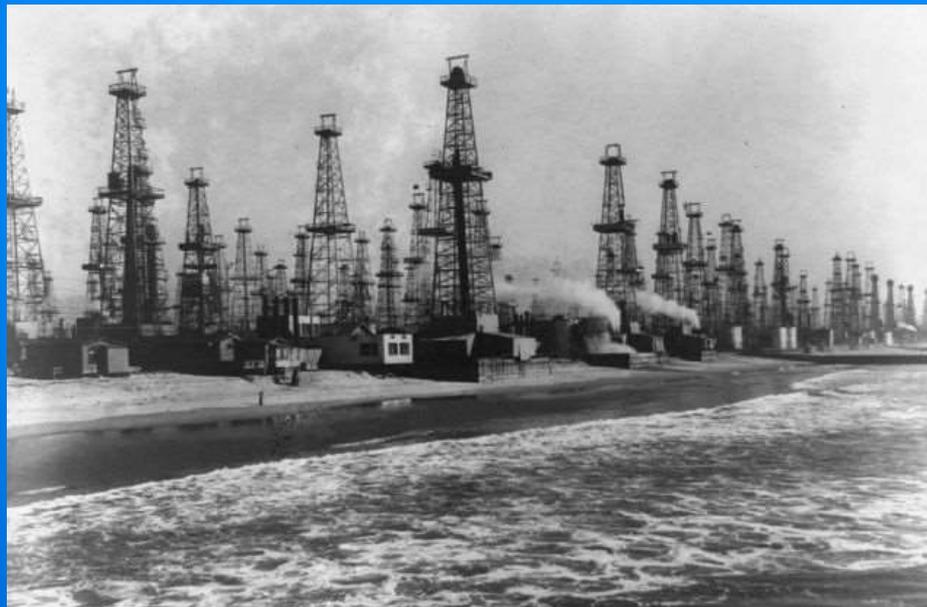
# Additional Information

➤ **State Water Board Web Site**

[http://www.waterboards.ca.gov/water\\_issues/programs/groundwater/sb4.shtml](http://www.waterboards.ca.gov/water_issues/programs/groundwater/sb4.shtml)

➤ **DOGGR Web Site**

<http://www.conservation.ca.gov/dog/Pages/WellStimulation.aspx#Item1>



# End of Presentation