

Cumulative Risks Associated with Shale Gas Development

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Abstract

The large-scale development of natural gas resources from deep shale formations has raised a host of concerns about risks to the environment and human health. The concerns of the general public, reflected in media coverage of this issue, may be due in part to the dearth of empirical evidence quantifying the scope, nature, and magnitude of environmental risks, as the physical and social science literatures regarding environmental risks are still very thin. This paper begins by describing a risk matrix that identifies 264 risk pathways linking shale gas development activities to environmental burdens and the media in which they appear (e.g., air quality, surface water quality, groundwater, species habitat, and other environmental endpoints). This risk matrix provided the underlying structure for an expert survey, which highlighted risks identified by all four respondent groups as deserving of high priority for management activity, either on a voluntary basis by industry or through regulatory mechanisms. We briefly review the literature on each of these high-priority risks and then speculate on how risks from any pathway or combination of pathways relate to the scale of drilling activities in a given geographic region. Next, we identify potential interactions -- ways in which multiple risk pathways may act synergistically to increase risks. Finally, we consider how risk mitigation strategies may simultaneously affect multiple risk pathways.