



San Juan Basin Produced Water Presentation

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## Outline



- BP's operations in the San Juan Basin
- Drill and Complete: A visual simulation
- Geological Cross Section
- Produced Water Curves: Coalbed methane well vs. non coalbed methane well
- Agency Oversight of Produced Water In the San Juan Basin
- BP's Produced Water Management In the San Juan Basin



## BP operations in the San Juan Basin

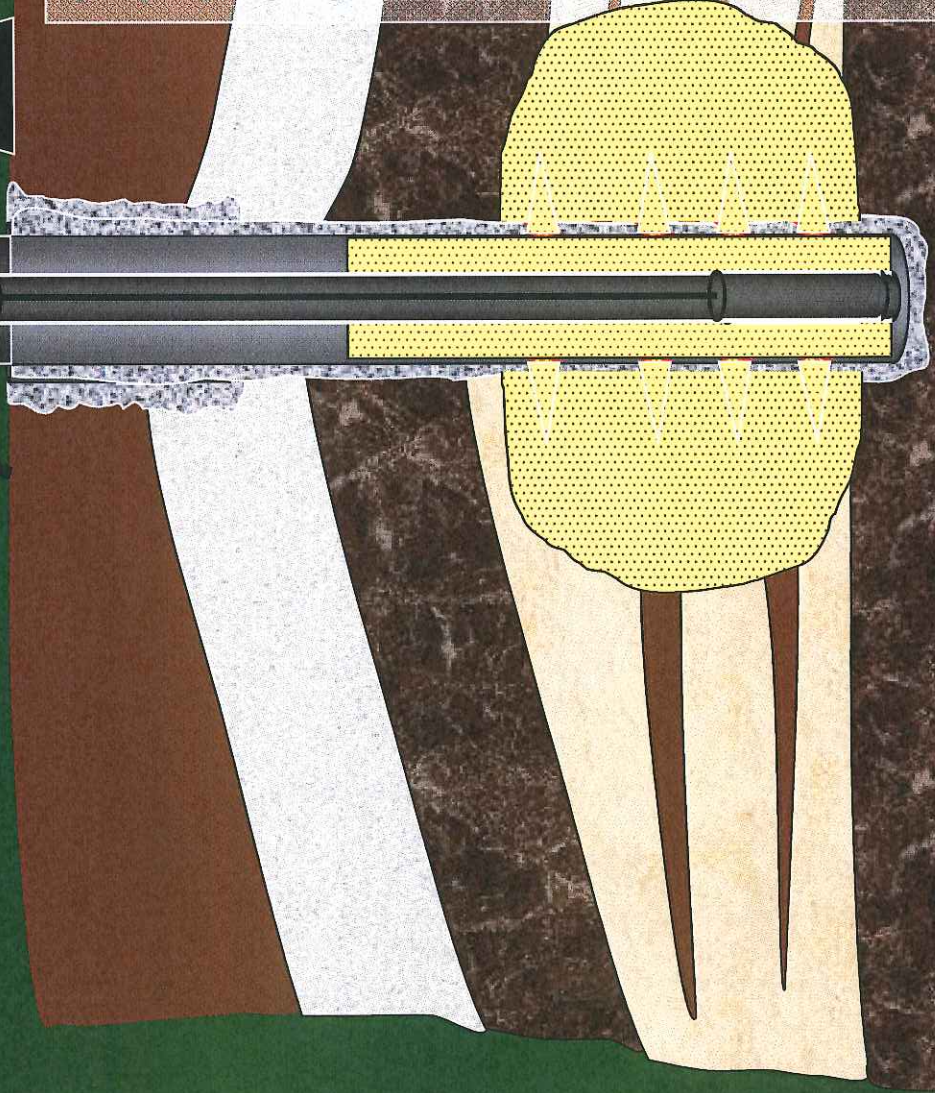
- Operate approximately 1,300 coalbed methane wells
- Employ approximately 700 people, including contractors
- Produce 550 million standard cubic feet of gas/day
- Number one producer of natural gas in La Plata County, third largest producer in Colorado



## ◆ Drilling and Completing a Typical Well



- Move in, rig up drilling rig
- Drill surface hole
- Run surface casing
- Cement surface casing
- Drill production hole
- Run logging tools
- Run and cement production casing
- Perforate casing
- Frac reservoir (if needed)
- Cleanout wellbore
- Run tubing (and pump if needed)
- Rig down, move off drilling rig
- Install wellhead
- Install pump jack (if needed)

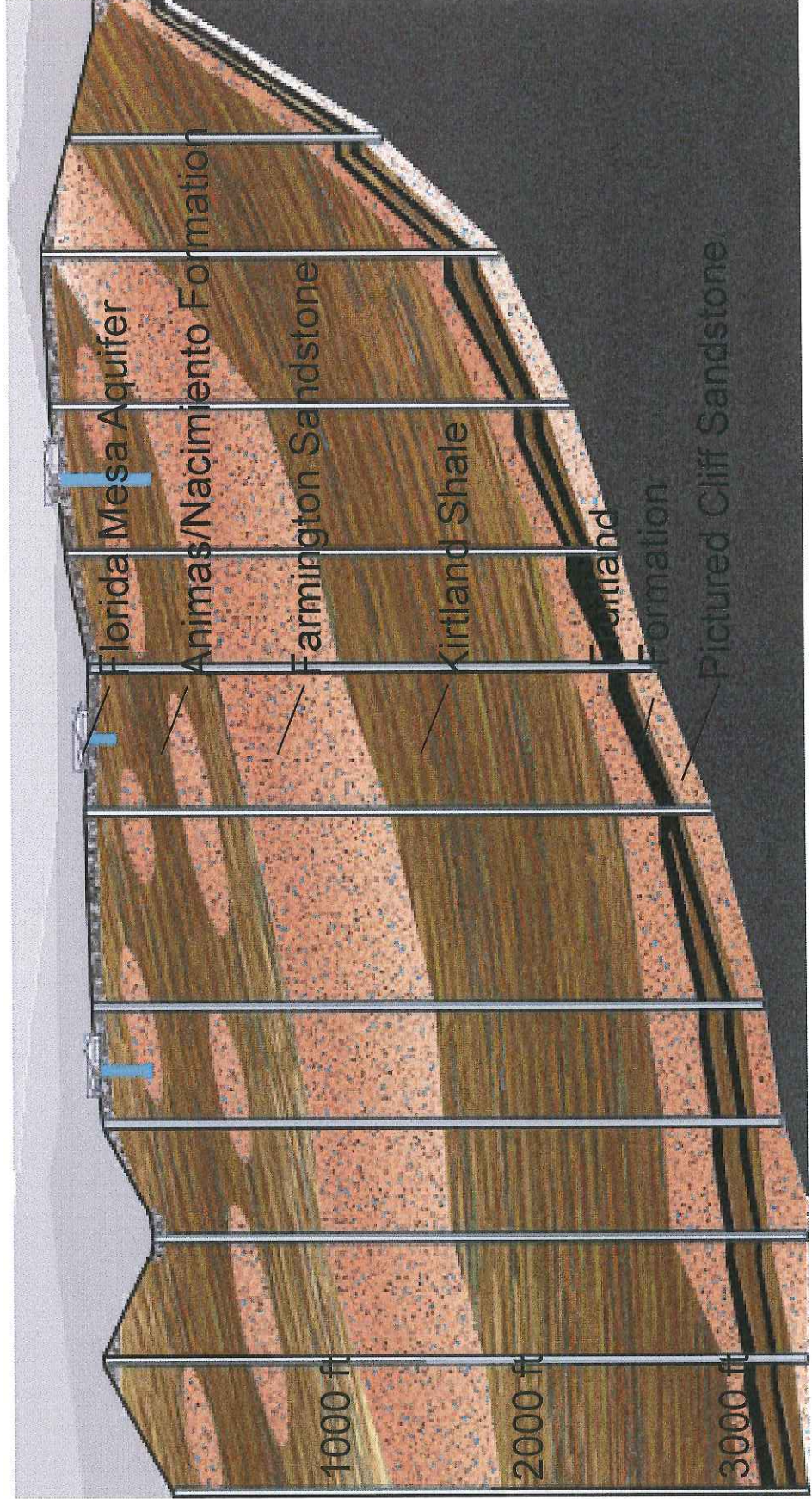






# Colorado San Juan Basin Geologic Cross Section

- San Juan Basin, Gas Wells and Water Wells

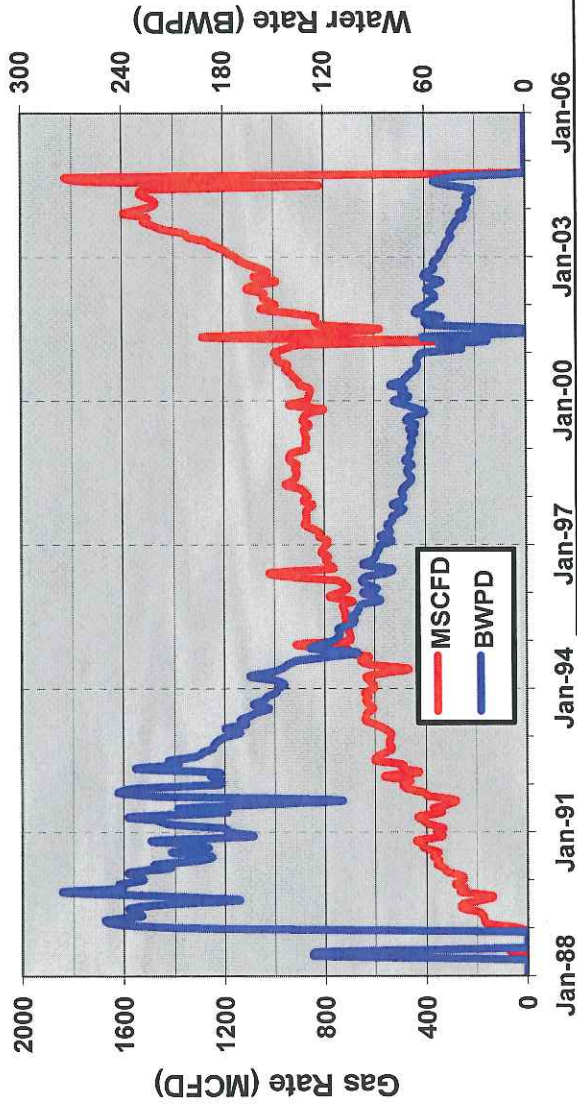




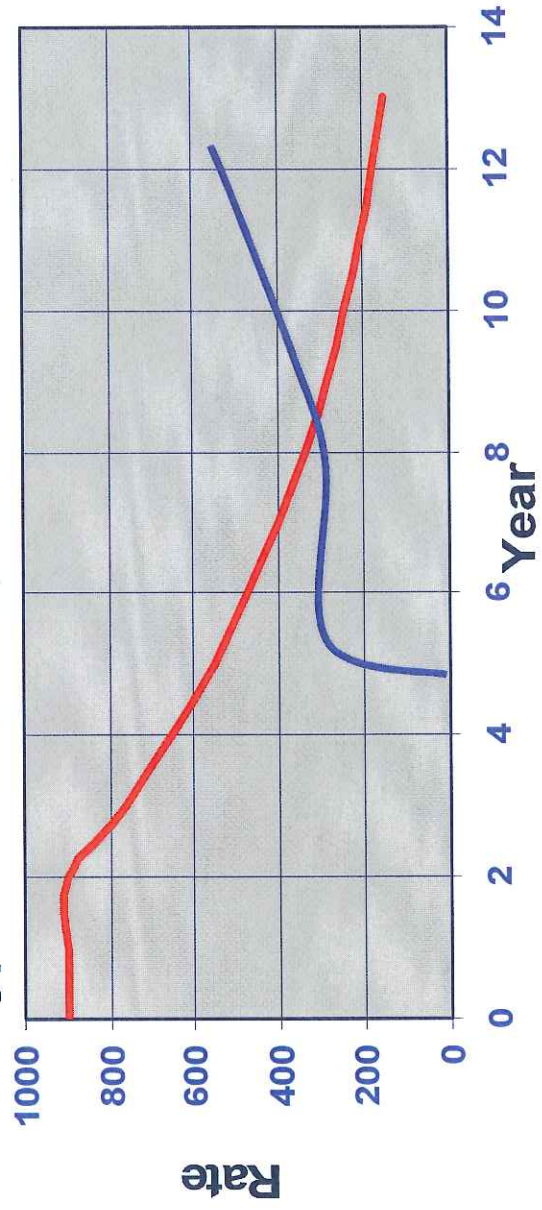


### Typical CBM Production Profile

LEMON GAS UNIT /G/ NO.1



### Typical Oil or Gas Production Profile





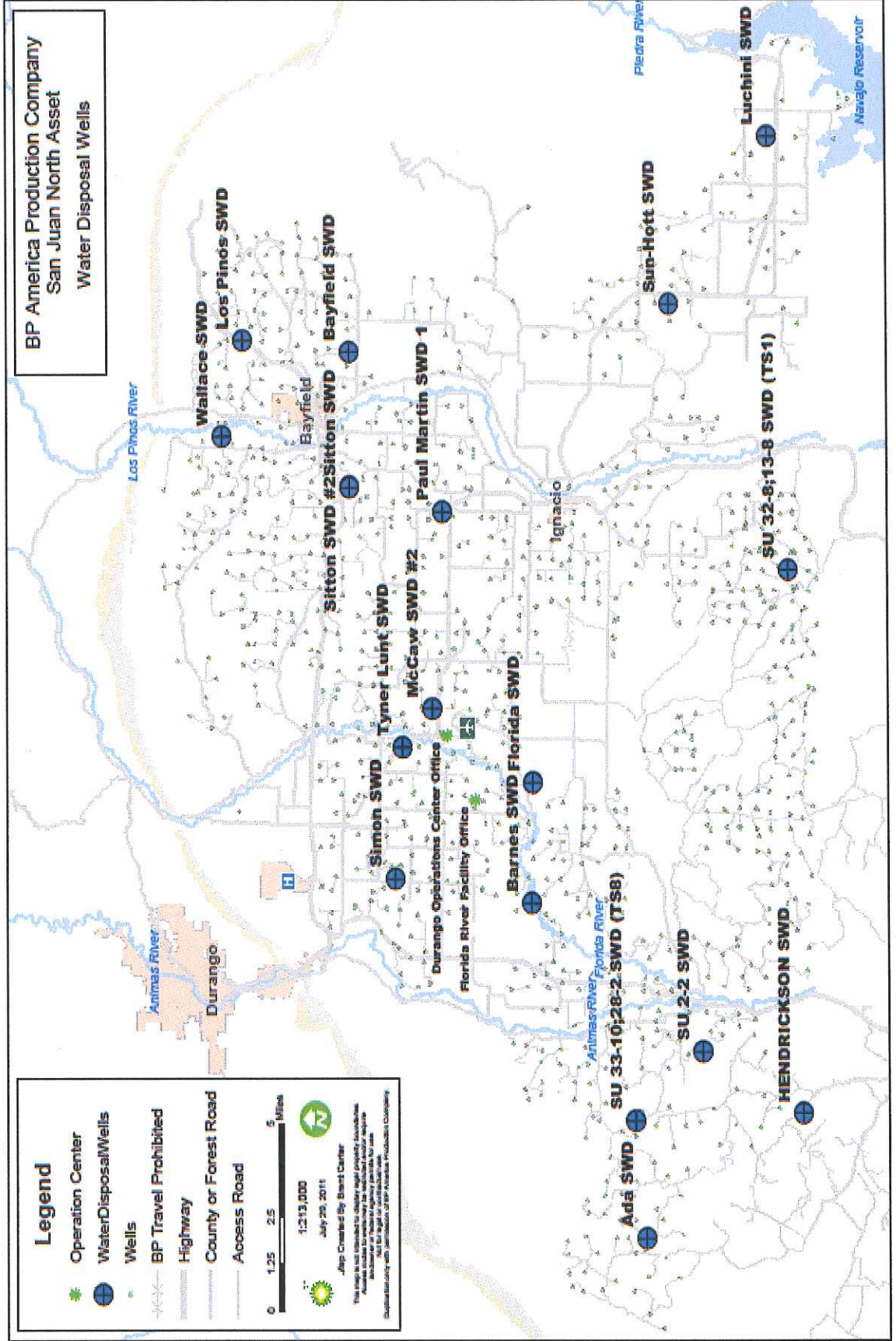
## Produced Water Management

- During the Last 6 months BP averaged producing approximately 45,000 Barrels of Water/Day.
- BP Disposes of our Produced Water:
  - ~ Water Gathering Collection System
  - ~ Deep Underground Class II Injection Wells regulated by COGCC and US EPA
  - ~ Very Limited Water Hauling by Truck
- Surface Discharge
  - ~ Has been evaluated extensively, but any produced water would have to be treated prior to discharge
  - ~ Treatment is not economic at the present time compared to disposal system currently in place





# BP Class II UIC Disposal Wells







## Agency Oversight of Produced Water Disposal: San Juan Basin

- Environmental Protection Agency
  - Class II Underground Injection Control (UIC) Disposal Wells If Requested (Within Southern Ute Indian Reservation)
  - National Pollutant Discharge Elimination System (NPDES) or Surface Discharge If Requested (Within Southern Ute Indian Reservation)
- Bureau of Land Management
  - Evaporation Pits or Ponds (Federal Lands and Tribal Lands)
  - Class II Disposal Wells-Surface Use Only (Federal Lands or Tribal Lands)
- Colorado Department of Public Health and Environment (Water Discharge)
  - Issues NPDES surface discharge permits if requested by the operator (Outside the Southern Ute Indian Reservation)
- Colorado Oil and Gas Conservation Commission (Outside Southern Ute Indian Reservation)
  - Rule 907 with recycling/re-use provisions
  - Class II Underground Injection Control Wells
  - Evaporation Pits or Ponds





# San Juan Basin: Total Industry Produced Water Compared To Historical Stream Flow

River	2011 Northern San Juan Basin Total CBM Produced Water Volumes (AF)	Annual Flow of Northern San Juan Basin Rivers (AF)
Animas		592,600
Florida		73,500
Pine		172,400
Piedra		288,200
San Juan		437,500
Total	3,000	1,564,200
Percent of River Flow	0.20%	