

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

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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

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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”

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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

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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

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