

STRATEGIC PLAN FOR  
RESEARCH ON THE IMPACTS OF 21ST  
CENTURY OIL AND GAS DEVELOPMENT IN  
THE APPALACHIAN REGION AND BEYOND

HEI's Special Committee on Unconventional  
Oil and Gas Development

Donna J. Vorhees  
Health Effects Institute

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# *Origin of the Initiative*

- Pennsylvania-based Shale Gas Roundtable formed in 2011 by leaders from government, industry, academia, environmental groups, and civil society.



- The central question for the Roundtable:

*“... how can we most effectively and responsibly safeguard our communities and environment, grow our economy, and manage unconventional oil and gas development?”*

- HEI’s Special Scientific Committee was formed in response to the Roundtable’s recommendation for:

“efforts to increase balanced research and rigorous monitoring of the possible impacts of unconventional oil and gas development.”



# *The Committee's Work in a Broader Context*

- The energy we use must come from somewhere
- Many at the regional, national, and international levels are actively engaged in the complex task of evaluating various combinations of energy sources
- Each combination of energy sources comes with its own mix of benefits and impacts
- The Committee has sought to answer the more focused but critical question to help inform future energy policy choices:
  - Which potential impacts of 21st century oil and gas development warrant priority consideration for scientific study?

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## *The Committee's Task*

- Develop an impartial, multidisciplinary guide for future research about potential adverse impacts of 21st century oil and gas development (abbreviated “OGD”)
- The guide should provide recommendations for research to better understand and to prevent or minimize potential impacts on:
  - Human health and well-being
  - Communities
  - Ecological health
  - The environment



## *Focus of the Committee's Review*

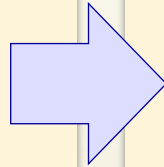
- Potential local and regional impacts
- Oil and gas development as practiced in recent years
- Development, production, and post-production phases at the well pad and beyond, but excluding pipeline networks and facilities used to transport oil or gas outside the production area (i.e., stops at the gathering pipelines)



# *Focus of the Committee's Review*

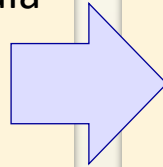
## **21st Century Oil and Gas Development**

- Exploration
- Site preparation
- Drilling
- Well completion
- Production and processing
- Waste management
- Closure and post-production



## **Potential Stressors**

- Chemical and radiological releases to the environment
- Changes in quality of environmental media
- Water use
- Land development
- Induced seismic activity
- Community change
- Increased truck traffic
- Noise, light, and odor
- Accidents

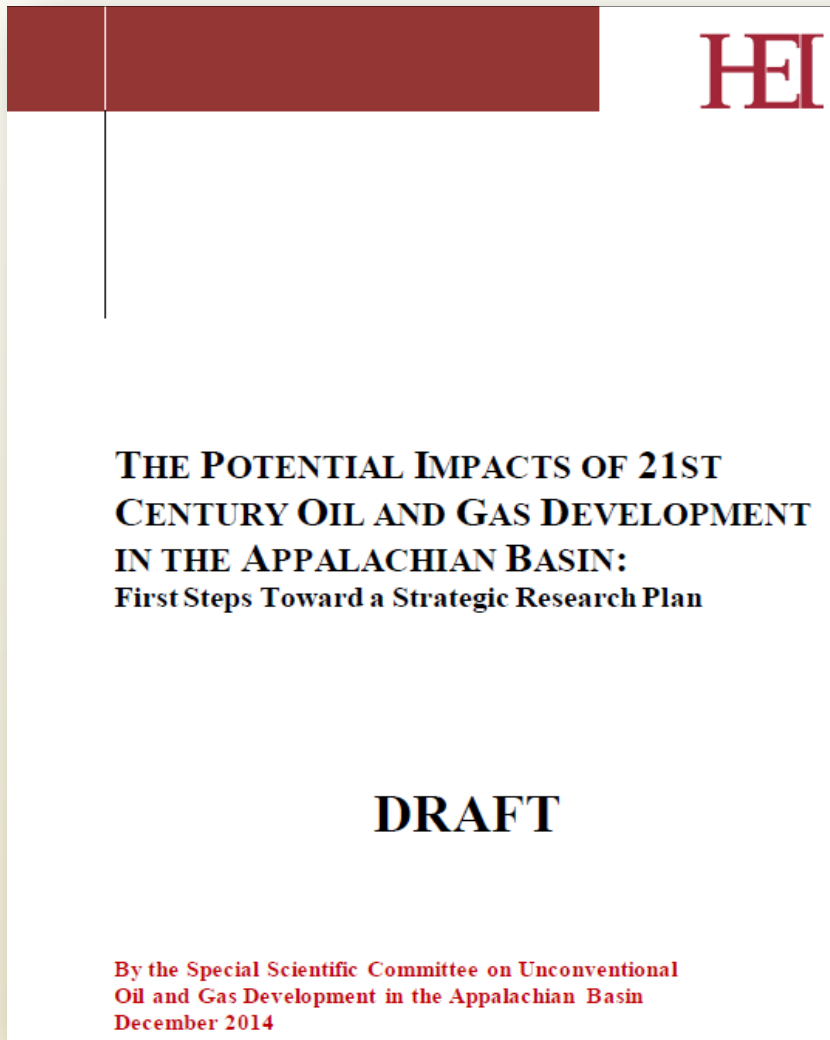


## **Potential Impacts**

- Reduced quality of environmental media
- Landscape disruption and habitat fragmentation
- Seismic damage
- Safety hazards
- Damage to community characteristics
- Reduced sense of well being and infrastructure capacity
- Public health concerns and stress



# *The Committee's Draft Interim Report released in December 2014*



- Received extremely helpful comments on this draft report that have shaped the draft Research Agenda



# *Steps Taken to Formulate Research Questions*

- An extensive literature review
- Consultations with experts
- Consultations with stakeholders





# *7 Criteria for Identifying and Evaluating Research Questions*

- Capacity to directly inform decision-making and planning
- Feasibility
- Geographic applicability
- Scope of the research
- Significance of the potential impacts
- Time sensitivity
- Value to local communities

**\*\* Intended to reflect the full breadth of research topics and characteristics that might be useful**

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## *Important Features of the Research Questions*

- Collectively indicate data gaps in the literature; they are not findings of impacts
- Are linked to the ultimate goal of understanding and preventing or minimizing potential impacts on human and ecological health and well-being
- Apply broadly to Appalachia and other regions

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# *Prioritizing Research Questions*

*(How did the Committee go from 35 to 13 questions?)*

- Proceeded through several iterations of using its qualitative criteria to rank the research questions
- Used its criteria to identify research questions of overarching importance that should be given priority consideration for initial funding
- Sought a Research Agenda that, when implemented, would provide the knowledge needed to answer the most important questions about potential impacts

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# *Cross-Cutting Themes*

- Background Conditions
- Temporal Variability
- Spatial Variability
- OGD Facility Variability
- Biological Response Variability
- Benefits of OGD



# *Research Topics of Overarching Importance*

General Area of Research	Purpose	Research Topic
Stressor and Exposure Characterization	To improve understanding of whether exposures of potential concern are occurring	Chemical toxicity (human and ecological) Local air quality Total human exposure Water quality
Health and Well-Being Assessment	To improve understanding of whether potential human health, ecological health, and well-being effects are occurring	Ecological health effects (landscape change) Public health effects (air exposure) Public health effects (drinking water exposure) Public health effects (near-term studies) Social and psychosocial effects Worker health effects (chemical and radiation)
Evaluation of Most-Effective Practices	To enhance practices that minimize or prevent impacts	Accidental waste release Permitted waste management Wellbore integrity

- **Much ongoing research related to these topics**
- **The Committee wants to hear your priorities**

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# *Summary of the Priority Research Questions*

- Target a better understanding of exposure, risk, and effects from a broad spatial and substantive perspective.
- Fall into three general areas of research: (1) stressor and exposure characterization, (2) health and well-being assessment, and (3) evaluation of most-effective practices.
- Questions about stressor and exposure characterization are useful in addressing questions about health and well-being.
- Research on management practices can help prevent or reduce impacts.

**An effective research program should include the questions of overarching importance.**

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