



# GRASSROOTS Environmental Education

Main Office: 52 Main Street • Port Washington • New York 11050 • T (516) 883-0887 • [www.grassrootsinfo.org](http://www.grassrootsinfo.org)  
Wainwright House, 260 Stuyvesant Ave Rye, NY 10580 • 25 Sylvan Road, Westport, CT. 06880

## **CGA Energy and Technology Committee Public Hearing**

**March 4, 2014**

### **H.B. No. 5409 (RAISED) AN ACT CONCERNING HYDRAULIC FRACTURING WASTE.**

#### **Senator Bob Duff, Representative Lonnie Reed, and Members of the Energy and Technology Committee, Good Morning:**

Thank you for the opportunity to address this public hearing. My name is Ellen Weinger. I am an environmental health educator and public health advocate and the Educational Outreach Director of Grassroots Environmental Education, a science-based nonprofit working closely with leading medical and scientific experts in the field of environmental health.

Grassroots Environmental Education supports the Energy and Technology Committee's H.B. 5409 that identifies hydraulic fracturing waste as hazardous. This bill is a step in the right direction, but will require more inclusive and comprehensive language in order to protect human-dependent natural resources and the citizens of Connecticut. Solely classifying hydraulic fracturing waste as hazardous waste is insufficient on its own to protect the health and safety of Connecticut residents.

We strongly urge that the bill also include language to prohibit the procurement, acquisition, possession, storage, handling, treatment, processing, application or disposal of all treated or untreated oil and gas drilling waste byproducts and their constituents for any purpose in the State.

The most fundamental responsibility of public officials is to protect the health and safety of constituents. To fulfill that responsibility, legislators must properly classify fracking waste as hazardous waste and ban it from the State. This is not a Democratic issue. This is not a Republican issue. This is a public health issue. This is not about whether you support or oppose fracking. This is about protecting Connecticut families. This is about the lack of capacity to handle toxic waste byproducts from oil and gas drilling operations known to be highly radioactive and that could potentially cause irreversible damage.

Costly lessons have been learned the hard way before when businesses have made profit at the expense of taxpayers and public health. PCBs, lead, asbestos, and Love Canal are just a few examples. Public health must come first.

There is no way to control the certain harm if the door is opened in Connecticut to toxic fracking waste. If allowed, convoys of leaking trucks hauling prodigious amounts of toxic, radioactive waste from oil and gas drilling operations will ply Connecticut's roads finally finding a dumping ground for Pennsylvania's toxic fracking waste problem.

Highly contaminated radioactive fracking waste byproducts from oil and gas exploration and extraction activities can potentially cause irreversible damage to air, water, soil and food supplies yet there are no safe options for handling, processing, storing or disposing of the billions of

gallons of hazardous radioactive oil and gas drilling waste byproducts that are produced each year.

The Pennsylvania Department of Environmental Protection (DEP) data noted a marked increase in radiation alarms at Pennsylvania landfills between 2009-2012 triggered by waste trucks from hydrofracking wells with over 1,000 of those radiation alarms coming from oil and gas waste. That does not factor in the millions of gallons of radioactive fracking waste that were handled or disposed of through other means.

Hydraulic fracturing, also known as “hydrofracking” or “fracking”, is a technology used for oil and gas extraction from shale formations which involves the injection of millions of gallons of fresh water mixed with hundreds of chemicals and sand forced under high pressure into the well bores to crack open the shale. The fissures created by this fracturing are held open by the sand particles so that oil or gas can be released up the drill shaft.

Ten to forty percent of this highly toxic mixture is returned to the surface with the oil or gas and additional contaminants including volatile organic compounds (VOCs), heavy metals (e.g. arsenic, lead, chromium, mercury), brine 8 times saltier than seawater, and radioactive elements including radon and radium.

The extraction process produces two types of wastewater. Flowback water is the chemically treated fracking fluid that returns to the surface shortly after a fracking operation. Produced water, also known as formation water or fracking brine, is the fluid that comes out of the target drilling formation along with the oil or gas.

Produced water or fracking brine has high levels of chlorides and bromides and contains toxic heavy metals. Produced water from the Marcellus Shale formation could potentially contain high levels of radium-226 and radium-228, which are known carcinogens. Radium-226 has a half-life of 1600 years and is linked to anemia, cataracts, bone, liver and breast cancers. Radon, a decay product of radium is considered the leading cause of lung cancer in non-smokers nationwide. Radioactive materials including radium and its decay product, radon, are known to be significantly higher in the Marcellus Shale.

According to a U.S. Geological Survey study, levels of total radium tested in the wastewater from eleven active New York vertical gas wells averaged over 8,400 pCi/L exceeding the EPA’s maximum contaminant level for drinking water by more than 1,000 times (5 pCi/L for combined radium-226 and radium-228).

Vertical oil and gas wells are typically 1500-3000 feet deep. Horizontal wells reach depths of 6,000 feet before running horizontally for a mile or more providing an even greater overall exposure to shale formations and the radioactive materials contained within it, increasing the likelihood of bringing greater quantities of radioactive contaminants to the surface.

In a 2011 review of federal, state and company records, the New York Times reported that in a sampling of wells studied in Pennsylvania and West Virginia, reported levels of radium or other radioactive elements exceeded EPA’s maximum contaminant level for drinking water by 100 times to more than 1,000 times.

According to the report, **Consideration of Radiation in Hazardous Waste Produced from Horizontal Hydrofracking**, authored by Ivan White, a staff scientist for the congressionally commissioned National Council on Radiation Protection, radioactive materials can migrate through air exposing crops and plants, soil, animals, livestock, food supplies and humans. Radioactive contaminants can also migrate through soil and surface or groundwater exposing sand and sediment, aquatic animals and plants, fish, irrigation water, vegetation, animals, livestock, food supplies and humans.

In his report, Ivan White, stated, “Importantly, the type of radioactive material found in the Marcellus Shale formation and brought to the surface by horizontal hydraulic fracturing is the type that is particularly long-lived and could easily bio-accumulate over time and deliver a dangerous radiation dose to potentially millions of people long after the drilling is over.”

Radioactive materials do not dissipate; they spread further.

Radium-226 emits gamma radiation known to travel fairly long distances through air, raising risks for cancer in communities.

Naturally occurring radioactive materials (NORM) are distributed through geologic formations and exist undisturbed in nature whether at the earth’s surface or below the surface.

However, when NORM are disturbed and transported by human activity to human environments they are considered technologically enhanced naturally occurring radioactive materials (TENORM) increasing potential of exposure that may result in concentration levels above background levels.

In a recent peer-reviewed study at University of Texas and University of North Texas Health Science Center, School of Public Health, Department of Environmental and Occupational Health, soil and water (sludge) obtained from reserve pits used in unconventional natural gas activities were analyzed for the presence of technologically enhanced naturally occurring radioactive material (TENORM). Samples were analyzed for total gamma, alpha, and beta radiation, and specific radionuclides. Laboratory analysis confirmed elevated beta readings. Specific radionuclides present included Thorium-232 and Radium-226 radionuclides.

According to the authors, many of the radionuclides found in oil and gas drilling waste and their constituents are not addressed by regulatory guidance documents and negligible information is provided in determining potential of cumulative effects of simultaneous exposure to several radionuclides or potential human and animal health impacts. The study also indicated that the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) do not have established federal regulations that directly govern NORM waste from the oil and gas industry.

The term NORM is often misused when applied to radioactive material introduced into human environments by oil and gas exploration and extraction operations. Hazardous radioactive oil and gas drilling waste byproducts are generally improperly classified as NORM instead of TENORM which would require special disposal requirements under radioactive waste law.

Synergistic catalysis, a relatively new field of chemical study, is concerned with the ability of synthetic chemicals to spontaneously form new chemical bonds when exposed to sunlight, water, air and radionuclides or other chemical catalysts. The potential health risks of resulting compounds are unknown and pose a public health threat as mixtures of fracking chemicals, interaction of chemicals with radioactive materials and reaction of chemicals with other contaminants under heat and pressure cause unknown synergistic reactions.

All oil and gas drilling waste is classified as “industrial waste” under federal and state laws as a result of special exemptions given to the oil and gas industry, although the waste exceeds the legal criteria for hazardous waste classification. These exemptions eliminate hazardous waste tracking requirements for the handling, storage, treatment and disposal of oil and gas drilling waste.

Exemptions as part of the Energy Act of 2005 include the Safe Drinking Water Act, the Clean Water Act, the Clean Air Act, the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Environmental Policy Act (NEPA) and the Toxic Release Inventory of the Emergency Planning and Community Right-to-Know Act.

Fifty-nine scientists attested to the fact that wastewater treatment facilities are not designed to treat chemicals, contaminants and highly radioactive materials produced from hydrofracking operations. High bromide levels in oil and gas drilling waste byproducts are highly corrosive to equipment and can react during water treatment to form brominated trihalomethanes linked to bladder and colon cancers and are associated with birth defects. Once added to drinking water supplies, trihalomethanes are difficult to eliminate.

According to another recent study conducted at Duke University, authors examined water quality and isotopic compositions of discharged effluents, surface waters, and stream sediments associated with a treatment facility site in western Pennsylvania. The elevated levels of chloride and bromide, combined with the strontium, radium, oxygen, and hydrogen isotopic compositions of the effluents reflect the composition of fracking waste from the Marcellus Shale. Downstream from the treatment facility, concentrations of chloride and bromide were above background levels. Barium and radium were reduced in the treated effluents compared to concentrations in Marcellus Shale produced water. However, Radium-226 levels in stream sediments at the point of discharge were 200 times greater than upstream and background sediments and above radioactive waste disposal threshold regulations, posing potential public health and environmental risks of radium bioaccumulation in areas of shale gas wastewater disposal.

Vehicles transporting hazardous radioactive hydrofracking waste byproducts increase the risk of human and animal exposure and contamination of water, air, soil and farmland when accidents, leaks, and spills occur. No special hazardous waste warning signs or emergency instructions are on the trucks placing first responders and residents at risk.

Increased risk of exposure is posed when hazardous fracking waste byproducts and their constituents are used for road spreading applications, maintenance and construction including dust control and de-icing on roads. While some states unwisely allow this practice, other state and local governments may, unwittingly, be procuring processed fracking waste. Road application products may originate from processed fracking waste from underground storage of natural gas or liquefied petroleum gas well storage operations or fracking activities. Full disclosure of ingredients and origin of all road application products is imperative.

Truck accidents, spills, leaks, and road spreading applications can expose drivers, passengers, pedestrians, animals and livestock to dangerous pollutants while contaminating nearby surface waters, residential areas, school properties and cropland. Radioactive particles may become airborne as trucks and passenger vehicles travel along roads and can be tracked on tires into driveways and garages and ultimately tracked in on shoes into homes. Rain and snowmelt carrying radioactive materials can run off road surfaces where it can migrate onto nearby property, farms and into streams, ponds and irrigation systems, leach into soil or seep into groundwater. These numerous pathways of exposure pose increased risk for human and livestock inhalation and ingestion of highly radioactive materials, and carcinogenic and endocrine disrupting chemicals.

Landfill disposal of radioactive sludge from oil and gas drilling operations could contaminate them for thousands of years. All landfill membranes fail eventually and leaching or flooding could result in contamination of nearby ponds, streams, or groundwater. Leachate from landfills is a frequent cause of groundwater contamination.

Storage of hazardous radioactive waste from oil and gas extraction operations in closed containment tanks can result in groundwater and surface water contamination. Closed containment tanks often used for storage of oil and gas drilling waste byproducts could corrode over time, resulting in leaks, and may overflow or rupture if capacity is surpassed.

Agricultural areas are vulnerable to the immediate threat posed by hazardous radioactive oil and gas drilling waste byproducts and their constituents. Mounting evidence reveals livestock illness and death from acute toxicity poisoning from harmful exposures to oil and gas drilling waste

byproducts. Reproductive problems in cows and higher rates of stillborn and deformed calves have also been reported.

Presence of highly radioactive materials and other contaminants on farmland and in food products can cause irreparable damage and serious financial impacts. Protection of the quality and safety of food production is imperative for the health and safety of residents and to ensure consumer confidence in food production in this region which could be easily undermined if oil or gas drilling waste byproducts and their constituents are accepted for disposal at wastewater treatment plants and landfills, applied on roads or processed, treated, stored or handled for any other purpose.

There are also numerous reports of “midnight dumping” by contractors of hazardous radioactive hydrofracking waste byproducts on roads, in ditches and wetlands and other properties.

Potential exposure to toxic chemicals and radioactive contaminants comes at a tremendous toll to human health and the economy. According to Mount Sinai School of Medicine’s Children’s Environmental Health Center, environmentally mediated disease continues to spiral and take a huge toll on our most vulnerable population, our children. Children are uniquely vulnerable to toxic exposures. Their immature organs and developing bodies make it more difficult for them to detoxify or eliminate toxins. Due to their small size, they take in more chemical contaminants, pound for pound, than adults.

Asthma has tripled in the past three decades and has become the leading cause of emergency room visits, hospitalizations and school absenteeism.

Birth defects are now the leading cause of infant death. Certain birth defects have doubled in frequency.

Developmental disorders such as ADHD, dyslexia and learning disabilities affect one of every six American children. Autism has increased sharply in prevalence and now afflicts one child in 88.

Primary brain cancer among children has increased in incidence by nearly 40% from 1975 to 2004, according to the National Cancer Institute.

Childhood leukemia has increased in incidence by over 40%. Benzene and other solvents are linked.

According to the World Health Organization, environmental exposures are responsible for 35% of all childhood disease and deaths worldwide. The U.S National Academy of Sciences has determined that environmental factors contribute to 28% of developmental disorders.

This all comes at a hefty price to families, schools, communities, health institutions and our society. A recent analysis in 2002 estimates that the total cost of environmentally mediated disease in children alone adds up to over \$54 billion annually. This figure does not factor in costs to taxpayers for the adult population impacted by toxic exposures.

Connecticut cannot afford to take these grave and unnecessary risks to public health and the economy. We strongly urge the proper classification of fracking waste as hazardous waste and the prohibition of the procurement, acquisition, possession, storage, handling, treatment, processing, application and disposal of all treated or untreated oil and gas drilling waste byproducts and their constituents for any purpose in Connecticut including but not limited to the prohibition of the disposal of all treated or untreated oil and gas drilling waste byproducts and their constituents at all wastewater treatment facilities and solid waste management facilities; the prohibition of the use of all treated or untreated oil and gas drilling waste byproducts and their constituents for road spreading applications, maintenance and construction, the prohibition of handling, processing,

treatment or storage of all treated or untreated oil and gas drilling byproducts and their constituents for any purpose in the State.

The prohibitions should also include any liquid or solid waste or its constituents that are generated as a result of oil or natural gas extraction activities which may consist of water, brine, chemicals, naturally occurring radioactive materials, heavy metals or other contaminants, leachate from solid wastes associated with oil or gas extraction activities, any waste that is generated as a result of or in association with the underground storage of natural gas or liquefied petroleum gas well storage operations, and any products or byproducts resulting from the treatment, processing or modification of any of the above wastes.

H.B. 5409 must go beyond the deserving classification of hydraulic fracturing waste as hazardous waste and ban fracking waste in the State in order to adequately protect the health and safety of Connecticut residents.

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Ellen Weininger  
Educational Outreach Director  
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