

6 Conclusions

In May, 2010, the Garfield County BOCC engaged the CSPH to perform a HIA to respond to citizen concerns about natural gas drilling in Battlement Mesa, Colorado. The CSPH has worked closely with the GCPH to ensure the scope of the HIA addressed the concerns outlined by the citizens in their letter to the BOCC as well as those voiced in citizen meetings. Along with the GCPH, the CSPH also met with the COGCC, the CDPHE, Antero, and the Colorado Hospital Association to ensure that all stakeholders with pertinent data and information had an opportunity to be involved in the HIA process.

To provide a scientific basis for the HIA we conducted a longitudinal review of multiple Garfield County air and water monitoring studies as well as COGCC reports of water contamination in the county. This information was used to conduct a Human Health Risk Assessment. We also obtained demographic, physical and social health outcome data and used it in a comprehensive review described in the Battlement Mesa Baseline Health Profile. We also reviewed all publicly available information on Antero's plans to drill in Battlement Mesa, as well information made available to us by request from Antero.

With this data we determined that natural gas development and production has the potential to create a variety of stressors that can impact health. Using the medical and social health literature, we reviewed the links between these stressors and health and then applied current conditions and Antero's natural gas development and production plans to assess the potential future impacts of these physical, psychological and social stressors. The HIA considers the mitigations that Antero has disclosed to decrease impacts, so the HIA is based on anticipated effects to current and future residents. These stressors include air emissions, water and soil contamination, traffic, noise/vibration/light, community wellness, economic/employment changes, health infrastructure stress, and industrial accidents/malfunctions.

Using this scientifically based, methodological approach we found that air emissions are likely to occur at levels that can cause human health impacts, especially to vulnerable populations. Increased traffic, particularly increased truck traffic, will be a safety risk to Battlement Mesa residents and contribute to increased air and noise pollution. Increased noise may annoy some residents, but at current and anticipated future levels it is not likely to cause health impacts. Should water contamination and industrial accidents/malfunctions occur they could also cause important health impacts to Battlement Mesa residents, but these events are not likely to occur.

Some stressors may have positive as well as negative social impacts. The Antero project may provide jobs for some Battlement Mesa residents and may provide increased economic activity for some local businesses, including health clinics. As long as these businesses are able to maintain services in the face of increased business, this increased economic activity can be positive for the community. If the quality of services, including medical services, diminishes,

then negative physical and/or social health impacts could occur. Other aspects of community wellness may be negatively impacted, and increased levels of substance abuse, crime, and sexually transmitted infections may occur, while opportunities for recreation and social cohesion could decrease. Both the positive and the negative effects of changing economics/employment, health care infrastructure, and community wellness will likely be small given the relatively small size of the Antero project and the likelihood that these affects will be generally absorbed into the County as a whole rather than affecting Battlement Mesa alone.

At the end of each assessment and Section 5, the CSPH investigators have provided several recommendations aimed at decreasing negative impacts or improving positive impacts. Central to decreasing the primary health stressor, air pollution, is continued efforts to decrease all possible emission sources. To bring emissions to the lowest possible level, it is important that the best available current technology be utilized, and new technologies be developed and adopted. To provide an adequate margin of safety, current COGCC emissions rules need to be strictly enforced. Ambient and well pad monitoring should be conducted to characterize emissions and their impacts on local air sheds and determine if further regulation is needed to protect public health. Likewise, because of the potential for important health impacts due to water contamination from accidents and/or malfunctions, effort should be focused on prevention of such events, the best available technologies required, new technologies adapted, and strict monitoring maintained. Traffic mitigation should also be a priority in order to reduce the inherent safety risk associated with large truck traffic in residential areas. Noise associated with Antero's project should be monitored and efforts to decrease noise due to drilling activities as well as truck traffic undertaken. Finally, efforts should be made to use economic benefits from Antero's project to mitigate the potential negative impacts of change in social structure. Planning should take place to provide services needed for increased population, as well as planning for the loss of the economic activity in five years when the development phase ends.

The CSPH investigators and the BOCC recognize that implementation of recommended impact mitigations may be insufficient to protect public health. To that end, the BOCC has provided funding to CSPH to design a long term EHMS in Battlement Mesa and/or Garfield County to address some of these issues. This long term study will: 1) further characterize air emissions associated with natural gas production; 2) characterize air emission exposure levels for persons living in close proximity to natural gas production; 3) further characterize emission sources during development and production phases; 4) develop methods to characterize surface and ground drinking water contamination; 5) conduct health surveillance of residents in areas impacted by natural gas and in similar comparison populations not affected by natural gas development and production; 6) conduct social and community health surveillance of areas impacted by natural gas development and production.

Because there are natural gas plays in other parts of the United States undergoing similar development as that occurring in the Piceance Basin, this HIA and future studies are likely to be broadly applicable. Communities in Texas and Wyoming have reported health and social impacts associated with natural gas development and production, while communities in

Pennsylvania, New York and other places are trying to anticipate and forestall impacts before drilling occurs. Use of this or other HIAs as a tool to summarize potential impacts can help communities prioritize mitigations and local resources. Local environmental and health monitoring can provide communities with information necessary to protect public health. This information can also contribute to the growing body of knowledge on chemical and psychosocial stressors and health impacts associated with natural gas development and production.

In Colorado, recent legislation will compel Front Range coal fired electrical plants to switch to cleaner fuels and alternative energies, thus enhancing the natural gas market. In Grand Junction, two fueling stations for natural gas vehicles are slated to be built in the next few years. These and other market enhancing projects and policies will mean Colorado natural gas development and production projects will continue to grow. The recently updated COGCC rules included provisions to protect health and environment. These rules should undergo regular review and update in order to reflect new understanding and technologies as they emerge.

Because development of domestic natural gas resource is part of the national policy to increase domestic energy production and reduce greenhouse gas emissions, a high level discussion of the health implications of this policy needs to take place. While municipal, county and state governments have begun to respond to citizen concerns, a national discussion of the benefits and risks associated with this policy is due. As outlined in this HIA, local economic benefits of energy development may not outweigh the negative local impacts to physical and social health of the community. Without understanding public health implications in the context of national priorities for domestic energy production, continued disagreements about the impact of drilling and its effects on local health are bound to continue.