DATA SETS NEEDED FOR ANALYSIS

The following data sets and analyses are examples of what is missing from the DSGEIS. These examples and others must be collected, described, analyzed, and subject to public comment before NYSDEC's review under SEQRA will adequately address the potentially significant adverse environmental impacts of shale gas exploration in New York State and legally required mitigation measures:

Utica Shale

- All data to support analysis of potentially significant environmental impacts resulting from development of the Utica Shale in NYS, with the exception of the geologic and geophysical data described in Section 4.3 of the DSGEIS

Other Low-Permeability Formations

- All data to support analysis of potentially significant environmental impacts resulting from development of "other" low-permeability gas reservoirs in NYS.

Marcellus Shale

Mapping of features of the Marcellus Shale region, including:

- Total area of potential well pad development within Marcellus Shale
- Critical Environmental Areas
- Navigable waters of the state, as defined as under 6 NYCRR § 608, including all DEC-regulated lakes, rivers, streams, and other bodies of water
- Watercourses, reservoirs, reservoir stems, intermittent streams, and perennial streams, as defined by New York City Watershed Rules and Regulations
- Primary and principal aquifers
- 8-digit United States Geological Survey (USGS) Hydrologic Unit Code (HUC) watershed outline and associated watercourse flowlines based on USGS National Hydrography Dataset (NHD)
- National Wetland Inventory (NWI) mapped wetlands and watercourses regulated under Section 404 of the Clean Water Act.
- Rare, Threatened, and Endangered species that are present or documented.
- Groundwater contours, including groundwater contours for the sandstone above the Marcellus Shale and for the near surface aquifers
- Vertical gradient based on the foregoing contour maps

Shale Formation and Overburden Properties

- Data documenting geologic, geophysical, geochemical, hydrologic, and hydrogeologic properties of shale formations in other states that the DSGEIS deems analogous to the Marcellus Shale, with references or sources
- Geologic, geophysical, geochemical, hydrologic, and hydrogeologic data offering a detailed understanding of the in-situ conditions present in the reservoir (e.g. shale thickness, reservoir pressure, rock fracture characteristics, special core analysis) to document Marcellus Shale reservoir heterogeneity across NYS (including variations in NORM content)

- Geologic, geophysical, geochemical, and hydrologic data documenting site-specific properties of the shale, from well cores obtained from exploratory wells, sufficient to permit development of sophisticated 3-dimensional reservoir models to more accurately design fracture treatments
- Geologic, geophysical, geochemical, and hydrologic data on the Marcellus Shale overburden (including data documenting permeability and presence of fractures) from well cores to the top of the Marcellus Shale, including all reservoirs separating the Marcellus Shale and drinking water aquifers
- Data used in reservoir simulation and fracture design models run prior to fracturing of the Marcellus Shale in NYS or other states
- Data from well cores documenting post-fracturing properties of the Marcellus Shale in NYS or other states, especially additional permeability, to verify the accuracy of any reservoir simulations or fracture models run prior to fracturing

Exploration

- Data documenting impacts of industrial seismic exploration

Drilling

- Data documenting the chemical content of drilling muds prior to use and when mixed with drill cuttings, including NORM and heavy metal content
- Toxicity data for the full range of drilling mud additives that will be permitted in NYS
- Data or references documenting impacts of long-term burial of drill cuttings coated with drilling muds containing heavy metals or NORM
- Data documenting capacity of authorized commercial treatment and disposal facilities in NYS to accept drilling muds and cuttings, including those containing heavy metals or NORM
- Data or references documenting when underground injection of drilling muds and cuttings is an environmentally preferable waste disposal alternative
- Data or references documenting amounts and rates of water diversions needed for fracturing fluid

Stimulation and Production

- Data documenting the projected total consumptive use of water for fracturing operations, including but not limited to the estimate of 25 mgd from the Susquehanna River basin.
- Toxicity data or references for each of the additives and chemicals that will be permitted for use in fracturing treatments
- Data documenting the concentrations of each chemical in flowback and produced water from Marcellus Shale wells
- Data documenting flowback rates and amounts from Marcellus Shale wells, correlated with properties of the well (*e.g.*, total vertical depth and horizontal extent)

- Data supporting estimated cumulative volume and production rate of gas wastewater requiring treatment
- Site specific modeling of hazardous air pollutant impact from flowback impoundments
- Data documenting the nature and extent of spills and leaks (including but not limited to spills of fracturing fluid during mixing and storage, flowback leaks, and leaks through or around well casings) that have occurred with gas development in New York and other states. Spills include.
- Data documenting capacity of POTWs or commercial treatment and disposal facilities authorized in NYS to accept gas wastewaters, including flowback or produced waters containing elevated TDS levels, BTEX compounds, heavy metals or NORM
- Actual field data, 3-dimensional reservoir simulation modeling and a peer-reviewed hydrological assessment supporting the proposed minimum 1,000-foot vertical offset with to ensure drinking water sources are protected.

Naturally Occurring Radioactive Materials

- Data documenting the identity of the radionuclides in Marcellus Shale gas wastes and a mass balance of contributors for the alpha emitters
- Data verifying the amount of NORM in Marcellus Shale formation water (produced water)
- Data documenting the radiological health risk of produced water containing NORM, especially the bottom sludges or residual salts of the surface impoundments
- Data supporting the claim that drinking water well contamination by oil and gas drilling activities will be eliminated by new casing and cementing practices and fresh water aquifer supplementary permit conditions

Other

- Data documenting comparative energy efficiency of collecting waste in the container that will be used to transport it offsite to a waste disposal facility, rather than use of intermediate storage pits
- Data documenting comparative energy efficiency of on-site and off-site wastewater treatment
- Data to verify the amounts benzene emissions estimated
- Data supporting estimated stormwater pollution from transportation of wastewater
- Data supporting estimated number of brine-hauling truck trips and associated impacts
- Data supporting noise analysis for impacts on wildlife
- Data supporting nighttime light analysis for impacts on wildlife
- Data supporting analysis of known and potential bat hibernacula associated with Karst formations and abandoned mines

- Data supporting estimates of total number of workers per multi-well pad with the number of shifts, schedule of shifts, and number of workers per shift
- Data supporting expected schedule of a typical multi-well pad development
- Data documenting whether proposed mitigation measures adopted by reference to regulations in other states have actually been successful in preventing adverse impacts, including but not limited to liner regulations for centralized impoundments