



Colorado Environmental Health Association
1000 North Lincoln Avenue
Denver, Colorado 80202

Jeffrey L. Stoll, MPH
Public Health & Environment Consulting, LLC

Oil and Gas Development Overview

Colorado Environmental Health Association

Annual Education Conference

Steamboat Springs, Colorado

September 24 – 26, 2014

Objectives

- Familiarize with the lifecycle of an oil or natural gas well and timeline
- Familiarize with the regulations and the roles of state agencies in assuring the responsible development of oil and gas.
- Familiarize with research
- Familiarize with perspectives on oil and gas development

Life Cycle of an Oil Well

Objective: Familiarizing with the steps in the lifecycle of an oil or natural gas well and the timeline.



Life Cycle of an Oil Well

Human Life Cycle

- Birth (40 weeks)
- Infancy (1 year)
- Childhood (10 years)
- Adolescence (6 – 8 years)
- Adulthood (55 – 65 years)

Oil Well Life Cycle

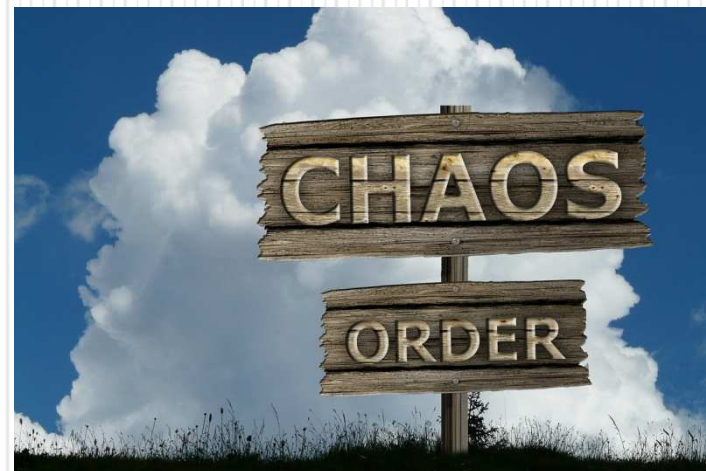
- Site Preparation (7 – 14 days)
- Drilling (3 – 15 days)
- Hauling (30 – 45 days)
- Fracking (3-5 days)
- Production & Reclamation (30 – 40 years)

Fracking Up Close in 45 seconds



Regulatory Roles

Objective: Familiarize with the regulations and the roles of state and local agencies in assuring the responsible development of oil and gas.



Roles

- Primary - Colorado Oil and Gas Conservation Commission (COGCC)
- Limited - Colorado Department of Public Health & Environment (CDPHE)

Protecting Water Quality

COGCC

- Oversees groundwater discharges and sampling programs
- Protects public water supply stream segments
- Establishes pit lining requirements,
- Manages produced water disposal and treatment
- Regulates stormwater protection
- Investigates spills and releases to groundwater

CDPHE

- Adopts water quality standards and classifications
- Issues surface water discharge permits, stormwater construction permits
- Investigates spills and releases to surface water, including those that apply and/or result from oil and gas development

Managing Wastes

COGCC

- Permitting,
- Construction and operation of pits,
- Methods used to dispose of E&P waste,
- Spill and release response,
- Contaminant levels and sampling requirements for soil and groundwater;
- Site investigation, remediation and closure;
- Sediment and tank bottom pit management requirements;
- Centralized E&P Waste Management Facilities;
- Venting and flaring natural gas requirements.
- Additional site-specific requirements

CDPHE

- Commercial Centralized E&P Waste Management Facilities
- Non-exempt solid wastes.
- Exempt E&P waste disposed of at a commercial solid waste facility

Protecting Air Quality

COGCC

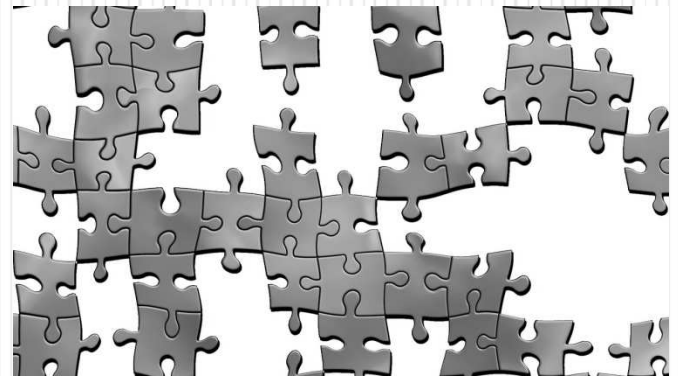
- Assure facilities control odors and dust
- Assure operators control emissions from equipment
- Require Green Completions statewide

CDPHE

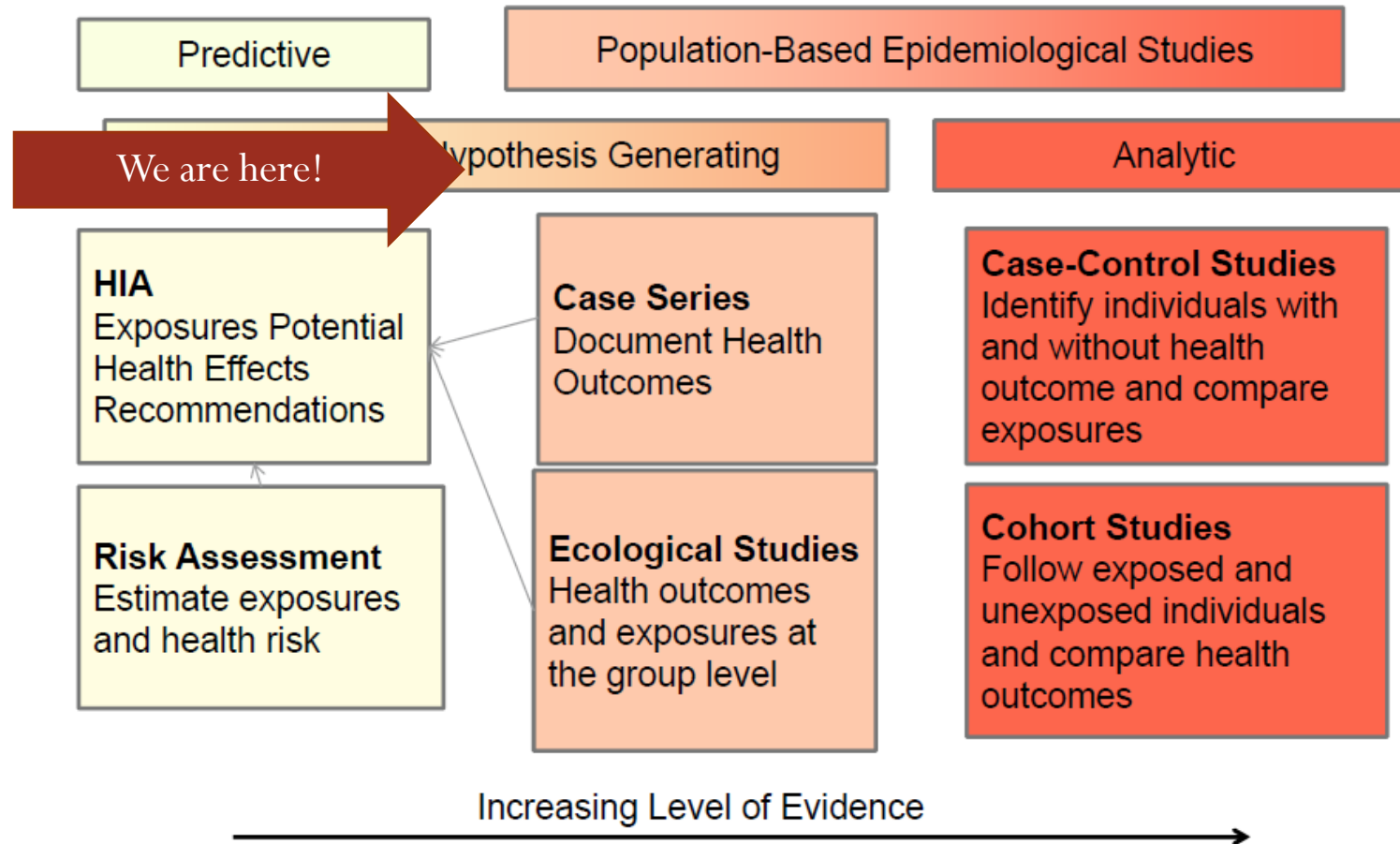
- Requires an Air Pollutant Emission Notice (APEN) for tanks
- Requires an APCD permit for facilities that have the potential to emit high levels of volatile organic compounds (VOCs)

Research

Objective: Familiarize with research



What Do We Know?



Air Quality

Literature Take-Aways



- **Shale gas activities have not resulted in VOC levels that pose a health concern (Texas).** (*A.G. Bunch, C.S. Perry, L. Abraham, D.S. Wikoff, J.A. Tachovsky, J.G. Hixon, J.D. Urban, M.A. Harris, L.C. Haws; Science of The Total Environment, Volumes 468-469; pages 832-842, 1/15/2014*)
- **Health effects from air emissions during development of UNG are more likely to occur in residents living close to well pads** (*Lisa McKenzie, Colorado School of Public Health, Science of the Total Environment; Human health risk assessment of air emissions from development of unconventional natural gas resources, 3/22/2012*)
- **The harm to people's health from breathing ambient air in Garfield County cannot be determined.** (*Summary of Colorado Public Health Studies 2005-2012 (compiled by Kent Kuster, Oil and Gas Liaison, CDPHE); Garfield County Health Consultation prepared by CDPHE in Cooperation with ATSDR 2010 (Principal Investigator Raj Goyal), 1/1/2012*)
- **Risk prevention efforts should be directed towards reducing air emission exposures for persons living and working near wells during well completions.** (*Summary of Colorado Public Health Studies 2005-2012 (compiled by Kent Kuster, Oil and Gas Liaison, CDPHE); Human Health Risk Assessment of Air Emissions from Development of Unconventional Natural Gas Resources – Colorado School of Public Health 2012., 1/1/2012*)
- **Emissions associated with hydraulic fracturing are within standards set by the air quality regulations** according to a study of the Inglewood Oil Field in Los Angeles County, California. (*Prepared by Cardno ENTRIX for Plains Exploration & Production Company and Los Angeles County, Department of Regional Planning; Hydraulic Fracturing Study: PXP Inglewood Oil Field, 10/10/2012*)

Water Quality

Literature Take-Aways



- **Study of well integrity in Los Angeles County, California show no effect from hydraulic fracturing. (Los Angeles County).** *(Prepared by Cardno ENTRIX for Plains Exploration & Production Company and Los Angeles County, Department of Regional Planning; Hydraulic Fracturing Study: PXP Inglewood Oil Field, 10/10/2012) -- Water quality-31*
- **According to before and after monitoring, no impact on groundwater quality was detected due to hydraulic fracturing . (Los Angeles County).** *(Prepared by Cardno ENTRIX for Plains Exploration & Production Company and Los Angeles County, Department of Regional Planning; Hydraulic Fracturing Study: PXP Inglewood Oil Field, 10/10/2012) -- Water quality-30*

Health

Literature Take-Aways



- **Increased risk of childhood cancer near HF facilities is not supported by research** (*Journal of Occupational and Environmental Medicine, Volume 55, Number 7; Childhood Cancer Incidence in Pennsylvania Counties in Relation to Living in Counties With Hydraulic Fracturing Sites, 7/1/2013*)
- **The health of people in Garfield County is not different from the health of residents in other Western slope counties.** (*Summary of Colorado Public Health Studies 2005-2012 (compiled by Kent Kuster, Oil and Gas Liaison, CDPHE); Community Health Risk Analysis of Oil and Gas Industry Impacts in Garfield County, 2008 – Teresa Coons and Russell Walker, 1/1/2012*)
- **We cannot say conclusively that negative health trends are directly related to natural gas industry activities.** (*Summary of Colorado Public Health Studies 2005-2012 (compiled by Kent Kuster, Oil and Gas Liaison, CDPHE); Community Health Risk Analysis of Oil and Gas Industry Impacts in Garfield County, 2008 – Teresa Coons and Russell Walker, 1/1/2012*)
- **There is limited data linking hazards with human exposure.** (*University of Michigan; Public Health Technical Report: Hydraulic Fracturing in the State of Michigan, 9/3/2013*) -- Health-39
- **Better information is needed in order to make complete and accurate evaluation to threats to human health.** (*Summary of Colorado Public Health Studies 2005-2012 (compiled by Kent Kuster, Oil and Gas Liaison, CDPHE); Community Health Risk Analysis of Oil and Gas Industry Impacts in Garfield County, 2008 – Teresa Coons and Russell Walker, 1/1/2012*)
- **There is an association between increased clinic visits and increases in ground-level ozone levels.** (Sublette County, Wyoming) (*Thomas O. Forslund; State of Wyoming Department of Health, 3/1/2013*)

Occupational

Literature Take-Aways



- **There are possible workplace hazards** (*University of Michigan; Public Health Technical Report: Hydraulic Fracturing in the State of Michigan, 9/3/2013*)
- **Motor vehicle crashes are the leading cause of work-related fatality in the oil and gas industry** (*Kyla D. Retzer , Ryan D. Hill, Stephanie G. Pratt (National Institute for Occupational Safety and Health, Oil and Gas Extraction Safety and Health Program); Accident Analysis and Prevention Journal, 11/1/2012*)
- **An occupational health hazard was determined to exist for workplace exposures to crystalline silica.** (*Eric J. Esswein, Michael Breitenstein, John Snawder, Max Kiefer, and W. Karl Sieber; Journal of Occupational and Environmental Hygiene, 10: 347–356, 7/1/2013*)
- **A small number of cases of "take home" lead exposure in children of oil field workers has been documented.** (*Oklahoma*) (*Fahad Khan, MPH; The Journal of the Oklahoma State Medical Association, 6/1/2011*)

Community

Literature Take-Aways



- **Noise and vibration associated with high-volume hydraulic fracturing are within the limits of community standards --** Angeles County, California. *(Prepared by Cardno ENTRIX for Plains Exploration & Production Company and Los Angeles County, Department of Regional Planning; Hydraulic Fracturing Study: PXP Inglewood Oil Field, 10/10/2012)*
- **There are possible public health benefits as well as occupational, environmental and community hazards that exist.** *(University of Michigan; Public Health Technical Report: Hydraulic Fracturing in the State of Michigan, 9/3/2013)*
- **Hydraulic fracturing does not create or contribute to abnormal health risks in the community.** (Los Angeles County). *(Prepared by Cardno ENTRIX for Plains Exploration & Production Company and Los Angeles County, Department of Regional Planning; Hydraulic Fracturing Study: PXP Inglewood Oil Field, 10/10/2012)*

Local Public Health Perspectives

Objective: Familiarize with perspectives
on oil and gas development

LPHAs: expectations, roles & needs

From Jim Rada's presentation at the Oil and Gas Symposium, June 29, 2014

Community Expectations of LPHAs

Expectations

- LPHAs will protect us
- LPHAs will be experts

Reality

- Questions/confusion over authority
- Often limited structure and capacity
- Expertise may be lacking
- Limited time and resources to help constituents understand topics like exposure, risk, study results

LPHA Roles

- Become or collaborate with the Local Government Designee
- Land use reviews
- Complaint response
- Spill response
- Local regulation development
- State regulation development and advocacy
- Monitoring
- Scientific research

LPHA Needs

- Local public health at the policy table
- More pre-planning of O&G developments with health in mind
- Continued research on human health impacts and collection of environmental data
- Collaborative leadership that will continue to take a unified stance on conducting/funding good scientific public health and environmental research
- Ongoing strong outreach and education to the general public
- Trust and respect; continued collaboration

More from local public health

Local Perspectives

- "Some individuals are concerned about the impact on pristine forest environment."
- "Such "intensively engineered" activity--piercing aquifers and extending horizontally for miles--intuitively suggests the possibility for impacts on the environment even into the future."
- "County staff have been directed to oppose oil and gas development in our county."
- "It is important to get good information out to the public because the information they get through the media now is biased and sensational."
- "I have lived in an oil-producing county all my life and worked with environmental health for decades and I don't understand what the big deal is."

Regulation

Local Perspectives

- "I am very impressed with the COGCC's regulatory improvements in the past decade. Their regulatory framework has become much more environmentally relevant."
- "We support the statewide regulatory framework and feel there is sufficient local means to collaborate with industry without need for moratoriums or bans."
- "Our county's special use permitting process is very effective in providing local assurance that issues can and are addressed."
- "Our concern is that the permitting process should consider the accumulative long-term effects of multiple wells regionally."
- "The county has never had any authority to regulate industry locally and yet the state regulation has been effective to address concerns as they've developed over the years."

Economy

Local Perspectives

- "The local economy is highly dependent on oil and gas development and without it, agriculture could not survive in our county."
- "Agriculture would die without the stabilizing affect oil and gas has on our local economy."
- "Oil and gas is essential to the quality of life that allows families to have health insurance and access to care."
- "Our county is planning for future oil and gas development."

Resources

- [Coloradans for Responsible Energy Development](#)
- [Colorado Oil and Gas Conservation Commission](#)
- [Studyfracking.com](#)
- [CDPHE Oil and Gas Consultation Program](#)
- [CDPHE Requirements](#)
- [Oil and Gas Development Symposium by Colorado School of Public Health \(Videos\)](#)
- jeff@jeffstollconsulting.com

Questions?