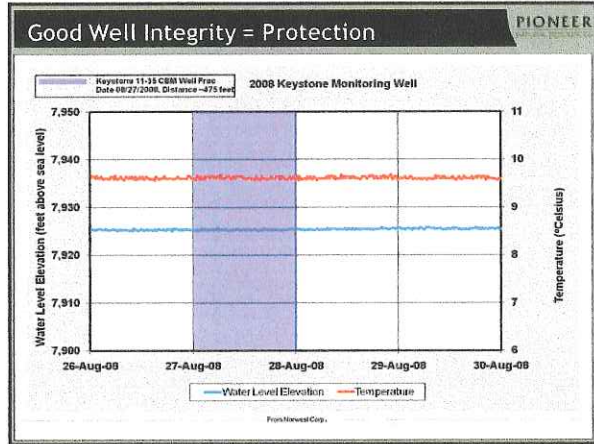


Frac Ingredients Reported

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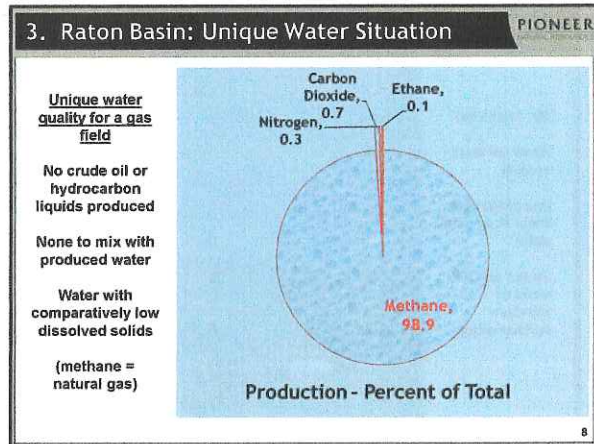
Water Well Testing

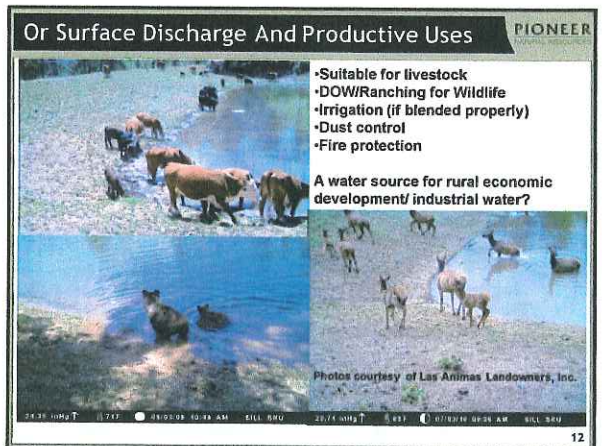
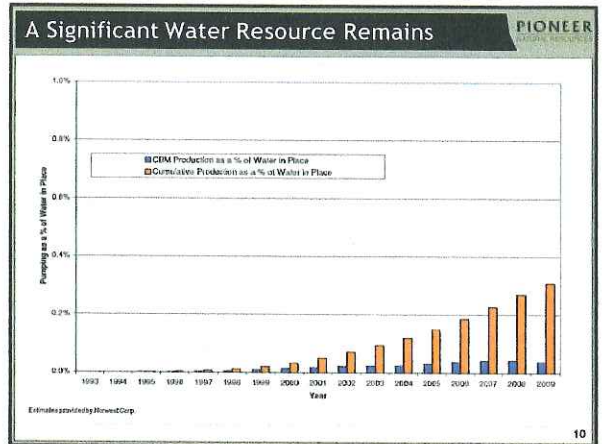
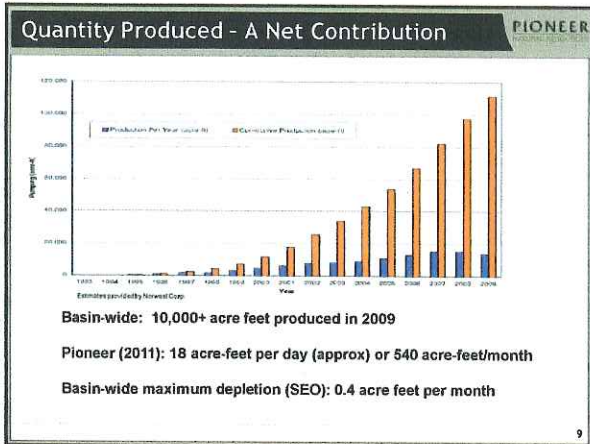
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COGCC CBM Rules
Require testing water wells before drilling and after the frac:

- Methane
- Metals
- Bacteria
- Anions (chloride, sulfide)
- SAR (sodium)


Also fund free water well test kits for landowners





5. Monitoring - Verify Water Quality

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Pre-discharge testing:
To assess suitability of water for surface discharge, uses

- CDPHE inspects outfalls, audits monitoring data
- Independent hydrologists conduct end-of-pipe water quality testing, monitoring

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Continuous Stream Water Quality Monitoring

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A voluntary program
One of 3 stations on Apishapa River

One of 9 stations in Purgatoire River watershed

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Real-time Data - Available to the Public

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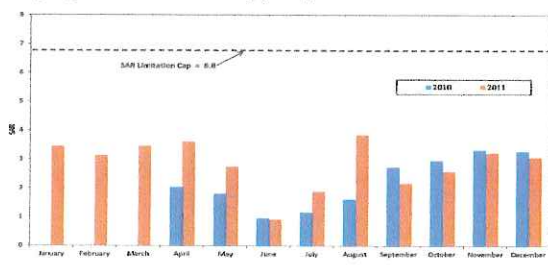
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Transparent Assessment

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Example: Does the discharge of CBM water alter the suitability of the two streams in the Basin used for irrigated crops?

Even in an extremely low flow year (2011), stream water remained suitable for irrigating the most sensitive local crop (alfalfa).



Month	2010 SAR	2011 SAR
January	3.5	3.5
February	3.2	3.2
March	3.5	3.5
April	3.8	3.8
May	3.5	3.5
June	1.0	1.0
July	1.5	1.5
August	3.8	3.8
September	3.5	3.5
October	3.5	3.5
November	3.5	3.5
December	3.5	3.5

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6. Monitoring - Assure Uses are Protected PIONEER
NATURAL RESOURCES

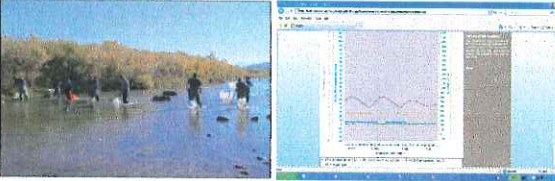
After 15+ years of CBM water production and discharge:

- Purgatoire and Apishapa Rivers remain suitable for irrigation, water supply and aquatic life use classifications

An environmental early warning system


Objective, real time, transparent third-party data

Quality data: quality assurance by experts



Raton CBM Wells and Produced Water PIONEER
NATURAL RESOURCES

A Unique Situation: A Water Resource for an Arid Region



CBM and Water - Further Information PIONEER

- www.purgatoirewatershed.org
 - Watershed Water Quality Monitoring System and Data
- www.apishapawatershed.org
 - Watershed Water Quality Monitoring System and Data
- www.apishapawatershed.org/ratonbasin
 - Information on water well quality and maintenance
 - Handouts on depletion, water wells, produced water, water quality monitoring, hydraulic fracturing

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