Do VOCs from UOGD result in exposures to Coloradoans living nearby at levels that may be harmful to their health?
Health Symptoms Reported to OGHIR

• 300+ health complaints

• 80% of symptoms coincided with odors during drilling

• Most complaints are localized in communities where new UOGD is occurring.
OGHIR Questions

1. What UOGD related VOCs are present in communities near UOGD operations?

2. What VOCs are driving risk and/or reported health symptoms?

3. What exposure durations are driving risk and/or reported health symptoms?
• 4 exposure investigations with mobile lab
• Multiple single samples
• ~1200 hours of continuous air sampling
Take Home

- Limited set of high priority VOCs

- Flowback > Drilling > Hydraulic Fracturing

- Acute health risks from intermittent, infrequent peak air concentrations
• Multiple grab samples during odor events

• Mobile lab 1,000 feet downwind of wellpad
Colorado Air Monitoring Mobile Lab (CAMML)

- 64 UOGD related VOCs
- Meterology
- Drilling, Hydraulic Fracturing and Flowback
- 55 days
- 900 hours
Screening Level Risk Assessment

Hydraulic Fracturing

MAX ➔ ACUTE (Short-term)

AVERAGE ➔ CHRONIC (long-term)
Chronic Hazard Index by Operation Type

Substance:
- benzene
- isoprene
- m,p-xylene
- methyl-cyclopentadiene
- n-hexane

Operations:
- Flowback_C
- Drilling_C
- Fracking_C
Benzene Cancer Risk Estimates

Flowback  Drilling  Hydraulic Fracturing

Risk Estimate

$1.00e^{-04}$

$1.00e^{-05}$

$1.00e^{-06}$
Summary of Exposure Investigations

• All 64 VOCs are consistently below health guideline values

• Flowback > Drilling > Hydraulic Fracturing

• Benzene is a high priority VOC

• Intermittent peak exposures that could lead to acute health risks
Probabilistic Health Risk Assessment
HEI Charge Questions
What exposure pathways and phases of UOGD should be the focus?

• Air

• Completion activities
What potential UOGD exposures are not well understood with existing data and merit original research?

- Acute, intermittent peak exposures
- Measurements in time-frames relevant to conducting risk assessments
- Limited set of VOCs (Benzene)
- Wellpad size
- Distance
What is the value of the research for decision-makers?

[Image: A Venn diagram showing the overlap between Risk Assessment and Risk Management, with subtopics such as Dose-Response Assessment, Hazard Identification, Exposure Assessment, Risk Characterization, Control decision, Determine acceptable risk level, Control alternatives, and Feedback.]

https://toxtutor.nlm.nih.gov/06-004.html