Department of Conservation
Division of Oil, Gas, and Geothermal Resources
Bill Bartling – Inland District Deputy

OVERVIEW OF THE DIVISION OF OIL, GAS & GEOTHERMAL RESOURCES (DOGGR) – PREVENTION FIRST CONFERENCE – SEPTEMBER 28, 2016 – LONG BEACH CA
DOGGR mission

Three elements form the foundation for DOGGR operations. The Aquifer Exemption and UIC technical analyses have an emphasis on protection of waters with beneficial use. Beneficial uses of water include:
- Public drinking water supplies
- Residential use
- Agriculture and livestock
- Industrial
- Enhanced oil recovery

The Division supervises the drilling, operation, maintenance, and P&A of oil, gas, and geothermal wells, to prevent damage to:

1. life, health, property, and natural resources
2. underground and surface waters suitable for irrigation or domestic use
3. oil, gas, and geothermal reservoirs
Oil and gas production provides broad economic and social benefits, but it also comes with risks and impacts that must be effectively addressed.

**Water Quality**
- Aquifer exemption process and UIC reviews protect Underground Sources of Drinking Water (USDW)

**Hydraulic Fracturing**
- First two permits issued under SB4 law - process was rigorous – took over a year

**Earthquakes**
- State Geologist has stated that unlike Oklahoma, there is no evidence for historic oilfield induced seismicity in California
- California is geologically and operationally not the same as Oklahoma and the geology here is not conducive to generating earthquakes from oilfield activities
- Nevertheless, we continue to monitor and study earthquakes

**Fugitive emissions**
- Aliso Canyon illuminated the issue
- Many studies underway, new legislation under consideration

**Leaks**
- DOGGR regulates leaks from producing infrastructure. New laws drafted to govern programs intended to minimize leaks from tanks, wells and pipelines
DOGGR through time 1915 - 2016

2015 – DOGGR Renewal Plan authored
Nearly 70% of Inland District operators have fewer than 100 wells and less than 5 bbl/day/well avg. = 7% of total active wells in District
We manage infrastructure but work with people
**Regulatory Overhaul**
- Injection Projects Review to be completed by October 2018
- Aquifer Exemption Review Under way – currently processing 23 applications, most with multiple aquifers

**New Regulations**
- Well Stimulation - First SB4 permits have recently been issued
- Underground Injection Controls - New draft regulations under review
- Gas Storage - Aliso Canyon has spawned new legislation and new regs. New regs have been issued with wide-ranging application to other state storage sites.
- Idle Wells – new rules for managing and abandoning

**Modernize Data Management**
- New database and modern analytical and modeling software
- Research projects with the National Laboratories

**Ensure a High Quality Work Force**
- Hiring highly skilled people recently surplussed from oil companies, and training the entire workforce
Research Projects with National Labs and others

- **Earth Observatory (LLNL)** – looking at hydraulic fracture behavior including extent and density via geomechanical modeling and simulation
- **Gas Storage** – Natural gas storage integrity, wellbore integrity and improvement of blowout kill methods
- **Induced seismicity (LBNL)** – assessing the potential of oilfield activities to contribute to seismicity
- **Training** - Hydraulic Fracturing geomechanics
- **Remote Sensing and data processing** – LiDAR, etc.
- **Surface/subsurface integration** – understanding reservoir systems
- **Multi-variate statistical analysis** – risk analysis and portfolio prioritization
major initiative 1

aquifer exemptions

Authorized by US EPA under the federal safe drinking water act.

Only the US EPA can exempt an aquifer. The State agencies (DOGGR and Water Boards) only enforce Federal and State laws, and submit applications for exemption that have passed rigorous technical evaluation for review and determination by US EPA.

- collect and analyze scientific and engineering data to document areas of hydrocarbon concentrations
- define the geological features that contain the hydrocarbons and associated water
- sub-surface rock formations must meet specific Federal and State criteria to be classified as exempt
- these are designed to ensure that underground sources of drinking water (USDW’s) remain protected.
Waters of the San Joaquin Valley

Waters are fresh on the east, saline on the west and fresh above saline in the middle.

This is due to:
- Fresh water recharge from the Sierra Nevada range via the Kern River and other waterways
- Sparse rainfall in the west to dilute saline formation waters
- Deeper formations deposited in marine environments in the central and western areas

Figure from: Gillespie, Kong and Anderson – CSUB 2016
Exemption criteria as specified in 40 CFR 146.4

a) The aquifer does not currently serve as a source of drinking water

b) The aquifer cannot now, and will not in the future, serve as a source of drinking water because:

1) It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit application for a Class II operation to contain hydrocarbons that considering their quantity and location are expected to be commercially producible

OR

2) The aquifer is situated at a depth or location that makes the recovery of water for drinking water purposes economically or technologically impractical

OR

3) The aquifer is so contaminated by natural or unnatural sources that it would be economically or technologically impractical to render that water fit for human consumption

OR

c) TDS is more than 3,000 and less than 10,000 and it is not reasonably expected to supply a public water system.
Exemption criteria as specified in PRC 3131(a)

1. Criteria set forth in Section 146.4 of Title 40 of the Code of Federal Regulations have been met

2. The injection of fluids will not affect the quality of water that is, or may reasonably be, used for any beneficial use

3. The injected fluid will remain in the aquifer or portion of the aquifer that would be exempted
vertical stratigraphic containment

It must be demonstrated that zones proposed for exemption are stratigraphically isolated from actual or potential zones with waters with beneficial use.

Vertical permeability and the lateral extents and thickness of stratigraphic confining layers must be documented.

The distribution and thickness of stratigraphic confining layers are defined and mapped from well and geophysical data.
mapping water wells

All water wells which produce for beneficial use within and for an effective distance beyond the proposed exemption area are mapped and analyzed to determine if there is any current, or risk of any future hydrologic connectivity to the zone being proposed for injection.
isolation of water wells from exemption zone

It must be demonstrated that the proposed exempted zones have containment boundaries, such as impermeable shales, faults or stratigraphic pinchouts to ensure that injected fluids remain in the exempted zone.

This diagram shows a proposed exempted zone and the water wells in the area, completed several thousand feet above and separated from the proposed exempted zone.
hydrocarbon producing

As a key criteria for exemption is the presence of hydrocarbons in the aquifer, documentation is cataloged from producing wells, subsurface samples and well logs to map the extent of these hydrocarbons.

Water produced with oil from these zones is in an emulsified state. These waters, and the waters remaining in the aquifer often have high salinities and nearly universally contain dissolved or entrained components of the hydrocarbons making the water unfit for any beneficial use.
Typical water chemistry analysis including drinking water standards, proposed exempted aquifer chemistry and proposed injectate water chemistry.

Note that in this case, the quality of the injectate is higher than the native formation waters although still exceeding Drinking Water Standards. Over time, these formation waters will continue to freshen through this process.
major initiative 2

project by project reviews

Re-certifying all active and new underground injection projects

Applying thorough review and advanced analysis to document that injected fluids have and will remain in the zone intended and permitted

- in excess of 900 active projects in the inventory State-wide
- projects will be prioritized to first evaluate projects with greatest potential risks to drinking water
- near-term deliverable is a searchable online database of information related to UIC projects
- new databases, analytical technologies and reservoir evaluation methods will be key to completing these tasks quickly and with the highest quality
- includes close interaction with operators and Water Boards
California’s SGMA

Requires finding new sources of water

- develop regulations to revise groundwater basin boundaries
- adopt regulations for evaluating and implementing Groundwater Sustainability Plans (GSPs) and coordination agreements
- identify basins subject to critical conditions of overdraft
- **identify water available for groundwater replenishment**
- publish best management practices for the sustainable management of groundwater.
oil and agriculture do mix

Cawelo Water District Produced Water Project

For more than 2 decades, ~29 million gallons of filtered and treated water per day, 10.4 billion gallons per year, have been delivered to agricultural uses.

- Water quality analysis reported the levels of acetone in Cawelo’s produced water were 280 times below the maximum concentration considered safe for drinking water;
- Petroleum hydrocarbons in Cawelo’s produced water were 750 times below the maximum concentration considered safe for drinking water;
- Crops irrigated with Cawelo’s produced water had the same chemical composition as crops irrigated with other water supplies.
- Other fields also provide water to agricultural districts.
thank you for listening
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