United States
Environmental Protection
Agency

EPA Briefing to the American Petroleum Institute

Cynthia Sonich-Mullin
Director, National Risk Management Research Laboratory
EPA staff scientists and managers

December
20, 2012

United States Environmental Protection Agency

Overview

- EPA's Phase V data supplement the information collected over the course of three previous years

- EPA worked in close coordination with USGS, and others on the development of sampling protocols

- EPA employed accepted protocols to collect samples as described in our Summary of Methods and Results

United States Environmental Protection Agency

Background – Pavillion, WY

- In response to citizen complaints regarding changes in well water, EPA Region 8 initiated a ground water investigation in Sept 2008
- Site investigation area is east of the town of Pavillion in central Wyoming, within boundaries of Wind River Indian Reservation
- Ground water from the Wind River Formation is principal source of municipal, domestic, and agricultural water in Pavillion area
  - Entire Wind River Formation meets EPA's definition of an Underground Source of Drinking Water (USDW); 40 CFR 144.3

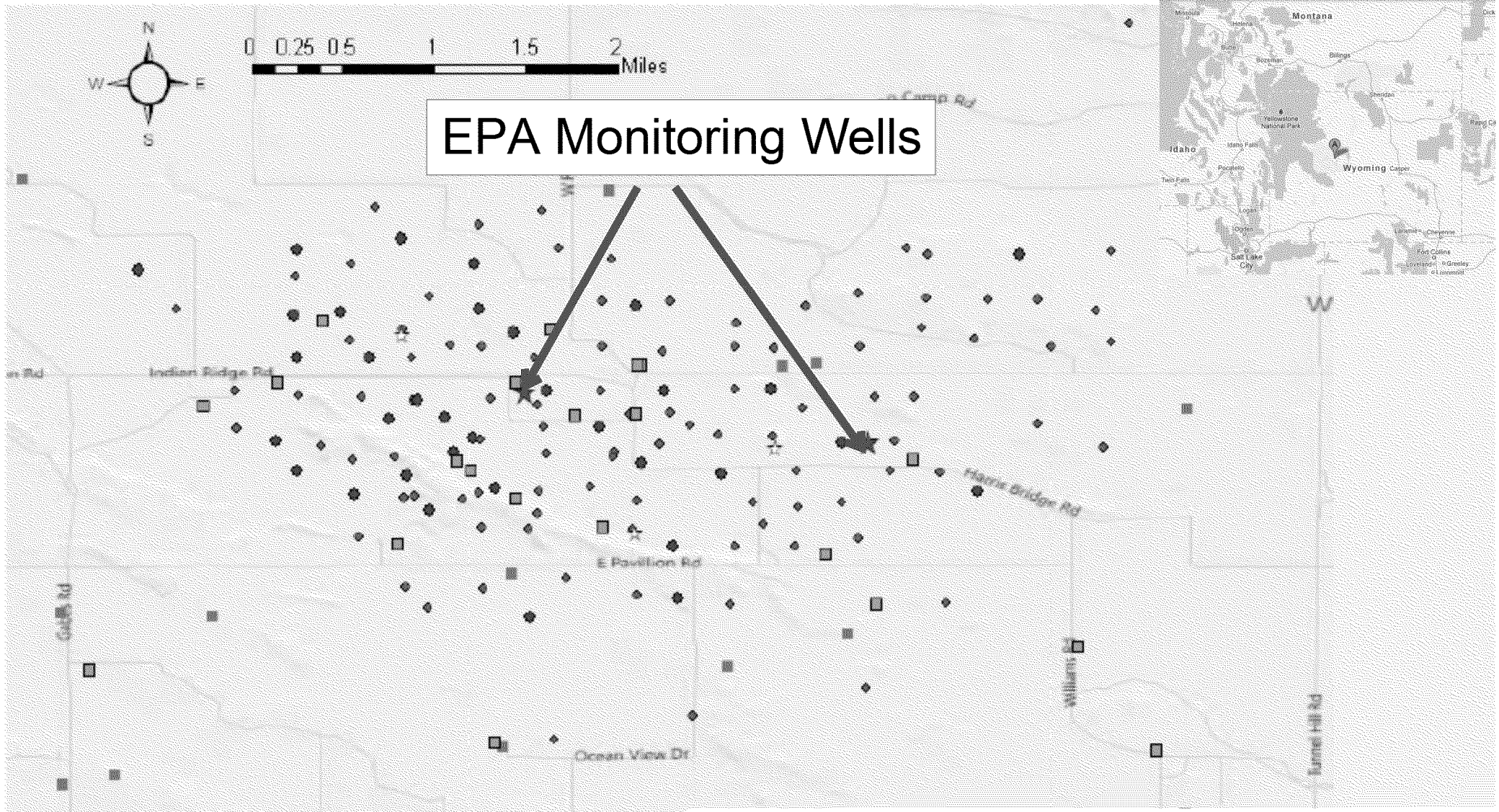
EPAPAV0042636

United States Environmental Protection Agency

History - Phases of Pavillion Investigation

- **Phase I (March 2009) - EPA**
  - Determine presence of potential ground water contamination
  - 35 domestic and 2 town wells sampled
- **Phase II (January 2010) - EPA**
  - Confirm contaminants and quantify Tentatively Identified Compounds (TIC)
  - Also collected production-related samples (e.g., pits, production fluids, gas)
  - 17 domestic wells, 4 stock wells and 2 town wells sampled
- **Phase III (June-October 2010) - EPA**
  - Differentiate potential sources of ground water contamination
  - Installation and sampling of 2 deep monitoring wells and 4 domestic wells
- **Phase IV (April 2011) - EPA**
  - Re-sampling of 2 deep monitoring wells and 11 domestic/stock wells
  - Expanded analyte list– glycols and alcohols
- **Phase V (April 2012) – USGS and EPA**
  - Sampling of MW01 in conjunction with USGS sampling
  - EPA collected and sent replicate MW02 samples to USGS contract lab for analysis
  - EPA also resampled 5 nearby domestic wells and 1 town of Pavillion municipal well

EPAPAV0042637



Legend

- Domestic Water Wells with Admantane, Methane, and/or DRO Detection
- Hydraulically Fractured Production Wells
- Pit Monitoring Well
- EPA Monitoring Well
- Production Wells
- Domestic Water Wells

Map of Study Area

Draft/Deliberati

MW01 & MW02 Well Construction

- **MWs drilled using mud-rotary technique with blowout protection**
- **Total Depth**

MW01 ≈ 785 ft below ground surface (screened 765-785 ft bgs)
MW02 ≈ 990 ft bgs (screened 970-990 ft bgs)

- **Well drilling and construction followed:**
  - ASTM D 5783 - Standard Guide for Use of Direct Rotary Drilling with Water-Based Drilling Fluid for Geoenvironmental Exploration and the Installation of Subsurface Water-Quality Monitoring Devices
  - ASTM D 6286 - Standard Guide for Selection of Drilling Methods for Environmental Site Characterization
- **MW construction materials consistent with WY Department of Environmental Quality (WYDEQ) Well Construction Standards**
  - Carbon steel casing
  - Stainless steel well screen
- **EPA installed submersible pumps near top of screened intervals to maximize recharge of formation water to well following purging**

EPAPAV0042639

United States Environmental Protection Agency

Phase V – MW02 Purging & Sampling

- EPA's RCRA Ground-Water Monitoring Technical Enforcement Guidance document (EPA, 1986) recommends that low yield wells be evacuated to the practical extent possible (but not into the screened interval to avoid cascading of water) and subsequently sampled when sufficient water is present to support analysis

- Approximately 2,014 L (1.0 BHV) of water were purged from MW02 over a period of 6 days prior to sample collection
  - 1st purge cycle – 16 April: 1,136 L
  - 2nd purge cycle – 18 April: 492 L
  - 3rd purge cycle – 20 April: 216 L
  - 4th purge cycle – 22 April: 170 L

  2,014 L

EPAPAV0042640

Phase V Sampling Overview

- USGS and State of Wyoming entered into a cooperative agreement to sample EPA deep monitoring wells
- USGS included EPA, State and Tribes on Technical Team to collaboratively develop the USGS Sampling and Analysis Plan (SAP)
- Pavillion Technical Team discussed sampling procedures and analytical methods and worked toward consensus on approaches

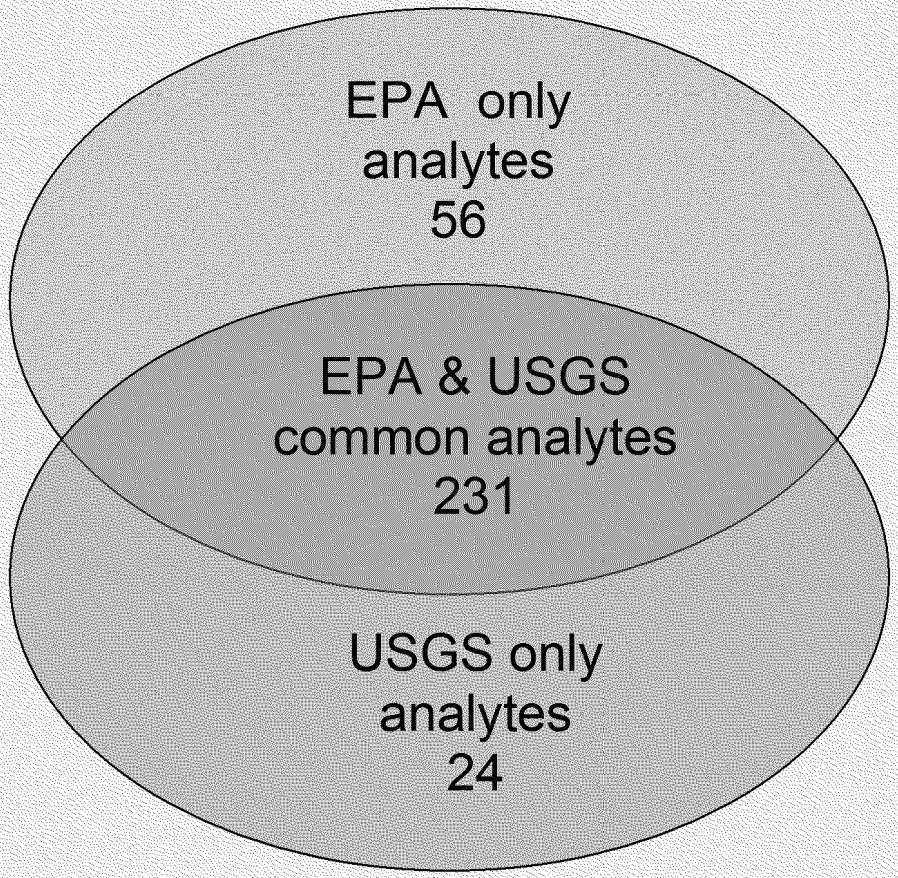
MW01

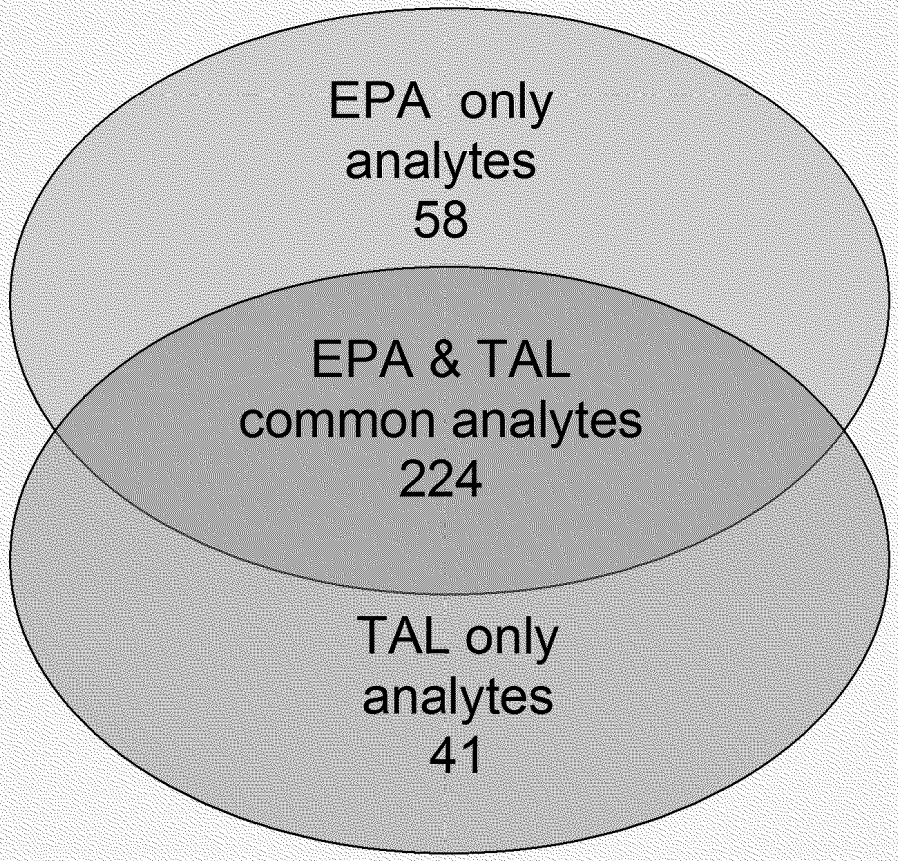
- The Technical Team agreed to sample after 1 BHV of purging and stabilization of field parameters
- An additional sample after 3 BHV of purging was added to the USGS SAP
- EPA collected a time series of 10 samples from 1 BHV to 3 BHV

MW02

- The Technical Team agreed that there was insufficient time to develop a consensus approach for sampling MW02
- EPA collected and sent replicate samples from MW02 to USGS contract

Phase V Summary





EPA only analyzed for low molecular weight organic acids, ethoxylated alcohols, and alkyl phenols
USGS only conducted age-dating of isotopes and radiometric measurements

Analytical methods were not identical and some quantitation limits differ, most notably for glycols

EPAPAV0042642

United States Environmental Protection Agency

Results Summary

MW01, EPA and USGS

-Similarity

-Detections

- Hydrocarbons, GRO/DRO, glycols, benzoic acid

MW02, EPA and Test America Lab

-Similarity

-Detections

- Hydrocarbons, GRO/DRO, glycols, benzoic acid, BTEX

EPA Results across Phases III/IV/V

EPAPAV0042643

United States
Environmental Protection
Agency

EPAPAV0042644