

NRC Shale Gas Committee Workshop #1:
Extended Abstract to Proposed White Paper:
Public Health Risks of Shale Gas Development

by

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Abstract:

This review summarizes the existing literature on the human health risks associated with shale gas development in the United States. Using a public health approach, we examine the chemical and non-chemical stressors associated with high volume hydraulic fracturing, the technological advance that has led to the rapid increase in the development and recovery of shale gas resources. We explore potential health effects in workers and communities, existing quantitative health risk estimates, and the perceived risks from development. We also identify major uncertainties to address when prioritizing research needed to inform the cumulative risk estimation process.

Worker and Community Stressors: Major stressors to workers range from known occupational hazards (e.g., traffic accidents, worksite injury) to hazardous chemical (e.g., benzene) or physical agent (e.g., silica) exposures. As shale gas operations encroach on residential areas there is increasing potential for community exposure to the stressors associated with well development, production and related ancillary infrastructure and activities associated with natural gas development. When viewed as a whole the major stressors for both the working and community populations fall into eight major categories: air emissions, ground and surface water contamination, truck traffic; noise and light pollution; accidents and malfunctions; strain on health care systems, psycho-social stress associated with community change, and loss of property values.

Health Effects: These stressors are associated with both short and long-term health risks in both worker and community populations. In worker populations the most serious risks are job-related mortality from worksite or traffic accidents. Based on existing data from conventional hydrocarbon development industries the principal chronic morbidity concerns for shale gas workers are thought to be silicosis and cancers associated with hydrocarbon exposures (e.g., leukemia) as well as respiratory and dermal diseases related to these exposures. People living near shale gas operations report noticeable odors and, in some cases,

upper respiratory, neurological, and dermatological symptoms that they consider related to development and production activities. Though little substantive research has been published on this topic, recent studies indicate a potential for health risks from the combination of physical, chemical, and nonchemical stressors associated with rapid change in communities. Despite the demonstrated contact with chemical and nonchemical stressors and broad public concern, no comprehensive population based studies of the public health impacts of unconventional natural gas operations have been published.

Risks and Risk Perception: Principal risks to workers and communities include safety and health risks. Industrial incidents, such as accidents and malfunctions involving wells and pipelines near homes, may place workers and residents at increased risk of exposure to fires, explosions and uncontrolled chemical releases. Human health air risk assessments indicate that episodic emissions near well development elevate the risk of systemic health effects in communities, and that lifetime excess cancer risks are often increased in areas with intensive development. Perception of the risks associated with shale gas development varies by location, intensity of development, and the actual or perceived economic opportunity for individuals.

Uncertainties and Research Needs: The major uncertainties are the unknown magnitude and location of future development as well as uncertain emission control and mitigation strategies that will be employed. The lack of baseline data to enable substantive before and after comparisons in the potentially affected populations and environmental media are important unknowns needed to help inform the cumulative risk estimation process. Overall, the current scientific literature suggests that there is both substantial public concern and substantial uncertainties that need to be addressed before we can reasonably quantify the likelihood of occurrence or magnitude of adverse health effects in workers and communities where development will likely occur.

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