July 21, 2014

U.S. Department of Energy (FE-34)
Attn: Addendum Comments
Office of Oil & Gas Global Security & Supply
Office of Fossil Energy
P.O. Box 44375
Washington, DC 20026-4375

RE: Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the U.S.

Dear Sir or Madam:

Please accept the following comments submitted by the undersigned organizations regarding the Department of Energy (DOE) draft report: *Addendum to Environmental Review Documents Concerning Exports of Natural Gas from the U.S.,* which evaluates the impacts of unconventional natural gas production involving high-volume hydraulic fracturing (hereafter the "Addendum"). The comments herein refer to the Addendum report provided for public comment, however they are also applicable to the DOE background document, *Environmental Impacts of Unconventional Natural Gas Development and Production.*

The Addendum in its current form is seriously flawed and unsuitable as a source of information for making decisions relating to the production and export of natural gas. Rather than performing a comprehensive assessment of impacts associated with unconventional natural gas development, the Addendum relies on outdated and extremely limited information to make broad generalizations about impacts to water, air, climate change, seismic activity, and land use. Many of its findings run contrary to current science and evidence of significant adverse impacts. The result is a document that is neither accurate nor useful to the purpose for which it was written.

Significantly, the Addendum fails to perform any meaningful assessment of policies and regulations in place at the federal and state levels, or their efficacy. For example, it is well known that the oil and gas industry has been granted broad exemptions from landmark environmental laws, such as the Clean Air Act and Safe Drinking Water Act. However, nowhere in the Addendum are the ramifications of these exemptions discussed. The Addendum instead assumes--without evidence--that regulations have become stricter (p.2). Growing accounts of pollution, accidents, and illness caused by widespread drilling and fracking activities throughout the United States are indicative of a system of lax regulatory oversight--refuting claims regarding the adequacy of rules in place, and demonstrating a clear need for stronger protections and the repeal of special interest exemptions.

Concerned Health Professionals of New York recently assembled a Compendium[1] of over 300 professional reports, studies, and articles that confirm the significant risks and harms of gas development. We incorporate here by reference the attached Compendium and its entire body of cited material, as though fully set forth herein.

[1] *Compendium of Scientific, Medical, and Media Findings Demonstrating Risks and Harms of Fracking (Unconventional Gas and Oil Extraction),* Concerned Health Professionals of New York, July 10, 2014. http://concernedhealthny.org/compendium/

The following highlight key concerns with respect to the Addendum:

Failure to Conduct a Cumulative Impact Analysis
The Addendum asserts that a meaningful analysis of environmental impacts cannot be performed or that the impacts of increased gas production are not "reasonably foreseeable" because the precise location of future wells and infrastructure is unknown. (p.2.) Hiding behind this rationale, the Addendum provides only a cursory description of fracking practices and possible impacts--a far cry from the meaningful cumulative environmental review that is needed. The precise location of infrastructure is not necessary to estimate impacts based on the modeling of typical build-out scenarios. A much more comprehensive analysis should be performed.

Water Contamination
The Addendum fails to assess or even acknowledge the numerous reported cases of surface and ground water contamination. (See Compendium, pp. 16-27, 30-32.) Many residents around the country are now forced to rely on water buffaloes (portable water tanks) or bottled water because drilling and fracking operations have contaminated drinking water supplies. Inexcusably, the EPA abruptly halted investigations of wells contaminated in Dimock, PA and Pavilion, WY although significant levels of toxins in well water were revealed. Likewise, hundreds of cases of water contamination have now been documented by the Pennsylvania DEP. Providing no assessment of vaguely referenced regulations, best management practices, and "pollution prevention concepts," the Addendum asserts without authority that if these measures are followed, only temporary, minor impacts to water resources are likely to occur. (p.19.) Furthermore, the Addendum states that even if they are not followed, significant impacts would only be "local." Clearly, regional water resources are at risk too. In fact, it is out of concern for a major regional watershed--the watershed of New York City--that the NYS-DEC has said it will not permit fracking within southeast New York. These defects and omissions in the analysis of risks to water resources must be corrected.

Fresh Water Consumption
The Addendum's comparison of water use for fracking to other forms of energy production is misleading because a significant amount of fracking water remains underground or is later disposed of by underground injection. Unlike water needed for other forms of energy production such as hydro-power, geothermal, biofuels or nuclear power, this water is permanently removed from the Earth's hydrologic cycle. As with water contamination, the Addendum dismisses water consumption as a "local" issue (p.12), ignoring cumulative regional impacts and failing to address real conflicts occurring between the gas industry and other water consumers such as farmers and residents in drought prone areas. The Addendum should be revised to address these issues.

Well Casing Integrity
The Addendum inaccurately describes the use of "multiple layers" of steel casing and cement as protective of freshwater aquifers. (p.13.) Various studies, including those by industry, have shown that 5 percent of oil and gas wells typically leak immediately, and that 40 to 60 percent leak over time. (See Compendium, pp. 27-29.) Further, the additional stress associated with high-volume fracking, which may be repeated several times for a single well, can compromise casing integrity. The Addendum also inaccurately claims that the surrounding rock formation will act as a seal. In actuality, leakage very often occurs through the vertical movement of methane gas and other volatile compounds between the pipe and casing, and between the casing and formation. This is a problem that the gas industry cannot solve, and long-term requirements for monitoring and repair are lacking. The Addendum fails to include any assessment of gas well leakage or failure rates. These issues must be addressed.

Fracking Fluid Toxicity and Disclosure
The Addendum mischaracterizes the amount of chemicals added to fracking fluid as "small" because it represents about two percent of the liquid solution. Chemists understand that concentrations measured in parts-per-thousand and parts-per-million are very significant to the properties of a fluid and its toxicity to human health. The Addendum compares the chemical disclosure requirements of only nine states although fracking occurs in many more. The Addendum also fails to address how industry secrecy prevents doctors, patients, and medical researchers from accessing information important to public health. The Addendum must acknowledge the need for disclosure of all fracking chemicals and call for study of the combined impacts of chemicals used in fracking--many of which are known human carcinogens--on public health.

Flowback and Produced Water
The Addendum contains a cursory description of fracking flowback and produced water, but fails to assess disposal methods, the adequacy of state regulations and their enforcement, or the significant problem of illegal dumping. Typical wastewater treatment plants are not able to treat or remove chemicals contained in fracking wastewater. Thus, fracking wastewater not disposed of by injection wells is simply diluted and released into drinking water sources. The Addendum mischaracterizes certain methods of disposal as a "pollution prevention approach" (p.18), although injection wells have caused groundwater contamination, evaporation results in concentrated effluent and the release of toxic compounds into the atmosphere, and surface discharges contribute to water pollution. Impacts associated with the spreading of "brine" that contains toxic and radioactive material on roads are not mentioned, nor are impacts to livestock and wildlife caused by containment ponds, spills, and soil contamination. (See Compendium, pp. 48-49.) The Addendum must be revised to address these issues.

Air Quality and Related Human Health Impacts
Although the Addendum discusses the types of air pollutants produced during gas extraction, it fails to quantitatively analyze how air quality has changed in areas where gas production occurs. A growing number of studies show that air pollution and ground-level ozone is a serious issue that has caused significant health problems including respiratory and neurological damage, cancer, miscarriages, and birth defects. Far more research has occurred than is discussed in the Addendum and numerous cases of harm have been documented which the Addendum fails to address. (See Compendium, pp. 8-16, 30-32.) The Addendum also fails to evaluate the efficacy of regulations and State Implementation Plans (SIPs) for air quality in gas development areas. Furthermore it fails to acknowledge or discuss how non-disclosure agreements and gag-order settlements have hindered access to important medical information. Although the Addendum acknowledges that emissions from gas development could result in more nonattainment areas, it improperly downplays these concerns, stating that drilling and fracking often occurs in areas where pre-existing pollution exists. This ignores the fact that gas development would make those problem areas worse, and that so far gas production has occurred mainly in rural areas. Parts of rural Wyoming with significant fracking now experience days with worse air quality than Los Angeles. (See Compendium, p.15.) Failure to address air quality impacts render the Addendum incomplete and inadequate. These issues must be addressed.

Inadequacy of Future Green Completion Requirements
The Addendum implies that green completion requirements scheduled to take effect in 2015 will significantly reduce emissions associated with drilling and fracking activity, but ignores deficiencies in the rule which limit its effectiveness, such as exemptions for loosely-defined "exploratory" wells. The Addendum also unrealistically describes optimal outcomes, assuming full compliance and enforcement. Even on public lands, federal regulators usually inspect only a small fraction of wells, and failure of regulatory inspections and controls are known to be rampant. An objective assessment of the green completion program is needed.

Global Warming Potential of Methane

In calculating greenhouse gas emissions, the Addendum applies an outdated global warming potential (GWP) factor of 21 for methane. According to current data from the Intergovernmental Panel on Climate Change (IPCC), methane is at least 34 times more potent as a greenhouse gas than carbon dioxide over 100 years, and at least 86 times more potent over 20 years. (See Compendium, p.53.) Climate scientists agree that major greenhouse gas reductions are essential in the near term to avoid the worst impacts of climate change, therefore the GWP of methane over twenty years must not be ignored. Even the DOE's lifecycle report of greenhouse gas emissions for the export of LNG considers the 20-year GWP of methane. The Addendum should be revised to reflect the global warming potential of methane too. (See also Compendium, pp.50-55.)

Methane Emissions Are Severely Understated

The Addendum grossly underestimates methane leakage rates, comparing a limited set of sources to suggest that the 5.75 percentage rate estimated by Howarth, et al., is an outlier that should be discarded. (p.40.) However, as explained by Howarth in his recent publication *A Bridge to Nowhere*, [2] this estimate is consistent with several other independent studies (Brandt, Miller, Karion, Petron)--some of which indicated even higher leakage rates. (See also Compendium, pp. 50.) Monitoring of actual well fields in production confirm high leakage rates that clearly refute EPA greenhouse gas inventory estimates. Unlike leakage estimates by EPA, which are based on a "bottom up" calculation of predicted emissions from various sources, these "top down" studies reflect real-world measurements of air quality. The Addendum also disputes data by Howarth, et al., that unconventional wells leak more than conventional wells and that the pre-production fracking phase has higher emissions. However this leakage, which occurs during the flowback period of an unconventional well, has also been confirmed by several sources, including the EPA. Leakage rates discussed in the Addendum must be revised.

Climate Change Forecasts

The Addendum acknowledges that no federal regulations directly limit upstream emissions from the gas industry, but suggests that significant reductions will occur through the implementation of NSPS/Green Completion rules. (pp.42-43.) As discussed above, this ignores deficiencies in the rule and unrealistically assumes optimal outcomes based on full compliance and enforcement. The Addendum also includes misleading forecasts by the World Resources Institute of "reduced" greenhouse gas emissions in 2035. These are relative to baseline projections that assume greater emissions from increased gas production and do not account for LNG exports. Disturbingly, the Addendum states that science is unable to translate greenhouse gas emissions to changes in global temperature (p.43.); however models have in fact been developed to do this. The International Energy Agency (IEA) has determined that a large natural gas boom--even with improvements in place to reduce leakage--would lead to a temperature rise of 3.5 degrees Celsius, far exceeding the 2 degree threshold necessary to avoid the most severe effects of climate change. (See Compendium, p.54.) Discounting the global warming potential of methane and leakage rates, the Addendum mistakenly concludes that replacing other carbon-based energy sources with natural gas could have a positive benefit on climate change. (p.43.) These flaws also cause incremental greenhouse gas estimates of increased natural gas production to be grossly inaccurate. (p.45.) Climate forecasts in the Addendum should be revised. (See also Compendium, pp. 50-55.)

Earthquakes

The Addendum relies on outdated information from 2010 to conclude that the chances of seismicity are low for tight sand and shale plays in the United States. (p. 49.) Since 2010, however, a growing swarm of seismic activity,

[2] *A Bridge to Nowhere: Methane Emissions and the Greenhouse Gas Footprint of Natural Gas*, Robert W. Howarth, Energy Science & Engineering, April 2014. http://onlinelibrary.wiley.com/doi/10.1002/ese3.35/pdf

including felt earthquakes, have been recorded in gas production areas. (See Compendium, pp. 37-42.) Table 12 and other statements dismissive of risks within the Addendum conflict with current data--including Figure 15 which documents the location and magnitude of seismic activity from gas development. In Oklahoma more than 200 quakes have already been recorded this year, a dramatic--indeed unprecedented--increase; and in Ohio, a recent drilling moratorium was enacted because of a surge in seismic activity. (See Compendium, pp. 37-38.) Recently the Seismological Society of America warned that the risks of earthquakes induced by fracking and injection wells is much greater than previously thought. (See Compendium, pp. 37-38.) In fact the USGS and Oklahoma Geological Survey has issued joint public advisories about earthquake danger, warning that the dramatic increase in smaller seismic activity significantly increases the chance of a damaging quake in central Oklahoma. (See Compendium, p.37.) Despite a dramatic increase in reports of seismic activity in areas that have had virtually none in the past, the Addendum offers only vague assurances that structural damage is rare and the potential for harm to people is generally low. (p.54.) Although virtually no policies exist at the federal or state level to address induced seismic activity, the Addendum fails to evaluate this deficiency, recommend the development of regulations, or suggest a limit to fracking and wastewater injection in areas at risk. The Addendum must be revised to address these issues.

Land Use Area Impacts

Although the Addendum estimates the aggregate amount of land required for other sources of energy generation as a function of energy produced, it provides no such estimates for natural gas development and infrastructure. (p.55.) A comprehensive evaluation would require a build-out analysis, accounting for not only the size of well pads, but also land required for infrastructure including water impoundments, staging areas, pipelines, compressor stations, processing plants, access roads, gas-fired power plants, and facilities for the production and storage of LNG. Furthermore, unlike renewable sources of energy, land impacts from natural gas increase over time because fracked wells are highly productive for only a couple of years--new wells and infrastructure must be perpetually added. Likewise, drilling and fracking is an intense industrial activity spread across large landscapes, which degrades the environmental value and usability of affected or interspersed lands. The Addendum also erroneously compares a single unconventional multi-well pad within a square mile to 16 conventional well pads over the same area, despite the fact that such a pattern of conventional wells is not economically viable for shale gas extraction. (p.56.) In the absence of fracking and horizontal drilling, there is little danger of this imagined scenario. The Addendum should include a comprehensive build-out analysis of anticipated land use impacts.

Ecological impacts

From an ecological standpoint, the impacts of well pads, pipelines, access roads, and other related infrastructure must be considered together. Although the Addendum includes aerial photos of widespread fracking and acknowledges that cumulative environmental impacts such as loss of wildlife habitat, forest fragmentation, and invasive species are significant, it fails to analyze the profound consequence of this on biodiversity, the integrity of ecosystems, are large-landscape connectivity. (pp. 60-62.) Although more research is needed, several reports and studies have been conducted by organizations like The Nature Conservancy to evaluate these impacts.[3] While the Addendum discusses forest fragmentation caused by gas development, it ignores other habitat which could be threatened such as wetlands, prairie, or scrub. The Addendum also neglects edge effects which extend into

[3] See for example: *An Assessment of Potential Impacts of High Volume Hydraulic Fracturing on Forest Resources,* Cara Lee, et al, The Nature Conservancy; December 2011.
http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newyork/ny-hydrofracking-impacts-20111220pdfnull.pdf
See also for example: *Hydraulic Fracturing Threats to Species with Restricted Geographic Ranges in the Eastern United States,* J. Gillen and Erik Kiviat, Environmental Practices, August, 2012 (doi:10.10170S1466046612000361).
http://hudsonia.org/wp-content/uploads/2013/03/GillenKiviatFracking.pdf

adjacent habitat such as noise and light, invasives, and predation. Other issues not adequately considered include air, water, and soil contamination; wildlife exposure to toxic flowback and emissions; or light and noise impacts including flaring which threatens migratory birds and other wildlife. Pipeline easements also require perpetual maintenance involving pesticides and suppression of natural regrowth. Furthermore, regardless of gates, linear corridors invite trespassing and environmental harm from ATVs, dirt-bikes, and other vehicles. Finally, the Addendum makes the extremely misleading statement that gas development may benefit certain wildlife species. The fact is that open areas created by gas development are often fragmenting linear corridors which divide interior forests and lead to the spread of invasive species. A few animal species that utilize edge habitat occasionally benefit, but these are usually common species adapted to impacted environments and which often prey upon more rare native species. The Addendum must be revised to meaningfully analyze these issues, evaluate the extent of impacts nationally, and assess the widespread ecological impacts of increased gas development.

Impacts on Existing Land Use

The Addendum provides no discussion of the significant negative impacts of gas development on private property, residences, and existing businesses. Intense industrial activities, noise, emissions, and pollution from gas development often intrude upon communities and directly conflict with other land uses such as agriculture, outdoor recreation, and tourism. (See Compendium, pp. 35-37.) The Addendum refers to housing for temporary workers, but fails to discuss the pervasive problem that "man camps" and the influx of out-of-area workers create with respect to increased prostitution, violent crime, and drug use. Land use impacts on property values, mortgages, and insurance are not addressed either. Moreover, the Addendum mentions businesses which are supported by gas development (p.59), but fails to address displaced activities, such as organic farming and tourism which rely on a clean, unspoiled environment; or the negative consequences of the boom-bust economy typical of extractive industries, including fracking. (See Compendium, pp. 55-62.) These serious issues must be discussed.

Mitigation of Land Use Impacts

The Addendum erroneously asserts that many impacts of gas development can be reduced or avoided by siting and design. (p.63.) This dismisses the major unavoidable industrial footprint and operational characteristics of gas production on a site-specific and regional scale. Drilling and fracking is an intense industrial activity involving around-the-clock disturbance, traffic, noise and pollution. Some impacts can be reduced, but it is disingenuous to suggest that many can be. (See Compendium, pp. 35-37.) The Addendum includes a vague set of siting and design considerations to "mitigate" impacts but fails to evaluate the extent to which any of these have been effectively applied, or the extent to which any are required and enforced. (p.63.) Contrary to mitigations identified, impacts often occur within previously undisturbed areas, and infrastructure is difficult or impossible to consolidate since gas development occurs on a grid pattern across large regions. The Addendum also fails to acknowledge that in many jurisdictions, the public has little or no legal recourse to oppose projects. Environmental damage, forest fragmentation, and other land use impacts which have already occurred during the first few years of shale gas development demonstrate that existing "mitigation" measures are woefully inadequate. Other considerations which the Addendum ignores include the need for setbacks to neighboring residences, business, and land uses; setbacks and restrictions relating to sensitive natural resources, surface waters, wetlands, and aquifers; security such as fencing to secure hazardous materials and prevent access by the public, wildlife, or livestock; and operational restrictions, such as limits on drilling, fracking, or flaring during wildlife migration times and other sensitive periods. The Addendum must be revised to address these many issues and objectively evaluate the inadequacy of current mitigation requirements.

State and Federal Lands
The Addendum fails to assess the efficacy of federal and state rules or guidelines pertaining to drilling and fracking on public lands. (p.64.) There is no discussion in the Addendum of what the BLM "Gold Book" requires or any objective assessment of its effectiveness and related enforcement. Federal regulators typically inspect only a fraction of wells that are drilled and fracked on public land. Regarding state land, the Addendum refers only to guidelines of one state: Pennsylvania. Impacts to state forests in Pennsylvania have been some of the most catastrophic in the nation. Clearly, the PA-DCNR guidelines are not effective. Disturbingly, the Addendum also provides no analysis of the large-scale ecological impacts of widespread fracking on public land, or discusses the need to restrict gas development on certain public lands to ensure the integrity of sensitive habitat, pristine areas, and wilderness. The Addendum must include an objective assessment of existing and projected impacts to public land and the inadequacy of protections in place.

Roadway Impacts
The Addendum improperly downplays concerns of traffic and road damage caused by drilling and fracking activity, asserting that increased traffic caused by gas production may only represent a "small, incremental change" in existing conditions, or is limited to certain local roads at certain times. (p.64.) Communities in and around areas of gas production have experienced significant problems caused by the high volume of large trucks needed to transport water, chemicals, construction supplies, and drilling or fracking waste--often on roads which are not designed to support the volume and weight of vehicles involved. Arterial and major collectors may also be impacted depending on prior levels of service. Although the Addendum acknowledges that damage to roads and bridges can strain government budgets, it fails to evaluate the cumulative impact of this problem. (See Compendium, pp. 56, 58-61.) The Addendum also fails to address how this impacts public safety. A surge in traffic-related deaths have been reported in heavily drilled areas of six states, including counties in North Dakota where traffic fatalities have jumped 350 percent. (See Compendium. pp.56.) The Addendum should be revised to address these issues.

For all of the reasons stated above, we request that the existing draft Addendum be withdrawn. The Addendum and background documentation must be substantially revised and expanded to address the errors, omissions, and deficiencies identified in these comments.

Sincerely,

Americans Against Fracking

Karen Feridun
Berks Gas Truth

Larry Bennett
Brewery Ommegang

Francis Eatherington
Cascadia Wildlands

Jill Wiener
Catskill Citizens for Safe Energy

Wes Gillingham
Catskill Mountainkeeper

Paul Ferazzi
Citizens Coalition for a Safe Community

Suzy Winkler
Concerned Burlington Neighbors

Dennis Higgins
Concerned Citizens of Otego

Caroline Martin
Delaware Action Group

Marie McRae
Dryden Resource Awareness Coalition

Wenonah Hauter
Food & Water Watch

Julia Walsh
Frack Action

Mary Beilby
Gas Drilling Awareness for Cortland County

Yvonne Taylor
Gas Free Seneca

Jay Sweeney
The Green Party of Pennsylvania

Josh Fox
Gasland

Rabbi Katy Allen
Jewish Climate Action Network

Joe Uehlein
Labor Network for Sustainability

Julie Ann Edgar
Lehigh Valley Gas Truth

Kelly Branigan, RN
Middlefield Neighbors

Matt Shapiro
New Jersey Tenants Organization

New Yorkers Against Fracking

Nicole Dillingham
Otsego 2000

Kaye Fissinger
Our Longmont

Kathy Shimberg
Protect Laurens

Gerri Wiley, RN
Residents Against Fracking Tioga

Allegra Schecter
ROAR Against Fracking

Nedra Harvey
Rochesterians Concerned About Unsafe Shale-gas Extraction

Clare Donohue
Sane Energy Project

Sara Hess
Shaleshock Action Alliance

Mary Menapace, RN
ShaleshockCNY

Sheila Cohen
Center for Gender and Intercultural Studies, SUNY Cortland Environmental Justice Committee

Adrian Kuzminski
Sustainable Otsego

Rabbi Arthur Waskow
The Shalom Center