

# An Independent Review of Scientific and Technical Information on Advanced Well Stimulation Technologies in California

A report in progress by the California Council on Science and Technology (CCST) for the Bureau of Land Management (BLM)

CCST Council

Feb 6, 2014

# BLM's mission

- The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations.
- The BLM is the federal agency that has the delegated authority to manage public lands and all onshore Federal mineral estate on behalf of the American people.

# BLM's need for the science assessment

- In response to a series of legal challenges, the BLM CA requested an independent assessment of well stimulation technologies
- BLM CA needs up-to-date, scientifically accurate information about well stimulation techniques to improve our environmental analysis documents
- Information resulting from the science assessment will be used in future oil and gas planning, leasing and development decisions (including the Hollister Field Office Oil and Gas Leasing and Development EIS)

# CCST's Independent Review of Scientific and Technical Information on Well Stimulation Technologies in California

- Purpose of the study is to conduct an independent scientific assessment of the potential and impacts of well stimulation technologies in California
- This is an independent scientific expert study
  - An assessment of published literature and available data
  - No new data collection
  - Interested parties may nominate literature to the study

# CCST's Well Stimulation Committee

- The CCST's California Well Stimulation Committee will provide oversight, scientific guidance and input for the project
- The study analysis is conducted by Lawrence Berkeley National Laboratory (LBNL) with expertise in Earth Sciences
- Pacific Institute is subcontracted through LBNL to provide expertise in water issues

# The CCST California Well Stimulation Steering Committee Members

- Jane C. S. Long, Chair (CCST, Lawrence Livermore National Lab, ret)
- Preston Jordon (Lawrence Berkeley National Lab)
- Robert Harriss (Joint fugitive emission campaign)
- Peter Gleick (Pacific Institute)
- Adam Brandt (Stanford)
- Seth Shonkoff (Physicians Scientists and Engineers for Healthy Energy)
- Dan Hill (Texas A&M University)
- Amy Myers Jaffe (UC Davis)
- Sam Traina (UC Merced)
- Donald Gautier (U.S. Geological Survey)
- Larry Lake (University of Texas at Austin)

# Committee members will be experts in a variety of topics

Expertise required	Nomination
Behavior in fractured rock, energy systems, petroleum reservoirs	Jane Long
LCA for energy systems, air quality and air emissions from oil and gas production	Adam Brandt
California oil and gas data, geology and hydrogeology, and risk analysis	Preston Jordon
Sustainability and general industry practice	Amy Myers Jaffe
Water resources	Peter Gleick
Environmental science and engineering	Sam Traina
Methane and measurement of methane leakage	Robert Harriss
Air pollution, environmental public health, and climate dimensions of oil and gas development and energy production	Seth B. Shonkoff
Industry fracking theory and practice	Dan Hill
Petroleum geology and resource analysis, quantitative evaluation of unconventional resources	Donald Gautier
Reservoir engineering and geochemistry, enhanced oil recovery and reservoir characterization	Larry Lake

# Forming the Steering Committee

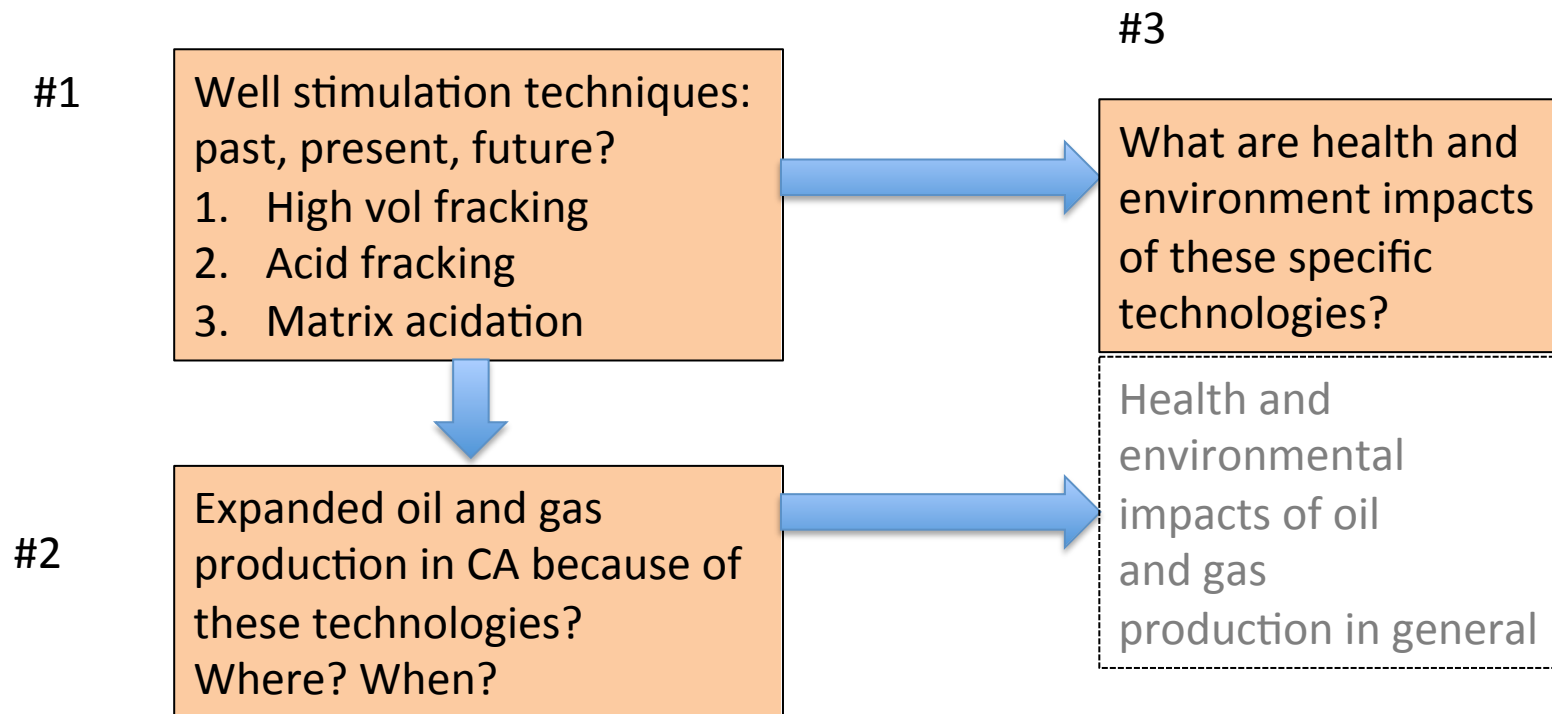
- Committee expertise requirements defined nominations through consultation with the academic and research community
- Committee members disclose conflicts of interest
- Committee roster submitted to CCST Board for approval
- Committee approved by the CCST Board



# Key Questions Addressed by the Study

1. What is past, current and potential future practice in well stimulation technologies including hydraulic fracturing, acid fracturing and matrix acidization in California?
2. Where might these technologies allow expanded production of oil onshore in California?
3. What are the potential direct environmental hazards of these specific technologies in California?

# Relationship between the three questions



# What will be the basis of our assessment?

- Peer reviewed published literature
- Analysis of available data from CDOGGR and other publicly available sources.
- Other relevant publications including reports and theses. Make the qualifications of this information transparent.
- The expertise of the committee and scientific community to identify issues
- Literature can be nominated to the committee emailed as attachments to CAFRAC@ccst.us and through the following website:
- [http://ccst.us/projects/fracking\\_public/submission-form.php](http://ccst.us/projects/fracking_public/submission-form.php)

# Report Review Process

- CCST will use the highest standard of scientific peer review
- The review will be managed by a CCST Board appointed Oversight Committee
- The Oversight Committee will seek qualified anonymous reviewers, including the USGS
- The Oversight Committee will communicate review findings to the steering committee and insure that the committee responds to these comments appropriately

# Project Schedule

- Draft completed: March 2014
- Review completed: April 2014
- Final report: May 2014

# Key Questions Addressed by the Study

- What is past, current and potential future practice in oil well stimulation onshore, including hydraulic fracturing, acid fracturing and matrix acidization in California?
- Where might these technologies allow expanded production of oil onshore in California?
- What are the potential direct environmental hazards of the use of these specific technologies in onshore oil production in California?

# Key Questions Addressed by the Study

- What is past, current and potential future practice in oil well stimulation **onshore**, including hydraulic fracturing, acid fracturing and matrix acidization in California?
- Where might these technologies allow expanded production of oil **onshore** in California?
- What are the potential direct environmental hazards of the use of these specific technologies in **onshore** oil production in California?

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- What is past, current and potential future practice in oil well stimulation onshore, including **hydraulic fracturing, acid fracturing and matrix acidization** in California?
  - The purpose of these technologies is to increase the permeability of the rock containing the oil by injecting at high pressure to open fractures and/or injecting acid to enlarge pathways, such as by etching fractures

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Information availability varies greatly between properties

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production facilitated by well stimulation

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Potential environmental hazards of production in general by well stimulation



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Potential environmental hazards of production in general by well stimulation

For example:

- Seismicity induced by stimulation and flowback fluid disposal
- Changes in water quality due to stimulation chemical spills during transportation and mixing
- Stimulation fluid leakage in the subsurface
- Changes in water availability due to stimulation fluid production

For example:

- Seismicity induced by disposal of water produced with oil
- Oil spills during separation, storage and transportation
- Oil and gas leakage from wells
- Changes in water availability due to drilling fluid production

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**focus of this study**