



EPA Hydraulic Fracturing Study

Industry's Perspective and Participation

AAEE Workshop, May 14, 2012

Outline

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- What is Hydraulic Fracturing?
- Introduction to the EPA HF Study
- Industry's Participation in the EPA HF Study
- Key Points
- Questions?

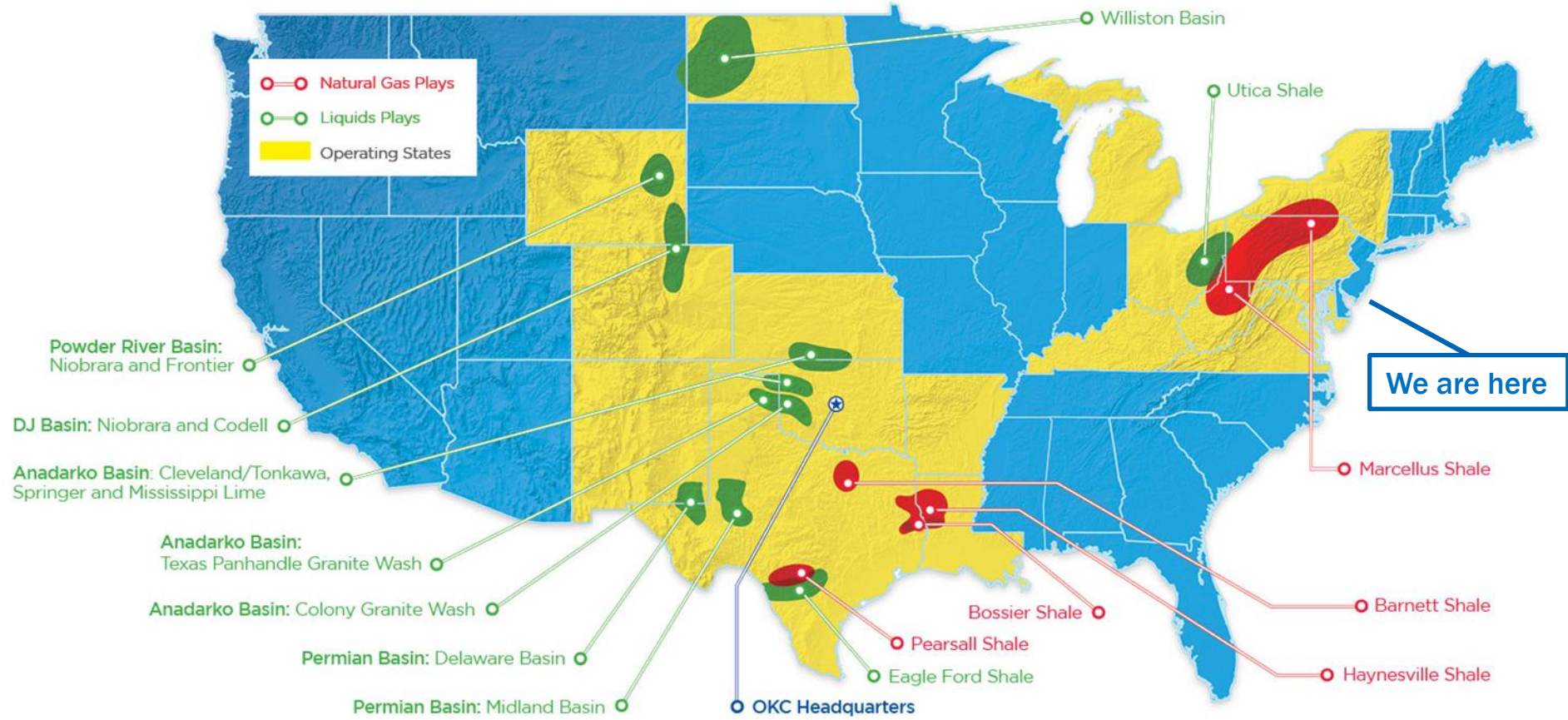
Chesapeake Energy Overview



Chesapeake Energy Overview

- **Second-largest producer of U.S. natural gas and a Top 15 producer of U.S. liquids**
- **Most active explorer for natural gas and liquids with 157 active U.S. drilling rigs as of April 2012**
- **Employ over 13,200 people in 17 states**
- **Applying unconventional thinking and state-of-the art technologies, Chesapeake has grown from a \$50,000 startup in 1989 to a \$30 billion enterprise**
- **Chesapeake is leading the industry effort to reduce American dependence on high-cost foreign oil and on higher emitting fuels through the greater use of natural gas in transportation and electric generation**

Chesapeake Energy Overview





Commitment to Environmental Excellence



- Chesapeake is committed to promoting and conducting responsible exploration and production activities.
- Our goal is to reduce our country's dependence on expensive foreign oil and carbon-heavy coal, and transition to clean-burning natural gas through the use of industry-leading operational practices and continuous technological innovation and improvement.
- We strive to integrate the following core values into all decisions affecting our operations and seek the same from our employees, contractors, suppliers and vendors.
 - › Business Philosophy
 - › Operational Excellence
 - › Commitment of Resources
 - › Continuous Improvement
 - › Support of Industry Regulations
 - › Community Focus

What is Hydraulic Fracturing?



Hydraulic Fracturing

What is Hydraulic Fracturing?

- Not FracKing!
- Not Site Preparation and Construction
- Not Drilling
- Not Production
- Not Salt Water Disposal Wells
- Not Pipelines
- EPA HF Study Plan¹
 - › “The process of using high pressure to pump fluid, often carrying proppants into subsurface rock formations in order to improve flow into a wellbore.”

1. EPA's Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Nov. 2011).

Introduction to the EPA Hydraulic Fracturing Study

(FROM INDUSTRY'S PERSPECTIVE)



Congressional Request

- **US House Appropriation Conference Committee**
 - › Study the relationship between hydraulic fracturing and drinking water
 - › Credible approach relying on the best available science
 - › Independent source of information
 - › Transparent, peer-reviewed process
 - › Consult with other Federal, State and interstate
 - › Rigorous quality assurance procedures

Stated Purpose of EPA's Study

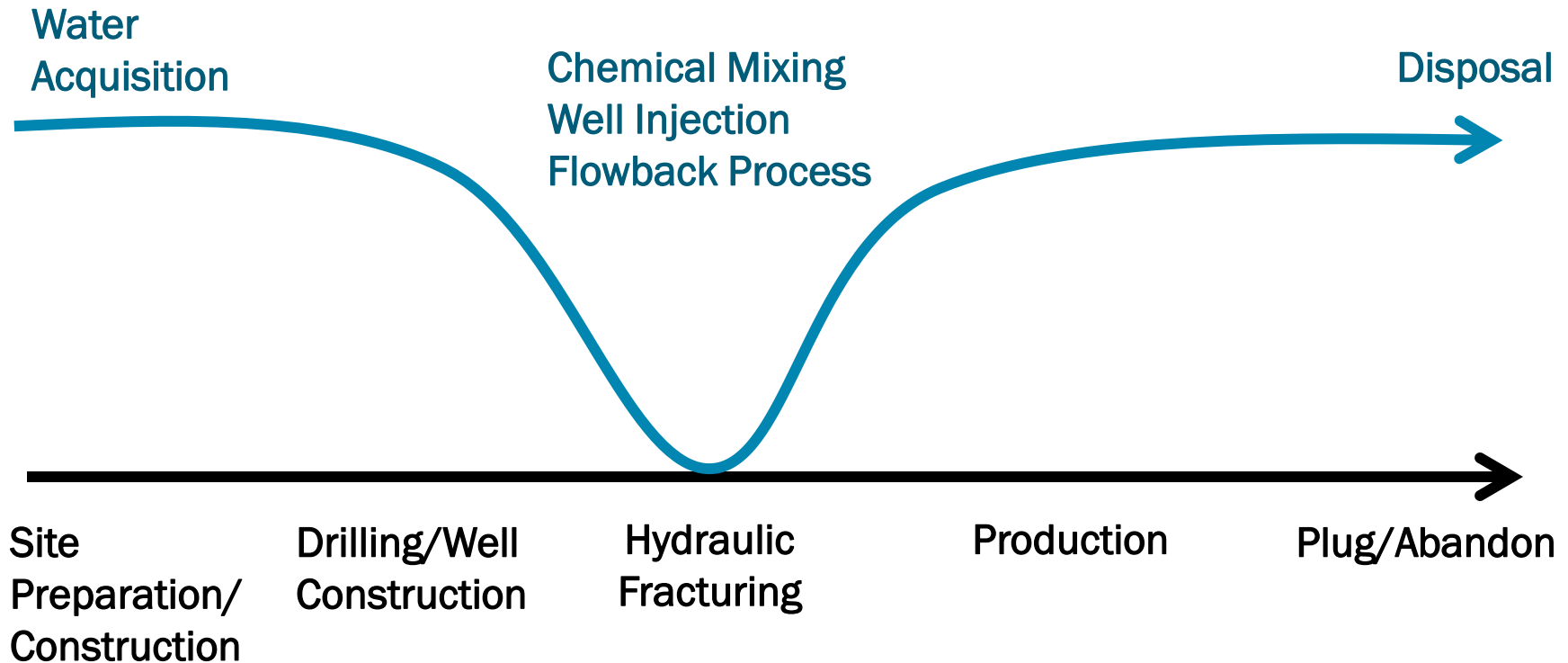
- To assess whether hydraulic fracturing can impact drinking water resources
- To identify driving factors that affect the severity and frequency of any impacts

EPA's study plan focuses on the water cycle in hydraulic fracturing

Hydraulic Fracturing Water Cycle vs. Production Well Lifecycle



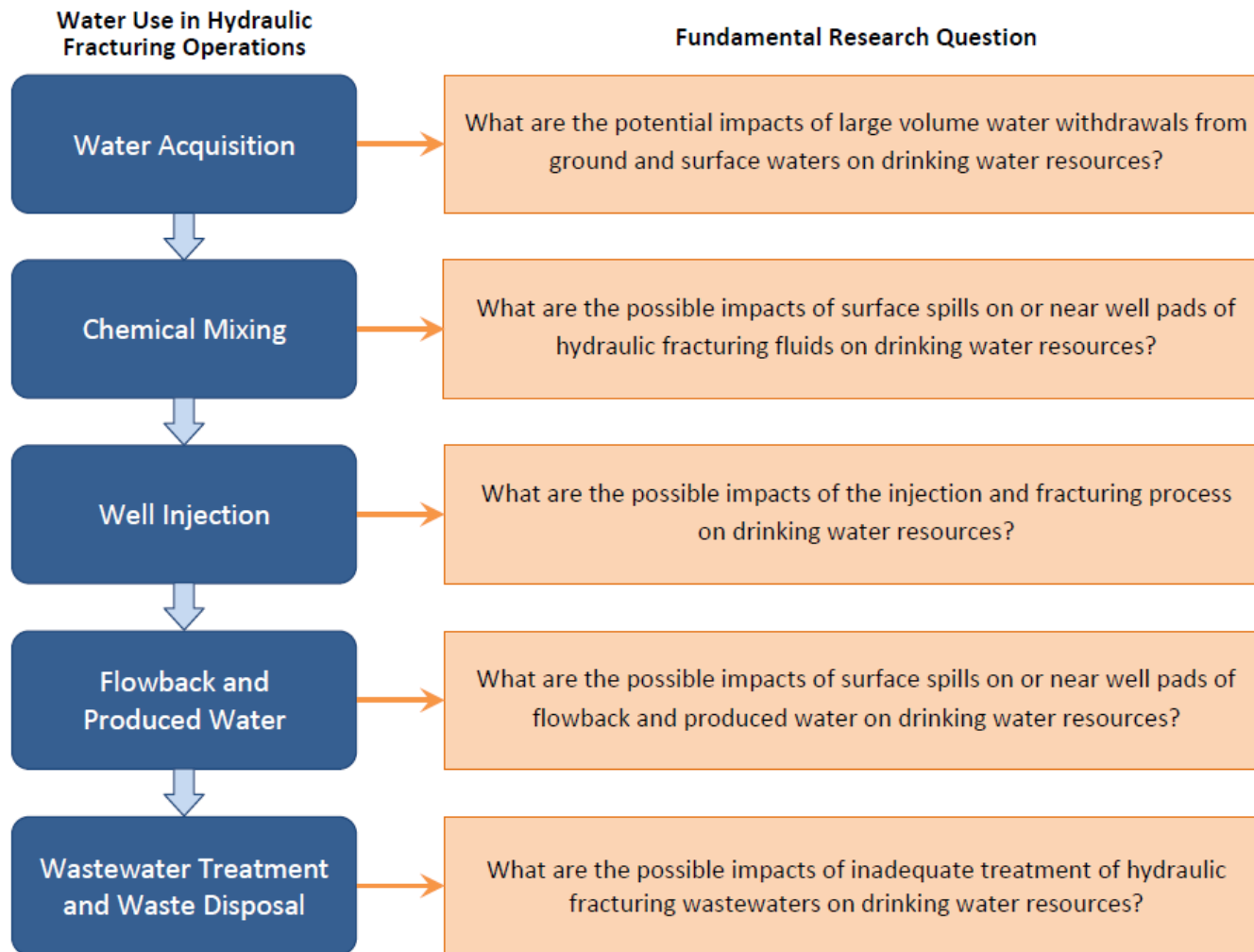
HF Water Lifecycle



Production Well Lifecycle



EPA Fundamental Research Questions



1. EPA's Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources (Nov. 2011).

Research Approach

- **Analysis of Existing Data**
 - › Peer Reviewed Literature
 - › Service Company & Operator Data
- **Case Studies**
 - › Retrospective Studies
 - › Prospective Studies
- **Environmental Justice**
- **Scenario Evaluations**
 - › Surface Water Transport
 - › Water Use
- **Laboratory Studies**
 - › Disinfection by products
 - › Activated Sludge Process
 - Fate and Transport
- **Toxicity Assessments**

EPA's Scientific Integrity Process

- **EPA Quality Policy and Procedures**

- › Quality Management Plan (QMP)
- › Data Quality Objectives (DQO)
- › Quality Assurance Project Plan (QAPP)

- **Peer Review**

- › Science Advisory Board (SAB)
- › Office of Management and Budget (OMB) Requirements

- **Transparency**

- › Stakeholder Engagement
- › Website

Study Chronology

- › 10/2009 Congress Requested Study
- › 3/2010 EPA Scoping Document
- › 5/2010 SAB Review of Scoping Document
- › Summer 2010 Stakeholder Meetings
- › 9/2010 EPA Service Company RFI
- › 2/2011 EPA Draft Study Plan Released
- › 3/2011 Technical Workshops
- › Summer 2011 SAB Review of Draft Study Plan & Field Sample Began
- › 8/2011 EPA Operators RFI Letter
- › 10/2011 State and Industry Stakeholder Letters
- › 11/2011 EPA Final Study Plan Released
- › 2/2012 EPA Update Webinar

2012 Initial Report
2014 Final Report

EPA's HF Study Challenges

- **Public Perception**
 - › Conflict of interest concerns
- **Schedule**
 - › Start date has changes but deliverables/schedule have not
- **Resources**
 - › What level resources does it take to conduct a highly influential scientific assessment?
- **Management of Change**
- **Track Record**
 - › Pavillion, Dimock, and Parker Co, TX

Industry Participation



Industry Comments on Study

■ Commenting Methods

- › Stakeholder Engagements
- › SAB Peer Review
- › Letters

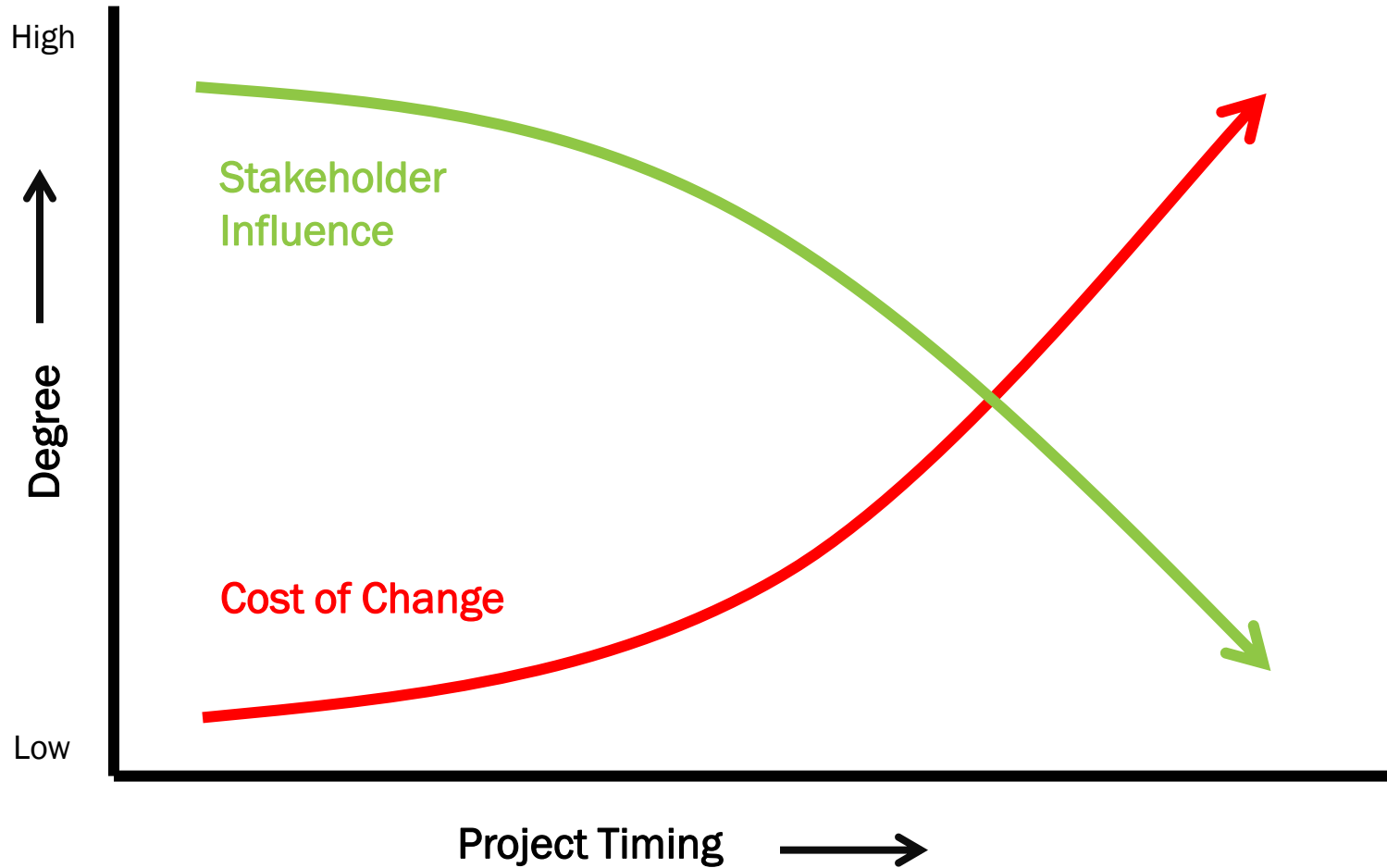
■ Major Comment Themes

- › Collaboration
- › Sound Science
- › Study Bias
- › Study Methodology
- › Appropriate Context

CHK submitted 47 comments during the Draft Study Plan peer review process. When comments were compared to the Final Study Plan;

- 6 were addressed
- 8 were partially addressed
- **33 were not address**

Timing of Comments



EPA Technical Workshops

Chemical & Analytical Methods

- Fracture Fluid Chemistry
- Fingerprinting
- Field and Analytical Challenges

Well Construction & Operation

- Well Construction
- Fracture Design and Stimulation
- Well Integrity

Fate & Transport

- Contaminant ID, Transformation & Transport
- Impact on Natural Transport System
- Modeling

Water Resource Management

- Water Use & Sustainability
- Flowback Recovery & Water Reuse
- Disposal Practices

EPA Technical Workshops

CHK Presentations



- **Chemical & Analytical Methods (Feb 24-25, 2011)**
 - › *High Rate HF in Non-Marcellus Unconventional Shale, Rick McCurdy*
 - › *Produced Water Sampling Results in Shale Plays, Nancy Coleman*

- **Well Construction & Operations (March 10-11, 2011)**
 - › *Fracture Design in Horizontal Shale Wells – Data Gathering to Implementation, Tim Beard*

EPA Technical Workshops

CHK Presentations



- **Fate & Transport (March 28-29, 2011)**
 - › *Comparison of Hydraulic Fracture Fluid Composition with Produced Formation Water Quality Following Fracturing: Implications for Fate and Transport, Debra McElreath*
 - › *Role of Induced and Natural Imbibitions in Fracturing Fluid Transport and Fate in Gas Shales, Alan Byrnes*

- **Water Resources Management (March 29-30, 2011)**
 - › *Produced Water Reuse and Recycling Challenges and Opportunities Across Major Shale Plays, Matthew Mantell*
 - › *Underground Injection Wells for Produced Water Disposal, Rick McCurdy*

Retrospect Study Participation

- **Critical review of retrospective study methodology**
- **Sampling locations selection and access**
- **Stakeholder “split” sampling**
 - › Third party sampling contractor
 - › Third party certified analytical laboratories
- **Evaluation of results**
 - › Independent evaluation by licensed professional geologist(s) and engineer(s).
- **Peer reviewed publications**

Prospective Study Participation

- **Participating Operators**
 - › Chesapeake Energy
 - › Range Resources
- **Prospective study design**
- **Parallel sampling activities**
- **Independent analytical results**
- **Independent evaluation of analytical results**
- **Peer reviewed publications**

Industry Related Research

- **CHK continues to pursue sound science through research. Topics of interest related to EPA's HF Study include:**
 - › Background water quality
 - › Natural variation in groundwater quality
 - › Analytical challenges and procedure development
 - › Isotopic analysis and investigation of methane
 - › Environmental Justice
 - › Critical review of HF related research

- **API/ANGA EPA Hydraulic Fracturing Study Work Group (Contracted Battelle)**

Key Points

- › Industry supports the EPA's, and others, efforts to conduct an unbiased study based on good science.
- › Industry encourages the EPA to maintain stakeholder consultation/collaboration, and processes that are transparent and peer-reviewed.
- › Industry has been actively engaged since Congress identified the need for a focused study on hydraulic fracturing, and will continue to participate in the Study.
- › Industry has and will continue to conduct research on topics related to the relationship, if any, between hydraulic fracturing and drinking water.

Questions?

