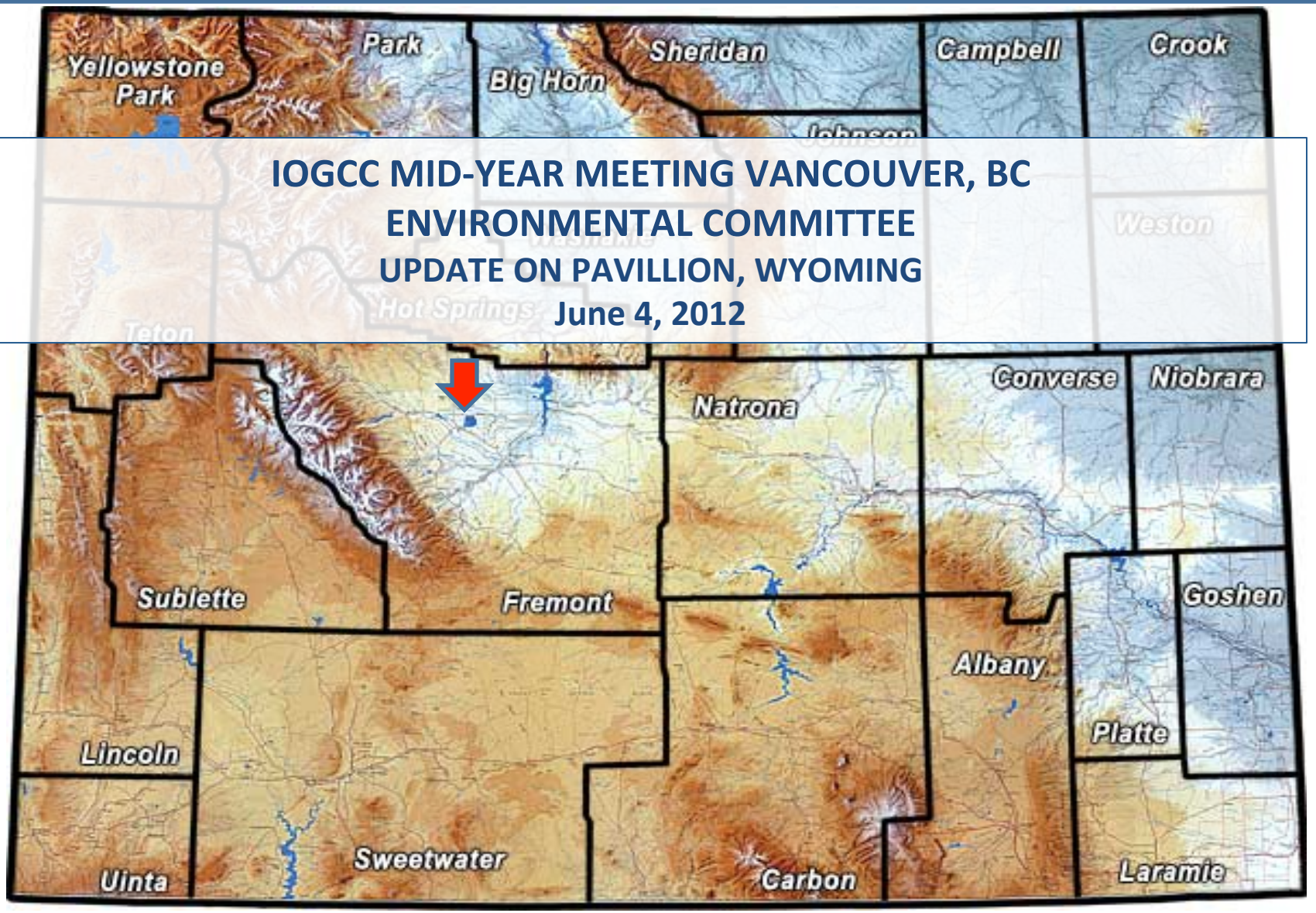
Wyoming Oil and Gas Conservation Commission

Thomas E. Doll
State Oil and Gas Supervisor



IOGCC MID-YEAR MEETING VANCOUVER, BC
ENVIRONMENTAL COMMITTEE
UPDATE ON PAVILLION, WYOMING
June 4, 2012

WHAT IS ALL THE CONTROVERSY REGARDING THE EPA DRAFT PAVILLION FIELD INVESTIGATION REPORT? Executive Summary

Landowner complaints of bad drinking water taste and odor was investigated by State Agencies. Not getting the response desired from the State, in 2008 EPA was the asked by certain individuals living within the Pavillion natural gas field to determine the cause of bad taste and odor in their water supply wells.

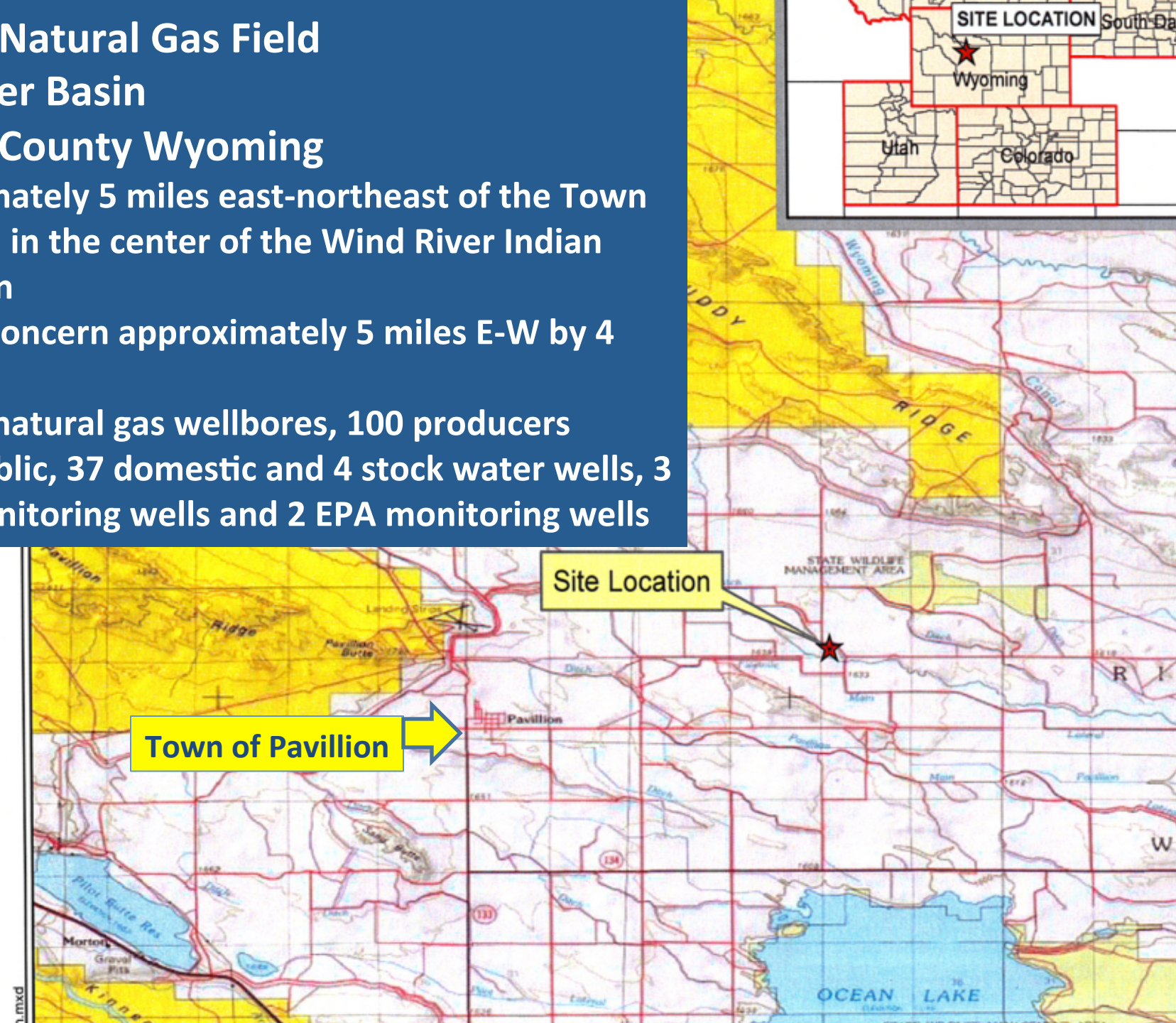
The draft report, found at http://www.epa.gov/region8/superfund/wy/pavillion/ addresses water sampling at two monitoring wells drilled after results of shallow domestic and stock water supply well testing in 2009 and 2010 by EPA were inconclusive as to the cause of or even if ground water contamination exists. Naturally occurring biogenic methane, not related to the natural gas field, was found in a few water supply wells.

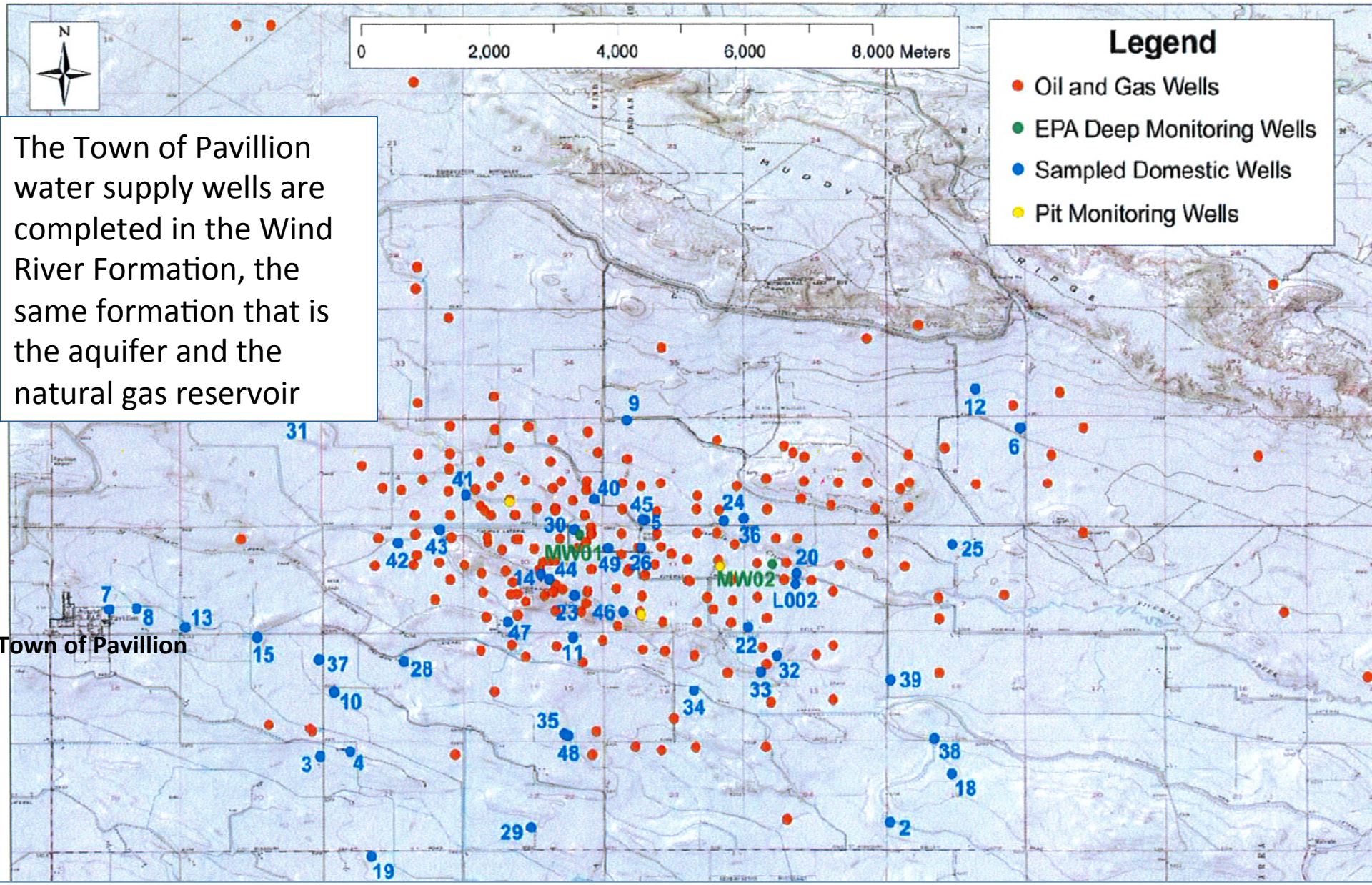
The report was issued by EPA with incomplete, inadequate, erroneous and political science; before the data was reviewed by Wyoming agencies; before data was verified by further testing; before the data was vetted through a peer review process; and before all data was provided.

The report does not address the original complaint of water supply wells with bad taste and odor but erroneously concludes that a chemical used in hydraulic fracturing caused groundwater contamination and ignores other potential causes of contamination including those introduced by EPA itself.

Pavillion Natural Gas Field
Wind River Basin
Fremont County Wyoming

- Approximately 5 miles east-northeast of the Town of Pavillion in the center of the Wind River Indian Reservation
- Area of Concern approximately 5 miles E-W by 4 miles N-S
  - 168 natural gas wellbores, 100 producers
  - 5 public, 37 domestic and 4 stock water wells, 3 pit monitoring wells and 2 EPA monitoring wells





Site Area

From EPA Draft Investigation of Ground Water Contamination near Pavillion, Wyoming Dec 2011

- **The EPA made public the Pavillion Draft Report on Ground Water December 2011.** ***Last data provided was on January 31, 2012 on the eve of EPA testimony at House Subcommittee on Energy and the Environment.***

- **EPA concluded that contamination of groundwater was caused by a chemical used in hydraulic fracturing – based solely on a single detect in a single monitoring well.**

Due to unanswered questions by EPA on the data and the monitoring wells, State agency and industry experts cannot make any conclusions regarding any groundwater contamination based on the monitoring well data provided by EPA.

State agency scientists contend that the organic chemical compounds detected were introduced by EPA into the monitoring wells during the drilling, completion, testing, sampling and laboratory analyses.

- **EPA's conclusion erroneously escalates the local Pavillion groundwater data to the national and international level which further obscures the possibility for public understanding. The quality of the debate continues to suffer and the EPA science itself is questioned.**

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- The EPA conceptual scientific model, lines of reasoning, and conclusion found in the report and released to the public is based on two monitoring wells and two sampling events.

- The laboratory analyses resulted in a single detect of a single chemical compound out of 9 samples analyzed; 2-butoxyethanol.

- This detect was in only one of the two monitoring wells sampled.

- Actual sample levels for organics are so low they are measured in parts per billion. The compound detected is acceptable for public water system.

- EPA linked 2-butoxyethanol to hydraulic fracturing based solely on their review of Material Safety Data Sheets of chemicals that could be used in hydraulic fracturing .

- The last well stimulation performed on any natural gas well in proximity to the EPA monitoring wells was performed in 2005.

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- Draft report was issued before all data is disclosed and the scientific analysis was completed - 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 regarding drinking water taste and odor.

- The EPA draft report ignores historical USGS data that shows the shallow domestic and stock water wells in the Pavillion area have naturally occurring high sodium, high sulfate, high iron and high carbonate ionic content, and some wells produce naturally occurring biogenic methane gas. EPA ignored the water supply well iron content disregarding its sampling or analysis and therefore discounting iron as a contributor to odor or taste.

- 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 years after the natural gas wells were drilled.

- EPA provides no evidence that the two monitoring wells represent water supply wells used by anyone in the Pavillion natural gas field.

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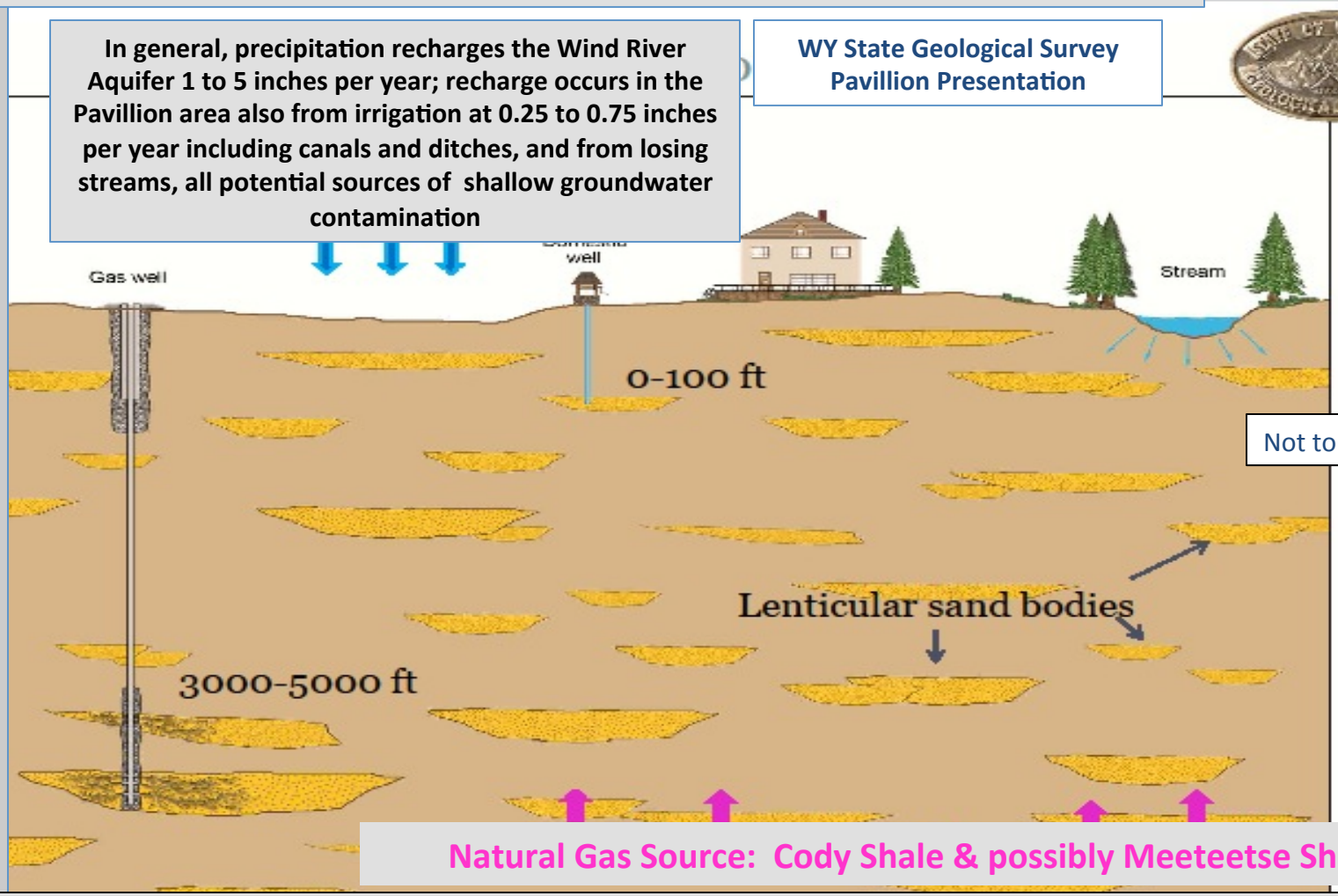
Concern: oil field sites contributed to shallow groundwater contamination; 11 sites soil sampled of 32 sites identified as landowner concern; 1 site to DEQ VRP; results to be reported 2012

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 6 wells for possible remediation; work continues

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 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 study Natural Gas Well Integrity and Landowner Identified Sites and are comprised of representatives from federal and state agencies, area landowners, and the natural gas well operator.

  - Work of Well Integrity Team continues after bradenhead testing 34 wells identified 6 that require additional research and possible remediation.

  - Identified Sites Team will finalize findings after 33 sites were investigated, 11 tested, and with one site added to the ongoing DEQ managed Voluntary Remediation Program and to work toward issuing their report.

- Other possible sources of groundwater contamination remain unstudied in the area located within the Pavillion natural gas field:
  - from the drilling, completion, and maintenance of the domestic and stock water supply wells;
  - from the active and inactive septic systems, stock pens and feedlots;
  - from the current and historic public and private landfills;
  - from the use of pesticides, fertilizers, and herbicides and subsequent aquifer recharge from irrigation run-off; or
  - from fuel stations and vehicle repair shops near landowner water supply wells.

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The EPA draft report contains questionable, unverified poor quality data.

State agency experts cannot support the EPA's analysis and conclusions as to the identification of any source of groundwater contamination based on the water supply well and monitoring well sampling and testing data or the draft report.

- **State agency scientists contend that the organic chemical compounds detected were introduced by EPA during the drilling, completion, testing, sampling and laboratory analyses.**

Long term science based efforts are being planned by the State of Wyoming, the Tribes, the USGS, and EPA 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.

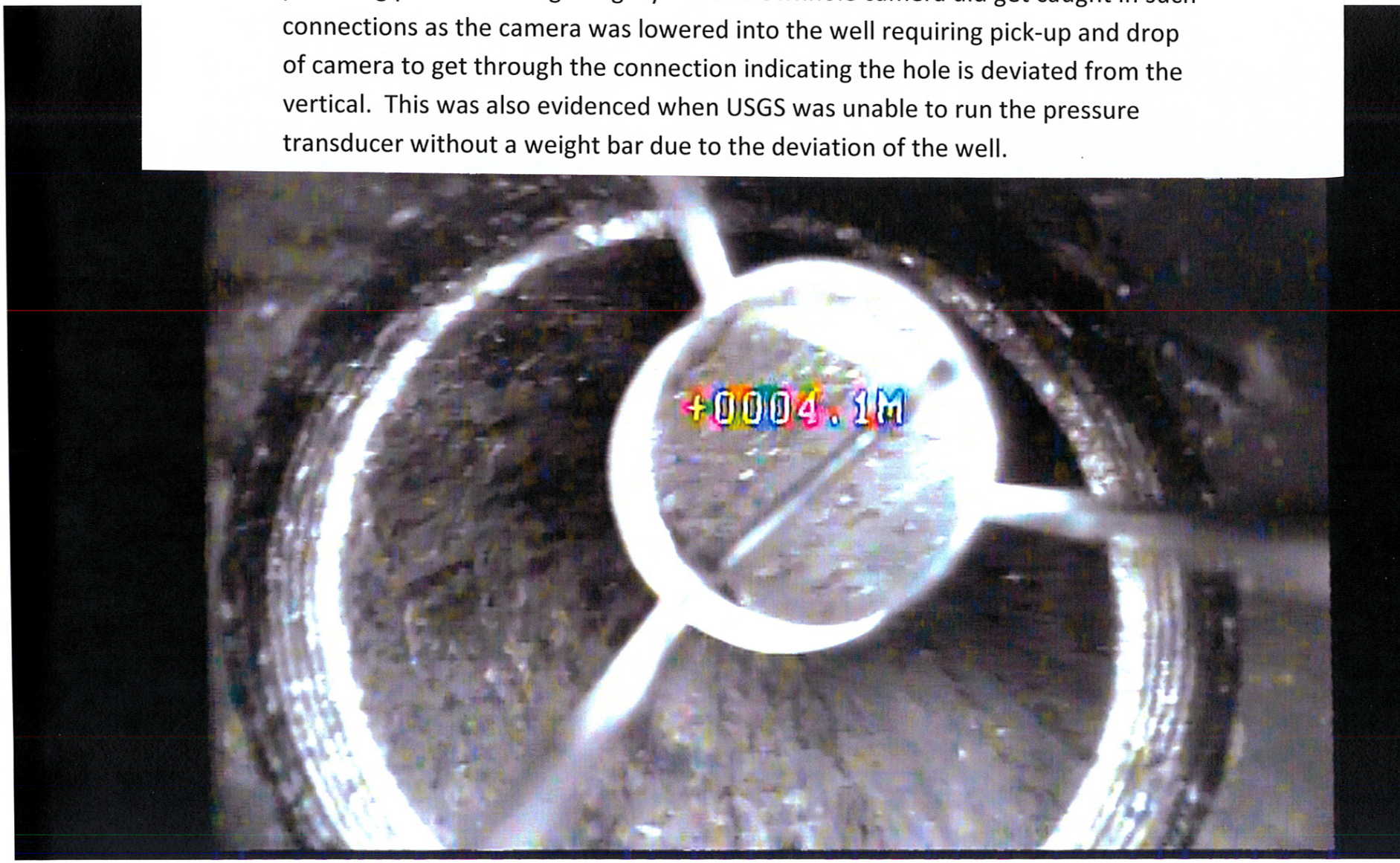
- During week of April 16, 2012 Monitor Well 2 (970 feet) was produced by EPA recovering tubular volume and then was sampled. USGS did not sample Monitor Well 2 as their sampling volume protocol cannot be met due to low fluid influx in this well. EPA also sampled a select few private water supply wells.
- During week of April 23, 2012 Monitoring Well 1 (790 feet) was produced by EPA. Tests of produced well water started at pH 12 and dropped to pH 10.6 on a constant decline. Wind River formation water pH ranges from 9 to 10 across the natural gas field. Both EPA and USGS sampled the produced water. EPA left Pavillion.
- USGS pulled production equipment from Monitor Well 2 during week of April 30, 2012. USGS ran a downhole camera, then ran a pressure transducer and used a bailer in an attempt to recover formation fluid. Well productivity was determined to be insufficient to meet USGS sample recovery volume protocol. No samples were taken by USGS.

Laboratory results are anticipated at time of Peer Review Panel, fall 2012.

EPA at Monitor Well 2, April 16, 2012

USGS DOWNHOLE CAMERA EPA MONITORING WELL MW02 2 May 2012

Casing connection – Coupling Threads: photo indicates improper make-up torque providing possible casing integrity issue. Downhole camera did get caught in such connections as the camera was lowered into the well requiring pick-up and drop of camera to get through the connection indicating the hole is deviated from the vertical. This was also evidenced when USGS was unable to run the pressure transducer without a weight bar due to the deviation of the well.



USGS DOWNHOLE CAMERA EPA MONITORING WELL MW02 2 May 2012

Top of screened interval – note solids suspended in the wellbore water and screen appears to be partially plugged with drilling cuttings or drilling mud (see center lower right mirrored reflection of the screen).

USGS DOWNHOLE CAMERA EPA MONITORING WELL MW02 2 May 2012

Mid-screened interval – screen plugged (see center mirrored reflection of the screen).

USGS DOWNHOLE CAMERA EPA MONITORING WELL MW02 2 May 2012

Below mid-screened interval – screen and casing is plugged with drill cuttings and drilling mud.

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The Wyoming Oil & Gas Conservation Commission webpage provides transparency for all records, reports: click on "Completions", enter dates and operator, and select pdf icon under the Completions column

All Pavillion Working Group information is public and is posted on the webpage

Thank you.

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