PUBLIC AND WORKER HEALTH

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General Issues Related to Health

• Public Health
  – Popular press and scientific literature reflect broad range of health concerns among people living near OGD
  – Well-designed near-term and long-term studies that incorporate high-quality measures of exposure and appropriate comparison groups are needed

• Worker Health
  – Workers have the greatest opportunity for exposures
  – Personal protective equipment and safety measures mitigate exposures, but intensive and rapidly changing OGD work environments warrant ongoing safety and health research
  – Studies of workers may identify hazards with potentially broader implications
Important Considerations

• Questions apply regionally, nationally, and beyond
• No single study or design will answer all questions
  – Multiple designs/approaches appropriate
  – Multiple outcomes – guided by community concerns and other relevant literature
• Important to determine if and to what extent individuals are exposed to stressors from OGD, but can’t wait for well developed individual-level exposure measures
  – Establish potential for health risks from specific OGD activities or exposures
  – Set the stage for future more definitive studies
  – Create opportunities to incorporate exposure metrics as developed
Cross-Cutting Challenges

• Studies must be able to distinguish between effects due to OGD and effects from other exposures or population characteristics
• Characteristics of communities influence real or perceived health outcomes
• People differ in their degree of exposure and susceptibility (vulnerable populations)
• Temporal and spatial variation in OGD operations may influence exposures and outcomes
• OGD may bring benefits that have positive impact on health or health care access
Public Health – Near-term Studies

Research Questions

• Are there demonstrable increases in symptom reporting, illnesses, doctor visits, accidents, or hospitalizations among community members living near OGD?

• Are any such indicators of adverse health effects attributable, singly or in combination, to specific chemical, physical, or sensory stressors associated with OGD?

Relationship to ongoing research: Expand and improve on past studies (e.g., McKenzie et al 2014, Stacy et al 2015, Jemielita et al 2015)

– Different and more specific exposure metrics
– New approaches to systematic outcome assessment
– Appropriate comparison groups
Public Health – Near-term Studies
Research Goals and Examples of Research Activities

• **Goals:** Determine, through systematic research, if individuals exposed to OGD are at increased risk for adverse health effects
  – What types of stressors contribute to observed effects
  – What exposures and effects require additional study

• **Example activities:**
  – Characterize communities before and after (or with and without) OGD
    • Population-based surveys or case-control studies
    • Record linkage, surveillance
    • Physiologic measurements and biomarkers of effect
  – Characterize exposures associated with “proximity”
Public Health – Air Exposure
Research Questions

• Are there adverse health effects associated with measureable OGD-related exposures in air, including unusually high local or regional short-term exposures?

Cross-cutting challenges:
- Distinguishing effects of OGD-linked exposures from effects of background exposures.
- Characterizing effects of local and short-term variations in exposure.
- Accounting for other factors that impact health outcomes typically linked to air pollution

Relationship to ongoing research:
- McKenzie et al. (2012) estimated health risks from air concentration data
- Few or no published human health studies specific to air exposures
Public Health – Air Exposure
Research Goals and Examples of Research Activities

• **Goals:** Conduct health research focused on the impact of regional and local variations in exposures to airborne stressors that can be attributed to OGD

• **Example activities:**
  – Studies with local or individual exposure monitoring
  – Linkage to medical records, surveillance
  – Measurement of changes in lung function or biomarkers over time or between exposed and unexposed communities
  – Studies of outcomes previously linked to air pollutants
  – GIS-based morbidity and mortality studies of any signature pollutants
  – Studies of vulnerable populations
Public Health – Drinking Water Exposure
Research Questions

• Are there adverse health effects associated with measurable OGD-related exposures in drinking water?

Cross-cutting challenges:
– Distinguishing effects of OGD-linked exposures from effects of background exposures
– Characterizing impacts from infrequent but high exposures associated with instances where safeguards fail and lead to impacts on drinking water quality
– Characterizing individual level exposures

Relationship to ongoing research:
– Research on potential exposures (e.g., Llewellyn et al. 2015)
– Few or no published human health studies specific to drinking water exposures
Public Health – Drinking Water Exposure
Research Goals and Examples of Research Activities

• **Goals:** Characterize individual-level exposures to OGD-related stressors in drinking water and determine whether such exposures are associated with specific health outcomes.

• **Example activities:**
  – Determine household-level exposures before and after initiation of OGD (or in exposed and control populations)
  – Develop and validate individual level measures of exposure accounting for water consumption and behaviors
  – Population-based studies of varying designs/outcomes
  – GIS-based studies
  – Studies of changes in biological function
Worker Health – Chemical and Radiation Exposure

Research Questions

• Under what conditions and to what extent are OGD workers exposed to chemical or radioactive health stressors?

• Do these exposures lead to adverse health effects?

Cross-cutting challenges:
– Degree of exposure dependent on use of personal protective equipment (PPE) and other health and safety measures
– Exposures and practices may vary across worksites

Relationship to ongoing research:
– Some sources of potential acute (e.g. H₂S gas) or chronic toxicity (e.g. silica) associated with OGD known; others recently reported (e.g. VOCs)
– Not aware of worker health studies specific to OGD-related chemical or radiation exposures
Worker Health – Chemical and Radiation Exposure
Research Goals and Examples of Research Activities

• **Goals:** Characterize exposures and acute and/or chronic effects and, if necessary, identify techniques for mitigating exposures to OGD-related health stressors.

• **Example activities:**
  – Exposure monitoring
  – Biomonitoring of workers before and after employment; before and after shifts
  – Medical surveillance or cross-sectional studies including measurement of biomarkers or intermediate health endpoints
  – Prospective studies using record linkage or direct follow-up