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FROM DAVE DILLON
RPK 11/6/08

103-10652

ExxonMobil

Piceance Drill Cuttings Injection

First Cuttings Injection in Colorado: Dec 07 – March 08 Pilot Project

SUMMARY



Pilot Project goals

- Evaluate feasibility of drill cuttings injection at Piceance
- Evaluate use of produced water in drilling fluid for intermediate and production holes
- Use proven technology

Potential Benefits

- Reduce freshwater usage by 80% with field-wide implementation
- Reduce freshwater hauling truck loads by 80%
- Elimination of drill cuttings pits, pad footprint reduction

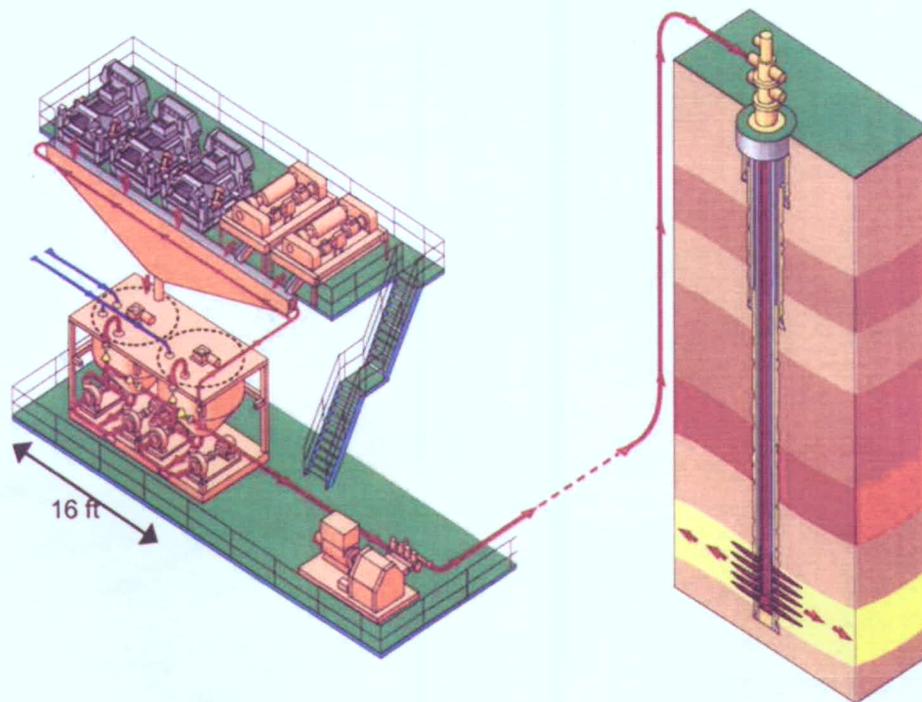
Technical Results

- Demonstrated technical feasibility of drill cuttings injection at Piceance
- Confirmed feasibility of using produced water in drilling fluid
- Injected cuttings were confined to the Wasatch G injection zone
- Low surface injection pressure into drawn-down Wasatch G *? WAS PRODUCED FOR 40 YEARS / HERITAGE MOBILE PRODUCED*
- Consumed 38,000 bbls of produced water for cuttings slurrification
- Consumed additional 77,000 bbls in drilling fluid *175,000 Bbls USED SO FAR*

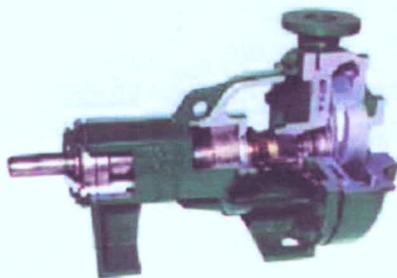
Economic Evaluation

- Cost prohibitive for single pad site disposal case
- Evaluate technical, economic, and regulatory aspects of centralized injection facility to service multiple pads

Drill Cuttings Grinding for Injection



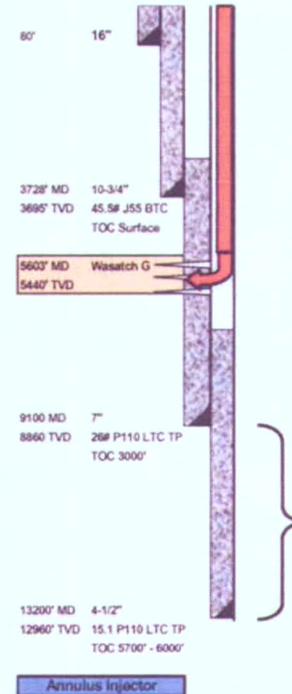
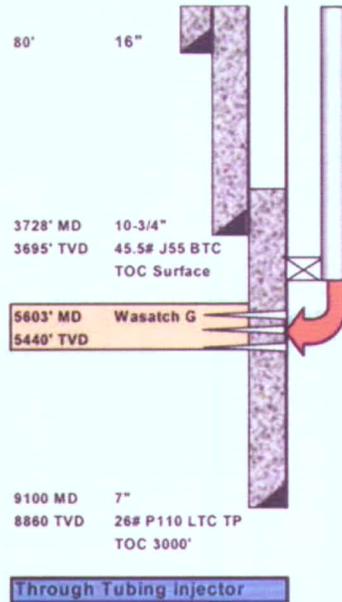
- Cuttings fall into tank, produced water added
- Centrifugal pumps circulate and grind
- Pump slurry to second tank via classifying shaker
- Oversize pieces sent back to grinding tank
- Slurry sent to storage tank or injection pump



Piceance Drill Cuttings Injection



Original Piceance Cuttings Injection Proposal



Original Scope:

- Drill first intermediate section, suspend as injector
- Inject cuttings from next 4 wells
- Recover injector
- Continue as annulus injector for pit cuttings and produced water

Proposed Well Geometry:

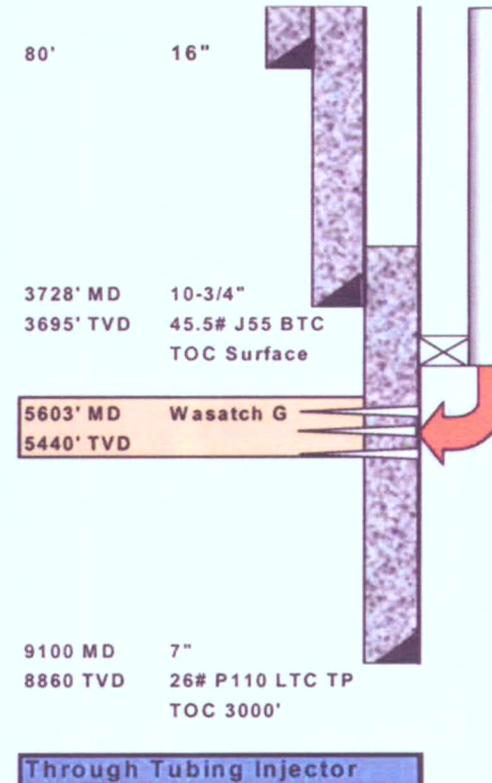
- Through tubing cuttings slurry injection
- Recover tubing, drill well to TD
- Use production annulus for water injection

Permitted Well Geometry:

- Slurry injection must be through tubing to facilitate Mechanical Integrity Testing (MIT)
- Recover tubing, seal perforations
- Drill well to TD
- Annulus injection not permitted

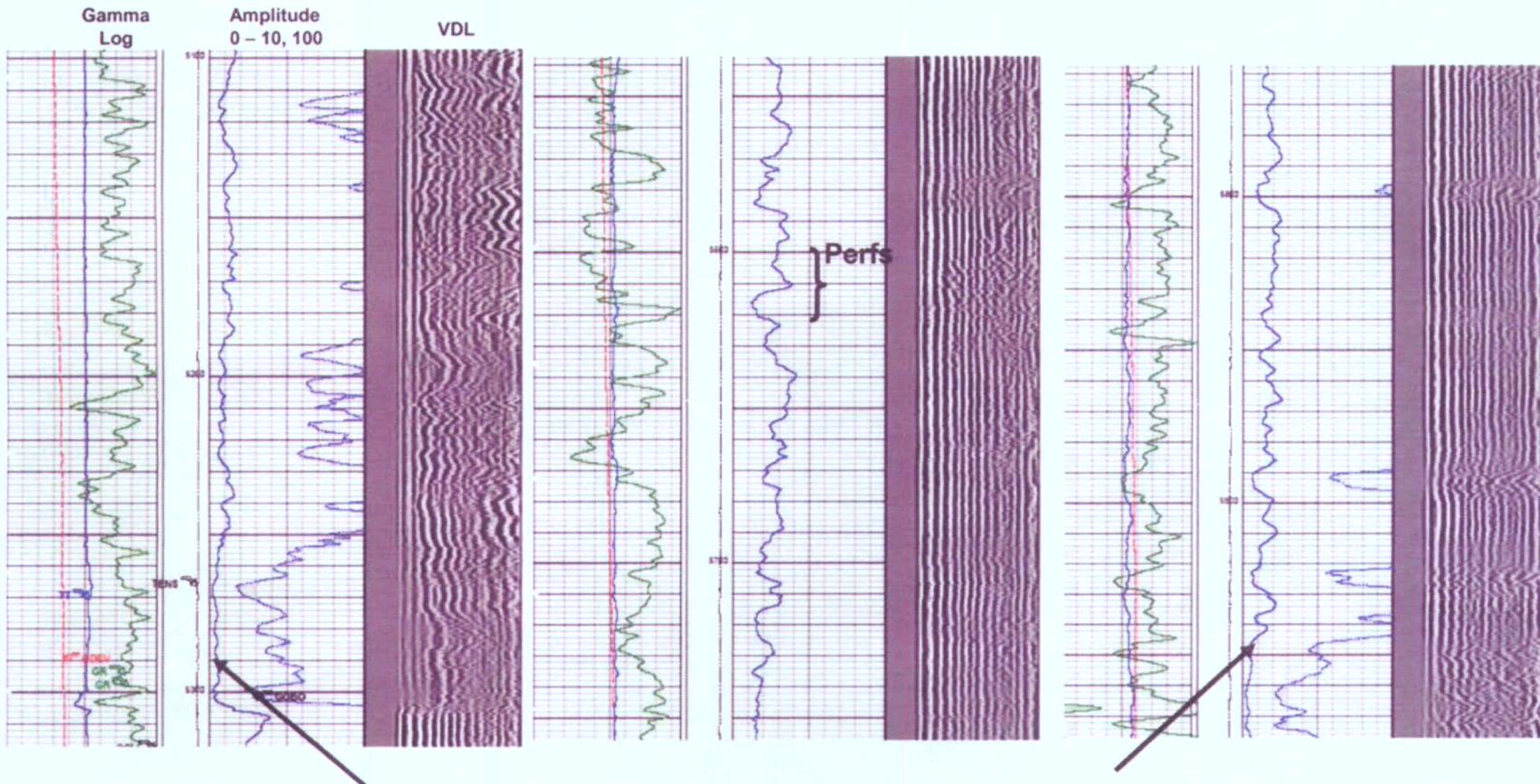
Revised Scope:

- Grind and inject cuttings from 4 wells
- Recover injector, seal perfs, drill to TD
- Cuttings from last production hole to cuttings pit



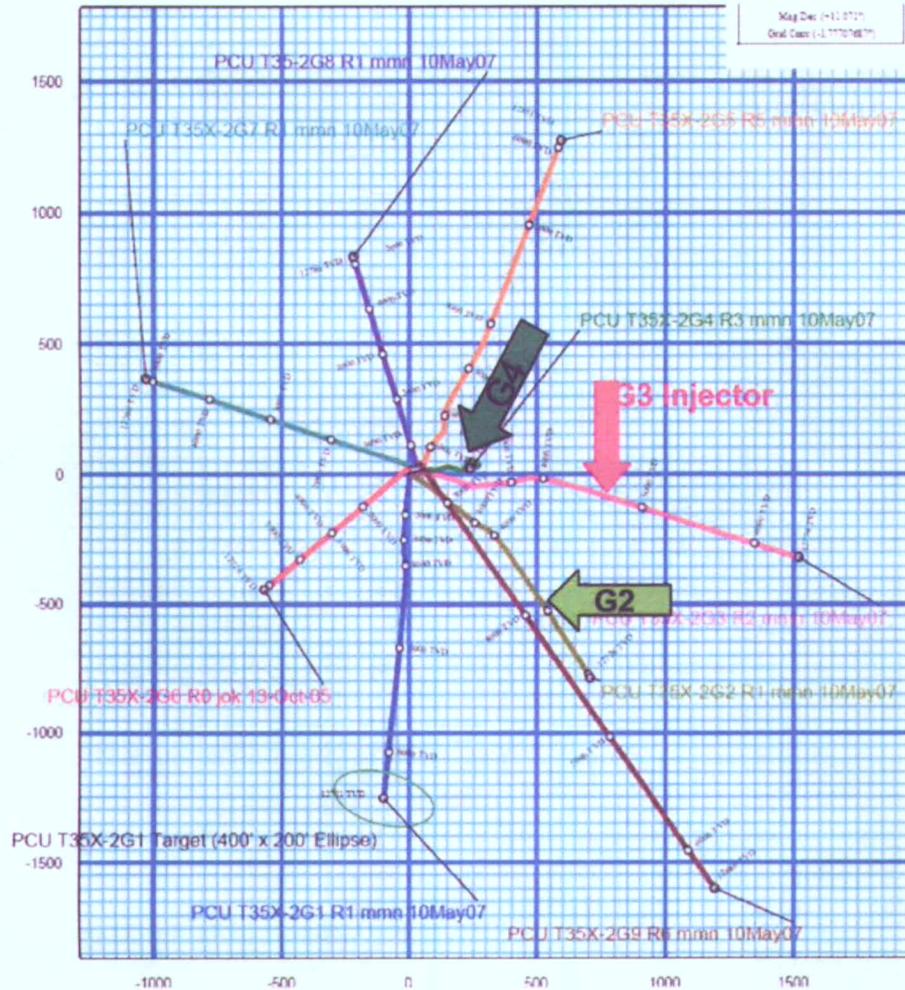
*HAD TO RUN A CASING PATCH TO SEAL ANNULUS.
COULD NOT SQUEEZE*

CBL Logging to Evaluate Zone Isolation



- Excellent cement bonding above and below injection zone
- Higher amplitude across from lost circulation/injection zone
- Perforate lost returns zone in sand, 5600 – 5610 ft (lost returns @ 5607 ft)
- Fresh water aquifer above 1000 ft

Injector Location Pad T35X-2G



- No noticeable effect during drilling offset wells
- G2 closest drilling offset, 675 ft at injection depth
- G4 closest well in projected direction of fracture (105° NW), 975 ft

Drill Cuttings Processing with Winterized Grinding Unit **ExxonMobil**

Commence Injection: 12/03/07
 Demob Injection: 3/24/08

Permitted Volume: 1,560,000 bbls

Final Injection Volumes, bbls:



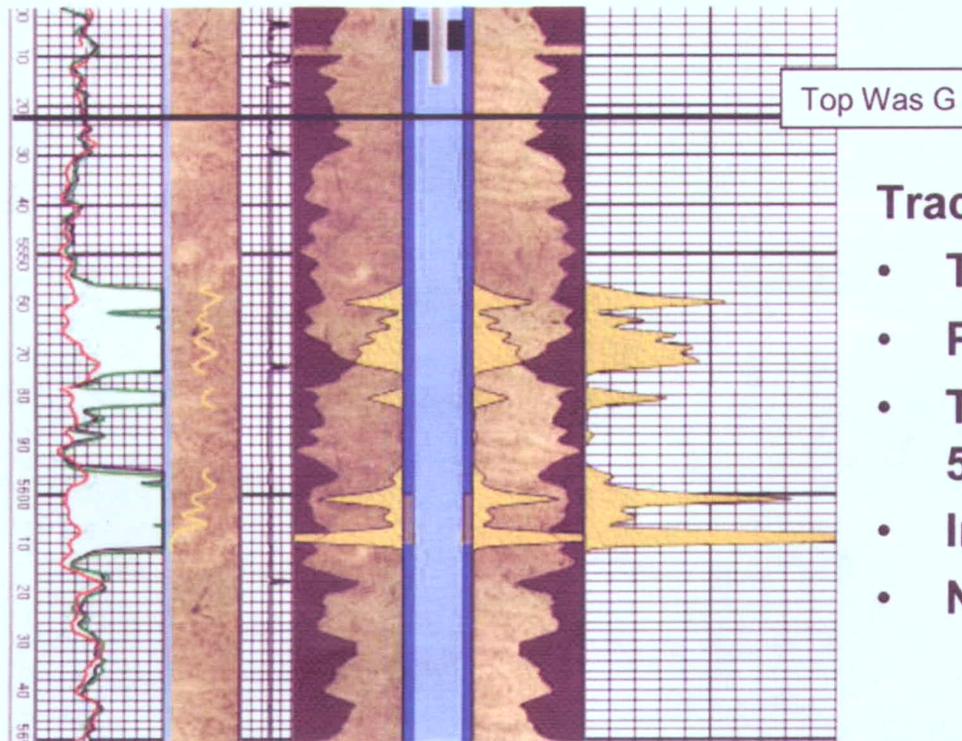
Cuttings Slurry	9,460
Prod Water Flushes	31,010
Drilling Fluid	1,680
Total	42,150

*900 PSI
 FRICTION
 ONLY
 @ Start w/*

Total Produced Water Consumption at T35X-2G Pad **ExxonMobil**

- **Produced water consumed for cuttings injection: 38,000 bbls**
- **Produced water consumed in drilling fluid for 5 wells: 77,000 bbls**
- **Total produced water consumed at pad T35X-2G: 115,000 bbls**
- ***Avoided consuming 77,000 bbls fresh water***

Low Level Radioactive Tracer Survey Shows Confinement to Wasatch G



Tracer logging results:

- Tracer in 50 bbls slurry *AT END OF PROGRAM*
- Perfs 5,600 – 5,610 ft MD
- Top of Wasatch G 5,522 ft, bottom 5,837 ft
- Injection fracture 5555 - 5610 ft
- No migration out of Wasatch G

Learnings

Successes

- Piceance drill cuttings can be ground with centrifugal pumps; auxiliary grinding not needed
- The Wasatch G accepted slurry and produced water on vacuum with no indication of pressure buildup
- No noticeable effect on other pad drilling wells
- Augers and equipment functioned even near 0°F
- Constant functioning with produced water prevented system freezing

Improvement Opportunities

- Cost prohibitive for single pad sites (5 - 7 times cost of burial)
- Had to bury cuttings from production hole of last well
- Still needed cuttings pit

Forward Plans for Expanded Pilot Project



- **One injector on a central pad**
 - Primarily a disposal well (produced water + cuttings)
 - Intermittently accept slurry from multiple pads
 - Transport to central location via truck, slurrify at central injector
 - Propose injection well at 297-13A6
- **Regulatory requirements**
 - BLM approval to move cuttings within field
 - Approval for 297-13A6 injection completion *500 BPH loss zone*
- **Potential future benefits**
 - Elimination of drill cuttings pit
 - Elimination of surface treatment for mud and cuttings prior to burial

