

**Comments on Proposed DEC Regulations  
Marcellus Shale Development  
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These comments on the proposed DEC regulations on Marcellus Shale Development pertain primarily to health and safety issues. Since the previous GEIS<sup>1</sup>, DEC has examined the regulatory experience in other states and responded to the concerns of New York City and State residents. The agency has done an excellent job in applying the experience of other States to New York. Nevertheless, the regulatory approach by DEC still needs major improvements and will not be protective of gas workers, the public and the environment. The author of these comments has had 20 years experience examining NORM in oil and gas exploration and production in Louisiana, Texas, Kentucky, Mississippi and more recently in New York State.

As with our previous comments on the rdsgeis<sup>2</sup>, these comments do not directly pertain to the visual, noise or socioeconomic impacts of fracking

**General Comments in Support of Proposed Regulations**

The following sections of the proposed regulations are highly commendable and should be supported. Prior to drilling, DEC will require water well testing to establish a baseline. With this information, the State can know whether an aquifer has become contaminated, and can require cleanup to background. The State will also require information on nearby wells, including abandoned wells. This is important because increased pressure in the gas reservoir during fracking operations may lead to release of gas from nearby wells. DEC will also require a plan for disposal of flowback water and brine before drilling. This is important because flowback water and brine will be radium-contaminated and must be properly disposed of. If flowback water and brine go to treatment plants, DEC will require SPDES permits for treatment plants and documentation of treatment plans before use, including monitoring requirements and testing at elap-certified labs.

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<sup>1</sup> Draft, Supplemental Generic Environmental Impact Statement On The Oil, Gas and Solution Mining Regulatory Program, Well Permit Issuance for Horizontal Drilling And High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs," NYS Dept of Environmental Conservation, September 2009

<sup>2</sup> Resnikoff, M, "Comments on rDSGEIS on Marcellus Shale Development," Radioactive Waste Management Associates, October 2011.

DEC will also require a listing of chemical additives to drilling fluids. Further, DEC will require specific well spacing between wells, with specific drilling depths and locations away from water supplies and aquifers.

Before drilling within the Marcellus shale, DEC has specific requirements for blowout preventers including pressure testing. DEC also has specific detailed drilling and hydrofracturing requirements. Directional drilling cannot vary more than 5% from vertical depth; this is important to ensure that drills do not pierce the gas containment layer. Finally, DEC has specific requirements regarding the cementing of casings.

Nevertheless, in our opinion the regulations do not go far enough in protecting water supplies and the health and safety of the general public, as we discuss below.

### **Section 551.6**

*The owner of an oil, gas or solution mining, storage, stratigraphic, geothermal or disposal well that exceeds or that is expected to exceed 6,000 feet in true measured depth must file financial security for that well in an amount based upon the anticipated costs of plugging and abandoning that well to the satisfaction of the department in accordance with Part 555 of this Title, up to \$250,000. However, the owner is not required to file financial security under this section exceeding \$2,000,000, regardless of the number of wells described in this section that the owner may have]*

It is commendable that DEC has changed this section to not place a dollar figure on plugging and abandoning a well. In addition to security for well plugging, DEC should require, if it has not done so in another section of the regulations, security or insurance for liability, to compensate the State and residents in case of a major accident or contamination of a water supply. In addition, Section 551.6 does not identify the form of security. This should be in the form of insurance or money placed in an escrow account overseen by the State. This should not be in the form of a security bond, which is only as good as the financial state of a company. In case of an extreme accident that tests the economic viability of a company, a security bond can be withdrawn by the issuing bank or company.

### **Part 554, Drilling Practices and Reports** **Subdivision (c) of Section 554.1**

*(c)(1) Prior to the issuance of a [well-drilling] permit to drill, deepen, plug back or convert a well for any operation in which the probability exists that brine, salt water or other polluting fluids will be produced or obtained during such drilling operations or used to conduct such operations in sufficient quantities to be deleterious to the surrounding environment, the operator must submit and receive approval for a plan for the environmentally safe and proper ultimate disposal of such fluids.*

It is not clear from the GEIS what constitutes “environmentally safe...disposal of such fluids.” It is doubtful that standard water treatment plants will be satisfactory. Filter

sludges are likely to become contaminated with radium, in which case DEC is just kicking the can down the road. Radium can be removed from flowback water; removal of radium is customarily done at uranium mills, but then the radium contaminated waste should be sent to Energy Solutions in Utah, or another location licensed to handle this radioactive waste. DEC should provide more specific guidance to the gas industry. DEC should also require that the aquifer be tested for concentrations of hydrocarbons, arsenic mercury, TDS and radium before well drilling commences, so that a baseline of background concentrations is known. In this way, DEC will know whether gas well drilling and production have contaminated an aquifer.

*(c)(4) Prior to the issuance of a permit to drill, deepen, plug back or convert a well, the operator must submit and receive approval for a plan for the environmentally safe and proper disposal or beneficial re-use of drill cuttings on-site or off-site.*

As DEC is aware, only a small percentage of drilling fluids and cuttings can be reused.

### **560.3 Application Requirements.**

In addition to the excellent list of requirements before gas drilling can commence, the Department should require testing of the aquifer for hydrocarbons, arsenic, mercury, TDS and radium, in an elap-certified laboratory.

### **560.5 Testing, Recordkeeping and Reporting Requirements**

#### **(d) Water well testing**

*(1) prior to well spud, the operator must make all reasonable attempts to sample and test residential water wells within 1,000 feet of the well pad for the parameters specified by the department.*

Before drilling, water well testing is important, in order to establish a baseline. This will allow DEC to know the impact of well drilling and gas production on the aquifer, particularly when gas wells are taken out of service. However, the department does not specify the parameters to be tested. This is open to lobbying by gas companies. At a minimum, the department should specify the parameters: hydrocarbons, arsenic, mercury, TDS and radium.

### **Section 560.7 Waste Management & Reclamation**

*(c) Cuttings contaminated with oil-based mud or polymer-based mud must be contained and managed in a closed-loop tank system and not be buried on site, and must be removed from the site for disposal in a solid waste disposal facility. Consultation with the department's Division of Materials Management (DMM) is required prior to disposal of any cuttings associated with water-based mud-drilling and pit liner associated with water-based mud-drilling where the water-based mud contains chemical additives. Any sampling and analysis directed by DMM must be by an ELAP-certified laboratory.*

All cuttings should be tested in an ELAP-certified laboratory, not just oil-based or polymer-based cuttings. Cuttings should be radium-tested according to EPA protocol, 903.0 or 903.1.

*(f) Flowback water recovered after high-volume hydraulic fracturing operations must be tested for naturally occurring radioactive material prior to removal from the site. Fluids recovered during the production phase (i.e., production brine) must be tested for naturally occurring radioactive material prior to removal.*

Flowback water should also be tested in an ELAP-certified laboratory, specifically for radium. Gamma testing for the surrogate Bi-214 should not be permitted. Radium concentrations are expected to be far higher than Bi-214 concentrations.

*(h) Partial reclamation and final reclamation of any well pad and access road must be approved by the department.*

In addition to flowback water and brine, DEC regulations should specify what will occur to production pipes, feed lines and condenser water tanks. In our experience, it is not unusual to remove production pipes after 5 years well production and these pipes will be internally coated with radium contaminated scale. The rdsgeis<sup>3</sup> states that “NYSDOH will require the well operator to obtain a radioactive materials license when exposure rate measurements...exceed 50 microR/hr.” While this requirement exists in other States, the basis for this requirement is not clear. Further, the rdsgeis does not cite a specific section of NYSDOH regulation and we cannot locate one. Perhaps it is based on the fact that a worker works 2000 hours per year (50 wks x 40 hrs/wk), and this leads to a contact dose of 100 millirems/year, the allowable dose to a member of the public. In any case, this NYSDOH limit, 50 microR/hr, is unacceptable and hydrofracturing of the Marcellus shale formation should not proceed until this matter is resolved. Aside from tossing the ball to NYSDOH, the basic issue is, what will become of radium-contaminated pipes? In our experience with gas pipes in Texas, after 5 years production, more than 50% of the pipes will have direct gamma rates greater than 50 microR/hr. According to our calculations using Microshield, and a standard 3 to 1 ratio of radium-226 to radium-228, pipes that emit gamma equal to 50 microR/hr will have radium-226 and radium-228 concentrations in scale that exceed 1300 pCi/g and 400 pCi/g, respectively. If these pipes are released for general unrestricted use, they can be used for corrals, playground equipment, etc. If radium at these concentrations are released to the environment, the respective radiation doses to children and the general public will be high; neither NYSDOH nor NYSDEC has produced an EIS that evaluates the impact to individuals and general society of releasing contaminated pipes for general use.

#### **750-3.4 Requirement to obtain a permit**

*(b)(1) Documentation from a legally permissible disposal facility that available capacity exists for the disposal of the projected amount of flowback fluid and production brine over the life of the well, and/or identification and certification of available capacity for alternative disposal locations;*

In our opinion, it is possible to remove radium from flowback water and production brine at specialized facilities, and licensed facilities exist to accept radium filters and sludges.

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<sup>3</sup> Rdsgeis, p. 5-142 and p. 6-205.

### **750-3.11 Applications of standards, limitations and other requirements**

*(h)(i) Flowback water recovered after high-volume hydraulic fracturing operations must be tested for NORM prior to removal from the site. Fluids recovered during the Production Phase (i.e., production brine) must be tested for NORM prior to removal, and the ground adjacent to the tanks must be measured for radioactivity. All testing must be in accordance with protocols satisfactory to the New York State Department of Health.* Flowback water should be tested in an ELAP-certified laboratory, specifically for radium, according to EPA protocols 903.0 or 903.1. Gamma testing for the surrogate Bi-214 should not be permitted.

### **Additional Permit Requirements**

#### **Production Pipes, Separators, Feed Lines and Water Condenser Tanks**

As the Department is aware, radium-contaminated scale will form in production pipes, separators, feed lines and water condenser tanks during production of natural gas. Depending on a conditions, production pipes may become occluded and have to be removed and replaced. We have seen conditions where production pipes have been removed as early as five years after initial production. Of 368 pipes from a single well in Texas tested for direct gamma, 204 pipes had direct gamma readings greater than 50  $\mu\text{R/h}$  and 139 had direct gamma readings less than 50  $\mu\text{R/h}$ . Twenty-five pipes contained no NORM. The highest reading was 150  $\mu\text{R/h}$ .

According to the rdsgeis, NYSDOH will require a materials license if pipes emit gamma radiation  $>50 \mu\text{R/h}$ . However, we cannot locate this licensing condition in NYSDOH regulations.

Since flowback water and brine are expected to have high radium concentrations, a radioactive materials license should be required at the point an operator is drilling in the Marcellus shale formation. This license should be continued during production and decommissioning phase. Based on our experience, a majority of production pipes are expected to have gamma rates  $>50 \mu\text{R/h}$ ; these pipes would then be automatically covered under the NYSDOH license.

The basis for the licensing requirement for production pipes with gamma rates  $>50 \mu\text{R/h}$  is unclear, other than the fact that this is a requirement in several states. In order for gamma rates to exceed 50  $\mu\text{R/h}$ , the Ra-226 and Ra-228 concentrations of radium must be greater than 1300 pCi/g and 400 pCi/g, respectively. If pipes emitting 50  $\mu\text{R/h}$  are released for unrestricted use, they can be used for any non-licensed purpose. They can be cut up and used in playgrounds for children. Ra-226 at concentrations exceeding 1300 pCi/g can be strewn on the ground. The direct gamma rates would then greatly exceed 50  $\mu\text{R/h}$ . This regulatory scheme makes no sense. Further, the environmental impact of disposal of production pipes, feed lines, separators and condenser tanks should also be under SEQRA review and an EIS should be prepared by NYSDOH.