WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
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WESTCARB Annual Business Meeting

Preliminary Static Geomodel of a 10-km Radius Surrounding Kimberlina, CA

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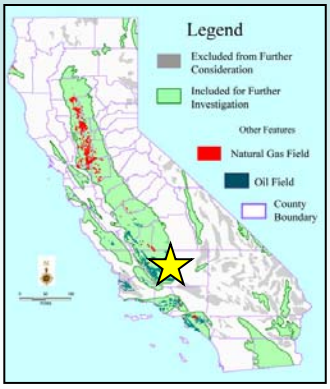
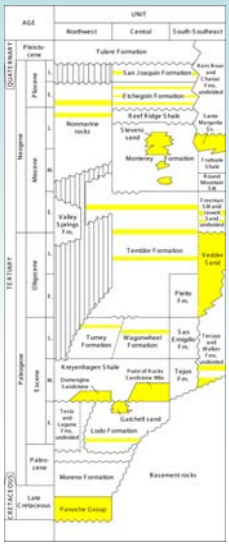
FY06: Began Work on Kimberlina Site Characterization

- Proximity to Clean Energy System experimental plant, near Bakersfield, CA
- Many subjacent reservoir targets
  - Depleted oil fields, including EOR opportunities
  - Many saline unit (Etchegoin, Stevens SS, Olcese SS, Vedder, Famosa, Eocene)
- Representative of many storage targets within WESTCARB region



The San Joaquin Basin Is a World-Class Target for CO_2 Storage and EOR

- Large number of saline units overlain by sealing units throughout basin
- Overall high injectivity (perm.) and capacity (porosity and thickness)
- Highly petroliferous: Over 13.7 billion bbls, 13.2 TCF gas reserves
  - Lots of well, 2D–3D seismic data; many geological studies
  - Well documented seals; effective storage likely
  - Many traps (stacked storage)
  - Well suited to EOR



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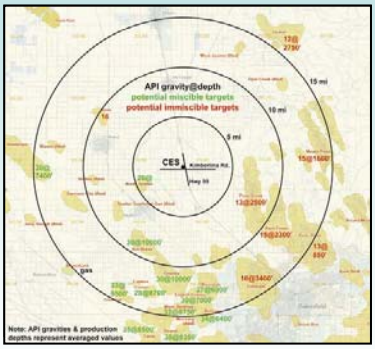
EOG Resources (Denver) and CA DOGGR Provided Most of the Primary Data

- 2-D seismic grid over much of S. San Joaquin basin
- Digital and raster well files
  - Formation picks
  - Range of well-log types
  - Some lithology, porosity, and permeability data (limited)
- Special core analyses
- Supplemented by literature, USGS, CGS information



eogresources

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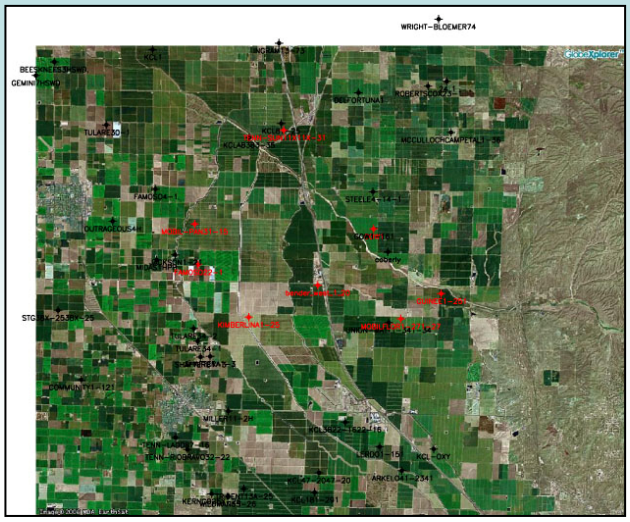
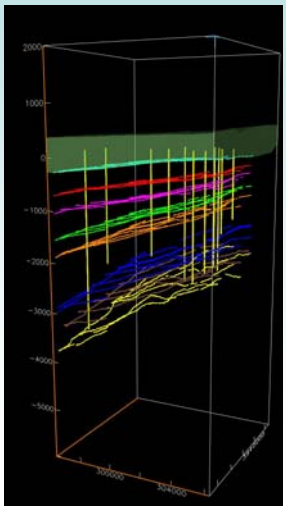
Only a Subset of Wells in Small Area Studied Initially

- 43 digital wells; 4 raster wells
- 8 wells in initial set
  - Pick main horizons
  - Pick main lithologies
  - Create base geomodel and grids



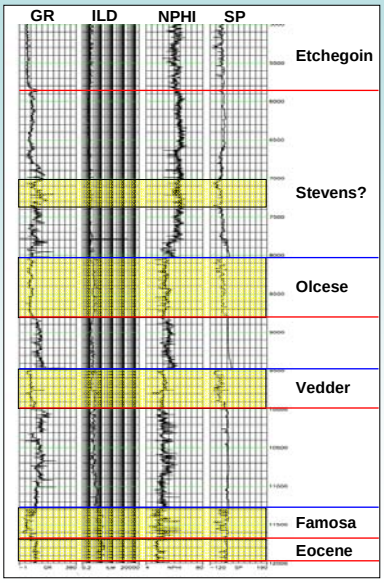
Information Served As Basis for Layered Geomodel Framework in Earthvision

- Some mis-ties; readily fixed
- Initial focus close to Kimberlina plant (~10 km radius)
  - Limited property data in current model
  - More data available for next steps
  - Sufficient for initial work



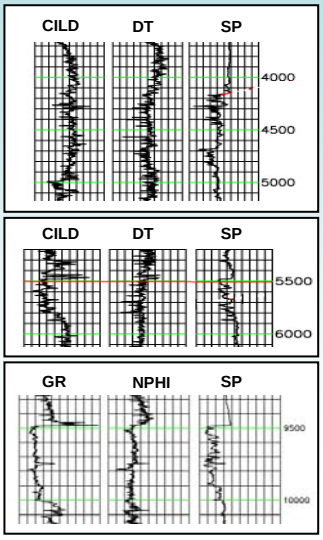
Kimberlina 1-25 Is the Key Reference Well

- Penetrates to basement
- Lithology log
  - Limited property data in current model
  - More data available for next steps
  - Sufficient for initial work



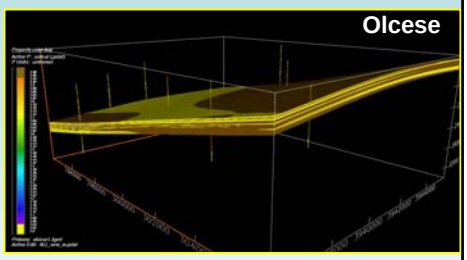
Within the Study Area, Three Units Are of Initial Over-Riding Interest

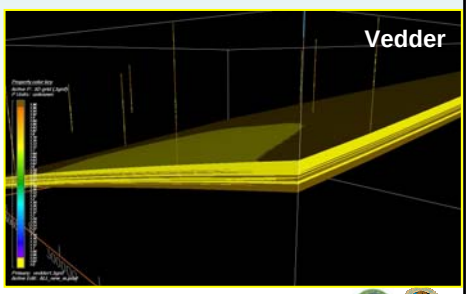
- Stevens Sandstone
  - Shallowest unit
  - Deep-water fan
  - Facies change w/i target area
- Olcese Sandstone
  - Fluvial-estuarine unit
  - Regionally continuous
  - Moderate injectivity and capacity
- Vedder Sandstone
  - Deep; most continuous unit
  - Braided stream unit in area
  - Thickest inj. & cap.; good P&P



Initial Gridding of Interval Between Base Etchegoin and Base Vedder

- 24 million equant voxels
  - XYZ, lithology (ss/sh)
  - Calculated porosity
  - More data, parameters, lithologies pending
- Correlation lengths assigned
  - Preliminary gridding
  - Can be better constrained w/ deterministic correlation
- Limited initial area
  - 8 digital, 2 raster wells
  - 165 billion cubic m
  - No oil fields in initial grid
  - Only one run; next step includes >1000 runs





Initial Volume Estimates for Region Are Extremely Promising

For each unit, fraction of pore vol:
- **Dissolved fraction: 5%**
- **Residual phase trapping: 8%**
  - **~15% of pore vol.**
  - **~ ½ of available rock volume**
- **Physical trapping: 65%**
  - **Initial 90% of pore volume**
  - **~ ½ of rock volume**
- ***NEXT: based on analysis, modeling***

For each, porosity varies from 15-30%
- **Current: rectangular distribution**
- ***NEXT: statistical characterization***

For each, density = 0.7 metric ton/m^3
- ***NEXT: P-T dependent calculations***

Summed single run
- ***NEXT: Monte Carlo, risked***

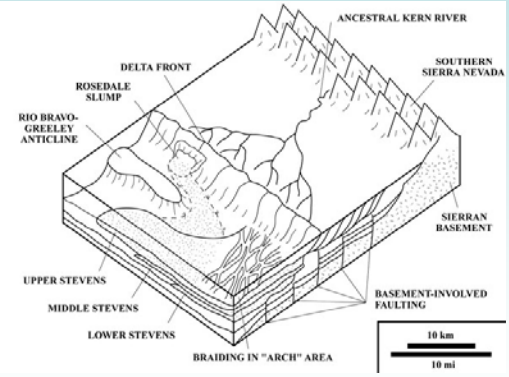
Capacity (Millions metr. tons CO_2)	
Vedder	
• Diss + Resid:	207
• Physical:	715
Olcese	
• Diss + Resid:	214
• Physical:	739
Stevens	
• Diss + Resid:	382
• Physical:	1320
Total	
• Diss + Resid:	~800
• Physical:	~2800

Preliminary Conclusions

- This region continues to be an excellent storage candidate (ICE)
  - High injectivity (~20-300 mD)
  - High capacity (>>800 M tons CO_2)
  - High effectiveness (regionally continuous, effective seals)
- Preliminary estimates promising
  - Conservative, limited area
  - Enough to host substantial project now
- Next steps
  - Expanded area, more constraints
  - Fully risked, Monte-Carlo estimates
  - Export grids and detailed model correlations to advanced simulation

Stevens Sandstone: Santa Margarita Formation

Deep-sea fan/turbidite complex



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