



Hydraulic Fracturing Study

Independent Expert

Daniel Tormey, Ph.D., P.G.

INFORMATION ONLY

Daniel Tormey, Ph.D., P.G., *Independent Expert*

- Ph.D., Geology and Geochemistry, MIT
- B.S., Civil Engineering and Geology, Stanford University
- 23 Years Environmental Experience; 20 at Cardno ENTRIX, Registered Professional Geologist
- Named by National Academy of Sciences to Science Advisory Board for Giant Sequoia National Monument
- UNESCO World Heritage Site List review committee
- Volcanologist for *Red Nacional de Emergencia*, an emergency response and contingency planning organization in Chile
- Former Executive in Residence, California Poly San Luis Obispo



General Outline of Hydraulic Fracturing Study

- **Background Discussion**
 - Overview of the practice
 - Current issues, shale gas and shale oil
 - Regulatory setting
- **Inglewood Site-Specific Evaluation**
 - Types of hydraulic fracturing used at the field
 - Site-specific data collection
 - Data analysis in the context of concerns related to hydraulic fracturing



Background Discussion

- **Potential for groundwater and surface water contamination**
- **Potential environmental effects of chemical packages**
- **Potential for vibration and induced seismicity**
- **Potential for gas migration**
- **Air emissions from fracturing operations**



Site-Specific Environmental Setting

- **Geology**
- **Ground water**
- **Surface water**
- **Oil and gas formations**

INFORMATION ONLY



Site-Specific Data Collection

- **Coring to identify physical properties**
- **Fracture modeling**
- **Fracture testing**
- **Well integrity testing**
- **Chemical disclosure (FracFocus format)**
- **Water demand/source**
- **Produced water management**
- **Groundwater monitoring**



Site-Specific Concerns Addressed by Study

- Potential for groundwater and surface water contamination
- Potential for ground movement or inducement of seismic events
- Potential for gas migration
- Vibration, noise, lighting
- Water demand
- Air emissions from fracturing operations

