

Oil & Natural Gas Regulatory Activities Update

Public Workshop



**California Air Resources Board
Sacramento, California
August 25, 2014**

Agenda

- **Background**
- **Studies and Research**
- **Oil & Natural Gas Methane**
- **Well Stimulation**
- **Next Steps**

Background

ARB and Air Districts

- **Local Air Districts**

- 35 county or multi-county agencies
- Stationary sources, including oil and natural gas production facilities

- **Air Resources Board**

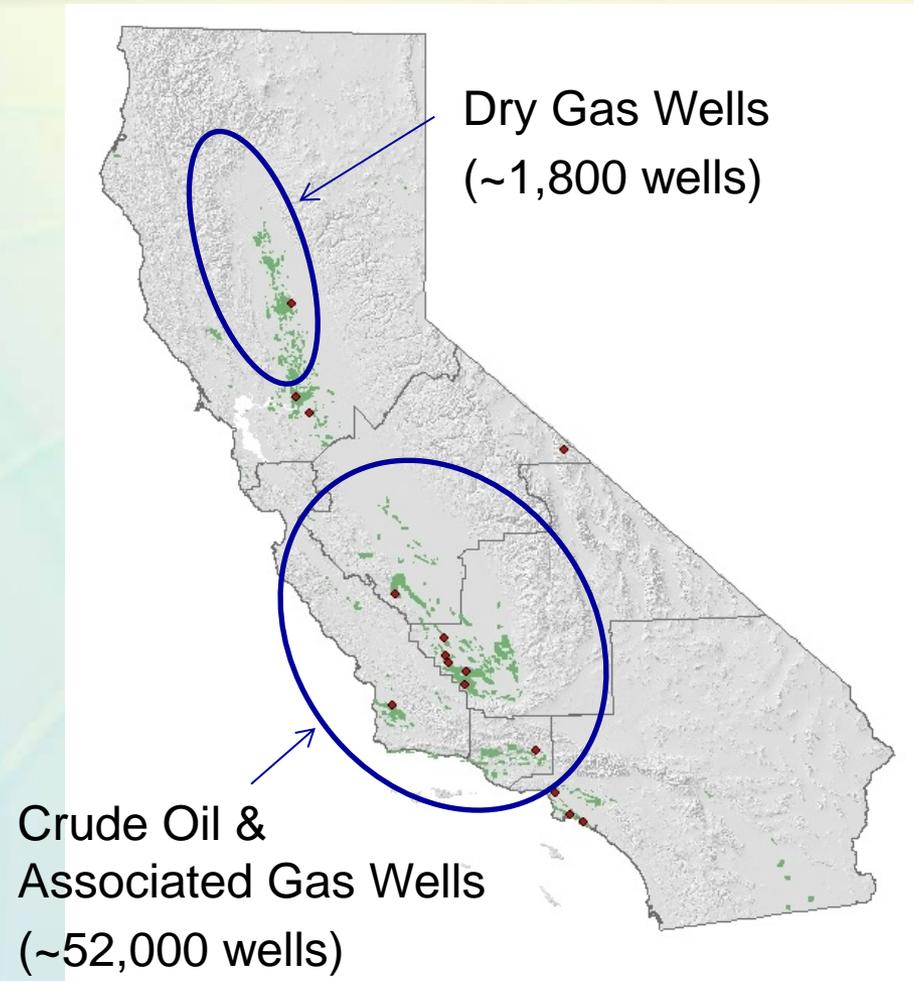
- State agency
- Motor vehicles, fuels, consumer products, AB 32
- Can include stationary sources when greenhouse gases or toxic air contaminants are involved

Oil & Natural Gas Sectors

- **Oil and Natural Gas Production**
- **Oil and Natural Gas Processing**
- **Oil Storage and Underground Natural Gas Storage**
- *Refineries*
- *Natural Gas Transmission*
- *Natural Gas Distribution*

California's Oil & Gas Fields

- California has both crude oil and dry natural gas wells.
- Generally, gas wells are found in northern California and oil wells further south.
- Gas produced with crude oil is called associated gas.

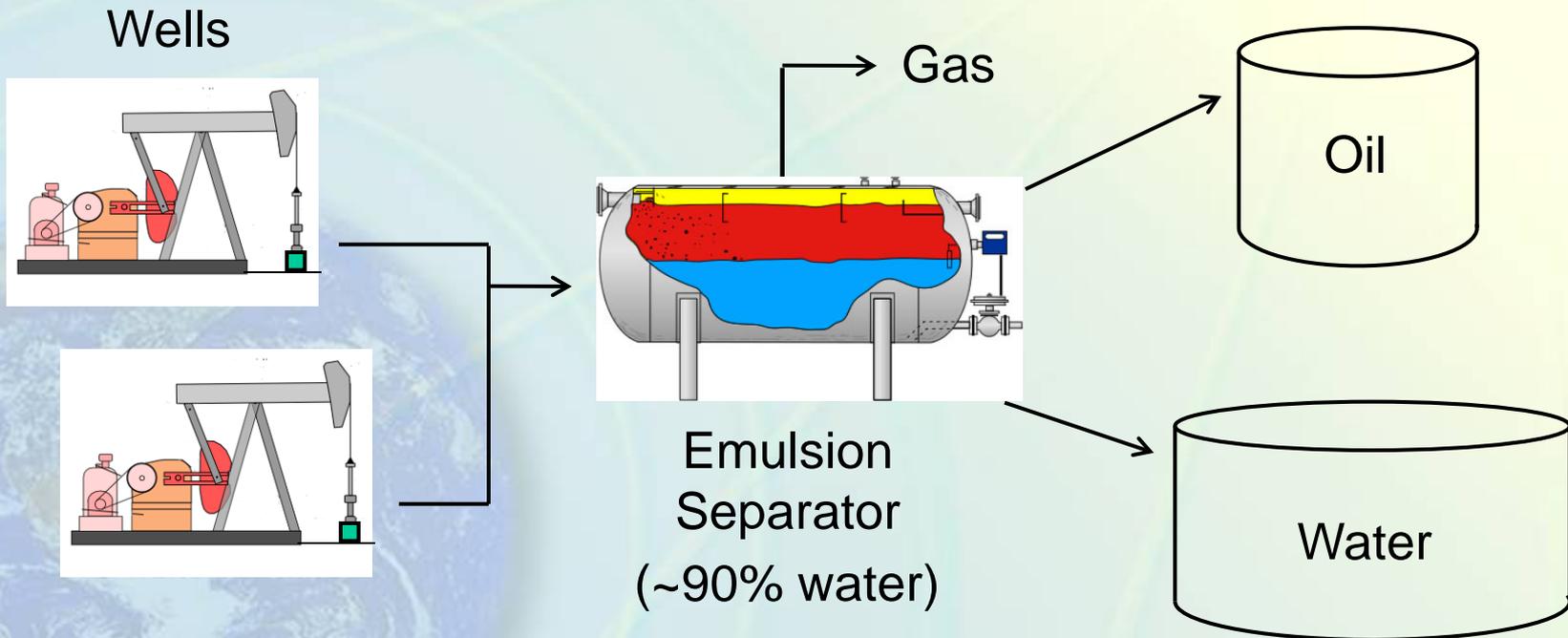


Oil & Gas Well Stages

- **Site Preparation & Drilling**
- **Well Completions/Well Stimulation**
- **Production**
- **Well Workovers**
- **Well shut-in**

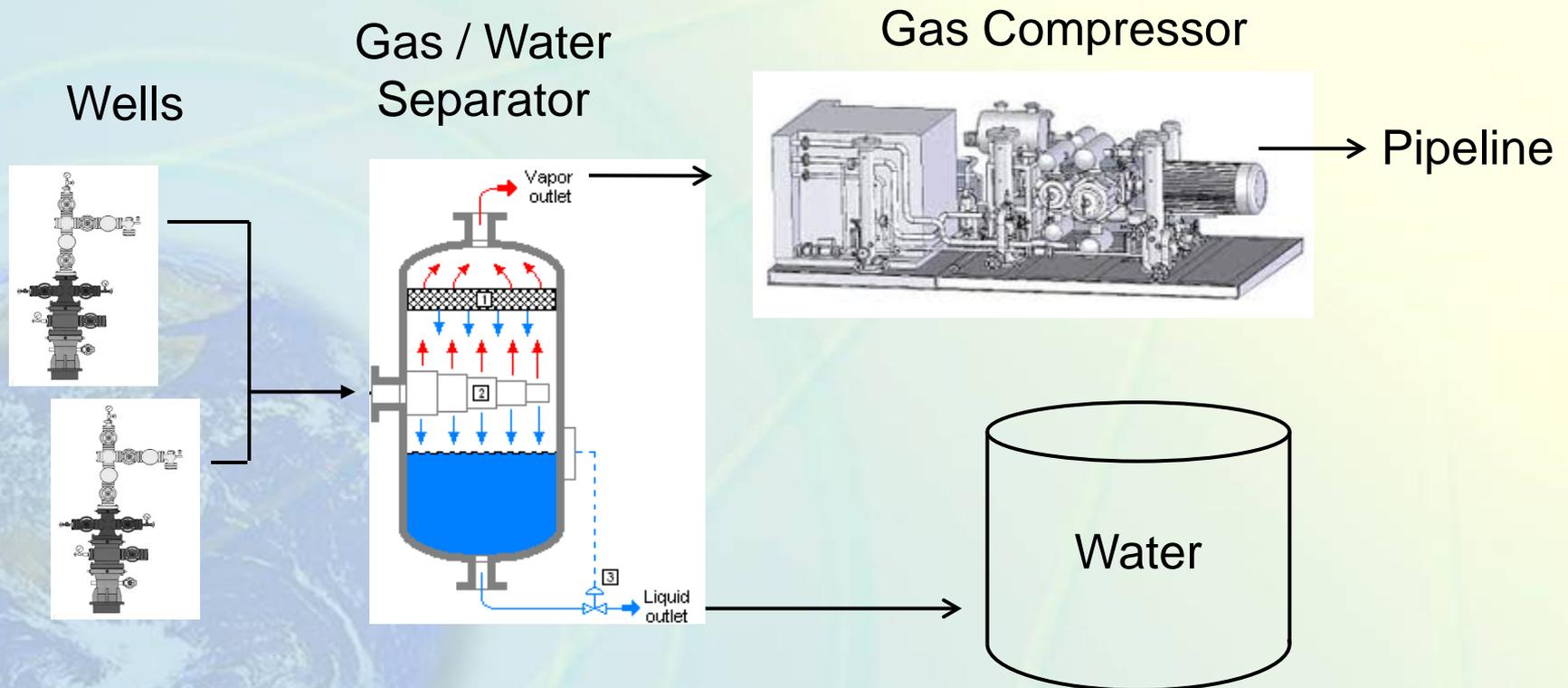
Crude Oil/Associated Gas Production

- Oil & water are pumped to the surface as an emulsion and separated. Associated gas is captured if present.



Dry Natural Gas Production

- In gas fields, water and gas are separated and gas is compressed into a pipeline.



Pollutants of Concern

- **Oxides of Nitrogen (NO_x) (Combustion)**
- **Volatile Organic Compounds (VOCs) (Venting, Leaks)**
- **Particulate Matter (PM) (Fugitive dust, Combustion)**
- **Methane (Venting, Leaks)**
- **Toxic Air Contaminants (TACs) (Combustion, Venting, Leaks)**

Local Air District Regulations

- **Stationary combustion**
- **Prohibition of gas venting**
- **Vapor recovery on tanks**
- **Covered sumps and pits**
- **Leak Detection and Repair (LDAR) for component leaks**
- **Fugitive dust during site preparation**
- **Equipment permitting**
- **Regulations vary by district**

ARB Regulations

- **On road trucks**
- **Off road equipment**
- **Drilling rig engines**
- **Well stimulation pump engines**
- **Well completion/workover engines**

Pollutants Addressed

- **NO_x, PM, and TACs from combustion during all well stages covered by District and ARB rules.**
- **PM from site preparation covered by District rules.**
- **VOCs from production, processing, and storage covered by District rules.
(Methane and TAC co-benefits.)**

Possible Pollutants Still to Address

- **Methane emissions, which are not already covered by Districts' VOC rules, due to methane's low reactivity.**
- **VOC, TAC, or methane emissions from short-duration handling of drilling mud and well completion, stimulation, and workover fluids.**
- **Fugitive dust PM from mixing dry materials for drilling mud and well stimulation fluids.**

Planned Approach to Address

- **Developing control measure to address methane emissions, pursuant to AB 32.**
- **Conducting well stimulation emission measurements of VOCs, TACs, and methane; will determine if any additional concerns not addressed by the methane measure.**



Studies and Research

Methane Efforts

- **Short Lived Climate Pollutants (SLCP) Strategy will address methane comprehensively.**
- **Technology and fuel assessment considers methane leakage from all oil and gas sectors.**
 - Workshop September 3, 2014

ARB Research – Methane

- **Both atmospheric (“top-down”) and source level (“bottom-up”) research**
- **Top-down**
 - Stationary tower measurements across state with inverse modeling and speciation
 - Collaboration on satellite, aircraft measurements, etc.

ARB Research – Methane (continued)

- **Bottom-Up**
 - Surveys and source specific measurements and testing
 - From the larger source (e.g. a landfill) to a specific equipment piece (e.g. a pipeline) or event (e.g. well stimulation)
- **Goal: to reconcile top-down and bottom-up state-wide and regionally**
 - Result in improved inventory for all sources

ARB Oil & Gas Survey

- **2009 ARB Survey of Oil & Natural Gas Production, Processing, and Storage Facilities in California**
- **Survey of equipment, activity, and production.**
- **Emissions calculated using established emission factors, mass balances, etc.**
- **GHG emissions estimated at 17.7 MMT CO₂e**
 - 16.4 MMT CO₂e from Combustion (~93%)
 - 1.3 MMT CO₂e from Venting and Fugitive (~7%)

ARB Oil & Gas Survey

- **Top methane emission sources from survey:**
 - Compressor Seals: 373,000 MT CO₂e
 - Uncontrolled Storage Tanks: 204,000 MT CO₂e
 - Pneumatic Devices: 120,000 MT CO₂e
- **Other smaller methane sources include compressor blowdowns, well workovers, and wellheads.**

Flash Emissions Test Procedure

- **Liquid samples collected in field under pressure and “flashed” in a laboratory to obtain maximum volatile emissions from liquids.**
- **Adopted as part of 2013 amendments to ARB’s Mandatory Greenhouse Gas Emissions Reporting Regulation.**

Well Stimulation Measurements

- **ARB has contracted with testing company to collect in-field methane, VOC, and TAC measurements from well stimulation activities in California.**
- **Draft Report expected by early 2015.**

Methane LDAR Study

- **Evaluate instruments for effectiveness at locating and measuring fugitive methane and VOC leaks.**
- **Develop new correlation equations for methane-specific natural gas equipment.**
- **Draft Report expected mid-2015**



Oil & Natural Gas Methane

Oil & Natural Gas Methane

- **ARB is working with Districts to develop strategies to limit methane emissions from oil and natural gas facilities.**
- **The EPA's NSPS Subpart OOOO and other states' rules are being incorporated into ARB's list of potential control strategies.**
- **Standards would apply to new and existing oil and natural gas facilities and equipment.**

Potential Control Strategies

- **Crude Oil and Produced Water Vessels:**
 - Vapor recovery on uncontrolled tanks and separators above a methane standard or above a discharge water standard

Potential Control Strategies

- **Reciprocating Compressors:**
 - Rod packing changed every 36 months or 26,000 hours of operation.
- **Gas Powered Pneumatic Devices:**
 - Low-bleed (6 scfh) or gas capture required

Potential Control Strategies

- **Leak Detection and Repair:**
 - Methane incorporated into existing district LDAR programs (possible new standard for some facilities).
 - Field testing can be conducted using the same current instruments, or other optional instruments pending results of current ARB testing contract.

Potential Control Strategies

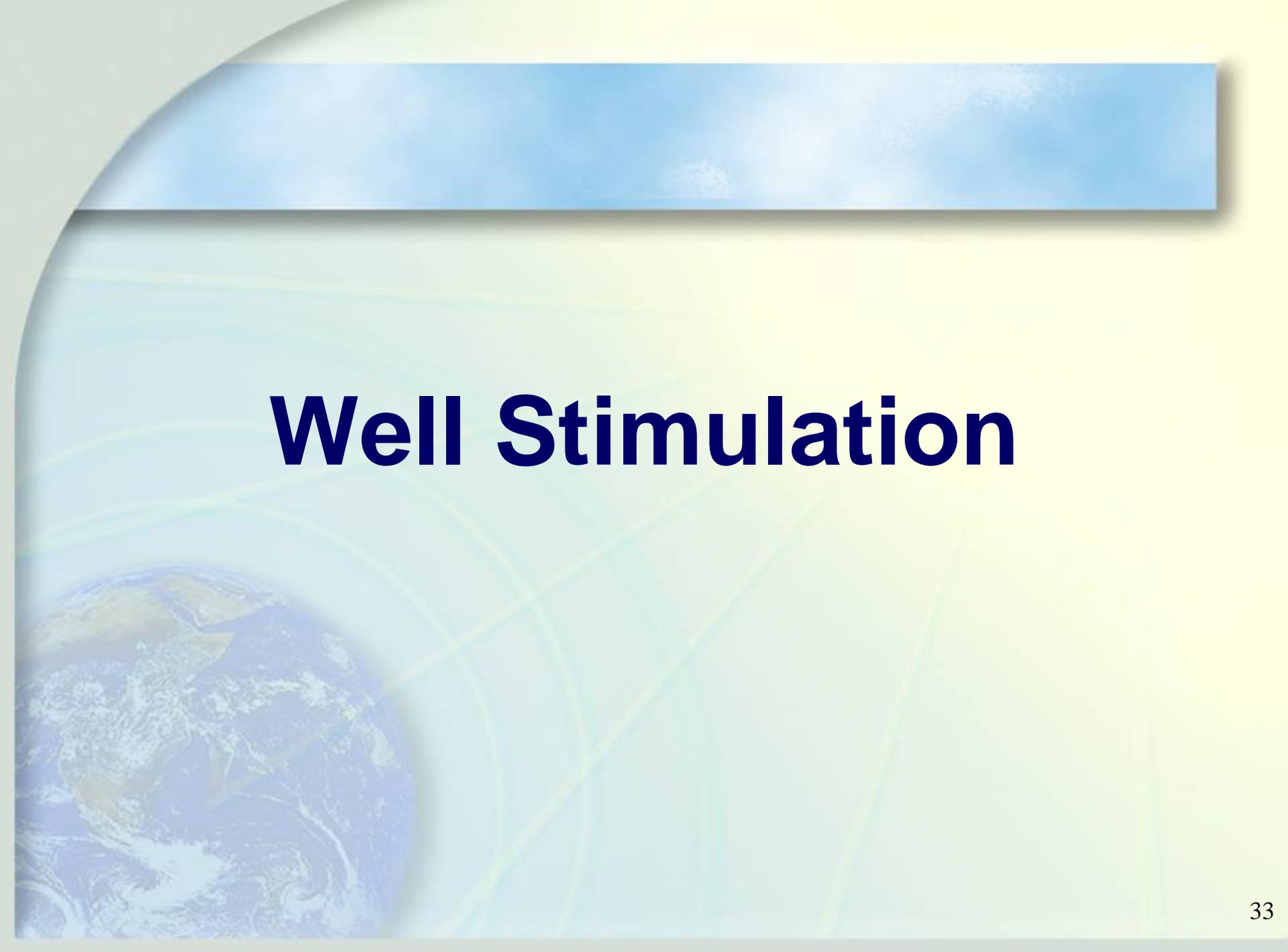
- **Liquids Unloading (Dry Gas Wells):**
 - Plunger Lift System or similar “no vent” standard required.
- **Well Completions and Well Stimulation:**
 - Best practices, e.g., no vent standard, such as requiring vapor recovery, or Reduced Emission Completions.

Cost-Effectiveness

- **ARB seeking information on costs associated with each control strategy, such as:**
 - Costs for installing vapor recovery
 - Costs to replace pneumatic devices
 - LDAR cost impacts
 - Any other cost impacts

Implementation

- **ARB and District Working Group discussing ways to implement and enforce new standards.**
- **New standards could become new permit conditions in districts with permits.**
- **In districts without permits, ARB could require thorough operator reporting.**



Well Stimulation

SB 4 Coordination

- **SB 4 directs DOGGR to develop reporting and notification regulations for well stimulation.**
- **ARB, Districts, and DOGGR developing MOA to outline respective authorities.**
- **Department of Conservation undertaking statewide EIR for well stimulation.**
- **Natural Resources Agency undertaking an Independent Scientific Study.**

Well Stimulation Data

- **ARB well stimulation emissions testing ongoing.**
- **Chemical constituent data being collected by DOGGR and SCAQMD.**
- **SCAQMD also collecting some air emissions data from well stimulation sites.**

ARB's Concerns and Goals

- **Understand Emissions and Risks**
- **Protect Public Health**
- **Reduce Greenhouse Gas Emissions**

Anticipated Approach

- **Proceed with development of oil & natural gas methane control measure, which would include well stimulation.**
- **Continue well stimulation emissions study, and analyze chemical constituent data.**
- **Depending on results, could propose additional controls for well stimulation.**



Next Steps



Next Steps

- **Continue working with Districts and DOGGR on SB 4 MOA.**
- **Continue to collect well stimulation air emission measurements, and to analyze reported chemical constituent data.**
- **Finalize methane emissions and emission reduction estimates.**

Next Steps (continued)

- **Continue collecting control cost information.**
- **Continue working with Districts on methane regulation implementation approach.**
- **Hold additional workshop(s) this year.**
- **Anticipate bringing methane measure to the Board in Spring 2015.**

Feedback

- **ARB seeking feedback on potential requirements, including cost of controls.**
- **Feedback by September 12, 2014**
- **Send feedback to Johanna Levine at jlevine@arb.ca.gov**

ARB Oil & Gas Web Site

Web Site: <http://www.arb.ca.gov/oil-gas/oil-gas.htm>

List Serve:

http://www.arb.ca.gov/listserv/listserv_ind.php?listname=oil-gas

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