Memorandum

To:	Kate Sinding, Natural Resources Defense Council, Inc.
From:	Philip C. Sears
Date:	December 30, 2009
Re:	**Comments on the Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program**
cc:	Deborah Goldberg, Esq., Earthjustice; James Simpson, Esq., Riverkeeper; Ramsay Adams, Catskill Moutainkeeper

A. INTRODUCTION

We are pleased to have assembled the data from the team of experts[1] retained by NRDC and its partner organizations, Earthjustice, Inc., Riverkeeper, Inc., and Catskill Mountainkeeper, in order to prepare this comment memorandum on the Draft Supplemental Generic Environmental Impact Statement (DSGEIS) on the Oil, Gas, and Solution Mining Regulatory Program. These comments are intended to assist the New York State Department of Environmental Conservation (NYSDEC or Department) in identifying relevant areas of environmental and public health concern that require new or substantially revised research and analysis before the DSGEIS will (1) disclose and evaluate all of the potential environmental impacts of gas exploration, development, and production, including use of horizontal drilling and high-volume hydraulic fracturing to develop natural gas resources from the Marcellus Shale and other low-permeability gas reservoirs; (2) comprehensively evaluate existing rules and new regulations required to govern such development (the Regulatory Program) and the Department's enforcement capacity and practices so that they adequately protect the environment and public health and safety from this industrial activity; (3) thoroughly present best management practices and mitigation measures that will promote safe and environmentally benign development; (4) carefully analyze the cumulative impacts of full development; and (5) support selection of an alternative that will result in the fewest unmitigated significant adverse environmental impacts.

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This memorandum summarizes the extensive analysis of the DSGEIS by the assembled team of experts in the fields of engineering, environmental impact analysis, hydrogeology, toxicology, hydrology, and biology. Appended are 8 attachments that contain the full analyses supporting the comments in this memorandum.

B. OVERARCHING COMMENTS

Overall, the DSGEIS does not meet the requirements of the State Environmental Quality Review Act (SEQRA). The DSGEIS does not analyze all low-permeability formations; fails to provide analyses of key areas of environmental concern and human health; and offers only incomplete analyses of other areas. The DSGEIS does not propose a complete regulatory program, relying instead on a proposed permitting process, which itself is not sufficient to protect human health and the environment. Significant mitigation measures proposed in the body of the DSGEIS are missing from the list of permit conditions in Appendix 10. The DSGEIS further fails to contain legally required regional and statewide cumulative impacts assessments; segments potential impacts of developing natural gas resources so as to exclude them from its analyses; and does not adequately consider alternatives. Proceeding with gas development in the Marcellus Shale and other low-permeability formations on the basis of the DSGEIS would accordingly be arbitrary and capricious, unsupported by substantial evidence, and contrary to law.

FAILURE TO ANALYZE ALL NEW YORK LOW-PERMEABILITY GAS RESERVOIRS

The subtitle of the DSGEIS indicates that the document will analyze impacts of developing "the Marcellus Shale *and Other Low-Permeability Gas Reservoirs*." (Emphasis added.) However, the DSGEIS attempts to analyze potential impacts from developing only the Marcellus Shale. The text briefly describes the Utica Shale, but without offering any environmental analysis of its development. The DSGEIS presents no evidence that the impacts of developing other shale formations will be the same as those caused by Marcellus Shale development. In fact, there is strong evidence that the impacts will be materially different. Therefore, the DSGEIS may be considered applicable only to the Marcellus Shale and not to other low-permeability natural gas reservoirs unless substantial scientific and technical analyses are added in a revised DSGEIS.

LACK OF A COMPREHENSIVE REGULATORY PROGRAM

The DSGEIS was intended to supplement the 1992 environmental review of the oil, gas, and solution mining "regulatory program" to address development of the Marcellus Shale. However, the DSGEIS falls short of recommending a supplemental, comprehensive regulatory program for the Marcellus Shale. It has been 37 years since New York State first adopted most of its oil, gas, and solution mining regulations. Thus, it is past time for an updated and revised regulatory program, and the SGEIS could, if properly prepared, serve as an appropriate tool, to identify regulations that must be adopted for safe, effective development of the Marcellus Shale.

Throughout the DSGEIS words like "should," "recommended," and "suggested" are used in conjunction with proposed mitigation measures, but there is no corresponding recommendation to codify these requirements in enforceable regulations. The DSGEIS assumes that its recommended or suggested measures would be implemented, but it does not propose new regulations or identify resources needed to enforce implementation of the suggestions. Instead, the DSGEIS proposes to implement mitigation measures exclusively through the applicant's completion of new forms and checklists, and through NYSDEC's imposition of permit conditions. The use of permit conditions, in place of codifying these requirements in regulations, is an unacceptable solution. Permit conditions can be changed and modified with each permit

application without any public environmental review. There is no assurance that NYSDEC has sufficient personnel or financial resources to implement this new patchwork of permit conditions. The public and the industry have no assurances that the limitations agreed upon in the SGEIS process will continue to be implemented and enforced in a consistent manner.

By promulgating regulations, NYSDEC would alert the oil and gas industry to what it has to do, the community is ensured that environmentally protective mandates will be imposed consistently, and the regulators have clear guidance in enforcing operational standards and mitigation requirements. The SGEIS process provides the Department with an excellent opportunity to develop and implement a state-of-the-art regulatory program for the oil and gas industry in New York State. Unfortunately, the DSGEIS and the proposed permit conditions do not even approach this goal. The DSGEIS does not encompass either the full range of processes that are necessary to successfully develop the natural gas resources (i.e., exploration, development, production, and closure) or the ancillary facilities needed for and induced by that development. Even the permit conditions (no regulations are proposed) for the development processes that are covered do not constitute best practices adopted in other federal and state regulatory programs for the oil and gas industry. Before the Final SGEIS can be prepared, NYSDEC must recommend and submit for public review a complete, improved regulatory program, and establish standards and best practices from exploration, through production, treatment, gathering, transmission of the natural gas into regulated pipelines, and closure of the wells.

FAILURE TO INCLUDE NECESSARY ANALYSES

The DSGEIS includes inadequate analysis in many areas of human health and environmental concern and it fails to provide any analysis in other areas. It therefore fails both to disclose all potential significant adverse impacts and to describe the mitigation measures necessary to avoid or minimize those impacts to the maximum extent practicable, as required by law. For example, there is no quantitative analysis to support NYSDEC's recommendation for noise mitigation, although models are readily available for such analysis. There is no analysis whatsoever of traffic impacts, even though the DSGEIS admits that as many as 1,350 truck trips will be needed for the fracturing of a single well, and that multiple wells are likely to be developed simultaneously at a single well pad. The analytical deficiencies combined with the lack of analysis in many of the critical technical areas makes the DSGEIS incomplete with any number of undisclosed significant adverse impacts.

CUMULATIVE IMPACTS

The DSGEIS does not analyze the potential for cumulative impacts on a regional or statewide basis on the grounds that "*the number of wells which will ultimately be drilled cannot be known in advance....*" (Section 9.2.1). Reasonable worst cases are regularly developed for SEQRA disclosure purposes. As an example, almost every large area rezoning includes a reasonable worst case analysis, even though a build out plan does not exist. A regional reasonable worst case of gas development of the Marcellus Shale including secondary impacts on a regional and statewide basis can, and **must be** developed in order to present a comprehensive analysis of potential impacts. The failure to disclose cumulative impacts deprives the decision makers of a rational basis for going forward. The experience in Pennsylvania where 99 Marcellus permits were issued in 2007 and nearly 1,600 were issued through October 31, 2009 provides one basis for making an estimate of likely future development in an area. In addition, one gas development company has supplied its internal estimates of the rate of development to the Department

(Section 6.13.2.1), which provides a second basis and a check on the Pennsylvania experience. In addition, shale gas development experiences in Pennsylvania, Texas, and Colorado provide data on the available number of workers, equipment, and market trends that have not been analyzed in the DSGEIS.

SCOPE OF REGULATORY PROGRAM

NYSDEC limits the analyses in this DSGEIS to drilling and fracturing of the Marcellus Shale, while ignoring all other parts of developing the gas resource. Drilling a well, and stimulating it, is only the start of the process of "Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs."

Gas resource development occurs in two distinct phases: (1) exploration and (2) production; commonly referred to as the upstream Exploration & Production (E & P) sector, to distinguish between downstream activities such as refining and marketing. Exploration activities are completed to locate the hydrocarbon resources, and collect sufficient data to determine whether the hydrocarbon resources can be safely and economically developed. Exploration processes typically include: drilling, completion, seismic data collection, geologic and geophysical assessment, and other studies. Due to the very limited amount of data known and available on the Marcellus Shale, it is evident that New York is still in the Marcellus Shale exploration phase.

Prior to conducting exploration, an EIS is typically completed to identify methods to mitigate exploration impacts. If data collected during exploration supports a production/development scenario, then larger scale production (multiple wells, on larger drill sites, and surface processing and distribution facilities) may be needed to develop the resource.

A full EIS examination of the production scenario is the next step after exploration activities are completed. Typically two different EIS analyses are performed; yet, in this case NYSDEC attempts to combine exploration and production drilling and fracture treatment all into one SGEIS. The DSGEIS fails to meet scientific and technical standards because there are insufficient data at this time to support an EIS beyond exploration.

NYSDEC attempts to include the production phase in this DSGEIS, but it encompasses only the drilling and completion portions of the production phase, ignoring the surface processing facilities, pipelines, compressor stations, service areas, and waste treatment facilities needed to develop the Marcellus Shale.

It is recommended that the DSGEIS be limited to the Marcellus Shale exploration phase, to match the data set available at this time. This does not preclude the DSGEIS from recommending regulatory improvements that clearly should be put in place for the future production scenario, but it allows a conservative, step-wise, rational process to take place to collect data during the exploration phase to support a future production scenario.

When sufficient data are available from the exploration phase, an EIS can be developed to evaluate the full suite of production impacts from all production activities (drilling, completion, surface processing facilities pipelines, compressor stations, service areas, and waste treatment facilities) not one limited just to a small segment of the production phase (i.e., drilling and completion), as in this DSGEIS. Examples of the data sets required to properly analyze the potential impacts from development, production, and closure are given in Attachment A.

SEGMENTATION

The DSGEIS contains several instances of segmentation. The document must take into account the readily predictable secondary development that will inevitably result from the proposed action, such as development of ancillary servicing and treatment facilities for the produced natural gas and its waste products. For example, the October 14, 2009 issue of NYSDEC's Environmental Notice Bulletin contained a negative declaration for the Schlumberger 65-acre natural gas servicing facility at Horseheads. Construction of this facility was directly induced by expected drilling for natural gas in the Marcellus Shale, and the potentially significant adverse impacts from this project and similar projects that will be built as a result of gas development activities should be analyzed in the DSGEIS. In addition, the DSGEIS in Section 5.16.8 claims that the potential impacts from the necessary new pipelines would be reviewed by the Public Service Commission (PSC). However, a large number of pipelines, including high pressure less than a certain length and low pressure, are specifically excluded from PSC jurisdiction, except for safety matters. Therefore, these pipelines would be built through the area of Marcellus Shale development without any type of environmental review. The same applies for servicing facilities. PSC was not the lead agency for the Schlumberger facility mentioned above. The need for servicing facilities and gathering pipelines comes directly from the issuing of permits to drill and produce natural gas; gathering pipelines and servicing facilities have no independent utility without the permits for drilling and producing natural gas. This type of induced growth, as well as construction of new waste treatment facilities needed for gas wastewater treatment, has been segmented from the permitting of individual wells.

ALTERNATIVES

SEQRA requires analysis of alternatives to the proposed action, but the DSGEIS does not present any meaningful analysis of alternatives. First, each EIS must contain a "no action" alternative.'

Characterizing the prohibition of developing natural gas from the Marcellus Shale as the "no action" alternative is not appropriate. The "no action" alternative would be continuation of the current program without alteration. A proper analysis of the "no action" alternative must be prepared.

The consideration of prohibitions on development—whether in parts or all of New York State—is appropriate in the context of evaluating alternatives that could result in fewer unmitigated significant adverse impacts than those associated with proposed action. The DSGEIS fails to consider partial prohibitions at all. Its discussion of a full prohibition ignores the fact that the policies and laws of New York State encourage development of oil and gas resources only after giving due consideration to the interest of the general public, e.g., significant environmental and public health risks. This alternative should be reevaluated in that context.

The Phased Permitting alternative is summarily dismissed as a possible alternative because of "…the inherent difficulties in predicting gas well development for a particular region or part of the State" (page 9-3). As addressed above in the context of NYSDEC's failure to properly evaluate the cumulative impacts of the proposed action, SEQRA does not allow a lead agency to avoid developing an analysis because it is "difficult." NYSDEC has not considered whether phasing in permitting in regions or all of the state is an appropriate alternative that would better mitigate cumulative significant adverse environmental impacts on a regional or statewide basis.

The Green or Non-Chemical Fracturing Technologies and Additives alternative addresses only one source of potential impacts from developing the Marcellus Shale, i.e., the use of non-chemical fracturing fluids. Even in this regard, NYSDEC has failed to use its regulatory authority to properly ascertain whether such fluids might in fact be viable alternatives; nor has it performed the requisite analyses to determine whether some or all proposed chemical constituents should be prohibited from use. Nor does the document consider whether less toxic alternatives are available to address other identified impacts not associated with the fracturing fluids. It is therefore not an adequately examined alternative.

The slim 10 pages of text on alternatives contain no analysis and improperly dismiss three legitimate alternatives (Partial prohibition on development, phased permitting, and the use of non-toxic technologies and additives) with potentially fewer unmitigated significant adverse environmental impacts in violation of SEQRA's requirements.

C. DETAILED TECHNICAL COMMENTS

Overall, the DSGEIS does not meet the requirements of SEQRA. The document does not include all of the technical areas of analysis promised in NYSDEC's Final Scope of Work. The 803-page document does not have an Executive Summary, which is a required element [6 NYCRR § 617.9(b)(4)]. The level of analysis in almost every technical area fails to satisfy the "hard look" standard of SEQRA. Whole areas of potential impacts are ignored. The *City Environmental Quality Review (CEQR) Technical Manual, 2001* has established methodologies and criteria for analyzing potential impacts in the wide range of technical areas required in the preparation of an Environmental Impact Statement. In areas where New York State does not have established methodologies and criteria, the use of the *CEQR Technical Manual* is suggested. Where some level of analysis is provided, no real conclusions regarding the analysis are made. When some conclusions are reached, they are often not translated into permit conditions, and no regulations are proposed. SEQRA regulations require analysis for potential catastrophic events, which is specifically called for in projects with natural gas facilities [*id*. § 617.9(b)(6)], but the DSGEIS contains no such analysis. Environmental justice is mentioned, but no analysis is provided, and NYSDEC imposes no requirement that environmental justice be analyzed as part of a site-specific assessment. The DSGEIS lists several mitigation "plans" as proposed permit conditions, but plans that are not subject to public reviews or NYSDEC approval are not sufficient mitigation measures. Specific comments on each technical area are presented below, and relevant backup studies are attached.

ADHERENCE TO FINAL SCOPE

The DSGEIS does not include all of the analyses that NYSDEC committed to prepare in the Final Scope of Work. Attachment B lists all of the analyses that were included in the Final Scope of Work and highlights the analyses that were not completed. Among the major areas for which the DSGEIS analysis does not match the Final Scope of Work are: water withdrawals, cumulative impacts, traffic, noise, and emergency response. The Final SGEIS must be expanded to include all of the analyses that the Department committed to in the Final Scope of Work. If the Final SGEIS is to be applied to other low-permeability formations, a new draft SGEIS will be needed to examine all technical areas listed in the Final Scope of Work for those formations, because the DSGEIS is silent on all other low-permeability gas reservoirs.

BEST MANAGEMENT PRACTICES

Scope of DSGEIS

The DSGEIS scope should be limited to analysis of the Marcellus Shale Gas Reservoir. The Marcellus Shale is a substantial accumulation, and warrants its own EIS analysis. Additional information and analysis is needed to examine the impacts of exploring and developing other low-permeability gas reservoirs.

There are insufficient data available on the Marcellus Shale Gas Reservoir to support a statewide exploration and production plan. The data set provided by NYSDEC in this first draft SGEIS is equivalent to that supporting only early exploration. There is insufficient information to support statewide production/development scenarios for the Marcellus Shale Gas Reservoir. NYSDEC should consider either:

- Narrowing the scope of this DSGEIS to exploration activities, and baseline study work, and completing a separate future EIS when additional exploration data is available to support a production/development case; or
- Clearly outline in this DSGEIS the data set that must be obtained, and analyses that must be performed during exploration, to obtain sufficient information to support a production/development case. The DSGEIS should then establish a process for conducting a site-specific environmental assessment for each production/development well site (or unit of well sites proposed by a single developer in the same area) based on that data collected during the exploration phase.

NYS Regulations Are Needed to Guide Marcellus Shale Exploration & Development

NYSDEC should update its regulations to include best technology and best management practices for oil and gas exploration and production in general, and more specifically for shale gas development. Oil and gas exploration and production should not be managed using out-of-date regulations, augmented by a patchwork of permit conditions and guidance memoranda. An updated regulatory framework provides: operators with clear, consistent rules to work from; NYSDEC staff with simplified instructions for implementation; a public process for input; and a more orderly and safe exploration and development process for New York State.

Even if NYSDEC persists, without adequate data, in addressing both exploration and production in this SGEIS, the proposed supplementary permit conditions are incomplete and inconsistent with both some of the DSGEIS findings and best technology/practices for gas shale development. The "Proposed Supplementary Permit Conditions" should be renamed to serve as a "List of Regulatory Proposed Improvements of and Revisions to New York State's Regulations." This list should reflect the numerous recommendations in this memorandum and its attachments and those substantive comments received by NYSDEC from others. The list should be used to revise New York State regulations, because the DSGEIS claims to be serving and should appropriately serve as the basis for examining and improving NYSDEC's "regulatory program" for shale gas.

New York State's regulations need to be revised to address Marcellus Shale gas development, provide a clear, complete list of prohibited activities, and describe maximum allowable levels of activities and expected mitigation. When codified in regulations, NYSDEC staff, the applicant, and the public will fully understand the "bottom-line" requirements.

Drilling Mud Composition and Drilling Waste Disposal

New York State regulations should be revised to acknowledge and mitigate drilling mud pollution impacts, minimize drilling waste generation, limit heavy metal and Normally Occurring Radioactive Material (NORM) content, and establish best practices for collection, treatment and disposal of drilling waste.

Disposal of Drilling & Production Waste & Equipment Containing NORM

NYSDEC should adopt regulations to establish best practices for collection, treatment, and disposal of drilling and production wastes, as well as equipment containing NORM. NYSDEC should adopt regulations prohibiting use of Marcellus Shale gas wastewater containing NORM for land or road spreading applications.

Casing and Cementing Requirements

New York State casing and cementing regulations should be developed specific to Marcellus Shale gas reservoir development. They should address high angle well construction, ensuring that casing and cementing are structurally sound and provide an effective drinking water barrier, particularly when high-volume fracture treatments are performed.

Flaring, Venting, and Fugitive Emissions

NYSDEC should develop regulations to restrict flaring, venting, and fugitive emissions to the lowest level technically feasible.

Hydrogen Sulfide

NYSDEC should adopt regulations to require gas production operators to follow hydrogen sulfide detection and protection procedures for employees and the public during drilling and production operations.

Seismic Data Collection

NYSDEC should establish regulatory requirements for seismic data collection that reduce impact to the environment and the public.

Corrosion & Erosion Control

New York State regulations should require equipment to be designed to prevent corrosion and erosion, and require monitoring, repair and replacement programs.

Spill Prevention

NYSDEC should adopt regulations to require more stringent oil spill prevention measures for temporary fuel tanks associated with drilling and well stimulation activities. NYSDEC should incorporate existing United States Environmental Protection Agency (EPA) oil spill prevention standards for oil and gas activities that require secondary containment for all fuel tanks 1,320 gallons and larger.

Spill Response

NYSDEC should adopt EPA Spill Prevention Control and Countermeasures (SPCC) requirements for drilling operations.

Fuel Selection

NYSDEC should require operators to use cleaner fuels than diesel (such as natural gas) or electric power whenever technically feasible.

Hydraulic Fracture— Design and Monitoring

NYSDEC should revise its regulations to specify best technology and best practices that must be used to collect data, model, design, implement, and monitor a fracture treatment. The regulations should specify that all data collected by industry must be reported to NYSDEC and made available to the public. Best technology and best practices should include:

- Collecting additional geophysical and reservoir data to support a reservoir simulation model;
- Developing a high-quality Marcellus Shale 3-dimensional reservoir model(s) to safely design fracture treatments;
- Hydraulic fracture modeling prior to each fracture treatment to ensure that the fracture is contained to the Marcellus Shale zone;
- Careful monitoring of the fracture treatment, including shutting the treatment down if data indicates casing leaks or out-of zone fractures;
- Collecting data, and carefully analyzing fracture treatment performance in the field on smaller fracture treatments in the deepest, thickest sections of the Marcellus Shale to gain data and experience (e.g. at least 4,000 feet deep and 150 feet thick);
- Using experience gained on fracture testing to design and implement larger treatment volumes over time (potentially allowing increasingly shallower and thinner intervals, only if technical data supports the safety of this technique);
- Documenting, reporting, and remediating fracture treatment failures to ensure drinking water protection; and
- Taking a conservative, step-wise approach to ensure there is technical data to support high-volume fracture treatments that protect the environment, before NYSDEC issues a blanket approval to fracture the Marcellus Shale at all depths and all thickness intervals.
- NYSDEC needs to technically justify the proposed minimum 1000-foot vertical offset with actual field data, 3-dimensional reservoir simulation modeling, and a peer-reviewed hydrological assessment to ensure drinking water sources are protected.

Hydraulic Fracture Treatment Additive Limitations

NYS regulations should identify the type, volume, and concentrations of fracture treatment additives that are protective of human health and the environment. NYSDEC regulations should develop a list of prohibited additives and require the use of non-toxic materials to the extent possible.

Hydraulic Fracture Fluid Flowback Impoundments

New York State regulations should require fracture fluid flowback be routed to onsite treatment systems for fracture fluid recycling and/or collected in tanks for transportation to offsite treatment systems. Surface impoundments should not be used for fracture fluid flowback.

The DSGEIS should disclose how many times a well may be fractured and treated over its life, and provide a worst case scenario for water use and waste disposal requirements based on this scenario.

Chemical Tank Containment

NYSDEC should adopt regulations requiring secondary containment for chemicals stored on the well pad or, alternatively, the use of double-wall tanks.

Reserve Pit & Impoundment Liner Quality

NYSDEC should adopt regulations requiring closed-loop tank systems as a best practice instead of reserve pits and impoundments, unless the operator demonstrates that it is not technically feasible.

If reserve pits and impoundments are demonstrated to be environmentally preferable, NYSDEC should adopt regulations that require impermeable, chemical resistant liner material, and limit the type of chemicals stored to those compatible with the liner material, require wildlife protection design standards, and establish firm removal and restoration requirements.

Wellbore Plugging & Abandonment Requirements

NYS regulations should clearly state when future Marcellus Shale wells must be plugged and abandoned, and this should be retroactively applied to existing wells that are no longer operating and may pose a risk to the environment.

Well Control & Emergency Response Planning

NYS regulations should be updated to include best practices for well control and emergency response planning.

Hazardous Air Pollution Control

NYS regulations should include best technology and practices to reduce hazardous air pollution to the lowest possible level.

Compressor Stations, Pipelines, and Gas Processing Facilities

NYSDEC should include compressor stations, pipelines and gas processing facilities in the DSGEIS, and identify best technology and practices for this equipment.

NYSDEC Inspection and Enforcement Program

NYSDEC should demonstrate in the DSGEIS that it has the personnel, equipment, technical expertise, and funding to carry out the inspection and enforcement procedures listed in the DSGEIS.

Financial Assurance Amount

NYSDEC should require financial assurance adequate to fund long-term monitoring, publicly incurred response costs and the cost of properly remediating and abandoning operations.

Attachments C and D provide further analysis and explanation of these recommendations.

HYDROLOGY AND HYDROGEOLOGY

HYDRAULIC FRACTURING FLUID SETBACKS

Hydraulic fracturing operations require that a large volume of fracturing fluids (e.g., water, chemicals, and propping agents) be stored on a well pad in preparation for a fracturing treatment. These materials have the potential to be spilled. Some of the fracturing fluids injected into the shale for fracturing will return to the surface as flowback, which also could spill. The operator must provide a means of capturing, handling, and storing the high volume of flowback which

will flow at rates up to 130 gallons per minute (gpm). NYSDEC appropriately proposes to require tanks at the well site to handle flowback. However, because of the potential for leaks to occur in the connection between the well and tank, additional site-specific analysis should be required for every gas well located 2,000 feet or closer to surface water sources. In addition, a monitoring well system should be installed for every gas well 1,000 feet or closer to domestic drinking water wells.

Attachment D provides further analysis and explanation of this recommendation.

HYDRAULIC FRACTURING WATER SUPPLY

The large amounts of water withdrawn from streams or rivers for fracturing may harm downstream surface waters by depleting and lessening flows sufficiently to impair public water supplies, natural habitats, and water quality during low flows periods. The discussion of water withdrawals for fracturing downplays these potential impacts by considering the withdrawals only in the context of large river basins.

The DSGEIS considers different regulatory regimes from the different commissions that have regulatory authority, but none of the approaches considered are protective of habitat. The Natural Flow Regime Method, proposed for application in the area regulated by NYSDEC, would limit diversions during normal low flow periods and is to be preferred to the other methods discussed in the DSGEIS. However, diversions should be allowed only when aquatic habitat will be minimally affected. This standard would permit water withdrawals only when the flow rate achieves a water level at or above the point where the wetted perimeter/flow area ratio is a minimum. The DSGEIS proposes a minimum passby requirement equal to 30 percent of the average annual daily flow. This requirement is reasonable only as long as the minimum passby is greater than 30 percent of average monthly flow during the month in which the diversion will occur. This added restriction is necessary to protect wet season flows responsible for channel forming processes. These recommendations may prevent diversions during much of the latter half of the summer and early autumn when the aquatic ecosystems are most stressed. The gas industry could be allowed to make diversions in advance of its late summer needs and store the water in tanks, lined ponds, or other reservoirs if the timing is going to be an issue.

Industry may propose to withdraw groundwater instead of or to supplement its surface water withdrawals. Most of the proposed mitigation provisions merely require that well operators report their pumping rates if they exceed certain levels, which is insufficient to protect the aquifer resource and its discharges to surface water. NYSDEC should specify a limit to the amount of water that can be diverted from an aquifer based on the expected recharge to that aquifer. NYSDEC should also specify the conditions under which the withdrawal of sufficient water for fracturing would be a "depletion" of an aquifer or "potential" aquifer. For example, a 5,000,000 gallon diversion is more than would be removed in a year by 15 domestic wells and could significantly impact the water balance of a small aquifer.

The passby regulatory regimes in the areas controlled by the Delaware River Basin Commission, Susquehanna River Basin Commission, and Great Lakes Compact are all insufficient to adequately protect downstream waters. To ensure that drilling in these areas does not result in significant adverse impacts to such waters, NYSDEC should evaluate whether it is necessary to limit (or even prohibit) development of the Marcellus Shale in these areas.

Attachment D provides further analysis and explanation of this recommendation.

HYDROGEOLOGY AND GROUNDWATER

The DSGEIS provides too little information about the targeted shale and the overlying formations. There are little or no data concerning hydraulic conductivity, porosity, groundwater contours, or natural flow directions, either horizontal or vertical. Hydraulic fracturing changes the properties of the targeted shale so that gas will flow toward the well, but this process will also change the flow paths. Industry should provide well logs, appropriate geochemistry of the cuttings, and cores, whenever possible, from the wells they drill to determine and verify the intrinsic properties of the shale in New York prior to fracturing.

Fracturing by injecting fluids into the shale will cause conditions that make transport of contaminants from the shale to surface aquifers possible. Specifically, fracturing could allow contaminants to exit the shale and reach the overlying formations where, if there is a vertical groundwater gradient, contaminant transport to the surface could contaminate aquifers. The potential contaminants include both flowback of the fracturing fluid and produced water from the formation. According to the DSGEIS, fracturing operations average about 5.0 million gallons of fluid and about 65 percent of it does not return to the surface as flowback. A simple numerical analysis (see Attachment D, Appendix A) demonstrated one simple conceptual flow pathway that would allow contaminants to reach overlying media, but there are many other potential pathways.

No vertical offset alone would guarantee that contaminants will not flow from the shale to the aquifers over time. Only a detailed site-specific analysis can determine the risk. In areas with an upward groundwater gradient above the shale, the industry should complete adequate site-specific analysis for all well pads. NYSDEC should include in its revision of the DGEIS a map of vertical groundwater gradient. The operator should collect a core sample and water level measurements to determine the vertical gradient and media properties at each site within an area with a vertical gradient. The operator should then do standard transport calculations to estimate the potential for contaminants to reach the surface aquifers. If the calculations based on measured data yield a travel time estimate of less than 500 years, the operator should be required to design the fracturing operation to end 25 feet shy of the edge of the shale and complete appropriate tests to verify that fractures did not reach into the overlying media. NYSDEC should require that the industry apply for permits covering an entire well pad or a series of well pads located closely together at one time. NYSDEC should also require more site-specific data regarding the geology and additional analysis of vertical transport as outlined above in this section.

The potential for long-term contaminant transport to the near-surface aquifers is real, but determining the source years in the future or assigning responsibility will be very difficult. NYSDEC should implement a long-term monitoring plan based on regional geology and flow and transport modeling to provide a lead time to identify the movement of contaminants and plan to mitigate it.

MONITORING WELLS SYSTEM

The monitoring system should be vastly improved over that proposed in the DSGEIS which includes testing only of existing domestic drinking water wells. Once contamination reaches these wells, it will be too late to prevent the degradation. NYSDEC should instead require dedicated properly screened monitoring wells between the well pads and nearby domestic wells. Monitoring should continue substantially beyond the end of production because of the long-term potential for transport from well pads to domestic drinking water wells.

Attachment E contains the detailed analyses to support these recommendations.

TOXICOLOGY OF FRACTURING FLUID AND WATER FROM THE MARCELLUS SHALE

The DSGEIS falls short of an adequate assessment of the risk of using the fracturing additives for hydraulic fracturing of the Marcellus Shale in New York. It similarly falls short of assessing the risk of formation waters contaminated with high levels of Total Dissolved Solids (TDS), heavy metals, and radioactivity, which will be transported to the surface both as a component of the flowback and during production. Specifically the following summary points should be considered:

Hydraulic Fracturing Additives

- The additives used in the hydraulic fracturing process are not well defined and the DSGEIS essentially provides only a laundry list of approximately 258 chemicals that may be used in the process.
- There is effectively no indication of the toxicity of each chemical, and insufficient information is provided that would allow the public to understand the hazard associated with individual or groups of chemicals.
- There is no clear indication of how much of each chemical will be used, and this lack of information is particularly troubling, because it eliminates the ability of the public to understand the risk of using effectively all of these chemicals.
- Certain of these chemicals will react with others and produce secondary products that are particularly problematic. Again, the lack of information on which chemicals will be used eliminates the opportunity to conduct a reasonable risk assessment for use of these chemicals.

A more complete listing of the use rates of these chemicals is required, as well the quantities of chemicals that will be used.

In addition, NYSDEC appears to place no restrictions on use of any of the chemicals, even though certain of these chemicals (e.g., acrylamide and benzene) pose significant risks, including carcinogenicity. NYSDEC should re-evaluate use of these 258 chemicals and propose use restrictions on the most toxic of the group.

Gas Wastewater:

- The flowback water (containing both the shale fracturing water and the produced water) that will carry contaminants from the shale and the fracturing additives is likely to be highly contaminated with metals, salts, and radioactivity that, in some cases, are greater than 1,000 times the drinking water standards. This level of contamination is sufficiently high that any level of contamination of surface and groundwater is unacceptable.

NYSDEC needs to develop a much better data set on the expected concentrations of contaminants in the gas wastewater, and should require disclosure of both the identities of the chemicals being produced in the waste as well as the amounts of those chemicals.

Chemical Analysis and Monitoring Issues:

- Many, if not most, of the hydraulic fracturing additives are not included as analytes in standard chemical analyses of flowback water. If a chemical is being injected into the subsurface (and thus has the potential to contaminate surface or accessible groundwater), that

chemical should be measured in the flowback and in samples of groundwater withdrawn from strategically located monitoring wells.

The NYSDEC should require that the identity of the hydraulic fracturing additives be revealed at each specific well, and require the gas production entities to establish monitoring methods for those chemicals, as well as a protocol and plan for their monitoring.

Monitoring of wells for these contaminants should be conducted at least for a full year (monthly or at least quarterly sampling) before drilling begins to provide a baseline for seasonal changes in water quality.

Following plugging and abandonment of a gas well, monitoring should be required for a minimum of 5 years, with a special emphasis on testing for those contaminants that will move the most rapidly (e.g., chloride). Prior to installation of these gas recovery wells, site-specific plans for cleanup of contamination should be developed by the operator and approved by NYSDEC.

Attachment F has further analysis and explanation of these recommendations.

WASTEWATER, STORMWATER, AND SPILLS

NYSDEC fails to assess and provide mitigation measures for the cumulative potential environmental impacts associated with wastewater treatment; energy use; increased stormwater pollution from wastewater transport; unavoidable spills of wastewater, drilling fluids, and other chemicals associated with natural gas development; and disposal of solid waste generated by natural gas wastewater treatment processes. NYSDEC must assess all of the cumulative adverse environmental impacts of both wastewater and stormwater associated with natural gas development processes and ancillary treatment facilities.

The DSGEIS does not evaluate the cumulative volume and production rate of wastewater requiring treatment and fails to identify publicly-owned treatment works (POTW) or private wastewater treatment plants (WWTP) with adequate capacities and treatment technologies to accept, treat, and dispose of the generated wastewater from individual or multi-well pad sites. NYSDEC must require that applicants for well drilling permits produce a signed contract for the disposal of flowback water to be treated off-site at an authorized POTW or other permitted WWTPs. Additionally, NYSDEC must require an analysis of all potential contaminants in the flowback water and the impact of the contaminants, including barium and iron, on the ability of a OITW ir WWTP to treat the generated wastewaters.

The DSGEIS does not account for the cumulative impacts of multiple stormwater discharges to a stream or river that may result in increased flow, in-stream velocities, and increased total suspended solids (TSS) and turbidity. Additionally, as the cumulative effects of increased TSS and turbidity could potentially result in the need for New York City to construct a filtration system for the drinking water supply, NYSDEC must provide a regional cumulative analysis to determine the potential impacts of stormwater discharges within the watershed associated with individual and multi-well pad sites.

In addition to TSS and turbidity, NYSDEC fails to identify and evaluate the impact of stormwater runoff on the highly erodible soils found within the Marcellus Shale, and fails to evaluate the inability of typical stormwater management systems to effectively remove such soils. Flocculants are sometimes used to improve the settleabilty; however, NYSDEC has not evaluated the use or limitations on the use of these flocculants. NYSDEC must evaluate the cumulative potential impacts resulting from the use of flocculants or other additives that the

Department will allow operators to use to enhance soils that settle poorly and also evaluate potential limitations on the use of these flocculants, as they are toxic to aquatic fauna such as rainbow trout.

The DSGEIS fails to provide any changes to Section AD of the Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP), and therefore, it is not possible to fully assess the impacts of industrial stormwater associated with gas well development. NYSDEC must provide an analysis of industrial stormwater environmental impacts and mitigation measures for each individual permit. If and when NYSDEC modifies the MSGP, another SGEIS must be prepared that analyzes industrial stormwater environmental impacts and defines mitigation methods.

Attachment G contains the detailed analyses to support these analyses and recommendations.

NATURAL RESOURCES

The DSGEIS does not fully address the cumulative impacts to various natural resources that would be affected by gas development processes. Stormwater discharges from multi-well pad sites would increase in-stream erosion resulting in an increase in TSS and turbidity in receiving waters. The NYSDEC fails to evaluate the cumulative impact of such increases of TSS and turbidity on the fauna that utilize the associated watercourses and waterbodies. Increases in turbidity have demonstrated detrimental effects on freshwater fish, including trout and bass, and have the potential to result in significant changes to population dynamics among fish populations and other aquatic species.

The DSGEIS does not fully address the potential cumulative impacts associated with spills of brine, spent fracturing fluids, chemical additives, and petroleum products. NYSDEC must provide adequate setback requirements for all watercourses and waterbodies, including wetlands, so as to afford equal protections of these resources in the event of a spill. Additionally, NYSDEC must prohibit the placement of well pads and all ancillary equipment within floodplains to eliminate the potential for flood-related spills of contaminants.

The DSGEIS does not provide a comprehensive analysis of the potential cumulative impacts to wildlife, such as the noise associated with multi-well pad development. NYSDEC also fails to analyze the effects of flowback water surface impoundments on vernal pools, waterfowl, and migratory bird species. An individual and cumulative impacts analysis on bats, including the state and federally endangered Indian bat (Myotis sodalis), must also be conducted by NYSDEC to fully address the potential for impacts to bat hibernacula. Finally, NYSDEC fails to address the potential cumulative impacts on rare, threatened, or endangered (RTE) species as a result of habitat destruction and fragmentation resulting from individual and multi-well pad development. NYSDEC must provide a comprehensive analysis of all potential cumulative impacts to wildlife associated with noise, flowback water surface impoundments, and habitat destruction and fragmentation resulting from gas well development processes.

NYSDEC must require a four-season natural resource inventory (NRI) for both individual and multi-pad well sites to provide a comprehensive analysis of flora and resident and migratory fauna. NYSDEC has the ability to provide detailed maps for public review that would assist in a comprehensive evaluation and understanding of the regional cumulative impacts to watercourses, waterbodies, wetlands, and RTE species within areas of potential gas well development.

Attachment G contains the detailed analyses to support these recommendations.

CENTRALIZED FLOWBACK IMPOUNDMENTS

The DSGEIS contemplates that centralized surface impoundments could be proposed to store flowback for substantial periods prior to treatment or for recycling. Steel tanks should be required for any centralized storage of flowback water because lined systems are subject to leakage and tears. If impoundments are permitted, contrary to these recommendations, all wells proposed to use such impoundments should be disclosed during the permitting process. NYSDEC proposed that centralized impoundments use a double-liner system (or tank) with leak detection, with requirements based on landfill regulations. If permitted to be used at all, NYSDEC should require that centralized impoundments be lined with a dual synthetic liner system and leak detection system. Synthetic liners should have permeability of 1×10^{-11} centimeters per second (cm/s) or less. A geosynthetic clay liner (GCL) must have the equivalent conductivity of two feet of clay compacted to 1×10^{-7} cm/s. The leak detection system should not be designed as a drain, and should be limited to 150 gallons per day (gpd) for the entire unit, which may be a pond of over 5 acres.

Attachment D contains the detailed analyses to support these recommendations.

AIR QUALITY

The air quality modeling and analysis is not conservative and may understate the significant adverse impacts that are predicted to occur. As an example, the air modeling assumed that one rig would be operating at a time, while the DSGEIS states that two rigs might be operating at the same time (Section 5.2.1) This non-conservative analysis found that the emissions from drilling on a well pad would exceed 24-hour ambient air quality standards for particulate matter finer than 2.5 microns ($PM_{2.5}$) by a factor of 10 and for particulate matter finer than 10 microns (PM_{10}) by more than a factor of 3 (Table 6.17). The air quality modeling did not include mobile sources, and large trucks are known to be large contributors of particulate matter. These exceedances are significant adverse impacts, even though the DSGEIS did not declare them to be significant adverse impacts. Because "no simple mitigation measures were indicated" (Page 7-88), the only mitigation suggested was "public access must be precluded from the pad area out to minimum distance of 500 m in all directions by erecting a fence or a comparable measure (e.g. posting of signs is not an acceptable measure)." Keeping the public away from the area does not address the impacts of exceeding Ambient Air Quality Standards. In addition, fencing off this large area of land is likely not an option open to a private gas developer.

The analysis of centralized impoundments found that they would cause short term exceedences of the guidelines for glutaraldehyde, methanol, and heavy naphtha. For the annual guidelines, acrylamide, glutaraldehyde, methanol, formaldehyde, and heavy naphtha were exceeded. The proposed mitigation is not practicable. For a 5 to 6 acre centralized impoundment, a fence line would be placed about 3,280 feet from the edge of the water surface. This requirement would require a fence to encompass about 330 acres or just over a half square mile. This approach likely would not be available to any natural gas developer. Fencing off an area does not address the impacts of short term exceedences of hazardous air pollutant guidelines.

The air quality analysis does not disclose the expected total region-wide criteria pollutant emissions, including ozone, for the various nonattainment areas. In Wyoming, natural gas development has worsened air quality and led to nonattainment for ozone. The DSGEIS represents a generic analysis of individual potential sites, but it is also required to examine the total cumulative impacts of all of these potential sites. An obvious potential cumulative impact is the combined regional criteria pollutant emissions from all potential sites in all relevant

nonattainment areas. The total potential emissions in each nonattainment area should be disclosed and discussed in the context of existing or future emission budgets.

A best estimate of the reasonable worst-case overall operations likely to occur per year is required under SEQRA to evaluate the region-wide implications and determine the need for mitigation. The difficulty in "accurately" predicting the unique nature of the New York play does not absolve NYSDEC of its obligation to present a best estimate. This requirement is not covered under the "regulatory analysis" provided in the DSGEIS.

NYSDEC's greenhouse gas analysis also includes a number of non-conservative assumptions. Therefore, the emissions of greenhouse gases are greatly underestimated. The potential impacts on air quality need to be re-analyzed, and detailed mitigation measures, such as diesel particulate filters and other emissions controls, proposed. A future greenhouse gas emission impacts mitigation plan that is not subject to public review and that does not require NYSDEC approval would not be an adequate mitigation measure. The greenhouse gas analysis also needs to be re-modeled, and effects on statewide programs, such as the State Implementation Plan and the Climate Action Plan disclosed.

Attachment H contains the detailed analyses to support these recommendations.

NOISE

The noise analysis is qualitative, whereas a fully quantified noise model is required to assess impacts and potential mitigation measures. The use of the *CEQR Technical Manual* for appropriate methodology is suggested. A generic well pad development can be modeled so that likely noise impacts can be identified. The mobile source noise from the truck and worker trips can be added to the stationary source noise from equipment. Then mitigation measures, including source control, path controls, and locational controls, can be developed, and regulations promulgated. The drilling and completion activities would take place 24 hours a day, 7 days a week, and for up to 3 years. Up to 21 engines and an undisclosed number of pieces of equipment and trucks would be operating simultaneously. Based on the number and size of the pieces of equipment and the length of the drilling operation, exceedances of the Department's noise impact criteria[2] will occur. A very basic noise screening model of a generic well pad development found that the noise levels would be about 62.1 dBA at 1,000 feet from the well pad (see Attachment I). The screening likely included fewer pieces of noise-generating equipment than would actually be used. Given the quiet background noise levels in rural areas, this level of noise will greatly exceed the Department's guidelines for impact. Therefore, the DSGEIS contains undisclosed significant adverse noise impacts. Without quantification, these impacts cannot be mitigated. A noise mitigation plan that is not subject to public review and that does not require NYSDEC approval would not be an adequate mitigation measure.

Attachment I contains the detailed analyses to support these recommendations.

TRAFFIC

There is virtually no analysis of traffic impacts. In a one-page section on "Road Use" (Section 6.11), the DSGEIS estimates that between 890 and 1,340 truck trips will be required for development of a well. The truck trip estimate in Chapter 6 is based on 1 to 3 millions gallons of hydraulic fracture water, while Chapter 5 states that between 2.4 to 7.8 million gallons will be

[2] "Assessing and Mitigating Noise Impacts" DEP-00-1

required. Moreover, this estimate assumes that each well will be fractured only once, whereas multiple fracturing treatments are likely. No estimates are made of worker vehicular trips or service trips. This large number of truck and vehicular trips on rural roads will cause significant adverse traffic impacts that are not disclosed and for which no mitigation is proposed. A generic well pad development must be modeled using methods and criteria specified in the *CEQR Technical Manual* so that likely type and cause of traffic impacts can be identified. Then generic mitigation measures can be developed, and regulations promulgated.

COMMUNITY CHARACTER AND SERVICES

The analysis of potential impacts on community character does not recognize the impacts of importing hundreds of workers into an area for years at a time. Many of the gas field workers will come from Texas and Oklahoma, as has been demonstrated in the Pennsylvania experience. These transient workers will be housed in the area and will need support services, including lodging, food, stores, and recreation. These workers will be located in rural areas that often lack these services or have the services but only at great distances. These needs will have to be filled, and service suppliers will come to the area. The influx of workers and service suppliers will have an effect on the rural areas. The supplemental report on community character never addresses the impacts of hundreds of transient workers with little or no investment in local New York communities and new service suppliers.

Another aspect that is not discussed or analyzed is the need for community services, such as police, medical, fire, and schools. Demands for these services will increase due to the larger number of workers and support staff. The need for these community services places heavy demands on local municipalities, and often the municipalities are unable to meet these demands. Placing a local government in situation where it can not meet its community service obligations is an unmitigated significant adverse impact. The use of the *CEQR Technical Manual* for appropriate methodology and criteria is suggested.

ENVIRONMENTAL JUSTICE

While environmental justice is difficult to adequately analyze generically, environmental justice must be analyzed as part of any site specific permit application. Environmental justice is an official policy of the Department, and the potential effects of drilling in the Marcellus Shale on communities of concern can not be ignored. Each application must have an environmental justice analysis of impacts on communities of concern, including low-income communities, in the area around the well pad. Further, DEC must compile all of the environmental justice analyses to determine if, on the whole, development of the Marcellus Shale is placing an undue burden on communities of concern statewide. If undue burdens are being placed on communities of concern by the development of Marcellus Shale, the Department must develop a plan of action to address any unacceptable situations found.

VISUAL RESOURCES

The DSGEIS requires that operators prepare a generic visual impacts mitigation plan and that the plan be available for NYSDEC's inspection. The DSGEIS refers generically to the NYSDEC guidance policy, but puts no real restrictions on the operator. The drilling and completion operations are 24 hours a day under bright lights. The DSGEIS suggests that the operator direct the lights downward and avoid glare on nearby roads. However, these are phrased as suggestions. Appendix 10 states that a visual impacts mitigation plan must be available upon request to NYSDEC prior to the start of drilling, but this procedure offers no opportunity for

public review or even notice to affected local residents A visual resources mitigation plan that is not subject to public review and that does not require NYSDEC approval would not be an adequate mitigation measure.. In addition, any proposed visual impacts mitigation must address the potential of a number of multi-well pads being visible from one location.

The DSGEIS contains no analysis of the effects of the 24-hour lighting on natural resources. Nocturnal birds and animals will be attracted to the lights. The literature documents birds and bats flying into the lights and equipment with a corresponding high death rate. The potential impacts of 24-hour lighting must be analyzed and enforceable mitigation measures developed.

EMERGENCY RESPONSE

Emergency response is a critical area that has been totally ignored in the DSGEIS. SEQRA regulations specifically call for an analysis of potentially catastrophic events. Catastrophic events, spills, fires, and industrial accidents will occur. Such accidents are documented everywhere gas is developed; they are inevitable with the large numbers of heavy equipment and workers. Moreover, local volunteer emergency response organizations often do not have the training, equipment, and personnel necessary to adequately respond to large industrial events. To ignore these facts is to ignore reality. In assuming that no accidents will happen, the DSGEIS fails to disclose significant adverse impacts on the local communities and emergency response organizations.

The only mitigation proposed to address emergency response to industrial accidents is a permit condition requiring notification to the county emergency management office prior to undertaking certain activities. Requiring notification is not the same as requiring that an emergency response plan be developed, submitted, approved, and implemented. The DSGEIS must assess the ability of the local emergency responders to handles accidents and spills. New regulations need to be proposed as part of the regulatory program, requiring the preparation of an emergency response plan, tailored to the specific locality. Construction Health and Safety Plans (CHASP), which are typically required by the Department's Division of Solid and Hazardous Materials on all projects, are readily available for guidance.

Mitigation measures for gas exploration and production emergencies must be developed and presented in the Final SGEIS. The DSGEIS now has undisclosed significant adverse impacts on the local emergency response organizations.

SOCIOECONOMIC IMPACTS

The DSGEIS alludes to the economic benefits associated with development of natural gas from the Marcellus Shale, but no where does the document provide an estimate of the costs, including to local communities of the natural gas development. The use of the *CEQR Technical Manual* for appropriate methodology and criteria is suggested. As discussed above under Community Character and Emergency Response, the influx of transient workers will place demands on local institutions, and the likelihood of industrial accidents and spills will tax local emergency responders. A generic analysis of these costs must be prepared and mitigation for the costs to local communities developed. The local communities will likely be unable to bear these costs without assistance and mitigation. Moreover, the industrialization of rural areas may have adverse impacts on tourism and recreational businesses. Investment in fossil fuel development by an industry that does not fully internalize its costs is likely to impede development of carbon-free energy and "green" jobs.

ODORS

The DSGEIS totally ignores the problem of odors from the flowback and produced waters, although a recent report (Health Survey Results of Current and Former DISH/Clark Texas Residents at www.earthworksaction.org/pubs/DishTXHealthSurvey_FINAL_hi.pdf) indicates that residents surrounding shale gas wells are frequently subjected to seriously objectionable odors. The odors can include a variety of sulfides, amines and other chemicals that can substantially reduce the quality of life of nearby residents (and perhaps their health). Odors have especially severe effects on children. While very real in terms of impact on people in the surrounding area, odors are often transient, and difficult to quantify. The DSGEIS must analyze this serious problem, and describe in detail how the odors will be identified, regulated, and controlled.

D. CLOSING

We are please to have the opportunity to assemble and prepare these comments. We trust that they will be used by NRDC and it partner organizations to assist NYSDEC in ensuring that development of natural gas from the Marcellus Shale is done where appropriate and in such a manner to ensure protection of the environmental and public health. If you have any question or comments, please do not hesitate to contact me at (646) 388-9795. If needed, we are available to meet with you at your convenience to discuss these comments.

List of Attachments

Attachment A:	Required Data Sets and Analysis
Attachment B:	Table of Adherence of the DSGEIS to the Final Scope of Work
Attachment C:	Harvey Consulting, LLC. *Review of DSGEIS and Identification of Best Technology and Best Practice Recommendations*
Attachment D:	Harvey Consulting, LLC. *New York State Casing Regulation Recommendations*
Attachment E:	Tom Myers, Ph.D., *Technical Memorandum*
Attachment F:	Glenn Miller, Ph.D., *Toxicity and Exposure to Substances in Fracturing Fluids and in the Groundwater Associated with the Hydrocarbon-bearing Shale*
Attachment G:	CEA Engineers, P.C.
Attachment H:	Air Quality Memorandum to Marcellus Shale Files
Attachment I:	Noise Screen