ENCLOSURE

EPA Comments on Revised Draft NYSDEC Revised dSGEIS for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs
January 11, 2012

GENERAL:

NYSDEC should establish a Geographic Information System-based display that not only indicates the locations of permitted wells but also—updated at least monthly—the stage of the hydraulic fracturing operation for each well on the pad—for example, the approximate percentage of the required water for hydraulic fracturing fluid that has been accessed and stored on site, whether hydraulic fracturing is in progress, whether gas is being collected. The Geographic Information System display should also show public water supply wells and intakes). Ideally, this information would be publicly accessible on NYSDEC's web site.

SPECIFIC COMMENTS:

Executive Summary:

Page 9, Third Paragraph – Groundwater level decrease could produce de-gassing and migration of methane in the Naturally-Occurring Methane Areas of New York State. If the aquifer contains methane or the groundwater is near saturation with methane, a decrease in aquifer pressure may cause a problem.

Page 19, NORM Concerns – The first sentence in this section states, in part, "Based upon currently available information it is anticipated that flowback water would not contain levels of naturally-occurring radioactive materials (NORM) of significance…" Available data of flowback water obtained by EPA Region 3 from six natural gas companies in Pennsylvania through information request letters shows elevated levels of naturally occurring radioactive materials (see http://www.epa.gov/region3/marcellus_shale/#wastewater). Thus the NYSDEC should consider revising this statement.

Page 20: No High-Volume Hydraulic Fracturing Operations on Primary Aquifers – The Executive Summary should make clear that the prohibition of high-volume hydraulic fracturing operations within 500 feet of a primary aquifer will be reconsidered by the NYSDEC two years after issuance of the first permit for high-volume hydraulic fracturing (see Page 1-17).

Chapter 1 - Introduction:

Page 1-2, Section 1.1.1.1: Use of Reserve Pits or Centralized Impoundments for Flowback Water – It is EPA's understanding that the storage of flowback water in reserve pits on the well pad will be prohibited by NYSDEC for wells where high-volume hydraulic fracturing is planned. EPA Region 2 supports the NYSDEC's decision. This paragraph, however, suggests that such on-site reserve pits could be allowed provided a site-specific environmental review is conducted.

Page 1-10, Section 1.7.2: Water Well Testing – Private drinking water wells should be tested at a distance from the "drilling site" that correlates to the length of the proposed longest horizontal well. Homeowners should be able to choose the water testing firm to sample their own water and the drilling companies should be required to pay the cost of testing the wells.

Page 1-13, Section 1.7.9: Flowback Water Disposal – The last sentence in this section states "Additionally, limits would be established for naturally-occurring radioactive materials (NORM) in publicly-owned treatment works

influent." On page 6-59 and 6-63 of Section 6.1.8.1, the NYSDEC indicates that they will limit the influent of wastewater at a publicly-owned treatment works to 15 pCi/L. Please clarify that this is the limit that the NYSDEC is considering establishing in Section 1.7.9. If this is not the limit, EPA suggests that the limits be established prior to initiating any hydraulic fracturing activities.

Page 1-13, Section 1.7.10: Management of Drill Cuttings – Drill cuttings should be tested to determine if they contain constituents that pose an endangerment to human health and the environment. If they do contain such constituents, they must be disposed of at a permitted offsite facility.

Page 1-18, Second Bullet – This restriction states that permits should not be issued for high-volume hydraulic fracturing at any well pads within a 100 year floodplain. .EPA supports this restriction and suggests that the NYSDEC do an analysis of whether this restriction should also apply to ancillary structures connected to the well pad such as pipes, transfer stations, containment tanks and other structures.

Chapter 2 - Description of Proposed Action:

Page 2-1, Second Paragraph – EPA suggests removing "slick water fracturing" from the second sentence. The majority of hydraulic fracturing in the gas shales will be of the slickwater type, but why use a specific type in the general description of high-volume hydraulic fracturing. The comprehensive additives and chemical lists in the revised dSGEIS refer to products used in various types of hydraulic fracturing; the slickwater type of hydraulic fracturing minimizes additive use so most of the additives and chemicals on the lists would not apply.

Page 2-63, Table 2.31: Region B: Wages, by Industry, 2009 (New August 2011) – Table 2.31 must be revised. Chemung and Tioga Counties should be replaced with Otsego County and Sullivan County information.

Page 2-129, Second Paragraph – The word "though" in the fourth sentence should be replaced with "through."

Page 2-144: Palisades Park (Palisades Interstate Park Commission) – The geographic designation of "northwestern" New Jersey in the first sentence should be replaced with "northeastern" New Jersey.

Chapter 3 – Proposed SEQRA Review Process:

Page 3-7, Third Paragraph – As noted in EPA Region 2's 12/30/09 public comments to NYSDEC, the SGEIS should include an evaluation of the environmental impacts associated with the construction and siting of associated gathering lines and pipelines. Consistent with standard environmental impact assessment practices, an assessment of indirect impacts should be included.

Since the New York State Public Service Commission has the regulatory authority over the construction and operation of the natural gas gathering lines, in order to ensure a full discussion of these impacts, the New York State Public Service Commission should become a cooperating agency and the New York State Public Service Commission-related issues should be integrated into the finalization of this document. At a minimum, the document should outline how the environmental impacts of this associated infrastructure would be analyzed and mitigated. Collaboration mechanisms in the future between the NYSDEC and the New York State Public Service Commission may also provide the opportunity to coordinate actions in order to minimize the amount of flaring of gas between the time of opening a well and the construction of gathering lines as well as to site well pads as much as possible near existing pipeline infrastructure to minimize surface disturbance.

Page 3-9, Section 3.2.3.2: Water Source Information – The operator should be required to provide information on any newly proposed groundwater source in addition to newly proposed surface water sources as part of the well permit application.

Page 3-13, Section 3.2.3.8: Required Affirmations – Drilling companies should affirm that they will have the least amount of habitat disturbance as possible especially within grasslands and interior forests.

Page 3-14, Section 3.2.4: Prohibited Locations – EPA Region 2 supports the NYSDEC's decision to prohibit high-volume hydraulic fracturing operations within the areas listed in Section 3.2.4.However, EPA Region 2 is still concerned that drilling of wells where high-volume hydraulic fracturing will not be employed will still be allowed by NYSDEC in these sensitive areas. Given that many of the same risks discussed in the revised dSGEIS are present when any well is drilled and hydraulically fractured in these locations regardless of whether high-volume or low-volume hydraulic fracturing is used, it appears inconsistent to prohibit one activity and not the other.

Also, the New York State Department of Health in its Source Water Assessment Program Plan (Nov 1999, p. 55), used a one-mile (5,280 ft) radius around community and non-transient non-community wells as the area in which it developed an inventory of potential pollution threats. This implies that New York State Department of Health considered potential pollution sources as far as one mile away possible threats to the public water supply. Furthermore, active oil and gas wells were included in the list of potential pollution sources in the New York State Department of Health Source Water Assessment Program Plan (p. 64). The NYSDEC should describe in the final SGEIS the difference between the proposal in this document and the use of a 1-mile radius in the New York State Department of Health Source Water Assessment Program Plan.

In addition, in regards to private drinking water wells, what happens if two private wells are closer than 1,000 ft, so that the 500-ft radii of exclusion intersect, and one owner (who presumably has leased his land to the drilling company) allows the drilling but the other opposes it? How would this conflict be resolved?

Chapter 4 – Geology:

Page 4-24, Section 4.5.2 Seismic Risk Zones – As the NYSDEC finalizes the revised dSGEIS, please examine the Geomechanical Study of Bowland Shale Seismicity issued in November 2011, which linked hydraulic fracturing of a well in the United Kingdom with induced seismic activity.

Page 4-27, Section 4.5.3: Seismic Damage – This section discusses the three different scales used to measure the strength of seismic events. For clarity, Section 4.5.4 and accompanying Table 4.2 which discusses the recorded seismic events in New York should indicate which scale is being used for the historical discussion.

Page 4-36, Section 4.7: Naturally-Occurring Methane in New York State – The referenced Figure 4.16 in the first paragraph is not in the revised dSGEIS.

Page 4-37, Second Paragraph – The first sentence of the second paragraph states "The existence of naturally occurring methane seeps have been known since the mid 1600s." Have these incidents of naturally occurring methane been mapped?

Page 4-39, Second Paragraph – The discovery of methane in groundwater by the NYSDEC and the United States Geologic Society's ongoing cooperative groundwater monitoring project should be delineated and a map provided. This information may prove valuable for operators in their decisions concerning surface hole drilling techniques (air, fresh water or mud), and casing and cementing design.

Chapter 5 – Natural Gas Development Activities & High-Volume Hydraulic Fracturing:

Page 5-6, Section 5.1 Land Disturbance – This section presents a good overview of land disturbance associated with traditional and high-volume horizontal hydraulically fractured wells and some of the associated infrastructure. It presents several scenarios for future drilling and development, and outlines the different well density patterns depending on which of three well spacing options are selected. Along with this protection, however, the NYSDEC must still take care to ensure that prescribed setbacks to protect drinking water supplies

and environmentally sensitive resources are appropriately applied, allowing for some flexibility to adjust either upwards or downwards given site-specific conditions.

Page 5-34, First Paragraph – Although horizontal wells will produce more drill cuttings than a vertical well (the example used demonstrated 217 cubic yards versus 154 cubic yards), if you look at drill cutting produced per 640 acre area, vertical wells would produce more drill cuttings (vertical: 16 x 154 = 2464 cubic yards, horizontal: 9 x 217 = 1953 cubic yards – 20% less).

Page 5-34, Section 5.2.4.2 NORM in Marcellus Cuttings – This section states that the Marcellus Shale drill cuttings data reported from Marcellus wells in Pennsylvania are essentially equal to background values and do not indicate an exposure concern for workers or the general public associated with Marcellus cuttings. While this may be true for some of the data sets, other data should also be taken into consideration and it should be made clear that the data referred to in the revised dSGEIS do not represent the entire radiological conditions of the Marcellus Shale. That is, data reported in Table 5.2b coupled with Table 5.2a and Table 5.3 is evident of the heterogeneity of radioactivity in the Marcellus shale. Also, other data (see data submitted to EPA Region 3 from six drillers in Pennsylvania (http://www.epa.gov/region3/marcellus_shale/#wastewater)) collected from water and brine generated from well drilling activities in Pennsylvania seems to indicate elevated levels of radioactivity. As such, EPA recommends that the conclusion about the concentrations of naturally-occurring radioactive materials (NORM), specifically that these concentrations do not indicate an exposure of concern to works or the public, should be reconsidered or possibly removed because it is based on limited data that does not represent the radiological conditions in the entire Marcellus Shale.

Page 5-35-36, Table 5.2 2009 Marcellus Radiological Data – Table 5.2a (Marcellus Radiological data from Gamma Ray Spectroscopy Analyses) lists the isotopic concentrations of composited samples collected from two vertical wells drilled through the Marcellus shale, which are within background levels found in soil in New York and New Jersey. However, the exposure rate measurements listed in Table 5.2b (Marcellus Radiological data from Geiger Counter Screening) collected on Marcellus shale cores, outcrops and well sites from the west-central part of the state ranged from 3 to 13 times the ambient radiation exposure rate. Although, isotopic analyses to determine the radionuclide concentrations were not performed on the samples listed in Table 5.2b, the radionuclide concentrations, based on EPA Region 2's understanding of and experience with exposure rate data, are anticipated to be as high as 10 times those listed in Table 5.2a, suggesting the need for more vigilance in proper handling and disposal of such naturally-occurring materials from the Marcellus cuttings.

Page 5-40, First Paragraph – NYSDEC should modify the end of the second sentence to add higher injection rates, "…finer-grained proppants, lower proppant concentrations and higher injection rates."

Page 5-104, Table 5.9: Parameters present in a limited set of flowback analytical results (Updated July 2011) – The table lists "Radium", "Radium 226", and "Radium 228". It is unclear what is meant by "Radium." The NYSDEC needs to either specify the isotope/meaning or revise/delete accordingly.

Pages 5-106 to 108, Table 5-10: Typical concentrations of flowback constituents based on limited samples from PA and WV, and regulated in NY (Revised July 2011) – A comparison of the maximum concentrations of several chemicals (arsenic, benzene, bis(2)ethylhexylphthalate, chromium (VI), and tetrachloroethylene) found in the flowback water samples reveals that they are greater than EPA's risk-based screening values for tap water. This indicates that there could be potential health-related problems for individuals who may ingest drinking water containing these concentrations over a lifetime of exposure if the flowback water is determined to be a source of drinking water contamination.

Furthermore, a comparison of the maximum concentrations of benzene and chromium (VI) found in flowback water reveals that they can be greater than EPA's Removal Action Levels – chemical-specific concentrations for individual contaminants in drinking water that may be used to support a decision by EPA to undertake a removal

action. This suggests that there could be potential health-related problems for individuals exposed to drinking water contaminated by flowback water over the short term (acute exposure).

Page 5-114, Table 5-23: Parameter Classes Detected in Flowback Analyticals in MSC Study – EPA recommends that chemicals and concentration levels be included in this table.

Page 5-117, Section 5.11.3.1 Temporal Trends in Flowback Water Composition – The footnote 111 should be updated to include results of water samples associated with the Marcellus Shale in Pennsylvania obtained by EPA Region 3 from six natural gas drillers in Pennsylvania through information request letters (see http://www.epa.gov/region3/marcellus_shale/#wastewater). Such data appears to reveal radionuclide concentrations far in excess of the reported data from the Marcellus Shale in New York State which is yet another indication of radionuclide heterogeneity in the Marcellus shale that should be taken into consideration.

Page 5-118, Section 5.12: Flowback Water Treatment, Recycling and Reuse – It is indicated that many companies plan to recycle flowback for reuse as hydraulic fracturing fluid in other wells. The NYSDEC should determine if the composition of the recycled flowback, or hydraulic fracturing fluid derived from it, differs significantly from the composition of the fluid initially used (for example, by the presence of brine). Page 5-124, Section 5.12.3 Other On-Site Treatment Technologies – Were the potential emanation of radon and its decay products taken into consideration for the on-site treatment technology? If not, why not? In New Jersey we have seen radon concentrations in ground water as high as 0.5 million pCi/L. At a minimum, the human health risks to the site workers from radon and its decay products should be assessed along with the associated treatment technologies such as aeration systems or holding for decay. Should radon and its decay products be of concern, then the associated radon air emissions, if treated, should be addressed using the National Emission Standard for Hazardous Air Pollutants (NESHAP) for radon emissions from operating uranium mill tailings (Subpart W) under the Clean Air Act as an applicable or relevant and appropriate requirement.

Page 5-129, Section 5.13.1 Cuttings from Mud Drilling – The last sentence states, in part, that "In New York State, the naturally-occurring radioactive materials in cuttings is not precluded by regulation from disposal in a solid waste landfill…" Does this apply to any concentration of naturally-occurring radioactive materials, such as concentrations defined as "source material" or higher? More specifics need to be provided. If it does apply to any concentration of naturally-occurring radioactive materials, then the NYSDEC needs to identify who will be responsible for any potential cleanup or for managing the engineering controls on solid waste landfills that accept cuttings with such high concentrations of naturally-occurring radioactive materials.

Page 5-132, Section 5.13.3.2: Municipal Sewage Treatment Facilities – This section must note that EPA Region 2 as well as the NYSDEC needs to be notified and approve the analysis conducted by a municipal sewage treatment works (also called publicly-owned treatment works or POTWs) prior to acceptance of natural gas wastewater at the Publicly-Owned Treatment Works' system. Notification and analysis requirements are outlined in 40 CFR 122.42(b), which includes identification of any potential effects on the publicly-owned treatment works' operations, sludge, and receiving water.

Page 5-133, Table 5.28: Out-of-state treatment plants proposed for disposition of NY flowback water – This table shows out-of-state treatment plants proposed for disposition of New York State flowback water. The table does not reflect the facilities' current capacity to accept flowback water. It is likely that several of these out-of-state treatment plants would not be able to take flowback water from New York. Below is a discussion addressing some of the out-of-state facilities in the table that incorporates input from EPA Region 3.

Effective August 21, 2010, the Pennsylvania Department of Environmental Protection developed regulations for discharge loadings of total dissolved solids (TDS) If there is a net increase in total dissolved solids loading of more than 5,000 pounds/day above the previously authorized loading, treatment requirements may be required for certain discharges. Any discharger that proposes to accept high total dissolved solids wastes after adoption

of the regulation must meet a 500 mg/l total dissolved solids average monthly limit as well as limits for chloride, barium, and strontium. The Pennsylvania Department of Environmental Protection rule establishes that publicly-owned treatment works may accept such wastewaters only if the wastes are first treated at a centralized waste treatment facility and the centralized waste treatment facility meets an end-of-pipe effluent standard of 500 mg/l for total dissolved solids (in addition to the standards for chloride, barium, and strontium).

Advanced Waste Services (AWS) discharges into the New Castle, Pennsylvania, publicly-owned treatment works. In 2009, New Castle reported that AWS caused interference at the Publicly-Owned Treatment Works. Since that time, the flow from AWS has been reduced. New Castle has a pretreatment program but has not yet developed local limits for total dissolved solids wastewater although they have been notified that they must develop local limits. The AWS discharge into New Castle falls under the existing discharger provision for the Pennsylvania Department of Environmental Protection regulations.

McKeesport, Pennsylvania has an approved pretreatment program. McKeesport has submitted a headworks analysis that indicates that they should be able to receive up to 1% of their flow as gas drilling waste. McKeesport is currently not receiving any shale gas extraction wastewater, but is seeking approval to accept coal bed methane wastewater.

The Lehigh County Authority Pretreatment Plant is an industrial publicly-owned treatment works that discharges into the Allentown, Pennsylvania Publicly-Owned Treatment Works. Lehigh County Authority has not previously reported accepting high total dissolved solids waste and would be considered a new discharge of total dissolved solids. Under Pennsylvania Department of Environmental Protection's regulations, the discharge from Lehigh County Authority into Allentown would be required to meet the 500 mg/l total dissolved solids standard.

Valley Joint Sewer Authority has not previously reported receipt of high total dissolved solids waste and new discharges would require treatment at a Centralized Waste Treatment facility that can meet the 500 mg/l total dissolved solids standard.

Page 5-133, Section 5.13.3.4: Road Spreading – According to the revised draft SGEIS, the NYSDEC will not allow road spreading of flowback water but will allow this activity for produced water. It is unclear why this distinction was made by the NYSDEC as produced water will have higher concentration of natural contaminants such as total dissolved solids, chloride, bromide, and radionuclides than flowback water since it has been in contact with the formation longer. Also, produced water may still contain some of the chemicals used in the hydraulic fracturing fluids if not all the fluids returned in the initial flowback period. Moreover, the actual concentration and/or radioactivity of contaminants in the produced water spread on land or roads would be unknown at any given time since the amount and type of contaminants in produced water varies from well to well and even in the same well over time unless each truckload is tested which would be a monumental task given the amount of produced water that is expected to be generated from Marcellus and Utica shale gas extraction and available for road spreading. In addition, road spreading of any type of natural gas non-domestic wastewater could lead to violations of the Clean Water Act's no direct discharge prohibition due to runoff of contaminated storm water and snowfall. Furthermore, such a practice, depending on the make-up of the soils along the roadway, could lead to surface infiltration of the produced water and risk contamination of the underlying aquifer. For these reasons, EPA supports the NYSDEC's decision to prohibit the road spreading of flowback water. Additional analysis of produced water should be done to determine if this prohibition should also apply to produced water (i.e. brine).

Page 5-133, Section 5.13.3.5: Private In-State Industrial Treatment Plants – This section does not address potential effluent guidelines under 40 CFR Part 437 that may apply to Private In-State Industrial Treatment Plants for treatment of extraction wastewater transferred to non- publicly-owned treatment works. Discharges from a centralized waste treatment (CWT) facility are subject to the effluent limitations guidelines and standards established at 40 CFR Part 437. For some pollutants, such as total dissolved solids, EPA considered, but did not

establish, pollutant limitations in the centralized waste treatment facility effluent guidelines. Total dissolved solids levels in Marcellus Shale wastewaters have been measured to be present in concentrations up to 345,000 mg/l. High concentrations of total dissolved solids will require advanced waste water treatment, such as distillation, and may cause scaling which requires frequent cleaning of equipment. In addition to any applicable technology-based requirements, State Pollutant Discharge Elimination System (SPDES) permits for discharges from centralized waste treatment facilities to waters of the State also must meet applicable water quality-based permitting requirements. Discharges from a centralized waste treatment facility are subject to the effluent limitations guidelines and standards established at 40 CFR Part 437. Additional limits may be required to address pollutants in the wastewater that were not considered in developing the centralized waste treatment facility effluent guideline. For such pollutants, EPA's National Pollutant Discharge Elimination System (NPDES) regulations require that permit writers include technology-based limits developed on a case-by-case, "best professional judgment" (BPJ) basis. See 40 CFR §125.3(c)(3) ("Where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, or to certain pollutants, other aspects or activities are subject to regulation on a case by case basis…"). In developing technology-based BPJ limits, the permit writer must consider the factors specified in 40 CFR 125.3(d), the same factors that EPA considers in establishing categorical effluent guidelines. In developing the centralized waste treatment facility effluent guideline, EPA did not evaluate certain pollutants that are likely to be present in shale gas extraction (SGE) wastewater, such as radionuclides. Consequently, the NYSDEC Department of Water will need to develop best professional judgment technology based effluent limits to address those pollutants identified in the effluent but not considered by the centralized waste treatment facility effluent guidelines and incorporate these limits in the centralized waste treatment facility's State Pollutant Discharge Elimination System permit.

Page 5-136, Horizontal Drilling, Activities – NYSDEC should add in the chart of activities for horizontal drilling, "wireline truck on site to run open-hole logs."

Page 5-137, 5.16.2.1: Hydrocarbons – The western portions of the "fairway," Area C, are going to be in the wet gas and possibly oil window. NYSDEC should consult with State geologist regarding the areas of possible wet gas production. Area A and B should be dry gas.

Page 5-138, First Paragraph – EPA suggests dropping the sentence "Based on low VOC content of these compositions, pollutants such as BTEX are not expected". This may not hold up in the western portion of the state in either the Marcellus or Utica shale formations.

Page 5-141-142, Section 5.16.7 NORM in Marcellus Production Brine – This section states, in part, that naturally-occurring radioactive materials (NORM) may require appropriate handling and treatment options, including possible radioactive materials licensing. The section further states that the well operator will be required to obtain a radioactive materials license when the radiation exposure rates exceed 50 micro-R per hour (µR/h). How does the need for proper handling, treatment options, and possible licensing compare with the statement in Section 5.13.1 that naturally-occurring radioactive materials are not precluded by regulation for disposal in a solid waste landfill? Would proper handling, treatment and licensing apply to naturally-occurring materials in solid waste landfills? Elaboration on this point is needed.

Also, the exposure rate of 50 µR/h is not only concentration-based, but also volume-based. For example, a one cubic foot of solid material containing naturally-occurring radioactive materials that reads 20 µR/h, may read over 50 µR/h when the volume is increased to 2 cubic yards or more. It would be preferable if licensing is based on the concentration of naturally-occurring materials and the volume of solid material containing the naturally-occurring radioactive materials. The concern here is that small volumes of solid material containing naturally-occurring radioactive materials reading less than 50 µR/h which is released for unrestricted disposal, may result in exposure rates well above 50 µR/h when volumes consolidated at a given disposal location.

Chapter 6 – Potential Environmental Impacts

Page 6-5, Section 6.1.1.6: Aquifer Depletion – Aquifer depletion may produce natural gas de-gassing in the Naturally-Occurring Methane Areas of New York. These areas should be delineated.

Page 6-6, Section 6.1.1.7: Cumulative Water Withdrawal Impacts – The third word in the first sentence (i.e., 'in") should be deleted.

Page 6-19-35, Table 6.1: Comparison of additives used or proposed for use in NY, parameters detected in analytical results of flowback from the Marcellus operations in PA and WV and parameters regulated via primary and secondary drinking water standards, SPDES or TOGS 1.1.1 (Revised August 2011) – This table would be more informative if it contained the minimum and maximum concentrations of the parameters found in the flowback water so that comparisons to maximum contaminant level goal and maximum contaminant level values can be performed. Also, on page 6-34, Table 6.1 lists Table 5 of Technical and Operational Guidance Series 1.1.1 as the reference for total dissolved solids (TDS) water quality standards. Table 5 of Technical and Operational Guidance Series 1.1.1 lists water quality standards for groundwater. While not included in Technical and Operational Guidance Series 1.1.1, the New York Codes, Rules and Regulations at 6 NYCRR § 703.3 has additional water quality standards for total dissolved solids for water classes A-Special, AA, A, B, C and AA-Special that are not reflected in Table 6.1. Perhaps rather than refer to the Technical & Operational Guidance Series 1.1.1, Table 6.1 should refer to 6 NYCRR Part 703 subsection tables instead.

Page 6-41 and 6-42, Section 6.1.4.3: Natural Gas Migration –Natural gas could potentially migrate into potable groundwater supplies as a result of air drilling surface holes near Naturally-Occurring Methane Areas. As mentioned earlier, within Naturally-Occurring Methane Areas, dissolved concentrations of methane can be greater than 40 parts per million. Drilling the surface hole with air may provide enough pressure decline to cause dissolved methane to come out of solution (methane saturation at standard temperature and pressure is about 28 parts per million.) Drilling with water, on the other hand, would maintain a pressure head. This situation warrants further study. If concentrated air drilling of surface holes could cause a problem in areas where the aquifer may be near saturation with methane, it may be prudent to require the use of fresh water instead of air to drill surface holes in the Naturally-Occurring Methane Areas of New York. Note that after the surface casing is set and cemented, drilling with air should not cause any problems.

Page 6-56, Section 6.1.7: Waste Transport – Regular testing of wastewater and materials from the drilling process should be performed to determine if they pose a threat to human health and the environment so that such wastewater and materials may be disposed of properly. Well operators should have to pay for this testing and NYSDEC staff should review the results.

Page 6-59 and 6-63 – The NYSDEC anticipates large volumes of wastewaters (flowback and produced water) containing naturally-occurring radioactive materials (NORM) to be processed by publicly-owned treatment works (POTWs) or private off-site wastewater treatment facilities and is therefore proposing in the revised dSGEIS to limit the radium 226 (Ra-226) influent to 15 pico-Curies per liter (pCi/L), which is 25% of the limit specified in the New York Codes, Rules and Regulations (6 NYCRR Part 380). Previously in Section 5.16.7 of the revised dSGEIS, the NYSDEC stated that a radioactive materials license may be required for facilities that will concentrate naturally-occurring materials during pre-treatment or treatment of brine (see page 5-142). Will this licensing requirement be applied to publicly-owned treatment works facilities and private off-site wastewater treatment facilities? Also, who will be responsible for the proper disposition of such wastewater treatment consolidated naturally-occurring radioactive materials?

Furthermore, who is responsible for addressing the potential health and safety issues and associated monitoring related to exposure to external radiation and the inhalation of radon and its decay products? Such potential concerns need to be addressed.

In addition, the NYSDEC should address the situation of what happens to the wastewaters that exceed the proposed influent limit of 15 pCi/L?

Page 6-61, Top of Page – Section 6.1.8.1 on publicly-owned treatment works in the revised dSGEIS specifies that in conducting a headworks analysis, the monitoring will be performed for radium using EPA Method 903.0 or Standard Method 7500-Ra B. EPA method 903.0 does not provide results for radium-228. New York has water quality standards for radium-226 and radium-228. The NYSDEC must specify an EPA method (such as method 9320) that provides analytical results for both isotopes. Alternatively, rather than specifying the analytical method, the NYSDEC should indicate the specific parameters that must be sampled and analyzed (e.g., radium-226, radium 228) and indicate that NYSDEC approved methods be used for the analysis. It should be noted that for other parameters to be analyzed in the headworks analysis, such as oil and grease, total dissolved solids, etc. the NYSDEC does not specify an analytical method in Section 6.1.8.1. The NYSDEC should either include all of the approved analytical methods or none of them.

Page 6-65, Section 6.1.9.1 NORM Considerations – Cuttings – This section needs to be revised per our comments associated with Section 5.2.4.2 (Page 5-34) above.

Page 6-84, Section 6.4.2: Invasive Species – In EPA's original December 30, 2009 comments, EPA stated that the invasive species issue should include potential invasive species that can be carried by equipment transported from other drilling locations because of a possibility that golden algae (prymnesium parvum) that may have been transported on equipment potentially contributed to a fish kill in Dunkard Creek. While the revised dSGEIS in Section 7.4.2.2 on page 7-97 does recommend best management practices be instituted and incorporated into the required invasive species mitigation plan to reduce the risk of transferring invasive species, a larger issue that was determined from Pennsylvania's investigation was that dissolved solids created conditions that helped the golden algae bloom. The NYSDEC must ensure that freshwater streams do not become brackish enough to support the golden algae, regardless of whether or not golden algae are an invasive species. The species is of concern because of its ability to produce a toxin that can cause fish kills. Although it can exist in waters without being harmful, according to an article in the Texas Water Resources Institute's tx*H2O* magazine for winter 2011, the algae caused major fish kills in five of Texas' river systems

Page 6-93, Section 6.5: Air Quality – Overall EPA Region 2 believes that the NYSDEC has prepared a comprehensive air quality assessment and identified a number of air quality concerns including the potential for local violations of short term air quality standards, emissions of air toxics including diesel engines, and the need for baseline and post development ambient monitoring. In some cases EPA believes the NYSDEC has identified mitigation measures but in other instances the measures could be strengthened or better defined (see below).

Page 6-93 - Applicable Federal Regulations – The revised dSGEIS should include a list of the applicable federally approved New York State regulations in this section including the effective date and EPA approval date (may be the same list as in the Applicable State Regulations section). In some instances the latest New York State applicable regulation may not be the same version that is federally enforceable and in some instances EPA may have kept more stringent limits in the SIP that were included in older versions of the applicable regulations. Also, on August 23, 2011, the EPA published in the Federal Register the proposed rule, ''Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Review.'' This rule is scheduled to be promulgated in March 2012 and may broaden the scope of operations and emission points covered by existing rules.

Page 6-96: Applicable New York State Regulations – As a point of clarification – there may be versions of applicable New York State regulations that were revised by New York subsequent to EPA's approval of previous versions of those particular regulations (in some instances there may be different control requirements, emission rates, applicability, etc. in the revised regulations when compared to the EPA approved version.) Therefore, it is important to specify the exact versions (effective dates) of the applicable New York State

regulations that are State enforceable and to also list out the exact versions of the New York State regulations that have been approved by EPA and are federally enforceable. Also, the revised dSGEIS should include the State effective date of each regulation.

Page 6-105 – The third sentence of the first paragraph on this page states "Hydrocarbons vapors from the condensate tanks can be emitted to the atmosphere through vents on the tanks." Also, the last sentence of the second paragraph on this page states "If such condensate tanks are to be used in New York, a vapor recovery system would be required to be installed instead of flaring the emissions since the latter creates additional combustion emissions and other potential issues." If volatile organic compounds are released to the atmosphere, the amount of volatile organic compounds released to the atmosphere should be quantified. EPA supports the required installation of a vapor recovery system. For these systems, a capture efficiency should be identified that is consistent with state of the art controls

Page 6-104, Third Paragraph – EPA suggests beginning the first sentence of the third paragraph with "Most of the gas from the Marcellus Shale in New York "… instead of "Gas from the Marcellus Shale in New York …"

Page 6-105, Second Paragraph – Southwest Pennsylvania and the areas south of Cattaraugus and Chautauqua Counties, New York possess wet gas in the Marcellus Shale.

Page 6-106, Tables 6.7-6.10: Estimated Wellsite Emissions – Clarify whether particulate matter (PM) in the charts represents total particulate matter. Separate out $PM_{2.5}$ and PM_{10} emissions.

Page 6-109, Second Paragraph – Replace the phrase "In the unlikely event of encountering" in the second sentence with "If."

Page 6-110-167, Section 6.5.2: Air Quality Impact Assessment – The air quality modeling methodology used by the NYSDEC conforms to EPA modeling guidelines and is appropriate for a generic assessment of the impacts associated with the emissions from horizontal drilling and high-volume hydraulic fracturing in the Marcellus Shale area. The modeling was done using the EPA approved dispersion model, AERMOD (American Meteorological Society\EPA\Regulatory Model) using 12 years of meteorological data measured across New York State. Conservative assumptions were appropriately made and justified since this analysis needed to be generally representative of all the areas. For example, the emission units were placed near the edge of the well pads rather than the in the middle in order to capture the maximum offsite impact. The modeled emissions take into account the emission reductions due to add on controls such as Selective Catalytic Reduction (SCR) and particulate traps. Any future refinements to this modeling analysis for a site specific area would need to be submitted to the NYSDEC for approval. While EPA finds the modeling to date to be generally acceptable, EPA recommends the following additional analyses and clarifications as stated below:

1. The revised dSGEIS notes "...as part of its commitment to the EPA, and in cooperation with the Ozone Transport Commission to consider future year emission strategies for the Ozone SIP, the Department would include the emissions from Marcellus Shale operations in subsequent SIP modeling scenarios." EPA agrees with the NYSDEC's commitment, and encourages the NYSDEC to use existing photochemical grid modeling work, in progress for attainment demonstrations, to evaluate the impact on ozone from projected multiple sources of drilling and hydraulic fracturing in multiple states.

2. As an adjunct to the regional photochemical grid modeling work for ozone, the NYSDEC should use a finer grid over a smaller domain to calculate the impact of secondary air toxics from the projected sources being considered across multiple states. Since formaldehyde is a major contributor to air toxics inhalation risks (based on the NYSDEC's assessment for this project), the NYSDEC should use the photochemical grid model to assess the additional formation of aldehydes on scales of a neighborhood and larger.

3. Table 6-19 on page 6-165, needs to be updated. The table currently shows exceedances of the 24 hour PM_{10}, 24 hour $PM_{2.5}$, and 1 hour nitrogen dioxide National Ambient Air Quality Standards which were identified prior to the consideration of emission controls as stated in the text. These impacts were reduced by the addition of controls. The table should reflect the impacts due to the reduced emissions.

4. The $PM_{2.5}$ significant emission rate is defined in the document as 15 tons per year. EPA defines this threshold as 10 tons per year. This should be revised.

5. The method for modeling the impacts from the open flares is unclear. Since EPA only has screening techniques for estimating impacts from flares, the document should elaborate on the assumptions made for simulating the impacts from the open flares.

Page 6-138 & 6-139 – The references to Table 6.17 throughout the two pages should be changed to Table 6.18.

Page 6-141, Last Paragraph – NYSDEC should replace "….has remodeled the units are 15 separate …" in the second sentence with "…has remodeled the units as 15 separate…"

Page 6-142, Second Paragraph – NYSDEC should replace, "It was notes …." in the first sentence with "It was noted …"

Page 6-143, Third Paragraph – The reference to Table 6.18 should be changed to Table 6.19.

Page 6-144, Third Paragraph – The reference to Table 6.18 should be changed to Table 6.19.

Page 6-147, Third Paragraph – The reference to Table 6.15 in the second sentence should be changed to Table 6.16 and the reference to Table 6.15 in the third sentence should be changed to Table 6.17.

Page 6-151, Third Paragraph – The reference to Table 6.18 in the first sentence should be changed to Table 6.19.

Page 6-152, Third Paragraph – The reference to Table 6.19 in the first sentence should be changed to Table 6.20.

Page 6-176 - Effects of Increased Truck Traffic on Emissions – A more detailed narrative of the Motor Vehicle Emission Simulator (MOVES) modeling should be included. Please provide more details summarizing the inputs, including rationale for key variables chosen, and results.

Page 6-177, Second Paragraph – NYSDEC should replace, "The estimated emissions of NOx and VOCs (and well …" in the first sentence with "The estimated emissions of NOx and VOCs (as well …"

Page 6-181, Bottom of Page – Air monitoring, especially for volatile organic compounds, will be most important in the "wet gas" and "oil" areas of the Marcellus and Utica Shales in the western portion of the Southern Tier.

Page 6-180-185, Section 6.5.4: Air Quality Monitoring Requirements for Marcellus Shale Activities – The NYSDEC has correctly identified that additional baseline and post development monitoring is needed – the main unresolved issue is related to the funding needed to conduct the monitoring.

EPA agrees with the general air monitoring approach for Marcellus Shale activities, specifically with the two monitoring objectives New York has proposed:

- Regional-scale monitoring that would directly address the impacts of regional emissions of the relevant pollutants by comparing background concentrations with a site located downwind and representative of a potential impact area. EPA believes that this type of approach, alongside the

information of existing monitoring sites, can address the concerns of monitoring in order to determine the status of air quality "before" drilling starts and "after" drilling commences. Local-scale or near-field monitoring at various drilling locations expected to be directly impacted by hydraulic fracturing activities.

EPA also agrees that additional details are difficult to define since there is currently no firm determination as to the location and duration of gas drilling and that additional information will become available from air quality studies around the country.

An action plan should be developed in the event that near-field/local scale and/or regional air monitoring indicates that the levels of air pollutants from activities taking place on or during construction of the well pads is impacting National Ambient Air Quality Standards, employees, or nearest receptors. Examples of activities that could be included in the action plan: dust mitigation measures, temporary work stoppage, and installation of emissions control equipment.

Lastly, the NYSDEC proposes a "purpose-built vehicle with generators as mobile laboratory." The NYSDEC should take precautions to make sure the generator emissions do not confound results by developing data quality indicators (DQIs) that could indicate the presence of interference from generators or other local sources. In addition, EPA recommends looking into a battery powered or land power option where possible.

Page 6-187, Section 6.6.1: Greenhouse Gases – The fourth sentence does not reference all six principal greenhouse gas emissions. Sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons should be added. Also, this section indicates that some greenhouse gases retain heat better than carbon dioxide but does not indicate that there are differences in the lifespan of the 6 principal greenhouse gases. EPA recommends adding reference to the relative lifespans of the different greenhouse gases and their Global Warming Potential This could be done in narrative form or in a table.

Pages 6-187, Section 6.6.2: Emissions from Oil and Gas Operations – The NYSDEC should define "direct" and "indirect" emissions.

Pages 6-187 to 6-193, Sections 6.6.2 & 6.6.3: Emissions from Oil and Gas Operations/Emissions Source Characterization – The revised dSGEIS' identification of the greenhouse gas emissions that will result, directly and indirectly, from well permit issuance for horizontal drilling and high-volume hydraulic fracturing operations appears to be incomplete. The document discusses three categories of greenhouse gas emissions: 1) vented emissions, 2) combustion emissions, and 3) fugitive emissions (Section 6.6.2). Additional sources of greenhouse gas emissions that appear not to have been accounted for and which ought to be analyzed and discussed in the SGEIS include:

- The greenhouse gas emissions associated with the combustion of the shale gas by downstream users; and
- The methane releases that occur during transport, storage, and distribution of the shale gas.

Page 6-188, Section 6.6.2.1: Vented Emissions – Under "Vented Emissions," please list "incomplete flare combustion" as another source of vented methane. Also, EPA recommends that the NYSDEC mention the ground-level ozone benefits of methane emissions controls, since methane is an ozone precursor See *Global Health Benefits of Mitigating Ozone Pollution with Methane Emission Controls* (West, *et al*., Jan. 2006, Princeton University).

Page 6-188, Section 6.6.2.2.: Combustion Emissions – At the bottom of the page, there is a statement that "[n]early all of the fuel carbon is converted to CO_2 during combustion." That statement is not true for all flares. Flare efficiency levels can vary - especially in the field with open pit flares, which often are essentially an open

ended pipe. See flaring studies: *Efficiencies Low Momentum Diffusion Flames* (Johnson, *et al.*, 2000); *Fuel Stripping Mechanism – Combustion Science and Technology* (Johnson, *et al*., 2001); and *Proceedings from Combustion Institute (*Johnson, *et al*., 2002).

Page 6-189, Top of Page – Add to the last sentence of Section 6.6.2.2 on top of page 6-189, "..., although their global warming potential is much greater." This will clarify that fewer emissions does not always equate with less impact given the different global warming potentials of the six (6) pollutants.

Page 6-189: Section 6.6.2.3: Fugitive Emissions – Regarding the statement in Section 6.6.2.3 that "relative to combustion and process emissions, fugitive CH_4 and CO_2 contributions are insignificant", note that according to the most recent EPA greenhouse gas inventory, on a carbon dioxide-equivalent basis, total methane emissions (fugitive and vented) in upstream production are not substantially less than combustion emissions. The 2011 U.S. Greenhouse Gas Inventory Data is available at http://www.epa.gov/climatechange/emissions/usinventoryreport.html.

Page 6-190, Fourth Bullet – The NYSDEC should add "Recompletions (e.g., workovers)" after "Well Completion."

Page 6-194, Second Paragraph – The second to last sentence in this paragraph refers to an assumption that "2% of the gas by volume goes uncombusted." Two percent is a combustion rate only achieved by the best flares and generally not those used in a production field. We suggest not using 2% as the default and suggest instead using 5%, which may be more reasonable based on the most recent data. See *Efficiencies Low Momentum Diffusion Flames* (Johnson, *et al.*, 2000); *Fuel Stripping Mechanism – Combustion Science and Technology* (Johnson, *et al*., 2001); and *Proceedings from Combustion Institute (*Johnson, *et al*., 2002).

Page 6-197, Second Paragraph – The second sentence in this paragraph states, "Generally speaking, flares in the oil and gas industry are used to manage the disposal of hydrocarbons from routine operations, upsets or emergencies via combustion." This is not true during flowback of hydraulically fractured wells for companies would need equipment to separate sand and other liquids. If EPA's proposed volatile organic compound New Source Performance Standard rule (see 76 *Federal Register* 52738-52843 (August 23, 2011)) is finalized as proposed, companies will have to implement reduced emission completions, and therefore this will not be a problem, but as of now, the term "generally" here is too strong.

Page 6-197, Third Paragraph – In the third sentence, the NYSDEC should replace "Otherwise, the gas is flared…" with "Otherwise, the gas is flared, vented or combusted…"

6-198-200, Section 6.6.9: Well Production – The NYSDEC should add crude oil and condensate tank emissions to the list of sources of methane emissions during the well production phase because if the well produces liquids, tank emissions can be a large source of methane as well.

Page 6-199, First Paragraph – In the seventh sentence, NYSDEC should replace, "…in the first year after all ten wells are…." with "….in the first year after all four well are…"

Page 6-199, First Paragraph – In the eighth sentence, NYSDEC should replace, "…the duration and production for the ten-well pad…" with "…the duration and production for the four-well pad…"

Page 6-200, Section 6.6.10: Summary of Greenhouse Gas Emissions – The NYSDEC should add "Recompletions (e.g., workovers)" after "Well Completion" in the first sentence.

Page 6-201, First Paragraph – The first paragraph on page 6-201 states in part "Therefore, GWP is a useful statistical weighting tool for comparing the heat trapping potential of various gases. For example, Chesapeake Energy Corporation's July 2009 Fact Sheet on greenhouse gas emissions states that CO_2 has a global warming

potential (GWP) of 1 and CH_4 has a global warming potential of 23, and that this comparison allows emissions of greenhouse gases to be estimated and reported on an equal basis as CO2e." Instead of referencing a July 2009 fact sheet from Chesapeake Energy Corporation regarding global warming potential values for carbon dioxide and methane, a more authoritative reference for determining the global warming potential values would be Table A–1 to Subpart A of 40 CFR Part 98 – Global Warming Potentials.

Page 6-203, Last Paragraph – The reference to Table 6.15 should be changed to Table 6.28.

Page 205, First Paragraph – The last two sentences of the first paragraph of Section 6.7 concerning naturally-occurring radioactive materials (NORM) in the Marcellus Shale states that "Based upon currently available information it is anticipated that flowback water will not contain levels of naturally-occurring radioactive materials of significance, whereas production brine is known to contain elevated naturally-occurring radioactive materials levels. Radium-226 is the primary radionuclide of concern from the Marcellus." Available data from gas drilling in Pennsylvania indicate elevated levels of Radium-226 and Radium-228 in flowback water. The NYSDEC should make use of such data and revise their anticipation.

Page 6-205, Second Paragraph – The last two sentences in the second paragraph of Section 6.7 states "the Department of Health would require a radioactive materials license when the radiation exposure levels of accessible piping and equipment are greater than 50 micro-R/hr (µR/h). Equipment that exhibits rates in excess of this level will be considered to contain processed and concentrated naturally-occurring radioactive materials for the purposes of waste determinations." Does this mean if the facility removes the pipe when it measures less than 50 µR/h, it will not need a radioactive materials license? Also, what will the disposition of such a pipe be and what will the impact of accumulated pipes at a given disposal location be? In addition, drilling companies should be required to determine how they will dispose of process and concentrated naturally-occurring radioactive waste in the form of pipe scale or water treatment waste subject to regulation under the New York Codes, Rules and Regulations (6 NYCRR Part 380) before they are granted a drilling permit to ensure that the disposal facility has taken the necessary precautions to handle such waste, including personnel monitoring for radiation doses (dosimetry) suggested by the New York State Department of Health in their July 2009 comments on the revised dSGEIS, and have obtained any required radioactive materials licenses pursuant to 10 NYCRR Part 16.

Page 6-205, Third Paragraph – The second sentence in the third paragraph of Section 6.7 states that "Although the highest concentrations of naturally-occurring radioactive material are in production brine, it does not present a risk to workers because the external radiation levels are very low." The NYSDEC needs to specify the basis for such a statement (e.g. concentrations of naturally-occurring radioactive materials, exposure time, and exposure frequency). Also, is external exposure the only route of exposure and are radon decay products of concern? The revised dSGEIS needs to address such topics.

Page 6-207, Second Paragraph – Including the language in the last paragraph in Section 6.7 earlier in the revised dSGEIS (i.e. Section 5.13.1). Also, this paragraph addresses the disposal of processed and concentrated naturally-occurring radioactive materials in the form of pipe scale or water treatment waste, known as technologically-enhanced naturally-occurring radioactive materials or TENORM. Do New York State requirements under Part 380 apply to elevated levels of naturally-occurring materials that were unprocessed? Please elaborate on the proper handling of elevated concentrations of naturally-occurring materials that at times may exceed the concentrations for technologically-enhanced naturally-occurring radioactive materials.

Page 6-300, Section 6.11: Transportation Impacts – It should be noted that if re-fracturing wells after a few years becomes standard practice in New York, truck traffic will be fairly continuous and if so should be treated as a continuous source of emissions. Also, the NYSDEC should document the estimated number of trucks that will be needed per year for general well maintenance.

Page 6-302, Table 6.60 – The total one-way, loaded trips per well for light trucks during peak well pad development should be 831, the same as during early well pad development since none of the numbers changed between the third and fifth columns. Please note that a corresponding change in Table 6.62 on Page 6-303 would need to be made as well.

Page 6-303, Table 6.16 – What is the reason that the number of one way loaded trips per well for heavy trucks during drill pad construction for vertical wells decreased from 32 during early well pad development to 25 during peak when there was no such change for horizontal well drill pad construction (see Table 6.60)?

Page 6-303, Table 6.62 – NYSDEC should replace "Heavy Truck" and "Light Truck" in the column headings to "Early Well Pad Development" and "Peak Well Pad Development." Also, 389 in the fourth column, second row should be 398.

Page 6-329-336 – The photos at the end of Chapter 6 would be more informative if there were pictures capturing what the landscape looked like before the well pads were installed. Several of the photos seem to show well pads installed in grassland areas. These areas are the most fragile due to the effects of habitat fragmentation.

Chapter 7 – Mitigation Measures:

Page 7-2, Section 7.1.1: Water Withdrawal Regulatory and Oversight Programs – This section discusses water withdrawal regulatory and oversight programs. If water levels are not maintained, the basis for State Pollutant Discharge Elimination System (SPDES) permitting can change. For instance, critical conditions, such as the low flow 7-day flow average over ten years or 7Q10, used in permitting can be affected by water withdrawals. The NYSDEC must ensure that the Natural Flow Regime Method (NFRM) that is proposed to be enforced as permit conditions will adequately ensure that critical conditions are maintained. Otherwise, the NYSDEC would need to reassess the impact of water withdrawals on reasonable potential analyses in currently issued State Pollutant Discharge Elimination System permits.

Page 7-2, Section 7.1.1.1: Department Jurisdictions – NYSDEC should replace "…due to water withdrawal from high-volume …." in the last sentence of the first paragraph with "….due to water withdrawal for high-volume …."

Page 7-24, Section 7.1.1.5: Impact Mitigation Measures for Groundwater Withdrawals – NYSDEC should add that in the delineated Naturally-Occurring Methane Areas of New York, methane water analysis be performed to determine methane concentrations dissolved in aquifer. An assessment of aquifer pressure decline and the potential of methane dissolution should be made.

Page 7-42, Section 7.1.4: Potential Ground Water Impacts Associated With Well Drilling and Construction – Private drinking water wells should be tested at a distance from the "drilling site" that correlates to the length of the proposed longest horizontal well. Homeowners should be able to choose the water testing firm to sample their own water and the drilling companies should be required to pay the costs of testing the wells. While this may make comparing analytical results from different labs more difficult, it would remove any concerns about the water testing results being biased.

Page 7-45 – Sampling protocol is confusing, suggest removing the bullets and replacing with 1 – An initial sampling and analyses will take place prior to site disturbance and construction of the well pad; 2 – Sampling and analyses will continue at three-month intervals until six-months after hydraulic fracturing of the last well drilled on the well pad; 3 – A final round of sampling and analyses will be performed one year after the last well on the pad is hydraulically fractured.

Page 7-45: Parameters – The revised dSGEIS should propose to require testing for the analytes listed in Table 7.3 instead of simply recommending unless the operator can show why sampling for a certain analyte in unnecessary.

Page 7-46 – Add Bromide to Table 7.3. If you test solely for chlorides, you will get an indication of salinity - but chlorides can come from the surface - such as road spreading. If you test for chlorides and bromides and then perform a chloride/bromide ratio you can confirm if the salinity is due to formation water or from surface sources. Formation water will have a low chloride to bromide ratio - opposite for surface sources.

Page 7-50, Second Bullet – Shallow gas areas should be delineated to the best of the State's ability. In the case when shallow gas zones are encountered, the NYSDEC should provide mitigation measures for the operator to implement. The NYSDEC will have to make a quick approval of "Department-approved actions" given that quick mitigation with proper casing and cementing techniques will lessen the affects of gas migration into the aquifer.

Pages 7-53, First bullet – Should true vertical depth (TVD) be placed after 500 feet?

Page 7-53, Last Full Sentence – In Appendix 10, paragraph 36 states that "the production casing cement must be tied into the intermediate casing string with at least 500 ft of cement" while page 7-53 has only 300 ft.

Page 7-53 to 54 – The revised dSGEIS requires that a radial cement bond log or equivalent be run on the intermediate and production casing strings, but contains no such requirement for the surface casing. In at least some situations, assurance of cement quality on the surface casing utilizing cement bond logging or equivalent tests may be desirable particularly given that the default depth for surface casing is 850 feet. Such situations might include: 1) shallow gas zone is encountered prior to the setting of surface casing; 2) multiple water-bearing zones of varying quality are encountered during drilling of the surface hole; 3) drilling mud, particularly oil-based mud, will be used to drill out below the surface casing seat; 4) public or private water wells are located down gradient of the drill site; and 5) the NYSDEC elects in the future to allow the drilling and high-volume hydraulic fracturing of gas wells within primary aquifer areas and/or the buffer zones surrounding them. In these situations, it may be prudent to ensure that the cement quality of the surface casing cement is sufficient to prevent movement of shallow gas, drilling fluids and/or water of lesser quality into high quality local aquifers. This may also become more critical should problems arise getting a good cement job on the intermediate casing string (at which time it will be impossible to run a cement bond log on the surface casing). Therefore, it is prudent to explicitly state in the revised dSGEIS that the NYSDEC reserves the right to require a cement bond log on the surface casing in such situations.

Page 7-55, Section 7.1.4.3: Annular Pressure Buildup – The paragraph states that for high-volume hydraulic fracturing operations "under no circumstances should the annulus between the surface casing and the next string be shut-in, except during pressure tests." However, according to Page 7-53, intermediate casing would be required for high-volume hydraulic fracturing, and cemented to surface (the intermediate casing – surface casing annulus space) would be required. Should this section state that under no circumstances should the annulus between the production casing and intermediate casing be shut in?

Page 7-58, Last Paragraph – The NYSDEC should provide flowback rates and volume units.

Page 7-61, Section 7.1.7.3 Flowback Water Piping – The revised dSGEIS states that the required fluid disposal plans would demonstrate that any flowback water pipelines and conveyances between well pads and flowback water storage tanks would be constructed of suitable materials, maintained in a leak-free condition, regularly inspected, and operated using all appropriate spill control and stormwater pollution prevention practices. The NYSDEC should clarify that these pipeline requirements apply to all flowback water pipelines and conveyances, including, but not limited to, pipelines between well pads and on-site flowback water storage tanks, pipelines between well pads and offsite centralized flowback water management facilities or pipelines between well pads and off-site treatment and disposal facilities. In addition, the NYSDEC should state in the revised dSGEIS that

such pipeline requirements will also be applied to pipelines and conveyances used for the transport of produced water not just flowback water.

Page 7-63 to 64, Section 7.1.8.1: Treatment Facilities (POTWs) – According to this section, the NYSDEC's Division of Water "shares pretreatment program oversight (approval authority) responsibility with the EPA." It is not accurate to state that the NYSDEC's Division of Water shares the Approval Authority for pretreatment. The NYSDEC's Division of Water does have some shared pretreatment roles and responsibilities with the EPA; for mini-pretreatment programs, the NYSDEC's Division of Water is the primary agency for implementation. For approved pretreatment programs, however, EPA Region 2 is the pretreatment program "Approval Authority" as defined at 40 CFR § 403.3(c). As such, EPA Region 2 must provide approval of local discharge limits for approved pretreatment programs, including any such limits for additional pollutants which may need regulation due to acceptance of flowback water and production brine (including barium, benzene, cadmium, chloride, radium, silver, tetrachloroethylene, and total dissolved solids).

Also, this section states that the NYSDEC's approval of headworks analysis is necessary for publicly owned treatment works to receive flowback water and production brine. Since EPA Region 2 is the Approval Authority, EPA approval is necessary for approved pretreatment programs. The discussion should state that submission of the headworks analysis to EPA Region 2 for publicly-owned treatment works programs with approved pretreatment programs is required. Although the text of Appendix 22 includes EPA Region 2's role as the Approval Authority, EPA Region 2's role should also be reflected in the text of section 7.1.8.1 on treatment facilities, since it may not be apparent that the reference to 40 CFR Part 403 only indirectly implies EPA Region 2's role as the Approval Authority.

Moreover, this section should clearly state that New York State publicly-owned treatment works with approved industrial pretreatment programs are required to notify EPA as well as the NYSDEC of new discharges or substantial changes in the volume or character of pollutants discharged to the permitted publicly-owned treatment works per 40 CFR 122.42(b).

In accordance with the federal permitting regulation at 40 CFR § 122.42(b)(5), permits must include conditions that require that –"all publicly-owned treatment works must provide adequate notice to the Director [EPA and/or the state permitting/pretreatment authority] of the following:

(1) Any new introduction of pollutants into the publicly-owned treatment works from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and

(2) Any substantial change in the volume or character of pollutants being introduced into that publicly-owned treatment works by a source introducing pollutants into the publicly-owned treatment works at the time of issuance of the [publicly-owned treatment works'] permit.

(3) For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the publicly-owned treatment works, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the publicly-owned treatment works. In cases such as New York, where the state is the permitting authority and EPA is the Approval Authority for pretreatment, the publicly-owned treatment works must submit the required information to both agencies. Most of New York's State Pollutant Discharge Elimination System (SPDES) permits for publicly-owned treatment works have yet to explicitly clarify this condition but must include this condition upon their next reissuance.

Furthermore, the NYSDEC may want to clarify the different regulatory scenarios for treatment of oil and gas extraction process wastewater by adding the following table:

Wastewater Disposal	Requirements
On-site treatment of process wastewater	No discharge from any source associated with production, field exploration, drilling, well completion or well treatment under 40 CFR Part 435.
Publicly-owned treatment works	Publicly-owned treatment works are required to notify EPA and the NYSDEC and obtain required approvals before acceptance of waste.
Privately-owned treatment works discharging to surface waters	Treatment facility is covered by standards at 40 CFR 437; Required to have a State Pollutant Discharge Elimination System permit.
Privately-owned treatment works discharging to publicly-owned treatment works	Covered by standards at 40 CFR 437; would need permit from local approved pretreatment program or report directly to EPA if not discharging to an approved pretreatment program (listed in Appendix 21).

Page 7-76, Section 7.2: Protecting Floodplains – EPA supports the NYSDEC proposal in the revised dSGEIS to require, through permit condition and/or regulation, that high-volume hydraulic fracturing not be permitted within 100-year floodplains in order to mitigate significant adverse impacts from such operations if located within 100-year floodplain areas. However, the NYSDEC must ensure that updated flooding conditions are used for evaluating floodplain distances.

Page 7-77, Section 7.4.1: Protecting Terrestrial Habitats and Wildlife – Along with proposed best management practices for individual well sites suggested on page 7-78 to reduce direct impacts at individual well sites, and the specific recommendations for reducing impacts to forests and grasslands described in subsequent sections, NYSDEC should also outline mitigation for the impacts due to loss of vegetation and tree removal at both the well sites and along related appurtenance rights of way. Removal of this terrestrial vegetation both produces an increased potential for sediment and other pollutant runoff into nearby waterways, and also reduces the capacity of such vegetation to serve as sources for biosequestration of carbon dioxide and other green house gases, and thus help to minimize the effects of greenhouse gas emissions.

Page 7-78, Fifth bullet – The NYSDEC should provide the website where Grassland Focus Areas Geographic Information System layer may be obtained.

Page 7-79, Section 7.4.1.2: Reducing Indirect and Cumulative Impacts of Habitat Fragmentation – The NYSDEC should provide the website where Forest Focus Areas Geographic Information System layer may be obtained.

Page 7-90, Fourth Bullet – The NYSDEC should replace "… would be required be employed;" in the last sentence with "… would be required to be employed;"

Page 7-91: Last Bullet – It is unclear in the revised dSGEIS whether or not the NYSDEC will review and approve the invasive species mitigation plan prior to the construction of the well pad or if it just needs to be available to the NYSDEC upon request. EPA believes the NYSDEC should review and approve.

Page 7-98, Section 7.4.3: Protecting Endangered and Threatened Species – The NYSDEC should provide the website for the "Department's Natural Heritage Database."

Page 7-99, First Bullet – The NYSDEC should replace "should do at least one of the following" with "must do at least one of the following."

Page 7-101, Second Paragraph – The NYSDEC should prohibit well companies from accessing subsurface resources from state parks and Wildlife Management Areas from adjacent private lands. This would absolutely ensure that these protected areas would not be harmed.

Page 7-108, Section 7.5.3 Summary of Mitigation Measures to Protect Air Quality – As stated in EPA's 2009 letter commenting on an earlier draft version of the SGEIS, the NYSDEC should identify and require steps to minimize diesel pollution from trucks and equipment involved in natural gas extraction operations through practices such as idle reduction. Truck idling should be minimized through strict anti-idling programs and the use of system/devices such as auxiliary power units, direct fired heaters and automatic engine shut down/start up. The NYSDEC and the New York State Department of Transportation should also require that trucks be routed away from sensitive receptor areas such as hospitals and schools.

Also, control technologies exist for electricity generators that are comparable in size to the typical drill rig engines expected to be used in hydraulic fracturing operations. The NYSDEC should investigate the feasibility of such control technologies for equipment supporting hydraulic fracturing. In the past add on control devices on the largest diesels were not commercially available but thanks to recent technical developments, it may be possible to place a control device – e.g. a diesel particulate filter - in a separate portable module. This module would be transported separately from the drill rig engines and reconnected to the engine when they arrive at the next drilling site.

In addition, EPA encourages deployment of Tier 4 engines or equivalent emission reduction technology to minimize emissions and impact to public health. The NYSDEC should also consider using electric engines or natural gas fired-engines.

Moreover, the NYSDEC should review the EPA Region 2 Clean Construction model specifications (http://www.northeastdiesel.org/pdf/NEDC-Construction-Contract-Spec.pdf) and encourage companies to incorporate these specifications into the well development. The use of these specifications can help minimize negative air quality impacts.

Page 7-110-117, Section 7.6: Mitigating GHG Emissions – EPA agrees that well operators should be required to have and to implement a proper leak detection and repair plan as well as a greenhouse gas (GHG) emissions mitigation plan. (As an aside, we recommend calling the latter a "GHG emissions mitigation plan" rather than a "GHG emissions *impacts* mitigation plan," because the plan should be about mitigating (i.e., reducing or minimizing) emissions of greenhouse gases, not about mitigating the impacts of such emissions.) Moreover, we believe it would be preferable for the NYSDEC to include these requirements not only in permits but in regulations as well, so as to strengthen these requirements' enforceability and provide added support for the permit provisions. In addition, EPA recommends that those regulations and permits be specific as to the minimum requirements that must be contained in the leak detection and repair plan and the greenhouse gas emissions mitigation plan. This is particularly important given that, as EPA understands it, the NYSDEC does not generally plan to exercise a review-and-approve role as to each of these plans.

Page 7-111, Bullet on Top of Page – Proof of participation in the Natural Gas STAR program will not by itself guarantee methane emission reductions or implementation of Gas STAR recommended technologies or practices. Specific Gas STAR recommended mitigation technologies and practices need to be included in each emissions mitigation plan to ensure reductions.

Page 7-112, Section 7.6.4: Well Design and Drilling – For the second to last bullet, where it states, "Flaring methane instead of venting" – please clarify what flaring you are referring to during drilling. Do you mean completion flaring?

Page 7-112, Section 7.6.5: Well Completion – In the first sentence of Section 7.6.5 (Well Completion), please discuss venting. This is very important as currently only internal combustion engines and flaring are mentioned. Hydraulically fractured well completion activities contribute to greenhouse gas emissions from internal combustion engines required for hydraulic fracturing as well as through flared and vented emissions that occur during the flowback period.

Page 7-113, Second Bullet – The second bullet on the page says, "Limiting flaring during the flowback phase by using REC equipment." Please change that to: "Limiting flaring **and venting** during the flowback phase by using REC equipment."

Page 7-113, First Paragraph (after bullets) – Please clarify what the basis is for waiting until two years after the completion date of the first well before doing the analysis of actual usage of reduced emission completions in New York and the evaluation of a possible additional reduced emission completion requirement under certain circumstances.

Page 7-113-114, Section 7.6.6: Well Production – EPA recommends adding to the list of measures to be included in a greenhouse gas emissions mitigation plan, 1) reduce tank emissions where applicable, and 2) convert gas pneumatic controls to instrument air where electric power is available. (For additional information on these mitigation technologies, refer to the following technical documents:

- http://www.epa.gov/gasstar/documents/ll_instrument_air.pdf
- http://www.epa.gov/gasstar/documents/ll_final_vap.pdf)

Also, note that EPA's proposed Oil and Gas New Source Performance Standard includes some of the example measures listed in Section 7.6.5 and Section 7.6.6. Additional information on the proposed rule is available at http://www.epa.gov/airquality/oilandgas/actions.html.

Page 7-114, Section 7.6.7: Leak Detection Repair Program – The revised dSGEIS states that the NYSDEC proposes to require, via permit condition and/or regulation, a Leak Detection and Repair Program [which] would include[,] as part of the operator's greenhouse gas emissions impacts[, a] mitigation plan which is required for any well subject to permit issuance under the revised dSGEIS. It is recommended that the Leak Detection and Repair Program be handled through regulation rather than only a permit condition because it would be less likely challenged. Also, please fix the grammatical error or missing words in this statement.

Page 7-115: First Bullet – It is not possible to see methane or volatile organic compounds emissions with the naked eye. Instead, require a detection device such as outlined in EPA's Alternative Work Practice which allows the use of the optical imaging camera for detecting emissions under the Leak Detection and Repair Program. Additional information on viable methane leak detection and measurement technologies is also available through the Gas STAR Program - http://www.epa.gov/gasstar/. In fact, this requirement is being considered in EPA's proposed Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants, which is currently accepting public comments.

Page 7-116, First Bullet – The NYSDEC should specify the timeframe for fixing leaks that pose a threat to on-site personnel or public safety.

Page 7-116, Section 7.6.8: Mitigating GHG Emissions Impacts – Conclusion – It is unclear in the revised dSGEIS whether or not the NYSDEC will review and approve the greenhouse gas emissions impacts mitigation plan prior to permit issuance. NYSDEC should.

Page 7-117, First Paragraph – With respect to the statement that "[t]he operator's GHG emissions impacts mitigation plan would be available to the Department upon request" – the well operators should be automatically required to file the plans with the NYSDEC by a date certain, such as prior to the start of drilling rig mobilization or site preparation.

Page 7-118 Section 7.7.2 Regulation of NORM in New York State – The State of New York has several means for regulating naturally-occurring radioactive materials (NORM) (e.g., 6 NYCRR Part 380) for which it can assure that the public health and the environment is protected from the risks associated with unnecessary exposure to radiation that may occur during high-volume hydraulic fracturing operations. These are not well spelled out in the revised dSGEIS and need to be better identified. We note that the levels of radioactivity across the Marcellus shale vary significantly. As such we believe the NYSDEC should consider adding a discussion to the revised dSGEIS that identifies how it will use its current authorities for radiation protection in these matters.

Page 7-136, Section 7.11.1.1: Development of Transportation Plans, Baseline Surveys, and Traffic Studies – The NYSDEC should require that baseline surveys of local roads conducted by well drilling companies be shared with municipalities and the public to review and determine if they are accurate.

Chapter 8 – Permit Process and Regulatory Coordination

Page 8-3: Table 8.1: Regulatory Jurisdictions Associated With High Volume Hydraulic Fracturing – EPA and the Federal government in general have a much broader scope of authority than is conveyed by the revised dSGEIS. EPA is implementing many of its statutory authorities and available tools to provide oversight and guidance to the oil and gas industry. Despite some of the restrictions legislated through the Energy Policy Act of 2005, EPA retains responsibilities for industry oversight under several Federal statutes, including the Clean Water Act, Clean Air Act, Safe Drinking Water Act, Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation Recovery Act, Emergency Planning Community Right-to-Know Act and the National Environmental Policy Act. For example, EPA Region 2 has regulatory authorities concerning publicly-owned treatment works (POTWs) disposal of flowback and produced water. Based on the symbols used, it probably needs to be a P with an asterisk since EPA is the Approval Authority for approved pretreatment programs and the NYSDEC has primary responsibility for mini-pretreatment programs. Also, an underground injection control permit under the Safe Drinking Water Act is required if diesel is used in the high-volume hydraulic fracturing fluid. Thus, an asterisk should be placed in the EPA column for hydraulic fracturing/re-fracturing. Furthermore, EPA has a significant Secondary role (not reflected in the Table) in wetlands permitting under the Clean Water Act Section 404, including setting the standards for review (i.e., 404(b)(1) Guidelines) and providing comments on proposed permits, with options for elevation and veto where warranted. EPA also has either a Secondary or Advisory role in several other categories listed, including stormwater runoff, commenting on interstate pipelines and compressor station proposals authorized by the Federal Energy Regulatory Commission, and overseeing air emissions regulated under the Clean Air Act. Finally, EPA has roles as explained further below under the Spill Prevention, Control and Countermeasure requirements of the Clean Water Act, the Emergency Planning and Community Right-to-Know Act, and the General Duty Clause of the Clean Air Act.

Spill Prevention Pursuant to the Clean Water Act: Rule makers should note that any entities to which the proposed regulations apply may also be subject to applicable Oil Spill Prevention, Countermeasures and Control requirements. EPA's Oil Pollution Prevention Regulations set forth at 40 C.F.R Part 112, require facilities that are currently in operation to have a Spill Prevention, Control and Countermeasure Plan prepared and implemented by November 10, 2011. Any oil storage, including condensate and/or produced water containers, in a volume above the threshold quantity of 1320 gallons, must incorporate spill prevention methods into its operations. A new production facility coming into operation after November 10, 2011, must have a Plan prepared and implemented within six months of beginning operations.

General Duty Clause of the Clean Air Act: Rule makers should note that any entities to which the proposed regulations apply may also be subject to the general duty requirements of the Clean Air Act. Chemical processes involving hazardous substances may pose a risk to workers and the public. The General Duty Clause is an important tool in protecting lives and the environment by making sure facilities operate safely.

Facilities should be advised that they must minimize accidents through prevention. The purpose of the General Duty Clause is to prevent the accidental release of any extremely hazardous substance. Most of these substances are listed in 40 CFR Part 68. However, an extremely hazardous substance could be any agent which may, as the result of short term exposures associated with releases to the air, cause death, injury or property damage due to its toxicity, reactivity, flammability, volatility or corrosivity. Many of these chemicals may be used in Marcellus Shale drilling operations, including constituents in fracturing fluids.

NYSDEC should advise companies that they are required to identify and comply with the state of practice or industry standard that applies in natural gas extraction:

- adopt or follow relevant industry codes, (particularly pertaining to equipment and **extremely hazardous substances**;

- be aware of unique circumstances of your facility which may require a more cautious prevention program; and

- be aware of incidents and accidents specific to the Marcellus Shale industry.

Incidents in the Marcellus Shale can be prevented by implementing process safety management practices which may also ensure compliance with the General Duty Clause.

Emergency Planning and Community Right to Know Act Obligations: The NYSDEC should also advise permit applicants that they are required to comply with the Emergency Planning and Community Right-to-Know Act. Facilities that use, produce, manufacture or store hazardous chemicals *must* provide information to all applicable Local Emergency Planning Committees, State Emergency Response Commissions and Local Fire Departments, if they have chemicals at, or above, reporting thresholds.

In addition, all facilities that have an extremely hazardous substance above its threshold Planning Quantity for any period of time *must* notify the State Emergency Response Commissions and Local Emergency Planning Committees within 60 days after they first receive a shipment or produce the substance on site. There are *no* exemptions under Section 302. Anytime an extremely hazardous substance is present at, or above, the threshold planning quantity, a facility official must notify the State Emergency Response Commissions and the Local Emergency Planning Committees.

With regard to any release or discharge of an extremely hazardous substance, facilities should be told that they *must* notify state and local authorities responsible for local emergency planning in two situations:

1. If there is a release at the facility (which includes releases from motor vehicles, rolling stock or aircraft) of an Extremely Hazardous Substance or a Hazardous Substance in excess of the reportable quantity for that substance; or
2. If the release could result in potential exposure of persons outside the boundary of the facility property.

Permittees should be advised to report chemical releases *immediately* to any State Emergency Response Commission, Tribal Emergency Response Commission, and Local Emergency Planning Committee potentially

affected by the release. Facilities must also report a release of a Comprehensive Environmental Response, Compensation, and Liability Act Hazardous Substance to the National Response Center (NRC) at 1-800-424-8802.

Page 8-24, Section 8.1.3.3: EPA's Mandatory Reporting of Greenhouse Gases – The last sentence in this section states "The rule requires data collection to begin on January 1, 2011 and that reports be submitted annually by March 31st, for the GHG emissions from the previous calendar year." This statement is correct but the NYSDEC should clarify that for 2011 only, reports under 40 CFR Part 98 Subpart W will not be due until Sept. 28, 2012 to allow EPA to further test the system that reporters will use to submit data, and give industry the opportunity to test the tool, provide feedback and have sufficient time to become familiar with it prior to reporting.

Page 8-27, GHG Emissions Calculations, Monitoring and Quality Assurance – In the second paragraph from the bottom, the NYSDEC should replace "specified time periods during the 2011 data collection year" in the first sentence with "all of the 2011 data collection year."

Page 8-29, Section 8.2.1: Water Permit Review Process – This section indicates that for the well permit review process the NYSDEC would review applications for beneficial use of production brine in road-spreading projects. EPA believes that such practice should be prohibited.

Page 8-31, Public Disclosure of Additive Information – The revised dSGEIS proposes that the NYSDEC provide a listing of high-volume hydraulic fracturing additive product names and links to the associated product Material Safety Data Sheets on an individual well basis on its website. EPA applauds this decision but recommends that the NYSDEC expand this public disclosure to include the concentrations of the chemicals used as well.

Page 8-44, First Paragraph – Does the Oil, Gas and Solution Mining Law provide the NYSDEC with the administrative power to shut down drilling or production operations whenever those operations fail to comply with a permit condition?

Chapter 9 – Alternative Actions

Page 9-4, Second Paragraph – The NYSDEC asserts that it will match the rate of permit issuance to the availability of personnel who will review those permits, inspect well pads, oversee well construction, waste disposal, and enforce other permit conditions and regulations. However, with the multitude of requirements and best management practices that the revised dSGEIS calls for – much of which provide protection for water resources – it is not made clear in the revised dSGEIS how NYSDEC plans to do this, given the current state of the economy.

Chapter 10 – Review of Selected Non-Routine Incidents in Pennsylvania

Page 10-4, Section 10.4.2: New York Mitigation Measures Designed to Prevent High In-Stream TDS – Based on this section, New York's mitigation measures designed to prevent high in-stream total dissolved solids (TDS) are that New York's water quality standards include an in-stream limit for total dissolved solids and State Pollutant Discharge Elimination System (SPDES) permits include effluent limitations based on a stream's assimilative capacity. Most State Pollutant Discharge Elimination System permits do not currently include effluent limits for total dissolved solids. The NYSDEC would need to use its "robust permitting and approval process" to modify the permits. Resources may present a challenge in modifying permits for all permittees that would want to accept flowback water or production brine.

Chapter 11 – Summary of Potential Impacts and Mitigation Measures

It does not appear that this summary chart reflects the revised dSGEIS.

Appendix 10 – Proposed Supplementary Permit Conditions for High-Volume Hydraulic Fracturing

Page 1, Condition 1 – EPA suggests that similar to the transportation plan in the fourth condition, the visual impacts mitigation plan and the greenhouse gas emissions impacts mitigation plan be approved by the NYSDEC and be incorporated by reference into the permit.

Page 1, Condition 4 – According to Page 7-139, the transportation plan should be approved by the New York State Department of Transportation as well as the NYSDEC.

Page 7, Condition 36 – This condition reads in part, "If intermediate casing is installed, the production casing cement must be tied into the intermediate casing string with at least 500 feet of cement measured using True Vertical Depth (TVD)." What does "tied into" mean? Is there a minimum amount of overlap between production and intermediate casing strings? EPA recommends clarifying language to ensure clear understanding of requirements. We read this as meaning either: 1) Must have a minimum of 500 feet of cement above the production casing shoe in a vertical well or 500 vertical feet for directional and horizontal wells, or enough cement to tie into the intermediate string, whichever is less, or 2) The production casing cement must extend a minimum of 500 feet above the depth of the casing shoe of the intermediate string.

Page 11, Condition 56 – It is unclear from this permit condition whether or not the site-specific acid rock drainage mitigation plan would be approved by the NYSDEC prior to issuing the permit or if it just needs to be developed and provided to the NYSDEC upon request. It should be prior to issuing the permit.

Attachment B – The proposed supplementary permit conditions do not specify that the Natural Flow Regime Method (NFRM) must be used as the pass-by flow requirement.

Appendix 12 – Beneficial Use Determination (BUD) Notification Regarding Road Spreading

EPA believes that road spreading of flowback water and produced water ("brine") should be prohibited for the reasons cited in our comments above concerning Section 5.13.3.4.

Appendix 13 – Radiological Data – Production Brine from NYS Marcellus Wells

The table shows some elevated levels of radioactivity (mainly Radium-226) in production brine. EPA recommends assessing radon decay products as well.

Appendix 17 –Applicability of 40 CFR Part 63 Subpart ZZZZ (Engine MACT) for Natural Gas Production Facilities – Final Rule

Appendix 17 discusses the applicability of 40 CFR Part 63 Subpart ZZZZ (RICE MACT) for natural gas production facilities. However, the NYSDEC has not yet accepted delegation of this rule which was last revised on August 20, 2010. New York needs to expeditiously accept delegation of this rule and 40 CFR Part 63 Subpart JJJJJJ (Area Source Boiler MACT), as they both may be applicable to the hydraulic fracturing process.

Also, the applicability of the national emission standard for hazardous air pollutants (NESHAP) for radon emissions from operating uranium mill tailings (NESHAP Subpart W) should be assessed for use as an Applicable or Relevant and Appropriate Requirement (ARAR).

Appendix 18 – Definition of Stationary Source or Facility for the Determination of Air Permit Requirements

Appendix 18 provides guidance on how the NYSDEC will determine applicability of New York Codes, Rules and Regulations (6 NYCRR Part 231) for a facility owning a number of natural gas wells connected to a gathering

pipeline. Appendix 18 should make clear that applicability of Part 231 must be based on the totality of wells connected to a pipeline that the company owns and are determined to be contiguous or adjacent even if the wells cross State lines. Also, with this in mind, New York State should develop protocols with permitting authorities in adjacent states to share emissions information on pipelines that cross state boundaries to determine whether the pipeline (which crosses both states) is an existing major source for purposes of Part 231 applicability on any new construction in New York.

Appendix 18, Number (3) entitled "Are the activities under common control?" states: "To assess common control, EPA has historically relied on the Securities and Exchange Commission's definition of control as follows: The term control (including the terms controlling, controlled by and under common control with) means the possession, direct or indirect, of the power to direct or cause the direction of management and policies of a person (or organization or association), whether through the ownership of voting shares, by contract or otherwise." The following questions have been used previously and in more recent actions by EPA to determine "common control:" 1) Whether control has been established through ownership of two entities by the same parent corporation or a subsidiary of the parent corporation; 2) Whether control has been established by a contractual arrangement giving one entity decision making authority over the operations of the second entity; 3) Whether there is a contract for service relationship between the two entities in which one sells all of its product to the other under a single purchase or contract; [and] 4) Whether there is a support or dependency relationship between the two entities such that one would not exist "but for the other" In support, NYSDEC cites two EPA letters regarding "common control" from 1999.

In more recent determinations EPA has used the Spratlin Letter[1] for guidance in determining "common control." As NYSDEC develops guidance and finalizes Appendix 18, NYSDEC should review EPA's more recent common control determinations, including, but not limited to the following: (a) Letter from Ronald J. Borsellino, Acting Director, Division of Environmental Planning and Protection, U.S. EPA Region 2, to Scott Salisbury, President, Manchester Renewable Power Corporation/LES and Lawrence C. Hesse, President, Ocean County Landfill Corporation, "Re: Common Control Determination for Ocean County Landfill and the Manchester Renewable Power Corp./LES," dated May 11, 2009; (b) Letter from Judith M. Katz, Director, Air Protection Division, U.S. EPA Region 3, to Gary E. Graham, Environmental Engineer, Commonwealth of Virginia Department of Environmental Quality, "Re: Common Control for Maplewood Landfill, also known as Amelia Landfill, and Industrial Power Generating Corporation," dated May 1, 2002; and (c) Letter from Jane M. Kenny, Regional Administrator, U.S. EPA Region 2, to Erin M. Crotty, Commissioner, New York State Department of Environmental Conservation, "Re: EPA's Review of Proposed Permit for Al Turi Landfill, Permit ID: 3-3330-00002/00039, Mod 1," dated July 8, 2004.

Appendix 18C – Regional On-Road Mobile Source Emission Estimates from EPA MOVES Model and Single Pad PM2.5 Estimates from MOBILE 6 Model

In the October 4, 2011 e-mail from Leon Sedefian of NYSDEC to Raymond Forde, EPA Region 2, it is mentioned that for mobile sources "there are no estimates of toxics from offsite truck traffic since these are not the purpose of the well pad SGEIS. Furthermore, such estimates are very difficult to make due to lack of data." Since EPA's current emissions inventory tools have the ability to quantify air toxics emissions from this source category then the emissions from these sources should be calculated.

[1] Letter from William A. Spratlin, Director, Air, RCRA, and Toxics Division, U.S. EPA Region 7, to Peter R. Hamlin, Chief, Air Quality Bureau, Iowa Dept. of Natural Resources, dated September 18, 1995 (Spratlin Letter);

Appendix 20 – Proposed Pre-Frac Checklist and Certification

Appendix 20, Page 1 – The third paragraph on the checklist reads in part "…verifies top of cement and effective cement bond at least 500 feet above the top of the formation to be fractured or at least 300 feet into the previous casing string." The discussion in Chapter 7 appears to indicate that production casing cement must extend a minimum of 500 feet above the production casing shoe AND must extend 300 feet above the casing shoe of the intermediate casing string. The "or" in Appendix 20 should be "and."

Appendix 20, Page 1 – There appears to be a typo in the last sentence of the third paragraph on checklist. The NYSDEC should replace "If was not production casing was not cemented…" with "if production casing was not cemented…"

Appendix 22 – Publicly-Owned Treatment Works (POTWs) Procedures for Accepting Wastewater from High-Volume Hydraulic Fracturing

There appears to be a typo in section 1.d.ii, 6.b.v, and 7. The NYSDEC should replace "piC/l" with "pCi/L."