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for the

Committee on Environmental Protection,

James F. Gennaro, Chair

Council of the City of New York

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I. Introduction

Thank you for the opportunity to present testimony related to Natural Gas Drilling in the New York City Drinking Water Watershed. I am the Senior Staff Attorney for the Oil & Gas Accountability Project (OGAP), a program of Earthworks. Our mission is to work with communities to address and reduce the impacts of oil and gas development.

My testimony is based upon OGAP's experience with oil and gas development during the past decade. In particular, I am drawing upon my experience as an appointed member of the New Mexico Governor's Pit Rule Task Force, OGAP's formal participation in three sets of state rulemakings covering all aspects of oil and gas development over the past 3 years and OGAP's development of, and support for, successful surface owner protection legislation in Colorado and New Mexico.

In addition, my testimony draws upon OGAP staff research and involvement in EPA processes regarding coalbed methane development and hydraulic fracturing. During this involvement, OGAP staff prepared Our Drinking Water at Risk (2005) and The Oil and Gas Industry's Exclusions and Exemptions to Major Environmental Statutes (2007).

We have also produced the Oil and Gas at Your Door? A Landowner's Guide to Oil and Gas Development (2nd Ed., 2005), the preeminent guide for landowners facing the prospect of oil and gas development on their land.

Finally, in response to numerous inquiries from individuals, organizations and local governments, OGAP produced Marcellus Gas Shale – A Report (2008) earlier this year, which discusses what can be expected from gas development in the Marcellus shale.

My testimony will first address the three main risks to water posed by gas development: well drilling and production, hydraulic fracturing and transportation of fluids to and from the wellsite. I will then briefly describe some specific incidents that illustrate these risks in a number of different states. Then, I will briefly discuss the current New York regulations most applicable to the risks associated with gas development. Finally, I will present some of the approaches that other municipalities and states have developed to try to address these risks.

II. Contamination Risks to Water from Gas Development

It is important to keep in mind that gas development is an industrial activity. The operations associated with gas development, no matter where they take place, generally follow a similar pattern of scope and intensity. It is also important to keep in mind that gas development will take place over a 20 to 30 year time frame. It is not a simple, once in and out kind of operation, particularly in the case of the Marcellus shale.

There are a number of potential environmental and public health impacts associated with each stage of gas development – exploration, drilling, production, treatment of the gas, and plugging and abandonment of wells. These impacts include loss of land value due to surface disturbance, contamination of ground and/or surface waters, human or animal

health effects related to ground and/or surface water contamination, erosion or sedimentation, loss of wildlife habitat, and air and soil degradation.

Based upon experience with gas development elsewhere, the most important risks from the perspective of protecting the New York City water supply are those that might result in the release of hydrocarbons and other contaminants to the land surface, into soils and groundwater or into surface waters. Releases of these contaminants may occur in a single event, such as a spill, or over longer periods of time, through seepage from drilling or fracturing pits, or from slow leaks in pipes and storage tanks. Spills are the most common type of release and may be small or large in volume. These spills and seepage result from human error, equipment failure, transportation accidents, improperly designed containment facilities, vandalism, or natural phenomena, such as floods or storm events.

These releases and subsequent contamination are not just theoretical, but are real events that have been documented across the gas fields of the United States today. For example, New Mexico has experienced significant impacts to its water resources from oil and gas development. Between 1992 and 2000, the New Mexico Oil Conservation Division (OCD) documented over 700 groundwater contamination events due to oil and gas development.[1] As a consequence, New Mexico has recently completed a revision of its rules related to drilling and fracturing fluids and how oil and gas wastes are handled following the completion of a well. The experience in New Mexico has led to a far stronger emphasis in regulation on prevention of the risks of contamination, and a shifting of the liability and cost of contamination from the public to the gas company.

The New Mexico experience, based upon sampling, has also shown that many of the contaminants released by oil and gas development are hazardous and even toxic to public health and the environment. The New Mexico OCD conducted an analysis of drilling and production pits in 2007 and found that many of these pits contained high enough levels of heavy metals and other hazardous constituents, e.g., naphthalene, benzene, and toluene, to be considered Superfund Sites.[2] In fact, a report prepared by the OCD staff stated that: "except for the RCRA Exemption, … constituents were present at concentrations that would be characteristically hazardous at other sites".[3]

There has been a similar experience in Colorado. Our review of that state's database found that over 1500 reported spills/releases have occurred since January of 2003. Of these 1500, over 20% have impacted ground and/or surface water.[4] The oil and gas industry submitted its own study to the Colorado Oil and Gas Conservation Commission this past summer. The industry's testing results were above state groundwater standards

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[1] New Mexico oil Conservation Division, *Generalized Record of Ground Water Impact Sites,* September 30, 2005. Available at: http://www.emnrd.state.nm.us/ocd/Statistics.htm.

[2] New Mexico Oil Conservation Division, *Analytical Results of OCD's Pit Sampling Program* (2007). Available at: http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental.

[3] New Mexico Oil Conservation Division Presentation by Staff at Pit Hearing #14015, Exhibit #15, *OCD's 2007 Pit Sampling Program: What is in that pit?* (November 2007).

[4] Oil & Gas Accountability Project, *Colorado Oil and Gas Industry Spills: A Review of COGCC Data (January 2003-March 2008),* April 23, 2008. Available at: http://www.ogap.org.

for benzene and toluene for samples taken in each of the four major oil and gas development basins.[5]

Impacts to water sources from the transportation of produced water, waste pit contents and hydraulic fracturing (fracing) fluids are also of great concern. For almost all gas shale wells the rock around the wellbore must be stimulated or hydraulically fractured before a well can produce significant amounts of gas.[6] This fracturing process, as well as others during the life of a well, requires hundreds of large trucks to haul the stimulating and fracing constituents. Not only does this impact the roads and residents with noise and dust, but it also creates the inevitable consequences of trucking accidents - accidents that can involve large volumes of hazardous materials.

For example, residents in the area of the Barnett shale in Parker County, Texas are already experiencing tremendous amounts of truck traffic – approximately 100 trucks per day in a neighborhood that, as yet, only has 10 wells drilled out of the 30 planned for development. Citizens living in older gas fields, such as those in Colorado, also know the consequences of heavy truck traffic on their neighborhoods and water resources. In 2005, a Halliburton truck released over 300 gallons of acid into the Colorado River when the truck overturned. In 2006, another Halliburton truck spilled diesel fuel into the Colorado River as a result of an accident.[7]

III. Specific Incidents

The following incidents illustrate that the spills and releases occur in a variety of ways, through drilling, waste pits and hydraulic fracturing, affecting both people and their water.

Hydraulic Fracturing: A couple in Garfield County, Colorado had their water well explode after fracturing activities began on the neighboring property (approximately 1000 feet from their house). They could light their water on fire because of the high levels of methane, although the agency initialing maintained that the methane was naturally occurring. It wasn't until the impacted woman developed a rare adrenal gland tumor and pursued her case with the legal help, and the assistance of a scientist, that more tests were completed showing that methane and chemicals, including 2-BE, had in fact gotten into their water because of the drilling and fracturing activities.[8]

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[5] Colorado Oil and Gas Association, Rebuttal Statement Exhibits 10 - 5 & 10 - 6, Colorado Oil and Gas Conservation Commission Hearing Docket #0803-RM-02 (2008). Available at: http://cogcc.state.co.us/RuleMaking/2007RuleMaking.cfm.

[6] Oil & Gas Accountability Project, *Shale Gas: Focus on the Marcellus Shale* (May 2008). Available at: http://www.ogap.org.

[7] Department of Homeland Security, *Dept. of Homeland Security Daily Open Source Infrastructure Report* (November 11, 2006). Available at: http:// osd.gov.com/osd/200611_November/DHS_Daily_Report_2006-11-22.pdf.

[8] Oil & Gas Accountability Project, *Oil & Gas at Your Door? A Landowners Guide to Oil and Gas Development*, pg. IV 23 – IV 25 (2005).

Drilling and Fracturing Fluids from Pits: A rancher in southwest Colorado came home a day after a well had just been completed on the neighboring property, approximately 400 feet from his house. He took a drink of water from his kitchen sink and immediately spit it out because of the bad taste. The regulating agency in Colorado determined that an unlined drilling pit had been used and that fluids from that pit had contaminated the rancher's domestic water well.

Another Coloradoan recently visited his hunting cabin in the western part of the state to find that his water well had been contaminated. The gentleman took a drink of water from his tap and immediately felt a burning sensation in his mouth and throat. He was taken to the hospital for treatment, as testing of his water revealed that it contained benzene – a known carcinogen. The regulating agency has issued notices of alleged violation to several companies and the exact source of contamination remains under investigation.[9]

Waste Drilling Fluids: This past winter, as a result of at least four pit-related leaks near the Garden Gulch area in northwest Colorado, a frozen waterfall of pit sludge threatened the land and irrigation surface waters of area residents. The release came from leaks at the bottom of pits and traveled through fractured shale until it reemerged as a frozen waterfall over a cliff. The regulating agency has confirmed that the spills were from pits, has issued notices of alleged violation, and is working towards remediation.[10]

Water Well Contamination: On August 26, 2008, the Pinedale (Wyoming) Anticline Working Group released its annual report on area ground and surface water quality for the Pinedale gas field. The report revealed that a number of water wells in the area were contaminated. The Sublette County Conservation District (SCCD) performed the yearly analysis, testing for a number of chemicals, including chloride, fluoride, sulfate, and total dissolved solids. Beginning in spring 2008, some wells were also tested for total petroleum hydrocarbons (TPH), which measures the diesel range organics (DRO) and gasoline range organics (GRO) of the water.

In its annual report, the SCCD gave results from 257 samples, taken from 220 wells. These included industrial wells, stock wells and domestic wells. 23 percent were above accepted limits for drinking water.[11]

House Explosion and Hydraulic Fracturing: On December 15, 2007, the Geauga County Emergency Management Agency notified an Ohio Department of Natural Resources, Division of Mineral Resources Management (DMRM) Inspector that there had been an explosion at a house in Geauga County, Ohio. The Bainbridge Township Fire Department and Dominion East Ohio personnel recognized that natural gas was entering

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[9] Article pertaining to the contamination can be found at: http://www.postindependent.com/article/20080701/VALLEYNEWS/270473249/1001&parentprofile=1074

[10] Article pertaining to the spills in the Garden Gulch area can be found at: http://www.postindependent.com/article/20080315/VALLEYNEWS/877853434

[11] Article pertaining to the contaminated wells in Pinedale, WY can be found at: http://www.pinedaleroundup.com/V2_news_articles.php?heading=0&story_id=788&page=72.

homes via water wells. The DMRM subsequently determined that accumulation and confinement of deep, high-pressure gas in the surface-production casing annulus of a recently drilled gas well resulted in the migration of gas into natural fractures in the bedrock below the base of the cemented surface casing. The pressure associated with the hydraulic fracturing of the well contributed to the gas migrating vertically through fractures into the overlying aquifers before exiting the aquifers through local water wells.[12]

IV. Brief Assessment of NY Regulations

OGAP staff has recently begun a detailed review of New York's oil and gas regulations, as compared with other state regulations. Our initial review indicates that the current New York state oil and gas regulations do not seem adequate to protect public health and the environment. Comprehensive regulations that require operators to maintain chemical inventories, residential setbacks, best management practices, and exclusionary buffer zones are currently in use around the country. These regulations are not in place in New York and should be incorporated into the New York regulatory scheme prior to development in the Marcellus Shale.

Specifically, the current setback for public water sources provided in 6 NYCRR § 553.2 is 50 feet. The incidents mentioned above clearly show that contaminants can travel considerably farther than 50 feet. Colorado is currently considering a buffer zone of 300 feet within municipal watersheds, based on these incidents and many others that have threatened the quality of ground and surface water sources.[13]

Further, the regulations for waste pits provided in 6 NYCRR § 554.1 do not address drilling fluids. Waste pits that contain drilling fluids do not have to be lined, cleaned up and wastes disposed of in a permitted facility, or even monitored for potential seepage into groundwater sources. As was found in studies conducted by Colorado and New Mexico, drilling fluids move very rapidly, in air or in soil and water, can be hazardous and can be very expensive to clean up, if not properly managed. New Mexico has implemented considerably stricter standards for all waste pits, which have almost effectively eliminated them from the southeastern part of the state. Colorado is in the process of overhauling all of its rules, including those that apply to waste pits.

There are currently over 14,000 active wells in the state of New York.[14] This number is expected to grow exponentially over the next 30 years, as the Marcellus shale begins to be developed. While OGAP could not get a firm confirmation of staffing levels from the Bureau of Oil and Gas Regulation, we believe that there are three compliance and

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[12] Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio, September 1, 2008, Ohio Department of Natural Resources Division of Mineral Resources Management.

[13] Information regarding the proposed Colorado oil and gas regulations can be found at: http://cogcc.state.co.us/.

[14] http://www.dec.ny.gov/energy/205.html.

environmental enforcement staff. If the Marcellus shale develops quickly, it is physically impossible for this level of staffing to adequately handle this level of growth, particularly given that the current NY regulations are based on a reactive standard rather than a proactive one.

V. Possible Approaches

In thinking about possible approaches to protecting New York City's drinking water, there are a number of suggestions that can be made, based upon experience elsewhere.

1. A Voice at the Table. At the most general level, municipalities and landowners have consistently found that they need a direct voice in the permit process. As with most states, the New York Bureau of Oil and Gas's mission is mostly focused on the development of the resource, not on protecting drinking water. It would be a mistake to expect otherwise. Therefore, the user of the water needs to establish a formal role in any drilling permit application process. Trying to get others to protect the water, or trying to influence how permits are administered after the fact does not result in good protection.

2. Prevention first. The hydrocarbons and chemicals at the heart of this industrial activity are notoriously mobile and (often) hazardous to health. Trying to chase down benzene, salts, heavy metals or polymers once they have been released into the soil or water is difficult, expensive and often unsuccessful. Therefore, building prevention measures into any gas drilling regulations is the most effective approach to protecting the water resource.

Two items in particular are critical to reducing the risk of contamination of water. First, the use of pitless drilling systems (sometimes called closed-loop drilling systems) should be mandatory within the city's drinking water watershed. The use of drilling mud or fracing fluid pits is not operationally required, is one of the single biggest contamination risks and represents a significant liability risk for the operator.[15] Lovington, New Mexico, Palisade and Grand Junction, Colorado, and now the state of Colorado have required pitless drilling or are about to require pitless drilling in drinking water watersheds.

Second, any drilling regulations must require that the drilling site and related facilities be cleaned up to 'multiple-use' standards upon completion of gas development. By this, I mean incorporating any state hazardous waste numeric standards, for constituents such as hydrocarbons, chlorides, and heavy metals, in particular, into the gas drilling closure regulations. Experience in other states has shown very clearly that having such a clean-up standard at the end of the line focuses the operator's attention on his operations during the life of the well. In order to avoid heavy clean-up costs down the road, the operators find ways to minimize their waste production and handling in salutary ways, which has the effect of reducing the risks of contamination to water resources. After all, a gas well's life is only 20 to 30 years, not forever. So it is reasonable to expect that the site

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[15] Oil & Gas Accountability Project, *Closed –loop drilling systems – a cost-effective alternative to pits* (2007). Available at: http://www.earthworksaction.org/alternativestopits.cfm#CLOSEDLOOP

should be maintained and then left available for any other subsequent use once the well is gone.

3. Build in buffers. Despite the best planning and intentions, accidents and releases will still happen during gas development. Recognizing this, regulators and governments are trying to put in place mechanisms that build in physical or temporal separation between the source of contamination and the significant public resource that needs protection. These buffers provide additional opportunities for remediation efforts to be successful, when there has been a spill or release. They accomplish this by putting in place 'no drill' setbacks along watercourses and around water wells.

With the developments in drilling technology that allow directional and horizontal drilling to much greater distances, the use of setbacks is now feasible in a way that was not thinkable when all drilling was simply vertical. Operators can and do move their drilling sites away from watercourses, residences, schools, etc. and still can reach the gas resource.

4. Be prepared. Given the industrial nature of gas development, governments should expect to have to respond to accidents. We increasingly see the involvement of emergency response personnel, whether to a gas well blowout, a gas field worker doused in drilling fluids or fire department personnel responding to a tanker truck lying on its side in a stream. In each of these instances, it is crucial that the responders have some idea of the nature and characteristics of any chemicals or constituents involved. That is why the State of Colorado is on the verge of requiring operators to maintain a chemical inventory for each well site. That is why La Plata County and Sublette County are doing the same. It is simply good safety practice.

In the medium term, there is also discussion of requiring the use of 'green' drilling and fracing fluids. That would help to avoid some of the potential risks to water, workers and adjacent residents. However, we, at OGAP, have not yet seen a well-developed example of this in a regulatory format, although some operators claim the use of 'green' drilling fluids and the offshore drilling regulatory program has some helpful components already in place.[16] It may be that New York City would want to explore this concept with the state to help protect its drinking water.

5. Speed is not the answer. The pace of gas drilling and development is largely a function of an operator's economic desire to generate the largest volume of gas as quickly as possible. We, at OGAP, have heard hours of testimony from the supermajor oil companies to small independents, and they all admit this fact. The ultimate volume of gas recovered does not differ significantly if the pace of development is slower; the operators may simply not generate as much revenue in the early part of a gas field's development.

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[16] Information on the availability of "green" drilling fluids at: http://web.ead.anl.gov/dwm/techdesc/lower/index.cfm.

As a consequence, New York City may want to explore with the state the ideas of clustering gas development and phasing it over time. By clustering, I mean focusing permit approvals within a fairly focused area, and not simply allowing drilling everywhere at once. By phasing, I mean requiring the full development of the focused area before allowing development to move into other areas. Otherwise, the development pattern is driven by uncoordinated individual operators and their short-term revenue needs. This nearly always results in increased impacts to water, air, communities and wildlife.

6. Federal regulatory support may be helpful. As OGAP and others have noted, the Energy Policy Act of 2005 exempted hydraulic fracturing from federal regulation under the Safe Drinking Water Act (SDWA).[17] Industry has often confirmed that hydraulic fracturing occurs at least once at 90% of all oil and gas wells. If the experience in the Barnett shale is any guide, each Marcellus shale gas well will require multiple hydraulic fractures over the life of the well. Given the range of chemicals involved, the high pressures used and the potential hazards associated with these chemicals, it may be prudent for New York City to look for assistance in regulating hydraulic fracturing not only with the state, but also with Congress.

Thank you for your time and attention, and I would be glad to answer any questions that you might have.

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[17] Oil & Gas Accountability Project, *The Oil and Gas Industry's Exclusions and Exemptions to Major Environmental Statutes* (2007). Available at http://www.ogap.org.