

A Health Impact Assessment of Unconventional Oil and Gas in Scotland.

Summary

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The Scottish Government (SG) requested an assessment of the potential impacts on health of developing shale oil and gas and coal bed methane (known as unconventional oil and gas (UOG)) in Scotland. The assessment was to consider a “broad range of health implications” arising from UOG development and was to suggest options to mitigate potential hazards and health impacts. The assessment was to adopt a “generic” rather than a local community perspective and was not expected to predict the scale of potential impacts on any specific communities in Scotland. The main aim was to provide a generic level overview of the current scientific understanding relating to the health impacts of UOG, in a Scottish context, in order to assist the Scottish Government in the development of future UOG policy.

HPS formed a working group with expertise in hazard and risk analysis and evidence assessment, supported by technical advisers from regulatory and other public sector organisations. The working group used a form of Health Impact Assessment (HIA) adapted to the SG remit, to address relevant issues. These were derived from the views of community and environmental groups, industry and professional stakeholders with interests in the topic, taken together with issues identified in previously published reports.

Peer-reviewed scientific publications on UOG hazards, exposures and health impacts were identified, screened and evaluated. The resulting evidence on specific UOG-associated hazards and potential health impacts was assessed systematically and used to derive conclusions. General literature on the health impacts of hazards potentially linked to UOG activities and findings from selected scientific studies specifically investigating UOG-sourced hazards and exposure levels, were included. Epidemiological studies seeking to identify quantifiable health effects associated with UOG site operation were also reviewed. The evidence was assessed using a standardised approach and categorized as being ‘**sufficient**’, ‘**limited**’ or ‘**inadequate**’, as a basis to establish associations between UOG-sourced hazards and potential health impacts.

The overall conclusion of this HIA is that the evidence considered was ‘**inadequate**’ as a basis to determine whether development of shale oil and gas or coal bed methane would pose a risk to public health, if permitted in Scotland. However, individual conclusions were drawn on particular types of UOG-related hazard and specific types of health outcome.

There was ‘**sufficient**’ evidence to determine that a number of airborne and waterborne environmental hazards would be likely to occur as a result of UOG operations. Specific UOG processes of hydraulic fracturing and to a greater extent, the disposal of UOG waste water into deep injection wells, were found to be associated with increased seismicity of variable intensity, much of it minor. However, there was ‘**inadequate**’ evidence that seismicity linked to UOG activity was associated with any actual physical risk to health.

There was ‘**sufficient**’ evidence that respirable crystalline silica, a component of fluids used in HF processes, occurred at levels that could pose a risk to UOG workers’ health. There was also evidence that other UOG hazards occurred at levels that could pose a risk to the health of nearby residents, although due to methodological weaknesses in the original studies, this evidence was classed as ‘**limited**’. This applied to airborne polycyclic aromatic hydrocarbons and tropospheric ozone and to waterborne total dissolved solids and metal ions. Waterborne

methane occurred at levels that posed a potential explosive risk. However, there was ‘**inadequate**’ evidence to suggest that other UOG-associated chemical hazards or nuisances such as noise, light or odours, occurred at levels that could pose a risk to physical health.

There were relatively few epidemiological studies available on the topic. The small quantity of material available was of variable quality and was characterised by contradictory and inconsistent findings. This evidence base was therefore ‘**inadequate**’ to determine if there was a general association between UOG activities and health impacts. Specific studies provided ‘**inadequate**’ evidence of association between UOG activities and effects on reproductive and developmental health; childhood cancer; or adverse neurological, cardiovascular, or dermatological health outcomes.

The evidence reviewed on the wider implications of UOG on health was primarily qualitative. This identified ambivalent views in the studied communities regarding the perceived positive and negative impacts of UOG development. It focused on self-reported concerns, anxieties and stress reported as being associated with UOG activity including: traffic-related impacts (noise, accidents, air pollution, community severance, and access to services); housing availability; environmental degradation; loss of community identity, control and social capital; increased demands on local services; and inequalities in the distribution of impacts especially on those with existing poor health. Beneficial impacts cited by communities included: economic benefits; increased training and employment opportunities; prospects for higher quality jobs and higher incomes; investment and improvements in local infrastructure and service provision. Although these topics are relevant as wider determinants of health, the evidence reviewed lacked quantified estimates of actual direct or indirect health impacts associated with UOG operations.

Evidence relating to the current regulatory framework for UOG development in Scotland suggested that there are inadequacies. Additional potential measures to mitigate UOG-related hazards and limit potential health impacts were therefore identified in relation to planning and regulation as well as for industry and regulator best practice, stakeholder engagement, local health impact assessment, and monitoring and evaluation.

If UOG development is permitted in Scotland in future, the evidence reviewed to date on UOG hazards, potential health impacts and wider health implications, although lacking in quantity, quality and consistency, would justify adopting a precautionary approach. This should be proportionate to the scale of the hazards and to the potential health impacts, both adverse and beneficial. It could be based on adopting a range of mitigation measures involving operational best practice, regulatory frameworks and community engagement.

This is the **Summary: A Health Impact Assessment of Unconventional Oil and Gas in Scotland**.

The full report **Volume 1: A Health Impact Assessment of Unconventional Oil and Gas in Scotland** available on the Health Protection Scotland website <http://www.hps.scot.nhs.uk/enviro/unconventionalgas.aspx> together with **Volume 2: Appendices**.