



Department of
Environmental
Conservation

Chapter 1

Introduction

Final

Supplemental Generic Environmental Impact Statement

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Chapter 1 – Introduction

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Chapter 1 INTRODUCTION

The Department of Environmental Conservation (Department) has received applications for permits to drill horizontal wells to evaluate and develop the Marcellus and Utica Shales for natural gas production. To release the gas embedded in the shale formations, wells would undergo a stimulation process known as high-volume hydraulic fracturing. While the horizontal well applications received to date are for proposed locations in Broome, Cattaraugus, Chemung, Chenango, Delaware, and Tioga Counties, the Department expects to receive applications to drill in other areas, including counties where natural gas production has not previously occurred. There is also potential for development of the Utica Shale using horizontal drilling and high-volume hydraulic fracturing in Otsego and Schoharie Counties and elsewhere as shown in Chapter 4. Other shale and low-permeability formations in New York may also be targeted for future application of horizontal drilling and high-volume hydraulic fracturing. The Department has prepared this revised draft Supplemental Generic Environmental Impact Statement (SGEIS) to satisfy the requirements of the State Environmental Quality Review Act (SEQRA) for some of these anticipated operations. In reviewing and processing permit applications for horizontal drilling and hydraulic fracturing in these deep, low-permeability formations, the Department would apply the findings and requirements of the SGEIS, including criteria and conditions for future approvals, in conjunction with the existing Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, issued by the Department in 1992 (1992 GEIS).¹

1.1 Hydraulic Fracturing and Multi-Well Pad Drilling

Hydraulic fracturing is a well stimulation technique which consists of pumping an engineered fluid system and a propping agent (proppant) such as sand down the wellbore under high pressure to create fractures in the hydrocarbon-bearing rock. The fractures serve as pathways for hydrocarbons to move to the wellbore for production. Further information on high-volume hydraulic fracturing, including the composition of the fluid system, is provided in Chapter 5.

¹ The 1992 GEIS is posted on the Department's website at <http://www.dec.ny.gov/energy/45912.html>.

For environmental review purposes pursuant to SEQRA, stimulation including hydraulic fracturing is considered part of the action of drilling a well. Wells where high-volume hydraulic fracturing is used may be drilled vertically, directionally or horizontally. Multiple wells may be drilled from a common location (multi-well pad or multi-well site).

1.1.1 Significant Changes in Proposed Operations Since 2009

The gas drilling industry has informed the Department of the following changes in its planned operations in New York, based, in part, on experience gained in actively developing the Marcellus Shale in Pennsylvania. These changes are reflected in the assumptions used in this revised draft SGEIS to identify and consider potential significant adverse impacts.

1.1.1.1 Use of Reserve Pits or Centralized Impoundments for Flowback Water

The Department was informed in September 2010 that operators would not routinely propose to store flowback water either in reserve pits on the wellpad or in centralized impoundments.² Therefore, these practices are not addressed in this revised draft SGEIS and such impoundments would not be approved without site-specific environmental review.

1.1.1.2 Flowback Water Recycling

The Department was also informed in September 2010 that operators plan to maximize reuse of flowback water for subsequent high-volume hydraulic fracturing operations, with some companies targeting goals of recycling 100% of flowback water.³ The technologies for accomplishing this have evolved through ongoing Marcellus Shale development in Pennsylvania. The Susquehanna River Basin Commission (SRBC) has confirmed that operators are re-using flowback water.⁴ This development has the potential to greatly reduce the volume of flowback water that requires treatment, hauling and disposal, and the related environmental concerns. Fresh water consumption and hauling are also somewhat reduced, but in current practice fresh water still comprises 80-90% of the water used at each well for high-volume hydraulic fracturing.

² ALL Consulting, 2010, pp. 18-19.

³ ALL Consulting, 2010, pp. 73-76.

⁴ Richenderfer, 2010, p. 30.

1.2 Regulatory Jurisdiction

The State of New York's official policy, enacted into law, is "to conserve, improve and protect its natural resources and environment . . . ,"⁵ and it is the Department's responsibility to carry out this policy. As set forth in Environmental Conservation Law (ECL) §3-0301(1), the Department's broad authority includes, among many other things, the power to:

- manage natural resources to assure their protection and balanced utilization;
- prevent and abate water, land and air pollution; and
- regulate storage, handling and transport of solids, liquids and gases to prevent pollution.

The Department regulates the drilling, operation and plugging of oil and natural gas wells to ensure that activities related to these wells are conducted in accordance with statutory mandates found in the ECL. In addition to protecting the environment and public health and safety, the Department is also required by Article 23 of the ECL (ECL 23) to prevent waste of the State's oil and gas resources, to provide for greater ultimate recovery of the resources, and to protect correlative rights.⁶

1.3 State Environmental Quality Review Act

As explained in greater detail in Chapter 3, the Department's SEQRA regulations authorize the use of generic environmental impact statements to assess the environmental impacts of separate actions having generic or common impacts. Drilling and production of separate oil and gas wells, and other wells regulated under the Oil, Gas and Solution Mining Law (ECL 23) have common impacts. After a comprehensive review of all the potential environmental impacts of oil and gas drilling and production in New York, the Department finalized a Generic Environmental Impact Statement and issued SEQRA Findings on the regulatory program in 1992 (1992 GEIS). In 2008, the Department determined that some aspects of the current and anticipated application of high-volume hydraulic fracturing, which is often used in conjunction with horizontal drilling and multi-well pad development, warranted further review in the context of a SGEIS. This revised draft SGEIS discusses high-volume hydraulic fracturing in great detail

⁵ Environmental Conservation Law (ECL) §1-0101(1).

⁶ Correlative rights are the rights of mineral owners to receive or recover oil and gas, or the equivalent thereof, from their owned tracts without drilling unnecessary wells or incurring unnecessary expense.

and describes the potential significant impacts from this activity as well as measures that would fully or partially mitigate the identified impacts. Specific mitigation measures would be adopted as part of the Department's Findings Statement in the event high-volume hydraulic fracturing is authorized pursuant to the studies presented herein.

1.4 Project Chronology

1.4.1 February 2009 Final Scope

The Department released a draft Scope for public review in October 2008, and held public scoping sessions at six venues in the Southern Tier and Catskills in November and December, 2008. A total of 188 verbal comments were received at these sessions. In addition, over 3,770 written comments were received (via e-mail, mail, or written comment card). All of these comments were read and reviewed by Department staff and the Final Scope was completed in February 2009, outlining the detailed analysis required for a thorough understanding of the potentially significant environmental impacts of horizontal drilling and high-volume hydraulic fracturing in low-permeability shale.

1.4.2 2009 Draft SGEIS

The Department released the 2009 draft SGEIS for public review on September 30, 2009 and held public hearings at four venues in New York City (NYC), the Catskills and the Southern Tier in October and November, 2009. Comments were accepted at the hearings verbally and in writing, by postal mail, by e-mail and through a web-based application developed specifically for that purpose. More than 2,500 people attended the Department hearings, and more than 200 verbal comments were delivered by individuals, local government officials, representatives of environmental groups and other organizations and members of the oil and gas industry. The Department also received over 13,000 comments via e-mail, postal mail and the web-based comment system. In addition, transcripts from hearings held by the New York State Assembly, the City of Oneonta, and the Tompkins County Council of Governments on the 2009 draft SGEIS also provided the Department with numerous comments.

1.4.2.1 April 2010 Announcement Regarding Communities with Filtration Avoidance

Determinations

On April 23, 2010, then-Commissioner Pete Grannis announced that due to the unique issues related to the protection of NYC and Syracuse drinking water supplies, these watersheds would be excluded from the generic environmental review process.

1.4.2.2 Subsequent Exclusion of Communities with Filtration Avoidance Determinations

The analysis of high-volume hydraulic fracturing conducted since the 2009 draft SGEIS supports a finding that high-volume hydraulic fracturing is not consistent with the preservation of these watersheds as an unfiltered drinking water supply.

1.4.3 2011 Revised Draft SGEIS

On January 1, 2011, Governor Cuomo continued Executive Order No. 41 (EO 41), which had been issued by then-Governor Paterson on December 13, 2010. EO 41 directed the Department to publish a revised draft SGEIS on or about June 1, 2011 and to accept public comment on the revisions for a period of not less than 30 days.

On July 1, 2011, the Department published the Executive Summary of the Preliminary Revised Draft SGEIS, prepared after considering the many comments received on the Draft SGEIS, and on July 8, 2011, the Department published the full Preliminary Revised Draft SGEIS.

On September 7, 2011, the Department published a full Revised Draft SGEIS with a supporting socioeconomic study for public comment. Hearings were held in four locations throughout the state in November 2011. Approximately 67,000 comments were received by the close of the comment period on January 11, 2012.

1.4.4 Draft Regulations

At the same time that the revised draft SGEIS was released in September 2011, the Department published draft regulations for comment. In December 2012, DEC published revised draft HVHF regulations. Over 180,000 comments were received on the proposed regulations. These proposed regulations have lapsed under State law.

1.4.5 Health Review by the New York State Department of Health

In September 2012, DEC Commissioner Martens requested the New York State Health Commissioner to assess the health impact analysis in DEC’s revised draft SGEIS. The New York State Department of Health (NYSDOH) retained three national experts, Drs. Lynn Goldman (G. Wash. School of Pub. Health), John Adgate (Col. School of Pub. Health) and Richard Jackson (UCLA School of Pub. Health), to assist in the review of the SGEIS. NYSDOH also reviewed and evaluated scientific literature, engaged in field visits and discussions with health and environmental authorities in nearly all states where HVHF activity is taking place, and communicated with local, state, federal, international, academic, environmental and public health stakeholders.

On December 17, 2014, Acting NYSDOH Commissioner Dr. Howard Zucker announced that NYSDOH had completed its public health review of HVHF and recommended that HVHF should not move forward in New York State. NYSDOH issued a report entitled “A Public Health Review of High Volume Hydraulic Fracturing for Shale Gas Development.”⁷ (See Appendix A to the accompanying Response to Comments.)

1.4.6 Final SGEIS

By publishing this SGEIS and the accompanying Response to Comments, the Department is further implementing EO 41.

1.4.7 Next Steps

At least 10 days after filing of the final SGEIS, the Department will issue a written Findings Statement. Chapter 3 presents detailed information about a proposed future SEQRA compliance process.

1.5 Methodology

1.5.1 Information about the Proposed Operations

For the 2009 draft SGEIS, the Department primarily relied on two sources of information regarding the operations proposed for New York: (1) a number of permit applications filed with the Department; and (2) the Independent Oil & Gas Association of New York (IOGA-NY),

⁷ The report can also be found at: http://www.health.ny.gov/press/reports/docs/high_volume_hydraulic_fracturing.pdf.

which provided the Department with information from operators actively developing the Marcellus Shale in Pennsylvania.

Preliminary review of comments on the 2009 draft SGEIS led Department staff to identify additional technical and operational details needed from industry in order to evaluate and address the comments. In April 2010, Department staff sent a “Notice of Information Needs” to IOGA-NY and to specific exploration/production and service companies that commented on the 2009 draft SGEIS. Again, IOGA-NY coordinated industry’s response, which was received in September 2010 (ALL Consulting, 2010).

Department staff also communicated with and reviewed information and data made available from the Pennsylvania Department of Environmental Protection (PADEP) and the SRBC about events, regulations, enforcement and other matters associated with ongoing Marcellus Shale development in Pennsylvania.

1.5.2 Intra-/Inter-agency Coordination

Within the Department, preparation of both the 2009 draft SGEIS and the revised draft SGEIS involved all of the programs listed on the “Acknowledgements” page of each document.⁸ Other State agencies also provided assistance. Department staff consulted extensively with NYSDOH staff, and staff in the Department of Public Service (Public Service Commission, or PSC) assisted with the text describing that Department’s jurisdiction and regulation over gas gathering facilities.

1.5.3 Comment Review

Of the nearly 13,300 comments received on the 2009 draft SGEIS, at least 9,830 were identified as various campaigns likely generated by on-line form letters, eleven were unique petitions signed by 31,464 individuals and organizations collectively, and seven were the transcripts of the hearings described in Subsection 1.4.2. Each of the transcripts includes comments from a large number of speakers, some of whom also submitted written comments. These transcripts were treated as official public comments, and all comments received were given equal consideration

⁸ As a result of organizational changes within the Department, the Division of Solid & Hazardous Materials is now the Division of Materials Management.

regardless of the method by which they are received. Department staff read and categorized every transcript and every piece of correspondence received to ensure that all substantive comments would be evaluated.

Although the comment period on the 2009 draft SGEIS officially closed on December 31, 2009, the Department accepted all comments submitted through January 8, 2010 to further ensure that all substantive comments would be considered. As noted above, approximately 67,000 comments were received by the close of the comment period for the revised draft SGEIS on January 11, 2012. Following this comment period, Department staff again reviewed and categorized every comment. Comments on both draft documents were consolidated, and all programs involved in preparing the revised draft SGEIS also participated in developing responses to the summarized comments. The accompanying Response to Comments (Vol. 2) includes summaries of the substantive comments received on both the 2009 draft SGEIS and the revised dSGEIS, along with the Department's responses to such comments.

1.6 Layout and Organization

The revised draft SGEIS supplements the existing 1992 GEIS, and does not exhaustively repeat narrative from the 1992 GEIS that remains applicable to well permit issuance for horizontal drilling and high-volume hydraulic fracturing.

1.6.1 Chapters

Chapter 1 is an introduction that explains the context, history and contents of the document, and highlights the enhanced procedures, regulations and mitigation measures incorporated into the document.

Chapter 2 is a description of the proposed action, and includes sections on purpose, public need and benefit, project location and environmental setting that are required by SEQRA. The environmental setting section focuses on topics that arose during the public scoping sessions. For a comprehensive understanding of the environmental setting where high-volume hydraulic fracturing might occur, it is necessary to also consult the 1992 GEIS.

Chapter 3 describes the use of a generic environmental impact statement and the resultant SEQRA review process, identifies those potential projects which would require site-specific

SEQRA determinations of significance after the SGEIS is completed, and identifies restricted locations where high-volume hydraulic fracturing would be prohibited.

Chapter 4 supplements the geology discussion in Chapter 5 of the 1992 GEIS with additional details about the Marcellus and Utica Shales, seismicity in New York State, naturally-occurring radioactive materials (NORM) in the Marcellus Shale and naturally-occurring methane in New York State.

Chapter 5 comprehensively describes the activities associated with high-volume hydraulic fracturing and multi-well pad drilling, including the composition of hydraulic fracturing additives and flowback water characteristics.

Chapter 6 describes potential impacts associated with the proposed activity and, like other chapters, should be read as a supplement to the 1992 GEIS.

Chapter 7 describes the enhanced procedures, regulations and proposed mitigation measures that have been identified to fully and/or partially mitigate potential significant adverse impacts from high-volume hydraulic fracturing activities to be covered by the SGEIS and 1992 GEIS for SEQRA purposes.

Chapter 8 explains intra- and interagency coordination involved in the well permitting process, including the role of local governments and an expanded approach to local government notification. Descriptions of other regulatory programs that govern some aspects of the potential activities that were previously distributed among several chapters in the document are also now included in Chapter 8.

Chapter 9 discusses the alternatives to well permit issuance that were reviewed and considered.

Chapter 10 is new in the revised draft SGEIS and provides information on certain non-routine incidents in Pennsylvania where development of the Marcellus Shale by high-volume hydraulic fracturing is currently ongoing.

Chapter 11 is new in the revised draft SGEIS and summarizes the impacts and mitigation discussed in Chapters 6 and 7.

The Department's response to comments (Vol. 2) represents the Department's most current assessment of the impacts associated with high-volume hydraulic fracturing and the effectiveness of proposed or considered mitigation measures to adequately mitigate significant adverse environmental and public health impacts. To the extent that there is any inconsistency between the Response to Comments and the text within the chapters and appendices of this Final SGEIS, the Response to Comments should be relied upon.

1.6.2 Revisions

Revisions to the 2011 revised draft SGEIS text are generally marked by vertical lines in the page margins, and new text is underlined.

1.6.3 Glossary, Bibliographies and Appendices

The Chapters described above are augmented by 27 Appendices and a lengthy glossary that includes acronyms and technical or scientific terms that appear in the document. References cited throughout the document are listed in a bibliography, and separate bibliographies are included that list the various consultants' sources.

1.7 Enhanced Impact Analyses and Mitigation Measures

The Department has identified numerous enhanced procedures and proposed mitigation measures that are available to address the potential significant environmental impacts associated with well permit issuance for horizontal drilling and high-volume hydraulic fracturing. Only the most significant are listed below. Chapter 7 of this document and the 1992 GEIS in its entirety would need to be consulted for the full range of available and required mitigation practices.

The list presented below does not include analyses and mitigation measures proposed in September 2009 that are superseded by the revised draft SGEIS, or that are no longer relevant because of changes in proposed operations.

1.7.1 Hydraulic Fracturing Chemical Disclosure

The Department's hydraulic fracturing chemical disclosure requirements and public disclosure approach set forth in Chapter 8, combined with the chemical disclosures required from industry for the SGEIS analysis, make the Department's disclosure regime among the most stringent in the country. The Department's regime exceeds the requirements of 22 of the 27 oil and gas

producing states reviewed and is on par with the five states currently leading the country on chemical disclosure. Additionally, the enhanced disclosure requirements are equivalent to the proposed requirements of the federal Fracturing Awareness and Responsibility (FRAC) Act of 2011.

1.7.2 Water Well Testing

Prior to drilling, operators would be required to test private wells within 1,000 feet of the drill site to provide baseline information and allow for ongoing monitoring. If there are no wells within 1,000 feet, the survey area would extend to 2,000 feet. Chapter 7 reflects updated recommendations from the NYSDOH regarding what analyses should be conducted.

1.7.3 Water Withdrawal and Consumption

1.7.3.1 2009 Draft SGEIS

Applicants would not only have to follow SRBC and Delaware River Basin Commission (DRBC) protocols for water withdrawal where applicable, but would also be required to adhere to a more stringent and protective passby flow requirement in regards to water withdrawal plans - whether inside or outside of the Susquehanna or Delaware river basins. The intended results of these requirements would be to protect aquatic organisms and their habitats in surface waters.

1.7.3.2 Revised Draft SGEIS

The discussion of passby flow and the required streamflow analysis have been updated based on research and studies conducted after the release of the 2009 draft SGEIS. Additionally, details have been added regarding the Department's methodology for evaluating and determining approvable groundwater withdrawal rates.

1.7.4 Well Control and Emergency Response Planning

Although current practices and requirements have proven effective at countless wells throughout New York State, the Department has responded to the public's heightened concerns regarding well control and emergency response issues by including three significant revisions in the revised draft SGEIS:

- Submission, for review in the permit application, of the operator's proposed blowout preventer use and test plan for drilling and completion;

- Description of the required elements of an emergency response plan (ERP); and
- Submission and on-site availability of an ERP consistent with the SGEIS, including a list of emergency contact numbers for the community surrounding the well pad.

1.7.5 Local Planning Documents

The Department proposes that applicants be required to compare the proposed well pad location to local land use laws, regulations, plans and policies to determine whether the proposed activity is consistent with such local land use laws, regulations, plans and policies. If the applicant or the potentially impacted local government informs the Department that it believes a conflict exists, the Department would request additional information with regard to this issue so it can consider whether significant adverse impacts relating to land use and zoning would result from permit issuance.

1.7.6 Secondary Containment, Spill Prevention and Stormwater Pollution Prevention

The Department proposes to require, via permit condition and/or new regulation, that operators provide secondary containment around all additive staging areas and fueling tanks, manned fluid/fuel transfers and visible piping and appropriate use of troughs, drip pads or drip pans. In addition, drilling and hydraulic fracturing operations would be subject to an activity-specific general stormwater permit that would address industrial activities as well as the construction activities that are traditionally the focus of stormwater permitting for oil and gas well sites. The comprehensive Stormwater Pollution Prevention Plan (SWPPP) would incorporate by reference a Spill Prevention, Control and Countermeasures Plan.

1.7.7 Well Construction

Existing requirements are designed to ensure that surface casing be set deeply enough to not only isolate fresh water zones but also to serve as an adequate foundation for well control while drilling deeper. It is also necessary under existing requirements, to the extent possible, to avoid extending the surface casing into shallow gas-bearing zones. Existing casing and cementing requirements that are incorporated into permit conditions establish the required surface casing setting depth based on the best available site-specific information. Each subsequent installation of casing and cement serves to further protect the surface casing and hence, the surrounding fresh water zones.

1.7.7.1 2009 Draft SGEIS

Proposed well construction enhancements for high-volume hydraulic fracturing included:

- Requirement for fully cemented production casing or intermediate casing (if used), with the cement bond evaluated by use of a cement bond logging tool; and
- Required certification prior to hydraulic fracturing of the sufficiency of as-built wellbore construction.

1.7.7.2 Revised Draft SGEIS

Additional well construction enhancements for high-volume hydraulic fracturing that the Department proposes to require pursuant to permit condition and/or regulation are listed below:

- Specific American Petroleum Institute (API) standards, specifications and practices would be incorporated into permit conditions related to well construction. Among these would be requirements to adhere to specifications for centralizer type and for casing and cement quality;
- Fully cemented intermediate casing would be required unless supporting site-specific documentation to waive the requirement is presented. This directly addresses gas migration concerns by providing additional barriers (i.e., steel casing, cement) between aquifers and shallow gas-bearing zones;
- Additional measures to ensure cement strength and sufficiency would be incorporated into permit conditions, also directly addressing gas migration concerns. Compliance would continue to be tracked through site inspections and required well completion reports, and any other documentation the Department deems necessary for the operator to submit or make available for review; and
- Minimum compressive strength requirements.
 - Minimum waiting times during which no activity is allowed which might disturb the cement while it sets;
 - Enhanced requirements for use of centralizers which serve to ensure the uniformity and strength of the cement around the well casing; and
 - Required use of more advanced cement evaluation tools.

1.7.8 Flowback Water Handling On-Site

The Department proposes to require that operators storing flowback water on-site would be required to use watertight tanks located within secondary containment, and remove the fluid from the wellpad within specified time frames.

1.7.9 Flowback Water Disposal

Under existing regulations, before a permit is issued, the operator must disclose plans for disposal of flowback water and production brine. Further, in the SGEIS the Department proposes to use a new "Drilling and Production Waste Tracking" process, similar to the process applicable to medical waste, to monitor disposal. Under existing regulations, full analysis and approvals under state water laws and regulations are required before a water treatment facility can accept flowback from high-volume hydraulic fracturing operations. Appendix 22 includes a description and flow chart of the required approval process for discharge of flowback water or production brine from high-volume hydraulic fracturing to a Publicly-Owned Treatment Works (POTW). An applicant proposing discharge to a POTW would be required to submit a treatment capacity analysis for the receiving POTW, and, in the event that the POTW is the primary fluid disposal plan, a contingency plan. Additionally, limits would be established for NORM in POTW influent.

1.7.10 Management of Drill Cuttings

The Department has determined that drill cuttings are solid wastes, specifically construction and demolition debris, under the State's regulatory system. Therefore, the Department would allow disposal of cuttings from drilling processes which utilize only air and/or water on-site, at construction and demolition (C&D) debris landfills, or at municipal solid waste (MSW) landfills, while cuttings from processes which utilize any oil-based or polymer-based products could only be disposed of at MSW landfills. The revised draft SGEIS proposes to require, pursuant to permit conditions and/or regulation, that a closed-loop tank system be used instead of a reserve pit to manage drilling fluids and cuttings for:

- Horizontal drilling in the Marcellus Shale without an acceptable acid rock drainage (ARD) mitigation plan for on-site cuttings burial; and

- Cuttings that, because of the drilling fluid composition used must be disposed off-site, including at a landfill.

Only ARD mitigation plans that do not require long-term monitoring would be acceptable.

Examples are provided in Chapter 7.

1.7.11 Emissions and Air Quality

The need to re-evaluate air quality impacts and the applicability of various regulations was raised during the scoping process, with emphasis on the duration of activities at a multi-well pad and the number of internal combustion engines used for high-volume hydraulic fracturing.

1.7.11.1 2009 Draft SGEIS

The following conclusions and requirements were set forth:

- Per United States Environmental Protection Agency (EPA) NESHAPS subpart ZZZZ, the compressor station would have an oxidation catalyst for formaldehyde. This also reduces carbon monoxide (CO) by 90% and Volatile Organic Compounds (VOCs) by 70%;
- Per EPA subpart HH, the glycol dehydrator would have a condenser to achieve a benzene emission of <1 ton per year (Tpy) (if “wet” gas is detected);
- Use of Ultra Low Sulfur Fuel (ULSF) of 15 parts per million (ppm) in all engines would be required;
- Small stack height increases on compressor, vent and dehydrator would be required (if “sour” and “wet” gas encountered for the latter two, respectively);
- All annual and short-term ambient standards (National Ambient Air Quality Standards, or NAAQS) and the Department’s toxics thresholds (Annual and Short-Term Guideline Concentrations, or AGCs and SGCs) would be met, except 24-hour PM10/PM2.5 NAAQS due to drilling and hydraulic fracturing engines; and
- Impacts from a nearby pad modeled and indicated no overlap in the calculated “cumulative” impacts on local scale.

The facility definition for permitting was based on Clean Air Act (CAA) 112(n)(4) per EPA guidance at the time, which limits it to “surface area” (i.e., per pad). Annual emissions from all sources were calculated assuming ten wells per pad and resulted in a classification of the emissions as “minor” sources. No final determination was made as to whether non-road engines

would be part of “stationary” facility since it was unclear before September 2009 if these would be at the pad more than 12 months.

1.7.11.2 Revised Draft SGEIS

The Department performed substantive additional emissions and air quality analyses, which identified the following mitigation measures that the Department proposes to require through enhanced procedures, permit conditions and/or regulations:

- The diesel fuel used in drilling and completion equipment engines would be limited to ULSF with a maximum sulfur content of 15 ppm;
- There would not be any simultaneous operations of the drilling and completion equipment engines at the single well pad;
- The maximum number of wells to be drilled and completed annually or during any consecutive 12-month period at a single pad would be limited to four;
- The emissions of benzene at any glycol dehydrator to be used at the well pad would be limited to 1 Tpy as determined by calculations with the Gas Research Institute’s (GRI) GlyCalc program. If wet gas is encountered, then the dehydrator would have a minimum stack height of 30 feet (9.1 meters) and would be equipped with a control device to limit the benzene emissions to 1 Tpy;
- Condensate tanks used at the well pad would be equipped with vapor recovery systems to minimize fugitive VOC emissions;
- During the flowback phase, the venting of gas from each well pad would be limited to a maximum of 5 million standard cubic feet (MMscf) during any consecutive 12 month period. If “sour” gas is encountered with detected hydrogen sulfide (H₂S) emissions, the height at which the gas would be vented would be a minimum of 30 feet (9.1 meters);
- During the flowback phase, flaring of gas at each well pad would be limited to a maximum of 120 MMscf during any consecutive 12-month period;
- Wellhead compressors would be equipped with Non-Selective Catalytic Reduction (NSCR) controls;
- No uncertified (i.e., EPA Tier 0) drilling or completion equipment engines would be used for any activity at the well sites;
- The drilling engines and drilling air compressors would be limited to EPA Tier 2 or newer equipment. If Tier 1 drilling equipment is to be used, these would be equipped with both particulate traps (Continuously Regenerating Diesel Particulate Filters, or

CRDPF) and Selective Catalytic Reduction (SCR) controls. During operations, this equipment would be positioned as close to the center of the well pad as practicable. If industry deviates from the control requirements or proposes alternate mitigation and/or control measures to demonstrate ambient standard compliance, site-specific information would be provided to the Department for review and concurrence; and

- The completion equipment engines would be limited to EPA Tier 2 or newer equipment. CRDPFs would be required for all Tier 2 engines. SCR control would be required on all completion equipment engines regardless of the emission Tier. During operations, this equipment would be positioned as close to the center of the well pad as practicable. If industry deviates from this requirement or proposes mitigation and/or alternate control measures to demonstrate ambient standard compliance, site specific information would be provided to the Department for review and concurrence.

In addition, the revised draft SGEIS discusses the effect of region-wide emissions on State Implementation Plan (SIP) for Ozone NAAQS and implementation of local and regional level air quality monitoring at well pads and surrounding areas.

1.7.12 Greenhouse Gas Mitigation

All operational phases of well pad activities, and all greenhouse gas (GHG) emission sources are evaluated in both the 2009 draft SGEIS and the current draft. Based on this analysis, the Department proposes in the current draft to require the following controls and mitigation measures, pursuant to permit conditions and/or regulation:

- Implementation by the operator of a Leak Detection and Repair Program;
- Upon request, the operator would be required to provide a copy of data required under federal (EPA) GHG reporting rule;
- Reduced Emissions Completion (REC) would be required whenever a gathering line is already constructed. In addition, two years after issuance of the first permit for high-volume hydraulic fracturing, the Department would evaluate whether the number of wells that can be drilled on a pad without REC should be limited; and
- Implementation of other control technologies when applicable, as described in Chapter 7.

1.7.13 Habitat Fragmentation

The current draft includes a substantially augmented analysis of potential impacts from high-volume hydraulic fracturing on wildlife and habitat. Based on that analysis, two measures that were not included in the 2009 draft SGEIS are proposed as mitigation in the revised draft SGEIS:

- *Grassland Focus Areas on private land* – Surface disturbance in grassland patches comprised of 30 acres or more of contiguous grassland within Grassland Focus Areas would be contingent on the findings of a site-specific ecological assessment conducted by the permit applicant and implementation of mitigation measures identified as part of such ecological assessment; and
- *Forest Focus Areas on private land* – Surface disturbance in forest patches comprised of 150 acres or more of undisturbed, contiguous forest within Forest Focus Areas would be contingent on a site-specific ecological assessment conducted by the permit applicant and implementation of mitigation measures identified as part of such ecological assessment.

1.7.14 State Forests, State Wildlife Management Areas and State Parks

Surface disturbance associated with high-volume hydraulic fracturing would not be allowed on State-owned lands administered by the Department, including but not limited to State Forests and State Wildlife Management Areas, because it is inconsistent with the suite of purposes for which those lands have been acquired. Current Office of Parks, Recreation and Historic Preservation (OPRHP) policy would impose a similar restriction on State Parks.

1.7.15 Community and Socioeconomic Impacts

Chapter 6 of this revised draft SGEIS includes a significantly expanded discussion of community and socioeconomic impacts, traffic impacts, and noise and visual impacts, with measures that will be implemented by the Department to mitigate these impacts described in Chapter 7.

1.8 Additional Precautionary Measures

In order to safeguard the environment from risks associated with spills or other events that could release contaminants into environmentally sensitive areas, the revised draft SGEIS includes the following prohibitions and mitigation measures for high-volume hydraulic fracturing:

- Well pads for high-volume hydraulic fracturing would be prohibited in the NYC and Syracuse watersheds, and within a 4,000-foot buffer around those watersheds;
- Well pads for high-volume hydraulic fracturing would be prohibited within 500 feet of primary aquifers (subject to reconsideration 2 years after issuance of the first permit for high-volume hydraulic fracturing);
- Well pads for high-volume hydraulic fracturing would be prohibited within 2,000 feet of public water supply wells, river or stream intakes and reservoirs (subject to reconsideration 3 years after issuance of the first permit for high-volume hydraulic fracturing);

- For at least two years from issuance of the first permit for high-volume hydraulic fracturing, proposals for high-volume hydraulic fracturing at any well pad within 500 feet of principal aquifers, would require (1) site-specific SEQRA determinations of significance and (2) individual State Pollutant Discharge Elimination System (SPDES) permits for stormwater discharges. The Department would re-evaluate the necessity of this approach after two years of experience issuing permits in areas outside of the 500-foot boundary;
- The Department would not issue permits for proposed high-volume hydraulic fracturing at any well pad in 100-year floodplains; and
- The Department would not issue permits for proposed high-volume hydraulic fracturing at any proposed well pad within 500 feet of a private water well or domestic use spring, unless waived by the owner.

As reflected in the response to comments, subsequent to the issuance of the 2011 dSGEIS and in the face of ever-increasing information and scientific studies detailing the risks and uncertainties regarding the environmental and public health impacts that result from HVHF development, the Department considered numerous additional mitigation measures to protect and reduce impacts to drinking and other water resources, air, and other resources, including, for example, banning any HVHF development in the Catskill Park, extending setbacks from various resources and eliminating sunset periods for various restrictions.

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