

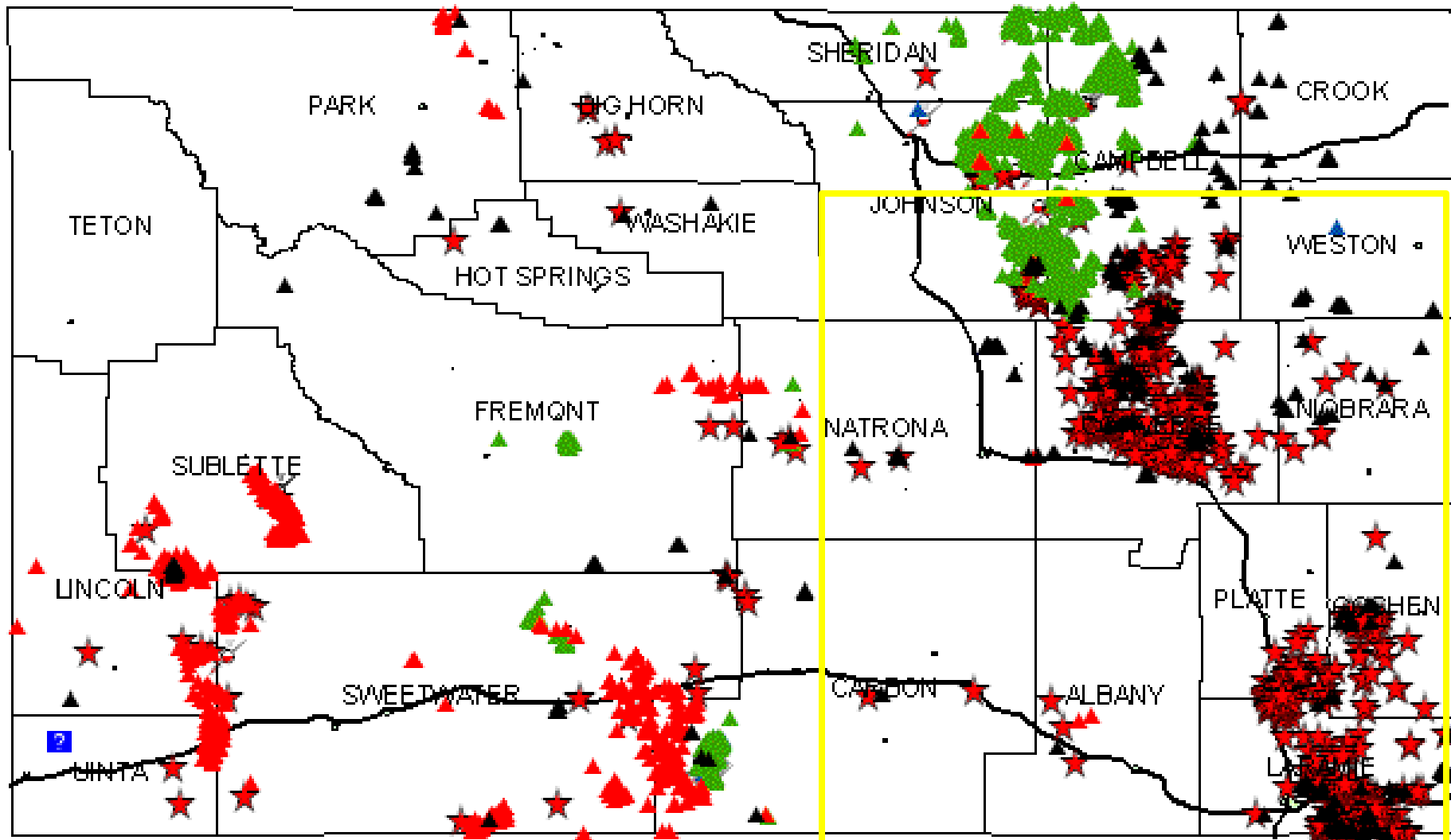
2011 Approved Applications for Permit to Drill

Wyoming Oil and Gas Conservation Commission

Thomas E. Doll
State Oil and Gas
Supervisor

Black is Oil
Red is Gas
Green is Coalbed
Star is Confidential

Denver Petroleum Club Breakfast Meeting
January 12, 2012

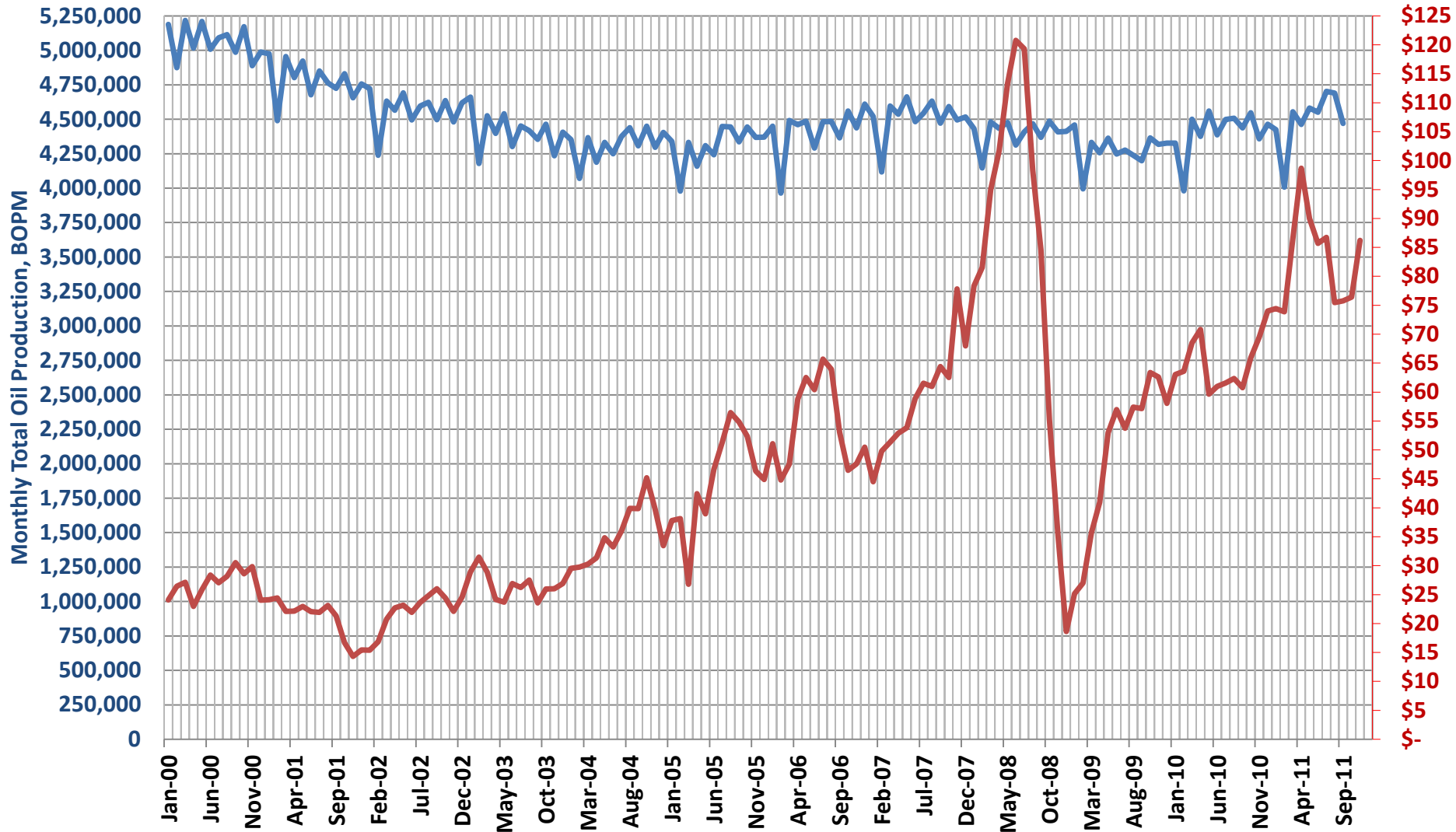




Wyoming Oil and Gas Conservation Commission

Thomas E. Doll
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Supervisor

Wyoming Crude Oil/Price

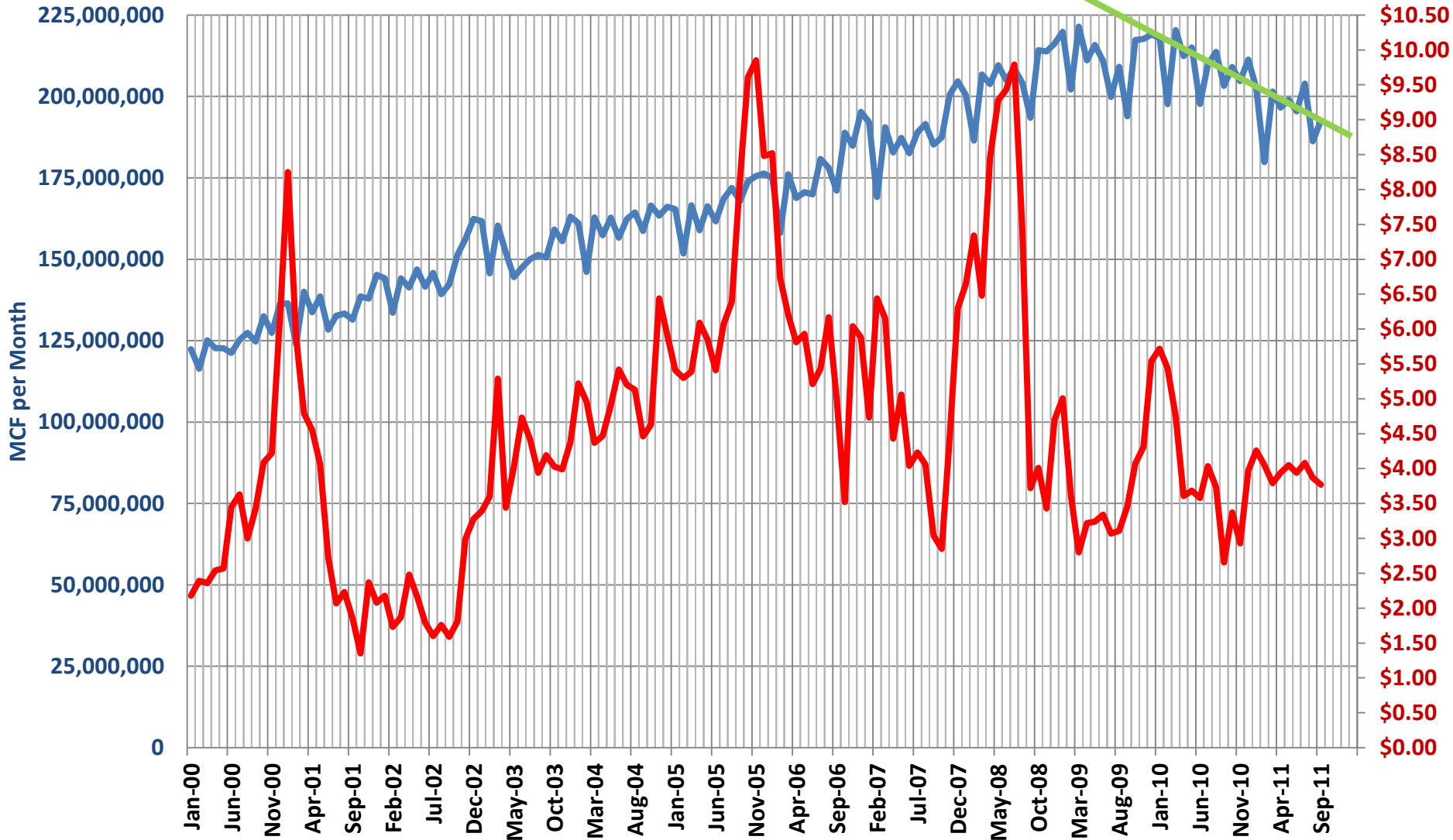




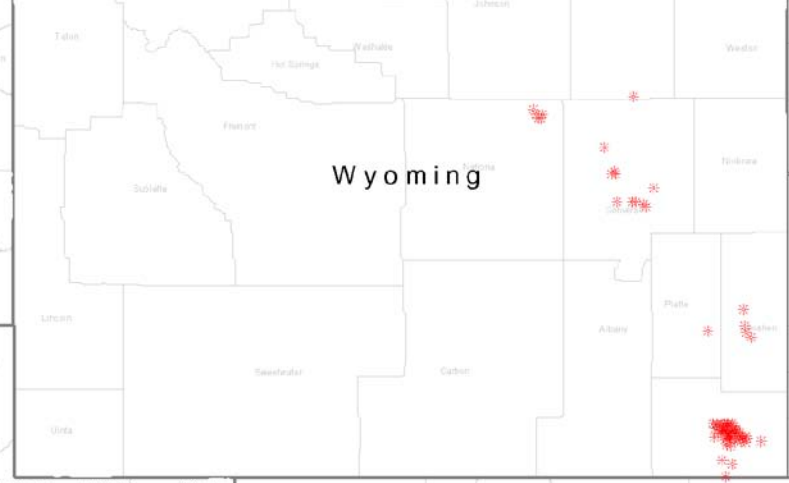
Wyoming Oil and Gas Conservation Commission

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Wyoming Natural Gas Production/Price

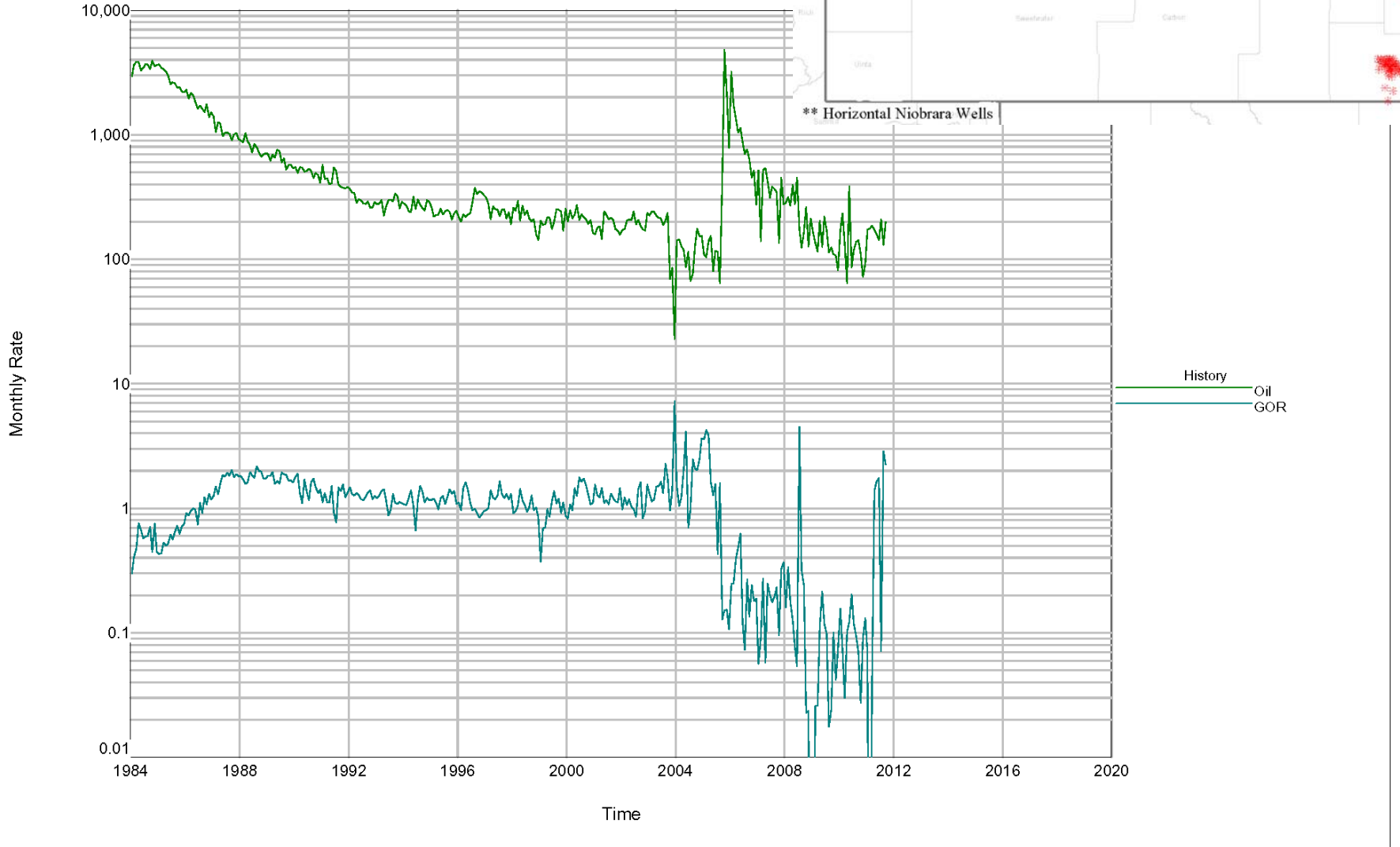


Wyoming Oil and Gas Conserv



NIOBARARA HORIZONTAL TYPE CURVE

** Horizontal Niobrara Wells



Hydraulic Fracturing Treatments in Wyoming

Year	Stimulated Well Count	Individual Stimulations
2005	914	3,448
2006	1,132	4,787
2007	1,044	5,171
2008	1,148	6,376
2009	746	5,675
2010	704	5,974
2011	830	10,186

Wyoming, since 2010, requires disclosure of all chemical compounds used in the well stimulation process. Disclosure of chemical compounds planned to be injected is required prior to the job. Disclosure of all chemical compounds actually injected is required post treatment.

Trend reflects increase in horizontal well drilling and multiple well stimulations in the horizontal wellbore



Almost 100% of oil and natural gas wells drilled in Wyoming are Hydraulic Fracture treated to be commercial; the exception is shallow Coalbed Natural Gas Wells in northeast Wyoming. Wyoming has no documented cases of groundwater contamination caused by HF.



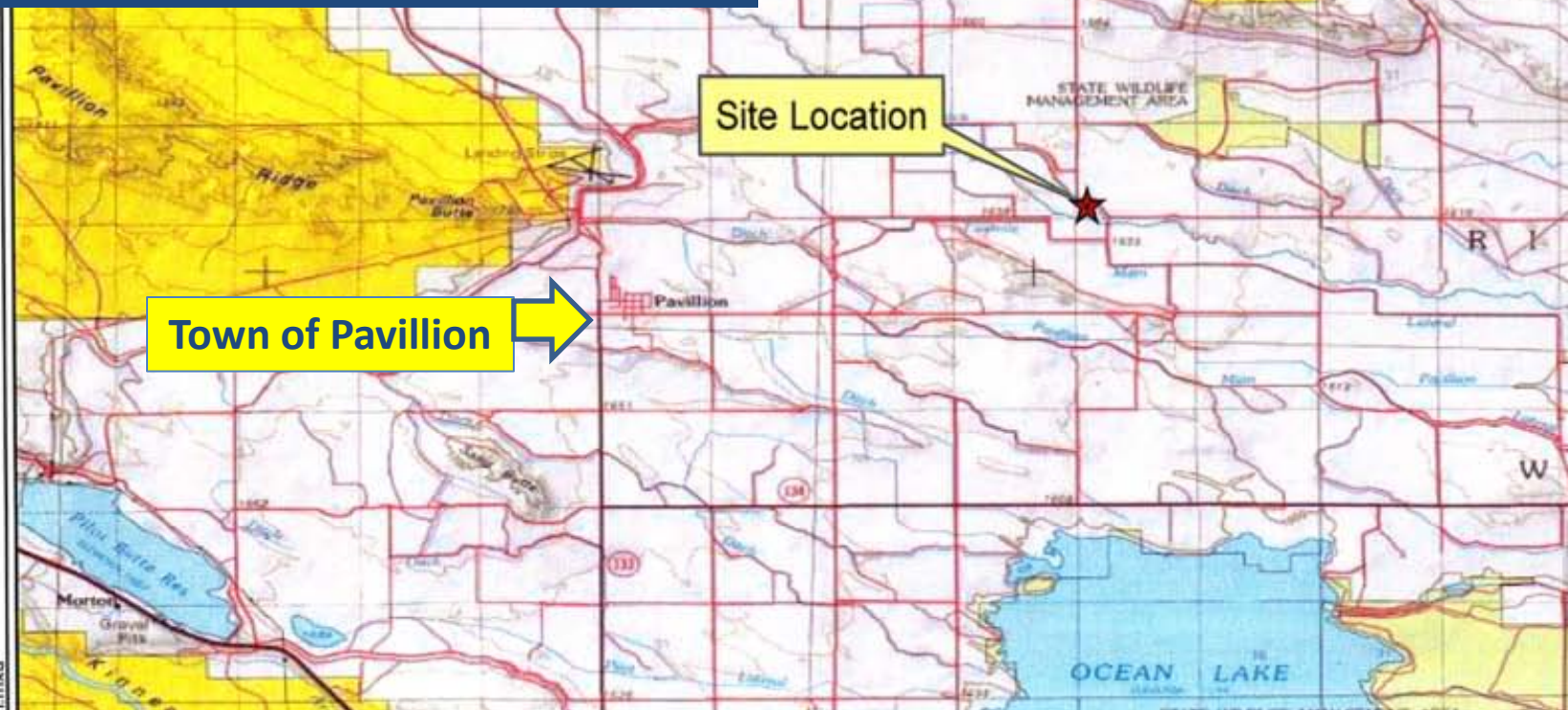
Based on the critical reservoir, commercial and tax based benefits associated with hydraulically fracture treating wells in Wyoming , the next series of slides will address the EPA DRAFT PAVILLION FIELD INVESTIGATION REPORT.

On December 14, 2011, EPA opened a 45-day public comment period on the EPA Draft Pavillion Field Investigation Report. I am requesting that each of you provide a formal and technically critical response to this report to the EPA by January 27, 2012. You will find the report and monitoring wells data and comment information at:

<http://www.epa.gov/region8/superfund/wy/pavillion/>

Pavillion Natural Gas Field Wind River Basin Fremont County Wyoming

- Approximately 5 miles east-northeast of the Town of Pavillion
- Area of Concern approximately 5 miles E-W by 4 miles N-S
 - 147 natural gas wellbores
 - 42 domestic and 4 stock water wells and 2 EPA monitoring wells





- **The EPA was quick to make public the Pavillion Draft Report on Ground Water.**
 - **The report was issued with incomplete, inadequate, erroneous and political science; before the data were reviewed by Wyoming agencies; before data were verified by further testing; and before the data were vetted through a peer review process**
- **EPA concludes that contamination of groundwater was caused by a chemical used in hydraulic fracturing.**
 - **Due to unanswered questions regarding the data, State agency and industry experts cannot make any conclusion based on the monitoring well data provided by EPA**
- **The facts related to the data collected seem to be lost now that the report is in the court of public opinion.**



- The EPA conceptual scientific model and line of reasoning is based on two monitoring wells and two sampling events.
- The laboratory analyses resulted in a single detect of a single chemical compound that EPA linked to hydraulic fracturing, or fracking, based on their review of Material Safety Data Sheets of chemical used in fracking.
- EPA's conclusion erroneously escalates the local Pavillion groundwater data to the national level which further obscures the possibility for public understanding. Now the quality of the debate suffers and the science itself is questioned.
- The scientific method requires collection of data in a reproducible manner, providing thorough and open analysis, and prior to making any conclusions on that data.



- Issuing this draft report before scientific analysis has been completed is a disservice to the public, specifically the individuals living within the Pavillion natural gas field area who are looking to federal and state agencies for answers to their groundwater concerns.
- The EPA draft groundwater report ignores that the shallow domestic and stock water wells in the Pavillion area have naturally occurring high sodium, high sulfate and high carbonate ionic content, and some wells produce methane gas.
- Landowners and groundwater users have known of these groundwater issues long before any natural gas wells were drilled in the area.
- Some landowners moved into the Pavillion natural gas field after the natural gas wells were drilled.



- The report does not address the complex geology and hydrogeology of the Wind River formation in central Wyoming.
- The Wind River formation matrix contains sand lenses much like potato chips in a bowl.
- The Wind River formation is the shallow groundwater aquifer as well as the deep natural gas reservoir.
- Natural gas from source rocks at depths below the Wind River formation has been migrating to the surface for tens of thousands of years. The Wind River formation does not contain any geologic horizon to prevent the gas migration.
- The shallow groundwater aquifer is recharged from the surface by rain, snow melt and irrigation run-off.



Wyoming Oil and Gas Conservation Commission

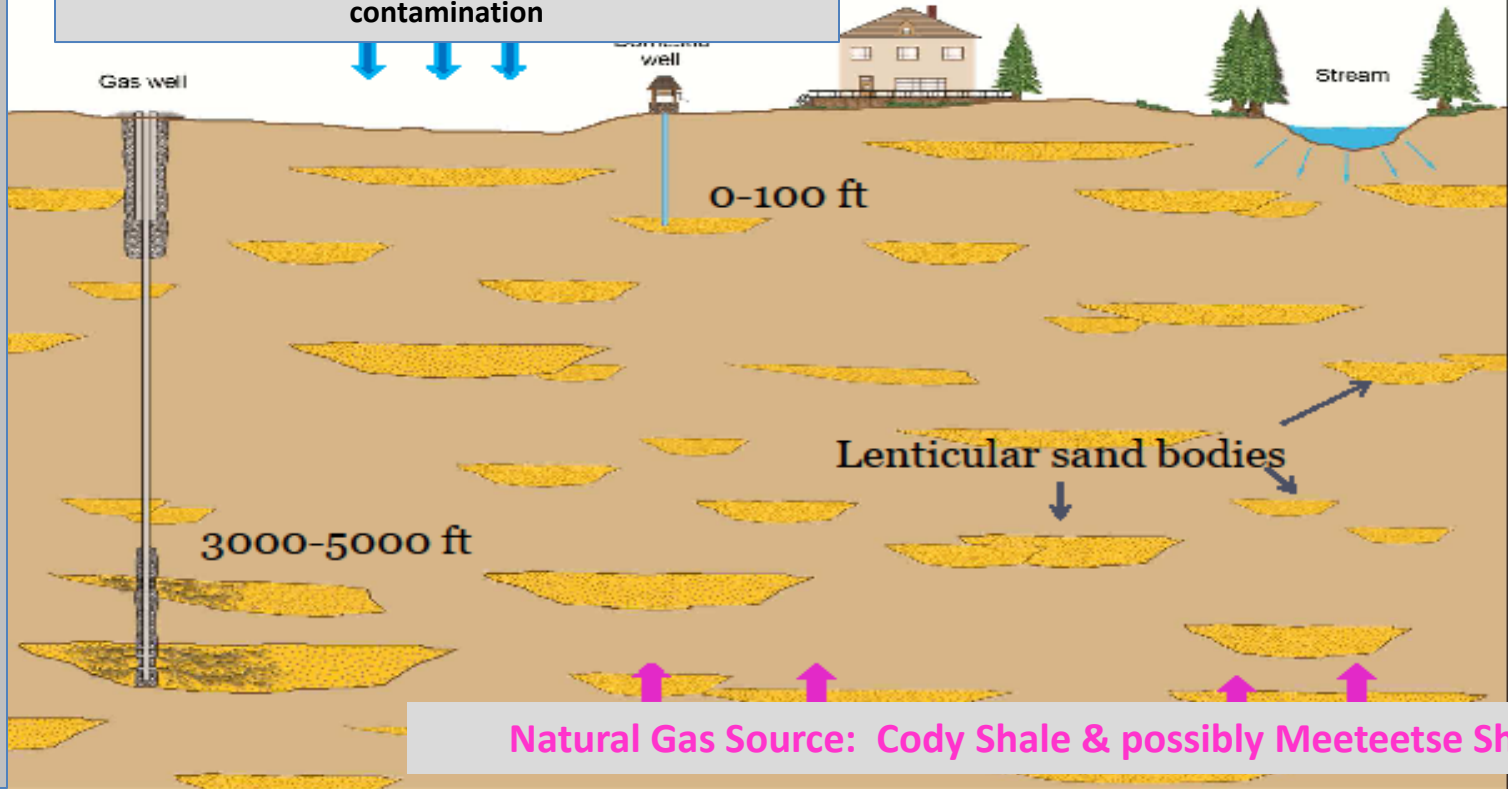
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Concern: oil field sites contributed to shallow groundwater contamination; 11 sites soil sampled of 32 sites identified as landowner concern; results to be reported and possible remediation to be determined

Concern: path for methane from gas well to water supply well; 38 of 169 Pavillion area wells identified as not having primary cement from circulated to surface or into surface casing; bradenhead pressure data collection identified 4 wells for possible remediation

In general, precipitation recharges the Wind River Aquifer 1 to 5 inches per year; recharge occurs in the Pavillion area also from irrigation at 0.25 to 0.75 inches per year including canals and ditches, and from losing streams, all potential sources of shallow groundwater contamination

WY State Geological Survey
Pavillion Presentation



Not to scale

Not all lenticular sands are charged with natural gas, some are wet, some are connected, some are not

- **The report ignores the public outreach effort established with 4 Working Group meetings held during 2011. Working Groups are in place for Natural Gas Well Integrity and Landowner Identified Pits comprised of representatives from federal and state agencies, area landowners, and the natural gas well operator.**
- **Other possible sources of groundwater contamination remain unstudied in the Pavillion area located within this active natural gas field:**
 - **from the drilling, completion, and maintenance of the domestic and stock water supply wells;**
 - **from the location and use of septic systems, stock pens and feedlots;**
 - **from the use of pesticides, fertilizers, and herbicides; from the recharge water quality from irrigation run-off;**
 - **or from fuel stations and vehicle repair shops near landowner water supply wells.**



- **To-date, EPA HQ, ORD, and Region 8 has not been responsive to requests:**
 - **has not responded to FOIA requests from industry**
 - **has not provided requested data or answered questions posed from various State of Wyoming agency experts**
 - **has not responded to Governor Matthew Mead's December 20, 2011 letter regarding collaboration on another sampling event at these monitoring wells**
 - **has not made public details regarding the draft report peer review process or review team participants; Wyoming provided 4 names for consideration on the peer review team and has requested all public meetings be held in Wyoming**



In conclusion, EPA has dismissed practical concerns raised by the Wyoming Oil and Gas Conservation Commission, the Wyoming Department of Environmental Quality, and by the natural gas well operator, Encana Oil and Gas USA, related to the drilling, completion, development, testing and sampling of the two monitoring wells.

- The EPA draft report contains questionable, unverified, poor quality data; please provide formal and technically critical comments to the EPA by January 27, 2012:**

<http://www.epa.gov/region8/superfund/wy/pavillion/>

- Additional short term sampling and a long term science based effort are being planned by the State of Wyoming for the Pavillion area. This science based effort will utilize proven and repeatable science, along with critical analysis and full disclosure, and will lead to thoughtful conclusions about groundwater in the Pavillion area.**



Wyoming Oil and Gas Conservation Commission

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The Wyoming
Oil & Gas
Conservation
Commission
webpage
provides
transparency for
all records,
reports, and
well data by API
number, or by
quarter-quarter,
Section,
Township and
Range, or by
Operator

Thank you.

<http://wogcc.state.wy.us>

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