

# COMPENDIUM of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction) – OVERVIEW



by Concerned Health Professionals of NY & Physicians for Social Responsibility - Nov. 17, 2016  
<http://concernedhealthny.org/compendium/>

## CONTENTS: *[Info snipped from section introductions...]*

### *page 2 - Foreword to Fourth Edition*

...The Compendium is a fully referenced compilation of the evidence outlining the risks and harms of fracking...bringing together findings from the scientific and medical literature, government and industry reports, and journalistic investigation... (the vast majority of which reveal problems).

### *p.6, 7 - Introduction*

...As fracking operations have increased in frequency and intensity, and, as the transport of extracted materials has expanded, a significant body of evidence has emerged to demonstrate that these activities are dangerous to people and their communities in ways that are difficult—and may prove impossible—to mitigate. Risks include earthquakes and adverse impacts on water, air, agriculture, public health and safety, property values, climate stability, and economic vitality.

...Industry secrecy and government inaction continue to thwart scientific inquiry, leaving many potential problems—especially cumulative, long-term risks—unidentified, unmonitored, and largely unexplored. This problem is compounded by non-disclosure agreements, sealed court records, and legal settlements that prevent families and their doctors from discussing injuries and illness.

### *p.8 - About this report*

...The Compendium is complemented by a fully searchable, near-exhaustive citation database of peer-reviewed journal articles...that was developed by PSE Healthy Energy and which is housed on its website (<http://www.psehealthyenergy.org/site/view/1180>).

### *p.11 - About Concerned Health Professionals of New York*

<http://concernedhealthny.org>

### *p.11 - About Physicians for Social Responsibility*

<http://www.psr.org>

### *p.12-18 - EMERGING TRENDS*

- 1) Growing evidence shows that regulations are simply not capable of preventing harm  
*[seismic activity, soil, water, & air contamination]*
- 2) Fracking threatens drinking water *[so do conventional drilling, waste disposal, & spills]*
- 3) Drilling and fracking emissions contribute to toxic air pollution and smog (ground-level ozone) at levels known to have health impacts
- 4) Public health problems associated with drilling and fracking, including reproductive impacts and occupational health and safety problems, are increasingly well documented  
*[hospitalizations, asthma, silicosis, rashes, pre-term births, low birth weights, vehicle fatalities, explosions, injuries, drug abuse]*

- 5) Natural gas is a bigger threat to the climate than previously believed *[methane emissions, leakage (& flaring)]*
- 6) Earthquakes are a consequence of drilling and fracking-related activities in many locations *[from injection disposal wells & sometimes from drilling itself]*
- 7) Fracking infrastructure poses serious potential exposure risks to those living near it *[from temporary drilling/fracking activities to up-to-24/7 compressor stations (many smaller ones are lesser-regulated) & pipelines, also silica sand mining/usage & fugitive fracking chemicals]*
- 8) Drilling and fracking activities can bring naturally occurring radioactive materials to the surface *[risks to workers & residents, increased radon levels in homes, other substances in wastewater can affect recreational & agricultural areas as well as homes]*
- 9) The risks posed by fracking in California are unique *[many vertical wells = just as much water contamination via more concentrated chemicals used (large food crop land/water usage & seismic instability in gas development areas, as in Idaho)]*
- 10) The economic instabilities of fracking further exacerbate public health risks *[phantom jobs, mortgage/insurance hazards, community costs: increased rates of crimes/addiction/prostitution, road damage, service impacts, diminished property values & property tax revenues, boom/bust cycles = uncertainties for planning, (increased industrialization = decreased community appeal, risks to public properties & water sources)]*

## COMPILATION OF STUDIES & FINDINGS:

### ***p.22 - Air pollution***

Researchers have documented dozens of air pollutants from drilling and fracking operations that pose serious health hazards. ... In some cases, VOC concentrations exceeded federal safety standards by several orders of magnitude. *[54 docs highlighted]*

### ***p.37 - Water contamination***

A range of studies from across the United States presents irrefutable evidence that groundwater contamination occurs...and is more likely to occur close to well pads. ...Injection wells for disposal of fracking waste also pose demonstrable threats to drinking water aquifers and surface water. ...Municipal sewage treatment plants are not capable of treating fracking waste... Overall, the number of well blowouts, spills, and cases of surface water contamination from waste pits and other sources has steadily grown. *[107 docs highlighted]*

### ***p.69 - Inherent engineering problems that worsen with time***

Studies consistently show that oil and gas wells routinely leak, allowing for the migration of natural gas and potentially other substances into groundwater and/or the atmosphere. ...The act of fracking itself may induce pathways for leaks. Leakage from faulty wells is an issue that the industry has identified and for which it has no solution. ...Leaks pose serious risks including potential loss of life or property from explosions and the migration of gas or other chemicals into drinking water supplies. Leaks also allow methane to escape into the atmosphere, where it acts as a more powerful greenhouse gas than carbon dioxide. *[13 docs highlighted]*

### ***p.74 - Radioactive releases***

High levels of radiation documented in fracking wastewater from many shale formations raise special concerns in terms of impacts to groundwater and surface water. ...The disposal of radioactive drill cuttings is an additional concern. *[16 docs highlighted]*

***[COMPENDIUM, continued]***

***p.80 - Occupational health and safety hazards***

Drilling and fracking jobs are among the most dangerous jobs in the nation... ..Many gas field workers, despite...serious occupational hazards, are uninsured or underinsured and lack access to basic medical care [or burden county hospitals with caring for them for free]. *[44 docs highlighted]*

***p.92 - Public health effects, measured directly***

Drilling and fracking operations are correlated with elevated motor vehicle fatalities (Texas), asthma (Pennsylvania), self-reported skin and respiratory problems (southwestern Pennsylvania), ambulance runs and emergency room visits (North Dakota), infant deaths (Utah), birth defects (Colorado), and low birthweight (multiple states). Benzene levels in ambient air surrounding drilling and fracking operations are sufficient to elevate risks for future cancers in both workers and nearby residents... *[23 docs highlighted]*

***p.101 - Noise pollution, light pollution, and stress***

Drilling and fracking operations and ancillary infrastructure expose workers and nearby residents to continuous noise and light pollution that is sustained for periods lasting many months. Chronic exposure to light at night is linked to adverse health effects, including breast cancer. ...Exposure to environmental noise pollution is linked to cardiovascular disease, cognitive impairment, and sleep disturbance. *[12 docs highlighted]*

***p.104 - Earthquakes and seismic activity***

A growing body of evidence from Ohio, Arkansas, Texas, Oklahoma, and Colorado links fracking wastewater injection (disposal) wells to earthquakes of magnitudes as high as 5.8, in addition to swarms of minor earthquakes and fault slipping. ...In some cases...the fracking process itself has been linked to earthquakes and seismic activity as significant as magnitude 4.4. *[60 docs highlighted]*

***p.121 - Abandoned and active oil and natural gas wells as pathways for gas and fluid migration***

Whether plugged or unplugged, abandoned wells serve as potential pathways for gas and fluid migration, heightening the risks of groundwater contamination and contributing methane emissions to the atmosphere. *[22 docs highlighted]*

***p.128 - Flood risks***

Compared to an acre of forest or meadow, an acre of land subject to fracking construction activity releases 1,000 to 2,000 times more sediment during rainstorms. ...In some cases, operators choose to site well pads on flood-prone areas... In turn, flooding increases the dangers of...gas extraction, heightening the risks of contamination of soils and water supplies, the overflow or breaching of containment ponds, and the escape of chemicals and hazardous materials. *[9 docs highlighted]*

***p.131 - Threats to agriculture and soil quality***

Drilling and fracking take agricultural land out of production and pose risks to the agricultural sector. ...The reuse of fracking wastewater for irrigation...raises questions about contamination of food crops via bioabsorption through roots. ...Potential water and air contamination put soil quality as well as livestock health at risk. *[20 docs highlighted]*

***p.137 - Threats to the climate system***

An increasing number of studies reveal high levels of methane leaks from gas drilling, fracking, storage, and transportation, undermining the notion that natural gas is a climate solution or a transition fuel. *[55 docs highlighted]*

***p.154 - Threats from fracking infrastructure***

The infrastructure for drilling and fracking is complex and widespread. ...Air pollution is produced at every stage of the process. Compressor stations and pipelines are major sources of air pollutants... that raise potential health risks for those living nearby while offering no offsetting economic benefits—indeed, they are associated with loss of tax revenue and economic development for the communities where they are sited and traverse. [71 docs highlighted]

***p.176 - Inaccurate jobs claims, increased crime rates, threats to property value and mortgages, and local government burden***

Many of the jobs are short-lived, and many have gone to out-of-area workers. With the arrival of drilling and fracking operations, communities have experienced steep increases in rates of crime, including sex trafficking, sexual assault, drunk driving, drug abuse, and violent victimization, all of which carry public health consequences, especially for women. Social costs include strain on law enforcement, municipal services, and road damage. ...Drilling and fracking diminish property values, tax revenues for local governments, and tourism [and] pose an inherent conflict with mortgages and property insurance due to the hazardous materials used and the associated risks. [64 docs highlighted]

***p.191 - Inflated estimates of oil and gas reserves and profitability***

Increasingly, well production has been short-lived, which has led companies drilling shale to reduce the value of their assets by billions of dollars, creating shortfalls that are largely filled through asset sales and increasing debt load, ...raising questions about who becomes the custodian of wells and infrastructure when companies abandon operations. [23 docs highlighted]

***p.196 - Disclosure of serious risks to investors***

...The annual Forms 10-K that oil and natural gas companies are required to file with the U.S. Securities and Exchange Commission [show]...the harms and risks of fracking that are otherwise shielded from view by “gag order” clauses in court settlements, non-disclosure agreements between industry and landowners, and trade secret claims in regards to the chemical ingredients of fracking fluid. [discussion]

***p.198 - Medical and scientific calls for more study and more transparency***

These appeals underscore the accumulating evidence of harm, point to the major knowledge gaps that remain, and denounce the atmosphere of secrecy and intimidation that continues to impede the progress of scientific inquiry. [36 docs highlighted]

***p.209 - CONCLUSION:***

**All together, findings to date from scientific, medical, and journalistic investigations combine to demonstrate that fracking poses significant threats to air, water, health, public safety, climate stability, seismic stability, community cohesion, and long-term economic vitality.** Emerging data from a rapidly expanding body of evidence continue to reveal a plethora of recurring problems and harms that cannot be averted or cannot be sufficiently averted through regulatory frameworks.

**There is no evidence that fracking can operate without threatening public health...** [From the *American Journal of Public Health*:] **‘Mounting empirical evidence shows harm to the environment and to human health...and we have no idea what the long-term effects might be.’**