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### SLIDES: Unconventional Gas and Oil – Potential Air Emissions

John Imse

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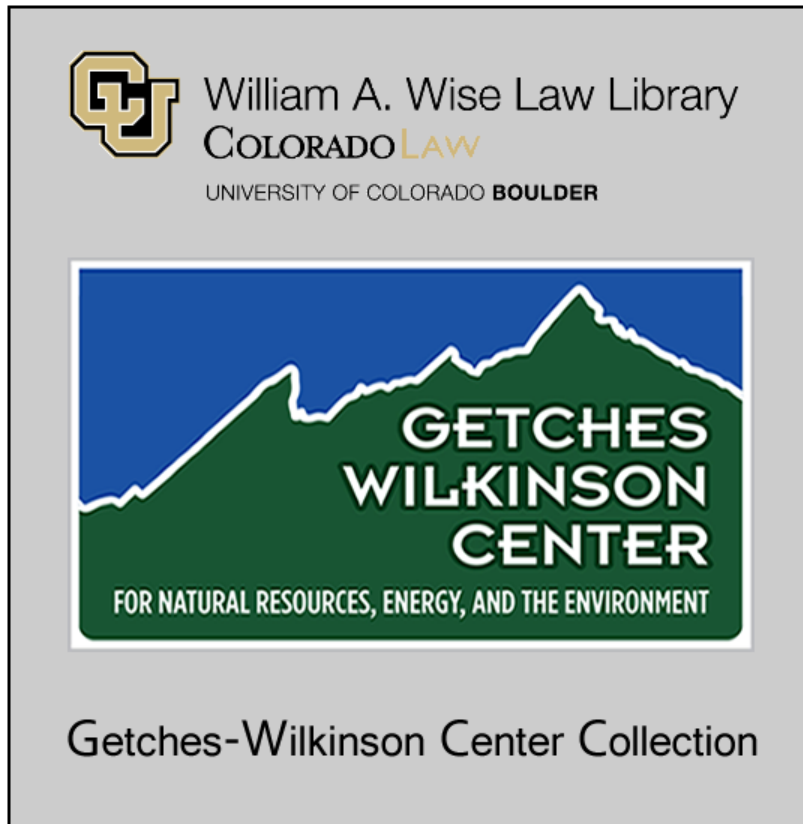
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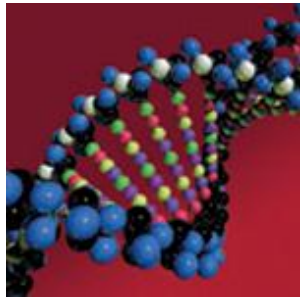
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# Unconventional Gas and Oil – Potential Air Emissions

CU Natural Resources Law Center – Denver, Co

January 27, 2012





# What Makes Tight Oil & Gas “Unconventional”?

- In a conventional play (oil or gas) you typically have 3 separate features:
  - Source rock/material
  - Reservoir Interval
  - Trap
- In a Tight Formation Play the shale interval is:
  - Source Rock
  - Reservoir
  - Trap

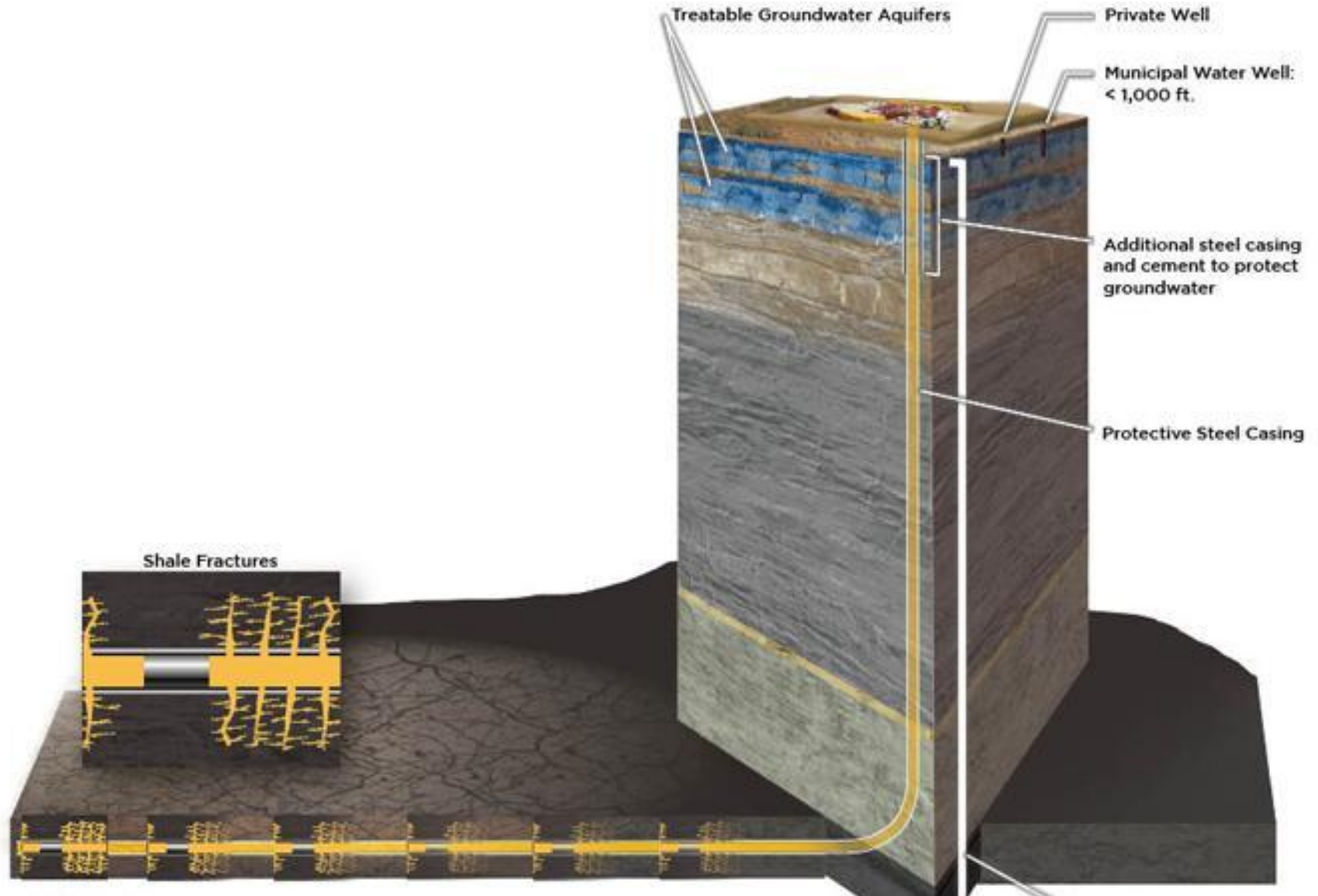


# Advances in Directional Drilling Key

- Pairing Directional Drilling with Hydraulic Fracturing allows for tapping the source rock while creating the reservoir interval.
- Directional and horizontal drilling techniques enable tapping relatively thin units along a horizontal well bore that may exceed 5000 feet. Current longest horizontal footprint in Marcellus 9663 feet (~1.8 miles)
- Technology enables multiple horizontal wells drilled/developed from a single pad location – 4 to 8 wells from a single drilling pad not uncommon.
- Each well may have from a few as 4 to as many as 20 fracturing intervals.

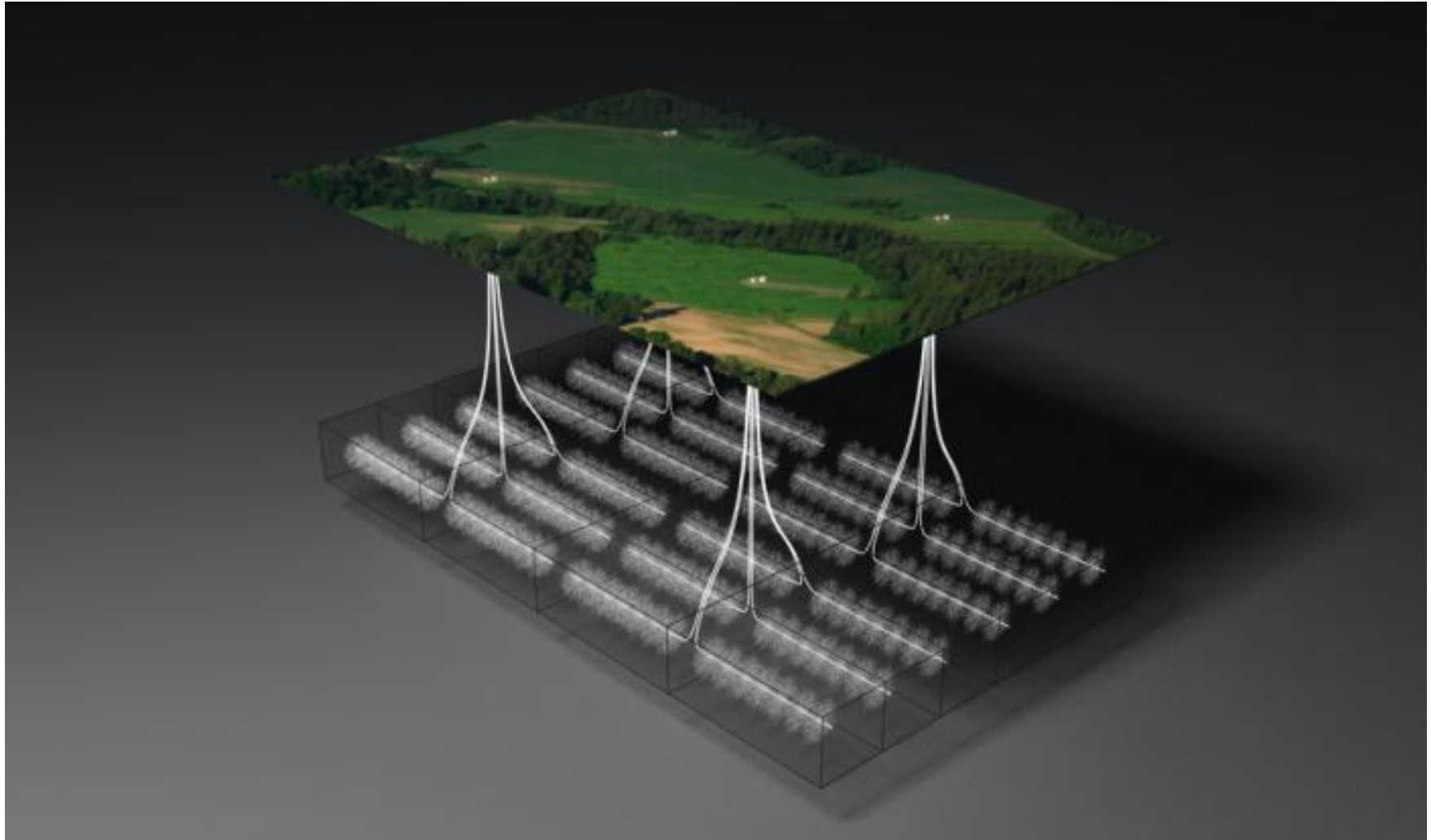


# Example Horizontal Well





# Multi-Well Pad Coverage







# Potential Airborne Releases

- Drilling and Development
  - Relatively short term from exposure perspective
  - Keep in mind – neighbors have different perspective
- Production
  - Longer term



# Site Development

- Potential significant increase in truck and equipment traffic/operations
- Potential increase in dust as well as engine exhaust





# Hydraulic Fracturing

- Vehicle exhaust
- Fugitive emissions
  - operational equipment
  - methane
  - “wet gas” components





# Well Completions

- Traditional configurations receiving greater scrutiny as potential significant sources for fugitive release of methane
- USEPA released proposed NSPS in July to require “green completions” – capture/flaring of the methane emissions
- CO and WY have regs in place – many companies consider this SOP

