RESOURCE	IMPACT	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.	MITIGATING MEASURE	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.
						Requires submission of a fluid disposal plan for flowback water which specifies quality, maintenance, and monitoring of piping and conveyances.	*7.1.6.3*			
						Requires application and pre-approval of POTWs proposing to dispose of flowback and production waters. Specifies application contents (e.g. headworks analysis, waste fluid characterization, regulatory limits) and demonstration that final discharges will fall within regulatory limits.	*7.1.8.1*			
						Requires SPDES coverage of any private wastewater treatment facility proposed to accept waste fluid.	*7.1.8.1*			
						Restates governance of EPA UIC permit over proposed injection well disposal. Notes site-specific SEQRA review for each injection well.	*7.1.8.2*			
Water resources (cont.)	Degradation/contamination of the NYC/unfiltered water supplies.					No well pads for high-volume hydraulic fracturing in the New York City or Syracuse watersheds or within a 4000' buffer of the watersheds.	*7.1.10*			
Floodplains	Contamination of surface waters from the release into the environment of chemical pollutants in a flood event.	*6.2*				No well pads or access roads for high-volume hydraulic fracturing permitted within 100-year floodplains.	*7.2*			
Freshwater Wetlands	Contamination of freshwater wetlands from accidental release of drilling or HF fluids, chemicals, or fuel.	*6.3*		*16.B.2.d*	*16-7..8*	For Department-regulated wetlands, makes permit approval dependent on site-specific SEQRA review and coverage under any necessary wetlands permits.	*7.3*			
						Specifies setbacks between fuel tanks and wetlands at a mandatory 500 feet.	*7.3*			
						Requires SPOTS 10 secondary containment for any fuel tank.	*7.3*			
						Requires a Wetlands Permit when project is w/in 100' of a freshwater wetland > 12.4 ac. in size or of unique local significance. Authorizes permit conditions on a case-by-case basis regarding location and timing of activities/facilities and replacement of lost wetland acreage.			*17.B.1.f*	*17-5*
Ecosystems and Wildlife	Degradation of local ecosystem from fragmentation of habitat	*6.4.1*				Requires operator to develop and employ Best Management Practices for surface disturbance to reduce habitat impacts.	*7.4.1*			
						Restricts operations during mating and migration seasons in certain habitats	*7.4.1*			

RESOURCE	IMPACT	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.	MITIGATING MEASURE	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.
						Requires pre-drilling and post-completion animal and plant surveys when well pads are located in 150-acre or larger forest patches within Forest Focus Areas or 30-acre or larger grassland patches within Grassland Focus Areas.	*7.4.1*			
	Degradation of local ecosystem functions and native biological communities from the introduction of invasive species.	*6.4.1*				Requires operator diligence in exploiting accepted BMPs for removal and preventing introduction of invasive species.	*7.4.2.1*			
						Requires baseline surveying and reporting of project site for existence of invasive species.	*7.4.2.1*			
						Affords DEC the right to apply permit conditions for invasive species management when outside of the DRB and SRB.	*7.4.2.2*			
						Relies upon DRBC and SRBC protocols for aquatic invasive species management in their respective jurisdictions.	*7.4.2.2*			
Ecosystems and Wildlife (cont.)	Harm to local wildlife populations from the loss of habitat	*6.4.3*		*16.B.2.b*	*16-6..7*	Requires partial and final well pad reclamation.	*7.4.1*			
	Impacts to State-Owned Lands	*6.4.4*				No surface drilling allowed on specified State-owned lands.	*7.4.4*			
Air Quality	Degradation of Air Quality	*6.5*		*16.B.2.f*	*16-9..10*	Specifies minimum exhaust-stack heights, restrictions on public access, and sulfur content of fuel-oil.	*7.5.3.1*			
						Prohibits use of the BTEX class of compounds as additives in HVHF fluid surface impoundments.	*7.5.3.2*			
						Requires reporting of fracturing additives and public access restrictions.	*7.5.3.2*			
						Requires catalytic technology for production equipment.	*7.5.3.3*			
Greenhouse Gas Emissions	Emission of gases with Global Warming Potential due to natural gas well drilling and production.	*6.6*				Requires development of a GHG emissions impacts mitigation plan, requires development of a leak detection and repair program, and encourages participation in the USEPA's Natural Gas STAR program. Requires reduced emission completions where a pipeline is available.	*7.6.8*			
Naturally Occuring Radioactive Material (NORM)	Exposure of workers, the public, and the environment to harmful levels of radiation.	*6.8*				Outlines necessary monitoring work.	*7.8.2*			
						Requires NORM testing of discharged waste fluids and material in production tanks.	*7.8.2*			

RESOURCE	IMPACT	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.	MITIGATING MEASURE	dSGEIS section	dSGEIS pp.	GEIS sec.	GEIS pp.
Visual Impacts	Temporary new landscape features at well pads, new offsite facilities, congested appearance of campsites and staging areas, increase in specialized traffic.	*6.9*		*16.B.2.e*	*16-8*	Permit conditions would require operation consistent with a visual impacts mitigation plan. Site-specifc assessment could result in additional design and siting requirements.	*7.9*			
Noise	Temporary impacts but could occur on 24-hour basis. Potential 37-42 dB increase over quietest background at 2,000 feet during drilling and hydraulic fracturing. Increased traffic noise near well pad. Noise along approach and departure corridors from increased airplan service.	*6.10*		*16.B*	*16-2*	Operator must submit and adhere to a noise impacts mitigation plan. Site-specific assessment could result in specific mitigating permit conditions.	*7.10*		*17.B.1.b*	*17-4*
Transportation	Increased traffic on roadways; damage to local roads, bridges and other infrastructure; damage to state roads, bridges and other infrastructure; increased number of breakdowns and other accidents; risk of potentially hazardous spills; traffic impacts near rail centers.	*6.11*				Potential for road use agreements between operators and municipalities. Requirement to file a transportation plan that includes prposed routes and a road condition assessment. Site-specific assessment could result in additional traffic safety requirements, first responder emergency response training or avoidance of sensitive locations for trucks carrying hazardous materials.	*7.11*			
Socioeconomic & Community Character	Positive impacts on employment and income; increased economic activity; potential localized housing shortages; positive and negative impacts on state and government spending; increased tax revenues and production royalties; increased demand for local services; potential changes in the economic, demographic and social characteristics of affected communities that could be viewed as negative by some and positive by others.	*6.8 & 6.12*		*16.B.2.h*	*16-10..11*	This section will be updated after July 31, 2011.	*7.8 & 7.12*			

This page intentionally left blank.

New York State

DEC

Glossary

Updated August 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

Term	Definition
Access Road:	A road constructed to the wellsite that provides access during the drilling and operation of the well.
Accumulator:	The storage device for nitrogen pressurized hydraulic fluid, which is used in operating the blowout preventers.
AERMOD:	American Meteorological Society's and USEPA's Regulatory Model recommended by EPA for regulatory dispersion modeling.
AGC/SGC:	Annual Guideline Concentrations and Short-term Guideline Concentration defined in DAR-1 (Air Guide 1) procedures.
ALJ:	Administrative Law Judge.
Anaerobic:	Living or active in the absence of free oxygen.
Annular Space or Annulus:	Space between casing and the wellbore, or between the tubing and casing or wellbore, or between two strings of casing.
ANSS:	USGS's Advanced National Seismic System.
Anticline:	A fold with strata sloping downward on both sides from a common crest.
API:	American Petroleum Institute.
API Number:	A number referencing system designed by the American Petroleum Institute to identify wells; each state and county has a specific number code.
Aquifer:	A zone of permeable, water saturated rock material below the surface of the earth capable of producing significant quantities of water.
ARD (Acid Rock Drainage):	Refers to the outflow of acidic water from (usually abandoned) metal mines or coal mines. Acid rock drainage occurs naturally within some environments as part of the rock weathering process, usually within rocks containing an abundance of sulfide minerals.
AST:	Above-ground storage tank.
Bactericides:	Also known as a "Biocide." An additive that kills bacteria.
Barrel:	A volumetric unit of measurement equivalent to 42 U.S. gallons.
bbl:	Barrel.
bbl/yr:	Barrels per year.
Bcf:	Billion cubic feet. A unit of measurement for large volumes of gas.
Bentonite:	A natural clay, used as a cement or mud additive for its expansive characteristics and/or its tendency to not separate from water.
Berm:	A mound or wall of earth or sand.
Biocides:	See definition for "Bactericides".
Blending Unit or Blender:	The equipment used to prepare the slurries and gels commonly used in stimulation treatments.
Blooie Line:	Pipe that diverts fluids from the wellbore to a reserve pit.
Blowout:	An uncontrolled flow of gas, oil or water from a well, during drilling when high formation pressure is encountered.
BMP:	Best Management Practices.
BOD:	Biochemical (or biological) oxygen demand.

Term	Definition
BOP:	Blowout Preventer. A device attached immediately above the casing which can be closed and shut off the hole should a blowout occur.
Borehole:	See wellbore.
Breaker:	A chemical used to reduce the viscosity of a fluid (break it down) after the thickened fluid has finished the job it was designed for.
Brine Disposal Well:	A well (Class IID) for subsurface injection of associated produced brines from oil, gas and underground gas storage operations, or a well (Class V) for disposal of spent brine from geothermal and solution mining operations.
Brine:	A solution containing appreciable amounts of NaCl and/or other salts. Synonymous with salt water.
BTEX:	Benzene, Toluene, Ethylbenzene, and Xylene. These are all aromatic hydrocarbons.
BUD:	Beneficial Use Determination issued by NYSDEC's Division of Materials Management.
Buffer Zone:	An area designed to protect and separate an activity from things around it.
C&D:	Construction and demolition.
CAA:	Clean Air Act.
Cable Tool:	Equipment (rig) for cable-tool drilling consisting of a heavy metal bar sharpened to a chisel-like point and attached to a cable. The gravity impact of the heavy metal bar (bit) pulverizes the rock which is removed with a bailer.
Caliper Log:	A log that is used to check for any wellbore irregularities. It is run prior to primary cementing as a means of calculating the amount of cement needed. Also run in conjunction with other open-hole logs for log corrections.
Carbonate:	A salt of carbonic acid, CO_3^{-2}.
Carcinogen:	Cancer causing substance.
CAS Number:	Chemicals Abstract Service number, assigned by Chemical Abstracts Service, which is part of the American Chemical Society. The CAS registry is the most authoritative collection of disclosed chemical substance information, containing more than 48 million organic and inorganic substances and 61 million sequences.
Casing:	Steel pipe placed in a well.
Casing Shoe:	Reinforcing collar screwed onto the bottom of surface casing that guides the casing through the hole while absorbing the brunt of the shock.
Cation:	A positively charged ion.
CBS:	Chemical Bulk Storage.
CEA:	Critical Environmental Area.
Cement Bond Log:	A log used to evaluate the effectiveness of a primary cement job based on the different responses of sound waves in metal pipe and cement. It can also be used to locate channels in the cement.
Cement Sheath:	A protective covering around the casing, segregates the producing formation and prevents undesirable migration of fluid.
CFR:	Code of Federal Regulations.
cfs:	Cubic feet per second.

Term	Definition
CH_4:	Methane.
Chemical Additive:	A product composed of one or more chemical constituents that is added to a primary carrier fluid to modify its properties in order to form hydraulic fracturing fluid.
Chemical Constituent:	A discrete chemical with its own specific name or identity, such as a CAS Number, which is contained within an additive product.
Choke:	A device with an orifice installed in a line to restrict the flow of fluids.
Choke Manifold:	The arrangement of piping and special valves, called chokes, through which drilling mud is circulated when the blowout preventers are closed to control the pressures encountered during a kick.
Circulation:	The round trip made by the well fluids from the surface down the tubing, wellbore or casing, and then back to the surface.
Class GSB Water:	The best usage of Class GSB waters is as a receiving water for disposal of wastes. Class GSB waters are saline groundwaters that have a chloride concentration in excess of 1,000 milligrams per liter or a total dissolved solids concentration in excess of 2,000 milligrams per liter.
Clastic:	Rock consisting of fragments of rocks that have been transported from other places.
Clay Stabilizer/Clay Inhibitor:	A chemical additive used in stimulation treatments to prevent the migration and/or swelling of clay particles.
Closed Loop Drilling System:	A pitless drilling system where all drilling fluids and cuttings are contained at the surface within piping, separation equipment and tanks.
CO:	Carbon monoxide.
CO_2:	Carbon Dioxide.
CO_2e:	Carbon Dioxide equivalents.
COGCC:	Colorado Oil and Gas Conservation Commission.
Completion:	Preparation of a well for production after it has been drilled to the objective formation and in the case of a dry hole, preparation of a well for plugging and abandonment.
Compressive Strength:	Measure of the ability of a substance to withstand compression.
Compressor Stations:	Facilities which increase the pressure on natural gas to move it in pipelines or into storage.
Compulsory Integration:	New York's Environmental Conservation Law (Article 23, Titles 5 and 9 as amended by Chapter 386 of the Laws of 2005) gives all property owners the opportunity to recover or receive the gas beneath their property. To protect these "correlative rights," the Department of Environmental Conservation may establish spacing units whenever necessary. Compulsory integration is required when any owner in a spacing unit does not voluntarily integrate their interests with those of the unit operator. Compensation to the compulsory integrated interests will be established by a DEC Commissioner's Order after a public hearing.
Condensate:	Liquid hydrocarbons that were originally in the reservoir gas and are recovered by surface separation.
Conductor Hole:	The hole for conductor pipe or casing.
Conductor Pipe or Casing:	Large diameter casing that is usually the first string of casing in a well. Set or driven into the unconsolidated material where the well will be drilled to keep loose material from caving in. Usually relatively short in length.
Correlative Rights:	Rights of any mineral owner to recover resources that underlay their property.

Term	Definition
Corrosion Inhibitor:	A chemical substance that minimizes or prevents corrosion in metal equipment.
CRDPF:	Continuously Regenerating Diesel Particulate Filter.
Crosslinkers:	A compound, typically a metallic salt, mixed with a base-gel fluid, such as a guar-gel system, to create a viscous gel used in some stimulation or pipeline cleaning treatments. The crosslinker reacts with the multiple-strand polymer to couple the molecules, creating a fluid of high viscosity.
CT:	coiled tubing.
Cubic Foot:	Unit of measurement of the volume of gas contained in one cubic foot of space at a standard pressure (14.73 psi) and standard temperature (60° F).
Cuttings or Samples:	Chips of rock cut by the drill bit and brought to the surface by the drilling fluid. They indicate to the wellsite workers what kind of rocks are being penetrated and can also indicate the presence of oil or gas.
CWA:	Clean Water Act.
CWF:	Cold-Water Fishery (waters).
CWS:	Community water systems.
CZM:	Coastal Zone Management.
DAR:	Division of Air Resources in the NYS Department of Environmental Conservation.
DAR-1 (Air Guide-1):	Division of Air Resources program policy guidelines for the control of toxic air contaminants.
Dehydrator:	A device used to remove water and water vapors from gas.
Department:	New York State Department of Environmental Conservation.
De-sander:	A centrifugal device for removing sand from drilling fluid to prevent abrasion of the pumps. It may be operated mechanically or by a fast-moving stream of fluid inside a special cone-shaped vessel, in which case it is sometimes called a hydrocyclone.
De-silter:	A centrifugal device used to remove very fine particles, or silt, from drilling fluid.
Devonian Period:	Period of geologic time from 415 to 360 million years ago.
Diesel-Based Hydraulic Fracturing:	Hydraulic fracturing using diesel as the primary carrier.
Dip:	Angle of inclination from the horizontal.
Dipole Sonic Log:	A type of acoustic log that displays travel time of P-waves versus depth.
Disconformity:	A surface of erosion between parallel rock strata or a contact between two discordant structures (e.g., a dike emplaced within a layered sedimentary rock unit).
Disposal Well:	A well into which waste fluids can be injected deep underground for safe disposal.
DMM:	Division of Materials Management in the NYS Department of Environmental Conservation.
DMN:	Division of Mineral Resources in the NYS Department of Environmental Conservation.
DMR:	Division of Marine Resources in the NYS Department of Environmental Conservation.
Doghouse:	A small enclosure on the rig floor used as an office and/or as a storehouse for small objects. Also, any small building used as an office or for storage.
DOH:	(New York State) Department of Health.
DOW:	Division of Water in the NYS Department of Environmental Conservation.
DMV:	(New York State) Department of Motor Vehicles.

Term	Definition
DPS:	(New York State) Department of Public Service.
DRA:	Division of Regulatory Affairs in the NYS Department of Environmental Conservation.
DRBC:	Delaware River Basin Commission.
Drilling Fluid:	Mud, water, or air pumped down the drill string which acts as a lubricant for the bit and is used to carry rock cuttings back up the wellbore. It is also used for pressure control in the wellbore.
Drive Pipe:	See definition for "Conductor Casing".
Dry Hole:	Any well that does not produce oil or gas in commercial quantities.
DSHM:	Division of Solid and Hazardous Materials in the NYS Department of Environmental Conservation.
E&P:	Exploration and Production.
EAF:	Environmental Assessment Form.
ECL:	Environmental Conservation Law.
Ecosystem:	The system composed of interacting organisms and their environments.
EDR:	Electrodialysis Reversal.
Effluent:	Something that flows out, in particular a waste material such as an industrial discharge.
EIS:	Environmental Impact Statement.
EM&CP:	Environmental Management and Construction Plan.
EM&CS&P:	Environmental Management and Construction Standards and Practices.
Entrainment:	The condition of being drawn into something and transported with it, for example, gas bubbles in cement.
EO 41:	Executive Order 41.
EPA:	(U.S.) Environmental Protection Agency.
EPCRA:	Emergency Planning and Community Right to Know Act of 1986.
ERP:	Emergency Response Plan.
EUR:	Estimated ultimate recovery.
EV:	Exceptional Value (waters).
Evaporite:	Sedimentary rock or mineral deposits formed from the extensive or total evaporation of seawater.
FAA:	(U.S.) Federal Aviation Administration.
FAD:	Filtration Avoidance Determination.
Fault:	A fracture or fracture zone along which there has been displacement of the sides relative to each other.
Field:	The general area underlain by one or more pools.
Flare:	The burning of unwanted gas through a pipe.
Flocculant:	A chemical added to a fluid to cause unwanted particles, such as clay, to clump together for easier removal.
Floodplain:	Level land built up by stream deposition (past floods) that may be subject to future flooding.
Flowback Fluids:	Liquids produced following drilling and initial completion and clean-up of the well.
Flowmeter:	An instrument that measures fluid flow rates.
Flue Gas:	An exhaust gas coming out of a pipe or stack.
FMCSA:	Federal Motor Carrier Safety Administration.

Term	Definition
Foaming Agents:	An additive used to make foam in a drilling fluid.
Fold:	A bend in rock strata.
Footwall:	The mass of rock beneath a fault plane.
Formation:	A rock body distinguishable from other rock bodies and useful for mapping or description. Formations may be combined into groups or subdivided into members.
Fossil:	A record of ancient life.
Fracing (pronounced “fracking”):	See definition for "Hydraulic Fracturing".
Freeboard:	The height above the recorded high-water mark of a structure associated with the water. In the case of pits, the extra depth left unused to prevent any chance of overflow.
Friction Reducers/Friction Reducing Agent:	Chemical additives which alter the hydraulic fracturing fluid allowing it to be pumped into the target formation at a higher rate & reduced pressure.
FTIR:	Fourier-transform Infrared.
Gamma Ray Log:	Log that records natural gamma radiation of the formations. Shales can be identified because of their high natural gamma radiation content.
Gas Gathering:	The collection and movement of raw gas from the wellhead to an acceptance point of a transportation pipeline.
Gas Meter:	An instrument for measuring and indicating, or recording, the volume of natural gas that has passed through it.
Gas-Water Separator:	A device used to separate undesirable water from gas produced from a well.
GEIS:	Generic Environmental Impact Statement.
Gelling Agents:	Polymers used to thicken fluid so that it can carry a significant amount of proppants into the formation.
Geomembrane:	Man-made polymeric membrane (flexible membrane) that is manufactured to be essentially impermeable and is used to build containment pits.
Geothermal Well:	A well drilled to explore for or produce heat from the subsurface.
GHG:	Greenhouse gas.
gpd:	Gallons per day.
gpm:	Gallons per minute.
GRI:	Gas Research Institute.
Groundwater:	Water in the subsurface below the water table. Groundwater is held in the pores of rocks, and can be connate, from meteoric sources, or associated with igneous intrusions.
Groundwater Hydrology:	The science of the occurrence, distribution, and movement of water below the surface of the earth.
Grout:	A concrete mixture placed into a well annulus from the surface; also, the process of emplacing such mixture.
GWP:	Global warming potential.
GWPC:	Ground Water Protection Council.
H_2SO_4:	Sulfuric acid.
HAPS:	Hazardous Air Pollutants as defined under the Clean Air Act.
Hardpan:	A hard impervious layer of soil composed chiefly of clay cemented by relatively insoluble materials.
HDPE:	High-density polyethylene. This plastic is resistant to most chemicals, insoluble in organic solvents, and has high impact and tensile strength.

Term	Definition
High-Volume Hydraulic Fracturing:	The stimulation of a well using 300,000 gallons or more of water as the base fluid in fracturing fluid.
HMTA:	Hazardous Material Transportation Act.
HMTUSA:	Hazardous Materials Transportation Uniform Safety Act.
Horizontal Drilling:	Deviation of the borehole from vertical so that the borehole penetrates a productive formation in a manner parallel to the formation.
Horizontal Leg:	The part of the wellbore that deviates significantly from the vertical; it may or may not be perfectly parallel with formational layering.
HQ:	High Quality (waters).
Hydraulic Conductivity:	A property of a soil or rock, that describes the ease with which water can move through pore spaces or fractures. It is dependent upon the intrinsic permeability of the material and on the degree of saturation.
Hydraulic Fracturing:	The act of pumping hydraulic fracturing fluid into a formation to increase its permeability.
Hydraulic Fracturing Fluid:	Fluid used to perform hydraulic fracturing; includes the primary carrier fluid and all applicable additives.
Hydrocarbons:	Organic compounds of hydrogen and carbon whose densities, boiling points, and freezing points increase as their molecular weights increase. Although composed of only two elements, hydrocarbons exist in a variety of compounds, because of the strong affinity of the carbon atom for other atoms and for itself. The smallest molecules of hydrocarbons are gaseous; the largest are solids. Petroleum is a mixture of many different hydrocarbons.
Hydrocyclone:	A device to classify, separate or sort particles in a liquid suspension based on the densities of the particles. A hydrocyclone may be used to separate solids from liquids or to separate liquids from different density.
Hydrogen Sulfide or H_2S:	A malodorous, toxic gas with the characteristic odor of rotten eggs.
ICE:	Internal Combustion Engines.
ICF:	ICF International, a consulting firm.
Igneous Rock:	Rock formed by solidification from a molten or partially molten state (magma).
Infill Wells:	Wells drilled between known producing wells to better exploit the reservoir.
Infrastructure:	The system of public works of a country, state, or region. It can also refer to the resources (as personnel, buildings, or equipment) required for an activity.
Injectate:	Injectate is any substance injected down a well.
Injection Well:	A well through which fluids are injected into an underground stratum to increase reservoir pressure and to displace oil. Also called an input well.
Injection Zone:	A geological formation, group of formations, or part of a formation that receives fluids through a well.
Intermediate Casing or String:	Casing set below the surface casing in deep holes where added support or control of the wellbore is needed. It goes between the surface casing and the conductor casing. In very deep wells, more than one string of intermediate casing may be used.
IOGA-NY:	Independent Oil and Gas Association of New York.
IOGCC:	Interstate Oil and Gas Compact Commission.
Iron Inhibitors:	Chemicals used to bind the metal ions and prevent a number of different types of problems that the metal can cause (for example, scaling problems in pipe).

Term	Definition
ITR:	Injection Timing Retard.
Joule-Thompson Effect:	Referring to the change in temperature observed when a gas expands while flowing through a restriction without any heat entering or leaving the system. The change may be positive or negative. The Joule-Thomson effect often causes a temperature decrease as gas flows through pores of a reservoir to the wellbore.
km:	Kilometer.
KML:	Keyhole Markup Language.
LCSN:	Lamont-Doherty Cooperative Seismographic Network.
LDAR:	Leak detection and repair.
LDCs:	Local Distribution Companies.
Limestone:	A sedimentary rock consisting chiefly of calcium carbonate ($CaCO_3$).
Lithologic:	Referring to the physical characteristics of rocks or sediment that can be determined with the human eye.
Log:	A systematic recording of data, such as a driller's log, mud log, electrical well log, or radioactivity log. Many different logs are run in wells to discern various characteristics of rock formations that the wellbore passes through.
Lost Circulation:	The quantities of drilling fluid lost to a formation, usually in cavernous, pressured, or coarsely permeable beds, evidenced by complete or partial failure of the mud to return to the surface as it is being circulated in the hole.
Lost Circulation Material:	Material put into fluids to block off the permeability of a lost circulation zone.
Lost Circulation Zone:	Formation that is so permeable or soluble that it diverts the flow of fluids from the well.
Low-Permeability Gas Reservoirs:	Gas bearing rocks (which may or may not contain natural fractures) which exhibit in-situ gas permeability of less than 0.10 milidarcies.
LPG:	Liquefied Petroleum Gas.
LWRP:	Local Waterfront Revitalization Program.
Manifold:	An arrangement of piping or valves designed to control, distribute and often monitor fluid flow.
Marcellus Well:	A well for which the operator designates the Marcellus Shale as the objective formation.
Mcf:	Thousand cubic feet.
MCL, MCLG:	Maximum Contaminant Level, Maximum Contaminant Level Goal.
md:	Millidarcy.
Methane:	Methane (CH_4) is a greenhouse gas that remains in the atmosphere for approximately 9-15 years. Methane is also a primary constituent of natural gas and an important energy source.
Microseisms (or microseismic events):	Small bursts of seismic energy generated by shear slippages along planes of weakness in the reservoir and surrounding layers which are induced by changes in stress and pore pressure around the hydraulic fracture. These microseisms are extremely small, and sensitive receiver systems are required.
Micro-annulus (plural is micro-annuli):	A small gap that can form between the casing or liner and the surrounding cement sheath, most commonly formed by variations in temperature or pressure during or after the cementing process.
mg/L:	milligrams per liter.

Term	Definition
Mineral Rights:	The ownership of the minerals under a given surface, with the right to enter and remove them. It may be separated from the surface ownership.
MMcf:	Million cubic feet.
MMcf/d:	Million cubic feet per day.
MOVES:	Motor Vehicle Emission Simulator.
mR/hr:	Milliroentgens per hour.
MSC:	Marcellus Shale Coalition.
MSDS:	Material Safety Data Sheet. A written or printed document which is prepared in accordance with 29 CFR 1910.1200(g).
MSGP:	Multi-Sector General Permit.
MSW:	Municipal solid waste.
Mudlogging (Unit):	Trailer located at the wellsite housing equipment and personnel to progressively analyze wellbore cuttings washed up from the borehole. A portion of the mud is diverted through a gas-detecting device.
NAAQS and AAQS:	National or State Ambient Air Quality Standards for criteria pollutants.
Native Gas:	Gas originally in place in an underground formation. Term is usually associated with gas storage.
NCWS:	Non-community water systems.
NESHAPs:	National Emission Standards for Hazardous Air Pollutants.
NFRM:	Natural Flow Regime Method.
NGPA:	Natural Gas Policy Act of 1978.
NH_3:	Ammonia.
NMHC:	Non-methane hydrocarbons.
NNSR:	Nonattainment New Source Review.
NOI:	Notice of Intent.
Noise Log:	A record of the sound vibrations in the wellbore caused by flowing liquid or gas. Used to determine fluid entry points or flow behind casing.
Non-Darcy Flow:	Fluid flow that deviates from Darcy's law, which assumes laminar flow in the formation. Non-Darcy flow is typically observed in high-rate gas wells when the flow converging to the wellbore reaches flow velocities exceeding the Reynolds number for laminar or Darcy flow, and results in turbulent flow.
Nonwetting Phase:	The pore space fluid which is not attached to the reservoir rock and thus has the greatest mobility.
N_2O:	Nitrous Oxide.
NO_2:	Nitrogen Dioxide.
NORM - Naturally Occurring Radioactive Materials:	Low-level radioactivity that can exist naturally in native materials, like some shales and may be present in drill cuttings and other wastes from a well.
Non-Indigenous:	Not having originated in and being produced, growing, living, or occurring naturally in a particular region or environment.
Normalized Pressure Integral Curve Analysis:	Another type of Decline or Type Curve Analysis (see).
NPDES:	National Pollutant Discharge Elimination System.

Term	Definition
NSCR:	Non-Selective Catalytic Reduction.
NSPS:	New Source Performance Standards.
NTNC:	Non- transient non-community.
NWS:	National Weather Service.
NYCDEP:	New York City Department of Environmental Protection.
NYCRR:	New York Codes of Rules and Regulations.
NYSDAM:	New York State Department of Agriculture and Markets.
NYSDOH:	New York State Department of Health.
NYSDOT:	New York State Department of Transportation.
NYSERDA:	New York State Energy Research and Development Authority.
O_3:	Ozone.
Operator:	Any person or organization in charge of the development of a lease or drilling and operation of a producing well.
OPRHP:	(NY State) Office of Parks, Recreation and Historic Preservation.
Ordovician Period:	Period of geologic time from 520 to 465 million years ago.
PADEP:	Pennsylvania Department of Environmental Protection.
Paleozoic Era:	Large block of geologic time from 570 to 225 million years ago; beginning marked by the appearance of abundant fossils. Most of the bedrock in New York State was formed (deposited) during the Paleozoic.
Parameter:	A characteristic of a model of a reservoir that may or may not vary with respect to position or with time. (e.g., porosity is a petrophysical parameter (or characteristic) that varies with position).
Partial Reclamation:	The reclamation of a well site following completion of a well and in the case of multi-well pad, completion of the last well on the multi-well pad. This includes the reclamation of pits, regarding of lands and the revegetation of lands outside the well pad.
Passby Flow Requirement:	A prescribed quantity of flow that must be allowed to pass an intake when withdrawal is occurring. Passby requirements also specify low- flow conditions during which no water can be withdrawn.
Pathogens:	A specific causative agent (as a virus or bacterium).
PBS:	Petroleum Bulk Storage.
PCC:	Pre-ignition Chamber Combustion.
Pennsylvanian Period:	Period of geologic time from 310 to 280 million years ago.
Percolation Test:	Test to determine at what rate fluids will pass through soil.
Perennial Stream:	A stream channel that has continuous flow in parts of its bed all year round during years of normal rainfall.
Perforate:	To make holes through the casing to allow the oil or gas to flow into the well or to squeeze cement behind the casing.
Perforation:	A hole created in the casing to achieve efficient communication between the reservoir and the wellbore.
Permeability:	A measure of a material's ability to allow passage of gas or liquid through pores, fractures, or other openings. The unit of measurement is the millidarcy.
Permeable:	Able to transmit gas or liquid through interconnected pores, fractures, or other openings.

Term	Definition
Petroleum:	In the broadest sense the term embraces the full spectrum of hydrocarbons (gaseous, liquid, and solid).
PHMSA:	Pipeline and Hazardous Materials Safety Administration.
PID:	Perforation Inflow Diagnostic.
Pipe Racks:	Horizontal supports for storing tubular goods.
Plat:	A map of land parcels; a drafted map of a site's location showing boundaries of adjoining parcels.
Plug Back:	To place cement in or near the bottom of a well to exclude bottom water, to sidetrack, or to produce from a formation higher in the well. Plugging back can also be accomplished with a mechanical plug set by wireline, tubing, or drill pipe.
Plugged and Abandoned:	(plug and abandon) To prepare a well to be closed permanently with cement plugs, usually after either logs determine there is insufficient hydrocarbon potential to complete the well, or after production operations have drained the reservoir.
PM10 and PM2.5:	Particulate matter with sizes of less than 10 and 2.5 microns, respectively.
Pneumatic:	Run by or using compressed air.
POC:	Principal Organic Contaminant.
Poisson's ratio:	An elastic constant that is a measure of the compressibility of material perpendicular to applied stress, or the ratio of latitudinal to longitudinal strain. Named for French mathematician Simeon Poisson (1781 to 1840).
Polymer:	Chemical compound of unusually high molecular weight composed of numerous repeated, linked molecular units.
Pool:	An underground reservoir containing a common accumulation of oil and/or gas. Each zone of a structure which is completely separated from any other zone in the same structure is a pool.
Porosity:	Volume of pore space expressed as a percent of the total bulk volume of the rock.
Potable Fresh Water:	Suitable for drinking by humans and containing less than 250 ppm of sodium chloride or 1,000 ppm TDS.
POTW:	Publicly Owned Treatment Works.
ppb:	Parts per billion.
ppm:	Parts per million.
Precambrian Era:	Very large block of geologic time spanning from Earth's formation to the 4,500 to 570 million years ago.
Pressure Buildup Test:	An analysis of data obtained from measurements of the bottomhole pressure in a well that is shut-in after a flow period. The profile created on a plot of pressure against time is used with mathematical reservoir models to assess the extent and characteristics of the reservoir and the near-wellbore area.
Primary Aquifer:	A highly productive aquifer presently being utilized as a source of water supply by a major municipal supply system.
Primary Carrier Fluid:	The base fluid, such as water, into which additives are mixed to form the hydraulic fracturing fluid which transports proppant.
Primary Production:	Production of a reservoir by natural energy in the reservoir.
Principal Aquifer:	An aquifer known to be highly productive or whose geology suggests abundant potential water supply, but which is not intensively used as a source of water supply by a major municipal system.

Term	Definition
Principal Stresses:	Forces per unit area acting on the external surface of a solid body.
Product:	A hydraulic fracturing fluid additive that is manufactured using precise amounts of specific chemical constituents and is assigned a commercial name under which the substance is sold or utilized.
Production Casing:	Casing set above or through the producing zone through which the well produces.
Production Brine:	Liquids co-produced during oil and gas wells production.
Proppant or Propping Agent:	A granular substance (sand grains, aluminum pellets, or other material) that is carried in suspension by the fracturing fluid and that serves to keep the cracks open when fracturing fluid is withdrawn after a fracture treatment.
PSC:	Public Service Commission.
PSD:	Prevention of Significant Deterioration defined in the Clean Air Act.
PSI:	Pounds per square inch.
PSIG:	Pounds per Square Inch Gauge.
PSL:	Public Service Law.
Public Water Supply:	Either a community or non-community well system which provides piped water to the public for human consumption if the system has a minimum of five (5) service connections, or regularly serves a minimum average of 25 individuals per day at least 60 days per year.
PTE:	Potential to Emit.
Pump and Plug Method:	A technique for placing cement plugs at appropriate intervals.
PVC:	Polyvinylchloride; a durable petroleum derived plastic.
RACT:	Reasonably Available Control Technology.
Radial Cement Bond Log:	A record of sonic amplitudes derived from acoustic signals passing along the well casing. Used to evaluate cement-to-pipe and cement-to-formation bonding.
RCRA:	Resource Conservation and Recovery Act.
Real Property:	Includes mineral claims, surface and water rights.
REC:	Reduced Emissions Completion.
Reclaimed:	(Reclamation) Rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, replacement of topsoil, re-vegetation, and other work necessary to restore it.
Remediation:	The removal of pollution or contaminants from the environmental media such as soil, groundwater, or surface water.
Reserve pit:	A mud pit in which a supply of drilling fluid has been stored. Also, a waste pit, usually an excavated, earthen-walled pit. In NY it is required to be lined with plastic to prevent soil contamination.
Reservoir (oil or gas):	A subsurface, porous, permeable or naturally fractured rock body in which oil or gas has accumulated. A gas and production is only gas plus fresh water that condenses from the flow stream reservoir. In a gas condensate reservoir, the hydrocarbons may exist as a gas, but, when brought to the surface, some of the heavier hydrocarbons condense and become a liquid.
Reservoir (water):	Any man-made structure used to supply fresh water to the public.
Reservoir Rock:	A rock that may contain oil or gas in appreciable quantity and through which petroleum may migrate.

Term	Definition
RO:	Reverse Osmosis.
Rotary Rig:	A derrick equipped with rotary equipment where a well is drilled using rotational movement.
Royalty:	The landowner's share of the value of oil and gas produced.
Run-Off:	The portion of precipitation on land that ultimately reaches streams sometimes with dissolved or suspended material.
Sandstone:	A variously colored sedimentary rock composed chiefly of sandlike quartz grains cemented by lime, silica or other materials.
SAPA:	State Administrative Procedures Act.
Scale Inhibitor:	A chemical substance which prevents the accumulation of a mineral deposit (for example, calcium carbonate) that precipitates out of water and adheres to the inside of pipes, heaters, and other equipment.
SCR:	Selective Catalytic Reduction.
SDWA:	Safe Drinking Water Act.
SDWIS:	Safe Drinking Water Information System.
Sedimentary:	Rocks formed from sediment transported from their source and deposited in water or by precipitation from solution or from secretions of organisms.
Sedimentation Control:	(sedimentation) The process of separation of the components of a cement slurry during which the solids settle. Sedimentation is one of the characterizations used to define slurry stability.
Seep:	Natural leakage of gas or oil at the earth's surface.
SEIS:	Supplemental Environmental Impact Statement.
Seismic:	Related to earth vibrations produced naturally or artificially.
Separator:	Tank used to physically separate the oil, gas, and water produced simultaneously from a well.
SEQR:	Reference to the regulatory program or type of review done under SEQRA.
SEQRA:	State Environmental Quality Review Act.
Setback:	Minimum distance required between a well operation and other zones, boundaries, or objects such as highways, wetlands, streams, or houses.
SGC/AGC:	Short-term Guideline Concentration and Annual Guideline Concentrations defined in DAR-1 (Air Guide 1) procedures.
SGEIS:	Supplemental Generic Environmental Impact Statement.
Shale:	A thinly laminated claystone, siltstone or mud stone.
Shale Shaker:	A series of trays with sieves or screens that vibrate to remove cuttings from circulating fluid in rotary drilling operations. The size of the openings in the sieve is selected to match the size of the solids in the drilling fluid and the anticipated size of cuttings. Also called a shaker.
Shear Wave (S-wave):	Elastic body wave in which particles oscillate perpendicular to the direction in which the wave propagates. S-waves, or shear waves, travel more slowly than P-waves and cannot travel through fluids. Interpretation of S-waves can help determine rock properties.
Short Ton:	20 short hundred weight, 2,000 pounds.

Term	Definition
Show:	Small quantity of oil or gas, not enough for commercial production.
Shut In (Verb):	To close the valves at the wellhead to keep the well from flowing or to stop producing a well.
Shut-In (Adjective):	The state of a well which has been shut-in.
SI:	Spark Ignition.
Significant Habitats:	Areas which provide one or more of the key factors required for survival, variety or abundance of wildlife, and/or for human recreation associated with such wildlife.
SILs:	Significant Impact Levels for criteria pollutants.
Siltation:	The build-up of silt in a stream or lake as a result of activity that disturbs the streambed, bank, or surrounding land.
Siltstone:	Rock in which the constituent particles are predominantly silt size.
Silurian Period:	Period of geologic time from 405 to 415 million years ago.
SIP	State Implementation Plan
Slickwater Fracturing (or slick-water):	A type of hydraulic fracturing which utilizes water-based fracturing fluid mixed with a friction reducing agent & other chemical additives. The fluid is typically 98% fresh water & sand (proppant) & 2% or less chemical additives.
Slippage:	The phenomenon in multiphase flow when one phase flows faster than another phase, in other words slips past it. Because of this phenomenon, there is a difference between the holdups and cuts of the phases.
SO_2:	Sulfur dioxide.
SO_3	Sulfur trioxide.
Sonic Log:	See "Dipole Sonic Log".
Spacing Unit:	A surface area allotted to a well by regulations or field rules issued by a governmental authority having jurisdiction for the drilling and production of a well.
Spacing:	Distance separating wells in a field to optimize recovery of oil and gas.
SPDES:	State Pollutant Discharge Elimination System.
Spring:	A place where groundwater naturally flows from underground onto land or into a body of surface water.
Spudding:	The breaking of the earth's surface in the initial stage of drilling a well.
Squeeze:	Technique where cement is forced under pressure into the annular space between casing and the wellbore, between two strings of pipe, or into the casing-hole annulus.
SRBC:	Susquehanna River Basin Commission.
Stage:	Isolation of a specific interval of the wellbore and the associated interval of the formation for the purpose of maintaining sufficient fracturing pressure.
Stage Plug:	A device used to mechanically isolate a specific interval of the wellbore and the formation for the purpose of maintaining sufficient fracturing pressure.
Standpipe:	A vertical pipe rising along the side of the derrick or mast. It joins the discharge line leading from the mud pump to the rotary hose and through which mud is pumped going into the hole.
Stimulation:	The act of increasing a well's productivity by artificial means such as hydraulic fracturing, acidizing, and shooting.

Term	Definition
Stratigraphic Test Well:	A hole drilled to gather engineering, geologic or hydrological information including but not limited to lithology, structural, porosity, permeability and geophysical data.
Stratigraphy:	The study of rock layering, including the history, composition, relative ages and distribution of different rock units.
Stratum (plural strata):	Sedimentary rock layer, typically referred to as a formation, member, or bed.
Stream's Designated Best Use:	Each waterbody in NYS has been assigned a classification, which reflects the designated "best uses" of the waterbody. These best uses typically include the ability to support fish and aquatic wildlife, recreational uses (fishing, boating) and, for some waters, public bathing, drinking water use or shellfishing. Water quality is considered to be good if the waters support their best uses.
Substructure:	The foundation on which the derrick and drawworks sit. It contains space for storage and well-control equipment.
Surface Casing:	Casing extending from the surface through the potable fresh water zone.
Surface Impoundment:	A liquid containment facility that can be installed in a natural topographical depression, excavation, or bermed area formed primarily of earthen materials, then lined with a geomembrane or a combination of other geosynthetic materials.
Surfactants:	Chemical additives that reduce surface tension; or a surface active substance. Detergent is a surfactant.
SWPPP:	Stormwater Pollution Prevention Plan.
SWTR:	Surface Water Treatment Rule.
Target Formation:	The reservoir that the driller is trying to reach when drilling the well.
TCEQ:	Texas Commission on Environmental Quality.
Tcf:	Trillion cubic feet.
TD:	Total depth.
TDS:	Total Dissolved Solids. The dry weight of dissolved material, organic and inorganic, contained in water and usually expressed in mg/L or ppm.
TEG:	Triethylene Glycol.
Tensile Strength:	The force per unit cross-sectional area required to pull a substance apart.
Tight Formation:	Formation with very low permeability.
TMD:	Total measured depth.
TNC:	Transient non-community (in the context of water systems) or The Nature Conservancy.
TOC:	Total Organic Carbon.
Total Kjeldahl Nitrogen:	The sum of organic nitrogen; ammonium NH_3 and ammonia NH_4+ in water and soil analyses.
Tote:	A container used in the storage of various solid powder or liquid bulk products.
Trap:	Any geological barrier which restricts the migration of oil & gas.
TVD:	True vertical depth.
Turbidity:	Amount of suspended solids in a liquid.

Term	Definition
UA:	Urbanized areas.
UC:	Urban clusters.
UIC – Underground Injection Control:	A program administered by the Environmental Protection Agency, primacy state, or Indian tribe under the Safe Drinking Water Act to ensure that subsurface emplacement of fluids does not endanger underground sources of drinking water.
ULSF:	Ultra-Low Sulfur (Diesel) Fuel.
UN:	United Nations.
Unfiltered Surface Water Supplies:	Those that the U.S. EPA and NYSDOH have determined meet the requirements of the "Interim Enhanced Surface Water Treatment Rule" (IESWT Rule) for unfiltered water supply systems. The IESWT Rule is a December 16, 1998 amendment to the Surface Water Treatment Rule that was originally promulgated by EPA on June 29, 1989. In New York State, this includes the NYC Drinking Water Supply Watershed and the Skaneateles Drinking Water Supply Watershed.
UOC:	Unspecified Organic Contaminant.
USCG:	United States Coast Guard.
USDOT:	United States Department of Transportation.
USDW - Underground Source of Drinking Water:	An aquifer or portion of an aquifer that supplies any public water system or that contains a sufficient quantity of ground water to supply a public water system, and currently supplies drinking water for human consumption, or that contains fewer than 10,000 mg/L total dissolved solids and is not an exempted aquifer.
Water Well:	Any residential well used to supply potable water.
USEPA:	United States Environmental Protection Agency.
USGS:	United States Geological Survey.
Viscosity:	A measure of the degree to which a fluid resists flow under an applied force.
Vitrinite Reflectance:	A measurement of the maturity of organic matter with respect to whether it has generated hydrocarbons or could be an effective source rock.
VMT:	Vehicle Miles per Trip.
VOC:	Volatile Organic Compound.
Watershed:	The region drained by, or contributing water to, a stream, lake, or other body of water.
Well Location Plat:	A map of parcels of land with the proposed well and other features, particularly adjoining parcel boundaries.
Well Pad:	The area directly disturbed during drilling and operation of a gas well.
Wellbore:	A borehole; the hole drilled by the bit. A wellbore may have casing in it or it may be open (uncased); or part of it may be cased, and part of it may be open.
Wellhead:	The equipment installed at the surface of the wellbore. A wellhead includes such equipment as the casinghead and tubing head.
Well site:	Includes the well pad and access roads, equipment storage and staging areas, vehicle turnarounds, and any other areas directly or indirectly impacted by activities involving a well.
Wetland:	Any area regulated pursuant to Part 663.
Wildcat:	Well drilled to discover a previously unknown oil or gas pool or a well drilled one mile or more from a producing

Term	Definition
	well.
Wireline:	A general term used to describe well-intervention operations conducted using single-strand or multistrand wire or cable for intervention in oil or gas wells. Although applied inconsistently, the term commonly is used in association with electric logging and cables incorporating electrical conductors.
WMA:	Wildlife Management Area.
WOC Time:	"Waiting on cement" time. Pertaining to the time when drilling or completion operations are suspended so that the cement in a well can harden sufficiently.
Workover:	Repair operations on a producing well to restore or increase production.
ZLD:	Zero liquid discharge.
Zonal Isolation:	The state of keeping fluids in one zone separate from the fluids in another zone. In the case of a well, isolation is maintained by appropriate use of casing, cement, plugs and packers.
Zone:	A rock stratum of different character or fluid content from other strata.

This page intentionally left blank.

New York State

DEC

SGEIS Bibliography

Updated August 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

Bibliography

[Alpha] Alpha Environmental Consultants Inc. 2011 February 4. Review of USGS Comment on dSGEIS. Letter from Thomas Johnson to Kathleen Sanford.

[Alpha] Alpha Environmental Consultants Inc. 2011 January 26. Review and Response to "Human Health Risk Evaluation for Hydraulic Fracturing Fluid Additives – Marcellus Shale Formation, New York. Prepared for NYSERDA, Albany, NY.

[Alpha] Alpha Environmental Consultants Inc. 2011 January 26. Review and Response to "Impact Assessment of Natural Gas Production in the New York City Watershed." Prepared for NYSERDA, Albany, NY.

[Alpha] Alpha Environmental Consultants Inc. 2011 January 20. Review of dSGEIS and Identification of Best Technology and Best Practices Recommendations. Prepared for NYSERDA, Albany, NY.

[Alpha] Alpha Environmental Consultants Inc. 2011 January 19. Review of dSGEIS Concerning Natural Gas Development of the Marcellus Shale within the New York City Watershed. Prepared for NYSERDA, Albany, NY.

[Alpha] Alpha Environmental Consultants Inc. 2010 January 14. Review of dSGEIS and Identification of Best Technology and Best Practices Recommendations. Prepared for NYSERDA, Albany, NY.

[Alpha] Alpha Environmental Consultants Inc. 2010 January 14. Review of HESI Chemistry Scoring Index. Letter from Thomas Johnson to Kathleen Sanford.

[Alpha] Alpha Environmental Consultants Inc. 2009 September 23. Issues Related to Developing the Marcellus Shale and Other Low-Permeability Gas Reservoirs. Prepared for NYSERDA, Albany, NY.

ALL Consulting. 2011 June 30. SGEIS Supplementary Information – Production Rates. Letter to Brad Gill, Executive Director, Independent Oil & Gas Association of New York.

ALL Consulting. 2010 September 16. NYDEC Information Requests. Project No. 1284. Prepared for the Independent Oil & Gas Association of New York.

ALL Consulting. 2009 August 26. Horizontally Drilled/High-Volume Hydraulically Fractured Wells Air Emission Data.

ALL Consulting. 2008 November. Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs.

[ANL] Argonne National Laboratory. 2011. Fact Sheet – The First Step: Separation of Mud from Cuttings. Drilling Waste Management Information System. Available at http://web.ead.anl.gov/dwm.techdesc/sep/index.cfm (accessed May 5, 2011).

[ANL] Argonne National Laboratory. 2011. Fact Sheet – Solidification and Stabilization. Drilling Waste Management Information System. Available at http://web.ead.anl.gov/dwm/techdesc/solid/index.cfm (accessed May 6, 2011).

[API] American Petroleum Institute. December 2010. Specification for Cements and Materials for Well Cementing. ANSI, API Specification 10A. Twenty-Fourth Edition.

[API] American Petroleum Institute. June 2010. Water Management Associated with Hydraulic Fracturing. API Guidance Document HF2. First Edition.

[API] American Petroleum Institute, ANSI. November 2009. Recommended Practice on Thread Compounds for Casing, Tubing, Line Pipe, and Drill Stem Elements. ANSI, API Recommended Practice 5A3. Third Edition.

[API] American Petroleum Institute. August 2009. Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry. Available at http://www.api.org/ehs/climate/new/upload/2009_GHG_COMPENDIUM.pdf (accessed September 21, 2009).

[API] American Petroleum Institute. March 2009. Coiled Tubing Well Control Equipment Systems. API Recommended Practice 16ST. First Edition.

[API] American Petroleum Institute. April 2008. Specification for Threading, Gauging and Thread Inspection of Casing, Tubing, and Line Pipe Threads. API Specification 5B. Fifteenth Edition.

[API] American Petroleum Institute. May 2006. Recommended Practice for Well Control Operations. API Recommended Practice 59.

[API] American Petroleum Institute. July 2005. Specification for Casing and Tubing. API Specification 5C7. Eighth Edition.

[API] American Petroleum Institute, ANSI. June 2005. Field Inspection of New Casing, Tubing, and Plain-end Drill Pipe. ANSI, API Recommended Practice 5A5. Seventh Edition.

[API] American Petroleum Institute. 2004, amended 2005. Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry. Washington DC.

[API] American Petroleum Institute, ISO, ANSI. August 2004. Recommended Practice for Centralizer Placement and Stop Collar Testing. ANSI,API Recommended Practice 10D-2. First Edition.

[API] American Petroleum Institute and International Petroleum Industry Environmental Conservation Association. 2003 December. Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions.

[API] American Petroleum Institute. ANSI, ISO. March 2002. Specification for Bow-Spring Casing Centralizers. API Specification 10D. Sixth Edition.

[API] American Petroleum Institute. November 2001. Recommended Practice for Diverter Systems Equipment and Operations. API Recommended Practice 64(RP 64). Second Edition.

[API] American Petroleum Institute. May 1999. Recommended Practice for Care and Use of Casing and Tubing. API Recommended Practice 5C1. Eighteenth Edition.

[API] American Petroleum Institute. March 1997. Recommended Practices for Blowout Prevention Equipment Systems for Drilling Wells. API Recommended Practice 53. Third Edition.

[API] American Petroleum Institute. 1996. December. Recommended Practice for Coiled Tubing Operations in Oil and Gas Well Services. API Recommended Practice 5C7. First Edition.

Armendariz, A. 2009 January 26. Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements. Department of Environmental and Civil Engineering. Southern Methodist University. Dallas, Texas. Available from: http://www.edf.org/documents/9235_Barnett_Shale_Report.pdf.

Bowen, K. 2010 September. Developer's Blasting Sparks Water Complaints. The Daily Gazette, Schenectady, NY.

Cabot Oil & Gas Corporation, 2009 October 16. Final Engineering Study in Response to Order Dated September 24, 2009.

Camp, Dresser and McKee. 1986. Minimum Instream Flow Study. Final Report to the Commonwealth of Virginia State Water Control Board, Annandale, Virginia.

Chesapeake Energy Corporation. 2009 July. Greenhouse Gas Emissions and Reductions Fact Sheet. Available from: http://www.chk.com/Media/CorpMediaKits/Greenhouse_Gas_Emissions_and_Reduction.pdf (accessed December 10, 2009).

Colorado Oil and Gas Conservation Commission. 2009. Final Amended Rules; Training Presentations. Available from: http://cogcc.state.co.us (accessed July 8, 2009).

Colorado Oil and Gas Conservation Commission. 2009 March 30. Series Drilling, Development, Production and Abandonment. Available from: http://cogcc.state.co.us/RR_Docs_new/rules/300series.pdf (accessed August 26, 2009).

Considine, T., Watson, R., Entler, R., and Sparks, J. 2009 August 5. An Emerging Giant: Prospects and Economic Impacts of Developing the Marcellus Shale Natural Gas Play. Prepared for the Marcellus Shale Gas Committee by the Department of Energy and Mineral Engineering, The Pennsylvania State University, p. 2.

Cornue, D. 2011 May 5. NYSDEC. SGEIS Question Concerning Surface Disturbance. Email to P. Briggs (NYSDEC).

[DFWMR] Division of Fish, Wildlife and Marine Resources. 2010. Technical Methods for Passby Flow Determinations for Ungaged Waterways. Technical Report. New York State Department of Environmental Conservation. 27 pages.

[DRBC] Delaware River Basin Commission. 2008 September 12. Administrative Manual Part III--Water Quality Regulations (with amendments through July 16, 2008) 18 CFR Part 410. Available from: http://www.state.nj.us/drbc/regs/WQRegs_071608.pdf (accessed August 27, 2009).

[DRBC] Delaware River Basin Commission. 2007 August 14. Water Code. 18 CFR Part 410. Available from: http://www.state.nj.us/drbc/regs/watercode_092706.pdf (accessed September 29, 2009).

Dutton, R. and Blankenship, G. 2010 August. Socioeconomic Effects of Natural Gas Development. Prepared to support NTC Consultants, under contract with The New York State Energy Research & Development Authority. Appendix B *in* NTC, 2011.

Dugan, G.M. 2008 April 1. Drilling Fluids: Tackling HDD Spoil Disposal Issues. Trenchless Technology. Available at http://www.trenchlessonline.com/index/webapp-stories-action?id=510 (accessed May 5, 2011).

[ECL] Environmental Conservation Law. (With 2009 Cumulative Pocket Part). c2007 and 2009. Ed. McKinney's Consolidated Laws of New York Annotated--Book 17½. Eagan MN: West. Available from: http://public.leginfo.state.ny.us/menugetf.cgi?COMMONQUERY=LAWS (accessed September 21, 2009).

Ecology and Environment Engineering, P.C. 2011 August. Assessing and Mitigating the Socioeconomic, Visual, Noise, Transportation, and Community Character Impacts Associated With High-Volume Hydraulic Fracturing.

Eltschlager, K., Hawkins, J., Ehler, W., Baldassare, F. 2001 September. Technical Measures for the Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining. U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, Pittsburgh.

Engelder, T. 2009 August. Marcellus 2008: Report Card on the Breakout Year for Gas Production in the Appalachian Basin. Fort Worth Basin Oil & Gas Magazine.

Environmental Law Clinic. 2010 October 28. Comment letter on NYSDEC's Draft Strategic Plan for Forest Management, from the Environmental Law Clinic.

Estes, C.C. 1998. Annual Summary of Instream Flow Reservations and Protection in Alaska. Fisheries Data Series No. 98-40. Anchorage: Alaska Department of Fish and Game.

Estes, C.C. 1984. Evaluation of Methods for Recommending Instream Flows to Support Spawning by Salmon. Master's thesis, Washington State University, Pullman.

Federal Register. 2010 November 30. Mandatory Reporting of Greenhouse Gases: Petroleum and Natural Gas Systems; Final Rule. Vol. 35. No. 229. P. 74458-74515. Available at http://edocket.access.gpo.gov/2010/pdf/2010-28655.pdf (accessed December 8, 2010).

[FEMA] United States Department of Homeland Security. FEMA Map Service Center. Available from: http://msc.fema.gov (accessed August 27, 2009).

Fisher, K. 2010 July. Data Confirm Safety of Well Fracturing. American Oil & Gas Reporter, July 2010, pp. 30-33.

Forster, P., Ramaswamy, V., Artaxo, P., Berntsen, T., Betts, R., Fahey, D.W., Haywood, J., Lean, J., Lowe, D.C., Myhre, G., Nganga, J., Prinn, R., Raga, G., Schulz, M., and Van Dorland, R. 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available from:. http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf (accessed December 10, 2009).

Gas Research Institute. 1996. Methane Emissions from Natural Gas Industry. Available at: epa.gov/gasstar/tools/related.html (accessed September 22, 2009).

[GWPC] Ground Water Protection Council. 2009 May. State Oil and Natural Gas Regulations Designed to Protect Water Resources. Prepared for the United States Department of Energy (USDOE). Available at: http://www.gwpc.org/e-library/documents/general/State%20Oil%20and%20Gas%20Regulations%20Designed%20to%20Protect%20Water%20Resources.pdf (accessed September 3, 2009).

[GWPC] Ground Water Protection Council and ALL Consulting. 2009 April. Modern Shale Gas Development in the United States: A Primer. Prepared for United States Department of Energy (USDOE). Available from: http://fossil.energy.gov/programs/oilgas/publications/naturalgas_general/Shale_Gas_Primer_2009.pdf (accessed August 28, 2009).

Harrison, S.S. 1983 November. Evaluating System for Groundwater Contamination Hazards Due to Gas Well Drilling on the Glaciated Appalachia Plateau. Groundwater 21:6 pp. 689-700.

Hill, D.G., Lombardi, T.E., Martin, J.P. 2003. Fractured Shale Gas Potential in New York. Available at http://www.pe.tamu.edu/wattenbarger/public_html/Selected_papers/--Shale%20Gas/fractured%20shale%20gas%20potential%20in%20new%20york.pdf (accessed September 22, 2009).

Hoover, J.P., M.C. Brittingham, and L.J. Goodrich. 1995. Effects of Forest Patch Size on Nesting Success of Wood Thrushes. The Auk 112 (1):146-155.

[ICF Task 1] ICF Incorporated, LLC. 2009 August 7. Technical Assistance for the Draft Supplemental Generic EIS: Oil, Gas and Solution Mining Regulatory Program, Task 1. Prepared for NYSERDA, Albany, NY.

[ICF Task 2] ICF Incorporated, LLC. 2009 August 5. Technical Assistance for the Draft Supplemental Generic EIS: Oil, Gas and Solution Mining Regulatory Program, Task 2. Prepared for NYSERDA, Albany, NY.

[IFC] Instream Flow Council. 2004. Instream Flows for Riverine Resource Stewardship.

[IOCGG] Interstate Oil & Gas Compact Commission. 2009. Issues. Available from: http://www.iogcc.state.ok.us/hydraulic-fracturing (accessed August 31, 2009).

[IPCC] International Panel on Climate Change. 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon S, Qin D, Manning M, Chen Z, Marquis M, Avery KB, Tignor M, and Miller HL, eds.. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available from: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_FAQs.pdf (accessed September 22, 2009).

[IPIECA] International Petroleum Industry Environmental Conservation Association and [API] American Petroleum Institute. Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions, December 2003., p. 5-2.

Johnson, N. 2010. Pennsylvania Energy Impacts Assessment Report 1: Marcellus Shale, Natural Gas and Wind. The Nature Conservancy, Harrisburg, PA. http://www.nature.org/media/pa/tnc_energy_analysis.pdf

Keech, D. and Gaber, M.1982 February. Methane in Water Wells. National Ground Water Association. Consultants Collection.

Kenny, J.F., Barber, N.L., Hutson, S.S., Linsey, K.S., Lovelace, J.K. and Maupin, M.A. 2009. Estimated Use of Water in the United States in 2005: U.S. Geological Survey Circular 1344, 52 p.

Kruse, M. 1997 July. Gaseous Gold. The Daily Gazette, Schenectady, NY.

Kucewicz, J. 1997 July. Potential Plays in Eastern New York; A New Evaluation to Identify Exploration Fairways.

Larsen, H.N. 1981. Internal Regional Policy for New England Streamflow Recommendations. Newton Corners, MA: U.S. Fish and Wildlife Service, Region 5.

Lloyd, E. 2008 July 18. Letter to Commissioner Alexander B. Grannis, NYSDEC.

Lumia, R., Freehafer, D.A., and Smith, M.J. 2006. Magnitude and Frequency of Floods in New York: U.S. Geological Survey Scientific Investigations Report 2006-5112, 152 pages. Available at http://pubs.usgs.gov/sir/2006/5112/SIR2006-5112.pdf

McGowan, K.J., and Corwin, K. 2008. The Second Atlas of Breeding Birds in New York State. Cornell University Press, Ithaca, NY. 688pp. Also see http://www/dec/ny.gov/animals/7312.html.

Mitchell, L.R., Smith, C.R., and Malecki, R.A. 2000. Ecology of Grassland Breeding Birds in the Northeastern United States - A Literature Review with Recommendations for Management. U.S. Geological Survey, Biological Resources Division, New York Cooperative Fish and Wildlife Research Unit, Department of Natural Resources, Cornell University, Ithaca, NY.

Morgan, M. and Burger, M. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation under contract # C005137.

National Reasearch Council. 2000. Watershed Management for Potable Water Supply: Assessing New York City's Approach.

New Mexico Climate Change Advisory Group. November 2006. Appendix D New Mexico Greenhouse Gas Inventory and Reference Case Projections, 1990-2020., pp. D-35. Available from: http://www.nmclimatechange.us/ewebeditpro/items/O117F10152.pdf (accessed December 10, 2009).

New Mexico Department of Game and Fish. 2007. Oil and Gas Development Guidelines: Conserving New Mexico's Wildlife Habitat and Wildlife. http://www.wildlife.state.nm.us/documents/oilandgasguidelines.pdf

New Mexico Environment Department. December 2007. Oil and Gas Greenhouse Gas Emissions Reductions.

New York State Commission on State Asset Maximization. 2009 June. The Final Report of the New York State Commission on Asset Maximization.

New York State Energy Planning Board. 2009 August. Draft New York State Energy Plan.

New York State Invasive Species Task Force. 2005 Fall. Final Report. Available from: http://www.dec.ny.gov/docs/wildlife_pdf/istfreport1105.pdf (accessed September 29, 2009).

New York State Public Service Commission. 2004 August. The Certification Review Process for Major Electric and Fuel Gas Transmission Facilities--Under Article VII of the New York State Public Service Law. Available from: http://www.dps.state.ny.us/Article_VII_Process_Guide.pdf (accessed September 29, 2009).

[NTC] NTC Consultants. 2011 February 18. Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and Other Low-Permeability Gas Reservoirs. Prepared for NYSERDA, Albany, NY.

[NTC] NTC Consultants. 2009 September 16. Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and Other Low-Permeability Gas Reservoirs. Prepared for NYSERDA, Albany, NY.

[NYCDEP] New York City Department of Environmental Protection. c2009. Drinking Water Supply and Quality Report. Available from: http://www.nyc.gov/html/dep/html/drinking_water/wsstate.shtml (accessed August 27, 2009).

[NYCDEP] New York City Department of Environmental Protection. c2009. New York City Water Supply Watersheds. Available from: http://www.nyc.gov/html/dep/html/watershed_protection/html/regcontext.html (accessed September 3, 2009).

[NYCDEP] New York State Department of Environmental Protection. March 2009. Title 15 Rules of the City of New York. Section 18-16. Definitions. Available from: http://24.97.137.100/nyc/rcny/entered.htm.

[NYCDEP] New York City Department of Environmental Protection. c2009. Watershed Rules and Regulations. Available from: http://www.nyc.gov/html/dep/html/watershed_protection/html/regulations.html# (accessed August 31, 2009).

[6 NYCRR] New York Department of State--Division of Administrative Rules. 2009. New York State Compilation of Codes, Rules and Regulations. Thomson Reuters\West. Unofficial version available from: http://www.dos.state.ny.us/info/nycrr.htm (accessed September 8, 2009).

[6 NYCRR] Part 617.20. [undated]. Appendix A--State Environmental Quality Review: Full Environmental Assessment Form. Available from: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/longeaf.pdf (accessed September 3, 2009).

[6 NYCRR] Part 617.20. [undated]. Appendix B--State Environmental Quality Review: Visual EAF Addendum. Available from:

http://www.dec.ny.gov/docs/permits_ej_operations_pdf/visualeaf.pdf (accessed September 2, 2009).

[10 NYCRR] New York Department of State--Division of Administrative Rules. 2009. New York State Compilation of Codes, Rules and Regulations. Thomson Reuters\West. Unofficial version available from: http://www.dos.state.ny.us/info/nycrr.htm (accessed September 8, 2009).

[12 NYCRR] New York Department of State--Division of Administrative Rules. 2009. New York State Compilation of Codes, Rules and Regulations. Thomson Reuters\West. Unofficial version available from: http://www.dos.state.ny.us/info/nycrr.htm (accessed September 8, 2009).

[NYSDEC] New York State Department of Environmental Conservation. 2010. Forest Resource Assessment and Strategy: 2010-2015. http://www.dec.ny.gov/docs/lands_forests_pdf/fras070110.pdf.

New York State Department of Environmental Conservation. 2010. Strategic Plan for State Forest Management. http://www.dec.ny.gov/docs/lands_forests_pdf/spsfmfinal.pdf.

[NYSDEC] New York State Department of Environmental Conservation. 2009 July 15. Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements. Available from: http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation. 2009 February 6. Final Scope for Draft Supplemental Generic Environmental Impact Statement [pdSGEIS) on the Oil, Gas and Solution Mining Regulatory Program-Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs. Albany, NY.

[NYSDEC] New York State Department of Environmental Conservation. c2009. Part 601: Water Supply Applications (Exclusive of Long Island Wells). Available from: http://www.dec.ny.gov/regs/4445.html (accessed September 4, 2009).

[NYSDEC] New York State Department of Environmental Conservation. c2009. Part 663: Freshwater Wetlands Permit Requirements. Available from: http://www.dec.ny.gov/regs/4613.html (accessed September 4, 2009).

[NYSDEC] New York State Department of Environmental Conservation. c2009. Part 664: Freshwater Wetlands Maps and Classification. Available from: http://www.dec.ny.gov/regs/4612.html (accessed September 4, 2009).

[NYSDEC] New York State Department of Environmental Conservation. 1992. [GEIS] Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program. Available from: http://www.dec.ny.gov/energy/45912.html (accessed August 27, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Bureau of Hazardous Waste Management. c2009. An Investigation of Naturally Occurring Radioactive Materials (NORM) in Oil and Gas Wells in New York State, Executive Summary. Available from: http://www.dec.ny.gov/chemical/23473.html (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Bureau of Source Control. 1994 September 28. Spill Prevention Operations Technology Series (SPOTS) Memo #10: Secondary Containment Systems for Aboveground Storage Tanks. Available from: http://www.dec.ny.gov/docs/remediation_hudson_pdf/spots10.pdf (accessed September 4, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Bureau of Water Resource Management. c2009. New York City Watershed Program. Available from: http://www.dec.ny.gov/lands/25599.html (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. Ambient Air Quality Monitoring. Available from: http://www.dec.ny.gov/chemical/8406.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. Policy CP-33: Assessing and Mitigating Impacts of Fine Particulate Matter Emissions. Available from: http://www.dec.ny.gov/chemical/8912.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. Policy DAR-1: Guidelines for Control of Toxic Ambient Air Contaminants. Available from: http://www.dec.ny.gov/chemical/30681.html (accessed August 31, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. DAR-1--AGC/SGC Tables and Software Support Files. Available from: http://www.dec.ny.gov/chemical/30560.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. Policy DAR-10: Impact Analysis Modeling. Available from: http://www.dec.ny.gov/chemical/8923.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Air. c2009. State Implementation Plan. Available from: http://www.dec.ny.gov/chemical/8403.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Environmental Permits. c2009. Division of Environmental Permits Policy Documents. Available from: html://www.dec.ny.gov/permits/6224.html (accessed September 2, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Environmental Remediation. 2010 May 3. Policy DER-10: Technical Guidance for Site

Investigation and Remediation. Available from: http://www.dec.ny.gov/regulations/67386.html (accessed June 15, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Mineral Resources. c2009. Casing and Cementing Practices. Available from: http://www.dec.ny.gov/energy/1757.html (accessed September 2, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Mineral Resources. c2009. Fresh Water Aquifer Supplementary Drilling Conditions. Available from: http://www.dec.ny.gov/energy/42714.html (accessed September 2, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Mineral Resources. c2009. Marcellus Shale. Available from: http://www.dec.ny.gov/energy/46288.html (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Minerals. 2007 October. Application to Drill, Deepen, Plug Back or Convert a Well Subject to the Oil, Gas and Solution Mining Law. Available from: http://www.dec.ny.gov/docs/materials_minerals_pdf/eaf_dril.pdf (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Minerals. 2007 January. Environmental Assessment Form. Available from: http://www.dec.ny.gov/docs/materials_minerals_pdf/eaf_dril.pdf (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Solid and Hazardous Materials. [undated]. Medical Waste Disposal Form. Available from: http://www.dec.ny.gov/docs/materials_minerals_pdf/medwste.pdf (accessed September 29, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. c2009. Multi-Sector General SW Permit and Forms. Available from: http://www.dec.ny.gov/chemical/9009.html (accessed September 29, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. c2009. Technical & Operational Guidance Series. Available from: http://www.dec.ny.gov/regulations/2652.html (accessed September 30, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. c2009. Water Proposed & Recently Adopted Regulations. Available from: http://www.dec.ny.gov/regulations/39559.html (accessed September 17, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. c2009. Watersheds, Lakes, Rivers. Available from: http://www.dec.ny.gov/lands/26561.html (accessed September 3, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. 1989 January. Guidelines for Design of Dams. Available from: http://www.dec.ny.gov/docs/water_pdf/damguideli.pdf (accessed September 17, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Office of Air, Energy, & Climate. 2009 July 15. Guide for Assessing Energy Use & Greenhouse Gas Emissions in an Environmental Impact Statement. Available at http://www.dec.ny.gov/docs/administration_pdf/eisghgpolicy.pdf (accessed September 22, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Office of Climate Change. c2009. Climate Change--New Yorkers are Working on Many Fronts. Available at http://www.dec.ny.gov/energy/44992.html (accessed September 22, 2009).

[NYSDEC] New York State Department of Environmental Conservation, Office of Remediation and Materials Management. 2008 September 23. DER-17: Guidelines for Inspecting and Certifying Secondary Containment Systems of Aboveground Petroleum Storage Tanks at Major Oil Storage Facilities. Available from: http://www.dec.ny.gov/docs/remediation_hudson_pdf/der17.pdf (accessed September 4, 2009).

[NYSDEC] New York State Department of Environmental Conservation. 1984 December 19. Public Information Meeting Pursuant to SEQR--Commissioner's Decision.

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. Ambient Groundwater Monitoring Program. Available from: http://www.dec.ny.gov/lands/36117.html (accessed June 14, 2011).

[NYSDEC] New York State Department of Environmental Conservation, Division of Mineral Resources. 2011 January. Investigation of Anschutz's Dow 1 & 2 Gas Wells Methane in Water Well Complaints. Memorandum from Linda Collart to Bradley Field/Jack Dahl.

[NYSDEC] New York State Department of Environmental Conservation, Division of Mineral Resources. 2011 February. Summary of Natalie Brant Complaint. Memorandum from Chris Miller to Brad Field/JackDahl.

[NYSDEC] New York State Department of Environmental Conservation, Division of Water. 2011 February. Memorandum from Daniel Kendal to Kathleen Sanford.

[NYSDOH] New York State Department of Health. [undated]. New York State Laws and Regulations--NYCRR Title 10. Available from: http://www.health.state.ny.us/nysdoh/phforum/nycrr10.htm (accessed September 4, 2009).

[NYSDOH] New York State Department of Health. 2009 July. Drinking Water Program: Facts and Figures. Available from:

http://www.health.state.ny.us/environmental/water/drinking/facts_figures.htm (accessed August 27, 2009).

[NYSDOH] New York State Department of Health. 2008 September. Individual Water Supply Wells--Fact Sheet #1. Available from: http://www.health.state.ny.us/environmental/water/drinking/part5/append5b/fs1_additional_measures.htm (accessed August 26, 2009).

[NYSDOH] New York State Department of Health. 2008 September. Individual Water Supply Wells--Fact Sheet #3. Available from: http://www.health.state.ny.us/environmental/water/drinking/part5/append5b/fs3_water_quality.htm (accessed September 16, 2009).

[NYSDOH] New York State Department of Health. 2008 September. Individual Water Supply Wells--Fact Sheet #5. Available from: http://www.health.state.ny.us/environmental/water/drinking/part5/append5b/fs5_susceptible_water_sources.htm (accessed August 27, 2009).

[NYSDOH] New York State Department of Health. 2007 September. Appendix 5-B: Standards for Water Wells. Available from: http://www.health.state.ny.us/environmental/water/drinking/part5/appendix5b.htm (accessed August 27, 2009).

[NYSDOH] New York State Department of Health. 2007 September. Appendix 5-B: Standards for Water Wells; Table 1--Required Minimum Separation Distances to Protect Water Wells From Contamination. Available from: http://www.health.state.ny.us/environmental/water/drinking/part5/appendix5b.htm#table1 (accessed August 26, 2009).

[NYSDOH] New York State Department of Health, Wadsworth Center. [undated]. Environmental Laboratory Approval Program. Available from: http://www.wadsworth.org/labcert/elap/elap.html (accessed September 29, 2009).

[NYSDPS] New York State Department of Public Service. 2006. Environmental Management and Construction Standards and Practices for Underground Transmission and Distribution Facilities in New York State, Office of Electricity & Environment, Albany, NY.

Osborne, S., Vengosh, A., Warner, N., and Jackson, R. 2011 April. Methane Contamination of Drinking Water Accompanying Gas-Well Drilling and Hydraulic Fracturing. Duke University, Durham, NC.

[OSHA] Occupational Safety and Health Administration. About OSHA. United States Department of Labor. http://www.osha.gov/about.html (accessed June 15, 2011).

[OSHA] Occupational Safety and Health Administration. Regulations. Part 1910, Occupational Safety and Health Standards. Subpart Z, Toxic and Hazardous Substances. Standard

1910.1200 Hazard Communication. Available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099 (accessed June 15, 2011).

Ohio Department of Natural Resources, Division of Mineral Resources Management. 2008. Report on the Investigation of the Natural Gas Invasion of Aquifers in Bainbridge Township of Geauga County, Ohio. 64 pp.

Pagano, S. 1990 October 23. Memorandum to Regional Water Engineers, Bureau Directors, Section Chiefs. Available from: http://www.dec.ny.gov/docs/water_pdf/togs213.pdf (accessed August 27, 2009).

Pennsylvania Environmental Quality Board. Title 25-Environmental Protection, Chapter 78, Oil and Gas Wells, Pennsylvania Bulletin, Col. 41. No. 6 (February 5, 2011).

[PADEP] Pennsylvania Department of Environmental Protection. 2009 November 4. Consent Order and Agreement in the Matter of Cabot Oil and Gas Corporation, Dimock and Springville Townships, Susquehanna County. 23p.

[PADEP] Pennsylvania Department of Environmental Protection. 2010 July 13. Investigative Report on Punxsutawney Hunting Club 36H Well.

[PADEP] Pennsylvania Department of Environmental Protection. 2011 May 16. Consent Order and Agreement in the Matter of Chesapeake Appalachia, LLC. Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County. 40p.

Post, T. 2006. Analysis of Breeding Bird Survey Trends for Landbirds by Species Suite (Habitat) and Nesting Location. NYSDEC.

Reiser, D.W., Ramey, M.P., and Lambert, T.R. 1988. Review of Flushing Flow Requirements in Regulated Streams. In Nelson WR, Dwyer JR, Greenberg WE, eds. Flushing and Scouring Flows for Habitat Maintenance in Regulated Streams. Washington, D.C.: U.S. Environmental Protection Agency.

Richenderfer, J. 2010. Water Use Profile of Natural Gas Industry in Susquehanna River Basin. IN Clear Waters Winter 2010, vol. 40, no. 4. New York Water Environment Association, Inc.

Robbins, C.R. 1979. Effects of Forest Fragmentation on Bird Populations. Pgs. 198-212 in Northcentral and Northeastern forests for nongame birds. USDA Forest Service Techpub. NC-51.

Roberts, C. and Norment, C.J. 1999. Effects of plot size and habitat characteristics on breeding success of scarlet tanagers. The Auk 116 (1):73-82.

Robinson, S.K., Thompson III, F.R., Donovan, T.M., Whitehead, D.R., and Faaborg, J. 1995. Regional forest fragmentation and nesting success of migratory birds. Science. 267(5206): 1987-1990.

Rosenberg, K.V., Rohrbaugh Jr., R.W., Barker, S.E., Lowe, J.D., Hames, R.S., and Dhondt, A.A. 1999. A Land Managers Guide to Improving Habitat for Scarlet Tanagers and Other Forest-Interior Birds. The Cornell Lab of Ornithology. web site. http://www.birds.cornell.edu/conservation/tanager/edge.html.

Sample, D.W. and Mossman, M.J. 1997. Managing Habitat for Grassland Birds: A Guide for Wisconsin. Dept. of Natural Resources, Madison. 154pp.

Sanford, K.F. 2007 April 18. Letter to Kenneth E. Moriarty, NYCDEP.

Schlumberger. 2010. Coiled Tubing, Nitrogen, and Pumping Services. Available from http://www.slb.com/resources/other_resources/brochures/coiled_tubing/usland_ct_br.aspx (accessed June 28, 2011).

Schuler, T. 1994. The Importance of Imperviousness.Watershed Protection Techniques. Vol. 1. Issue 3.

Skrapits, E. 2011 May. Drillers Take Another Chance in Columbia County. Citizens Voice. Available from http://energy.wilkes.edu/pages/106.asp?item=341 (accessed June 10, 2011.

Skrapits, E. 2010 November. Despite Encana's Exit, Other Companies Stay Put. Citizens Voice. Available from http://citizensvoice.com/news/despite-encana-s-exit-other-companies-stay-put-1.1066540#axzz1NZF23wB (accessed June 10, 2011).

Smith, M. 2008 September 1. FRACforward, Startup Cracks Propane Fracture Puzzle, Provides 'Green' Solution, Nickle's New Technology Magazine, www.ntm.nickles.com.

Sovas, G.H. 2003 April 19. Supplemental Findings Statement. SEQR File No. P0-009900-00046. Available from: http://www.dec.ny.gov/docs/materials_minerals_pdf/geisfindsup.pdf (accessed September 3, 2009).

Sovas, G.H. 1992 September 1. Findings Statement. Available from: http://www.dec.ny.gov/docs/materials_minerals_pdf/geisfindorig.pdf (accessed September 3, 2009).

[SRBC] Susquehanna River Basin Commission. 2011 March 4. Email from Paula Ballaron (SRBC) to K. Sanford (NYSDEC).

[SRBC] Susquehanna River Basin Commission. 2009 January 15. Regulation of Projects. 18 CFR Parts 801, 806, 807 and 808. Available from: http://www.srbc.net/policies/docs/srbc_regulation_of_projects.PDF (accessed September 29, 2009).

[SRBC] Susquehanna River Basin Commission. 2002 November 8. Policy No. 2003-01. Guidelines for Using and Determining Passby Flows and Conservation Releases for Surface-Water and Ground-Water Withdrawal Approvals. Available from: http://www.srbc.net/policies/docs/Policy%202003_01.pdf (accessed September 29, 2009).

[SRBC] Susquehanna River Basin Commission. [undated]. Marcellus/Utica Shale and Natural Gas Well Development. Available from: http://www.srbc.net/programs/projreviewmarcellustier3.htm (accessed August 27, 2009).

Tennant, D.L. 1976a. Instream Flow Regimes for Fish, Wildlife, Recreation and Related Environmental Resources. In Osborn JF and Allman CH, eds. Proceedings of Symposium and Specialty Conference on Instream Flow Needs, Vol. II, American Fisheries Society, Bethesda, Maryland: 359-373.

Tennant, D.L. 1976b. Instream Flow Regimes for Fish, Wildlife Recreation and Related Environmental Resources. Fisheries. July-August 1(4):6-10.

Tennant, D.L. 1975. Instream Flow Regimes for Fish, Wildlife Recreation, and Related Environmental Resources. United States Fish & Wildlife Service. Billings, Montana.

Tennant, D.L. 1972. A Method for Determining Instream Flow Requirements for Fish, Wildlife and Aquatic Environment. In Pacific Northwest River Basin Commission pp. 3-11.

Tessmann, S.A. 1980. Environmental Assessment, Technical Appendix E in Environmental Use Sector Reconnaissance Elements of the Western Dakotas Region South Dakota Study. Brookings, SD: South Dakota State University, Water Resources Research Institute.

The American Oil & Gas Reporter. 2010 August. Technologies Treat OBM Drill Cuttings. Special Report: Drilling Fluids. pp. 92-93.

The Nature Conservancy. 2004. Determining the Size of Eastern Forest Reserves. http://www.sweetwatertrust.org/ezstatic/data/sweetwatertrust/forestreserves/Eastern_Forest_Reserves.pdf.

The Nature Conservancy. 2003. Planning Methods for Ecoregional Targets: Matrix-Forming Ecosystems. http://conserveonline.org/library/HAL_070130.pdf/view.html.

The Nature Conservancy. 2002. Results for Matrix-Forming Ecosystems. This is where the table above is from ; had some trouble with formatting and I deleted a lot of rows and some columns. Good info though. http://conserveonline.org/workspaces/ecs/hal/hal_extras/docs/matrix_results/view.html.

Thurman, K. 1987. Water System Urged for Subdivision. Times Union, Albany, NY.

United States Department of the Interior and United States Department of Agriculture. 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/Rev 07. Bureau of Land Management. Denver, Colorado. 84 pp.

United State Fish and Wildlife Service. Conserving Grassland Bird Series. USFWS.

[URS] URS Corporation. 2011 March 25. Water-Related Issues Associated with Gas Production in the Marcellus Shale. Prepared for NYSERDA, Albany, NY.

[URS] URS Corporation. 2010 May 21. Water-Related Issues Associated with Gas Production in the Marcellus Shale. Prepared for NYSERDA, Albany, NY.

[URS] URS Corporation. 2009 August 5. Water-Related Issues Associated with Gas Production in the Marcellus Shale. Prepared for NYSERDA, Albany, NY.

[USEPA] United States Environmental Protection Agency. 2010 August. Fact Sheet Mandatory Reporting of Greenhouse Gases. 40 CFR Part 98. Available at http://www.epa.gov/climatechange/emissions/downloads09/FactSheet.pdf (accessed June 13, 2011).

[USEPA] United States Environmental Protection Agency. 2010 November. Fact Sheet for Subpart W Petroleum and Natural Gas Systems. Final Rule. Mandatory Reporting of Greenhouse Gases. 40 CFR Part 98. Available at http://www.epa.gov/climatechange/emissions/downloads10/Subpart-W_factsheet.pdf (accessed June 13, 2011).

[USEPA] United States Environmental Protection Agency. 2009 September 24. Natural Gas STAR Program. Available at: http://www.epa.gov/gasstar/ (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2009 September 11. Drinking Water Contaminants. Available from: http://www.epa.gov/safewater/contaminants/index.html (accessed September 29, 2009).

[USEPA] United States Environmental Protection Agency. 2009 August 28. Filtration Avoidance. Available from: http://www.epa.gov/Region2/water/nycshed/filtad.htm (accessed September 3, 2009).

[USEPA] United States Environmental Protection Agency. 2009 August 28. Natural Gas STAR Program--Recommended Technologies and Practices. Available at: http://www.epa.gov/gasstar/tools/recommended.html (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2009 August 27. Drinking Water Contaminants. Available from: http://www.epa.gov/safewater/contaminants/index.html (accessed August 27, 2009).

[USEPA] United States Environmental Protection Agency. 2009 May 21. Technology Transfer Network--National Ambient Air Quality Standards (NAAQS). Available from: http://www.epa.gov/ttn/naaqs/ (accessed September 30, 2009).

[USEPA] United States Environmental Protection Agency. 2009 February 16. Natural Gas STAR Program--Join the Program. Available from: http://www.epa.gov/gasstar/join/index.html (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2008 October. Your Partner in Improving Operational Efficiency, Saving Money, and Reducing Emissions. Available at http://www.epa.gov/gasstar/documents/ngstar_mktg-factsheet.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2007 January 3. Federal Register. Rules and Regulations. Vol. 72, No. 1. Available from: http://www.epa.gov/ttn/atw/oilgas/fr03ja07.pdf (accessed September 2, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Optimize Glycol Circulation and Install Flash Tank Separators In Glycol Dehydrators. Available at: http://www.epa.gov/gasstar/documents/ll_flashtanks3.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Options for Reducing Methane Emissions from Pneumatic Devices in the Natural Gas Industry. Available at: http://www.epa.gov/gasstar/documents/ll_pneumatics.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Reducing Emissions When Taking Compressors Offline. Available at: http://www.epa.gov/gasstar/documents/ll_compressorsoffline.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Reducing Methane Emissions from Compressor Rod Packing Systems. Available at: http://www.epa.gov/gasstar/documents/ll_rodpack.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Replacing Gas-Assisted Glycol Pumps with Electric Pumps. Available at: http://www.epa.gov/gasstar/documents/ll_glycol_pumps3.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2006. Lessons Learned From Natural Gas STAR Partners--Replacing Glycol Dehydrators with Desiccant Dehydrators. Available at: http://www.epa.gov/gasstar/documents/ll_desde.pdf (accessed September 22, 2009).

[USEPA] United States Environmental Protection Agency. 2005 November 9. Guideline on Air Dispersion Models, Appendix W of 40 CFR, Part 51. pp. 68218-68261.

Van Tyne, A.M. and Copley, D.L. 1983. New York State Natural Gas Reserve Study. Prepared for Independent Oil and Gas Association of New York, Inc.

Weinstein, B.L. and Clower, T.L. 2009 July 28. Draft Potential Economic and Fiscal Impacts from Natural Gas Production in Broome County, New York. Prepared for Broome County Legislators. Available from: http://www.energyindepth.org/wp-content/uploads/2009/03/broome-county-potential-economic.pdf (accessed September 30, 2009).

Weller, W., Thomson, J., Morton, P., and Aplet, G. 2002. Fragmenting our Lands: The Ecological Footprint from Oil and Gas Development. A Spatial Analysis of a Wyoming Gas Field. The Wilderness Society, Seattle, WA. http://wilderness.org/files/fragmenting-our-lands.pdf.

Wells, J. 1963. Early Investigations of the Devonian System in New York 1656-1836. Special GSA Papers Number 74. Cornell University.

Wilbert, M., Thomson, J., and Culver, N.W. 2008. Analysis of Habitat Fragmentation from Oil and Gas Development and its Impact on Wildlife: A Framework for Public Land Management Planning. The Wilderness Society. http://wilderness.org/files/Oil-Gas-Fragmentation-Scoping-Brief.pdf.

Yoxtheimer, D. 2011 May. Personal Communication with Theodore Loukides, Division of Mineral Resources.

This page intentionally left blank.

New York State

DEC

Consultants' Bibliographies

Updated August 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

Alpha Environmental, 2011

Review and Response to "Human Health Risk Evaluation for Hydraulic Fracturing Additives – Marcellus Shale Formation, New York" By Gradient Corporation; December 31, 2009

API (American Petroleum Institute), 2009. "Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines"

Baker Botts LLP, 2009. "Comments of Halliburton Energy Services, Inc. on the dSGEIS on the Oil, Gas and Solution Mining Regulatory Program; Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs." December 31, 2009.

Billman, Dan A., 2008, "Geological and Activity Overview of Appalachian Plays." Presented at the 2008 North American Prospect Expo, Houston.

Freeze, R.A.; Cherry, J.A., 1979. *Groundwater*. Prentice-Hall, Inc., Englewood Cliffs, NJ.

Hill, David G., Tracy E. Lombardi, and John P. Martin, 2002. "Fractured Shale Gas Potential in New York".

Hornberger, G.; Raffensperger, J.; Wiberg, P.; and Eshleman, K., 1998. "Elements of Physical Hydrology." John Hopkins University Press, Baltimore.

ICF International, 2009. "Analysis of Subsurface Mobility of Fracturing Fluids." Portions excerpted and included as Appendix 11 in dSGEIS.

Selley, Richard C., 1998. "Elements of Petroleum Geology." 2nd Edition. Academic Press.

SRBC (Susquehanna River Basin Commission), 2009. Susquehanna River Basin Commission – Natural Gas Development." Presented at the Independent Oil and Gas Association of New York Annual Meeting, November 4, 2009.

USDOE (United States Department of Energy), 2009. "Modern Shale Gas Development in the United States: A Primer." Prepared by the Ground Water Protection Council and ALL Consulting.

USGS (United States Geological Survey). National Water Information System website accessed at http://waterdata.usgs.gov/nwis.

Review of dSGEIS Concerning Natural Gas Development of the Marcellus Shale within the New York City Watershed
ARCADIS; December 30, 2009

API (American Petroleum Institute), 2009. "Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines"

Berden, Jean M., 1954. "The Ground-Water Resources of Green County, New York." USGS Bulletin GW-34.

Billman, Dan A., 2008, "Geological and Activity Overview of Appalachian Plays." Presented at the 2008 North American Prospect Expo, Houston.

Frimpter, Michael H., 1972. "The Ground-Water Resources of Orange and Ulster Counties, New York." USGS Water Supply Paper 1985.

Hill, David G., Tracy E. Lombardi, and John P. Martin, 2002. "Fractured Shale Gas Potential in New York".

ICF International, 2009. "Analysis of Subsurface Mobility of Fracturing Fluids." Portions excerpted and included as Appendix 11 in dSGEIS.

McPherson, Wendy S., 1993. "Hydrogeology of Unconsolidated Deposits in Chenango County, New York." USGS Water-Resources Investigations Report 91-4138.

Soren, Julian, 1963. "The Ground-Water Resources of Delaware County, New York." USGS Bulletin GW-50.

Selley, Richard C., 1998. "Elements of Petroleum Geology." 2nd Edition. Academic Press.

Terracon Consulting Engineers and Scientists, 2008. "Remedial Investigation Work Plan – Final – Crosby 25-3 Natural Gas Well Release."

US Department of Energy, 2009. "Modern Shale Gas Development in the United States: A Primer." Prepared by the Ground Water Protection Council and ALL Consulting.

Review of dSGEIS and Identification of Best Technology and Best Practices Recommendations
Harvey Consulting; December 28, 2009

Harvey Consulting, LLC., December 28, 2009, *Review of dSGEIS and Identification of Best Technology and Best Practice Recommendations*, Prepared for the Natural Resources Defense Council (NRDC).

NYSDEC, April 21, 2010. *SEQR Handbook*, A. General Concepts, http://www.dec.ny.gov/permits/50602.html.

NYSDEC, April 21, 2010. 617: *State Environmental Quality Review*, http://www.dec.ny.gov/regs/4490.html.

NYSDEC, April 22, 2010. *Marcellus Shale*, http://www.dec.ny.gov/energy/46288.html.

NYSDEC, April 22, 2010. *Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, Scoping Meeting Transcripts, http://www.dec.ny.gov/energy/51422.html.

NYSDEC, September 2009, *DRAFT Supplemental Generic Environmental Impact Statement On The Oil, Gas and Solution Mining Regulatory Program*.

6 NYCRR §554.1 (c) (1)

NYSDEC, September 2009, *DRAFT Supplemental Generic Environmental Impact Statement On The Oil, Gas and Solution Mining Regulatory Program*.

Harvey Consulting LLC., September 16, 2009, *New York State (NYS) Casing Regulation Recommendations*, Prepared for the Natural Resources Defense Council (NRDC).

NRDC, December 15, 2008 – not found.

NYSDEC, January 1988. *Draft Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program, Volume I*. http://www.dec.ny.gov/docs/materials_minerals_pdf/dgeisv1ch9.pdf

NYSDEC, July 1992, *Final Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program.*

NYSDEC, September 2009, *DRAFT Supplemental Generic Environmental Impact Statement On The Oil, Gas and Solution Mining Regulatory Program*.

Sanford, K.; June10, 2010. NYSDEC; personal communication.

Curran, E., *Corrosion Control in Gas Pipelines, Coating Protection Provides a Lifetime of Prevention*, Pipeline & Gas Journal, October 2007. Article found online at, http://www.curranintl.com/articles/corrosion_control_gas_pipeline_systems.asp

ICF International, 2009. *Technical Assistance for the Draft Supplemental Generic EIS: Oil, Gas and Solution Mining Regulatory Program*. NYSERDA Agreement No. 9679.

40 CFR § 112

6 NYCRR, Part 612, 613, 614

NYSDEC, September 1994, *Spill Prevention Operations Technology Series (SPOTS) Memo #10, Secondary Containment Systems for Aboveground Storage Tanks.*

NYSDEC, September 2008, DRAFT DER-17: *Guidelines for Inspecting and Certifying Secondary Containment Systems of Aboveground Petroleum Storage Tanks at Major Oil Storage Facilities*.

EnCana 2005 Annual Report.

Naturalgas.org; www.naturalgas.org

Alpha Environmental Consultants Inc. 2009 September. *Technical Consulting Reports Prepared in Support of the Draft Supplemental Generic Environmental Impact Statement for Natural Gas Production in New York State*. Prepared for NYSERDA, Albany, NY.

Review of dSGEIS and Identification of Best Technology and Best Practices Recommendations
Tom Meyers; December 28, 2009

API, 2009. *Hydraulic Fracturing Operations - Well Construction and Integrity Guidelines,* API Guidance Document HF1, First Edition, October 2009.

Arthur, J.D., B. Bohm, and M. Layne, 2008. Hydraulic Fracturing Consideration for natural Gas Wells of the Marcellus Shale. Presented at the Ground Water Protection Council, Cincinnati, OH, September 21-24, 2008.

Billman, D.A., 2008. *Geological and Activity Overview of Appalachian Plays*. August 26, 2008 Presentation.

Boyer, C., J. Kieschnick, R. Suarez-Rivera, R.E. Lewis, and G. Waters, 2006. Producing gas from its Source. Oilfields Review, Autumn 2006.

Chesapeake, 2009. Response to NYSDEC SGEIS Information request as compiled by ALL Consulting. June 4, 2009

East, 2009. Response to NYSDEC SGEIS Information request as compiled by ALL Consulting. April 29, 2009

Engelder, T., G.G. Lash, and R.S. Uzcategui, 2009. Joint sets that enhance production from Middle and Upper Devonian Gas Shales of the Appalachian Basin. AAPG Bulletin 93(7): 857-889.

Fetter, C.W., 2001. Applied Hydrogeology, Fourth Edition. Prentice-Hall.

Hill, D.G., T.E. Lombardi, J.P. Martin, 2003. Fracture Shale Gas Potential in New York.

Hill, David G., Tracy E. Lombardi, and John P. Martin, 2002. "Fractured Shale Gas Potential in New York".

ICF International, 2009. Technical Assistance for the Draft Supplemental Generic EIS: Oil, Gas and Solution Mining Regulatory Program Well Permit issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs. Agreement No. 9679, NYSERDA, Albany NY. August 7, 2009.

NYSDEC, September 2009. Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program.

NYSDEC, April 22, 2010. Marcellus Shale, http://www.dec.ny.gov/energy/46288.html.

NYSDEC, April 22, 2010. Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, Scoping Meeting Transcripts, http://www.dec.ny.gov/energy/51422.html.

NYSDEC, April 21, 2010. SEQR Handbook, A. General Concepts, http://www.dec.ny.gov/permits/50602.html.

NYSDEC, April 21, 2010. 617: State Environmental Quality Review, http://www.dec.ny.gov/regs/4490.html.

Perry, R., and Henry, B., July 1, 2010. Letter and attachment, Interstate Oil & Gas Compact Commission to Jeff Bingaman and Henry A. Waxman.

Selley, Richard C., 1998. "Elements of Petroleum Geology." 2nd Edition. Academic Press.

US Department of Energy, 2009. "Modern Shale Gas Development in the United States: A Primer." Prepared by the Ground Water Protection Council and ALL Consulting.

Colorado Oil and Gas Conservation Commission, 2010. Comments to the documentary *Gasland* relating to thermogenic and biogenic methane and alleged contamination of water wells in Colorado from hydrofracturing. Colorado Department of Natural Resources, Denver CO, www.colorado.gov/cogcc

Ground Water Protection Council and ALL Consulting, 2009. Modern Shale Gas Development in the United States, A Primer, prepared for U.S. Department of Energy and National Energy Technology Laboratory (DE-FG26-04NT15455). April 2009.

Hill, M.C., and C.R. Tiedeman, 2007. Effective Groundwater Model Calibration: With Analysis of Data, Sensitivities, Predictions, and Uncertainty. John Wiley and Sons, Inc.

Soeder, D.J. and Kappel, W.M., 2009. Water Resources and Natural Gas Production from the Marcellus Shale. USGS Fact Sheet 2009-3032. May 2009.

Veil, John A. (Argonne National Laboratory), July 2010. Final Report, Water Management Technologies Used by Marcellus Shale Gas Producers, prepared for USDOE, Office of Fossil Energy, Oil & Gas Technology DOE Award No. FWP 49462

Fetter, C.W., 1999. Contaminant Hydrogeology, Second Edition. Prentice-Hall.

Ground Water Protection Council, 2009. "Statement of Scott Kell before the House Committee on Natural Resources Subcommittee on Energy and Mineral Resources," Washington, D.C., June 4, 2009.

USEPA, 2004. *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs*, EPA 816-R-04_003, June 2004. http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_coalbedmethanestudy.cfm.

Engelder, Terry, 2010. "Over 1,000,000 Hydraulic Fracturing Stimulations Within the USA Without Compromising Fresh Groundwater: True or False?", Department of Geosciences, The Pennsylvania State University, University Park, PA 16802, Presented to the Ground Water Protection Council.

NYSDEC, 2010. Regulations and Enforcement: Chapter IV – Quality Services, Subchapter B: Solid Wastes, Part 360: Solid Waste Management Facilities, Subpart 360-6: Liquid Storage. http://www.dec.ny.gov/regs/4410.html.

U.S. Fish and Wildlife Service, 2010. Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service; Migratory Bird Treaty Act of 1918 (as amended). http://www.fws.gov/laws/lawsdigest/migtrea.html.

NYSDEC, January 1988. Draft Generic Environmental Impact Statement on the Oil, Gas, and Solution Mining Regulatory Program, Volume I. http://www.dec.ny.gov/docs/materials_minerals_pdf/dgeisv1ch9.pdf

SRBC, December 31, 2009. Water Quality Impacts Associated with Shale Gas Development.

Colorado Oil and Gas Conservation Commission, undated document. Untitled document regarding the documentary *Gasland*; http://cogcc.state.co.us/library/GASLAND%20DOC.pdf

Gorody, A.W., president Universal Geoscience Consulting, Inc., 2009. *Summary Comments on Report by Dr. G. Thyne. http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/GlenwoodMasterPage.html*

S. S. Papadopulos & Associates, Inc., July 14, 2009. *Evaluation of Thyne, 2008 "Review of Phase II Hydrogeologic Study".*

http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/(1_D)_Evaluation_of_Thyne_Report_vers2%20(dv).pdf

Thyne, G., 2008. *Review of Phase II Hydrogeologic Study, Prepared for Garfield County, 12/20/2008.* http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/(1_A)_ReviewofPhase-II-HydrogeologicStudy.pdf

URS, 2009. Chapter 2: Water-Related Issues Associated with Gas Production in the Marcellus Shale, Additives, Flowback Quality and Quantity, NYS Regulations, On-site Treatment, Green Technologies, Alternate Water Sources, and Water Well Testing. NYSERDA Contract No. 10666.

SRBC, September 11, 2008. *Gas Well Drilling Update,* http://www.srbc.net/programs/WRM/video/gas%20well%20drilling%20update/gas%20well%20drilling%20update.html.

Alpha Geoscience, September 13, 2010. Letter response to Ms. Kathy Sanford, NYSDEC, regarding: *Review of USGS Comment on dSGEIS.*

Council of Great Lakes Governors, 2005. Great Lakes – St. Lawrence River Basin Water Resources Compact, December 13, 2005. http://www.cglg.org/projects/water/docs/12-13-05/Great_Lakes-St_Lawrence_River_Basin_Water_Resources_Compact.pdf

DRBC, 2010a. DRBC Special Protection Waters and Marcellus Shale Map. http://www.state.nj.us/drbc/maps/SPW-MarcellusShale.pdf.

DRBC, 2010b. DRBC News Release, May 6, 2009: *DRBC Will Review Natural Gas Well Pad Projects After Adoption of New Regulations*. http://www.state.nj.us/drbc/newsrel_naturalgas050610.htm

DRBC, 2010c. DRBC posting, December 9, 2010. *Natural Gas Development Regulations, December 9, 2010, Article 7 of Part III- Basin Regulations*. http://www.state.nj.us/drbc/naturalgas-draftregs.pdf

DRBC, 2009a. Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters, May 19, 2009. http://www.state.nj.us/drbc/EDD5-19-09.pdf

DRBC, 2009b. DRBC News Release, May 19, 2009: *DRBC Eliminates Review Thresholds for Gas Extraction Projects in Shale Formations in Delaware Basin's Special Protection Waters*. http://www.state.nj.us/drbc/newsrel_naturalgas.htm.

Great Lakes-St. Lawrence River Basin Water Resources Council (Compact Council), June 10, 2010. http://www.glslcompactcouncil.org.

National Archives and Records Administration, June 11, 2010. Electronic Code of Federal Regulations, Title 18 – Conservation of Power and Water Resources, Chapter VIII – Susquehanna River Basin Commission, Parts 801, 806, 807, and 808. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=72fc0084175e978551ee541a01dbc40f&c= ecfr&tpl=/ecfrbrowse/Title18/18cfrv2_02.tpl#800.

SRBC, August 15, 2008. Press Release: *SRBC to Require All Natural Gas Well Development Projects in the SRB to Obtain Prior Use Approval Regardless of the Amount of Water Used.* http://www.srbc.net/pubinfo/press/docs/ProjectRevNaturalGasDetermination81508.pdf.

SRBC, 2002. Policy No. 2003-01: Guidelines for Using and Determining Passby Flows and Conservation Releases for Surface-Water and Ground-Water Withdrawal Approvals, November 8, 2002. http://www.srbc.net/policies/docs/Policy%202003_01.pdf.

DRBC, 2010c. http://www.state.nj.us/drbc/regs/gw-sw_form0109.pdf

DRBC, 2010d. http://www.state.nj.us/drbc/vision.htm

Gaudlip, A.W., L.O. Paugh, and T.D. Hayes, 2008. Marcellus Shale Water management Challenges in Pennsylvania. Society of Petroleum Engineers paper No. 119898.

NYSDEC, 2009. Final Scope for Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program, February 6, 2009. http://www.dec.ny.gov/docs/materials_minerals_pdf/finalscope.pdf\

Review and Response to "Impact Assessment of Natural Gas Production in the New York City Water Supply Watershed"
Hazen & Sawyer and Leggette, Brashears & Graham; December 22, 2009

API (American Petroleum Institute), 2009. "Hydraulic Fracturing Operations – Well Construction and Integrity Guidelines"

Aurthur, J.D., Bhom, B., Coughlin, B.J., Layne, M., 2008. *Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs.*

Berden, Jean M., 1954. "The Ground-Water Resources of Green County, New York." USGS Bulletin GW-34.

Chesapeake, 2009. Response to NYSDEC SGEIS Information request as compiled by ALL Consulting. June 4, 2009

Cornell University Cooperative Extension, 2010. "Other States", Water Well Contamination; http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Pages/OtherStates.aspx

Czekanski, Adam, Fall 2005, "Annual Snowmelt and the New York City Water Supply", GIS in Water Resources, http://www.crwr.utexas.edu/gis/gishydro06/Introduction/TermProjects...

DRBC, 2010a. DRBC Special Protection Waters and Marcellus Shale Map. http://www.state.nj.us/drbc/maps/SPW-MarcellusShale.pdf.

DRBC, 2010b. DRBC News Release, May 6, 2009: *DRBC Will Review Natural Gas Well Pad Projects After Adoption of New Regulations*. http://www.state.nj.us/drbc/newsrel_naturalgas050610.htm

DRBC, 2009a. Determination of the Executive Director Concerning Natural Gas Extraction Activities in Shale Formations within the Drainage Area of Special Protection Waters, May 19, 2009. http://www.state.nj.us/drbc/EDD5-19-09.pdf

DRBC, 2009b. DRBC News Release, May 19, 2009: *DRBC Eliminates Review Thresholds for Gas Extraction Projects in Shale Formations in Delaware Basin's Special Protection Waters*. http://www.state.nj.us/drbc/newsrel_naturalgas.htm.

East, 2009. Response to NYSDEC SGEIS Information request as compiled by ALL Consulting. April 29, 2009

Engelder, Terry, 2010. "Over 1,000,000 Hydraulic Fracturing Stimulations Within the USA Without Compromising Fresh Groundwater: True or False?", Department of Geosciences, The Pennsylvania State University, University Park, PA 16802, Presented to the Ground Water Protection Council.

Billman, Dan A., 2008, "Geological and Activity Overview of Appalachian Plays." Presented at the 2008 North American Prospect Expo, Houston.

Frimpter, Michael H., 1972. "The Ground-Water Resources of Orange and Ulster Counties, New York." USGS Water Supply Paper 1985.

Hill, David G., Tracy E. Lombardi, and John P. Martin, 2002. "Fractured Shale Gas Potential in New York".

Grannis, A.B., 2009. Letter to NYS Assemblyman William L. Parment. December 30, 2009.

Houston Business Journal, 2010. "Halliburton to Release List of "Fracking" Chemicals", October 25, 2010; http://www.bizjuornals.com/houston/news/2010/10/25/halliburton-to-release-chemicals...

Isachsen, Y.W., and McKendree, W.G., 1977. Preliminary Brittle Structure Map of New York, Map and Chart Series No. 31.

McPherson, Wendy S., 1993. "Hydrogeology of Unconsolidated Deposits in Chenango County, New York." USGS Water-Resources Investigations Report 91-4138.

New York City Department of Environmental Protection website, 2010. http://nyc.gov/html/dep/html/drinking_water/droughthist.shtml

NYSDEC, July 8, 2010. "Casing and Cementing Practices." http://www.dec.ny.gov/energy/1757.html.

NYSDEC, June 10, 2010. "Application For Permit to Drill, Deepen, Plug Back or Convert a Well." http://www.dec.ny.gov/docs/materials_minerals_pdf/dril_req.pdf.

Riha, Susan, 2009. Director, NYS Water Resources Institute, "Impacts of Gas Drilling on Water Resources", presentation May 20, 2009. http://www.srbc.net/programs/docs/ImpactsofGasDrillingonWaterResources_5_20_09.pdf

PADEP, December 27, 2010. Personal Communication, Mr. Scott Perry, Director, Bureau of Oil and Gas Management.

PADEP, September 26, 2010. Memorandum on Stray Gas Investigation, Dimock Township, PA, Susquehanna County; To: Craig Lobins, Program Manager, Oil and Gas Management; From: Fred Baldassare, P.G. Geologist, Emergency Response.

PADEP, April 11, 2009. "Permitting Strategy for High Total Dissolved Solids (TDS) Wastewater Discharges." http://files.dep.state.pa.us/Water/Wastewater%20 Management/WastewaterPortalFiles/MarcellusShaleWastewaterPartnership/high_tds_wastewater_strategy_041109.pdf.

Parsons, J., 2008. "Pa. Streams Drained Dry by Drillers." WTAE, Pittsburgh, Action News Special Report. November 13, 2008. transcript accessed at http://www.thepittsburghchannel.com/news/17973811/detail.html

Richenderfer, James, Ph.D., P.G., 2010. SRBC Deputy Director, Technical Programs; *Water Use and the Marcellus Gas Play*, presented October 19, 2010, at the Association for Environmental Health & Science Foundation, 26th Annual International Conference on Soils, Sediment, Water, and Energy, University of Massachusetts at Amherst.

Soren, Julian, 1963. "The Ground-Water Resources of Delaware County, New York." USGS Bulletin GW-50.

Selley, Richard C., 1998. "Elements of Petroleum Geology." 2nd Edition. Academic Press.

Soeder, D.J. and W.M. Kappel, 2009. "Water Resources and Natural Gas Production from the Marcellus Shale." USGS Fact Sheet 2009-3032.

SRBC (Susquehanna River Basin Commission), 2009. Susquehanna River Basin Commission – Natural Gas Development." Presented at the Independent Oil and Gas Association of New York Annual Meeting, November 4, 2009.

SRBC, December 31, 2009. Water Quality Impacts Associated with Shale Gas Development.

USDOE (United States Department of Energy), 2009. "Modern Shale Gas Development in the United States: A Primer." Prepared by the Ground Water Protection Council and ALL Consulting.

Wikipedia, 2010. "New York City Water Supply System". "http://en.wikipedia.org/wiki/New_York_City_water_supply_system"

Review of USGS Comment on dSGEIS
Ward Freeman; December 18, 2009

Avary, K.L. and J.E. Lewis, 2008. New Interest in Cores Taken Thirty Years Ago: the Devonian Marcellus Shale in Northern West Virginia.

Hosterman, J.W. and S.I. Whitlow, 1983. Clay Mineralogy of Devonian Shales in the Appalachian Basin: U.S. Geological Survey Professional Paper 1298, 31 p.

Lash, G.G. and Engelder, T., 2008. Tracking the Burial and Tectonic History of Devonian Shale of the Appalachian Basin by Analysis of Joint Intersection Style: Geological Society of America Bulletin.

New York State Geological Survey, September 7, 2010; personal communication.

Smith, M.W., J.P. Varner, J.P. Mital, D.J. Sokoloski, 2006. Remediation of Acid Rock Drainage from Highway Construction in the Marcellus Shale, Mifflin County, Pennsylvania. Abstract at http://gsa.confex.com/gsa/2006NE/finalprogram/abstract_100515.htm).

Alpha Environmental, 2009

Issues Related to Developing the Marcellus Shale and Other Low-Permeability Gas Reservoirs

American Petroleum Institute, 1992, Bulletin on Management of Naturally Occurring Radioactive Materials (NORM) in Oil & Gas Production: American Petroleum Institute, Washington, D.C., API Bulletin E2, 45 p.

Argonne National Laboratory, 2009. http://web.ead.anl.gov/dwm/regs/index.cfm

Arthur, J. Daniel, Brian Bohm, and Mark Layne, 2008 "Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale", Presented at the Ground Water Protection Council 2008 Annual Forum.

Bou-Rabee, F. and Nur, Amos, 2002. The 1993 M4.7 Kuwait Earthquake: Induced by the Burning of Oil Fields. Kuwait Journal of Science and Engineering, 29(2).

Brownell, M., 2008, Balancing Economic Development & Environmental Impacts in the Susquehanna River Basin, Pennsylvania Natural Gas Summit, December 11, 2008. http://www.srbc.net/programs/docs/PANatura%20GasSummit-StateCollege12-11-08.PDF

Charpentier, R. R.; W. deWitt, Jr.; G.E. Claypool, L.D. Harris, R.F. Mast, J. D. Megeath, J. B. Roen, and J.W. Schmoker, 1982, "Estimates of Unconventional Natural-Gas Resources of the Devonian Shale of the Appalachian Basin", USGS Open-File Report 82-474.

Delaware County Planning, 2009, Personal communications between Delaware County (Nicole Franzese) and Alpha Geoscience, June 9, 2009.

DRBC, 1961, Delaware River Basin Compact, DRBC, West Trenton, NJ, 55 p.

DRBC, 2002, Administrative Manual, Rules of Practice and Procedure, 45pp.

DRBC, 2009, Personal communications between DRBC (Laura Tessieri) and Alpha Geoscience, May 11, 2009.

DRBC, September 2008, Delaware River Basin Water Code, with Amendments Through July 16, 2008, 18 CFR Part 410, DRBC, West Trenton, NJ, 182 p.

Duffield, W.A. and J.H. Sass, 2003, Geothermal Energy – Clean Power from the Earth's Heat, USGS Circular No. 1249, 36 pp. http://pubs.usgs.gov/circ/2004/c1249

Dyer, B.C., U. Schanz, T. Spillmann, F. Ladner and M.O. Häring, 2008, Microseismic Imaging of a Geothermal Reservoir Stimulation, The Leading Edge; July 2008; v. 27; no. 7; p. 856-869; DOI: 10.1190/1.2954024© 2008 Society of Exploration Geophysicists.

Engelder, Terry and Gary G. Lash, 2008, "Marcellus Shale Play's Vast Resource Potential Creating Stir in Appalachia," in The American Oil and Gas Reporter, May 2008.

Federal Remediation Technologies Roundtable, August 12, 2009. Remediation Technologies Screening Matrix and Reference Guide, Version 4.0. http://www.frtr.gov/matrix2/section4/4-54.html

FEMA, 2009a, "Federal Emergency Management Agency Community Status Book Report, June 4, 2009", http://www.fema.gov/fema/csb.shtm

FEMA, 2009b, Personal communications between FEMA Map Service Center (Travis McGilton) and Alpha Geoscience, May 8, 2009.

Fletcher, Jon B., Lynn R. Sykes, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964, September 10, 1977, "Earthquakes Related to Hydraulic Mining and Natural Seismic Activity in Western New York State", Journal of Geophysical Research, Vol. 82, No. 26

Florentin, L., S. Ulrich, and H. Markus, 2007, Part 1: Geological and hydraulic evaluation of the geothermal reservoir Basel 1, 5th Swiss Geoscience Meeting, Geneva 2007. http://www.geothermal.ch/fileadmin/docs/downloads/geoladnertalk.pdf

Foxall, W., and Friedmann, S. J., 2008, Frequently Asked Questions About Carbon Sequestration and Earthquakes, LLNL-BR-408445. https://eed.llnl.gov/co2/pdf/Seismicity_FAQs_final4.pdf

Freeze, R. Allan and John A. Cherry, 1979, Groundwater, Prentice –Hall, Inc, Englewood Cliffs, NJ, 604 Frohlich, C., 2009, personal communication

Gaudlip, A.W., Paugh, L.O., and T.D. Hayes, 2008, "Marcellus Shale Water Management Challenges in Pennsylvania", presented at the SPE Shale Gas Production Conference, Dallas, TX, November 18, 2008.

Geoscience Australia, 2009, http://www.ga.gov.au/minerals/research/national/geothermal/

Geosciences Australia, 2008. Induced Seismicity and Geothermal Power Development in Australia. GEOCAT #66220.

Gowan, S.W., and S. M. Trader, 2000, Mine Failure Associated with a Pressurized Brine Horizon: Retsof Salt Mine, Western New York, Environmental & Engineering Geoscience, Vol. VI, No.1, February 2000 (Winter), pp. 57-70. http://eeg.geoscienceworld.org/cgi/content/abstract/6/1/57

Gowan, S.W., S.M. Trader, M.E. Piel, and L.D. Milliken, 2006, "Stratigraphy of the Devonian and Upper Silurian in the Vicinity of the Retsof, Sterling, and Hampton Corners Mines in Livingston County, New York, NYS Museum Map and Chart Series No. 45, 72 p.

Grey, James E., June 4, 2009, Letter to Ms. Kathleen Sanford, NYSDEC, re: NY DEC SGEIS Information Requests, 18 p.

Halliburton, August 12, 2009. The Barnett Shale. http://www.halliburton.com/public/solutions/contents/Shale/related_docs/Barnett.pdf

Health Physics Society, 2009. http://hps.org

Hill, David G., Tracy E. Lombardi, and John P. Martin, 2002. "Fractured Shale Gas Potential in New York".

Isachsen, Y.W., and W. McKendree, 1977. Preliminary Brittle Structure Map of New York State. New York State Museum Map and Chart Series No. 31. Digitized for GIS http://www.nysm.nysed.gov/gis

Isachsen, Y.W., E. Landing, J.M. Lauber, L.V. Rickard, and W.B. Rogers, editors, 1991. Geology of New York – A Simplified Account. New York State Museum Educational Leaflet No. 28.

Junex, Inc., 2009, Press Release, "Junex's Partner Announces Preliminary Results from Utica Shale Operations", February 24, 2009.

Kessey, Rick, May 12, 2009, Fortuna, personal communication.

LA Office of Conservation, 2009, http://dnr.louisiana.gov/cons/CONSERIN?UIC.ssi

Lash, Gary G., 2009, "Overview of the Tectonic and Eustatic Framework of Devonian Black Shale, Appalachian Basin", Presented at the Society of Petroleum Engineers Water Management Technology Work Shop, March 31, 2009.

LCSN, 2009. "Lamont-Doherty Cooperative Seismographic Network" http://www.ldeo.columbia.edu/LCSN/

Leone, James, 2009, Personal Communications with Alpha Geoscience and GIS data coverage generated from NYS Museum Reservoir Characterization Group Data.

Marcellus Shale Committee, July 22, 2009, "Natural Gas, Tapping Pennsylvania's Potential." http://www.pamarcellus.com/protection.php.

Martin, John, 2005, "Utica Shale Deposition in the Taconic Foreland Basin: Evolution and the Potential for Natural Gas Production," Presented at GSA Northeastern Section 40th Annual Meeting, March 14-16, 2005.

McBurney, E.E., 2008, "Radiation Protection from NORM and TENORM in the Oil and Gas Industry: Regulatory and Non-Regulatory Approaches", PowerPoint Presentation to IRPA-12, October 2008.

MCEER, 2009, http://mceer.buffalo.edu/infoservice/reference_services/westernNewYorkEQs.asp

Milici, Robert C., 2005, "Assessment of Undiscovered Natural Gas Resources in Devonian Black Shales, Appalachian Basin, Eastern USA", USGS Open-File Report 2005-1268.

Mitsuru, et. al., 2006. Numerical Simulation of Crack Propagation with Shear Slip. Induced by Hydraulic Fracturing. http://sciencelinks.jp/j-east/article/200618/000020061806A0351175.php

Nyahay, Richard, James Leone, Langhorne Smith, John Martin, and Daniel Jarvie, 2007, "Update on the Regional Assessment of Gas Potential in the Devonian Marcellus and Ordovician Utica Shales in New York".

NYCDEP web page: History of Drought and Water Consumption. http://www.nyc.gov/html/dep/html/drinking_water/droughthist.shtml

NYCDEP, 2006, Watershed Protection Program Summary and Assessment, Prepared by the Bureau of Water Supply.

NYCDEP, 2009, New York City 2008 Drinking Water Supply and Quality Report.

NYSDEC, 1993, Nonindigenous Aquatic Species Comprehensive Management Plan, Division of Fish and Wildlife, 39pp.

NYSDEC, 1999, An Investigation of Naturally Occurring Radioactive Materials (NORM) in Oil and Gas Wells in New York State, NYSDEC, Division of Solid and Hazardous Materials, Bureau of Radiation and Hazardous Site Management, Albany, NY, 86 p.

NYSDEC, 2005, Final Report of the New York State Invasive Species Task Force, Fall 2005, 146pp.

NYSDEC, 2007, "2007 Annual Oil and Gas Production Data". http://www.dec.ny.gov/pubs/36033.html

NYSDEC, 2008, "2008 Annual Oil and Gas Production Data". http://www.dec.ny.gov/energy/36159.html

NYSDEC, 2009, Comprehensive Wildlife Conservation Strategy (CWCS) Plan, http://www.dec.ny.gov/animals/30483.html

NYSDEC, 2009, Personal communication between NYSDEC Central Office PBS personnel and Alpha Geoscience, June 8, 2009.

NYSDEC, August 12, 2009. Marcellus Shale. http://www.dec.ny.gov/energy/46288.html

NYSDEC, August 31, 2005, "Recommended Pump Test Procedure for Water Supply Application". Appendix 10, TOGS 3.2.1.

NYSDEC, July 9, 2009. Data on Oil, Gas, and Other Wells in New York. http://www.dec.ny.gov/energy/1603.html

NYSDOH, 2009a. Personal communications with Dave Rowley, Division of Water Supply, Rochester District Office June 9, 2009.

NYSDOH, 2009a. Personal communications with Jane Thapa, Division of Water Supply June 2, 2009.

NYSDOH, April 2001. New York State Aquifers retrieved from http://www.nysgis.state.ny.us/gis9/nyaquifers.zip

NYSDOH, July 2008. Drinking Water Protection Program retrieved on June 9, 2009 from http://www.health.state.ny.us/environmental/water/drinking/index.htm

NYSDOH, July 2009. "Drinking Water Program: Facts and Figures." retrieved from http://www.health.state.ny.us/environmental/water/drinking/facts_figures.htm

NYSDOT, 2009, http://www.nysdot.gov/divisions/operating/osss/truck/regulations

NYSERDA, 2002

NYSERDA, undated

PHMSA, 2009, http://phmsa.dot.gov/portal/site/PHMSA

Pinnacle Technologies, Inc., August 11, 2009. Microseismic.

Pinnacle Technologies, Inc., August 11, 2009. FracSeis Microseismic Fracture Mapping.http://www.pinntech.com/pubs/TU/TU02_MS.pdf http://www.pinntech.com/microseismic.html

Pratt, Dave, April 19, 2001. "Deep Well Injection and Triggered Earthquakes." Internal DEC-DMR working document.

Rickard, Lawrence V., 1989. "Stratigraphy of the Subsurface Lower and Middle Devonian of New York, Pennsylvania, Ohio, and Ontario". New York State Museum Map and Chart Series Number 39.

Sansalone, J., E. Voon, and V. Srinivasan, 2001. Management of Invasive Species Transported in Ballast Water by Dissolved Air Flotation Technology, Louisiana State University. Proceedings of the Second International Conference on Marine Bioinvasions, New Orleans, La., April 9-11, 2001, pp. 119-120.

Sauder, Elizabeth, 2009, Water Disposal Wells Possibly Linked to Earthquakes, Not Fractured Wells, Texas Energy and Environment Blog, August 14, 2009, http://energyandenvironmentblog.dallasnews.com/archives/2009/08/water-disposal-wells-possibly.html

Schopp, Robert D., and Gary D. Firda, 2008, "Flood Management and Frequency of the Delaware River in New Jersey, New York, and Pennsylvania", USGS Open-File Report 2008-1203.

Selley, Richard C. 1998. "Elements of Petroleum Geology", 2nd Edition, Academic Press.

Sierra Club Atlantic Chapter, undated, "Protect NY's Resources from the New Gas Rush". Retrieved from http://newyork.sieraclub.org/lhg/fliers/Gas%20Hadout.pdf

Smith, K. P., Blunt, G. P., and Tebes, Cl.L., 1996, Radiological Dose Assessment Related to Management of Naturally Occurring Radioactive Materials Generated by the Petroleum Industry, Argonne National Laboratory/Environmental Assessment Division-2, Argonne, IL, 69 p.

Smith, Langhorne and James Leone, 2009, "Integrated Characterization of the Devonian Marcellus Shale Play in New York State", Presented at the Marcellus Shale Gas Symposium, Hudson Mohawk Professional Geologists Association, Albany, NY, April 29, 2009.

Smith, Langhorne, 2009. Personal Communications with Alpha Geoscience and GIS data coverage generated from NYS Museum Reservoir Characterization Group Data.

SMU, 2009, SMU Seismologist: More Study Needed in North Texas Quakes, http://www.smu.edu/News/2009/stump-quakes-13aug2009.aspx

Souders, S., 2005. http://www.strongerinc.org.

SRBC, 1998, Policy Regarding Diversions of Water from the Susquehanna River Basin, Policy No. 98-01.

SRBC, 2007. "June 2009 Flood – A Summary of the Flood and Performance of the Susquehanna Flood Forecast and Warning System", January, 2007.

SRBC, 2009, Personal communications between SRBC (Ben Pratt) and Alpha Geoscience, May 8, 2009.

SRBC, 2009, Standard Docket Conditions Contained in Gas Well Consumptive Water Use Dockets; http://www.srbc.net/programs/projreviewmarcellus.htm

SRBC, February 2007, Susquehanna River Basin Commission Regulation of Projects, 18 CFR Parts 801,806, 807, and 808, SRBC, Harrisburg, PA, 36 p.

SRBC, February 2009, Accommodating a New Straw in the Water is Extracting Natural Gas from the Marcellus Shale in the Susquehanna River Basin. http://www.srbc.net/programs/docs/Marcellus%20Legal%20Overview%20Paper%20(Beauduy).pdf.PDF

SRBC, November 2002, Guidelines for Using and Determining Passby Flows and Conservation Releases for Surface-Water and Ground-Water Withdrawal Approvals, Policy No. 2003-01.

Tetra Tech EM, Inc., 2005, "Delaware County Multi-Jurisdictional Hazard Mitigation Plan (Draft)", Prepared for Delaware County, FEMA, US Department of Homeland Security, and New York State Emergency Management Office, October 31, 2005

USEPA, 2009A. http://www.epa.gov/radiation/tenorm/about.html

USEPA, 2009B. http://www.epa.gov/radiation/tenorm/oilandgas.html

USGS, 1999, Naturally Occurring Radioactive Material (NORM) in Produced Water and Oil-Field Equipment – An Issue for the Energy Industry, U.S.G.S. Fact Sheet FS-142-99, 4 p.

USGS, 2002, "National Assessment of Oil and Gas Project – Appalachian Basin Province Boundary", GIS data coverage.

USGS, 2008a. "New York Seismic Hazard Map." National Seismic Hazard Mapping Project (2008). http://earthquake.usgs.gov/regional/states/new_york/hazards.php

USGS, 2008b. 2008 United States National Seismic Hazard Maps. Fact Sheet 2008-3018.

USGS, 2009. http://ga.water.usgs.gov/edu/wupt.html

USGS, 2009, "Historic Earthquakes – New York." http://earthquake.usgs.gov/regional/states/events/1944_09_05.php

USGS, 2009A, http://pubs.usgs.gov/fs/2004/3022/fs-2004-3022.html

Van Tyne, Arthur M., 1993, "Detailed Study of Devonian Black Shales Encountered in Nine Wells", USGS Bulletin 1909.

VerStraeten, C. A., 2007, "Basinwide Stratigraphic Synthesis and Sequence Stratigraphy, Upper Pragian, Emsians and Eifelian Stages (Lower to Middle Devonian), Appalachian Basin", From Devoinian Events and Correlations. R.T. Becker and W. T. Kirchgasser (eds), Geological Society of London.

Weany, David J. Robert T. Ryder, and Richard Nyahay, 2000, "Thermal Maturity Patterns (CAI and %Ro) in Ordovician and Devonian Rocks of the Appalachian Basin in New York State", USGS Open-File Report 00-496.

Zaengle, Don, 2009, "Natural Gas Exploration", Presented at the 12th Annual NYWEA and AWMA Joint Seminar, February 12, 2009.

Zerrahn, Gregory J., 1978, "Ordovician (Trenton to Richmond) Depositional Patterns of New York State, and their Relation to the Taconic Orogeny", In Geological Society of America Bulletin v. 89 p., 1751-1760.

Ecology and Environment Engineering, P.C., 2011

Section 2 – Socioeconomics

Bassett Healthcare. 2011. Residency Programs. http://www.bassett.org/bassett-medical-center/medical-education/residency-programs/. Accessed July 11, 2011.

Buffalo Business First. 2011. Book of Lists 2011. American City Business Journals. 2010. Publication.

Bureau of Labor Statistics. 2010. Persons at Work in Non-Agricultural Industries by Class of Worker and Usual Full or Part-Time Status, Household Data 2010 Annual Average.

_____. 2011. National Employment Matrix, Oil and Gas Extraction by 2008 Employment. Available online at: http://data.bls.gov/oep/nioem. Date last accessed July 1, 2011.

Cornell University. 2009. Cornell Program on Applied Demographics. New York population projection by age and sex. County Projections 2005-2030. May 2009. Available online at: http://pad.human.cornell.edu/counties/projections.cfm. Date last accessed June 23, 2011.

Delaware County Economic Development. 2010. Top Industries. Last updated February 2, 2010.

Energy Information Administration (EIA). 2011. Natural Gas Consumption by End Use. Available online at: http://www.eia.gov/dnav/ng/ng_cons_sum_a_epg0_vc0_mmcf_a.htm. Accessed on June 29, 2011.

ILOVENY (The official New York State Tourism Site). 2011. All cities and towns. Available online at: http://www.iloveny.com/Cities-And-Towns/All-Cities-And-Towns.aspx. Data accessed July 18, 2011.

New York State Association of REALTORS Housing Survey. 2011a. Annual Median Sales Price of Existing Single-Family Homes Sold 2008-2010. Available online at: http://www.nysar.com/content/upload/AssetMgmt/pdfs/annualmedian.pdf . Data accessed July 12, 2011.

_____. 2011b. Annual Existing Single-Family Homes Sold 2008-2010. Available online at: http://www.nysar.com/content/upload/AssetMgmt/pdfs/annualsales.pdf . Data accessed July 12, 2011.

New York State Department of Agriculture and Markets (NYSDAM). 2011. GIS Data. Data Theme: Agricultural Districts (Ag and Markets) for Broome, Tioga, Chemung, Delaware, Sullivan, Otsego, Cattarugus and Chautauqua Counties. Available online at: http://cugir.mannlib.cornell.edu/datatheme.jsp?id=2. Data accessed August 11, 2011.

New York State Department of Environmental Conservation (NYSDEC). 1994. New York State Oil and Gas Drilling and Production and Mineral Resources. 1994 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 1995. New York State Oil and Gas Drilling and Production and Mineral Resources. 1995 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 1996. New York State Oil and Gas Drilling and Production and Mineral Resources. 1996 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 1997. New York State Oil and Gas Drilling and Production and Mineral Resources. 1997 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 1998. New York State Oil and Gas Drilling and Production and Mineral Resources. 1998 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 1999. New York State Oil and Gas Drilling and Production and Mineral Resources. 1999 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2000. New York State Oil and Gas Drilling and Production and Mineral Resources. 2000 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2001. New York State Oil and Gas Drilling and Production and Mineral Resources. 2001 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2002. New York State Oil and Gas Drilling and Production and Mineral Resources. 2002 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2003. New York State Oil and Gas Drilling and Production and Mineral Resources. 2003 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2004. New York State Oil and Gas Drilling and Production and Mineral Resources. 2004 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2005. New York State Oil and Gas Drilling and Production and Mineral Resources. 2005 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2006. New York State Oil and Gas Drilling and Production and Mineral Resources. 2006 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2007 New York State Oil and Gas Drilling and Production and Mineral Resources. 2007 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2008. New York State Oil and Gas Drilling and Production and Mineral Resources. 2008 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2009. New York State Oil and Gas Drilling and Production and Mineral Resources. 2009 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011.

_____. 2010. New York State Leasing of State Lands for Oil and Gas Development 2010 Report. http://www.dec.ny.gov/docs/materials_minerals_pdf/10leasrpt.pdf. (Accessed July 5, 2011).

New York State Department of Labor (NYSDOL). 2000. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2001. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2002. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2003. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2004. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2005. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2006. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2007. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2008. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2009a. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 30, 2011.

_____. 2009b. Quarterly Census of Employment and Wages: Travel and Tourism Sector 2007-2009. http://www.labor.ny.gov/stats/travelandtourism2007-2009.xls. Accessed July 5, 2011.

_____. 2010a. Local Area Unemployment Statistics Program. http://www.labor.state.ny.us/stats/lslaus.shtm. (Accessed June 22, 2011).

_____.2010b. Quarterly Census of Employment and Wages (QCEW). http://www.labor.ny.gov/stats/ins.asp. Accessed June 22, 2011.

New York State Department of Taxation and Finance [NYSDTF]. 2010a. Statewide Summary of Tax Rate and Levy Data. http://www.orps.state.ny.us/cfapps/MuniPro/osc/oscYearselect.cfm. (Accessed June 29, 2011).

_____. 2010b. Fiscal Year Tax Collections: 2009-10; Annual Statistics Report of New York State Tax Collections Statistical Summaries and Historical Tables, Fiscal Year 2009-10. http://www.tax.ny.gov/research/collections/fy_collections_stat_report/2009_10_annual_statistical_report_of_ny_state_tax_collections.htm. (Accessed June 24, 2011).

_____. 2011. Office of Real Property Tax Service (ORPTS). 2011 Tentative Oil and Gas Unit of Production Values. http://www.orps.state.ny.us/sas/oil_gas/tentUnitProdValues.pdf. (Accessed July 5, 2011).

New York State (NYS) Office of the Comptroller. 2010a. Level One and Level Two Analysis for Local Government and School Accountability: Counties for Fiscal Year Ending 12/31/2009. www.osc.state.ny.us/localgov/datanstat/findata/index_choice.htm. (Accessed June 23, 2011).

_____.2010b. Financial Data: Overlapping Real Property Tax Rates and Levies. http://www.osc.state.ny.us/localgov/orptbook/taxrates.htm. (Accessed July 8, 2011).

Otsego County. 2010. Otsego County's Top Employers. http://www.otsegoeconomicdevelopment.com/business_climate/Industry.html. (Accessed June 24, 2011).

Southern Tier Central Regional Planning and Development Board (STC Planning). 2009. Chemung County, New York Economic Profile 2009. http://www.threeriversdevelopment.com/usr/pdf/ChemungProfile2009.pdf. (Accessed June 28, 2011).

Tourism Economics. 2010. The Economic Impact of Tourism in New York State: Finger Lakes Focus. May 2010.

U.S. Bureau of Economic Analysis. 2011. Regional Input-Output Modeling System (RIMS II), Total Multipliers for Output, Earnings, Employment, and Value Added by State: Oil and Gas Extraction (Type 1).

U.S. Census Bureau (USCB). 1990a. 1990 Summary Tape File 1 (STF 1)-100-Percent data. P001: PERSONS-Universe: Persons. Geography: New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 23, 2011.

_____. 1990b. 1990 Summary Tape File 1(STF 1)-100-Percent data. H001. HOUSING UNITS-Universe: Housing units. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 22, 2011.

_____. 2000a. Profile of Selected Economic Characteristics: 2000, Census 2000 Summary File 3 (SF 3) : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. (Accessed July 1, 2011).

_____. 2000b. Census 2000 Summary File 1(SF 1) 100-Percent Data. GCT-PH1: Population, Housing Units, Area, and Density: 2000. Geography: New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 22, 2011.

_____. 2000c. Census 2000 Summary File 1 (SF 1) 100-Percent Data. H1. HOUSING UNITS [1]-Universe: Housing units. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 22, 2011.

_____. 2009a. Selected Economic Characteristics: 2005-2009, 2005-2009 American Community Survey 5-year Estimates. Available online at: http://factfinder.census.gov/home/saff/main.html?_lang=en. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware

County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 28, 2011.

_____.2009b. 2005-2009 American Community Survey 5-year Estimates. B17001 Poverty Status in Past 12 Months by Sex by Age. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed August 1, 2011

_____. 2009c. 2005-2009 American Community Survey 5-year Estimates. B25024 UNITS IN STRUCTURE-Universe: HOUSING UNITS. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed July 13, 2011.

_____. 2010. 2010 Demographic Profile Data. DP-1 Profile of General Population and Housing Characteristics: 2010. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed July 6, 2011.

United States Department of Agriculture (USDA). 2007. 2007 Census of Agriculture Report. Viewed on August 16, 2011. Available online at: http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp

United States Department of Commerce (USDOC 2010). 2010. Bureau of Economic Analysis. Regional Data: GDP & Personal Income. Available online at: http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1. (Accessed July 11, 2011).

Section 2 – Visual Resources

Adirondack Park Agency. 2003. *The Adirondack Park*. Available online at: http://www.apa.state.ny.us/about_park/index.html. Web site accessed on July 14, 2011.

Advisory Council on Historic Preservation (ACHP). 2011. 36 CFR Part 800 – Protection of Historic Properties (incorporating amendments effective August 4, 2004). Available online at: http://www.achp.gov/work106.html. Web site accessed on July 7, 2011.

Catskill Center for Conservation and Development. 2011. *Route 28 Central Catskills Scenic Byway Nomination, Final Draft of Project Description*. Available online at: http://www.catskillcenter.org/programs/planning/route28scenicbyway.pdf. Web site accessed on June 30, 2011.

Concord Grape Belt Heritage Association. 2011. Lake Erie Concord Grape Belt. Available online at: http://www.concordgrapebelt.org. Web site accessed on June 29, 2011.

Durham Valley Scenic Byway Corridor Coordinating Committee. Undated. *Draft Durham Valley Scenic Byway Corridor Management Plan*. Available online at: http://durhamvalley.com/scenic_byway.html. Web site accessed on July 17, 2011.

Environmental Systems Research Institute (ESRI). 2010. Data & Maps (CD-Rom). Redlands, CA: Environmental Systems Research Institute.

Erie Canalway National Heritage Area. 2008. *Erie Canalway National Heritage Area*. Available online at: http://www.eriecanalway.gov. Web site accessed on June 29, 2011.

FindLaw. 2011. NY Code - Article 52: Implementation of Environmental Quality Bond Act of 1986. Available online at: http://codes.lp.findlaw.com/nycode/ENV/52. Web site accessed on July 18, 2011.

Hudson River Valley National Heritage Area. 2011. Welcome to the Hudson River Valley National Heritage Area. Available online at: http://www.hudsonrivervalley.com/Home.aspx. Web site accessed on July 7, 2011.

Mountain Cloves Scenic Byway Steering Committee. 2011. Mountain Cloves Scenic Byway Proposed Corridor Management Plan. Prepared by the Mountain Cloves Scenic Byway Steering Committee in cooperation with the Town of Hunter. Available online at: https://www.nysdot.gov/portal/page/portal/content/engineering/Scenic-Byways/Byways-repository/Mountain%20Cloves%20CMP%20Revised%20Combined%20Final.pdf. Web site accessed on June 30, 2011.

National Park Service (NPS). 2008a. Nationwide Rivers Inventory. Available online at: http://www.nps.gov/ncrc/programs/rtca/nri. Web site accessed on July 15, 2010.

_____. 2008b. National Natural Landmark Program. Available online at: http://www.nature.nps.gov/nnl/docs/NNLBrochure.pdf. Web site accessed on June 27, 2011.

_____. 2009a. Nationwide Rivers Inventory, New York Segments. Available online at: http://www.nps.gov/ncrc/programs/rtca/nri/states/ny.html. Web site accessed on July 15, 2010.

_____. 2009b. National Registry of Natural Landmarks. Available online at: http://www.nature.nps.gov/nnl. Web site accessed on June 27, 2011.

_____. 2010a. The National Trails System Act. Available online at: http://www.nps.gov/nts/legislation.html. Web site accessed June 29, 2011.

_____. 2010b. National Trails Map. Available online at: http://www.nps.gov/nts/maps/National%20Trails%20map.pdf. Web site accessed on June 29, 2011.

_____. 2010c. Upper Delaware Scenic and Recreational River. Available online at: http://www.nps.gov/upde/index.htm. Web site accessed on July 15, 2010.

_____. 2010d. National Heritage Areas. Available online at: http://www.nps.gov/history/heritageareas/CNTC/contact.DOC (web site accessed July 7, 2011).

_____. 2011a. National Register of Historic Places Program: About Us. Available online at: http://www.nps.gov/nr/about.htm. Web site accessed on July 7, 2011.

_____. 2011b. National Register Research. Available online at: http://www.nps.gov/nr/research. Web site accessed July 7, 2011.

_____. 2011c. National Historic Landmarks Program. Available online at: http://www.nps.gov/history/nhl. Web site accessed on July 7, 2011.

_____. 2011d. National Historic Landmarks Program, Listing of National Historic Landmarks by State: New York. Available online at: http://www.nps.gov/history/nhl/designations/Lists/NY01.pdf. Web site accessed on June 28, 2011.

_____. 2011e. National Natural Landmark Program. Available online at: http://www.nature.nps.gov/nnl. Web site accessed on June 27, 2011.

_____. 2011f. National Natural Landmark Sites. Available online at: http://www.nature.nps.gov/nnl/nation.cfm. Web site accessed on June 27, 2011.

_____. 2011g. National Heritage Areas: FAQs. Available online at: http://www.nps.gov/history/heritageareas/FAQ. Web site accessed on July 7, 2011.

National Wild and Scenic Rivers System. 2011a. National Wild and Scenic Rivers. Available online at: http://www.rivers.gov. Web site accessed on July 15, 2011.

_____. 2011b. Designated Wild and Scenic Rivers. Available online at: http://www.rivers.gov/wildriverslist.html. Web site accessed on July 15, 2011.

_____. 2011c. Delaware River. Available online at: http://www.rivers.gov/wsr-delaware-upper.html. Web site accessed on July 15, 2011.

_____. 2011d. Wild and Scenic Study Rivers, Study Status as of January 2010. Available online at: http://www.rivers.gov/study.html. Web site accessed on July 15, 2011.

New York-New Jersey Trail Conference. 2011. Palisades Interstate Park-NY Cluster. Available online at: http://www.nynjtc.org/park/palisades-interstate-park. Web site accessed on July 14, 2011.

New York State Department of Environmental Conservation (NYSDEC). 2000. *Assessing and Mitigating Visual Impacts*, Program Policy No. DEP-00-2. Available online at: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/visual2000.pdf. Web site accessed on June 28, 2011.

_____. 2011a. New York's Forest Preserve. Available online at: http://www.dec.ny.gov/lands/4960.html. Web site accessed on June 29, 2011.

_____. 2011b. Adirondack Forest Preserve. Available online at: http://www.dec.ny.gov/lands/5263.html. Web site accessed on June 29, 2011.

_____. 2011c. Catskill Forest Preserve. Available online at: http://www.dec.ny.gov/lands/5265.html. Web site accessed on June 29, 2011.

_____. 2011d. State Lands Classifications. Available online at: http://www.dec.ny.gov/lands/7811.html. Web site accessed on June 29, 2011.

_____. 2011e. Wild, Scenic and Recreational Rivers Permit Program. Available online at: http://www.dec.ny.gov/permits/6033.html. Web site accessed on July 15, 2011.

_____. 2011f. Wild, Scenic and Recreational Rivers. Available online at: http://www.dec.ny.gov/lands/32739.html. Web site accessed on July 15, 2011.

_____. 2011g. Wildlife Management Areas Program. Available online at: http://www.dec.ny.gov/outdoor/8295.html. Web site accessed on June 29, 2011.

_____. 2011h. List of New York State Wildlife Management Areas. Available online at: http://www.dec.ny.gov/outdoor/8297.html. Web site accessed on June 29, 2011.

New York State Department of State (NYSDOS). 2004. Division of Coastal Resources. Coastal Resources Online: Scenic Areas of Statewide Significance. Available online at: http://nyswaterfronts.com/waterfront_developed_SASS.asp. Web site accessed on June 27, 2011.

New York State Department of Transportation (NYSDOT). 1999-2011. New York State Scenic Byways. Available online at: https://www.nysdot.gov/display/programs/scenic-byways. Web site accessed on June 30, 2011.

New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP). 2007. Heritage Development Resource Guide. Available online at: http://nysparks.state.ny.us/historic-preservation/documents/HeritageDevelopmentResourceGuide.pdf. Web site accessed on July 7, 2011.

_____. 2008. Statewide Comprehensive Outdoor Recreation Plan, 2009-2013. Available online at: http://nysparks.state.ny.us/recreation/trails/statewide-plans.aspx. Web site accessed on June 29, 2011.

_____. 2009. New York State Open Space Conservation Plan. Available online at: http://nysparks.state.ny.us/inside-our-agency/documents/NYSOpenSpaceConservationPlan.pdf. Web site accessed on June 29, 2011.

_____. 2010. New York Statewide Trails Plan. Available online at: http://nysparks.state.ny.us/recreation/trails/documents/StatewideTrailsPlan/StatewideTrailsPlan.pdf. Web site accessed on June 29, 2011.

_____. 2011a. What are the State and National Registers? Available online at: http://www.nysparks.com/shpo/national-register/#documents. Web site accessed on July 7, 2011.

_____. 2011b. Online Tools. Available online at: http://www.nysparks.com/shpo/online-tools. Web site accessed on July 7, 2011.

_____. 2011c. SPHINX Access Introduction. Available online at: http://www.nysparks.com/shpo/online-tools/disclaimer.aspx?pgm=spx. Web site accessed on July 7, 2011.

_____. 2011d. New York – Celebrate our History. Available online at: http://nysparks.state.ny.us/publications/documents/GuidetoNYStateHistoricSites.pdf. Web site accessed on July 8, 2011.

_____. 2011e. Heritage Areas: Explore the past; look into the future in state heritage areas. Available online at: http://nysparks.state.ny.us/historic-preservation/heritage-areas.aspx. Web site accessed on June 29, 2011.

_____. 2011f. New York State Heritage Areas: Open a door to the past…to explore the future. Available online at: http://nysparks.state.ny.us/historic-preservation/documents/HeritageAreasBrochure.pdf. Web site accessed on July 7, 2011.

Palisades Parks Conservancy. 2003-2007. State Park Listing. Available online at: http://www.palisadesparksconservancy.org/parks/. Web site accessed August 15, 2011.

State of New York. 2001. State of New York Adirondack State Park State Land Master Plan. Available online at: http://www.apa.state.ny.us/Documents/Laws_Regs/SlmpPDF2001.pdf. Web site accessed on July 14, 2011.

United States Department of Transportation (USDOT). 2011. Federal Highways Administration. America's Byways. Available online at: http://www.byways.org/explore/states/NY. Web site accessed on July 16, 2011.

United States Fish and Wildlife Service (USFWS). 2011. National Wildlife Refuge System. Available online at: http://www.fws.gov/refuges. Web site accessed on June 29, 2011.

Western Erie Canal Alliance. 2010-2011. A Living Historic Landscape! Available online at: http://eriecanalheritage.com. Web site accessed on June 29, 2011.

Section 2 – Noise

Cowan, James P. 1994. *Handbook of Environmental Acoustics*. New York: Van Nostrand Reinhold.

New York State Department of Environmental Conservation (NYSDEC). 2003. Assessing and Mitigating Noise Impacts. Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, and 27, by Jeffrey Sama, Director. Issued October 6, 2000, revised June 3, 2003.

NTC Consultants. 2011. *Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and other Low-Permeability Gas Reservoirs*, pp. 7-11. Prepared for the New York State Energy Research and Development Authority, Albany, NY.

United States Environmental Protection Agency (USEPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control. Available online at: http://www.nonoise.org/library/levels74/levels74.htm. Web site accessed on July 19, 2011.

World Health Organization (WHO). 2000. Guidelines for Community Noise. Geneva: World Health Organization. Available online at: http://www.who.int/docstore/peh/noise/guidelines2.html. Web site accessed on July 19, 2011.

Section 2 – Transportation

Diamond Traffic Products. 2011. Image depicting the FHWA Vehicle Classification Scheme F Report obtained via the web at: http://support.diamondtraffic.com/knowledgemanager/questions/46/FHWA+Vehicle+Classification+Scheme+F+Report. Site accessed on July 13, 2011.

Federal Highway Administration (FHWA). 2001. Office of Highway Policy Information (OHPI). *Traffic Monitoring Guide* – Section 4: Vehicle Classification Monitoring. May 1, 2001. Available online at: http://www.fhwa.dot.gov/ohim/tmguide/tmg4.htm . Site accessed on July 12, 2011.

_____. 2011. FHWA Functional Classification Guidelines. Available online at: http://www.fhwa.dot.gov/planning/fcsec2_1.htm. Site accessed on July 11, 2011.

New York State Department of Taxation and Finance (NYSDTF). 2011a. Petroleum business tax information. February 24, 2011. Available online at: www.tax.ny.gov/bus/petrol/ptdix.htm. Web site accessed on July 27, 2011.

_____. 2011b. Motor fuel excise tax information. February 24, 2011. Available online at: www.tax.ny.gov/bus/gas/gasidx.htm. Web site accessed on July 27, 2011.

_____. 2011c. Highway use tax information, last modified July 8, 2011. Available online at: www.tax.ny.gov/bus/hut/huidx.htm. Web site accessed on July 27, 2011.

New York State Department of Transportation (NYSDOT). 2009a. Table of "2009 Highway Mileage by County." Available online at: https://www.nysdot.gov/divisions/engineering/technical-services/hds-respository/HMR2009_by_County.pdf. Web site accessed on July 11, 2011.

_____. 2009b. Pavement Report: 2009. Available online at: https://www.nysdot.gov/divisions/engineering/technical-services/technical-services-repository/pavement/09PR.pdf. Web site accessed on August 17, 2011.

_____. 2010a. Table from the Highway Data Services Bureau for "Heavy Vehicle (F04-F13) Percentages 2009 – Based on 2004 to 2009 Vehicle Classification Data." Available online at: https://www.nysdot.gov/divisions/engineering/technical-services/hds-respository/NYSDOT%20Heavy%20Vehicle%20Percentages%202010.pdf. Site accessed on July 11, 2011.

_____. 2010b. Pavement Data Report, Region 1. Available online at: https://www.nysdot.gov/divisions/engineering/technical-services/technical-services-repository/pavement/2010%20pdr%20reg1.pdf. Web site accessed on August 17, 2011.

_____ . 2011a. Image depicting the NYSDOT Regions. Available online at: https://www.nysdot.gov/nypermits/restrictions. Web site accessed on July 11, 2011.

_____. 2011b. New York State's Bridge Program in Brief. Available online at: https://www.nysdot.gov/main/bridgedata/repository/NYSBridgeDataNarrative.pdf Web site accessed on August 17, 2011.

Zerrillo, Robert. 2011. E-mail communication with attachment from Robert Zerrillo, NYSDOT, to Matthew Butwin, Ecology and Environment, Inc., on July 26, 2011, regarding NYSDOT receipts information.

Section 2 – Community Character

Broome County. 2009. Broome County Department of Planning and Economic Development Annual Report. Viewed on July 19, 2011. Available online at: http://www.gobroomecounty.com/files/planning/_pdf/Annual%20Report%202009%20Final%20Draft.pdf

_____. 2011. Broome County, NY Municipalities. Viewed on July 18, 2011. Available online at: http://www.gobroomecounty.com/community/municipalities

Catskills Region. 2011. Catskills Region Delaware County. Viewed on July 19, 2011. Available online at: http://www.greatwesterncatskills.com/

Cattaraugus County. 2007. Agricultural and Farmland Protection Plan. Viewed on July 19, 2011. Available online at: http://ww2.cattco.org/files/downloads/planning/Catt_Co_Ag_and_Farmland_Protection_Plan.pdf

_____. 2010. Cattaraugus County Department of Economic Development, Planning and Tourism – 2010 Annual Report. Viewed on July 19, 2011. Available online at: http://ww2.cattco.org/files/downloads/economic-development-planning-and-tourism/annual_report_2010.pdf

_____. 2011. Planning for Cattaraugus County. Viewed on July 19, 2011. Available online at: http://ww2.cattco.org/planning

Chautauqua County. 2011a. County Overview. Viewed on July 19, 2011. Available online at: http://www.co.chautauqua.ny.us/Pages/AboutCC.aspx

_____. 2011b. Chautauqua 20/20 Comprehensive Plan. Viewed July 19, 2011. Available online at: http://www.planningchautauqua.com/pdf/CompPlan/FinalReport/Chautauqua_CompPlan.pdf

Chautauqua County Chamber of Commerce. 2011a. Mayville/Chautauqua Chamber of Commerce. Viewed on July 19, 2011. Available online at: http://www.chautauquachamber.org/TheChamber/AboutUs/MayvilleChautauquaChamberofCommerce.aspx

_____. 2011b. Dunkirk Chamber of Commerce. Viewed on July 19, 2011. Available online at: http://www.chautauquachamber.org/TheChamber/AboutUs/DunkirkChamberofCommerce.aspx

_____. 2011c. Fredonia Chamber of Commerce. Viewed on July 19, 2011. Available online at:

http://www.chautauquachamber.org/TheChamber/AboutUs/FredoniaChamberofCommerce.aspx

_____. 2011d. Jamestown Chamber of Commerce. Viewed on July 19, 2011. Available online at: http://www.chautauquachamber.org/TheChamber/AboutUs/JamestownChamberofCommerce.aspx

Chemung County. 2008. Physiographic and Demographic Character of Chemung County.

_____. 2011a. List of County, Town, City and Village Officials. Viewed on July 18, 2011. Available online at: http://www.chemungcounty.com/usr/PDF/Legislature%202010/OFFICI~1[1].pdf

_____. 2011b. Chemung County Department of Planning: Local Planning Assistance. Viewed on July 20, 2011. Available online at: http://chemungcounty.com/index.asp?pageId=202.

_____. 2011c. Chemung County Department of Planning: Missions. Viewed on July 20, 2011. Available online at http://chemungcounty.com/index.asp?pageId=198.

Chemung County Chamber of Commerce. 2011. Mark Twain County – Visitor's Guide to Chemung County, NY. Viewed on July 19, 2011. Available online at: http://www.marktwaincountry.com/SupportingFiles/documents/TG_2010_Web.pdf

City of Oneonta. 2011. General Economy. Viewed on July 12, 2011. Available online at: http://www.oneonta.ny.us/oneonta/economy.asp.

City of Salamanca. 2011. About Salamanca. Viewed on July 20, 2011. Available online at http://www.salmun.com/about.htm.

Delaware County. 2011. Municipalities. Viewed on July 20, 2011. Available online at: http://www.co.delaware.ny.us/municipalities.htm

Delaware County Chamber of Commerce. 2011a. About Delaware County. Viewed on July 19, 2011. Available online at: http://www.delawarecounty.org/generalprofile.lasso

_____. 2011b. Delaware County Business Demographics. Viewed on July 19, 2011. Available online at: http://delawarecounty.org/businessdemographics.lasso

Enchanted Mountains. 2011a. Enchanted Mountains of Cattaraugus County. Viewed on July 19, 2011. Available online at: http://enchantedmountains.com/page/about

_____. 2011b. Enchanted Mountains of Cattaraugus County Activities. Viewed on July 19, 2011. Available online at: http://enchantedmountains.com/activities

Greater Binghamton Chamber of Commerce. 2011. Our Communities Introductions. Viewed on July 18, 2011. Available online at: http://www.greaterbinghamtonchamber.com/ourcommunitiesintroduction.aspx

Greater Olean Area Chamber of Commerce (GOACC). 2011. Greater Olean Area Guide. Viewed on July 19, 2011. Available online at: http://www.oleanny.com/content/Olean%20guide.pdf

New York City Watershed. 2009. Economic Impact Assessment Report. Viewed on July 19, 2011. Available online at: http://www.dcecodev.com/documents/DelawareCountyEIAExecutiveSummary-Final.pdf

New York State Department of Agriculture and Markets (NYSDAM). 2011. GIS Data. Data Theme: Agricultural Districts (Ag and Markets) for Broome, Tioga, Chemung, Delaware, Sullivan, Otsego, Cattarugus and Chautauqua Counties. Available online at: http://cugir.mannlib.cornell.edu/datatheme.jsp?id=2. Data accessed August 11, 2011.

New York State Department of Environmental Conservation (NYSDEC). 2007 Notable Court Decisions on SEQR Village of Chestnut Ridge v. Town of Ramapo, 5 AD3d 74 (2d Dept. 2007). View on July 19, 2011. Available online at: http://www.dec.ny.gov/permits/55303.html

_____. 2009. New York State Oil and Gas Drilling and Production and Mineral Resources. 2009 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Last accessed August 10, 2011

_____. 2011. "Wells Data Search" Database. Available on line at: http://www.dec.ny.gov/cfmx/extapps/GasOil/search/wells/index.cfm, Accessed August 3-4, 2011.

New York Schools. 2011a. Broome County School Districts. Viewed on July 19, 2011. Available online at: http://www.newyorkschools.com/counties/broome.html

_____. 2011b. Tioga County School Districts. Viewed on July 18, 2011. Available online at: http://www.newyorkschools.com/counties/tioga.html

_____. 2011c. Chemung County School Districts. Viewed on July 18, 2011. Available online at: http://www.newyorkschools.com/counties/chemung.html

_____. 2011d. Delaware County School Districts. Viewed on July 19, 2011. Available online at: http://www.newyorkschools.com/counties/delaware.html

_____. 2011e. Chautauqua County School Districts. Viewed on July 19, 2011. Available online at: http://www.newyorkschools.com/counties/chautauqua.html

_____. 2011f. Cattaraugus County School Districts. Viewed on July 19, 2011. Available online at: http://www.newyorkschools.com/counties/cattaraugus.html

Otsego County. 1999. Otsego County Agricultural and Farmland Protection Board. Viewed on July 19, 2011. Available online at: http://www.otsegocounty.com/depts/pln/documents/FarmlandProtectionPlan-Text.pdf

_____. 2009. Integrated Housing Needs and Opportunities Study. Viewed on July 19, 2011. Available online at: http://otsegocounty.com/depts/pln/documents/OtsegoCountyHousingNeedsAnalysisFinal.pdf

_____. 2011. Quality of Life. Viewed on July 19, 2011. Available online at: http://www.otsegoeconomicdevelopment.com/community_profile/

Robinson, E. 2005. "A Sense of Place – a Model to Compare Places, People, and Their Relationships over Time – Salisbury Plain Revisited." Paper Presented April 2005 at the Forum UNESCO University and Heritage 10th International Seminar "Cultural Landscapes in the 21st Century" Newcastle-upon-Tyne, Institute of Archaeology, UCL London.

Sullivan County Catskills. 2005. Sullivan2020 Volume II: The Toolbox. Viewed on July 19, 2011. Available online at: http://webapps.co.sullivan.ny.us/DOCS/DPEM/Sullivan2020/ZoingGoals.pdf

_____. 2011a. Division of Planning and Environmental Management. Viewed on July 19, 2011. Available online at: http://www.co.sullivan.ny.us/Departments/PlanningandEnvironmentalManagement/tabid/3225/Default.aspx

_____. 2011b. Agriculture. Viewed on July 19, 2011. Available online at: http://www.catskillsedc.com/about-our-area/agriculture/

Sullivan County Chamber of Commerce. 2011a. Live and Work – History. Viewed on July 19, 2011. Available online at: http://www.catskills.com/live-work/history.aspx

_____. 2011b. Live and Work – Regional Facts and Figures. Viewed on July 19, 2011. Available online at: http://catskills.com/live-work/regional-facts-figures.aspx

Susquehanna-Chemung. 2011. Economic Development – Draft Recommendations for the Susquehanna-Chemung Action Plan. Viewed on July 18, 2011. Available online at: http://www.stcplanning.org/usr/Program_Areas/Water_Resources/Susquehanna-Chemung_Action_Plan/DRAFT_SCActionPlan_EconDev_11_03_14.pdf

Susquehanna Heritage Area. 2009. Executive Summary December 2009. Viewed on July 19, 2011. Available online at:

http://gobroomecounty.com/files/planning/_pdf/SHAMPA_Executive_Summary_3_23_10.pdf

Tioga County. 2005. Tioga County Strategic Plan – Tioga Twenty Ten. Viewed on July 19, 2011. Available online at: http://www.tiogacountyny.com/images/stories/PDFs/departments/edp/tioga2010planF.pdf

_____2011a. About Tioga County. Viewed on July 18, 2011. Available online at: http://www.tiogacountyny.com/Government/government/print.html

_____. 2011b. Suburban vs. Rural Population. Viewed on July 18, 2011. Available online at: http://www.tiogacountyny.com/images/stories/charts/Urban-vs-Rural.jpg

_____2011c. County Profile. Viewed on July 18, 2011. Available online at: http://tiogacountyny.com/County-Profile/county-profile/print.html

Tour Chautauqua. 2011a. Chautauqua County Wineries. Viewed on July 19, 2011. Available online at: http://tourchautauqua.com/Wineries.aspx

_____. 2011b. Chautauqua County Villages and Towns. Viewed on July 19, 2011. Available online at: http://tourchautauqua.com/Villages-and-Towns.aspx

Town of Candor. 1999. Town of Candor Comprehensive Plan. 1995, updated 1999, page 2. Available online at: http://candorny.us/planning/comprehensive_plan.shtml. Accessed August 16, 2011.

Town of Otsego. 2005. Master Plan – Town of Otsego. Viewed on July 19, 2011. Available online at: http://townofotsego.com/legislation/MasterPlan.htm

_____. 2008. Town of Otsego Comprehensive Plan, page 11. Viewed on July 19, 2011. Available online at: http://townofotsego.com/compplan/TownofOtsegoApprovedComprehensivePlanfordistribution13Feb08.pdf

Town of Portville. 2003. Town Plan prepared by Town of Portville Planning Board. January 10, 2003, page 5. Available online at: http://www.portville-ny.org/23_plngboard.html. Accessed August 16, 2011.

Town of Stamford. 2011. Town of Stamford Draft Comprehensive Plan v5. June 2011, page 17. Available online at: http://townofstamfordny.us/compplan.html. Accessed August 16, 2011.

Town of Union. 2009. Town of Union Comprehensive Plan, Goals and Objectives. January 2009, page 3. Available online at:

http://www.townofunion.com/depts_services_plan_comprehensive_plan.html. Accessed August 16, 2011.

United States Department of Agriculture (USDA). 2007. 2007 Census of Agriculture Report. Viewed on August 16, 2011. Available online at: http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp

Village of Horseheads. 2010. Village of Horseheads Comprehensive Plan. April 2010, page ix. Available online at: http://www.horseheads.org/index.php?n=Govt.Planning#toc7. Accessed August 16, 2011.

Visit Binghamton. 2011. Agritourism. Viewed on July 18, 2011. Available online at: http://visitbinghamton.org/whattosee/agritourism.php

Visit Tioga County. 2011. Heritage/Arts/Culture. Viewed on July18, 2011. Available online at: http://www.visittioga.com/heritage

Section 6 – Socioeconomics

All Consulting, LLC. 2011. Personal communication to Brad Gill, Executive Director of the Independent Oil and Gas Association of New York. Letter entitled "SGEIS Supplemental Information – Production Rates." June 30, 2011.

BBC Research and Consulting. 2001. Measuring the Impact of Coalbed Methane Wells on Property Values. BBC Research and Consulting, Denver, Colorado.

Boxall, Peter C., Wing H. Chan, and Melville L. McMillian. 2005. The Impact of Oil and Natural Gas Facilities on Rural Residential Property Values: A Spatial Hedonic Analysis. Elsevier B.V. 2005.

Cornell University. 2009. Cornell Program on Applied Demographics. New York population projection by age and sex. County Projections 2005-2030. May 2009. Available online at: http://pad.human.cornell.edu/counties/projections.cfm. Web site accessed on June 23, 2011.

Fruits, Eric Ph.D. 2008. Natural Gas Pipelines and Residential Property Values: Evidence from Clackamas and Washington Counties (draft). *ECONorthwest*. February 20, 2008.

Integra Realty Resources. 2011. *Flower Mound Well Site Impact Study*. Integra Realty Resources, Dallas/Fort Worth, Texas.

Kelsey, Timothy W. 2011. Impact of Marcellus Shale on Housing Needs. *Cascade*, No. 77. Federal Reserve Bank of Philadelphia.

Lowenstein, James. 2010. Skyrocketing rent in Bradford County: Influx of incoming workers creating a shortage of affordable housing. *The Daily Review*. January 22, 2010.

Marcellus Shale Education and Training Center. 2009. *Marcellus Shale Workforce Needs Assessment*.

New York State Department of Environmental Conservation (NYSDEC). 1994. New York State Oil and Gas Drilling and Production and Mineral Resources. 1994 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 1995. New York State Oil and Gas Drilling and Production and Mineral Resources. 1995 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 1996. New York State Oil and Gas Drilling and Production and Mineral Resources. 1996 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 1997. New York State Oil and Gas Drilling and Production and Mineral Resources. 1997 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 1998. New York State Oil and Gas Drilling and Production and Mineral Resources. 1998 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 1999. New York State Oil and Gas Drilling and Production and Mineral Resources. 1999 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2000. New York State Oil and Gas Drilling and Production and Mineral Resources. 2000 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2001. New York State Oil and Gas Drilling and Production and Mineral Resources. 2001 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2002. New York State Oil and Gas Drilling and Production and Mineral Resources. 2002 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2003. New York State Oil and Gas Drilling and Production and Mineral Resources. 2003 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2004. New York State Oil and Gas Drilling and Production and Mineral Resources. 2004 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2005. New York State Oil and Gas Drilling and Production and Mineral Resources. 2005 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2006. New York State Oil and Gas Drilling and Production and Mineral Resources. 2006 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2007a. *New York's Natural Gas and Resource Endowment: Past, Present and Potential*. Available online at: http://www.dec.ny.gov/about/37805.html. Web site accessed on July 1, 2011.

_____. 2007b New York State Oil and Gas Drilling and Production and Mineral Resources. 2007 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2008. New York State Oil and Gas Drilling and Production and Mineral Resources. 2008 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2009. New York State Oil and Gas Drilling and Production and Mineral Resources. 2009 Annual Report. Available online at: www.dec.ny.gov/pubs/30633.html. Web site accessed on August 10, 2011.

_____. 2011. "Wells Data Search" Database. Available online at: http://www.dec.ny.gov/cfmx/extapps/GasOil/search/wells/index.cfm. Web site accessed on August 3-4, 2011.

New York State Department of Labor (NYSDOL). 2009. Quarterly Census of Employment and Wages. Available online at: http://www.labor.ny.gov/stats/ins.asp. Web site accessed on July 5, 2011.

_____. 2010. Local Area Unemployment Statistics Program. Available online at: http://www.labor.state.ny.us/stats/lslaus.shtm. Web site accessed on June 22, 2011.

New York State Department of Taxation and Finance (NYSDTF). 2011a. Office of Tax Policy Analysis, Interagency Communication. August 2011.

_____. 2011b. Office of Real Property Tax Services, Valuation Services Bureau. "Overview Manual for Valuation and Assessment of Oil and Gas Producing Property in New York State."

_____. 2011c. Office of Real Property Tax Services, Valuation Services Bureau. "2011 Tentative Oil and Gas Unit of Production Values."

_____. 2011d. Office of Real Property Tax Services Valuation Services Bureau. 2011c. "Understanding the Equalization Rate: A Guide for Property Owners."

_____. 2011e. Office of Real Property Tax Services, Valuation Services Bureau. "Statewide Full-Value Tax Rates, 2001-2010." Available online at: http://www.orps.state.ny.us/ref/pubs/fvtaxrates/statewide_10.html. Web site accessed on July 25, 2011.

Palmer, Donald R. MAI. 2008. Updated Market Analysis: The Impact of Natural Gas Pipelines on Property Values. Prepared for Palomar Gas Transmission LLC. PGP Valuation, Inc. February 21, 2008.

U.S. Bureau of Economic Analysis. 2011a. Regional Input-Output Modeling System (RIMS II), Total Multipliers for Output, Earnings, Employment, and Value Added by State: Oil and Gas Extraction (Type 1).

_____. 2011b. Regional Input-Output Modeling System (RIMS II), Total Multipliers for Output, Earnings, Employment, and Value Added for Chemung, Broome, and Tioga Counties, New York (Type 1).

_____. 2011c. Regional Input-Output Modeling System (RIMS II), Total Multipliers for Output, Earnings, Employment, and Value Added for Delaware, Sullivan, and Otsego Counties, New York (Type 1).

_____. 2011d. Regional Input-Output Modeling System (RIMS II), Total Multipliers for Output, Earnings, Employment, and Value Added for Cattaraugus and Chautauqua Counties, New York (Type 1).

_____. 2011e. National Employment Matrix for 2008. Available online at : http://data.bls.gov/oep/nioem. Accessed July 1, 2011.

U.S. Census Bureau (USCB). 2009. 2009 American Community Survey 5-Year Estimates. B25002 OCCUPANCY STATUS-Universe: HOUSING UNITS. Geography : New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed June 21, 2011.

_____. 2010. 2010 Census of Population and Housing; General Housing Characteristics 2010, 2010 Census SF-1. Geography: New York State, Chemung County, Tioga County, Broome County, Sullivan County, Delaware County, Otsego County, Chautauqua County, Cattaraugus County. Data accessed August 1, 2011.

Section 6 – Visual Impacts

New York State Department of Environmental Conservation (NYSDEC). 1992. Division of Mineral Resources. *Final Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*. July 1992.

_____. 2000. *Assessing and Mitigating Visual Impacts*, Program Policy No. DEP-00-2.

_____. 2011a. Visual EAF Addendum (Appendix B to the State Environmental Quality Review Environmental Assessment form[s]. Available online at: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/visualeaf.pdf. Web site accessed on July 24, 2011.

_____. 2011b. Stepping through the SEQR Process.

_____. 2011c. Full Environmental Assessment Form (Appendix A to the State Environmental Quality Review Environmental Assessment form[s]).

NTC Consultants. 2011. *Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and other Low-Permeability Gas Reservoirs*. Final report prepared ror The New York State Energy Research and Development Authority, Albany, New York, by NTC Consultants, Saratoga Springs, New York. Original 2009, updated 2011,

Rumbach, Andrew. 2011. *Natural Gas Drilling in the Marcellus Shale: Potential Impacts on the Tourism Economy of the Southern Tier. Prepared for the Southern Tier Central (STC) Regional Planning and Development Board*, Corning, New York; approved by the STC on June 23, 2011. Available online at: . Web site accessed July 27, 2011.

Upadhyay, Sarita Rose and Min Bu. 2010. *Visual Impacts of Natural Gas Drilling in the Marcellus Shale Region*. Cornell University, Department of City and Regional Planning: CRP 3071 Land Use, Environmental Planning, and Urban Design Worship, Fall 2010. Available online at: . Web site accessed July 23, 2011.

Section 6 – Noise Impacts

Federal Highway Authority (FHWA). 1998. Federal Highway Administration's Traffic Noise Model (FHWA TNM ®), Version 1.0, Technical Manual. February, 1998. Available online at: http://www.fhwa.dot.gov/environment/noise/traffic_noise_model/old_versions/tnm_version_10/tech_manual/index.cfm. Web site accessed on August 2, 2011.

_____. 2006. *Highway Traffic Noise: Construction Noise Handbook*. Office of Planning, Environment, & Realty. Final Report, August 2006. Available online at: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook. Web site accessed on August 2, 2011.

Section 6 – Transportation Impacts

Alaska Department of Transportation and Public Facilities. 2004. *Alaska Flexible Design Manual*. DOT&PF Research Report FHWA-AK-RD-03-01, effective April 1, 2004. Available online at: http://dot.state.ak.us/stwddes/desmaterials/assets/pdf/pvmtdesign/ch6.pdf. Web site accessed on August 17, 2011.

All Consulting. 2010. "NY DEC Information Requests" prepared for Independent Oil & Gas Association (IOGA) of New York. Project No. 1284. September 16, 2010.

Dutton, Ron and George Blankenship. 2010. Memo regarding "Perspectives on Truck Traffic Effects Associated with Potential Development of the Marcellus Shale in New York." Prepared for the New York State Energy Research and Development Authority on September 27, 2010.

New York State Department of Transportation (NYSDOT). 2011. Traffic Data Viewer (Interactive web site).

Section 7 – Visual Mitigation Measures

New York State Department of Environmental Conservation (NYSDEC). 2000. *Assessing and Mitigating Visual Impacts*, Program Policy No. DEP-00-2. Available online at: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/visual2000.pdf. Web site accessed on June 28, 2011.

NTC Consultants. 2011. *Impacts on Community Character of Horizontal Drilling and High Volume Hydrulic Fracturing in Marcellus Shale and other Low-Permeability Gas Reservoirs*. Final report prepared for the New York State Energy Research and Development Authority, Albany, New York, by NTC Consultants, Saratoga Springs, New York.

Rumbach, Andrew. 2011. *Natural Gas Drilling in the Marcellus Shale: Potential Impacts on the Tourism Economy of the Southern Tier. Prepared for the Southern Tier Central (STC) Regional Planning and Development Board*, Corning, New York; approved by the STC on June 23, 2011. Available online at: http://www.stcplanning.org/usr/Program_Areas/Energy/Naturalgas_Resources/STC_RumbachMarcellusTourismFinal.pdf. Web site accessed on July 27, 2011.

Upadhyay, Sarita Rose and Min Bu. 2010. *Visual Impacts of Natural Gas Drilling in the Marcellus Shale Region*. Cornell University, Department of City and Regional Planning: CRP 3071 Land Use, Environmental Planning, and Urban Design Worship, Fall 2010. Available online at: http://cce.cornell.edu/EnergyClimateChange/NaturalGasDev/Documents/City%20and%20Regional%20Planning%20Student%20Papers/CRP5072_Visual%20Impact_Final%20Report.pdf. Web site accessed on July 23, 2011.

Section 7 – Noise Mitigation Measures

Ground Water Protection Council Oklahoma City, OK and ALL Consulting, Tulsa, OK. 2009. Modern Shale Gas Development in the United States: A Primer. Prepared for U.S. Department of Energy Office of Fossil Energy and National Energy Technology Laboratory. Page 51. April 2009. Available online at: http://www.marcellus.psu.edu/resources/PDFs/NETLprimer.pdf

New York State Department of Environmental Conservation (NYSDEC). 1992. Division of Mineral Resources. *Final Supplemental Generic Environmental Impact Statement On The Oil, Gas and Solution Mining Regulatory Program*. July 1992.

NTC Consultants. 2011. *Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and other Low-Permeability Gas Reservoirs*. Final report prepared for the New York State Energy Research and Development Authority, Albany, New York, by NTC Consultants, Saratoga Springs, New York.

Section 7 – Transportation and Road Use Mitigation Measures

New York State Department of Transportation (NYSDOT). 2010. NYSDOT Network Level Pavement Condition Assessment V2.0w. Pavement Data Services, Albany, New York.

ICF International, 2009

Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs – Task 1

Al-Reshedan, Faisal, S., Ahamed Gawish, and Hazim N. Dmour, "Evaluation the Methodologies of Analyzing Production and Pressure Data of Hydraulic Fractured Wells in Low Permeability Gas Reservoirs", *Oil and Gas Business*, Ufa, Russia, 13 February 2009.

"Alabama lawsuit poses threat to hydraulic fracturing across US," *Drilling Contractor*, January/February 2000, p. 42-43.

Alfenore, Jacques, 2009. "Hydraulic Fracturing Challenges," Presented at Hydraulic Fracturing Technical Conference, January 19-21, 2009, The Woodlands, Texas.

Ali, Syed, et al, 2002. "Combined Stimulation and Sand Control," *Oilfield Review*, Summer 2002, p. 30-47.

Arkansas Department of Environmental Quality, Undated. "General Permits, 00000-WG-P (Reserve Pits), 00000-WG-LA (Land Application)."

Arkansas Department of Environmental Quality, 2007. "Permit 00000-WG-P, Authorization to Construct, Operate, and Close the Pits Associated with Oil and Gas Well Exploration," November 30, 2007.

Arkansas Department of Environmental Quality, 2009. "Regulations of the Arkansas Pollution Control and Ecology Commission," URL: http://www.adeq.state.ar.us/regs/default.htm, April 20, 2009.

Arkansas Oil and Gas Commission, 2009. "General Rules and Regulations", February 19, 2009.

Arkansas Code, Title 15 Natural Resources and Economic Development, Subtitle 6 Oil, Gas, and Brine, URL: http://www.arkleg.state.ar.us/SearchCenter/Pages/ArkansasCodeSearchResultPage.aspx, accessed 24 July 2009.

Arthur, J.D., et al, 2008. "Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale," Presented at Ground Water Protection Council 2008 Annual Forum, September 21-24, 2008, Cincinnati, Ohio.

Bachman, Bob, 2007. "Resolving Inconsistencies between Well Test and Designed Fracture Lengths," Presented at The Petroleum Society of the CIM Technical Luncheon, November 6, 2007.

Barree, R. D., 2009. "Hydraulic Fracture Stimulation in Tight-Gas Reservoirs." January 19, 2009.

Bennett, Les, et al, Undated. "The Source for Hydraulic Fracture Characterization," *Oilfield Review*, Winter 2005/2006, p. 47-52.

Bennion, D.B., F .B. Thomas, and R.F. Bietz, 1995. "Low Permeability Gas Reservoirs: Problems, Opportunities and Solutions for Drilling, Completion, Stimulation and Production," Presented at the Gas Technology Conference, April 28-May 1, 1996, Calgary, Alberta, Canada, Paper No. SPE 35577.

Bennion, D.B., F.B. Thomas, D.W. Bennion, and R.F. Bietz, 1996. "Fluid Design to Minimize Invasive Damage In Horizontal Wells," *The Journal of Canadian Petroleum Technology*, Vol. 35, No. 9, November 1996, p. 45-51.

Billman, Dan A., 2008. "Geological and Activity Overview of Appalachian Plays," Summer NAPE 2008, Houston, Texas.

Billman, Dan A., 2009. "Geological Overview of Appalachian Shale Plays (or ….. Why Here?, Why Now?)."

Bolin, David E., Deputy Director, State Oil and Gas Board of Alabama, Letter to Mr. Michael Paque, Executive Director, Ground Water Protection Council, May 27, 2009.

Boone, Doug, 2006. "Evaluation Of the Barnett Shale, The process and results using PowerTools and Production data," IHS Energy User Forum, 18 May 2006.

Boyer, Charles, John Kieschnick, Roberto Suarez-Rivera, Richard E. Lewis, and George Waters, 2006. "Producing gas from Its Source," *Oilfield Review*, Autumn 2006.

Bracken, Lisa, 2009. "Technical Weaknesses in Hydraulic Fracture Modeling and Execution," URL: http://www.journeyoftheforsaken.com/fracmodeling.htm, accessed 24 July 2009.

Brannon, Harold D., 2009. "Fracturing Materials," Presented at the SPE Hydraulic Fracturing Technology Conference, January 19-21, 2009, The Woodlands, Texas.

Bybee, Karen, 2009. "Technology Focus: Hydraulic Fracturing," *Journal of Petroleum Technology*, Society of Petroleum Engineers, March 2009.

Carrillo, Victor G., Chairman, Railroad Commission of Texas, Letter to Mr. Michael Paque, Executive Director, Ground Water Protection Council, May 29, 2009.

Carter, B.J., J. Desroches, A.R. Ingraffea, and P.A. Wawrzynek, 2000. "Simulating Fully 3D Hydraulic Fracturing." in *Modeling in Geomechanics*, Ed. Zaman, Booker, and Gioda, Wiley Publishers.

Chesapeake Appalachia LLC, 2009, "Application for Permit to Drill, Deepen, Plug Back or Convert a Well Subject to the Oil, Gas and Solution Mining Law", various wells, March 2009.

Chiou, Cary T., *Partition and adsorption of organic contaminants in environmental systems*, John Wiley & Sons, New York, 2002.

Chang, W., 2007. "Modeling production in hydraulically fractured wells with a reservoir simulator," April 27, 2007.

Core Labs, 2003. "Optimization of Hydraulic Fracture Design Using Geomechanics Tests," 2003.

Crisman Institute for Petroleum Research, 2008. *Crisman Institute Newsletter*, Issue 3, August 2008.

"Current Advanced Practices in Hydrofracture (Hydrofrac) - Hydraulic Fracturing of 'Tight Gas Shale' Formations: The "Listening" Well for Seismic data collection," URL: http://www.pagaslease.com/pdf_downloads/listening_wells.pdf, 2008.

Curtis, John B., David G. Hill, and Paul G. Lillis, 2008. “Realities of Shale Gas Resources: Yesterday, Today and Tomorrow,” Summer NAPE 2008, Houston, Texas.

Daneshy, A.A., 2009. "Factors Controlling The Vertical Growth of Hydraulic Fractures," Presented at Hydraulic Fracturing Technology Conference 2009, January 19-21, 2009, The Woodlands, Texas.

Darbonne, Nissa, 2006. “The Barnett Shale and Other Shale Dreams,” IHS Energy User Forum, 17 May 2006.

Delaware River Basin Commission, 2008. “Natural Gas Drilling in the Marcellus Shale Formation,” URL: http://www.state.nj.us/drbc/naturalgas.htm, November 18, 2009.

Dmour, Hazim N. and Eissa M. Shokir, 2008. “Pre-Post Frac Test Data Analysis for Hydraulically Fractured Vertical Tight Gas Well-Field Case Study,” 2008.

DOE, Energy Information Administration, 2009. “Maps: Exploration, Resources, Reserves, and Production,” URL: http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/maps/maps.htm, 2009

DOE, Office of Fossil Energy, 2007. “Development of an Advanced Hydraulic Fracture Mapping System,” Prepared under DE-FC26-04NT42108.

DOE, Office of Fossil Energy, 2009. *Modern Shale Gas Development in the United States: A Primer*, Prepared under DE-FG26-04NT15455.

DOE, Office of Fossil Energy, 2009. *State Oil and National Gas Regulations Designed to Protect Water Resources*, May 2009.

DOE, Office of Fossil Energy, 2009. *State Oil and National Gas Regulations Designed to Protect Water Resources, Reference Document*, May 2009.

DOE, Office of Legacy Management, 2008. “Rulison and Rio Blanco Sites,” Presented at the Northwest Colorado Oil and Gas Forum, September 4, 2008, Rifle, Colorado.

Dozier, George, et al, Undated. “Refracturing Works,” *Oilfield Review*, Autumn 2003, p. 38-53.

Drilling Waste Management Information System, “Fact Sheet - Using Muds and Additives with Lower Environmental Impacts,” URL: http://web.ead.anl.gov/dwm/techdesc/lower/index.cfm, accessed 9 July 2009.

Energy Resources Conservation Board, 2008. “Shallow Fracturing Operations—Interim Controls, Restricted Operations, and Technical Review,” Directive 027, April 25, 2008.

Energy Resources Conservation Board, 2008. "Clarification to Directive 027: Shallow Fracturing Operations—Interim Controls, Restricted Operations, and Technical Review," Bulletin 2008-19, April 25, 2008.

Energy Resources Conservation Board, 2009. "Shallow Fracturing Operations—Restricted Operations," Directive 027-Draft, February 25, 2009.

Engelder, Terry, 2008, "Structural geology of the Marcellus and other Devonian gas shales: Geological conundrums involving joints, layer-parallel shortening strain, and the contemporary tectonic stress field," Department of Geosciences, The Pennsylvania State University.

Engelder, Terry and Gary G. Lash, 2008, "Marcellus Shale Play's Vast Resource Potential Creating Stir in Appalachia", *The American Oil & Gas Reporter*, May 2008.

Engelder, Terry and Gary G. Lash, 2008, "Science behind the Marcellus Play, The Devonian Black Shale Play of the Appalachian Basin".

Fesmire, Mark E.,Director, New Mexico Oil Conservation Division, Letter to Mr. Michael Paque, Executive Director, Ground Water Protection Council, May 29, 2009.

Fischer, T., S. Hainzl, Z. Jechumtalova, and L. Eisner, Undated. "Microseismic Signatures of Hydraulic Fracture Propagation in Sediment Formations," Proceedings from the Thirty-Third Workshop on Geothermal Reservoir Engineering, January 28-30, 2008, Stanford University, Stanford, California.

Flesher, Robert, 2009. "Stimulation in Tight Gas Sands," Presented at Hydraulic Fracturing Technology Conference 2009, January 19-21, 2009, The Woodlands, Texas.

Fokker, Peter, 2007. "Hydraulic Fracturing," TNO Built Environment and Geosciences, Geological Survey of the Netherlands, The Netherlands.

"The Future of Water Recycling," *Fort Worth Basin Oil & Gas Magazine*, Issue No. 14, February 2009.

GAO, 1989. *Drinking Water - Safeguards Are Not Preventing Contamination From Injected Oil and Gas Wastes*, Report to the Chairman, Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives, July 1989.

Geospace Technologies, 2004. "Microseismic hydraulic fracture monitoring," 2004.

Givens, Natalie and Hank Zhao, 2009. "The Barnett Shale: Not So Simple After All," *Republic Energy*, URL: http://republicenergy.com/Articles/Barnett_Shale/Barnett.aspx, 2009.

Gottschling, J .C., T. N. Royce, and L. Z. Shuck, 1985. “Nitrogen Gas and Sand: A New Technique for Stimulation of Devonian Shale,” *Journal of Petroleum Technology*, May 1985, p. 901-907.

Ground Water Protection Council, 1998, *Survey Results on Inventory and Extent of Hydraulic Fracturing in Coalbed Methane Wells in the Producing States*, December 15, 1998.

Ground Water Protection Council, 2009. “Statement of Scott Kell before the House Committee On Natural Resources Subcommittee on Energy and Mineral Resources”, Washington, D.C., June 4, 2009.

Halliburton, 2008. “Trends in Unconventional Gas,” Articles from *Oil and Gas Journal*, 2007-2008.

Halliburton, 2007. “Advances in Unconventional Gas,” Hart Energy Publishing, Houston, Texas.

Harper, John A., “The Marcellus Shale—An Old “New” Gas Reservoir in Pennsylvania,” *Pennsylvania Geography*, Spring 2008, Vol. 38, No. 1.

Hawkes, R., 2007. "Pre-frac Reservoir Characterization from Perforation Inflow Diagnostic (PID) Testing - Measure Twice –Frac Once," Presented as part of the Society of Petroleum Engineers Distinguished Lecturer Series.

Haywood, Phaedra, 2008. “Panel gives green light to drilling ordinance,” The New Mexican, Santa Fe, 9 December 2008.

Heinze, Jim, “Stimulation in Gas Shales,” Presented at Hydraulic Fracturing Technology Conference 2009, January 19-21, 2009, The Woodlands, Texas.

Hexion, S.V."Fracturing Technology: Improving technology for fracture height,” *E&P Magazine*, September 2008.

Hill, David G., Tracy E. Lombardi and John P. Martin, 2003, “Fractured Shale Gas Potential in New York”, New York State Energy Research and Development Authority, Albany, New York, USA.

Holditch, Stephen A., 2009. “Summary of Ideas on How Hydraulic Fracture Treatment Technology Transfer Will Expand Development of Unconventional Gas Worldwide,” Presented at Hydraulic Fracturing Technology Conference 2009, January 19-21, 2009, The Woodlands, Texas.

“Innovative water conservation technology,” *Oil & Gas Network Magazine*, 20 April 2006.

Independent Petroleum Association of America, 2007. *The Oil & Gas Producing Industry in Your State*,” Washington, D.C., August 2007.

IUPAC-NIST Solubility Database, Version 1.0, NIST Standard Reference Database 106, URL: http://srdata.nist.gov/solubility/index.aspx.

Jacoby, C. H. and L. F. Dellwig, "Appalachian Foreland Thrusting in Salina Salt, Watkins Glen, New York," Presented at the Fourth International Symposium on Salt-Northern Ohio Geological Survey.

Joseph, D. D., 2000. "Direct Simulation of the Motion of Particles in Flowing Liquids: Industrial Problems: Hydraulic Fracturing," *Industrial Problems*, URL: http://www.aem.umn.edu/Solid-Liquid_Flows/industry.html, 2000.

Kaufman, P., G.S. Penny, and J. Paktinat, 2008. "Critical Evaluations of Additives Used in Shale Slickwater Fracs," SPE 119900, Presented at 2008 SPE Shale Gas Production Conference, November 16-18, 2008, Irving, Texas.

Kell, Scott, Testimony on behalf of the Ground Water Protection Council to the House Committee on Natural Resources, Subcommittee on Energy and Mineral Resources, Washington, DC, June 4, 2009.

Kell, Scott, Letter to Mr. Michael Paque, Executive Director, Ground Water Protection Council, May 27, 2009.

Kopel, Dave, "ProPublica's shaky facts," *Rocky Mountain News*. January 10, 2009.

Lambe, T. William, *Soil Testing for Engineers*, John Wiley & Sons, Inc., New York, 1951.

Lash, Gary G., 2008. "Stratigraphy and Fracture History of the Middle and Upper Devonian Succession, Western New York – Significance to Basin Evolution and Hydrocarbon Exploration", Dept. of Geosciences, SUNY Fredonia, New York.

Lee, Joseph, J., Letter to Mr. Michael Paque, Executive Director, Ground Water Protection Council, June 1, 2009.

Louisiana Administrative Code, 2007. Title 43, Part 9, "Office of Conservation—Natural Gas Policy Act," December 2007.

Louisiana Administrative Code, 2007. Title 43, Part 15, "Office of Conservation—Surface Mining," October 2007.

Louisiana Administrative Code, 2007. Title 43, Part 17, "Office of Conservation—Injection and Mining," October 2007.

Louisiana Administrative Code, 2008. Title 43, Part 19, "Office of Conservation—General Operations," Subpart 1. Statewide Order No. 29-B, December 2008.

Louisiana Office of Conservation, 2006. "Engineering Division Permit and Reservoir Section," URL: http://dnr.louisiana.gov/cons/CONSEREN/Permits/permitssection.ssi, September 28 2006

Majer, Ernest L., John E. Peterson, Thomas Daley, Kurt NiHei, Larry Myer, Don Vasco, Chris Doughty, John Queen, Peter D'Onfro, William Rizer, and Akhil Datta-Gupta, 1998. "Results of High Resolution Seismic Imaging Experiments for Defining Permeable Pathways in Fractured Gas Reservoirs," DOE Contract No. DE-AC03-76SF00098.

Malpani, R.V., December 2006. *Selection of Fracturing Fluid for Stimulating Tight Gas Reservoirs*, Thesis for Master of Science in Petroleum Engineering, Texas A&M University.

"Marcellus Shale - Appalachian Basin Natural Gas Play," Geology.com, URL: http://geology.com/articles/marcellus-shale.shtml.

Martin, T., 2007. "Appropriate Hydraulic Fracturing Technologies for Mature Oil and Gas Formations," Presented as part of the Society of Petroleum Engineers Distinguished Lecturer Program.

Matthews, H. Lee, "Overview of Shale Gas Stimulation Techniques," Search and Discovery Article #40335, Adapted from oral presentation at AAPG Annual Convention, April 20-23, 2008, San Antonio, Texas.

Maxwell, S.C., T.I. Urbancic, N. Steinsberger, Devon, and R. Zinno, "Fracs tracked using microseismic images," *E&P*, August 2003, p. 58-59.

Mayerhofer, M.J., E.P. Lolon, J.F. Youngblood, and J.R. Heinze, 2006. "Integration of Microseimic Fracture Mapping Results With Numerical Fracture Network Production Modeling in the Barnett Shale," Report No. SPE 102103, Prepared for SPE Annual Technical Conference and Exhibition, September 24-27, 2006, San Antonio, Texas.

Mayerhofer, Michael, Norm Warpinski, and Elyezer Lolon, 2008. "Use of Fracture-Mapping Technologies to Improve Well Completions in Shale Reservoirs," Search and Discovery Article #40336, Adapted from oral presentation at AAPG Annual Convention, April 20-23, 2008.

Milliken, L. D., M. E. Piel, S. M. Trader, and S. W. Gowan, 2006. "Stratigraphy of the Devonian and Upper Silurian in the Vicinity of the Retsof, Sterling, and Hampton Corners Mines in Livingston County, New York," New York State Museum Map and Chart Series No. 45.

Mills, Kelly W., 2006. *Updated Evaluation for the North-Central Texas – Trinity and Woodbine Aquifers – Priority Groundwater Management Study Area*, Draft, Priority Groundwater Management Area File Report, September 2006.

Mohaghegh, S., B. Balan, S. Ameri, and D.S. McVey, 1996. "A Hybrid, Neuro-Genetic Approach to Hydraulic Fracture Treatment Design and Optimization," SPE 36602, Presented at the SPE Annual Technical Conference & Exhibition, October 6-9, 1996, Denver, Colorado, Report No. SPE 36602.

National Resource Defense Council, 2002. "Hydraulic Fracturing of Coalbed Methane Wells: A Threat to Drinking Water," January 2002.

New York Codes, Rules, and Regulations, Title 6 Department of Environmental Conservation, Chapter V Resource Management Services, Subchapter B Mineral Resources, 6 NYCRR Parts 550 through 559, (as of 5 April 2009).

New York State, 2009, Environmental Conservation Law, Article 23, URL: http://public.leginfo.state.ny.us, accessed 4 August 2009.

NYSERDA, 2007, *New York's Natural Gas and Oil Resource Endowment: Past, Present and Potential*.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, Undated."Affirmation of Acreage Control & Rights in Target Formation."

NYSDEC, Division of Mineral Resources, Undated. "Annual Well Report."

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2008. "Application for A.P.I Well Identification Number," Form No. 85-16-1 (04/08), April 2008.

NYSDEC, Division of Mineral Resources, 1992. *Final Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program*, July 1992.

NYSDEC, Division of Mineral Resources, "Applicant's Checklist for Spacing Unit Map," Undated.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, Undated. "Template Letter for Certificate Deposit."

NYSDEC, -Bureau of Oil and Gas Regulation, Undated. "Compulsory Integration Election Form," Form No. 06-1-1.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Application for Permit to Drill, Deepen, Plug Back or Convert a Well Subject to the Oil, Gas and Solution Mining Law," Form No. 85-12-5 (10/07), October 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Instruction for Application for Permit to Drill, Deepen, Plug Back or Convert a Well Subject to the Oil, Gas and Solution Mining Law Form," Form No. 85-12-5 (10/07), October 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Environmental Assessment Form, Form No. 85-16-5 (1/07)-10b, January 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 1984. Financial Security Worksheet, Form No. 85-11-2 (11/84), November 1984.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, Undated. "Template Letter for Irrevocable Letter of Credit."

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2006. "Notice of Intention to Plug and Abandon," Form No. 85-12-4 (01/06)-27b, January 2006.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2006. "Instructions for Notice of Intention to Plug and Abandon Form," Form No. 85-12-4 (01/06)-27b, January 2006.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, Undated. "Application for a Non-conforming Spacing Unit or a Variance from Regulatory Well Spacing," Form No. 07-01-05.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Organizational Report," Form No. 85-15-12 (6/07)–28b, June 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2006. "Plugging Report," Form No. 85-15-8 (06/06)--7f, June 2006.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2006. "Instruction for Plugging Report Form," Form No. 85-15-8 (06/06)--7f, June 2006.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2004. "Request for Shut-in or Temporary Abandonment," Form No. 85-16-4 (11/04)–10d, November 2004.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2006. "Request for Well Transfer," Form No. 85-12-9 (2/06)–10g, February 2006.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Application for Transfer of Underground Storage Permit and Application for Transfer of Pending Underground Storage Application," Form No. 07-ST-1 (1/07), January 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, Undated. "Application for Transfer of Underground Storage Permit and Application for Transfer of Pending Underground Storage Application – General Instructions."

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Well Drilling and Completion Report," Form No. 85-15-7 (10/07)--28a, October 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2007. "Instructions for Well Drilling and Completion Report Form," Form No. 85-15-7 (10/07)--28a, October 2007.

NYSDEC, Division of Mineral Resources-Bureau of Oil and Gas Regulation, 2008. "Well Plugging and Surface Restoration Bond," Form No. 85-02-2 (04/08)–10a, April 2008.

NYSDEC, 2009. "Designing and Drilling Your Well," URL: http://www.dec.ny.gov/energy/1628.html, 2009.

NYSDEC, 2009, "Final Scope for Draft Supplemental Generic Environmental Impact Statement (dSGEIS) on the Oil, Gas And Solution Mining Regulatory Program, Well Permit Issuance For Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-permeability Gas Reservoirs", February 2009.

NYSDEC, 2009. "Financial Security," URL: http://www.dec.ny.gov/energy/1622.html, 2009.

NYSDEC. 2009, "Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program," URL: http://www.dec.ny.gov/energy/45912.html, accessed 3 February 2009.

NYSDEC, 2009. "Mineral Resources Environmental Notice Bulletin," URL: http://www.dec.ny.gov/energy/1634.html, 2009.

NYSDEC, 2009. "Oil, Gas and Solution Salt Mining Forms," URL: http://www.dec.ny.gov/energy/4761.html, 2009.

NYSDEC, 2009. "Organizational Report," URL: http://www.dec.ny.gov/energy/1624.html, 2009.

NYSDEC, 2009. "Required Reports," URL: http://www.dec.ny.gov/energy/1616.html, 2009.

NYSDEC, 2009. "Regulated Well Types," URL: http://www.dec.ny.gov/energy/1632.html, 2009.

NYSDEC, 2009. "Shut-In or Temporary Abandonment," URL: http://www.dec.ny.gov/energy/1614.html, 2009.

NYSDEC, 2009. "Technical Guidance Memoranda," URL: http://www.dec.ny.gov/energy/1626.html, 2009.

NYSDEC, 2009. "Underground Gas Storage Permitting Process," URL: http://www.dec.ny.gov/energy/1612.html, 2009.

NYSDEC, 2009. "Well Owner and Applicants Information Center," URL: http://www.dec.ny.gov/energy/1522.html, 2009.

NYSDEC, 2009. "Well Ownership Responsibilities," URL: http://www.dec.ny.gov/energy/1639.html, 2009.

NYSDEC, 2009. "Well Permitting Process," URL: http://www.dec.ny.gov/energy/1772.html, 2009.

NYSDEC, 2009. "Well Plugging," URL: http://www.dec.ny.gov/energy/1618.html, 2009.

NYSDEC, 2009. "Well Transfer," URL: http://www.dec.ny.gov/energy/1620.html, 2009.

PADEP, Undated. "Table 1, Summary of Hydraulic Fracture Solutions – Marcellus Shale."

PADEP, 2007. "Oil and Gas Well Drilling and Production in Pennsylvania," Fact Sheet, April 2007.

PADEP, Undated. "Bureau of Oil and Gas Management," URL: http://www.dep.state.pa.us/dep/deputate/minres/OILGAS/oilgas.htm.

PADEP, Bureau of Oil and Gas Management, 2001. *Oil and Gas Operators Manua*l, Document No. 550-0300-001, October 30, 2001.

PADEP, Bureau of Oil and Gas Management, Bureau of Watershed Management, 2008. "Application Addendum and Instructions for Marcellus Shale Gas Well Development," Form No. 5500-PM-OG0083, October 2008.

PADEP, Bureau of Oil and Gas Management, Bureau of Watershed Management, 2008. "Application Addendum for Marcellus Shale Gas Well Development Checklist for Submittal," Form No. 5500-PM-OG0083, October 2008.

Paktinat, J., J. Pinkhouse, J. Fontaine, G. Lash, and G. Penny, 2009. "Investigation of Methods to Improve Utica Shale Hydraulic Fracturing in the Appalachian Basin," Search and Discovery Article #40391(2009), Adapted from extended abstract presented at AAPG Convention, April 20-23, 2008, San Antonio, Texas, March 16, 2009.

Pennsylvania Code, Chapter 78. Oil and Gas Wells, August 1, 1987.

Pennsylvania Code, Chapter 79. Oil and Gas Conservation, August 13, 1971.

Pennsylvania Code, Chapter 91. General Provisions, September 3, 1971.

Pennsylvania Department of Community & Economic Development, Undated. "More on Marcellus Shale Factsheet."

Popa, Andrei S., Shahab D. Mohaghegh, Razi Gaskari, and Samuel Ameri,, 2003. "Identification of Contaminated Data in Hydraulic Fracturing Databases: Application to the Codell

Formation in the DJ Basin," SPE 83446, Presented at the SPE Western Regional/AAPG Pacific Section Joint Meeting, May 19–24, 2003, Long Beach, California.

Powell, Gene, 2008. "2008 Tarrant County Barnett Shale Well Revenue Estimate For Neighborhoods," *Powell Barnett Shale Newsletter*, 5 May 2008.

Petroleum Technology Alliance Canada, 2006. *Filling the Gap: Unconventional Gas Technology Roadmap*, June 2006.

PTTC, 2006. *PTTC Appalachian Region Newsletter* , Fall 2006, Vol. 7, No. 2.

Railroad Commission of Texas, Undated. "Oil & Gas Permits," http://www.rrc.state.tx.us/licenses/og/index.php.

Railroad Commission of Texas, 2008. "Oil & Gas Proposals for Decision and Orders," URL: http://www.rrc.state.tx.us/meetings/ogpfd/index.php, March 25, 2008.

Railroad Commission of Texas, 2008. "Water Use in the Barnett Shale," URL: http://www.rrc.state.tx.us/barnettshale/wateruse_barnettshale.php, July 30, 2008.

Reynolds, Rodney R., "Produced Water and Associated Issues," Oklahoma Geological Survey, Open-File Report 6-2003. 2003.

Russell, William L., 1972, "Pressure-Depth Relations in Appalachian Region", *AAPG Bulletin*, March 1972, v. 56, No. 3, p. 528-536.

Schein, Gary, 2009. "Hydraulic Fracturing in Gas Shale Plays - Are They All the Same?" Presented at the Barnett Shale Breakfast Symposium, February 29, 2009.

Schlumberger, 2003, *Services*, "DataFRAC Service."

Schlumberger, 2006. "Improve Production with Optimum Fracture Design in Real Time." October 2006.

Schlumberger, 2009. "Case Study: StimMORE Service Increases EUR in Barnett Shale Well by 0.25 Bcf, Integrated approach results in daily production increase of nearly threefold."

Settari, A, 2009. "Review of Fracturing Modeling Technology," Presented at the SPE Hydraulic Fracturing Technology Conference, The Woodlands, Texas, January 19-21, 2009.

Sharma, M.M. et al, 2003. "The Impact of Proppant Placement on the Productivity of Tight Gas Wells," *GasTIPS*, Fall 2003.

Siebrits, E., J.L. Elbel, R.S. Hoover, I.R. Diyashev, L.G. Griffin, S.L. Demetrius, C.A. Wright, B.M. Davidson, and D.G. Hill, 2000, "Refracture Reorientation Enhances Gas Production

in Barnett Shale Tight Gas Wells," SPE 63030, Presented at the 2000 SPE Annual Technical Conference and Exhibition, October 1-4, 2000, Dallas, Texas.

Simon, Yves, 2006. "Stress and fracture characterization in a shale reservoir, North Texas, using correlation between seismic attributes and well data," NAPE, August 22, 2006.

Soeder, Daniel J., "Porosity and Permeability of Eastern Devonian Gas Shale," SPE Formation Evaluation, March 1988, p. 116-124.

Stark, Pete and Curtis Smith, "Perspectives: Cost & Performance Factors Driving the Future of Unconventional Gas," AAPG Annual Meeting, San Antonio, April 22, 2008.

Susquehanna River Basin Commission, Undated. "Marcellus Shale and Natural Gas Well Development," URL: http://www.srbc.net/programs/projreviewmarcellus.htm.

TAURUS Reservoir Solutions Ltd., 2008, "Shallow Nitrogen Fracturing Dimensions and Groundwater Protection, Evaluation of the ERCB Directive 27, Final report," October 8, 2008.

Texas A&M University, 2000. "Simulation and Behavior of Fractured Wells Volume II," July 2000.

Texas Administrative Code, Title 16, Part 1, Chapter 3, Oil and Gas Division.

Tosic, Slavko, Christine Ehlig-Economides, Michael J. Economides, and Mike C. Vincent, Undated. "New Flux Surveillance Approach for High Rate Wells," SPE 115689.

Tschirhart, Nicholas Ray, August 2005. *The Evaluation Of Waterfrac Technology in Low-Permeability Gas Sands in the East Texas Basin*, A Thesis for Master of Science in Petroleum Engineering, Texas A&M University.

United States Code of Federal Regulations, 40 CFR Part 144, Underground Injection Control Program (as of 22 July 2009)

United States Code of Federal Regulations, 40 CFR Part 146, Underground Injection Control Program: Criteria and Standards (as of 22 July 2009)

U.S. EPA, 1998. "Legal Issues Related to Coalbed Methane Storage in Abandoned Coal Mines in Virginia, West Virginia, Pennsylvania, Utah, Colorado and Alabama," White paper prepared under Work Assignment 3-1 of the EPA Contract 68-W5-0018, June 20, 1998.

U.S. EPA, 2003, "Elimination of Diesel Fuel in Hydraulic Fracturing Fluids Injected into Underground Sources of Drinking Water During Hydraulic Fracturing of Coalbed Methane Wells", Memorandum of Agreement Between the United States Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc., and Schlumberger Technology Corporation, 12 December 2003.

U.S. EPA, 2004. *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs*, Report number: EPA 816-R-04-003.

U.S. EPA, 2009. "Coalbed Methane Outreach Program (CMOP)," URL: http://www.epa.gov/coalbed/, February 19, 2009.

U.S. EPA, Undated. "Fracturing Technologies For Improving CMM/CBM Prodction," Prepared under Contract 68-W-00-094.

U.S. EPA, Undated. "Methane to Markets International Coal Mine Methane Projects Database," URL: http://www2.ergweb.com/cmm/index.aspx.

U.S. EPA, Office of Water, 2008. "Contaminant Candidate List 3 Chemicals: Classification of the PCCL to CCL," Draft Report No. EPA 815-R-08-004, February 2008.

Vera, Sergio Armando Jerez, December 2006. *Using multi-layer models to forecast gas flow rates in tight gas reservoirs*, Thesis for Master of Science in Petroleum Engineering, Texas A&M University.

Warpinski, N.R., James E. Uhl, and Bruce P. Engler, 1997. "Review of Hydraulic Fracture Mapping Using Advanced Accelerometer-Based Receiver Systems."

Warpinski, N.R, "Patent for apparatus and method for monitoring underground fracturing," U.S. Patent number: 5934373, Issued 10 August 1999.

Wiley, C., Bob Barree, Mike Eberhard, and Tom Lantz, 2004. "Improved Horizontal Well Stimulations in the Bakken Formation, Williston Basin, Montana," Prepared for SPE Annual Technical Conference and Exhibition, Houston, Texas, September 25-29, 2004.

Willberg, D. M., R.J. Card, L.K. Britt, M. Samuel, K.W. England, L. Cawiezel, and H. Krus, "Determination of the effect of formation water on fracture fluid cleanup through field testing in the East Texas Cotton Valley," SPE annual technical conference, San Antonio TX, 5-8 October 1997.

Zhang, Lianyang, 2005. *Engineering Properties of Rocks*, Elsevier Geo-Engineering Book Series, Volume 4, Amsterdam.

Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low Permeability Gas Reservoirs – Task 2

All Consulting. Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs www.all-llc.com/shale/ArthurHydrFracPaperFINAL.pdf

American Petroleum Institute. Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry. February, 2004. Page 6-9

Argonne national Laboratory: EVS. Trip Report for Field Visit to Fayetteville Shale Gas Wells www.evs.anl.gov/pub/doc/ANL-EVS_R07-4TripReport.pdf

Bullin, Keith, et al. "Compositional Variety Complicates Processing Plans for US Shale Gas." Oil and Gas Journal. Vol 107, Issue 10. 9 March 2009. ogj.com/articles/article_display.cfm?ARTICLE_ID=355486&p=7&section=ARCHI&subsection=none&c=none&page=1&x=y&x=y&x=y

Bureau of Land Management: Wyoming. Hornbuckle Field Horizontal Drilling Program www.blm.gov/pgdata/etc/medialib/blm/wy/information/NEPA/cfodocs/hornbuckle.Par.11552.File.dat/ch2.pdf

"Compositional variety complicates processing plans for US shale gas" Oil and Gas Journal. Vol 107, Issue 10. 9 Mar 2009

Energy Information Administration. tonto.eia.doe.gov/FTPROOT/modeldoc/m063(2001).pdf, pg 11

Environmental Defense Fund. Emissions from Natural Gas Production in the Barnett Shale Area and Opportunities for Cost-Effective Improvements. 26 Jan 2009. www.edf.org/documents/9235_Barnett_Shale_Report.pdf

EPA AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. epa.gov/ttn/chief/ap42/index.html

EPA AP-42, Fifth Edition. Table 1.4-2 www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

EPA AP-42, Fifth Edition. Table 13.5-1. www.epa.gov/ttn/chief/ap42/ch13/final/c13s05.pdf

Final Statewide Oil and Gas EIS and Proposed Amendment of the Powder River and Billings RMP's (Montana CBM EIS) - www.deq.state.mt.us/CoalBedMethane/FinalEIS/Volume%20I/07%20Chapter-4.pdf

Gas Research Institute, Methane Emissions from the Natural Gas Industry, Volume 8. epa.gov/gasstar/tools/related.html

Gas Technology Institute. gastechnology.org/webroot/app/xn/xd.aspx?it=enweb&xd=10abstractpage\12352.xml

Jared Hall, East Resources Inc. General Mgr. Teleconference @ 2p.m. 4/13/09

M-I SWACO: Land Mud-Gas Separator Features & Benefits. www.miswaco.com/Products_and_Services/Drilling_Solutions/Pressure_Control/Mud_Gas_Separators/Mud_Gas_SeparatorsDocuments/LAND%20MUD-GAS%20SEPARATOR.cfm

Michigan DEQ, Environmental Science and Services Division. Emission Calculation Fact Sheet. Fact Sheet #9845. October, 2006

NY DEC SGEIS Information Request Responses from Fortuna, Chesapeake and East Resources

OSHA. www.osha.gov/SLTC/etools/oilandgas/illustrated_glossary/mud_return_line.html

Pennsylvania Department of Environmental Protection. Permit Workload Report. www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/Marcellus/Marcellus.htm

Personal Contact, Kathleen Sanford, NYS DEC, 6/15/2009

Petrocasa Energy, Inc. www.petrocasa.com/3D%20Rig%20Animation%20Web%20Version/index.html

Pipeline Rules of Thumb Handbook, 4th edition. Horsepower selection chart, page 262

Summary of Chesapeake Delaware County applications for 23 horizontal wells. Provided by Carrie Friello (NYS DEC)

U.S. Department of Energy (DOE). Office of Fossil Energy. "Modern Shale Gas Development in the United States: A Primer" A Primer www.all-llc.com/pdf/ShaleGasPrimer2009.pdf

U.S. Environmental Protection Agency. Frequent Questions. iaq.custhelp.com/cgi-bin/iaq.cfg/php/enduser/std_adp.php?p_faqid=3218

U.S. EPA. Natural Gas STAR Program. "Lessons Learned: Reducing Methane Emissions from Compressor Rod Packing Systems". www.epa.gov/gasstar/documents/ll_rodpack.pdf

U.S. EPA. Natural Gas STAR Program. "Lessons Learned: Replacing Glycol Dehydrators with Desiccant Dehydrators". www.epa.gov/gasstar/documents/ll_desde.pdf

U.S. EPA. Natural Gas STAR Program. "Lessons Learned: Vapor Recovery Tower/VRU Configuration". www.epa.gov/gasstar/documents/vrt_vru_configuration_08_21_07.pdf

U.S. EPA. Natural Gas STAR Program. Draft EPA Lessons Learned – Reduced Emissions Completions

U.S. EPA. Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Chapter 13: Miscellaneous Sources. www.epa.gov/ttnchie1/ap42/ch13/final/c13s05.pdf

Wyoming DEQ Air Quality Division. Oil and Gas Production Facilities Chapter 6, Section 2 Permitting Guidance. June 1997. August 2007 revision

NTC, 2011

Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and Other Low-Permeability Gas Reservoirs

Adverse Impact Reduction Handbook – Reducing Onshore Natural Gas & Oil Exploration and Production Impacts Using a Broad-Based Stakeholder Approach. Interstate Oil & Gas Compact Commission (2008)

Adverse Impact Reduction – Stepping Lightly: Reducing the Environmental Footprint of Oil and Gas Production. Interstate Oil & Gas Compact Commission (undated)

Air Emissions and Regulations Fact Sheet. Chesapeake Energy (March 2009)

An Enduring Resource: A Perspective on the Past, Present and Future Contributions of the Barnett Shale and the Economy of Fort Worth and Surrounding Areas. Perryman Group, The (March 2009)

AOTSNY - Sample Weight Limit Local Laws. (web posting undated)

Appalachian Basin Black Shale Exploitations: Past, Present, and Future. (Power Point Presentation) John Gottschling, Regional Tech. Rep. BJ Services Company, U.S.A. (5/16 & 5/17, 2007)

Bedford, Texas – Drilling Ordinance Comparison Sheet. (undated)

Better With the Shale Than Without. Press Release: Fort Worth Chamber of Commerce (3/11/09)

BLM Q & A Fact Sheet – Roan Plateau Planning Area – Reasonable Foreseeable Development (RFD) 10/24/04)

Bounty from Below: The Impact Associated with the Barnett Shale on Business Activity in Fort Worth and the Surrounding 14-County Area. The Perryman Group, May 2007.

Bounty from Below – The Impact of Developing Natural Gas Resources Associated with Barnett Shale. Perryman Group, The (May 2008)

Chesapeake Energy – Natural Gas Development & Production – Marcellus Shale, J.E. Grey May 14, 2009.

Chesapeake/Statoil Hydro – Marcellus Black Shale. Steinar Eikaas, et al (November 2008)

Chesapeake Quick News (Newsletter). (October 2008)

City of Fort Worth, Texas – Gas Drilling Ordinance. (2008)

Colorado – House Bill 07-1252 – Concerning the Accommodation of the Rights of Surface Owners with Respect to Oil and Gas Operators.

Community Safety and Emergency Response Fact Sheet. Chesapeake Energy (March 2009)

Disposal of Spent Drilling Fluids to Publically Owned Treatment Works (POTW's). Alan A. Fuchs, NYSDEC – Division of Water (10/21/08)

Economic Impact of Barnett. Perryman Group, The (undated power point slide)

Economic Impact of the Fayetteville Shale in White County, Arkansas, The. Kathy Deck, Sam M. Walton College of Business (2008)

Economic Impact of the Oil & Gas Industry in Pennsylvania, The. Pennsylvania Economic League. (November 2008)

Economic Workforce Brief – Forecast of the Potential Impact of Increased Royalty Income on the Pennsylvania Economy 2008-1.1 (June 2008)

Environmental Resources for Tribal Energy Development – Office of Indian Energy and Economic Development. Tribal Energy and Environmental Information Clearing House (undated web site).

Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs. J. Daniel Arthur, et al (2008)

Experience in Sublette County. Penn State, Ecosystem Research Group (undated power point slide)

Farmers Branch Texas – Ordinance #2946 Regulating Well Drilling. (undated)

Flower Mound Texas – Oil and Gas Drilling Ordinance Comparison Chart. (May 2007)

Forest Landowners & Natural Gas Development, Marcellus Education Fact Sheet – Penn State, College of Agriculture (2008)

Forestry – Press Release. Pennsylvania DOC – NRB (2008)

Fortuna NY DEC SGEIS Response, Rick Kessy, Fortuna Energy (May 27, 2009)

Fractured Shale Gas Potential in New York – David G. Hill and Tracy E. Lombardi & John P. Martin – undated

Gas Rights and Right of Way Leasing Pointers for Forest Owners. Cornell Cooperative Extension (12/15/08)

Gas Well Drilling Noise Impacts and Mitigation Study. Behiens and Associates, Inc. (April 2006)

Geological and Activity Overview of Appalachian Plays (Power Point Presentation). Dan A. Billman, P.G. CPG. April 2008)

Goldbook, 4th Edition, revised 2007 – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. Bureau of Land Management (2007)

Hearing on The Environmental Impact of Drilling and Development of Natural Gas. Memo to NYS Assembly – Michael P. Joy, PhD. Esq. (10/16/08)

Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale. Daniel Arthur, P.E., et al (9/21/08)

Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale. Groundwater Protection Council (9/23/08)

Information Gathering on Hydraulic Fracturing of Shale Formation for Gas Production. G. Struyk., Fortuna Energy, Inc. (8/14/08)

Jonah/Anticline Fields Direct Workforce Through Three Phases. Penn State, Ecosystem Research Group (undated power point slide)

Kentucky Erosion Prevention and Sediment Control Field Guide: Kentucky Division of Water Nonpoint Source Section and Kentucky Division of Conservation.

Low Risk Site Handbook for Erosion Potential and Sediment Control: Vermont Department of Environmental Conservation (2006)

Marcellus Shale Hydraulic Fracturing Fact Sheet. Chesapeake Energy (March 2009)

Marcellus Shale Play's Vast Resource Potential. T. Engelder & G. Lash (May 2008)

Modern Shale Gas Development in the U.S., A Primer. U.S. Department of Energy, Office of Fossil Energy (April 2009)

Natural Gas and Local Governments. Timothy Kelsey, PhD, Penn State Cooperative Extension (2009)

NYS-DEC Policy DEP-00-1 – Assessing and Mitigating Noise Impacts (10/06/00 – Last Revised 02/02/01)

NYS-DEC Policy DEP-00-2 – Assessing and Mitigating Visual Impacts (7/31/00)

NY DEC SGEIS Information Requests, Independent Oil and Gas Association of New York (IOGA), Project No: 1284 (09/16/10)

New York State – Open Space Conservation Plan (2006)

NYS Vehicle Traffic Law §1660 – Weight Limits on Town Roads. (undated)

Notice of Change to City of Grand Prairie, Texas – Code of Ordinances – Summary. (5/6/08)

Notice of Determination of Non-Significance – API# 31-015-2290-00, Permit 08828 (February 13, 2002).

Oil & Gas Lease Sale - Pennsylvania DOC – NRB – Forestry. (September 2008)

Oil & Gas Position Statement. Pennsylvania DOC – NRB – Forestry (April 1, 2008)

Oil & Gas Program (slide show). Pennsylvania DOC – NRB – Forestry (2008)

Potential Development of the Natural Resources in the Marcellus Shale (New York, Pennsylvania, West Virginia & Ohio). National Park Service – U.S. Department of the Interior (December 2008).

Potential Development of the Natural Gas Resources in the Marcellus Shale – New York, Pennsylvania, West Virginia & Ohio. (National Park Service – U.S. Department of the Interior – December 2008)

Potential Economic Impacts of Marcellus Shale in Pennsylvania. Timothy W. Kelsey, PhD, Penn State Cooperative Extension – (2009)

Potential Environmental Impacts Associated with Proposed Marcellus Shale Wells. Talisman Energy, Linda Collart, Mineral Resources Supervisor (7/3/08).

Preparing for Natural Gas Development: Understanding Impacts and Protecting Public Assets. Gas Drilling Task Force, The: (2/13/09)

Projecting the Economic Impact of the Fayetteville Shale Play 2005 – 2008. Sam M. Walton College of Business. (May 2006)

Projecting the Economic Impact of the Fayetteville Shale Play (2008-2012). Sam M. Walton College of Business (March 2008)

Protecting Water, Producing Gases. Mary Griffiths, Pembina Institute, Alberta Canada. (April 2007).

Reasonably Foreseeable Development Report – Roan Plateau (Question and Answer Fact Sheet). Bureau of Land Management (2004)

Reasonably Foreseeable Development Scenario for Oil & Gas (RFD) "Life of Area" Forecast for ultimate development of lease - Bureau of Land Management (2004)

Reasonably Foreseeable Development Scenario for Oil and Gas Activities In the BLM White River Field Office. Bureau of Land Management (Executive Summary, Undated).

Responses to Notice of Incomplete Applications. Chesapeake Energy (3/9/09)

Responses to NY DEC SGEIS Information Requests. Chesapeake Energy (June 4, 2009)

Responses to NYDEC SGEIS Informational Request. East Resources. (5/21/09)

Responses to NYDEC SGEIS Informational Request. Fortuna (5/22/09)

Responses to NYDEC SGEIS Informational Request. Seneca (6/3/09)

Revised Policy for Reasonably Foreseeable Development Scenarios for Oil & Gas. Bryce Baslan, Division of Fluid Minerals (2008)

Roan Plateau Fact Sheet – Impacts of Oil and Gas Drilling. (7/7/04)

Rural Development Paper No. 43 – Energy Boomtowns & Natural Gas. Jeffrey Jacquet, NERCRD. (January 2009)

Santa Fe County Oil & Gas Amendment to the Santa Fe County Land Development Code. Ordinance No. 2008-19 (12/10/08)

Schlumberger – Shale Gas: Explanation of Gas Shale – Barnett Shale in the Fort Worth Basin, Texas (2005)

Shale Gas, Focus on the Marcellus Shale. Oil & Gas Accountability Project/Earthworks (June 2008)

Statement to Senate Environmental Resources and Energy Committee. Pennsylvania DOC – NRB – Forestry (2008)

Stepping Lightly: Reducing the Environmental Footprint of Oil & Gas Production. Interstate Oil & Gas Compact Commission (2008)

Summary of Public Comments on Natural Gas Leasing. Pennsylvania DOC – NRB – Forestry (2008)

Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "Gold Book" United States Department of the Interior - BLM Fourth Edition – Revised 2007

Testimony of Michael P. Joy, Ph.D., Esq. – Hearings on the Environmental Impact of Drilling and Development of Natural Gas in New York State. (10/16/08)

Water Fact Sheet #28, Gas Drilling & Your Private Water Supply. Penn State, School of Forestry (2009)

Water Use in Marcellus Deep Shale Gas Exploration Fact Sheet. Chesapeake Energy (March 2009)

Well Drilling Details – Gas Ranch Storage Project – Appendix A.6 (undated untitled)

Well Permit Issuance for Horizontal Drilling. NYSDEC – Final Scoping Document (2009)

1980 N.Y. Op. Atty. Gen. (inf.) 209 – Office of the Attorney General State of New York Informal Opinion. (August 11, 1980)

NTC, 2009

Impacts on Community Character of Horizontal Drilling and High Volume Hydraulic Fracturing in Marcellus Shale and Other Low-Permeability Gas Reservoirs

Adverse Impact Reduction – Stepping Lightly: Reducing the Environmental Footprint of Oil and Gas Production. Interstate Oil & Gas Compact Commission (undated)

Adverse Impact Reduction Handbook – Reducing Onshore Natural Gas & Oil Exploration and Production Impacts Using a Broad-Based Stakeholder Approach. Interstate Oil & Gas Compact Commission (2008)

Air Emissions and Regulations Fact Sheet. Chesapeake Energy (March 2009)

An Enduring Resource: A Perspective on the Past, Present and Future Contributions of the Barnett Shale and the Economy of Fort Worth and Surrounding Areas. Perryman Group, The (March 2009)

AOTSNY - Sample Weight Limit Local Laws. (web posting undated)

Appalachian Basin Black Shale Exploitations: Past, Present, and Future. (Power Point Presentation) John Gottschling, Regional Tech. Rep. BJ Services Company, U.S.A. (5/16 & 5/17, 2007)

Bedford, Texas – Drilling Ordinance Comparison Sheet. (undated)

Better With the Shale Than Without. Press Release: Fort Worth Chamber of Commerce (3/11/09)

BLM Q & A Fact Sheet – Roan Plateau Planning Area – Reasonable Foreseeable Development (RFD) 10/24/04)

Bounty from Below – The Impact of Developing Natural Gas Resources Associated with Barnett Shale. Perryman Group, The (May 2008)

Bounty from Below: The Impact Associated with the Barnett Shale on Business Activity in Fort Worth and the Surrounding 14-County Area. The Perryman Group, May 2007.

Chesapeake Energy – Natural Gas Development & Production – Marcellus Shale, J.E. Grey May 14, 2009.

Chesapeake Quick News (Newsletter). (October 2008)

Chesapeake/Statoil Hydro – Marcellus Black Shale. Steinar Eikaas, et al (November 2008)

City of Fort Worth, Texas – Gas Drilling Ordinance. (2008)

Colorado – House Bill 07-1252 – Concerning the Accommodation of the Rights of Surface Owners with Respect to Oil and Gas Operators. (Date____).

Community Safety and Emergency Response Fact Sheet. Chesapeake Energy (March 2009)

Disposal of Spent Drilling Fluids to Publically Owned Treatment Works (POTW's). Alan A. Fuchs, NYSDEC – Division of Water (10/21/08)

Economic Impact of Barnett. Perryman Group, The (undated power point slide)

Economic Impact of the Fayetteville Shale in White County, Arkansas, The. Kathy Deck, Sam M. Walton College of Business (2008)

Economic Impact of the Oil & Gas Industry in Pennsylvania, The. Pennsylvania Economic League. (November 2008)

Economic Workforce Brief – Forecast of the Potential Impact of Increased Royalty Income on the Pennsylvania Economy 2008-1.1 (June 2008)

Environmental Resources for Tribal Energy Development – Office of Indian Energy and Economic Development. Tribal Energy and Environmental Information Clearing House (undated web site).

Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs. J. Daniel Arthur, et al (2008)

Experience in Sublette County. Penn State, Ecosystem Research Group (undated power point slide)

Farmers Branch Texas – Ordinance #2946 Regulating Well Drilling. (undated)

Flower Mound Texas – Oil and Gas Drilling Ordinance Comparison Chart. (May 2007)

Forest Landowners & Natural Gas Development, Marcellus Education Fact Sheet – Penn State, College of Agriculture (2008)

Forestry – Press Release. Pennsylvania DOC – NRB (2008)

Fortuna NY DEC SGEIS Response, Rick Kessy, Fortuna Energy (May 27, 2009)

Fractured Shale Gas Potential in New York – David G. Hill and Tracy E. Lombardi & John P. Martin – undated

Gas Rights and Right of Way Leasing Pointers for Forest Owners. Cornell Cooperative Extension (12/15/08)

Gas Well Drilling Noise Impacts and Mitigation Study. Behiens and Associates, Inc. (April 2006)

Geological and Activity Overview of Appalachian Plays (Power Point Presentation). Dan A. Billman, P.G. CPG. April 2008)

Goldbook, 4th Edition, revised 2007 – Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. Bureau of Land Management (2007)

Hearing on The Environmental Impact of Drilling and Development of Natural Gas. Memo to NYS Assembly – Michael P. Joy, PhD. Esq. (10/16/08)

Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale. Daniel Arthur, P.E., et al (9/21/08)

Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale. Groundwater Protection Council (9/23/08)

Information Gathering on Hydraulic Fracturing of Shale Formation for Gas Production. G. Struyk., Fortuna Energy, Inc. (8/14/08)

Jonah/Anticline Fields Direct Workforce Through Three Phases. Penn State, Ecosystem Research Group (undated power point slide)

Kentucky Erosion Prevention and Sediment Control Field Guide: Kentucky Division of Water Nonpoint Source Section and Kentucky Division of Conservation.

Low Risk Site Handbook for Erosion Potential and Sediment Control: Vermont Department of Environmental Conservation (2006)

Marcellus Shale Hydraulic Fracturing Fact Sheet. Chesapeake Energy (March 2009)

Marcellus Shale Play's Vast Resource Potential. T. Engelder & G. Lash (May 2008)

Modern Shale Gas Development in the U.S., A Primer. U.S. Department of Energy, Office of Fossil Energy (April 2009)

Natural Gas and Local Governments. Timothy Kelsey, PhD, Penn State Cooperative Extension (2009)

New York State – Open Space Conservation Plan (2006)

Notice of Change to City of Grand Prairie, Texas – Code of Ordinances – Summary. (5/6/08)

Notice of Determination of Non-Significance – API# 31-015-2290-00, Permit 08828 (February 13, 2002).

NYS Vehicle Traffic Law §1660 – Weight Limits on Town Roads. (undated)

NYS-DEC Policy DEP-00-1 – Assessing and Mitigating Noise Impacts (10/06/00 – Last Revised 02/02/01)

NYS-DEC Policy DEP-00-2 – Assessing and Mitigating Visual Impacts (7/31/00)

Oil & Gas Lease Sale - Pennsylvania DOC – NRB – Forestry. (September 2008)

Oil & Gas Position Statement. Pennsylvania DOC – NRB – Forestry (April 1, 2008)

Oil & Gas Program (slide show). Pennsylvania DOC – NRB – Forestry (2008)

Potential Development of the Natural Gas Resources in the Marcellus Shale – New York, Pennsylvania, West Virginia & Ohio. (National Park Service – U.S. Department of the Interior – December 2008)

Potential Development of the Natural Resources in the Marcellus Shale (New York, Pennsylvania, West Virginia & Ohio). National Park Service – U.S. Department of the Interior (December 2008).

Potential Economic Impacts of Marcellus Shale in Pennsylvania. Timothy W. Kelsey, PhD, Penn State Cooperative Extension – (2009)

Potential Environmental Impacts Associated with Proposed Marcellus Shale Wells. Talisman Energy, Linda Collart, Mineral Resources Supervisor (7/3/08).

Preparing for Natural Gas Development: Understanding Impacts and Protecting Public Assets. Gas Drilling Task Force, The: (2/13/09)

Projecting the Economic Impact of the Fayetteville Shale Play (2008-2012). Sam M. Walton College of Business (March 2008)

Projecting the Economic Impact of the Fayetteville Shale Play 2005 – 2008. Sam M. Walton College of Business. (May 2006)

Protecting Water, Producing Gases. Mary Griffiths, Pembina Institute, Alberta Canada. (April 2007).

Reasonably Foreseeable Development Report – Roan Plateau (Question and Answer Fact Sheet). Bureau of Land Management (2004)

Reasonably Foreseeable Development Scenario for Oil & Gas (RFD) "Life of Area" Forecast for ultimate development of lease - Bureau of Land Management (2004)

Reasonably Foreseeable Development Scenario for Oil and Gas Activities In the BLM White River Field Office. Bureau of Land Managment (Executive Summary, Undated).

Responses to Notice of Incomplete Applications. Chesapeake Energy (3/9/09)

Responses to NY DEC SGEIS Information Requests. Chesapeake Energy (June 4, 2009)

Responses to NYDEC SGEIS Informational Request. East Resources. (5/21/09)

Responses to NYDEC SGEIS Informational Request. Fortuna (5/22/09)

Responses to NYDEC SGEIS Informational Request. Seneca (6/3/09)

Revised Policy for Reasonably Foreseeable Development Scenarios for Oil & Gas. Bryce Baslan, Division of Fluid Minerals (2008)

Roan Plateau Fact Sheet – Impacts of Oil and Gas Drilling. (7/7/04)

Rural Development Paper No. 43 – Energy Boomtowns & Natural Gas. Jeffrey Jacquet, NERCRD. (January 2009)

Sammons/Dutton LLC and Blankenship Consulting. August 2010. Socioeconomic Effects of Natural Gas Development. Prepared for NTC Consultants, Saratoga Springs, NY.

Santa Fe County Oil & Gas Amendment to the Santa Fe County Land Development Code. Ordinance No. 2008-19 (12/10/08)

Schlumberger – Shale Gas: Explanation of Gas Shale – Barnett Shale in the Fort Worth Basin, Texas (2005)

Shale Gas, Focus on the Marcellus Shale. Oil & Gas Accountability Project/Earthworks (June 2008)

Statement to Senate Environmental Resources and Energy Committee. Pennsylvania DOC – NRB – Forestry (2008)

Stepping Lightly: Reducing the Environmental Footprint of Oil & Gas Production. Interstate Oil & Gas Compact Commission (2008)

Summary of Public Comments on Natural Gas Leasing. Pennsylvania DOC – NRB – Forestry (2008)

Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "Gold Book" United States Department of the Interior - BLM Fourth Edition – Revised 2007

Testimony of Michael P. Joy, Ph.D., Esq. – Hearings on the Environmental Impact of Drilling and Development of Natural Gas in New York State. (10/16/08)

Water Fact Sheet #28, Gas Drilling & Your Private Water Supply. Penn State, School of Forestry (2009)

Water Use in Marcellus Deep Shale Gas Exploration Fact Sheet. Chesapeake Energy (March 2009)

Well Drilling Details – Gas Ranch Storage Project – Appendix A.6 (undated untitled)

Well Permit Issuance for Horizontal Drilling. NYSDEC – Final Scoping Document (2009)

1980 N.Y. Op. Atty. Gen. (inf.) 209 – Office of the Attorney General State of New York Informal Opinion. (August 11, 1980)

URS Corporation, 2011

Water-Related Issues Associated with Gas Production in the Marcellus Shale

[1] Gas Technology Institute (September 26, 2007). Proceedings and Minutes of the Hydraulic Fracturing Expert Panel, XTO Facilities, Fort Worth, TX, compiled by Tom Hayes of GTI.

[2] Parshall, J. (undated). Barnett Shale Showcases Tight-gas Development. Journal of Petroleum Technology, in: ALL Consulting. 2008. Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale.

[3] All Consulting, LLC (2008). Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs, presented at International Petroleum & Biofuels Environmental Conference Albuquerque, NM, November 11-13, 2008.

[4] Independent Oil & Gas Association of New York (IOGA NY) Response to NY DEC SGEIS Information Requests (September 16, 2010), prepared by All Consulting Project No. 1284.

[5] New York State Water Resources Institute at Cornell University (visited 2009). Waste Management of Cuttings, Drilling Fluids, Hydrofrac Water and Produced Water, at http://wri.eas.cornell.edu/gas_wells_waste.html.

[6] Fichter, J.K., Johnson, K., French, K. an Oden, R. 2008. "Use of Microbiocides in Barnett Shale Gas Well Fracturing Fluids to Control Bacterially-Related Problems." NACE International Corrosion 2008 Conference and Expo. Paper 08658. I pp. 2, 3. http://content.nace.org/Store/Downloads/7B772A1BA1- 6E44-DD11-889D-0017A446694E.pdf.

[7] Pennsylvania State University (2009). Gas Well Drilling and Your Private Water Supply: Water Facts #28. URL: http://resources.cas.psu.edu/WaterResources/pdfs/gasdrilling.pdf.

[8] ASWCMC {June 30, 2008) Appalachian Shale Water Conservation and Management Committee.

[9] Marcellus Shale Coalition, December 31, 2009. Sampling and Analysis of Water Streams Associated with the Development of Marcellus Shale Gas, Final Report, prepared by the Gas Technology Institute, Des Plaines, IL 60018.

[10] NYSDEC (visited June 2009). Classification – Surface Waters and Groundwaters (6 NYCRR 701), at http://www.dec.ny.gov/regs/4592.html#15979.

[11] USEPA (visited June 2009). Setting Standards for Safe Drinking Water, at http://www.epa.gov/ogwdw/standard/setting.html.

[12] USEPA (visited June 2009). Drinking water contaminants, at http://www.epa.gov/safewater/contaminants/index.html.

[13] USEPA (visited June 2009). Secondary Drinking Water Regulations: Guidance for Nuisance Chemicals, at http://www.epa.gov/OGWDW/consumer/2ndstandards.html.

[14] USEPA (visited June 2009). Drinking Water Contaminant Candidate List and Regulatory Determinations, at http://www.epa.gov/OGWDW/ccl/index.html.

[15] USEPA (visited June 2009). Six Year Review of Drinking Water Standards, at http://www.epa.gov/OGWDW/review.html.

[16] Division of Water (June 1998). Division of Water Technical and Operational Guidance Series 1.1.1. - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, at http://www.dec.ny.gov/regulations/2652.html.

[17] NYSDEC (visited June 2009). Casing and Cementing Practices, at http://www.dec.ny.gov/energy/1757.html.

[18] NYSDEC (1992). Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program (GEIS), at http://www.dec.ny.gov/energy/45912.html.

[19] USEPA (2002). EPA Facts about Cesium-137. At http://www.epa.gov/superfund/health/contaminants/radiation/pdfs/cesium.pdf.

[20] Fichter, J.K. et al. (2008) Use of microbiocides in Barnett Shale gas well fracturing fluids to control bacteria related problems, presented at the National Association of Corrosion Engineers (NACE) International Corrosion 2008 Conference and Expo.

[21] Lidji, Eric (2010). Membranes possible key to recycling frac water. In Greening of Oil, at http://www.greeningofoil.com/post/Membranes-possible-key-to-recycling-frac-water.aspx.

[22] New Logic Research, Inc. (2010). Case Study: Using V-SEP to treat produced water, at www.vsep.com.

[23] Intevras Technologies, LLC (2008). INTEGRA Overview, at www.intevras.com.

[24] 212 Resources (2010). 212 Solution to Marcellus Water Challenges, at www.212resources.com.

[25] Leposky, George (2006). Clean Water to Go: Mobile evaporator treats water in Texas gas field. *Onsite Water Treatment*. Vol. 2 No. 2, April/March.

[26] Lake Country FracWater Specialists, LLC (2010). Solutions for Reuse of Flowback Water from Marcellus Shale Operations, at www.fracwaterrecyclers.com.

[27] Keister, Timothy (2010). Marcellus Hydrofracture Flowback and Production Wastewater Treatment, Recycle, and Disposal Technologies. Presented at The Science of Marcellus Shale Conference, January 29, 2010.

[28] Washington Group International (undated). Water in the West: Treatment, Disposal, and Reuse of Produced Water from Natural Gas Exploration in the Rocky Mountain Region, prepared by Tim Rollenhagen, Barry Friedman, Jeff Matthews and Sally Cuffin, of Washington Group International, Denver, CO.

[29] Mobile Power International (2010). Providing Power and Water for Life, at www.mobilepowerintl.com.

[30] GE Water & Process Technologies (2010), at htpp://www.gewater.com/industries/index.jsp.

[31] Horn, Aaron (2009). Breakthrough Water Treatment Converts 75% of Fracturing Flowback Fluid to Fresh Water and Lowers CO_2 Emissions. Presented at the 2009 SPE Americas E&P Environmental & Safety Conference. San Antonio, Texas, March 23-25, 2009.

[32] Allison, Robert (1991). Surface and Wastewater Desalination by Electrodialysis Reversal. Paper presented at the American Water Works Association Membrane Technology Conference. Orlando, Florida, March 1991.

[33] National Energy Technology Laboratory (visited April 2009). Produced Water Technology Description – Fact sheet – Ion Exchange, at http://www.netl.doe.gov/technologies/pwmis/techdesc/ionex/index.html.

[34] Bruff, Matthew (2006). An Exciting New Produced Water Concentrator Technology for Tail and Brine Waters: AltelaRain. Presented at the International Petroleum Environmental Conference. San Antonio, Texas, October 17-20, 2006.

[35] AquaTech (2009). MoVap: Mobile Evaporator, at www.aquatech.com.

[36] Percival, Pamela (2009). Oil and gas wastewater recycling continues to increase, but is affected by current economy. *Fort Worth Basin Oil & Gas.* Iss. 17, May 2009.

[37] HPD Systems (2010). Evaporation and Crystallization Technology for the Oil & Gas Industry, at http://www.hpdsystems.com/en/industries/industrysolutions/oilgas/.

[38] STW Resources (2009). Testimony of STW Resources before the Environmental Resources and Energy Committee, House of Representatives, Commonwealth of Pennsylvania. Harrisburg, PA, April 15, 2009.

[39] Allegheny Ozone (2008). Treating Frac Water with Ozone, at http://alleghenyozone.com/frac_water.html.

[40] Texas Administrative Code (2004). Title 16: Economic Regulation §3.8(d)(6)(A).

[41] Railroad Commission of Texas (2010). Surface Waste Management Manual: Chapter IV – Pits, at http://www.rrc.state.tx.us/forms/publications/SurfaceWasteManagementManual/index.php.

[42] The Pennsylvania Code (2001). Title 25: Environmental Protection §78.56.

[43] New York State Regulations (1972). Chapter V – Resource Management §556.5.

[44] New York State Regulations (1988). Chapter IV – Quality Services §360-6.5.

[45] USEPA (2010). *Definition of Solid Waste Tool*, at http://www.epa.gov/osw/hazard/dsw/tool.htm.

[46] Code of Federal Regulations (1980). *Exclusions from Hazardous Waste Listing.* Title 40: Protection of Environment §261.4(b)(5).

[47] USEPA (2002). *Exemption of Oil and Gas Exploration and Production Wastes from Federal Hazardous Waste Regulations*, at http://www.epa.gov/osw/nonhaz/industrial/special/oil/oil-gas.pdf.

[48] USEPA (1988). *Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes*, at www.epa.gov/wastes/nonhaz/industrial/special/oil/og88wp.pdf.

[49] USEPA (2009). Radiation Protection: Radium, at http://www.epa.gov/radiation/radionuclides/radium.html.

[50] USEPA (2003). 40 CFR Chapter 1: Approaches to an Integrated Framework for Management and Disposal of Low-Activity Radioactive Waste: Request for Comment; Proposed Rule. Federal Register. Vol. 68, No. 222/Tuesday, November 18, 2003/Proposed Rules.

[51] Natural Gas and Technology (2004), at http://www.naturalgas.org/environment/technology.asp.

[52] Texas Administrative Code (1999). Title 25: Health Services §289.259.

[53] Conference of Radiation Control Program Directors (2004) Suggested State Regulations for Control of Radiation, Part N: Regulation and Licensing of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), at http://www.crcpd.org/ssrcr.aspx.

[54] Louisiana Department of Environmental Quality: Radiation Protection Division (1995). Implementation Manual for management of NORM in Louisiana, Draft, at http://www.deq.state.la.us/portal/tabid/240/Default.aspx.

[55] Louisiana Department of Environmental Quality: Emergency & Radiological Services Division (2006). Radioactive Material License Guide: Naturally Occurring Radioactive Material: NORM Specific License, at http://www.deq.state.la.us/portal/tabid/240/Default.aspx.

[56] NYSDEC: Division of Solid & Hazardous Materials (1999). An Investigation of Naturally Occurring Radioactive Materials (NORM) in Oil and Gas Wells in New York State, at http://www.dec.ny.gov/docs/materials_minerals_pdf/normrpt.pdf.

[57] United States Department of Energy and United States Environmental Protection Agency (2004). Interagency Steering Committee on Radiation Standards (ISCORS) Assessment of Radioactivity in Sewage Sludge: Recommendations on Management of Radioactive Materials in Sewage Sludge and Ash at Publicly Owned Treatment Works, DOE/EH-0668 EPA 832-R-03-002B, ISCORS Technical Report 2004-04.

[58] Rae, P., A. N. Martin, and B. Sinanan (1999). Skin bypass fracs: Proof that size is not important. SPE annual technical conference and exhibition, 3-6 October 1999. Volume delta: Drilling and completion. SPE annual technical conference, Houston TX , ETATS-UNIS (03/10/1999) 1999, pp. 129-141 (23 ref.).

[59] USEPA (2003). A Memorandum of Agreement between the United States Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc., and Schlumberger Technology Corporation for Elimination of Diesel Fuel in Hydraulic Fracturing Fluids Injected into Underground Sources of Drinking Water During Hydraulic Fracturing of Coalbed Methane Wells, dated 12 December 2003.

[60] USDOE (2009). State Oil and Natural Gas Regulations Designed to Protect Water Resources, prepared by the office of Fossil Energy of the United States Department of Energy, and the National Energy Technology Laboratory.

[61] Schlumberger (visited April 2009). Green Chemistry: Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/content/services/stimulation/execution/greenslurry.asp.

[62] USEPA (visited April 2009). Introduction to the Concept Of Green Chemistry, at http://www.epa.gov/oppt/greenchemistry/pubs/about_gc.html?

[63] Cameron, C., A. Florence, and C. Temple (2004). Water-Based Drilling Fluid Helps Achieve Oil-Mud Performance. AADE-04-DF-HO-01. Presented at the AADE 2004 Drilling Fluids Conference, Houston, Texas, April 6-7, 2004.

[64] Cobby, G. L. and R. J. Craddock (1999). Western Australian Government Decision-Making Criteria Involved In the Regulation of Drilling Fluids Offshore. APPEA Journal, pp 600-605.

[65] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes Discharges in Different Jurisdictions, at http://www.offshore-environment.com/unitedkingdom.html.

[66] Anastas, P. and J. C. Warner (1998). Green Chemistry: Theory and Practice. Oxford University Press: New York. 152 pp.

[67] Journal of Petroleum Technology Online (2006). Summary of Society of Petroleum Engineers paper 102908, "Meeting the Environmental Challenge: A New Acid Corrosion Inhibitor for the Norwegian Sector of the North Sea," by M. Vorderbruggen, SPE and H. Kaarlgstad, SPE, prepared for ATCE 2006, San Antonio, TX, 24-27 September.

[68] Cefas (visited April 2009). Description of Offshore Chemical Notification Scheme (OCNS), at http://www.cefas.co.uk/offshore-chemical-notification-scheme-(ocns).aspx

[69] Schlumberger (visited April 2009). Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/media/services/stimulation/execution/greenslurry.pdf.

[70] National Energy Board of Canada (April 2009). Offshore Chemical Selection Guidelines for Drilling & Production Activities On Frontier Lands, at http://www.cnlopb.nl.ca/pdfs/guidelines/ocsg.pdf.

[71] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes Discharges in Different Jurisdictions - Norway, at http://www.offshore-environment.com/norway.html.

[72] Scott M. Stringer (2009). Uncalculated Risk: How plans to drill for gas in Upstate New York could threaten New York City's water system. A report based on statement by Manhattan Borough President.

[73] Lustgarten, Abrahm (November 11, 2008). *Does Natural-Gas Drilling Endanger Water Supplies?* in Business Week November 11, 2008.

[74] Witter et al. (September 15, 2008). Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper, prepared by Roxana Witter, Kaylan Stinson, Holly Sackett, Stefanie Putter, Gregory Kinney, Daniel Teitelbaum, and Lee Newman.

[75] Texas Administrative Code (2003). Title 16: Economic Regulation §4.601-§4.632.

[76] Interstate Oil and Gas Compact Commission (undated). Is Hydraulic Fracturing Safe?, at http://www.iogcc.state.ok.us/hydraulic-fracturing visited August 2009.

[77] Pennsylvania Statutes and Consolidated Statutes Annotated, Title 58 - Oil And Gas, Chapter 11 - Oil And Gas Act.

[78] Ohio Department of Natural Resources: Mineral Resources Management (April 28, 2005). Best Management Practices for Pre-Drilling Water Sampling, at http://www.dnr.state.oh.us/Portals/11/oil/pdf/BMP_PRE-DRILLING_WATER_SAMPLING.pdf.

[79] Well testing information published on Kentucky Division of Water website at http://www.water.ky.gov/dw/profi/tips/welltest.htm

[80] Kentucky Administrative Regulations: Title 401 - Energy and Environment Cabinet Department for Environmental Protection published at http://www.lrc.ky.gov/kar/TITLE401.HTM.

[81] NYSDEC (visited April 2009). Protecting the Environment During Well Drilling and Operation - Environmental Protections for Oil and Gas Development, at http://www.dec.ny.gov/energy/1536.html.

[82] NYSDEC (visited April 2009). Protecting the Environment, Water Resources and Public Water Supplies at http://www.dec.ny.gov/energy/46288.html.

[83] Maurice Smith (September 2008). Frac Forward: Startup Cracks Propane Fracture Puzzle, Provides 'Green' Solution, in New Technology Magazine.

[84] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- Drilling Waste Streams from Offshore Oil and Gas Installations, at http://www.offshore-environment.com/drillwastestream.html.

[85] D. B. Burnett Global Petroleum (visited April 2009). Undated. Environmentally Friendly Drilling Systems Background & Current Programs, at http://www.bismarckstate.edu/gpee/presentations/pdfs/BurnettDaveGPEEPresentation.pdf.

[86] USEPA (2010). Radiation Protection: Oil and Gas Production Wastes, at http://www.epa.gov/radiation/tenorm/oilandgas.html.

[87] Hill et al. (undated). Fractured Shale Gas Potential in New York, prepared by David G. Hill and Tracy E. Lombardi of TICORA Geosciences, Inc., and John P. Martin of NYSERDA.

[88] National Energy Technology Laboratory: Home Page (visited June 2009). Petroleum Consulting Services Production Verification Tests, DE-AC21-90MC26025, at http://www.netl.doe.gov/technologies/oil-gas/NaturalGas/Projects_n/EP/DCS/DCS_C_26025PetrolConsult.html.

[89] NUMA (visited April 2009). Undated. Project Summaries, Horizontal Drilling Project, United Kingdom. http://www.numahammers.com/newsitems/PS-EIL_shropshire.html.

[90] TAMU (Texas A&M University) (2003). Drilling for Natural Gas – an Environmental Friendly Process. The Texas Institute for Advancement of Chemical Technology (TIACT). October 10, 2003. http://cheweb.tamu.edu/tiact/.

[91] CDX Gas (2007). About Z-Pinnate Technology, at http://www.cdxgas.com/technology.php.

[92] USEPA (June, 2004). Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs. EPA 816-R-04-003.

[93] USDOE (1999). Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology, prepared by the office of Fossil Energy of the United States Department of Energy.

URS Corporation, 2010

Water-Related Issues Associated with Gas Production in the Marcellus Shale

[1] Gas Technology Institute (September 26, 2007). Proceedings and Minutes of the Hydraulic Fracturing Expert Panel, XTO Facilities, Fort Worth, TX, compiled by Tom Hayes of GTI.

[2] Parshall, J. (undated). Barnett Shale Showcases Tight-gas Development. Journal of Petroleum Technology, in: ALL Consulting. 2008. Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale.

[3] All Consulting, LLC (2008). Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs, presented at International Petroleum & Biofuels Environmental Conference Albuquerque, NM, November 11-13, 2008.

[4] New York State Water Resources Institute at Cornell University (visited 2009). Waste Management of Cuttings, Drilling Fluids, Hydrofrac Water and Produced Water, at http://wri.eas.cornell.edu/gas_wells_waste.html.

[5] Fichter, J.K., Johnson, K., French, K. an Oden, R. 2008. "Use of Microbiocides in Barnett Shale Gas Well Fracturing Fluids to Control Bacterially-Related Problems." NACE International Corrosion 2008 Conference and Expo. Paper 08658. I pp. 2, 3. http://content.nace.org/Store/Downloads/7B772A1BA1- 6E44-DD11-889D-0017A446694E.pdf

[6] Pennsylvania State University (2009). Gas Well Drilling and Your Private Water Supply: Water Facts #28. URL: http://resources.cas.psu.edu/WaterResources/pdfs/gasdrilling.pdf

[7] ASWCMC {June 30, 2008) Appalachian Shale Water Conservation and Management Committee.

[8] NYSDEC (visited June 2009). Classification – Surface Waters and Groundwaters (6 NYCRR 701), at http://www.dec.ny.gov/regs/4592.html#15979.

[9] USEPA (visited June 2009). Setting Standards for Safe Drinking Water, at http://www.epa.gov/ogwdw/standard/setting.html.

[10] USEPA (visited June 2009). Drinking water contaminants, at http://www.epa.gov/safewater/contaminants/index.html.

[11] USEPA (visited June 2009). Secondary Drinking Water Regulations: Guidance for Nuisance Chemicals, at http://www.epa.gov/OGWDW/consumer/2ndstandards.html.

[12] USEPA (visited June 2009). Drinking Water Contaminant Candidate List and Regulatory Determinations, at http://www.epa.gov/OGWDW/ccl/index.html.

[13] USEPA (visited June 2009). Six Year Review of Drinking Water Standards, at http://www.epa.gov/OGWDW/review.html.

[14] NYSDEC (visited June 2009). Casing and Cementing Practices, at http://www.dec.ny.gov/energy/1757.html.

[15] NYSDEC (1992). Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program (GEIS), at http://www.dec.ny.gov/energy/45912.html.

[16] Fichter, J.K. et al. (2008) Use of microbiocides in Barnett Shale gas well fracturing fluids to control bacteria related problems, presented at the National Association of Corrosion Engineers (NACE) International Corrosion 2008 Conference and Expo.

[17] Washington Group International (undated). Water in the West: Treatment, Disposal, and Reuse of Produced Water from Natural Gas Exploration in the Rocky Mountain Region, prepared by Tim Rollenhagen, Barry Friedman, Jeff Matthews and Sally Cuffin, of Washington Group International, Denver, CO.

[18] National Energy Technology Laboratory (visited April 2009). Produced Water Technology Description – Fact sheet – Ion Exchange, at http://www.netl.doe.gov/technologies/pwmis/techdesc/ionex/index.html.

[19] Natural Gas and Technology (2004), at http://www.naturalgas.org/environment/technology.asp.

[20] USDOE (1999). Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology, prepared by the office of Fossil Energy of the United States Department of Energy.

[21] Hill et al. (undated). Fractured Shale Gas Potential in New York, prepared by David G. Hill and Tracy E. Lombardi of TICORA Geosciences, Inc., and John P. Martin of NYSERDA.

[22]National Energy Technology Laboratory: Home Page (visited June 2009). Petroleum Consulting Services Production Verification Tests, DE-AC21-90MC26025, at http://www.netl.doe.gov/technologies/oil-gas/NaturalGas/Projects_n/EP/DCS/DCS_C_26025PetrolConsult.html.

[23] NUMA (visited April 2009). Undated. Project Summaries, Horizontal Drilling Project, United Kingdom. http://www.numahammers.com/newsitems/PS-EIL_shropshire.html.

[24] TAMU (Texas A&M University) (2003). Drilling for Natural Gas – an Environmental Friendly Process. The Texas Institute for Advancement of Chemical Technology (TIACT). October 10, 2003. http://cheweb.tamu.edu/tiact/.

[25] CDX Gas (2007). About Z-Pinnate Technology, at http://www.cdxgas.com/technology.php.

[26] Rae, P., A. N. Martin, and B. Sinanan (1999). Skin bypass fracs: Proof that size is not important. SPE annual technical conference and exhibition, 3-6 October 1999. Volume delta: Drilling and completion. SPE annual technical conference, Houston TX , ETATS-UNIS (03/10/1999) 1999, pp. 129-141 (23 ref.).

[27] USEPA (2003). A Memorandum of Agreement between the United States Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc., and Schlumberger Technology Corporation for Elimination of Diesel Fuel in Hydraulic Fracturing Fluids Injected into Underground Sources of Drinking Water During Hydraulic Fracturing of Coalbed Methane Wells, dated 12 December 2003.

[28] USDOE (2009). State Oil and Natural Gas Regulations Designed to Protect Water Resources, prepared by the office of Fossil Energy of the United States Department of Energy, and the National Energy Technology Laboratory.

[29] Schlumberger (visited April 2009). Green Chemistry: Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/content/services/stimulation/execution/greenslurry.asp

[30] USEPA (visited April 2009). Introduction to the Concept Of Green Chemistry, at http://www.epa.gov/oppt/greenchemistry/pubs/about_gc.html.

[31] Cameron, C., A. Florence, and C. Temple (2004). Water-Based Drilling Fluid Helps Achieve Oil-Mud Performance. AADE-04-DF-HO-01. Presented at the AADE 2004 Drilling Fluids Conference, Houston, Texas, April 6-7, 2004.

[32] Cobby, G. L. and R. J. Craddock (1999). Western Australian Government Decision-Making Criteria Involved In the Regulation of Drilling Fluids Offshore. APPEA Journal, pp 600-605.

[33] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes Discharges in Different Jurisdictions, at http://www.offshore-environment.com/unitedkingdom.html.

[34] Anastas, P. and J. C. Warner (1998). Green Chemistry: Theory and Practice. Oxford University Press: New York. 152 pp.

[35] Journal of Petroleum Technology Online (2006). Summary of Society of Petroleum Engineers paper 102908, “Meeting the Environmental Challenge: A New Acid Corrosion Inhibitor for the Norwegian Sector of the North Sea,” by M. Vorderbruggen, SPE and H. Kaarlgstad, SPE, prepared for ATCE 2006, San Antonio, TX, 24-27 September.

[36] Cefas (visited April 2009). Description of Offshore Chemical Notification Scheme (OCNS), at http://www.cefas.co.uk/offshore-chemical-notification-scheme-(ocns).aspx

[37] Schlumberger (visited April 2009). Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/media/services/stimulation/execution/greenslurry.pdf.

[38] National Energy Board of Canada (April 2009). Offshore Chemical Selection Guidelines for Drilling & Production Activities On Frontier Lands, at http://www.cnlopb.nl.ca/pdfs/guidelines/ocsg.pdf.

[39] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes Discharges in Different Jurisdictions - Norway, at http://www.offshore-environment.com/norway.html

[40] Scott M. Stringer (2009). Uncalculated Risk: How plans to drill for gas in Upstate New York could threaten New York City's water system. A report based on statement by Manhattan Borough President.

[41] Lustgarten, Abrahm (November 11, 2008). *Does Natural-Gas Drilling Endanger Water Supplies?* in Business Week November 11, 2008.

[42] Witter et al. (September 15, 2008). Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper, prepared by Roxana Witter, Kaylan Stinson, Holly Sackett, Stefanie Putter, Gregory Kinney, Daniel Teitelbaum, and Lee Newman.

[43] USEPA (June, 2004). Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs. EPA 816-R-04-003.

[44] Pennsylvania Statutes and Consolidated Statutes Annotated, Title 58 - Oil And Gas, Chapter 11 - Oil And Gas Act

[45] Ohio Department of Natural Resources: Mineral Resources Management (April 28, 2005). Best Management Practices for Pre-Drilling Water Sampling, at http://www.dnr.state.oh.us/Portals/11/oil/pdf/BMP_PRE-DRILLING_WATER_SAMPLING.pdf.

[46] Well testing information published on Kentucky Division of Water website at http://www.water.ky.gov/dw/profi/tips/welltest.htm

[47] Kentucky Administrative Regulations: Title 401 - Energy and Environment Cabinet Department for Environmental Protection published at http://www.lrc.ky.gov/kar/TITLE401.HTM

[48] NYSDEC (visited April 2009). Protecting the Environment During Well Drilling and Operation - Environmental Protections for Oil and Gas Development, at http://www.dec.ny.gov/energy/1536.html.

[49] NYSDEC (visited April 2009). Protecting the Environment, Water Resources and Public Water Supplies at http://www.dec.ny.gov/energy/46288.html.

[51] Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- Drilling Waste Streams from Offshore Oil and Gas Installations, at http://www.offshore-environment.com/drillwastestream.html.

[52] D. B. Burnett Global Petroleum (visited April 2009). Undated. Environmentally Friendly Drilling Systems Background & Current Programs, at http://www.bismarckstate.edu/gpee/presentations/pdfs/BurnettDaveGPEEPresentation.pdf.

[53] Division of Water (June 1998). Division of Water Technical and Operational Guidance Series 1.1.1. - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, at http://www.dec.ny.gov/regulations/2652.html.

[54] Interstate Oil and Gas Compact Commission (undated). Is Hydraulic Fracturing Safe?, at http://www.iogcc.state.ok.us/hydraulic-fracturing visited August 2009.

[55] Maurice Smith (September 2008). Frac Forward: Startup Cracks Propane Fracture Puzzle, Provides 'Green' Solution, in New Technology Magazine.

[56] USEPA (2002). EPA Facts about Cesium-137. At http www.epa.gov superfund health contaminants radiation pdfs cesium.pdf.

URS Corporation, 2009

Water-Related Issues Associated with Gas Production in the Marcellus Shale

All Consulting, LLC (2008). Evaluating the Environmental Implications of Hydraulic Fracturing in Shale Gas Reservoirs, presented at International Petroleum & Biofuels Environmental Conference Albuquerque, NM, November 11-13, 2008.

Anastas, P. and J. C. Warner (1998). Green Chemistry: Theory and Practice. Oxford University Press: New York. 152 pp.

ASWCMC {June 30, 2008) Appalachian Shale Water Conservation and Management Committee.

Cameron, C., A. Florence, and C. Temple (2004). Water-Based Drilling Fluid Helps Achieve Oil-Mud Performance. AADE-04-DF-HO-01. Presented at the AADE 2004 Drilling Fluids Conference, Houston, Texas, April 6-7, 2004.

CDX Gas (2007). About Z-Pinnate Technology, at http://www.cdxgas.com/technology.php.

Cefas (visited April 2009). Description of Offshore Chemical Notification Scheme (OCNS), at http://www.cefas.co.uk/offshore-chemical-notification-scheme-(ocns).aspx

Cobby, G. L. and R. J. Craddock (1999). Western Australian Government Decision-Making Criteria Involved In the Regulation of Drilling Fluids Offshore. APPEA Journal, pp 600-605.

D. B. Burnett Global Petroleum (visited April 2009). Undated. Environmentally Friendly Drilling Systems Background & Current Programs, at http://www.bismarckstate.edu/gpee/presentations/pdfs/BurnettDaveGPEEPresentation.pdf.

Division of Water (June 1998). Division of Water Technical and Operational Guidance Series 1.1.1. - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, at http://www.dec.ny.gov/regulations/2652.html.

Fichter, J.K. et al. (2008) Use of microbiocides in Barnett Shale gas well fracturing fluids to control bacteria related problems, presented at the National Association of Corrosion Engineers (NACE) International Corrosion 2008 Conference and Expo.

Fichter, J.K., Johnson, K., French, K. an Oden, R. 2008. "Use of Microbiocides in Barnett Shale Gas Well Fracturing Fluids to Control Bacterially-Related Problems." NACE International Corrosion 2008 Conference and Expo. Paper 08658. I pp. 2, 3. http://content.nace.org/Store/Downloads/7B772A1BA1- 6E44-DD11-889D-0017A446694E.pdf

Gas Technology Institute (September 26, 2007). Proceedings and Minutes of the Hydraulic Fracturing Expert Panel, XTO Facilities, Fort Worth, TX, compiled by Tom Hayes of GTI.

Hill et al. (undated). Fractured Shale Gas Potential in New York, prepared by David G. Hill and Tracy E. Lombardi of TICORA Geosciences, Inc., and John P. Martin of NYSERDA.

Interstate Oil and Gas Compact Commission (undated). Is Hydraulic Fracturing Safe?, at http://www.iogcc.state.ok.us/hydraulic-fracturing visited August 2009.

Journal of Petroleum Technology Online (2006). Summary of Society of Petroleum Engineers paper 102908, “Meeting the Environmental Challenge: A New Acid Corrosion Inhibitor for the Norwegian Sector of the North Sea,” by M. Vorderbruggen, SPE and H. Kaarlgstad, SPE, prepared for ATCE 2006, San Antonio, TX, 24-27 September.

Kentucky Administrative Regulations: Title 401 - Energy and Environment Cabinet Department for Environmental Protection published at http://www.lrc.ky.gov/kar/TITLE401.HTM

Lustgarten, Abrahm (November 11, 2008). Does Natural-Gas Drilling Endanger Water Supplies? in Business Week November 11, 2008.

Maurice Smith (September 2008). Frac Forward: Startup Cracks Propane Fracture Puzzle, Provides 'Green' Solution, in New Technology Magazine.

National Energy Board of Canada (April 2009). Offshore Chemical Selection Guidelines for Drilling & Production Activities On Frontier Lands, at http://www.cnlopb.nl.ca/pdfs/guidelines/ocsg.pdf.

National Energy Technology Laboratory (visited April 2009). Produced Water Technology Description – Fact sheet – Ion Exchange, at http://www.netl.doe.gov/technologies/pwmis/techdesc/ionex/index.html.

National Energy Technology Laboratory: Home Page (visited June 2009). Petroleum Consulting Services Production Verification Tests, DE-AC21-90MC26025, at http://www.netl.doe.gov/technologies/oil-gas/NaturalGas/Projects_n/EP/DCS/DCS_C_26025PetrolConsult.html.

Natural Gas and Technology (2004), at http://www.naturalgas.org/environment/technology.asp.

New York State Water Resources Institute at Cornell University (visited 2009). Waste Management of Cuttings, Drilling Fluids, Hydrofrac Water and Produced Water, at http://wri.eas.cornell.edu/gas_wells_waste.html.

NUMA (visited April 2009). Undated. Project Summaries, Horizontal Drilling Project, United Kingdom. http://www.numahammers.com/newsitems/PS-EIL_shropshire.html.

NYSDEC (1992). Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program (GEIS), at http://www.dec.ny.gov/energy/45912.html.

NYSDEC (visited April 2009). Protecting the Environment During Well Drilling and Operation - Environmental Protections for Oil and Gas Development, at http://www.dec.ny.gov/energy/1536.html.

NYSDEC (visited April 2009). Protecting the Environment, Water Resources and Public Water Supplies at http://www.dec.ny.gov/energy/46288.html.

NYSDEC (visited June 2009). Casing and Cementing Practices, at http://www.dec.ny.gov/energy/1757.html.

NYSDEC (visited June 2009). Classification – Surface Waters and Groundwaters (6 NYCRR 701), at http://www.dec.ny.gov/regs/4592.html#15979.

Ohio Department of Natural Resources: Mineral Resources Management (April 28, 2005). Best Management Practices for Pre-Drilling Water Sampling, at http://www.dnr.state.oh.us/Portals/11/oil/pdf/BMP_PRE-DRILLING_WATER_SAMPLING.pdf.

Parshall, J. (undated). Barnett Shale Showcases Tight-gas Development. Journal of Petroleum Technology, in: ALL Consulting. 2008. Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale.

Pennsylvania State University (2009). Gas Well Drilling and Your Private Water Supply: Water Facts #28. URL: http://resources.cas.psu.edu/WaterResources/pdfs/gasdrilling.pdf

Pennsylvania Statutes and Consolidated Statutes Annotated, Title 58 - Oil And Gas, Chapter 11 - Oil And Gas Act

Rae, P., A. N. Martin, and B. Sinanan (1999). Skin bypass fracs: Proof that size is not important. SPE annual technical conference and exhibition, 3-6 October 1999. Volume delta: Drilling and completion. SPE annual technical conference, Houston TX , ETATS-UNIS (03/10/1999) 1999, pp. 129-141 (23 ref.).

Schlumberger (visited April 2009). Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/media/services/stimulation/execution/greenslurry.pdf.

Schlumberger (visited April 2009). Green Chemistry: Earth-friendly GreenSlurry system for uniform marine performance, at http://www.slb.com/content/services/stimulation/execution/greenslurry.asp

Scott M. Stringer (2009). Uncalculated Risk: How plans to drill for gas in Upstate New York could threaten New York City's water system. A report based on statement by Manhattan Borough President.

TAMU (Texas A&M University) (2003). Drilling for Natural Gas – an Environmental Friendly Process. The Texas Institute for Advancement of Chemical Technology (TIACT). October 10, 2003. http://cheweb.tamu.edu/tiact/.

USDOE (1999). Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology, prepared by the office of Fossil Energy of the United States Department of Energy.

USDOE (2009). State Oil and Natural Gas Regulations Designed to Protect Water Resources, prepared by the office of Fossil Energy of the United States Department of Energy, and the National Energy Technology Laboratory.

USEPA (2002). EPA Facts about Cesium-137. At http www.epa.gov superfund health contaminants radiation pdfs cesium.pdf.

USEPA (2003). A Memorandum of Agreement between the United States Environmental Protection Agency and BJ Services Company, Halliburton Energy Services, Inc., and Schlumberger Technology Corporation for Elimination of Diesel Fuel in Hydraulic Fracturing Fluids Injected into Underground Sources of Drinking Water During Hydraulic Fracturing of Coalbed Methane Wells, dated 12 December 2003.

USEPA (June, 2004). Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs. EPA 816-R-04-003.

USEPA (visited April 2009). Introduction to the Concept Of Green Chemistry, at http://www.epa.gov/oppt/greenchemistry/pubs/about_gc.html?.

USEPA (visited June 2009). Drinking Water Contaminant Candidate List and Regulatory Determinations, at http://www.epa.gov/OGWDW/ccl/index.html.

USEPA (visited June 2009). Drinking water contaminants, at http://www.epa.gov/safewater/contaminants/index.html.

USEPA (visited June 2009). Secondary Drinking Water Regulations: Guidance for Nuisance Chemicals, at http://www.epa.gov/OGWDW/consumer/2ndstandards.html.

USEPA (visited June 2009). Setting Standards for Safe Drinking Water, at http://www.epa.gov/ogwdw/standard/setting.html.

USEPA (visited June 2009). Six Year Review of Drinking Water Standards, at http://www.epa.gov/OGWDW/review.html.

Washington Group International (undated). Water in the West: Treatment, Disposal, and Reuse of Produced Water from Natural Gas Exploration in the Rocky Mountain Region, prepared by Tim Rollenhagen, Barry Friedman, Jeff Matthews and Sally Cuffin, of Washington Group International, Denver, CO.

Well testing information published on Kentucky Division of Water website at http://www.water.ky.gov/dw/profi/tips/welltest.htm

Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- Drilling Waste Streams from Offshore Oil and Gas Installations, at http://www.offshore-environment.com/drillwastestream.html.

Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes

Discharges in Different Jurisdictions - Norway, at http://www.offshore-environment.com/norway.html

Wills, Jonathan (2000). A Survey of Offshore Oilfield Drilling Wastes and Disposal Techniques to Reduce the Ecological Impact of Sea Dumping- The Law on Offshore Wastes Discharges in Different Jurisdictions, at http://www.offshore-environment.com/unitedkingdom.html.

Witter et al. (September 15, 2008). Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper, prepared by Roxana Witter, Kaylan Stinson, Holly Sackett, Stefanie Putter, Gregory Kinney, Daniel Teitelbaum, and Lee Newman.

New York State

DEC

Appendices

REVISED DRAFT
Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program

Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs

New York State Department of Environmental Conservation

This page intentionally left blank.

Table of Appendices

APPENDIX NO.	TITLE
1	FEMA Flood Insurance Rate Map Availability[1]
2	1992 SEQRA Findings Statement On the GEIS on the Oil, Gas, and Solution Mining Regulatory Program
3	Supplemental SEQRA Findings Statement On Leasing of State Lands for Activities Regulated Under the Oil, Gas, and Solution Mining Law
4	Application Form for Permit to Drill, Deepen, Plug Back or Convert a Well Subject to the Oil, Gas, and Solution Mining Regulatory Program
5	Environmental Assessment Form For Well Permitting
6	PROPOSED Environmental Assessment Form (EAF) Addendum[1]
7	Sample Drilling Rig Specifications Provided By Chesapeake Energy
8	Casing & Cementing Practices Required for All Wells in NY
9	EXISTING Fresh Water Aquifer Supplementary Permit Conditions Required for Wells Drilled in Primary and Principal Aquifers
10	PROPOSED Supplementary Permit Conditions for High-Volume Hydraulic Fracturing[1]
11	Analysis of Surface Mobility of Fracturing Fluids Excerpted from ICF International, Task 1, 2009
12	Beneficial Use Determination (BUD) Notification Regarding Roadspreading
13	Radiological Data – Production Brine from NYS Marcellus Wells
14	Department of Public Service Environmental Management & Construction Standards and Practices - Pipelines
15	Hydraulic Fracturing – 15 Statements from Regulatory Officials
16	Applicability of NO_x RACT Requirements for Natural Gas Production Facilities
17	Applicability of 40 CFR Part 63 Subpart ZZZZ (Engine MACT) for Natural Gas Production Facilities – Final Rule[1]
18	Definition of Stationary Source or Facility for the Determination of Air Permit Requirements[1]
18A	Evaluation of Particulate Matter and Nitrogen Oxides Emissions Factors and Potential Aftertreatment Controls for Nonroad Engines for Marcellus Shale Drilling and Hydraulic Fracturing[2]
18B	Cost Analysis of Mitigation of NO_2 Emission and Air Impacts By Selected Catalytic Reduction (SCR) Treatment[2]
18C	Regional On-Road Mobile Source Emission Estimates from EPA's MOVES Model and Single Pad PM2.5Estimates from MOBILE 6 Model[2]
19	Greenhouse Gas (GHG) Emissions[1]
20	PROPOSED Pre-Frac Checklist and Certification[1]
21	Publically Owned Treatment Works (POTWs) With Approved Pretreatment Programs
22	POTW Procedures for Accepting HVHF Wastewater[3]
23	USEPA Natural Gas STAR Program

[1] Updated/revised July 2011
[2] New July 2011
[3] Appendix 22 from the September 2009 dSGEIS has been replaced with a new Appendix 22.

Table of Appendices

APPENDIX NO.	TITLE
24	Key Features of USEPA Natural Gas STAR Program
25	Reduced Emissions Completion (REC) Executive Summary
26	Instructions for Using The On-Line Searchable Database To Locate Drilling Applications
27	NYSDOH Radiation Survey Guidelines and Sample Radioactive Materials Handling License[2]

New York State

DEC

Appendix 1

FEMA
Flood Insurance Rate Map
Availability

Excerpted from Alpha Environmental, 2009
Updated by NYSDEC

Updated July 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ALBANY COUNTY	ALBANY, CITY OF	04/15/1980
ALBANY COUNTY	ALTAMONT, VILLAGE OF	08/15/1983
ALBANY COUNTY	BERNE,TOWN OF	08/01/1987 (L)
ALBANY COUNTY	BETHLEHEM, TOWN OF	04/17/1984
ALBANY COUNTY	COEYMANS, TOWN OF	08/03/1989
ALBANY COUNTY	COHOES, CITY OF	12/4/1979
ALBANY COUNTY	COLONIE, TOWN OF	09/05/1979
ALBANY COUNTY	GREEN ISLAND, VILLAGE OF	06/04/1980
ALBANY COUNTY	GUILDERLAND, TOWN OF	01/06/1983
ALBANY COUNTY	KNOX, TOWNSHIP OF	08/13/1982 (M)
ALBANY COUNTY	MENANDS, VILLAGE OF	03/18/1980
ALBANY COUNTY	NEW SCOTLAND, TOWN OF	12/1/1982
ALBANY COUNTY	RAVENA, VILLAGE OF	04/02/1982 (M)
ALBANY COUNTY	RENSSELAERVILLE, TOWN OF	08/27/1982 (M)
ALBANY COUNTY	VOORHEESVILLE, VILLAGE OF	12/1/1982
ALBANY COUNTY	WATERVLIET, CITY OF	01/02/1980
ALBANY COUNTY	WESTERLO, TOWN OF	08/03/1989
ALLEGANY COUNTY	ALFRED, TOWN OF	10/07/1983 (M)
ALLEGANY COUNTY	ALFRED, VILLAGE OF	02/15/1980
ALLEGANY COUNTY	ALLEN, TOWN OF	07/16/1982 (M)
ALLEGANY COUNTY	ALMA, TOWN OF	10/07/1983 (M)
ALLEGANY COUNTY	ALMOND, VILLAGE OF	02/15/1980
ALLEGANY COUNTY	AMITY, TOWN OF	12/18/1984
ALLEGANY COUNTY	ANDOVER, TOWN OF	03/02/1998
ALLEGANY COUNTY	ANDOVER, VILLAGE OF	04/02/1979
ALLEGANY COUNTY	ANGELICA, TOWN OF	12/31/1982 (M)
ALLEGANY COUNTY	ANGELICA, VILLAGE OF	02/01/1984
ALLEGANY COUNTY	BELFAST, TOWN OF	08/06/1982 (M)
ALLEGANY COUNTY	BELMONT, VILLAGE OF	12/18/1984
ALLEGANY COUNTY	BIRDSALL, TOWN OF	07/16/1982 (M)
ALLEGANY COUNTY	BOLIVAR, TOWN OF	07/30/1982 (M)
ALLEGANY COUNTY	BOLIVAR, VILLAGE OF	01/19/1996
ALLEGANY COUNTY	BURNS, TOWN OF	07/16/1982 (M)
ALLEGANY COUNTY	CANASERAGA, VILLAGE OF	12/02/1983 (M)
ALLEGANY COUNTY	CANEADEA, TOWN OF	08/20/1982 (M)
ALLEGANY COUNTY	CLARKSVILLE, TOWN OF	11/12/1982 (M)
ALLEGANY COUNTY	CUBA, TOWN OF	07/30/1982 (M)
ALLEGANY COUNTY	CUBA, VILLAGE OF	04/17/1978
ALLEGANY COUNTY	FRIENDSHIP, TOWN OF	12/18/1984
ALLEGANY COUNTY	GENESEE, TOWN OF	07/30/1982 (M)
ALLEGANY COUNTY	GRANGER, TOWN OF	10/07/1983 (M)
ALLEGANY COUNTY	GROVE, TOWN OF	11/6/1991

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ALLEGANY COUNTY	HUME, TOWN OF	10/2/1997
ALLEGANY COUNTY	INDEPENDENCE, TOWN OF	07/09/1982 (M)
ALLEGANY COUNTY	NEW HUDSON, TOWN OF	08/20/1982 (M)
ALLEGANY COUNTY	RICHBURG, VILLAGE OF	01/05/1978
ALLEGANY COUNTY	RUSHFORD, TOWN OF	12/23/1983 (M)
ALLEGANY COUNTY	SCIO, TOWN OF	03/18/1985
ALLEGANY COUNTY	WARD,TOWN OF	(NSFHA)
ALLEGANY COUNTY	WELLSVILLE, TOWN OF	03/18/1985
ALLEGANY COUNTY	WELLSVILLE, VILLAGE OF	07/17/1978
ALLEGANY COUNTY	WEST ALMOND, TOWN OF	(NSFHA)
ALLEGANY COUNTY	WILLING, TOWN OF	12/24/1982 (M)
ALLEGANY COUNTY	WIRT, TOWN OF	06/25/1982 (M)
BROOME COUNTY	BARKER, TOWN OF	02/05/1992
BROOME COUNTY	BINGHAMTON, CITY OF	06/01/1977
BROOME COUNTY	BINGHAMTON, TOWN OF	01/06/1984 (M)
BROOME COUNTY	CHENANGO, TOWN OF	08/17/1981
BROOME COUNTY	COLESVILLE, TOWN OF	01/20/1993
BROOME COUNTY	CONKLIN, TOWN OF	07/17/1981
BROOME COUNTY	DICKINSON, TOWN OF	04/15/1977
BROOME COUNTY	ENDICOTT, VILLAGE OF	09/07/1998
BROOME COUNTY	FENTON, TOWN OF	08/03/1981
BROOME COUNTY	JOHNSON CITY, VILLAGE OF	09/30/1977
BROOME COUNTY	KIRKWOOD, TOWN OF	06/01/1977
BROOME COUNTY	LISLE, TOWN OF	08/20/2002
BROOME COUNTY	LISLE, VILLAGE OF	01/06/1984 (M)
BROOME COUNTY	MAINE, TOWN OF	02/05/1992
BROOME COUNTY	NANTICOKE, TOWN OF	12/18/1985
BROOME COUNTY	PORT DICKINSON, VILLAGE OF	05/02/1977
BROOME COUNTY	SANFORD, TOWN OF	06/04/1980
BROOME COUNTY	TRIANGLE, TOWN OF	07/20/1984 (M)
BROOME COUNTY	UNION, TOWN OF	09/30/1988
BROOME COUNTY	VESTAL, TOWN OF	03/02/1998
BROOME COUNTY	WHITNEY POINT, VILLAGE OF	01/06/1984 (M)
BROOME COUNTY	WINDSOR, TOWN OF	09/30/1992
BROOME COUNTY	WINDSOR, VILLAGE OF	05/18/1992
CATTARAUGUS COUNTY	ALLEGANY, TOWN OF	11/15/1978
CATTARAUGUS COUNTY	ALLEGANY, VILLAGE OF	12/17/1991
CATTARAUGUS COUNTY	ASHFORD, TOWNSHIP OF	05/25/1984
CATTARAUGUS COUNTY	CARROLLTON, TOWN OF	03/18/1983 (M)
CATTARAUGUS COUNTY	CATTARAUGUS, VILLAGE OF	04/20/1984 (M)
CATTARAUGUS COUNTY	COLD SPRING, TOWN OF	03/01/1978
CATTARAUGUS COUNTY	CONEWANGO, TOWN OF	07/30/1982 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CATTARAUGUS COUNTY	DAYTON, TOWN OF	05/25/1984 (M)
CATTARAUGUS COUNTY	DELEVAN, VILLAGE OF	01/20/1984 (M)
CATTARAUGUS COUNTY	EAST OTTO, TOWN OF	04/20/1984 (M)
CATTARAUGUS COUNTY	EAST RANDOLPH, VILLAGE OF	02/01/1978
CATTARAUGUS COUNTY	ELLICOTTVILLE, TOWN OF	01/19/2000
CATTARAUGUS COUNTY	ELLICOTTVILLE, VILLAGE OF	05/02/1994
CATTARAUGUS COUNTY	FARMERSVILLE, TOWN OF	07/23/1982 (M)
CATTARAUGUS COUNTY	FRANKLINVILLE, TOWN OF	07/17/1978
CATTARAUGUS COUNTY	FRANKLINVILLE, VILLAGE OF	07/03/1978
CATTARAUGUS COUNTY	FREEDOM, TOWN OF	08/19/1991
CATTARAUGUS COUNTY	GREAT VALLEY, TOWN OF	07/17/1978
CATTARAUGUS COUNTY	HINSDALE, TOWN OF	01/17/1979
CATTARAUGUS COUNTY	HUMPHREY, TOWN OF	08/13/1982 (M)
CATTARAUGUS COUNTY	ISCHUA, TOWN OF	08/15/1978
CATTARAUGUS COUNTY	LEON, TOWN OF	08/13/1982 (M)
CATTARAUGUS COUNTY	LIMESTONE, VILLAGE OF	04/17/1978
CATTARAUGUS COUNTY	LITTLE VALLEY, TOWN OF	06/22/1984 (M)
CATTARAUGUS COUNTY	LITTLE VALLEY, VILLAGE OF	02/01/1978
CATTARAUGUS COUNTY	LYNDON, TOWN OF	07/16/1982 (M)
CATTARAUGUS COUNTY	MACHIAS, TOWN OF	08/20/1982 (M)
CATTARAUGUS COUNTY	MANSFIELD, TOWN OF	05/25/1984 (M)
CATTARAUGUS COUNTY	NAPOLI, TOWN OF	07/02/1982 (M)
CATTARAUGUS COUNTY	NEW ALBION, TOWN OF	12/03/1982 (M)
CATTARAUGUS COUNTY	OLEAN, CITY OF	05/09/1980
CATTARAUGUS COUNTY	OLEAN, TOWN OF	02/01/1979
CATTARAUGUS COUNTY	OTTO, TOWN OF	04/20/1984 (M)
CATTARAUGUS COUNTY	PERRYSBURG, TOWN OF	04/20/1984 (M)
CATTARAUGUS COUNTY	PERSIA, TOWN OF	04/20/1984 (M)
CATTARAUGUS COUNTY	PORTVILLE, TOWN OF	07/18/1983
CATTARAUGUS COUNTY	PORTVILLE, VILLAGE OF	04/17/1978
CATTARAUGUS COUNTY	RANDOLPH, TOWN OF	11/05/1982 (M)
CATTARAUGUS COUNTY	RANDOLPH, VILLAGE OF	08/01/1978
CATTARAUGUS COUNTY	SALAMANCA, CITY OF	04/17/1978
CATTARAUGUS COUNTY	SALAMANCA, TOWN OF	11/1/1979
CATTARAUGUS COUNTY	SOUTH DAYTON, VILLAGE OF	01/05/1978
CATTARAUGUS COUNTY	SOUTH VALLEY, TOWN OF	12/02/1983 (M)
CATTARAUGUS COUNTY	YORKSHIRE, TOWN OF	05/25/1984 (M)
CATTARAUGUS COUNTY/ERIE COUNTY/CHAUTAUQUA COUNTY/ALLEGANY COUNTY	SENECA NATION OF INDIANS	09/30/1988
CAYUGA COUNTY	AUBURN, CITY OF	08/02/2007
CAYUGA COUNTY	AURELIUS, TOWN OF	08/02/2007

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CAYUGA COUNTY	AURORA, VILLAGE OF	08/02/2007
CAYUGA COUNTY	BRUTUS, TOWN OF	08/02/2007
CAYUGA COUNTY	CATO, TOWN OF	08/02/2007
CAYUGA COUNTY	CATO, VILLAGE OF	08/02/2007
CAYUGA COUNTY	CAYUGA, VILLAGE OF	08/02/2007
CAYUGA COUNTY	CONQUEST, TOWN OF	08/02/2007
CAYUGA COUNTY	FAIR HAVEN, VILLAGE OF	08/02/2007
CAYUGA COUNTY	FLEMING, TOWN OF	08/02/2007
CAYUGA COUNTY	GENOA,TOWN OF	08/02/2007
CAYUGA COUNTY	IRA, TOWN OF	08/02/2007
CAYUGA COUNTY	LEDYARD, TOWN OF	08/02/2007
CAYUGA COUNTY	LOCKE, TOWN OF	08/02/2007
CAYUGA COUNTY	MENTZ, TOWN OF	08/02/2007
CAYUGA COUNTY	MERIDIAN, VILLAGE OF	08/02/2007
CAYUGA COUNTY	MONTEZUMA, TOWN OF	08/02/2007
CAYUGA COUNTY	MORAVIA, TOWN OF	08/02/2007
CAYUGA COUNTY	MORAVIA, VILLAGE OF	08/02/2007
CAYUGA COUNTY	NILES, TOWN OF	08/02/2007
CAYUGA COUNTY	OWASCO, TOWN OF	08/02/2007
CAYUGA COUNTY	PORT BYRON, VILLAGE OF	08/02/2007
CAYUGA COUNTY	SCIPIO, TOWN OF	08/02/2007
CAYUGA COUNTY	SEMPRONIUS, TOWN OF	08/02/2007
CAYUGA COUNTY	SENNETT, TOWN OF	08/02/2007
CAYUGA COUNTY	SPRINGPORT, TOWN OF	08/02/2007
CAYUGA COUNTY	STERLING, TOWN OF	08/02/2007
CAYUGA COUNTY	SUMMER HILL, TOWN OF	08/02/2007
CAYUGA COUNTY	THROOP, TOWN OF	08/02/2007
CAYUGA COUNTY	UNION SPRINGS, VILLAGE OF	08/02/2007
CAYUGA COUNTY	VENICE, TOWN OF	08/02/2007
CAYUGA COUNTY	VICTORY, TOWN OF	08/02/2007
CAYUGA COUNTY	WEEDSPORT, VILLAGE OF	08/02/2007
CHAUTAUQUA COUNTY	ARKWRIGHT, TOWN OF	04/08/1983 (M)
CHAUTAUQUA COUNTY	BEMUS POINT, VILLAGE OF	11/2/1977
CHAUTAUQUA COUNTY	BROCTON, VILLAGE OF	(NSFHA)
CHAUTAUQUA COUNTY	BUSTI, TOWN OF	01/20/1993
CHAUTAUQUA COUNTY	CARROLL, TOWN OF	10/29/1982 (M)
CHAUTAUQUA COUNTY	CASSADAGA, VILLAGE OF	12/1/1977
CHAUTAUQUA COUNTY	CELORON, VILLAGE OF	03/18/1980
CHAUTAUQUA COUNTY	CHARLOTTE, TOWN OF	03/23/1984 (M)
CHAUTAUQUA COUNTY	CHAUTAUQUA, TOWN OF	06/15/1984
CHAUTAUQUA COUNTY	CHERRY CREEK, TOWN OF	07/02/1982 (M)
CHAUTAUQUA COUNTY	CHERRY CREEK, VILLAGE OF	02/15/1978

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CHAUTAUQUA COUNTY	CLYMER, TOWN OF	10/07/1983 (M)
CHAUTAUQUA COUNTY	DUNKIRK, CITY OF	02/04/1981
CHAUTAUQUA COUNTY	DUNKIRK, TOWN OF	08/06/1982 (M)
CHAUTAUQUA COUNTY	ELLERY, TOWN OF	03/18/1980
CHAUTAUQUA COUNTY	ELLICOTT, TOWN OF	08/01/1984
CHAUTAUQUA COUNTY	ELLINGTON, TOWN OF	10/07/1983(M)
CHAUTAUQUA COUNTY	FALCONER, VILLAGE OF	01/05/1978
CHAUTAUQUA COUNTY	FORESTVILLE, VILLAGE OF	03/18/1983(M)
CHAUTAUQUA COUNTY	FREDONIA, VILLAGE OF	11/15/1989
CHAUTAUQUA COUNTY	FRENCH CREEK, TOWN OF	06/08/1984 (M)
CHAUTAUQUA COUNTY	GERRY, TOWN OF	01/06/1984 (M)
CHAUTAUQUA COUNTY	HANOVER, TOWN OF	12/18/1984
CHAUTAUQUA COUNTY	HARMONY, TOWNSHIP OF	12/01/1986 (L)
CHAUTAUQUA COUNTY	JAMESTOWN, CITY OF	06/01/1978
CHAUTAUQUA COUNTY	KIANTONE, TOWN OF	02/02/1996
CHAUTAUQUA COUNTY	LAKEWOOD, VILLAGE OF	11/2/1977
CHAUTAUQUA COUNTY	MAYVILLE, VILLAGE OF	01/05/1978
CHAUTAUQUA COUNTY	MINA, TOWN OF	01/02/2003
CHAUTAUQUA COUNTY	NORTH HARMONY, TOWN OF	02/15/1980
CHAUTAUQUA COUNTY	PANAMA, VILLAGE OF	03/01/1978
CHAUTAUQUA COUNTY	POLAND, TOWN OF	03/11/1983 (M)
CHAUTAUQUA COUNTY	POMFRET, TOWN OF	12/18/1984
CHAUTAUQUA COUNTY	PORTLAND, TOWN OF	10/07/1983 (M)
CHAUTAUQUA COUNTY	RIPLEY,TOWN OF	(NSFHA)
CHAUTAUQUA COUNTY	SHERIDAN, TOWN OF	10/07/1983 (M)
CHAUTAUQUA COUNTY	SHERMAN, VILLAGE OF	03/01/1978
CHAUTAUQUA COUNTY	SHERMAN,TOWN OF	01/06/1984 (M)
CHAUTAUQUA COUNTY	SILVER CREEK, VILLAGE OF	08/01/1983
CHAUTAUQUA COUNTY	SINCLAIRVILLE, VILLAGE OF	12/1/1977
CHAUTAUQUA COUNTY	STOCKTON, TOWN OF	10/21/1983 (M)
CHAUTAUQUA COUNTY	VILLENOVA, TOWN OF	05/21/1982 (M)
CHAUTAUQUA COUNTY	WESTFIELD, TOWN OF	06/08/1984 (M)
CHAUTAUQUA COUNTY	WESTFIELD, VILLAGE OF	10/07/1983 (M)
CHEMUNG COUNTY	ASHLAND, TOWN OF	01/16/1980
CHEMUNG COUNTY	BALDWIN, TOWN OF	07/23/1982 (M)
CHEMUNG COUNTY	BIG FLATS, TOWN OF	08/18/1992
CHEMUNG COUNTY	CATLIN, TOWN OF	06/22/1984 (M)
CHEMUNG COUNTY	CHEMUNG, TOWN OF	09/03/1980
CHEMUNG COUNTY	ELMIRA HEIGHTS, VILLAGE OF	09/29/1996
CHEMUNG COUNTY	ELMIRA, CITY OF	04/02/1997
CHEMUNG COUNTY	ELMIRA, TOWN OF	09/29/1996
CHEMUNG COUNTY	ERIN, TOWN OF	08/13/1982 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CHEMUNG COUNTY	HORSEHEADS, TOWN OF	09/29/1996
CHEMUNG COUNTY	HORSEHEADS, VILLAGE OF	09/29/1996
CHEMUNG COUNTY	MILLPORT, VILLAGE OF	06/15/1988 (M)
CHEMUNG COUNTY	SOUTHPORT, TOWN OF	08/05/1991
CHEMUNG COUNTY	VAN ETTEN, TOWN OF	09/28/1979 (M)
CHEMUNG COUNTY	VAN ETTEN, VILLAGE OF	07/01/1988 (L)
CHEMUNG COUNTY	VETERAN, TOWN OF	02/18/1983 (M)
CHEMUNG COUNTY	WELLSBURG, VILLAGE OF	06/15/1981
CHENANGO COUNTY	AFTON, TOWN OF	11/26/2010
CHENANGO COUNTY	AFTON, VILLAGE OF	11/26/2010
CHENANGO COUNTY	BAINBRIDGE, TOWN OF	11/26/2010
CHENANGO COUNTY	BAINBRIDGE, VILLAGE OF	11/26/2010
CHENANGO COUNTY	COLUMBUS, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	COVENTRY, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	EARLVILLE, VILLAGE OF	11/26/2010 (M)
CHENANGO COUNTY	GERMAN, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	GREENE, TOWN OF	11/26/2010
CHENANGO COUNTY	GREENE, VILLAGE OF	11/26/2010
CHENANGO COUNTY	GUILFORD, TOWN OF	11/26/2010
CHENANGO COUNTY	LINCKLAEN, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	MC DONOUGH, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	NEW BERLIN, TOWN OF	11/26/2010
CHENANGO COUNTY	NEW BERLIN, VILLAGE OF	11/26/2010
CHENANGO COUNTY	NORTH NORWICH, TOWN OF	11/26/2010
CHENANGO COUNTY	NORWICH, CITY OF	11/26/2010
CHENANGO COUNTY	NORWICH, TOWN OF	11/26/2010
CHENANGO COUNTY	OTSELIC, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	OXFORD, TOWN OF	11/26/2010
CHENANGO COUNTY	OXFORD, VILLAGE OF	11/26/2010
CHENANGO COUNTY	PHARSALIA, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	PITCHER, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	PLYMOUTH, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	PRESTON, TOWN OF	11/26/2010
CHENANGO COUNTY	SHERBURNE, TOWN OF	11/26/2010
CHENANGO COUNTY	SHERBURNE, VILLAGE OF	11/26/2010
CHENANGO COUNTY	SMITHVILLE, TOWN OF	11/26/2010 (M)
CHENANGO COUNTY	SMYRNA, TOWN OF	11/26/2010
CHENANGO COUNTY	SMYRNA, VILLAGE OF	11/26/2010 (M)
CLINTON COUNTY	ALTONA, TOWN OF	09/28/2007 (M)
CLINTON COUNTY	AUSABLE, TOWN OF	09/28/2007 (M)
CLINTON COUNTY	BEEKMANTOWN, TOWN OF	09/28/2007
CLINTON COUNTY	BLACK BROOK, TOWN OF	09/28/2007

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CLINTON COUNTY	CHAMPLAIN, TOWN OF	09/28/2007
CLINTON COUNTY	CHAMPLAIN, VILLAGE OF	09/28/2007
CLINTON COUNTY	CHAZY, TOWN OF	09/28/2007
CLINTON COUNTY	CLINTON, TOWN OF	09/28/2007 (M)
CLINTON COUNTY	ELLENBURG, TOWN OF	09/28/2007 (M)
CLINTON COUNTY	MOOERS, TOWN OF	09/28/2007 (M)
CLINTON COUNTY	PERU,TOWN OF	09/28/2007
CLINTON COUNTY	PLATTSBURGH, CITY OF	09/28/2007
CLINTON COUNTY	PLATTSBURGH, TOWN OF	09/28/2007
CLINTON COUNTY	ROUSES POINT, VILLAGE OF	09/28/2007
CLINTON COUNTY	SARANAC, TOWN OF	09/28/2007
CLINTON COUNTY	SCHUYLER FALLS, TOWN OF	09/28/2007
COLUMBIA COUNTY	ANCRAM, TOWN OF	06/05/1985 (M)
COLUMBIA COUNTY	AUSTERLITZ, TOWN OF	06/05/1985 (M)
COLUMBIA COUNTY	CANAAN, TOWN OF	07/03/1985 (M)
COLUMBIA COUNTY	CHATHAM, TOWN OF	09/15/1993
COLUMBIA COUNTY	CHATHAM, VILLAGE OF	12/15/1982
COLUMBIA COUNTY	CLAVERACK, TOWN OF	09/06/1989
COLUMBIA COUNTY	CLERMONT, TOWNSHIP OF	09/05/1984
COLUMBIA COUNTY	COPAKE, TOWN OF	06/19/1985 (M)
COLUMBIA COUNTY	GALLATIN, TOWN OF	10/16/1984
COLUMBIA COUNTY	GERMANTOWN, TOWN OF	05/11/1979 (M)
COLUMBIA COUNTY	GHENT, TOWN OF	01/01/1988 (L)
COLUMBIA COUNTY	GREENPORT, TOWN OF	11/15/1989
COLUMBIA COUNTY	HILLSDALE, TOWN OF	05/15/1985 (M)
COLUMBIA COUNTY	HUDSON, CITY OF	09/29/1989
COLUMBIA COUNTY	KINDERHOOK, TOWN OF	12/1/1982
COLUMBIA COUNTY	KINDERHOOK, VILLAGE OF	12/1/1982
COLUMBIA COUNTY	LIVINGSTON, TOWN OF	05/11/1979 (M)
COLUMBIA COUNTY	NEW LEBANON, TOWN OF	06/05/1985 (M)
COLUMBIA COUNTY	STOCKPORT, TOWN OF	01/19/1983
COLUMBIA COUNTY	STUYVESANT, TOWN OF	09/14/1979 (M)
COLUMBIA COUNTY	TAGHKANIC, TOWN OF	01/03/1986 (M)
COLUMBIA COUNTY	VALATIE, VILLAGE OF	12/1/1982
CORTLAND COUNTY	CINCINNATUS, TOWN OF	03/02/2010
CORTLAND COUNTY	CORTLAND, CITY OF	03/02/2010
CORTLAND COUNTY	CORTLANDVILLE, TOWN OF	03/02/2010
CORTLAND COUNTY	CUYLER, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	FREETOWN, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	HARFORD, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	HOMER, TOWN OF	03/02/2010
CORTLAND COUNTY	HOMER, VILLAGE OF	03/02/2010

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
CORTLAND COUNTY	LAPEER, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	MARATHON, TOWN OF	03/02/2010
CORTLAND COUNTY	MARATHON, VILLAGE OF	03/02/2010
CORTLAND COUNTY	MCGRAW, VILLAGE OF	03/02/2010
CORTLAND COUNTY	PREBLE, TOWN OF	03/02/2010
CORTLAND COUNTY	SCOTT, TOWN OF	03/02/2010
CORTLAND COUNTY	SOLON, TOWN OF	03/02/2010
CORTLAND COUNTY	TAYLOR, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	TRUXTON, TOWN OF	03/02/2010 (M)
CORTLAND COUNTY	VIRGIL, TOWN OF	03/02/2010
CORTLAND COUNTY	WILLET, TOWN OF	03/02/2010 (M)
DELAWARE COUNTY	ANDES, TOWN OF	05/01/1985 (M)
DELAWARE COUNTY	ANDES, VILLAGE OF	04/01/1986 (L)
DELAWARE COUNTY	BOVINA, TOWN OF	05/01/1985 (M)
DELAWARE COUNTY	COLCHESTER,TOWN OF	02/04/1987
DELAWARE COUNTY	DAVENPORT, TOWN OF	02/02/2002
DELAWARE COUNTY	DELHI, TOWN OF	07/18/1985
DELAWARE COUNTY	DELHI, VILLAGE OF	07/18/1985
DELAWARE COUNTY	DEPOSIT, TOWN OF	03/18/1986 (M)
DELAWARE COUNTY	FLEISCHMANNS, VILLAGE OF	01/17/1986 (M)
DELAWARE COUNTY	FRANKLIN, TOWN OF	04/01/1988 (L)
DELAWARE COUNTY	FRANKLIN, VILLAGE OF	08/01/1987 (L)
DELAWARE COUNTY	HAMDEN,TOWN OF	03/04/1986 (M)
DELAWARE COUNTY	HANCOCK, TOWN OF	09/28/1990
DELAWARE COUNTY	HANCOCK, VILLAGE OF	09/28/1990
DELAWARE COUNTY	HARPERSFIELD, TOWN OF	06/05/1985 (M)
DELAWARE COUNTY	HOBART, VILLAGE OF	05/15/1985 (M)
DELAWARE COUNTY	KORTRIGHT, TOWN OF	05/15/1985 (M)
DELAWARE COUNTY	MARGARETVILLE, VILLAGE OF	06/04/1990
DELAWARE COUNTY	MASONVILLE, TOWN OF	11/01/1985 (M)
DELAWARE COUNTY	MEREDITH, TOWN OF	05/15/1985 (M)
DELAWARE COUNTY	MIDDLETOWN, TOWN OF	08/02/1993
DELAWARE COUNTY	ROXBURY, TOWN OF	05/15/1985 (M)
DELAWARE COUNTY	SIDNEY, TOWN OF	09/30/1987
DELAWARE COUNTY	SIDNEY, VILLAGE OF	09/30/1987
DELAWARE COUNTY	STAMFORD, TOWN OF	10/01/1986 (L)
DELAWARE COUNTY	STAMFORD, VILLAGE OF	08/01/1987 (L)
DELAWARE COUNTY	TOMPKINS, TOWN OF	11/15/1985 (M)
DELAWARE COUNTY	WALTON, TOWN OF	09/02/1988
DELAWARE COUNTY	WALTON, VILLAGE OF	04/02/1991
DELAWARE COUNTY/BROOME COUNTY	DEPOSIT, VILLAGE OF	02/01/1979

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
DUTCHESS COUNTY	AMENIA, TOWN OF	11/15/1989
DUTCHESS COUNTY	BEACON, CITY OF	03/01/1984
DUTCHESS COUNTY	BEEKMAN, TOWN OF	09/05/1984
DUTCHESS COUNTY	CLINTON, TOWN OF	07/05/1984
DUTCHESS COUNTY	DOVER, TOWN OF	07/04/1988
DUTCHESS COUNTY	EAST FISHKILL, TOWN OF	06/15/1984
DUTCHESS COUNTY	FISHKILL, TOWN OF	06/01/1984
DUTCHESS COUNTY	FISHKILL, VILLAGE OF	03/15/1984
DUTCHESS COUNTY	HYDE PARK, TOWN OF	06/15/1984
DUTCHESS COUNTY	LAGRANGE, TOWN OF	09/08/1999
DUTCHESS COUNTY	MILAN, TOWN OF	08/10/1979 (M)
DUTCHESS COUNTY	MILLBROOK, VILLAGE OF	02/27/1984 (M)
DUTCHESS COUNTY	MILLERTON, VILLAGE OF	01/03/1985
DUTCHESS COUNTY	NORTH EAST, TOWN OF	09/05/1984
DUTCHESS COUNTY	PAWLING, TOWN OF	01/03/1985
DUTCHESS COUNTY	PAWLING, VILLAGE OF	08/01/1984
DUTCHESS COUNTY	PINE PLAINS, TOWN OF	10/05/1984 (M)
DUTCHESS COUNTY	PLEASANT VALLEY, TOWN OF	01/16/1980
DUTCHESS COUNTY	POUGHKEEPSIE, CITY OF	01/05/1984
DUTCHESS COUNTY	POUGHKEEPSIE, TOWN OF	09/08/1999
DUTCHESS COUNTY	RED HOOK, TOWN OF	10/16/1984
DUTCHESS COUNTY	RED HOOK, VILLAGE OF	(NSFHA)
DUTCHESS COUNTY	RHINEBECK, TOWN OF	09/05/1984
DUTCHESS COUNTY	RHINEBECK, VILLAGE OF	02/01/1985
DUTCHESS COUNTY	STANFORD, TOWN OF	12/17/1991
DUTCHESS COUNTY	TIVOLI, VILLAGE OF	08/01/1984
DUTCHESS COUNTY	UNION VALE, TOWN OF	09/02/1988
DUTCHESS COUNTY	WAPPINGER, TOWN OF	09/22/1999
DUTCHESS COUNTY	WAPPINGERS FALLS, VILLAGE OF	09/22/1999
DUTCHESS COUNTY	WASHINGTON, TOWN OF	08/17/1979 (M)
ERIE COUNTY	AKRON, VILLAGE OF	11/19/1980
ERIE COUNTY	ALDEN, TOWN OF	02/06/1991
ERIE COUNTY	ALDEN, VILLAGE OF	01/06/1984 (M)
ERIE COUNTY	AMHERST, TOWN OF	10/16/1992
ERIE COUNTY	ANGOLA, VILLAGE OF	08/06/2002
ERIE COUNTY	AURORA, TOWN OF	04/16/1979
ERIE COUNTY	BLASDELL, VILLAGE OF	06/25/1976 (M)
ERIE COUNTY	BOSTON, TOWN OF	09/30/1981
ERIE COUNTY	BRANT, TOWN OF	01/06/1984 (M)
ERIE COUNTY	BUFFALO, CITY OF	09/26/2008
ERIE COUNTY	CHEEKTOWAGA, TOWN OF	03/15/1984
ERIE COUNTY	CLARENCE, TOWN OF	03/05/1996

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ERIE COUNTY	COLDEN, TOWN OF	07/02/1979
ERIE COUNTY	COLLINS,TOWN OF	09/26/2008
ERIE COUNTY	CONCORD, TOWN OF	09/04/1986
ERIE COUNTY	DEPEW, VILLAGE OF	08/03/1981
ERIE COUNTY	EAST AURORA, VILLAGE OF	08/06/2002
ERIE COUNTY	EDEN, TOWN OF	08/24/1979 (M)
ERIE COUNTY	ELMA,TOWN OF	06/22/1998
ERIE COUNTY	EVANS, TOWN OF	02/02/2002
ERIE COUNTY	FARNHAM, VILLAGE OF	(NSFHA)
ERIE COUNTY	GRAND ISLAND, TOWN OF	09/26/2008
ERIE COUNTY	HAMBURG, TOWN OF	12/20/2001
ERIE COUNTY	HAMBURG, VILLAGE OF	01/20/1982
ERIE COUNTY	HOLLAND, TOWN OF	09/26/2008
ERIE COUNTY	KENMORE,VILLAGE OF	(NSFHA)
ERIE COUNTY	LACKAWANNA, CITY OF	07/02/1980
ERIE COUNTY	LANCASTER, TOWN OF	02/23/2001
ERIE COUNTY	LANCASTER, VILLAGE OF	07/02/1979
ERIE COUNTY	MARILLA, TOWN OF	09/29/1978
ERIE COUNTY	NEWSTEAD, TOWN OF	05/04/1992
ERIE COUNTY	ORCHARD PARK, TOWN OF	03/16/1983
ERIE COUNTY	ORCHARD PARK, VILLAGE OF	(NSFHA)
ERIE COUNTY	SARDINIA, TOWN OF	01/16/2003
ERIE COUNTY	SLOAN, VILLAGE OF	(NSFHA)
ERIE COUNTY	SPRINGVILLE, VILLAGE OF	07/17/1986
ERIE COUNTY	TONAWANDA, CITY OF	09/26/2008
ERIE COUNTY	TONAWANDA, TOWN OF	11/12/1982
ERIE COUNTY	WALES, TOWN OF	09/26/2008
ERIE COUNTY	WEST SENECA, TOWN OF	09/30/1992
ERIE COUNTY	WILLIAMSVILLE, VILLAGE OF	09/26/2008
ERIE COUNTY/CATTARAUGUS COUNTY	GOWANDA, VILLAGE OF	09/26/2008
ESSEX COUNTY	CHESTERFIELD, TOWN OF	05/04/1987
ESSEX COUNTY	CROWN POINT,TOWN OF	07/16/1987
ESSEX COUNTY	ELIZABETHTOWN, TOWN OF	01/20/1993
ESSEX COUNTY	ESSEX, TOWN OF	04/03/1987
ESSEX COUNTY	JAY, TOWN OF	06/17/2002
ESSEX COUNTY	KEENE, TOWN OF	06/05/1985 (M)
ESSEX COUNTY	KEESEVILLE, VILLAGE OF	09/28/2007 (M)
ESSEX COUNTY	LAKE PLACID, VILLAGE OF	(NSFHA)
ESSEX COUNTY	LEWIS, TOWN OF	05/15/1985 (M)
ESSEX COUNTY	MINERVA, TOWN OF	10/05/1984 (M)
ESSEX COUNTY	MORIAH, TOWN OF	09/24/1984 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ESSEX COUNTY	NEWCOMB, TOWN OF	06/05/1985 (M)
ESSEX COUNTY	NORTH ELBA, TOWN OF	08/23/2001
ESSEX COUNTY	NORTH HUDSON, TOWN OF	05/15/1985 (M)
ESSEX COUNTY	PORT HENRY, VILLAGE OF	07/16/1987
ESSEX COUNTY	SCHROON, TOWN OF	11/16/1995
ESSEX COUNTY	ST. ARMAND, TOWN OF	02/05/1986
ESSEX COUNTY	TICONDEROGA, TOWN OF	09/06/1996
ESSEX COUNTY	WESTPORT, TOWN OF	09/04/1987
ESSEX COUNTY	WILLSBORO, TOWN OF	05/18/1992
ESSEX COUNTY	WILMINGTON, TOWN OF	11/16/1995
FRANKLIN COUNTY	BANGOR, TOWN OF	(NSFHA)
FRANKLIN COUNTY	BELLMONT, TOWN OF	08/05/1985 (M)
FRANKLIN COUNTY	BOMBAY, TOWN OF	02/15/1985 (M)
FRANKLIN COUNTY	BRANDON, TOWN OF	(NSFHA)
FRANKLIN COUNTY	BRIGHTON, TOWN OF	(NSFHA)
FRANKLIN COUNTY	BRUSHTON, VILLAGE OF	02/19/1986 (M)
FRANKLIN COUNTY	BURKE, TOWN OF	02/19/1986 (M)
FRANKLIN COUNTY	BURKE, VILLAGE OF	(NSFHA)
FRANKLIN COUNTY	CHATEAUGAY, VILLAGE OF	(NSFHA)
FRANKLIN COUNTY	CONSTABLE, TOWN OF	(NSFHA)
FRANKLIN COUNTY	DICKINSON, TOWN OF	03/18/1986 (M)
FRANKLIN COUNTY	DUANE, TOWN OF	(NSFHA)
FRANKLIN COUNTY	FORT COVINGTON, TOWN OF	12/23/1983 (M)
FRANKLIN COUNTY	FRANKLIN, TOWN OF	09/24/1984 (M)
FRANKLIN COUNTY	HARRIETSTOWN, TOWN OF	01/03/1985
FRANKLIN COUNTY	MALONE, TOWN OF	09/04/1985 (M)
FRANKLIN COUNTY	MALONE, VILLAGE OF	04/03/1978
FRANKLIN COUNTY	MOIRA, TOWN OF	04/15/1986 (M)
FRANKLIN COUNTY	SANTA CLARA, TOWN OF	(NSFHA)
FRANKLIN COUNTY	SARANAC LAKE, VILLAGE OF	01/02/1992
FRANKLIN COUNTY	TUPPER LAKE, TOWN OF	(NSFHA)
FRANKLIN COUNTY	TUPPER LAKE,VILLAGE OF	03/01/1987 (L)
FRANKLIN COUNTY	WAVERLY, TOWN OF	(NSFHA)
FRANKLIN COUNTY	WESTVILLE, TOWN OF	02/15/1985 (M)
FULTON COUNTY	BLEECKER,TOWN OF	07/18/1985 (M)
FULTON COUNTY	BROADALBIN, TOWN OF	01/03/1985 (M)
FULTON COUNTY	BROADALBIN, VILLAGE OF	04/15/1986 (M)
FULTON COUNTY	CAROGA, TOWN OF	07/18/1985 (M)
FULTON COUNTY	EPHRATAH, TOWN OF	07/03/1985 (M)
FULTON COUNTY	GLOVERSVILLE, CITY OF	09/30/1983
FULTON COUNTY	JOHNSTOWN, CITY OF	07/18/1983
FULTON COUNTY	JOHNSTOWN, TOWN OF	07/03/1985 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
FULTON COUNTY	MAYFIELD, TOWN OF	08/05/1985 (M)
FULTON COUNTY	NORTHAMPTON, TOWN OF	08/19/1985 (M)
FULTON COUNTY	NORTHVILLE, VILLAGE OF	(NSFHA)
FULTON COUNTY	OPPENHEIM, TOWN OF	06/18/1976
FULTON COUNTY	PERTH, TOWN OF	02/15/1985 (M)
FULTON COUNTY	STRATFORD, TOWN OF	01/03/1985 (M)
GENESEE COUNTY	ALABAMA, TOWN OF	11/18/1983 (M)
GENESEE COUNTY	ALEXANDER, VILLAGE OF	05/04/1987
GENESEE COUNTY	ALEXANDER,TOWN OF	05/04/1987
GENESEE COUNTY	BATAVIA, CITY OF	09/16/1982
GENESEE COUNTY	BATAVIA, TOWN OF	01/17/1985
GENESEE COUNTY	BERGEN, TOWN OF	07/06/1984 (M)
GENESEE COUNTY	BERGEN, VILLAGE OF	06/08/1979 (M)
GENESEE COUNTY	BETHANY, TOWN OF	09/24/1984 (M)
GENESEE COUNTY	BYRON, TOWN OF	02/01/1988 (L)
GENESEE COUNTY	CORFU, VILLAGE OF	10/15/1985 (M)
GENESEE COUNTY	DARIEN, TOWN OF	07/06/1984 (M)
GENESEE COUNTY	ELBA, TOWN OF	10/05/1984 (M)
GENESEE COUNTY	ELBA, VILLAGE OF	01/20/1984 (M)
GENESEE COUNTY	LE ROY, TOWN OF	09/14/1979 (M)
GENESEE COUNTY	LE ROY, VILLAGE OF	08/03/1981
GENESEE COUNTY	OAKFIELD, TOWN OF	05/25/1984 (M)
GENESEE COUNTY	OAKFIELD, VILLAGE OF	03/23/1984 (M)
GENESEE COUNTY	PAVILION, TOWN OF	02/27/1984 (M)
GENESEE COUNTY	PEMBROKE, TOWN OF	01/20/1984 (M)
GENESEE COUNTY	STAFFORD,TOWN OF	07/16/1982
GENESEE COUNTY/WYOMING COUNTY	ATTICA, VILLAGE OF	07/03/1986
GREENE COUNTY	ASHLAND, TOWN OF	05/16/2008
GREENE COUNTY	ATHENS, TOWN OF	05/16/2008
GREENE COUNTY	ATHENS, VILLAGE OF	05/16/2008
GREENE COUNTY	CAIRO, TOWN OF	05/16/2008
GREENE COUNTY	CATSKILL, TOWN OF	05/16/2008
GREENE COUNTY	CATSKILL, VILLAGE OF	05/16/2008
GREENE COUNTY	COXSACKIE, TOWN OF	05/16/2008
GREENE COUNTY	COXSACKIE, VILLAGE OF	05/16/2008
GREENE COUNTY	DURHAM, TOWN OF	05/16/2008 (M)
GREENE COUNTY	GREENVILLE, TOWN OF	05/16/2008 (M)
GREENE COUNTY	HALCOTT, TOWN OF	05/16/2008 (M)
GREENE COUNTY	HUNTER, TOWN OF	05/16/2008
GREENE COUNTY	HUNTER, VILLAGE OF	05/16/2008
GREENE COUNTY	JEWETT, TOWN OF	05/16/2008

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
GREENE COUNTY	LEXINGTON, TOWN OF	05/16/2008
GREENE COUNTY	NEW BALTIMORE, TOWN OF	05/16/2008 (M)
GREENE COUNTY	PRATTSVILLE, TOWN OF	05/16/2008
GREENE COUNTY	TANNERSVILLE, VILLAGE OF	05/16/2008
GREENE COUNTY	WINDHAM, TOWN OF	05/16/2008
HAMILTON COUNTY	ARIETTA, TOWN OF	(NSFHA)
HAMILTON COUNTY	BENSON, TOWN OF	(NSFHA)
HAMILTON COUNTY	HOPE, TOWN OF	04/30/86(M)
HAMILTON COUNTY	INDIAN LAKE, TOWN OF	12/04/85(M)
HAMILTON COUNTY	INLET, TOWN OF	(NSFHA)
HAMILTON COUNTY	LAKE PLEASANT, TOWN OF	(NSFHA)
HAMILTON COUNTY	LONG LAKE, TOWN OF	09/24/1984 (M)
HAMILTON COUNTY	MOREHOUSE, TOWN OF	(NSFHA)
HAMILTON COUNTY	SPECULATOR, VILLAGE OF	02/06/1984 (M)
HAMILTON COUNTY	WELLS, TOWN OF	06/03/1986 (M)
HERKIMER COUNTY	COLD BROOK, VILLAGE OF	12/20/2000
HERKIMER COUNTY	COLUMBIA, TOWN OF	07/16/1982 (M)
HERKIMER COUNTY	DANUBE, TOWN OF	05/12/1999 (M)
HERKIMER COUNTY	DOLGEVILLE, VILLAGE OF	03/16/1983
HERKIMER COUNTY	FAIRFIELD, TOWN OF	10/18/1988
HERKIMER COUNTY	FRANKFORT, TOWN OF	12/20/2000
HERKIMER COUNTY	FRANKFORT, VILLAGE OF	03/07/2001
HERKIMER COUNTY	GERMAN FLATTS, TOWN OF	05/15/1985 (M)
HERKIMER COUNTY	HERKIMER, TOWN OF	04/17/1985 (M)
HERKIMER COUNTY	HERKIMER, VILLAGE OF	06/17/2002
HERKIMER COUNTY	ILION, VILLAGE OF	09/08/1999
HERKIMER COUNTY	LITCHFIELD, TOWN OF	05/07/2001
HERKIMER COUNTY	LITTLE FALLS, CITY OF	04/04/1983
HERKIMER COUNTY	LITTLE FALLS, TOWN OF	03/28/1980 (M)
HERKIMER COUNTY	MANHEIM, TOWN OF	05/01/1985 (M)
HERKIMER COUNTY	MIDDLEVILLE, VILLAGE OF	07/03/1985 (M)
HERKIMER COUNTY	MOHAWK, VILLAGE OF	09/08/1999
HERKIMER COUNTY	NEWPORT, TOWN OF	06/02/1999
HERKIMER COUNTY	NEWPORT, VILLAGE OF	04/02/1991
HERKIMER COUNTY	NORWAY, TOWN OF	07/03/1985 (M)
HERKIMER COUNTY	OHIO, TOWN OF	09/24/1984 (M)
HERKIMER COUNTY	POLAND, VILLAGE OF	06/02/1999 (M)
HERKIMER COUNTY	RUSSIA, TOWN OF	06/02/1999
HERKIMER COUNTY	SALISBURY, TOWN OF	07/03/1985 (M)
HERKIMER COUNTY	SCHUYLER, TOWN OF	06/20/2001
HERKIMER COUNTY	STARK, TOWN OF	05/15/1985 (M)
HERKIMER COUNTY	WARREN, TOWN OF	(NSFHA)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
HERKIMER COUNTY	WEBB, TOWN OF	07/30/1982 (M)
HERKIMER COUNTY	WEST WINFIELD, VILLAGE OF	07/30/1982 (M)
HERKIMER COUNTY	WINFIELD, TOWN OF	07/30/1982 (M)
JEFFERSON COUNTY	ADAMS, TOWN OF	06/05/1985 (M)
JEFFERSON COUNTY	ADAMS, VILLAGE OF	06/19/1985 (M)
JEFFERSON COUNTY	ALEXANDRIA BAY, VILLAGE OF	04/03/1978
JEFFERSON COUNTY	ALEXANDRIA, TOWN OF	10/15/1985 (M)
JEFFERSON COUNTY	ANTWERP, TOWN OF	04/15/1986 (M)
JEFFERSON COUNTY	ANTWERP, VILLAGE OF	(NSFHA)
JEFFERSON COUNTY	BLACK RIVER, VILLAGE OF	06/05/1989 (M)
JEFFERSON COUNTY	BROWNVILLE, TOWN OF	06/02/1992
JEFFERSON COUNTY	BROWNVILLE, VILLAGE OF	03/18/1986 (M)
JEFFERSON COUNTY	CAPE VINCENT, TOWN OF	06/02/1992
JEFFERSON COUNTY	CAPE VINCENT, VILLAGE OF	04/17/1985 (M)
JEFFERSON COUNTY	CARTHAGE, VILLAGE OF	06/17/1991
JEFFERSON COUNTY	CHAMPION, TOWN OF	06/02/1993
JEFFERSON COUNTY	CHAUMONT, VILLAGE OF	09/08/1999
JEFFERSON COUNTY	CLAYTON, TOWN OF	04/02/1986
JEFFERSON COUNTY	CLAYTON, VILLAGE OF	12/1/1977
JEFFERSON COUNTY	DEFERIET, VILLAGE OF	(NSFHA)
JEFFERSON COUNTY	DEXTER, VILLAGE OF	06/15/1994
JEFFERSON COUNTY	ELLISBURG, TOWN OF	05/18/1992
JEFFERSON COUNTY	ELLISBURG, VILLAGE OF	06/19/1985 (M)
JEFFERSON COUNTY	EVANS MILLS, VILLAGE OF	01/02/1992
JEFFERSON COUNTY	GLEN PARK, VILLAGE OF	(NSFHA)
JEFFERSON COUNTY	HENDERSON, TOWN OF	05/18/1992
JEFFERSON COUNTY	HERRINGS, VILLAGE OF	12/18/1985
JEFFERSON COUNTY	HOUNSFIELD, TOWN OF	05/18/1992
JEFFERSON COUNTY	LERAY, TOWN OF	02/02/1902
JEFFERSON COUNTY	LYME, TOWN OF	09/02/1993
JEFFERSON COUNTY	ORLEANS, TOWN OF	03/01/1978
JEFFERSON COUNTY	PAMELIA, TOWN OF	01/02/1992
JEFFERSON COUNTY	PHILADELPHIA, TOWN OF	06/05/89(M)
JEFFERSON COUNTY	PHILADELPHIA, VILLAGE OF	09/15/1993
JEFFERSON COUNTY	RODMAN, TOWN OF	07/03/1985 (M)
JEFFERSON COUNTY	RUTLAND, TOWN OF	08/18/1992
JEFFERSON COUNTY	SACKETS HARBOR, VILLAGE OF	05/02/1994
JEFFERSON COUNTY	THERESA, TOWN OF	10/15/1985 (M)
JEFFERSON COUNTY	THERESA, VILLAGE OF	10/15/1985 (M)
JEFFERSON COUNTY	WATERTOWN, CITY OF	08/02/1993
JEFFERSON COUNTY	WATERTOWN, TOWN OF	08/02/1993
JEFFERSON COUNTY	WEST CARTHAGE, VILLAGE OF	09/28/1990

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
JEFFERSON COUNTY	WILNA, TOWN OF	01/16/1992
JEFFERSON COUNTY	WORTH, TOWN OF	(NSFHA)
LEWIS COUNTY	CASTORLAND, VILLAGE OF	(NSFHA)
LEWIS COUNTY	CONSTABLEVILLE, VILLAGE OF	07/16/1982 (M)
LEWIS COUNTY	COPENHAGEN, VILLAGE OF	(NSFHA)
LEWIS COUNTY	CROGHAM, VILLAGE OF	05/15/1985 (M)
LEWIS COUNTY	CROGHAN, TOWN OF	05/15/1985 (M)
LEWIS COUNTY	DENMARK, TOWN OF	05/15/1985 (M)
LEWIS COUNTY	DIANA, TOWN OF	09/24/1984 (M)
LEWIS COUNTY	GREIG, TOWN OF	05/15/1985 (M)
LEWIS COUNTY	HARRISBURG, TOWN OF	(NSFHA)
LEWIS COUNTY	HARRISVILLE, VILLAGE OF	09/24/1984 (M)
LEWIS COUNTY	LEWIS, TOWN OF	09/29/1996
LEWIS COUNTY	LEYDEN, TOWN OF	06/19/1985 (M)
LEWIS COUNTY	LOWVILLE, TOWN OF	06/20/2000
LEWIS COUNTY	LOWVILLE, VILLAGE OF	06/20/2000
LEWIS COUNTY	LYONS FALLS, VILLAGE OF	06/19/1985 (M)
LEWIS COUNTY	LYONSDALE, TOWN OF	06/19/1985 (M)
LEWIS COUNTY	MARTINSBURG, TOWN OF	06/19/1985 (M)
LEWIS COUNTY	NEW BREMEN, TOWN OF	05/04/2000
LEWIS COUNTY	OSCEOLA, TOWN OF	06/30/1976 (M)
LEWIS COUNTY	PINCKNEY, TOWN OF	(NSFHA)
LEWIS COUNTY	PORT LEYDEN, VILLAGE OF	06/19/1985 (M)
LEWIS COUNTY	TURIN, TOWN OF	08/02/1994
LEWIS COUNTY	TURIN, VILLAGE OF	07/01/1977 (M)
LEWIS COUNTY	WATSON, TOWN OF	07/19/2000
LEWIS COUNTY	WEST TURIN, TOWN OF	(NSFHA)
LIVINGSTON COUNTY	AVON, TOWN OF	08/15/1978
LIVINGSTON COUNTY	AVON, VILLAGE OF	08/01/1978
LIVINGSTON COUNTY	CALEDONIA, TOWN OF	06/01/1981
LIVINGSTON COUNTY	CALEDONIA, VILLAGE OF	06/01/1981
LIVINGSTON COUNTY	CONESUS, TOWN OF	02/15/1991
LIVINGSTON COUNTY	DANSVILLE, VILLAGE OF	04/05/2010
LIVINGSTON COUNTY	GENESEO, TOWN OF	09/29/1996
LIVINGSTON COUNTY	GENESEO, VILLAGE OF	09/29/1996
LIVINGSTON COUNTY	GROVELAND, TOWN OF	02/15/1991
LIVINGSTON COUNTY	LEICESTER, TOWN OF	01/20/1982
LIVINGSTON COUNTY	LEICESTER, VILLAGE OF	08/27/1982 (M)
LIVINGSTON COUNTY	LIMA, TOWN OF	12/23/1983 (M)
LIVINGSTON COUNTY	LIMA, VILLAGE OF	07/23/1982 (M)
LIVINGSTON COUNTY	LIVONIA, TOWN OF	02/19/1992
LIVINGSTON COUNTY	LIVONIA, VILLAGE OF	06/01/1988 (L)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
LIVINGSTON COUNTY	MOUNT MORRIS, TOWN OF	(NSFHA)
LIVINGSTON COUNTY	MOUNT MORRIS, VILLAGE OF	08/01/1978
LIVINGSTON COUNTY	NORTH DANSVILLE, TOWN OF	04/05/2010
LIVINGSTON COUNTY	NUNDA, TOWN OF	07/03/1985 (M)
LIVINGSTON COUNTY	NUNDA, VILLAGE OF	03/23/1984 (M)
LIVINGSTON COUNTY	OSSIAN, TOWN OF	06/08/1984 (M)
LIVINGSTON COUNTY	PORTAGE,TOWN OF	12/18/1984
LIVINGSTON COUNTY	SPARTA, TOWN OF	04/05/2010
LIVINGSTON COUNTY	SPRINGWATER, TOWN OF	08/24/1984 (M)
LIVINGSTON COUNTY	WEST SPARTA, TOWN OF	04/05/2010
LIVINGSTON COUNTY	YORK, TOWN OF	01/20/1982
MADISON COUNTY	BROOKFIELD, TOWN OF	04/17/1985 (M)
MADISON COUNTY	CANASTOTA , VILLAGE OF	04/15/1988
MADISON COUNTY	CAZENOVIA, TOWN OF	06/19/1985
MADISON COUNTY	CAZENOVIA, VILLAGE OF	06/19/1985
MADISON COUNTY	CHITTENANGO, VILLAGE OF	02/01/1985 (M)
MADISON COUNTY	DE RUYTER, TOWN OF	06/08/1984
MADISON COUNTY	DE RUYTER, VILLAGE OF	08/24/1984 (M)
MADISON COUNTY	EATON, TOWN OF	09/10/1984 (M)
MADISON COUNTY	FENNER, TOWNSHIP OF	02/05/1986
MADISON COUNTY	GEORGETOWN, TOWN OF	11/02/1984 (M)
MADISON COUNTY	HAMILTON, TOWN OF	09/27/2002
MADISON COUNTY	HAMILTON,VILLAGE	09/27/2002
MADISON COUNTY	LEBANON, TOWN OF	04/17/1985 (M)
MADISON COUNTY	LENOX, TOWN OF	06/03/1988
MADISON COUNTY	LINCOLN, TOWN OF	09/04/1985 (M)
MADISON COUNTY	MADISON, TOWN OF	01/19/1983
MADISON COUNTY	MORRISVILLE, VILLAGE OF	04/15/1982
MADISON COUNTY	MUNNSVILLE, VILLAGE OF	09/15/1983
MADISON COUNTY	NELSON, TOWN OF	10/05/1984 (M)
MADISON COUNTY	ONEIDA, CITY OF	02/23/2001
MADISON COUNTY	SMITHFIELD, TOWN OF	04/17/1985 (M)
MADISON COUNTY	STOCKBRIDGE, TOWN OF	(NSFHA)
MADISON COUNTY	SULLIVAN, TOWN OF	05/15/1986
MADISON COUNTY	WAMPSVILLE, VILLAGE OF	(NSFHA)
MONROE COUNTY	BRIGHTON, TOWN OF	08/28/2008
MONROE COUNTY	BROCKPORT, VILLAGE OF	08/28/2008 (M)
MONROE COUNTY	CHILI, TOWN OF	08/28/2008
MONROE COUNTY	CHURCHVILLE, VILLAGE OF	08/28/2008
MONROE COUNTY	CLARKSON, TOWN OF	08/28/2008
MONROE COUNTY	EAST ROCHESTER, VILLAGE OF	08/28/2008 (M)
MONROE COUNTY	FAIRPORT, VILLAGE OF	08/28/2008

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
MONROE COUNTY	GATES, TOWN OF	08/28/2008
MONROE COUNTY	GREECE, TOWN OF	08/28/2008
MONROE COUNTY	HAMLIN, TOWN OF	08/28/2008
MONROE COUNTY	HENRIETTA, TOWN OF	08/28/2008
MONROE COUNTY	HILTON, VILLAGE OF	08/28/2008
MONROE COUNTY	HONEOYE FALLS, VILLAGE OF	08/28/2008
MONROE COUNTY	IRONDEQUOIT, TOWN OF	08/28/2008
MONROE COUNTY	MENDON, TOWN OF	08/28/2008
MONROE COUNTY	OGDEN, TOWN OF	08/28/2008
MONROE COUNTY	PARMA, TOWN OF	08/28/2008
MONROE COUNTY	PENFIELD, TOWN OF	08/28/2008
MONROE COUNTY	PERINTON, TOWN OF	08/28/2008
MONROE COUNTY	PITTSFORD, TOWN OF	08/28/2008
MONROE COUNTY	PITTSFORD, VILLAGE OF	08/28/2008 (M)
MONROE COUNTY	RIGA, TOWN OF	08/28/2008
MONROE COUNTY	ROCHESTER, CITY OF	08/28/2008
MONROE COUNTY	RUSH, TOWN OF	08/28/2008
MONROE COUNTY	SCOTTSVILLE, VILLAGE OF	08/28/2008
MONROE COUNTY	SPENCERPORT, VILLAGE OF	08/28/2008
MONROE COUNTY	SWEDEN, TOWN OF	08/28/2008 (M)
MONROE COUNTY	WEBSTER, TOWN OF	08/28/2008
MONROE COUNTY	WEBSTER, VILLAGE OF	08/28/2008
MONROE COUNTY	WHEATLAND, TOWN OF	08/28/2008
MONTGOMERY COUNTY	AMES, VILLAGE OF	12/4/1985
MONTGOMERY COUNTY	AMSTERDAM, CITY OF	06/19/1985
MONTGOMERY COUNTY	AMSTERDAM, TOWN OF	12/01/1987 (L)
MONTGOMERY COUNTY	CANAJOHARIE, TOWN OF	01/06/1983
MONTGOMERY COUNTY	CANAJOHARIE, VILLAGE OF	11/3/1982
MONTGOMERY COUNTY	CHARLESTON, TOWN OF	10/15/1985 (M)
MONTGOMERY COUNTY	FLORIDA, TOWN OF	12/01/1987 (L)
MONTGOMERY COUNTY	FONDA, VILLAGE OF	07/06/1983
MONTGOMERY COUNTY	FORT JOHNSON, VILLAGE OF	01/19/1983
MONTGOMERY COUNTY	FORT PLAIN, VILLAGE OF	06/17/2002
MONTGOMERY COUNTY	FULTONVILLE, VILLAGE OF	10/15/1982
MONTGOMERY COUNTY	GLEN, TOWN OF	02/19/1986 (M)
MONTGOMERY COUNTY	HAGAMAN, VILLAGE OF	03/18/1986 (M)
MONTGOMERY COUNTY	MINDEN, TOWN OF	01/19/1983
MONTGOMERY COUNTY	MOHAWK, TOWN OF	08/05/1985 (M)
MONTGOMERY COUNTY	NELLISTON, VILLAGE OF	11/3/1982
MONTGOMERY COUNTY	PALATINE BRIDGE, VILLAGE OF	11/17/1982
MONTGOMERY COUNTY	PALATINE, TOWN OF	05/04/1987
MONTGOMERY COUNTY	ROOT, TOWN OF	04/01/1988 (L)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
MONTGOMERY COUNTY	ST. JOHNSVILLE, TOWN OF	03/16/1983
MONTGOMERY COUNTY	ST. JOHNSVILLE, VILLAGE OF	09/29/1989
NASSAU COUNTY	ATLANTIC BEACH, VILLAGE OF	09/11/2009
NASSAU COUNTY	BAXTER ESTATES, VILLAGE OF	09/11/2009
NASSAU COUNTY	BAYVILLE, VILLAGE OF	09/11/2009
NASSAU COUNTY	CEDARHURST, VILLAGE OF	09/11/2009
NASSAU COUNTY	CENTRE ISLAND, VILLAGE OF	09/11/2009
NASSAU COUNTY	COVE NECK, VILLAGE OF	09/11/2009
NASSAU COUNTY	EAST HILLS, VILLAGE OF	(NSFHA)
NASSAU COUNTY	EAST ROCKAWAY, VILLAGE OF	09/11/2009
NASSAU COUNTY	EAST WILLISTON, VILLAGE OF	(NSFHA)
NASSAU COUNTY	FLORAL PARK, VILLAGE OF	(NSFHA)
NASSAU COUNTY	FLOWER HILL, VILLAGE OF	09/11/2009
NASSAU COUNTY	FREEPORT, VILLAGE OF	09/11/2009
NASSAU COUNTY	GARDEN CITY, VILLAGE OF	(NSFHA)
NASSAU COUNTY	GLEN COVE, CITY OF	09/11/2009
NASSAU COUNTY	GREAT NECK ESTATES, VILLAGE OF	09/11/2009
NASSAU COUNTY	GREAT NECK PLAZA, VILLAGE OF	09/11/2009
NASSAU COUNTY	GREAT NECK, VILLAGE OF	09/11/2009
NASSAU COUNTY	HEMPSTEAD, TOWN OF	09/11/2009
NASSAU COUNTY	HEMPSTEAD, VILLAGE OF	(NSFHA)
NASSAU COUNTY	HEWLETT BAY PARK, VILLAGE OF	09/11/2009
NASSAU COUNTY	HEWLETT HARBOR, VILLAGE OF	09/11/2009
NASSAU COUNTY	HEWLETT NECK, VILLAGE OF	09/11/2009
NASSAU COUNTY	ISLAND PARK, VILLAGE OF	09/11/2009
NASSAU COUNTY	KENSINGTON, VILLAGE OF	09/11/2009
NASSAU COUNTY	KINGS POINT, VILLAGE OF	09/11/2009
NASSAU COUNTY	LAKE SUCCESS, VILLAGE OF	(NSFHA)
NASSAU COUNTY	LATTINGTOWN, VILLAGE OF	09/11/2009
NASSAU COUNTY	LAUREL HOLLOW, VILLAGE OF	09/11/2009
NASSAU COUNTY	LAWRENCE, VILLAGE OF	09/11/2009
NASSAU COUNTY	LONG BEACH, CITY OF	09/11/2009
NASSAU COUNTY	LYNBROOK, VILLAGE OF	09/11/2009
NASSAU COUNTY	MALVERNE, VILLAGE OF	09/11/2009
NASSAU COUNTY	MANORHAVEN, VILLAGE OF	09/11/2009
NASSAU COUNTY	MASSAPEQUA PARK, VILLAGE OF	09/11/2009
NASSAU COUNTY	MILL NECK, VILLAGE OF	09/11/2009
NASSAU COUNTY	MINEOLA, VILLAGE OF	(NSFHA)
NASSAU COUNTY	MUNSEY PARK, VILLAGE OF	(NSFHA)
NASSAU COUNTY	NEW HYDE PARK, VILLAGE OF	(NSFHA)
NASSAU COUNTY	NORTH HEMPSTEAD, TOWN OF	09/11/2009
NASSAU COUNTY	NORTH HILLS, VILLAGE OF	(NSFHA)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
NASSAU COUNTY	OYSTER BAY COVE, VILLAGE OF	09/11/2009
NASSAU COUNTY	OYSTER BAY, TOWN OF	09/11/2009
NASSAU COUNTY	PLANDOME HEIGHTS, VILLAGE OF	09/11/2009
NASSAU COUNTY	PLANDOME MANOR, VILLAGE OF	09/11/2009
NASSAU COUNTY	PLANDOME, VILLAGE OF	09/11/2009
NASSAU COUNTY	PORT WASHINGTON NORTH, VILLAG	09/11/2009
NASSAU COUNTY	ROCKVILLE CENTRE, VILLAGE OF	09/11/2009
NASSAU COUNTY	ROSLYN ESTATES, VILLAGE OF	(NSFHA)
NASSAU COUNTY	ROSLYN HARBOR, VILLAGE OF	09/11/2009
NASSAU COUNTY	ROSLYN, VILLAGE OF	09/11/2009
NASSAU COUNTY	RUSSELL GARDENS, VILLAGE OF	09/11/2009
NASSAU COUNTY	SADDLE ROCK, VILLAGE OF	09/11/2009
NASSAU COUNTY	SANDS POINT, VILLAGE OF	09/11/2009
NASSAU COUNTY	SEA CLIFF, VILLAGE OF	09/11/2009
NASSAU COUNTY	STEWART MANOR, VILLAGE OF	(NSFHA)
NASSAU COUNTY	THOMASTON, VILLAGE OF	09/11/2009
NASSAU COUNTY	VALLEY STREAM, VILLAGE OF	09/11/2009
NASSAU COUNTY	WESTBURY, VILLAGE OF	(NSFHA)
NASSAU COUNTY	WOODSBURGH, VILLAGE OF	09/11/2009
NIAGARA COUNTY	BARKER, VILLAGE OF	09/17/2010
NIAGARA COUNTY	CAMBRIA, TOWN OF	09/17/2010
NIAGARA COUNTY	HARTLAND, TOWN OF	09/17/2010 (M)
NIAGARA COUNTY	LEWISTON, TOWN OF	09/17/2010
NIAGARA COUNTY	LEWISTON, VILLAGE OF	(NSFHA)
NIAGARA COUNTY	LOCKPORT, CITY OF	09/17/2010
NIAGARA COUNTY	LOCKPORT, TOWN OF	09/17/2010
NIAGARA COUNTY	MIDDLEPORT, VILLAGE OF	09/17/2010
NIAGARA COUNTY	NEWFANE, TOWN OF	09/17/2010
NIAGARA COUNTY	NIAGARA FALLS, CITY OF	09/17/2010
NIAGARA COUNTY	NIAGARA, TOWN OF	09/17/2010
NIAGARA COUNTY	NORTH TONAWANDA, CITY OF	09/17/2010
NIAGARA COUNTY	PENDLETON, TOWN OF	09/17/2010
NIAGARA COUNTY	PORTER, TOWN OF	09/17/2010
NIAGARA COUNTY	ROYALTON, TOWN OF	09/17/2010
NIAGARA COUNTY	SOMERSET, TOWN OF	09/17/2010
NIAGARA COUNTY	WHEATFIELD, TOWN OF	09/17/2010
NIAGARA COUNTY	WILSON, TOWN OF	09/17/2010
NIAGARA COUNTY	WILSON, VILLAGE OF	09/17/2010
NIAGARA COUNTY	YOUNGSTOWN, VILLAGE OF	09/17/2010
ONEIDA COUNTY	ANNSVILLE, TOWN OF	04/05/1988
ONEIDA COUNTY	AUGUSTA, TOWN OF	05/01/1985 (M)
ONEIDA COUNTY	AVA, TOWN OF	02/01/1985 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ONEIDA COUNTY	BARNEVELD, VILLAGE OF	03/23/1999
ONEIDA COUNTY	BOONVILLE, TOWN OF	07/03/1985 (M)
ONEIDA COUNTY	BOONVILLE, VILLAGE OF	04/17/1985 (M)
ONEIDA COUNTY	BRIDGEWATER, TOWN OF	(NSFHA)
ONEIDA COUNTY	BRIDGEWATER, VILLAGE OF	04/15/1982
ONEIDA COUNTY	CAMDEN, TOWN OF	09/07/1998
ONEIDA COUNTY	CAMDEN, VILLAGE OF	08/16/1988
ONEIDA COUNTY	CLAYVILLE, VILLAGE OF	07/05/1983
ONEIDA COUNTY	CLINTON, VILLAGE OF	05/01/1985
ONEIDA COUNTY	DEERFIELD, TOWN OF	06/02/1999
ONEIDA COUNTY	FLORENCE, TOWN OF	04/17/1985 (M)
ONEIDA COUNTY	FLOYD, TOWN OF	03/15/1984
ONEIDA COUNTY	FORESTPORT, TOWN OF	04/17/1985 (M)
ONEIDA COUNTY	HOLLAND PATENT, VILLAGE OF	05/21/2001
ONEIDA COUNTY	KIRKLAND, TOWN OF	04/03/1985
ONEIDA COUNTY	LEE, TOWN OF	08/03/1998
ONEIDA COUNTY	MARCY, TOWN OF	06/01/1984
ONEIDA COUNTY	MARSHALL, TOWN OF	09/30/1982
ONEIDA COUNTY	NEW HARTFORD, TOWN OF	04/18/1983
ONEIDA COUNTY	NEW HARTFORD, VILLAGE OF	07/05/1983
ONEIDA COUNTY	NEW YORK MILLS, VILLAGE OF	05/04/2000
ONEIDA COUNTY	ONEIDA CASTLE, VILLAGE OF	07/04/1989
ONEIDA COUNTY	ORISKANY FALLS, VILLAGE OF	01/19/1983
ONEIDA COUNTY	ORISKANY, VILLAGE OF	09/15/1983
ONEIDA COUNTY	PARIS, TOWN OF	09/15/1983
ONEIDA COUNTY	PROSPECT, VILLAGE OF	11/20/2000
ONEIDA COUNTY	REMSEN, TOWN OF	05/01/1985 (M)
ONEIDA COUNTY	REMSEN, VILLAGE OF	09/24/1984 (M)
ONEIDA COUNTY	ROME, CITY OF	09/21/1998
ONEIDA COUNTY	SANGERFIELD, TOWN OF	06/05/1985
ONEIDA COUNTY	SHERRILL, CITY OF	09/15/1983
ONEIDA COUNTY	STEUBEN, TOWN OF	09/24/1984 (M)
ONEIDA COUNTY	SYLVAN BEACH, VILLAGE OF	06/02/1999
ONEIDA COUNTY	TRENTON, TOWN OF	09/07/1998
ONEIDA COUNTY	UTICA, CITY OF	02/01/1984
ONEIDA COUNTY	VERNON, TOWN OF	08/16/1988
ONEIDA COUNTY	VERNON, VILLAGE OF	04/15/1988
ONEIDA COUNTY	VERONA, TOWN OF	10/20/1999
ONEIDA COUNTY	VIENNA, TOWN OF	10/20/1999
ONEIDA COUNTY	WATERVILLE, VILLAGE OF	08/02/1982
ONEIDA COUNTY	WESTERN, TOWN OF	05/04/1989
ONEIDA COUNTY	WESTMORELAND, TOWN OF	03/02/1983

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ONEIDA COUNTY	WHITESBORO, VILLAGE OF	05/04/2000
ONEIDA COUNTY	WHITESTOWN, TOWN OF	05/04/2000
ONEIDA COUNTY	YORKVILLE, VILLAGE OF	05/04/2000
ONONDAGA COUNTY	BALDWINSVILLE, VILLAGE OF	03/01/1984
ONONDAGA COUNTY	CAMILLUS, TOWN OF	05/18/1999
ONONDAGA COUNTY	CAMILLUS, VILLAGE OF	05/18/1999
ONONDAGA COUNTY	CICERO, TOWN OF	09/15/1994
ONONDAGA COUNTY	CLAY, TOWN OF	03/16/1992
ONONDAGA COUNTY	DEWITT, TOWN OF	03/01/1979
ONONDAGA COUNTY	EAST SYRACUSE, VILLAGE OF	08/03/1981
ONONDAGA COUNTY	ELBRIDGE, TOWN OF	08/16/1982
ONONDAGA COUNTY	ELBRIDGE, VILLAGE OF	08/16/1982
ONONDAGA COUNTY	FABIUS, TOWN OF	04/30/1986 (M)
ONONDAGA COUNTY	FAYETTEVILLE, VILLAGE OF	04/17/1985
ONONDAGA COUNTY	GEDDES, TOWN OF	02/17/1982
ONONDAGA COUNTY	JORDAN, VILLAGE OF	08/16/1982
ONONDAGA COUNTY	LAFAYETTE, TOWN OF	04/03/1985
ONONDAGA COUNTY	LIVERPOOL, VILLAGE OF	02/04/1981
ONONDAGA COUNTY	LYSANDER, TOWN OF	02/04/1983
ONONDAGA COUNTY	MANLIUS, TOWN OF	09/17/1992
ONONDAGA COUNTY	MANLIUS, VILLAGE OF	08/01/1984
ONONDAGA COUNTY	MARCELLUS, TOWN OF	08/16/1982
ONONDAGA COUNTY	MARCELLUS, VILLAGE OF	06/01/1982
ONONDAGA COUNTY	MINOA, VILLAGE OF	09/02/1982
ONONDAGA COUNTY	NORTH SYRACUSE, VILLAGE OF	(NSFHA)
ONONDAGA COUNTY	ONONDAGA, TOWN OF	06/17/1991
ONONDAGA COUNTY	OTISCO, TOWN OF	06/03/1986 (M)
ONONDAGA COUNTY	POMPEY, TOWN OF	10/8/1982
ONONDAGA COUNTY	SALINA, TOWN OF	08/16/1982
ONONDAGA COUNTY	SKANEATELES, TOWN OF	06/01/1982
ONONDAGA COUNTY	SKANEATELES, VILLAGE OF	02/17/1982
ONONDAGA COUNTY	SOLVAY, VILLAGE OF	(NSFHA)
ONONDAGA COUNTY	SPAFFORD, TOWN OF	04/30/1986 (M)
ONONDAGA COUNTY	SYRACUSE, CITY OF	05/15/1986
ONONDAGA COUNTY	TULLY, TOWN OF	04/30/1986 (M)
ONONDAGA COUNTY	TULLY, VILLAGE OF	01/19/1983
ONONDAGA COUNTY	VAN BUREN, TOWN OF	03/01/1984
ONTARIO COUNTY	BLOOMFIELD, VILLAGE OF	8/15/1983
ONTARIO COUNTY	BRISTOL, TOWN OF	01/20/1984 (M)
ONTARIO COUNTY	CANADICE, TOWN OF	05/15/1984
ONTARIO COUNTY	CANANDAIGUA, CITY OF	09/24/1982
ONTARIO COUNTY	CANANDAIGUA, TOWN OF	03/03/1997

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ONTARIO COUNTY	CLIFTON SPRINGS, VILLAGE OF	07/23/1982 (M)
ONTARIO COUNTY	EAST BLOOMFIELD, TOWN OF	08/15/1983
ONTARIO COUNTY	FARMINGTON, TOWN OF	09/30/1983
ONTARIO COUNTY	GENEVA, CITY OF	04/15/1982
ONTARIO COUNTY	GENEVA, TOWN OF	02/15/1978
ONTARIO COUNTY	GORHAM, TOWN OF	12/5/1996
ONTARIO COUNTY	HOPEWELL, TOWN OF	02/27/1984 (M)
ONTARIO COUNTY	MANCHESTER, TOWN OF	03/09/1984 (M)
ONTARIO COUNTY	MANCHESTER, VILLAGE OF	01/20/1984 (M)
ONTARIO COUNTY	NAPLES, TOWN OF	06/08/1984 (M)
ONTARIO COUNTY	NAPLES, VILLAGE OF	09/30/1977
ONTARIO COUNTY	PHELPS, TOWN OF	12/03/1982 (M)
ONTARIO COUNTY	PHELPS, VILLAGE OF	01/20/1984 (M)
ONTARIO COUNTY	RICHMOND, TOWN OF	12/18/1984
ONTARIO COUNTY	SENECA, TOWN OF	06/22/1984(M)
ONTARIO COUNTY	SHORTSVILLE, VILLAGE OF	09/24/1984 (M)
ONTARIO COUNTY	SOUTH BRISTOL, TOWN OF	05/18/1998
ONTARIO COUNTY	VICTOR, TOWN OF	09/30/1983
ONTARIO COUNTY	VICTOR, VILLAGE OF	05/17/2004
ONTARIO COUNTY	WEST BLOOMFIELD, TOWN OF	06/01/1978
ORANGE COUNTY	BLOOMING GROVE, TOWN OF	08/03/2009
ORANGE COUNTY	CHESTER, TOWN OF	08/03/2009
ORANGE COUNTY	CHESTER, VILLAGE OF	08/03/2009
ORANGE COUNTY	CORNWALL ON THE HUDSON, VILLA	08/03/2009
ORANGE COUNTY	CORNWALL, TOWN OF	08/03/2009
ORANGE COUNTY	CRAWFORD, TOWN OF	08/03/2009
ORANGE COUNTY	DEER PARK, TOWN OF	08/03/2009
ORANGE COUNTY	FLORIDA, VILLAGE OF	08/03/2009
ORANGE COUNTY	GOSHEN, TOWN OF	08/03/2009
ORANGE COUNTY	GOSHEN, VILLAGE OF	08/03/2009
ORANGE COUNTY	GREENVILLE, TOWN OF	08/03/2009
ORANGE COUNTY	GREENWOOD LAKE, VILLAGE OF	08/03/2009
ORANGE COUNTY	HAMPTONBURGH, TOWN OF	08/03/2009
ORANGE COUNTY	HARRIMAN, VILLAGE OF	08/03/2009
ORANGE COUNTY	HIGHLAND FALLS, VILLAGE OF	08/03/2009
ORANGE COUNTY	HIGHLANDS, TOWNSHIP OF	08/03/2009
ORANGE COUNTY	KIRYAS JOEL, VILLAGE OF	08/03/2009
ORANGE COUNTY	MAYBROOK, VILLAGE OF	08/03/2009 (M)
ORANGE COUNTY	MIDDLETOWN, CITY OF	08/03/2009
ORANGE COUNTY	MINISINK, TOWN OF	08/03/2009
ORANGE COUNTY	MONROE, TOWN OF	08/03/2009
ORANGE COUNTY	MONROE, VILLAGE OF	08/03/2009

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ORANGE COUNTY	MONTGOMERY, TOWN OF	08/03/2009
ORANGE COUNTY	MONTGOMERY, VILLAGE OF	08/03/2009
ORANGE COUNTY	MOUNT HOPE, TOWN OF	08/03/2009 (M)
ORANGE COUNTY	NEW WINDSOR, TOWN OF	08/03/2009
ORANGE COUNTY	NEWBURGH, CITY OF	08/03/2009
ORANGE COUNTY	NEWBURGH, TOWN OF	08/03/2009
ORANGE COUNTY	PORT JERVIS, CITY OF	08/03/2009
ORANGE COUNTY	SOUTH BLOOMING GROVE, VILLAGE	08/03/2009
ORANGE COUNTY	TUXEDO PARK, VILLAGE OF	08/03/2009
ORANGE COUNTY	TUXEDO, TOWN OF	08/03/2009
ORANGE COUNTY	UNIONVILLE, VILLAGE OF	08/03/2009 (M)
ORANGE COUNTY	WALDEN, VILLAGE OF	08/03/2009
ORANGE COUNTY	WALLKILL, TOWN OF	08/03/2009
ORANGE COUNTY	WARWICK, TOWN OF	08/03/2009
ORANGE COUNTY	WARWICK, VILLAGE OF	08/03/2009
ORANGE COUNTY	WASHINGTONVILLE, VILLAGE OF	08/03/2009
ORANGE COUNTY	WAWAYANDA, TOWN OF	08/03/2009
ORANGE COUNTY	WOODBURY, VILLAGE OF	08/03/2009
ORLEANS COUNTY	ALBION, TOWN OF	08/08/1980 (M)
ORLEANS COUNTY	ALBION, VILLAGE OF	11/30/1979 (M)
ORLEANS COUNTY	BARRE, TOWN OF	10/15/1981 (M)
ORLEANS COUNTY	CARLTON, TOWN OF	11/1/1978
ORLEANS COUNTY	CLARENDON,TOWN OF	(NSFHA)
ORLEANS COUNTY	GAINES, TOWN OF	06/08/1984 (M)
ORLEANS COUNTY	HOLLEY, VILLAGE OF	11/30/1979 (M)
ORLEANS COUNTY	KENDALL, TOWN OF	05/01/1978
ORLEANS COUNTY	LYNDONVILLE, VILLAGE OF	09/16/1981
ORLEANS COUNTY	MEDINA, VILLAGE OF	03/28/1980 (M)
ORLEANS COUNTY	MURRAY, TOWN OF	03/21/1980 (M)
ORLEANS COUNTY	RIDGEWAY,TOWN OF	09/14/1979 (M)
ORLEANS COUNTY	SHELBY,TOWN OF	12/23/1983 (M)
ORLEANS COUNTY	YATES, TOWN OF	09/29/1978
OSWEGO COUNTY	ALBION, TOWN OF	04/15/1986 (M)
OSWEGO COUNTY	ALTMAR, VILLAGE OF	02/05/1986 (M)
OSWEGO COUNTY	AMBOY, TOWN OF	03/01/1988 (L)
OSWEGO COUNTY	BOYLSTON, TOWN OF	(NSFHA)
OSWEGO COUNTY	CENTRAL SQUARE,VILLAGE OF	(NSFHA)
OSWEGO COUNTY	CLEVELAND, VILLAGE OF	06/01/1982
OSWEGO COUNTY	CONSTANTIA, TOWN OF	11/3/1982
OSWEGO COUNTY	FULTON, CITY OF	04/15/1982
OSWEGO COUNTY	GRANBY, TOWN OF	09/16/1982
OSWEGO COUNTY	HANNIBAL, TOWN OF	02/01/1988 (L)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
OSWEGO COUNTY	HANNIBAL, VILLAGE OF	04/01/1987 (L)
OSWEGO COUNTY	HASTINGS, TOWN OF	01/19/1983
OSWEGO COUNTY	LACONA, VILLAGE OF	05/11/1979 (M)
OSWEGO COUNTY	MEXICO, TOWN OF	10/15/1981
OSWEGO COUNTY	MEXICO, VILLAGE OF	10/15/1981
OSWEGO COUNTY	MINETTO, TOWN OF	09/30/1981
OSWEGO COUNTY	NEW HAVEN, TOWN OF	11/2/1995
OSWEGO COUNTY	ORWELL, TOWN OF	02/19/1986
OSWEGO COUNTY	OSWEGO, CITY OF	11/22/1999
OSWEGO COUNTY	OSWEGO, TOWN OF	06/20/2001
OSWEGO COUNTY	PALERMO, TOWN OF	03/01/1988
OSWEGO COUNTY	PARISH, TOWN OF	04/15/1986 (M)
OSWEGO COUNTY	PARISH, VILLAGE OF	02/19/1986 (M)
OSWEGO COUNTY	PHOENIX, VILLAGE OF	02/17/1982
OSWEGO COUNTY	PULASKI, VILLAGE OF	09/02/1982
OSWEGO COUNTY	REDFIELD, TOWN OF	04/01/1991 (L)
OSWEGO COUNTY	RICHLAND, TOWN OF	07/17/1995
OSWEGO COUNTY	SANDY CREEK, TOWN OF	07/17/1995
OSWEGO COUNTY	SANDY CREEK, VILLAGE OF	05/11/1979 (M)
OSWEGO COUNTY	SCHROEPPEL, TOWN OF	08/02/1982
OSWEGO COUNTY	SCRIBA, TOWN OF	06/06/2001
OSWEGO COUNTY	VOLNEY, TOWN OF	04/15/1982
OSWEGO COUNTY	WEST MONROE, TOWN OF	01/20/1982
OSWEGO COUNTY	WILLIAMSTOWN, TOWN OF	03/01/1988
OTSEGO COUNTY	BURLINGTON, TOWN OF	10/21/1983 (M)
OTSEGO COUNTY	BUTTERNUTS, TOWN OF	12/23/1983 (M)
OTSEGO COUNTY	CHERRY VALLEY, TOWN OF	02/01/1988 (L)
OTSEGO COUNTY	CHERRY VALLEY, VILLAGE OF	01/03/1986 (M)
OTSEGO COUNTY	COOPERSTOWN, VILLAGE OF	05/04/2000
OTSEGO COUNTY	DECATUR, TOWN OF	06/18/1987
OTSEGO COUNTY	EDMESTON, TOWN OF	06/01/1987 (L)
OTSEGO COUNTY	EXETER, TOWN OF	11/18/1983 (M)
OTSEGO COUNTY	GILBERTSVILLE, VILLAGE OF	11/01/1985 (M)
OTSEGO COUNTY	HARTWICK, TOWN OF	11/04/1983 (M)
OTSEGO COUNTY	LAURENS, TOWN OF	05/15/1985 (M)
OTSEGO COUNTY	LAURENS, VILLAGE OF	04/17/1987 (M)
OTSEGO COUNTY	MARYLAND, TOWN OF	06/03/1986 (M)
OTSEGO COUNTY	MIDDLEFIELD, TOWN OF	06/01/1988 (L)
OTSEGO COUNTY	MILFORD, TOWN OF	05/19/1987 (M)
OTSEGO COUNTY	MILFORD, VILLAGE OF	11/18/1983
OTSEGO COUNTY	MORRIS, TOWN OF	01/03/1986 (M)
OTSEGO COUNTY	MORRIS, VILLAGE OF	12/04/1985 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
OTSEGO COUNTY	NEW LISBON, TOWN OF	11/18/1983 (M)
OTSEGO COUNTY	ONEONTA, CITY OF	09/29/1978
OTSEGO COUNTY	ONEONTA, TOWN OF	10/17/1986
OTSEGO COUNTY	OTEGO, TOWN OF	02/04/1987
OTSEGO COUNTY	OTEGO, VILLAGE OF	11/5/1986
OTSEGO COUNTY	OTSEGO, TOWN OF	06/01/1987 (L)
OTSEGO COUNTY	PITTSFIELD, TOWN OF	11/04/1983 (M)
OTSEGO COUNTY	PLAINFIELD, TOWN OF	11/04/1983 (M)
OTSEGO COUNTY	RICHFIELD SPRINGS, VILLAGE OF	01/03/1986 (M)
OTSEGO COUNTY	RICHFIELD, TOWN OF	04/15/1986 (M)
OTSEGO COUNTY	ROSEBOOM, TOWN OF	06/01/1988
OTSEGO COUNTY	SPRINGFIELD, TOWN OF	06/01/1987 (L)
OTSEGO COUNTY	UNADILLA, TOWN OF	09/30/1987
OTSEGO COUNTY	UNADILLA, VILLAGE OF	09/30/1987
OTSEGO COUNTY	WESTFORD, TOWN OF	06/01/1987 (L)
OTSEGO COUNTY	WORCESTER, TOWN OF	06/01/1987 (L)
PUTNAM COUNTY	BREWSTER, VILLAGE OF	09/18/1986
PUTNAM COUNTY	CARMEL,TOWN OF	10/19/2001
PUTNAM COUNTY	COLD SPRING, VILLAGE OF	03/15/1984
PUTNAM COUNTY	KENT, TOWN OF	09/04/1986
PUTNAM COUNTY	NELSONVILLE, VILLAGE OF	09/10/1984 (M)
PUTNAM COUNTY	PATTERSON, TOWN OF	07/03/1986
PUTNAM COUNTY	PHILIPSTOWN,TOWN OF	06/18/1987
PUTNAM COUNTY	PUTNAM VALLEY, TOWN OF	06/20/2001
PUTNAM COUNTY	SOUTHEAST, TOWN OF	09/04/1986
RENSSELAER COUNTY	BERLIN, TOWN OF	08/17/1979 (M)
RENSSELAER COUNTY	BRUNSWICK, TOWN OF	12/6/2000
RENSSELAER COUNTY	CASTLETON-ON-HUDSON, VILLAGE O	11/15/1984
RENSSELAER COUNTY	EAST GREENBUSH, TOWN OF	03/18/1980
RENSSELAER COUNTY	EAST NASSAU, VILLAGE OF	09/05/1984
RENSSELAER COUNTY	GRAFTON, TOWN OF	10/13/1978 (M)
RENSSELAER COUNTY	HOOSICK FALLS, VILLAGE OF	02/04/2005
RENSSELAER COUNTY	HOOSICK, TOWN OF	08/01/1987 (L)
RENSSELAER COUNTY	NASSAU, TOWN OF	09/05/1984
RENSSELAER COUNTY	NASSAU, VILLAGE OF	05/18/1979 (M)
RENSSELAER COUNTY	NORTH GREENBUSH,TOWN OF	06/18/1980
RENSSELAER COUNTY	PETERSBURG, TOWN OF	09/01/1978 (M)
RENSSELAER COUNTY	PITTSTOWN, TOWN OF	09/05/1990
RENSSELAER COUNTY	POESTENKILL, TOWN OF	09/02/1981
RENSSELAER COUNTY	RENSSELAER, CITY OF	03/18/1980
RENSSELAER COUNTY	SAND LAKE, TOWN OF	05/15/1980
RENSSELAER COUNTY	SCHAGHTICOKE, TOWN OF	07/16/1984

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
RENSSELAER COUNTY	SCHAGHTICOKE, VILLAGE OF	06/05/1985
RENSSELAER COUNTY	SCHODACK, TOWN OF	08/15/1984
RENSSELAER COUNTY	STEPHENTOWN, TOWN OF	08/03/1981
RENSSELAER COUNTY	TROY, CITY OF	03/18/1980
RENSSELAER COUNTY	VALLEY FALLS, VILLAGE OF	06/05/1985
RICHMOND COUNTY/QUEENS COUNTY/NEW YORK COUNTY/KINGS COUNTY/BRONX COUNTY	NEW YORK, CITY OF	09/05/2007
ROCKLAND COUNTY	CHESTNUT RIDGE, VILLAGE OF	09/16/1988
ROCKLAND COUNTY	CLARKSTOWN, TOWN OF	05/21/2001
ROCKLAND COUNTY	GRAND VIEW-ON-HUDSON, VILLAGE	10/15/1981
ROCKLAND COUNTY	HAVERSTRAW, TOWN OF	01/06/1982
ROCKLAND COUNTY	HAVERSTRAW, VILLAGE OF	09/02/1981
ROCKLAND COUNTY	HILLBURN, VILLAGE OF	09/20/1996
ROCKLAND COUNTY	KASER, VILLAGE OF	01/01/2050
ROCKLAND COUNTY	MONTEBELLO, VILLAGE OF	01/18/1989
ROCKLAND COUNTY	NEW HEMPSTEAD, VILLAGE OF	12/16/1988
ROCKLAND COUNTY	NEW SQUARE, VILLAGE OF	(NSFHA)
ROCKLAND COUNTY	NYACK, VILLAGE OF	12/4/1985
ROCKLAND COUNTY	ORANGETOWN, TOWN OF	08/02/1982
ROCKLAND COUNTY	PIERMONT, VILLAGE OF	11/17/1982
ROCKLAND COUNTY	POMONA, VILLAGE OF	04/15/1982
ROCKLAND COUNTY	RAMAPO, TOWN OF	02/02/1989
ROCKLAND COUNTY	SLOATSBURG, VILLAGE OF	01/06/1982
ROCKLAND COUNTY	SOUTH NYACK, VILLAGE OF	11/4/1981
ROCKLAND COUNTY	SPRING VALLEY, VILLAGE OF	08/16/1988
ROCKLAND COUNTY	STONY POINT, TOWN OF	09/30/1981
ROCKLAND COUNTY	SUFFERN, VILLAGE OF	03/28/1980
ROCKLAND COUNTY	UPPER NYACK, VILLAGE OF	(NSFHA)
ROCKLAND COUNTY	WESLEY HILLS, VILLAGE OF	09/16/1988
ROCKLAND COUNTY	WEST HAVERSTRAW, VILLAGE OF	09/30/1981
SARATOGA COUNTY	BALLSTON SPA, VILLAGE OF	08/16/1995
SARATOGA COUNTY	BALLSTON, TOWN OF	08/16/1995
SARATOGA COUNTY	CHARLTON, TOWN OF	08/16/1995
SARATOGA COUNTY	CLIFTON PARK, TOWN OF	08/16/1995
SARATOGA COUNTY	CORINTH, TOWN OF	08/16/1995
SARATOGA COUNTY	CORINTH, VILLAGE OF	08/16/1995
SARATOGA COUNTY	DAY, TOWN OF	(NSFHA)
SARATOGA COUNTY	GALWAY, TOWN OF	08/16/1995
SARATOGA COUNTY	GREENFIELD, TOWN OF	08/16/1995
SARATOGA COUNTY	HADLEY, TOWN OF	08/16/1995

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
SARATOGA COUNTY	HALFMOON, TOWN OF	08/16/1995
SARATOGA COUNTY	MALTA, TOWN OF	08/16/1995
SARATOGA COUNTY	MECHANICVILLE, CITY OF	08/16/1995
SARATOGA COUNTY	MILTON, TOWN OF	08/16/1995
SARATOGA COUNTY	MOREAU, TOWN OF	08/16/1995
SARATOGA COUNTY	NORTHUMBERLAND, TOWN OF	08/16/1995
SARATOGA COUNTY	PROVIDENCE, TOWN OF	08/16/1995
SARATOGA COUNTY	ROUND LAKE, VILLAGE OF	08/16/1995
SARATOGA COUNTY	SARATOGA SPRINGS, CITY OF	08/16/1995
SARATOGA COUNTY	SARATOGA, TOWN OF	08/16/1995
SARATOGA COUNTY	SCHUYLERVILLE, VILLAGE OF	08/16/1995
SARATOGA COUNTY	SOUTH GLENS FALLS, VILLAGE OF	08/16/1995
SARATOGA COUNTY	STILLWATER, TOWN OF	08/16/1995
SARATOGA COUNTY	STILLWATER, VILLAGE OF	08/16/1995
SARATOGA COUNTY	VICTORY, VILLAGE OF	08/16/1995
SARATOGA COUNTY	WATERFORD, TOWN OF	08/16/1995
SARATOGA COUNTY	WATERFORD, VILLAGE OF	08/16/1995
SARATOGA COUNTY	WILTON,TOWN OF	(NSFHA)
SCHENECTADY COUNTY	DELANSON, VILLAGE OF	05/25/1984 (M)
SCHENECTADY COUNTY	DUANESBURG, TOWN OF	02/17/1989
SCHENECTADY COUNTY	GLENVILLE,TOWN OF	05/04/1987
SCHENECTADY COUNTY	NISKAYUNA, TOWN OF	03/01/1978
SCHENECTADY COUNTY	PRINCETOWN, TOWN OF	07/01/1988 (L)
SCHENECTADY COUNTY	ROTTERDAM, TOWN OF	06/15/1984
SCHENECTADY COUNTY	SCHENECTADY, CITY OF	09/30/1983
SCHENECTADY COUNTY	SCOTIA, VILLAGE OF	06/01/1984
SCHOHARIE COUNTY	BLENHEIM, TOWN OF	04/02/2004
SCHOHARIE COUNTY	BROOME, TOWN OF	04/02/2004
SCHOHARIE COUNTY	CARLISLE, TOWN OF	04/02/2004
SCHOHARIE COUNTY	COBLESKILL, TOWN OF	04/02/2004
SCHOHARIE COUNTY	COBLESKILL, VILLAGE OF	04/02/2004
SCHOHARIE COUNTY	CONESVILLE, TOWN OF	04/02/2004
SCHOHARIE COUNTY	ESPERANCE, TOWN OF	04/02/2004
SCHOHARIE COUNTY	ESPERANCE, VILLAGE OF	04/02/2004
SCHOHARIE COUNTY	FULTON, TOWN OF	04/02/2004
SCHOHARIE COUNTY	GILBOA, TOWN OF	04/02/2004
SCHOHARIE COUNTY	JEFFERSON, TOWN OF	04/02/2004
SCHOHARIE COUNTY	MIDDLEBURGH, TOWN OF	04/02/2004
SCHOHARIE COUNTY	MIDDLEBURGH, VILLAGE OF	04/02/2004
SCHOHARIE COUNTY	RICHMONDVILLE, TOWN OF	04/02/2004
SCHOHARIE COUNTY	RICHMONDVILLE, VILLAGE OF	04/02/2004
SCHOHARIE COUNTY	SCHOHARIE, TOWN OF	04/02/2004

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
SCHOHARIE COUNTY	SCHOHARIE, VILLAGE OF	04/02/2004
SCHOHARIE COUNTY	SEWARD, TOWN OF	04/02/2004
SCHOHARIE COUNTY	SHARON SPRING, VILLAGE OF	04/02/2004 (M)
SCHOHARIE COUNTY	SHARON, TOWN OF	04/02/2004
SCHOHARIE COUNTY	SUMMIT, TOWN OF	04/02/2004
SCHOHARIE COUNTY	WRIGHT, TOWN OF	04/02/2004
SCHUYLER COUNTY	BURDETT, VILLAGE OF	06/01/1988 (L)
SCHUYLER COUNTY	CATHARINE, TOWN OF	04/20/1984 (M)
SCHUYLER COUNTY	CAYUTA, TOWN OF	09/24/1984 (M)
SCHUYLER COUNTY	DIX, TOWN OF	10/29/1982 (M)
SCHUYLER COUNTY	HECTOR, TOWN OF	07/20/1984 (M)
SCHUYLER COUNTY	MONTOUR FALLS, VILLAGE OF	09/15/1983
SCHUYLER COUNTY	MONTOUR, TOWN OF	03/01/1988 (L)
SCHUYLER COUNTY	ODESSA, VILLAGE OF	04/20/1984 (M)
SCHUYLER COUNTY	ORANGE, TOWN OF	04/20/1984 (M)
SCHUYLER COUNTY	READING, TOWN OF	(NSFHA)
SCHUYLER COUNTY	TYRONE, TOWN OF	07/06/1984 (M)
SCHUYLER COUNTY	WATKINS GLEN, VILLAGE OF	07/17/1978
SENECA COUNTY	COVERT, TOWN OF	06/08/1984 (M)
SENECA COUNTY	FAYETTE, TOWN OF	01/15/1988
SENECA COUNTY	LODI, TOWN OF	01/15/1988
SENECA COUNTY	LODI, VILLAGE OF	(NSFHA)
SENECA COUNTY	OVID, TOWN OF	01/15/1988
SENECA COUNTY	ROMULUS, TOWN OF	06/05/1985 (M)
SENECA COUNTY	SENECA FALLS, TOWN OF	08/03/1981
SENECA COUNTY	SENECA FALLS, VILLAGE OF	08/03/1981
SENECA COUNTY	TYRE, TOWN OF	08/31/1979 (M)
SENECA COUNTY	VARICK, TOWN OF	12/17/1987
SENECA COUNTY	WATERLOO, TOWN OF	09/16/1981
SENECA COUNTY	WATERLOO, VILLAGE OF	08/03/1981
ST. LAWRENCE COUNTY	BRASHER, TOWN OF	01/03/1986 (M)
ST. LAWRENCE COUNTY	CANTON, TOWN OF	08/17/1998
ST. LAWRENCE COUNTY	CANTON, VILLAGE OF	05/02/1994
ST. LAWRENCE COUNTY	CLARE, TOWN OF	07/16/1982 (M)
ST. LAWRENCE COUNTY	CLIFTON, CITY OF	05/15/1986 (M)
ST. LAWRENCE COUNTY	COLTON, TOWN OF	05/01/1985 (M)
ST. LAWRENCE COUNTY	DE KALB, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	DE PEYSTER, TOWN OF	07/23/1982 (M)
ST. LAWRENCE COUNTY	EDWARDS, TOWN OF	07/30/1982 (M)
ST. LAWRENCE COUNTY	EDWARDS, VILLAGE OF	07/23/1982 (M)
ST. LAWRENCE COUNTY	FINE, TOWN OF	05/01/1985 (M)
ST. LAWRENCE COUNTY	FOWLER, TOWN OF	06/05/1989 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
ST. LAWRENCE COUNTY	GOUVERNEUR, TOWN OF	08/06/1982 (M)
ST. LAWRENCE COUNTY	GOUVERNEUR, VILLAGE OF	03/03/1997
ST. LAWRENCE COUNTY	HAMMOND, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	HERMON, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	HERMON, VILLAGE OF	08/03/1998
ST. LAWRENCE COUNTY	HEUVELTON, VILLAGE OF	04/30/1986 (M)
ST. LAWRENCE COUNTY	HOPKINTON, TOWN OF	11/12/1982 (M)
ST. LAWRENCE COUNTY	LAWRENCE, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	LISBON, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	LOUISVILLE, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	MACOMB, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	MADRID, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	MASSENA, TOWN OF	06/17/1986 (M)
ST. LAWRENCE COUNTY	MASSENA, VILLAGE OF	11/5/1980
ST. LAWRENCE COUNTY	MORRISTOWN, TOWN OF	08/06/1982 (M)
ST. LAWRENCE COUNTY	MORRISTOWN, VILLAGE OF	12/02/1980 (M)
ST. LAWRENCE COUNTY	NORFOLK, TOWN OF	04/15/1986 (M)
ST. LAWRENCE COUNTY	NORWOOD, VILLAGE OF	04/30/1986 (M)
ST. LAWRENCE COUNTY	OGDENSBURG, CITY OF	11/5/1980
ST. LAWRENCE COUNTY	OSWEGATCHIE, TOWN OF	05/01/1985 (M)
ST. LAWRENCE COUNTY	PARISHVILLE, TOWN OF	07/30/1982 (M)
ST. LAWRENCE COUNTY	PIERCEFIELD, TOWN OF	01/06/1984 (M)
ST. LAWRENCE COUNTY	PIERREPONT, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	PITCAIRN, TOWN OF	08/13/1982 (M)
ST. LAWRENCE COUNTY	POTSDAM, VILLAGE OF	01/05/1996
ST. LAWRENCE COUNTY	POTSDAM,TOWN OF	03/04/1986 (M)
ST. LAWRENCE COUNTY	RENSSELAER FALLS, VILLAGE OF	01/06/1984 (M)
ST. LAWRENCE COUNTY	RICHVILLE, VILLAGE OF	01/06/1984 (M)
ST. LAWRENCE COUNTY	ROSSIE, TOWN OF	07/30/1982 (M)
ST. LAWRENCE COUNTY	RUSSELL, TOWN OF	(NSFHA)
ST. LAWRENCE COUNTY	STOCKHOLM, TOWN OF	04/15/1986 (M)
ST. LAWRENCE COUNTY	WADDINGTON, TOWN OF	04/15/1986 (M)
ST. LAWRENCE COUNTY	WADDINGTON, VILLAGE OF	05/11/1979 (M)
STEUBEN COUNTY	ADDISON, TOWN OF	12/18/1984
STEUBEN COUNTY	ADDISON, VILLAGE OF	06/15/1981
STEUBEN COUNTY	ARKPORT, VILLAGE OF	03/04/1980
STEUBEN COUNTY	AVOCA, TOWN OF	02/05/1992
STEUBEN COUNTY	AVOCA, VILLAGE OF	05/16/1983
STEUBEN COUNTY	BATH, TOWN OF	05/02/1983
STEUBEN COUNTY	BATH, VILLAGE OF	03/16/1983
STEUBEN COUNTY	BRADFORD, TOWN OF	09/24/1984 (M)
STEUBEN COUNTY	CAMERON, TOWN OF	05/15/1991

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
STEUBEN COUNTY	CAMPBELL, TOWN OF	06/11/1982
STEUBEN COUNTY	CANISTEO, TOWN OF	12/18/1984
STEUBEN COUNTY	CANISTEO, VILLAGE OF	05/18/1979 (M)
STEUBEN COUNTY	CATON, TOWN OF	03/23/1984 (M)
STEUBEN COUNTY	COHOCTON, TOWN OF	05/16/1983
STEUBEN COUNTY	COHOCTON, VILLAGE OF	05/16/1983
STEUBEN COUNTY	CORNING, CITY OF	09/27/2002
STEUBEN COUNTY	CORNING, TOWN OF	09/27/2002
STEUBEN COUNTY	DANSVILLE, TOWN OF	03/09/84(M)
STEUBEN COUNTY	ERWIN, TOWN OF	07/02/1980
STEUBEN COUNTY	FREMONT, TOWN OF	10/29/1982 (M)
STEUBEN COUNTY	GREENWOOD, TOWN OF	09/03/1982 (M)
STEUBEN COUNTY	HAMMONDSPORT, VILLAGE OF	04/17/1978
STEUBEN COUNTY	HARTSVILLE, TOWN OF	09/17/1982 (M)
STEUBEN COUNTY	HORNBY, TOWN OF	04/15/1986
STEUBEN COUNTY	HORNELL, CITY OF	03/18/1980
STEUBEN COUNTY	HORNELLSVILLE, TOWN OF	07/16/1980
STEUBEN COUNTY	HOWARD, TOWN OF	09/03/1982 (M)
STEUBEN COUNTY	JASPER, TOWN OF	07/23/1982 (M)
STEUBEN COUNTY	LINDLEY, TOWN OF	08/01/1980
STEUBEN COUNTY	NORTH HORNELL, VILLAGE OF	01/17/1986
STEUBEN COUNTY	PAINTED POST, VILLAGE OF	05/18/2000
STEUBEN COUNTY	PRATTSBURG, TOWN OF	01/20/1984 (M)
STEUBEN COUNTY	PULTENEY, TOWN OF	09/30/1977
STEUBEN COUNTY	RATHBONE, TOWN OF	12/03/1982 (M)
STEUBEN COUNTY	RIVERSIDE, VILLAGE OF	05/15/1980
STEUBEN COUNTY	SAVONA, VILLAGE OF	08/15/1980
STEUBEN COUNTY	SOUTH CORNING, VILLAGE OF	10/15/1981
STEUBEN COUNTY	THURSTON, TOWN OF	02/11/1983 (M)
STEUBEN COUNTY	TROUPSBURG, TOWN OF	09/24/1982 (M)
STEUBEN COUNTY	TUSCARORA, TOWN OF	03/01/1988 (L)
STEUBEN COUNTY	URBANA, TOWN OF	01/19/1978
STEUBEN COUNTY	WAYLAND, TOWN OF	06/08/1984 (M)
STEUBEN COUNTY	WAYLAND, VILLAGE OF	08/01/1988 (L)
STEUBEN COUNTY	WAYNE, TOWN OF	11/2/1977
STEUBEN COUNTY	WEST UNION, TOWN OF	07/01/1988 (L)
STEUBEN COUNTY	WHEELER, TOWN OF	07/25/1980 (M)
STEUBEN COUNTY	WOODHULL, TOWN OF	04/02/1991
STEUBEN COUNTY/ALLEGANY COUNTY	ALMOND, TOWN OF	03/04/1980
SUFFOLK COUNTY	AMITYVILLE, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	ASHAROKEN, VILLAGE OF	09/25/2009

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
SUFFOLK COUNTY	BABYLON, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	BABYLON,TOWN OF	09/25/2009
SUFFOLK COUNTY	BELLE TERRE, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	BELLPORT, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	BRIGHTWATERS, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	BROOKHAVEN,TOWN OF	09/25/2009
SUFFOLK COUNTY	DERING HARBOR, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	EAST HAMPTON,TOWN OF	09/25/2009
SUFFOLK COUNTY	EAST HAMPTON,VILLAGE OF	09/25/2009
SUFFOLK COUNTY	GREENPORT, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	HEAD OF THE HARBOR, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	HUNTINGTON BAY, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	HUNTINGTON, TOWN OF	09/25/2009
SUFFOLK COUNTY	ISLANDIA, VILLAGE OF	09/25/2009 (M)
SUFFOLK COUNTY	ISLIP,TOWN OF	09/25/2009
SUFFOLK COUNTY	LAKE GROVE, VILLAGE OF	(NSFHA)
SUFFOLK COUNTY	LINDENHURST, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	LLOYD HARBOR, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	NISSEQUOGUE, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	NORTH HAVEN, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	NORTHPORT, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	OCEAN BEACH, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	OLD FIELD, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	PATCHOGUE, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	POQUOTT, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	PORT JEFFERSON, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	QUOGUE, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	RIVERHEAD, TOWN OF	09/25/2009
SUFFOLK COUNTY	SAG HARBOR, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	SAGAPONACK, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	SALTAIRE,VILLAGE OF	09/25/2009
SUFFOLK COUNTY	SHELTER ISLAND, TOWN OF	09/25/2009
SUFFOLK COUNTY	SHOREHAM, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	SMITHTOWN, TOWN OF	09/25/2009
SUFFOLK COUNTY	SOUTHAMPTON, TOWN OF	09/25/2009
SUFFOLK COUNTY	SOUTHAMPTON, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	SOUTHOLD,TOWN OF	09/25/2009
SUFFOLK COUNTY	THE BRANCH, VILLAGE OF	09/25/2009
SUFFOLK COUNTY	WEST HAMPTON DUNES, VILLAGE O	09/25/2009
SUFFOLK COUNTY	WESTHAMPTON BEACH, VILLAGE OF	09/25/2009
SULLIVAN COUNTY	BETHEL, TOWN OF	02/18/2011
SULLIVAN COUNTY	BLOOMINGBURG, VILLAGE OF	02/18/2011

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
SULLIVAN COUNTY	CALLICOON, TOWN OF	02/18/2011
SULLIVAN COUNTY	COCHECTON, TOWN OF	02/18/2011
SULLIVAN COUNTY	DELAWARE, TOWN OF	02/18/2011
SULLIVAN COUNTY	FALLSBURG, TOWN OF	02/18/2011
SULLIVAN COUNTY	FORESTBURGH, TOWN OF	02/18/2011
SULLIVAN COUNTY	FREMONT, TOWN OF	02/18/2011
SULLIVAN COUNTY	HIGHLAND, TOWN OF	02/18/2011
SULLIVAN COUNTY	JEFFERSONVILLE, VILLAGE OF	02/18/2011
SULLIVAN COUNTY	LIBERTY, TOWN OF	02/18/2011
SULLIVAN COUNTY	LIBERTY, VILLAGE OF	02/18/2011
SULLIVAN COUNTY	LUMBERLAND, TOWN OF	02/18/2011
SULLIVAN COUNTY	MAMAKATING, TOWN OF	02/18/2011
SULLIVAN COUNTY	MONTICELLO, VILLAGE OF	02/18/2011
SULLIVAN COUNTY	NEVERSINK, TOWN OF	02/18/2011 (M)
SULLIVAN COUNTY	ROCKLAND, TOWN OF	02/18/2011
SULLIVAN COUNTY	THOMPSON, TOWN OF	02/18/2011
SULLIVAN COUNTY	TUSTEN, TOWN OF	02/18/2011
SULLIVAN COUNTY	WOODRIDGE, VILLAGE OF	02/18/2011 (M)
SULLIVAN COUNTY	WURTSBORO, VILLAGE OF	02/18/2011
TIOGA COUNTY	BARTON, TOWN OF	05/15/1991
TIOGA COUNTY	BERKSHIRE, TOWN OF	05/15/1985 (M)
TIOGA COUNTY	CANDOR, TOWN OF	08/19/1986
TIOGA COUNTY	CANDOR, VILLAGE OF	10/01/1991 (L)
TIOGA COUNTY	NEWARK VALLEY, TOWN OF	02/03/1982
TIOGA COUNTY	NEWARK VALLEY, VILLAGE OF	02/03/1982
TIOGA COUNTY	NICHOLS, TOWN OF	02/17/1982
TIOGA COUNTY	NICHOLS, VILLAGE OF	09/29/1986
TIOGA COUNTY	OWEGO, TOWN OF	01/17/1997
TIOGA COUNTY	OWEGO, VILLAGE OF	04/02/1982
TIOGA COUNTY	RICHFORD, TOWN OF	05/15/1985 (M)
TIOGA COUNTY	SPENCER, TOWN OF	05/15/1985 (M)
TIOGA COUNTY	SPENCER, VILLAGE OF	05/15/1985 (M)
TIOGA COUNTY	TIOGA, TOWN OF	05/17/1982
TIOGA COUNTY	WAVERLY, VILLAGE OF	03/16/1983
TOMPKINS COUNTY	CAROLINE, TOWN OF	06/19/1985 (M)
TOMPKINS COUNTY	CAYUGA HEIGHTS, VILLAGE OF	(NSFHA)
TOMPKINS COUNTY	DANBY, TOWN OF	05/15/1985 (M)
TOMPKINS COUNTY	DRYDEN, TOWN OF	05/15/1985 (M)
TOMPKINS COUNTY	DRYDEN, VILLAGE OF	01/03/1979
TOMPKINS COUNTY	FREEVILLE, VILLAGE OF	05/01/88(L)
TOMPKINS COUNTY	GROTON, TOWN OF	10/05/1984 (M)
TOMPKINS COUNTY	GROTON, VILLAGE OF	11/5/1986

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
TOMPKINS COUNTY	ITHACA, CITY OF	09/30/1981
TOMPKINS COUNTY	ITHACA, TOWN OF	06/19/1985
TOMPKINS COUNTY	LANSING, TOWN OF	10/15/1985
TOMPKINS COUNTY	LANSING, VILLAGE OF	11/19/1987
TOMPKINS COUNTY	NEWFIELD, TOWN OF	10/15/1985 (M)
TOMPKINS COUNTY	TRUMANSBURG, VILLAGE OF	04/01/1988 (L)
TOMPKINS COUNTY	ULYSSES, TOWN OF	02/19/1987
ULSTER COUNTY	DENNING, TOWN OF	05/25/1984 (M)
ULSTER COUNTY	ELLENVILLE, VILLAGE OF	09/25/2009
ULSTER COUNTY	ESOPUS, TOWN OF	09/25/2009
ULSTER COUNTY	GARDINER, TOWN OF	09/25/2009
ULSTER COUNTY	HARDENBURGH, TOWN OF	03/16/2089
ULSTER COUNTY	HURLEY, TOWN OF	08/18/2092
ULSTER COUNTY	KINGSTON, CITY OF	09/25/2009
ULSTER COUNTY	KINGSTON,TOWN OF	09/25/2009
ULSTER COUNTY	LLOYD, TOWN OF	09/25/2009
ULSTER COUNTY	MARBLETOWN, TOWN OF	09/25/2009
ULSTER COUNTY	MARLBOROUGH, TOWN OF	09/25/2009
ULSTER COUNTY	NEW PALTZ, TOWN OF	09/25/2009
ULSTER COUNTY	NEW PALTZ, VILLAGE OF	09/25/2009
ULSTER COUNTY	OLIVE, TOWN OF	11/1/1984
ULSTER COUNTY	PLATTEKILL, TOWN OF	(NSFHA)
ULSTER COUNTY	ROCHESTER, TOWN OF	09/25/2009
ULSTER COUNTY	ROSENDALE, TOWN OF	09/25/2009
ULSTER COUNTY	SAUGERTIES, TOWN OF	09/25/2009
ULSTER COUNTY	SAUGERTIES, VILLAGE OF	09/25/2009 (M)
ULSTER COUNTY	SHANDAKEN, TOWN OF	02/17/1989
ULSTER COUNTY	SHAWANGUNK, TOWN OF	09/25/2009
ULSTER COUNTY	ULSTER, TOWN OF	09/25/2009
ULSTER COUNTY	WAWARSING, TOWN OF	09/15/1983
ULSTER COUNTY	WOODSTOCK, TOWN OF	09/27/1991
WARREN COUNTY	BOLTON, TOWN OF	08/16/1996
WARREN COUNTY	CHESTER, TOWN OF	06/05/1985 (M)
WARREN COUNTY	GLENS FALLS, CITY OF	06/05/1985
WARREN COUNTY	HAGUE, TOWN OF	09/29/1996
WARREN COUNTY	HORICON, TOWN OF	02/15/1985 (M)
WARREN COUNTY	JOHNSBURG, TOWN OF	05/01/1985 (M)
WARREN COUNTY	LAKE GEORGE, TOWN OF	08/16/1996
WARREN COUNTY	LAKE GEORGE, VILLAGE OF	09/29/1996
WARREN COUNTY	LAKE LUZERNE, TOWN OF	05/01/1984
WARREN COUNTY	QUEENSBURY, TOWN OF	08/16/1996
WARREN COUNTY	STONY CREEK, TOWN OF	08/24/1984 (M)

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
WARREN COUNTY	THURMAN, TOWN OF	08/19/1986
WARREN COUNTY	WARRENSBURG, TOWN OF	03/01/1984
WASHINGTON COUNTY	ARGYLE, TOWN OF	08/24/1984 (M)
WASHINGTON COUNTY	ARGYLE, VILLAGE OF	05/18/1979 (M)
WASHINGTON COUNTY	CAMBRIDGE, TOWN OF	09/04/1985 (M)
WASHINGTON COUNTY	CAMBRIDGE, VILLAGE OF	01/02/2008
WASHINGTON COUNTY	DRESDEN, TOWN OF	09/20/1996
WASHINGTON COUNTY	EASTON, TOWN OF	11/20/1991
WASHINGTON COUNTY	FORT ANN, TOWN OF	11/5/1997
WASHINGTON COUNTY	FORT ANN, VILLAGE OF	(NSFHA)
WASHINGTON COUNTY	FORT EDWARD, TOWN OF	12/15/1982
WASHINGTON COUNTY	FORT EDWARD, VILLAGE OF	02/15/1984
WASHINGTON COUNTY	GRANVILLE, TOWN OF	08/05/1985 (M)
WASHINGTON COUNTY	GRANVILLE, VILLAGE OF	04/17/1985 (M)
WASHINGTON COUNTY	GREENWICH, VILLAGE OF	05/04/2000
WASHINGTON COUNTY	GREENWICH,TOWN OF	03/16/1992
WASHINGTON COUNTY	HAMPTON, TOWN OF	04/17/1985 (M)
WASHINGTON COUNTY	HARTFORD, TOWN OF	11/01/1985 (M)
WASHINGTON COUNTY	HEBRON, TOWN OF	06/15/1994
WASHINGTON COUNTY	HUDSON FALLS, VILLAGE OF	(NSFHA)
WASHINGTON COUNTY	JACKSON, TOWN OF	03/16/1992
WASHINGTON COUNTY	KINGSBURY, TOWN OF	09/07/1979 (M)
WASHINGTON COUNTY	PUTNAM, TOWN OF	11/20/1996
WASHINGTON COUNTY	SALEM, VILLAGE OF	04/17/1985 (M)
WASHINGTON COUNTY	SALEM,TOWN OF	04/17/1985 (M)
WASHINGTON COUNTY	WHITE CREEK, TOWN OF	04/17/1985 (M)
WASHINGTON COUNTY	WHITEHALL, TOWN OF	07/03/1986
WASHINGTON COUNTY	WHITEHALL, VILLAGE OF	06/03/1985 (M)
WAYNE COUNTY	ARCADIA, TOWN OF	11/2/1977
WAYNE COUNTY	BUTLER, TOWN OF	07/09/1982 (M)
WAYNE COUNTY	CLYDE, VILLAGE OF	12/18/1984
WAYNE COUNTY	GALEN, TOWN OF	05/16/1983
WAYNE COUNTY	HURON, TOWN OF	01/19/1996
WAYNE COUNTY	LYONS, TOWN OF	09/07/1979 (M)
WAYNE COUNTY	LYONS, VILLAGE OF	03/16/1983
WAYNE COUNTY	MACEDON, TOWN OF	01/05/1984
WAYNE COUNTY	MACEDON, VILLAGE OF	09/30/1983
WAYNE COUNTY	MARION, TOWN OF	07/01/1988 (L)
WAYNE COUNTY	NEWARK, VILLAGE OF	07/15/1988
WAYNE COUNTY	ONTARIO, TOWN OF	06/01/1978
WAYNE COUNTY	PALMYRA, TOWN OF	03/01/1978
WAYNE COUNTY	PALMYRA, VILLAGE OF	07/15/1988

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
WAYNE COUNTY	RED CREEK, VILLAGE OF	04/08/1983 (M)
WAYNE COUNTY	ROSE, TOWN OF	03/09/1984 (M)
WAYNE COUNTY	SAVANNAH, TOWN OF	08/06/1982 (M)
WAYNE COUNTY	SODUS POINT, VILLAGE OF	11/2/1977
WAYNE COUNTY	SODUS, TOWN OF	06/02/1992
WAYNE COUNTY	WALWORTH, TOWN OF	03/16/1983
WAYNE COUNTY	WILLIAMSON TOWN	10/17/1978
WAYNE COUNTY	WOLCOTT, TOWN OF	06/02/1992
WAYNE COUNTY	WOLCOTT, VILLAGE OF	07/06/1984 (M)
WESTCHESTER COUNTY	ARDSLEY, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	BEDFORD, TOWN OF	09/28/2007
WESTCHESTER COUNTY	BRIARCLIFF MANOR, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	BRONXVILLE, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	BUCHANAN, VILLAGE OF	09/28/2007 (M)
WESTCHESTER COUNTY	CORTLANDT, TOWN OF	09/28/2007
WESTCHESTER COUNTY	CROTON-ON-HUDSON, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	DOBBS FERRY, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	EASTCHESTER, TOWN OF	09/28/2007
WESTCHESTER COUNTY	ELMSFORD, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	GREENBURGH,TOWN OF	09/28/2007
WESTCHESTER COUNTY	HARRISON, TOWN OF	09/28/2007
WESTCHESTER COUNTY	HASTINGS-ON-HUDSON, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	IRVINGTON, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	LARCHMONT, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	LEWISBORO, TOWN OF	09/28/2007 (M)
WESTCHESTER COUNTY	MAMARONECK, TOWN OF	09/28/2007
WESTCHESTER COUNTY	MAMARONECK, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	MOUNT KISCO, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	MOUNT PLEASANT, TOWN OF	09/28/2007
WESTCHESTER COUNTY	MOUNT VERNON, CITY OF	09/28/2007
WESTCHESTER COUNTY	NEW CASTLE, TOWN OF	09/28/2007
WESTCHESTER COUNTY	NEW ROCHELLE, CITY OF	09/28/2007
WESTCHESTER COUNTY	NORTH CASTLE, TOWN OF	09/28/2007
WESTCHESTER COUNTY	NORTH SALEM, TOWN OF	09/28/2007
WESTCHESTER COUNTY	OSSINING, TOWN OF	09/28/2007
WESTCHESTER COUNTY	OSSINING, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	PEEKSKILL, CITY OF	09/28/2007
WESTCHESTER COUNTY	PELHAM MANOR, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	PELHAM, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	PLEASANTVILLE, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	PORT CHESTER, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	POUND RIDGE, TOWN OF	09/28/2007

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
WESTCHESTER COUNTY	RYE BROOK, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	RYE, CITY OF	09/28/2007
WESTCHESTER COUNTY	SCARSDALE, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	SLEEPY HOLLOW, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	SOMERS, TOWN OF	09/28/2007
WESTCHESTER COUNTY	TARRYTOWN, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	TUCKAHOE, VILLAGE OF	09/28/2007
WESTCHESTER COUNTY	WHITE PLAINS, CITY OF	09/28/2007
WESTCHESTER COUNTY	YONKERS, CITY OF	09/28/2007
WESTCHESTER COUNTY	YORKTOWN, TOWN OF	09/28/2007
WYOMING COUNTY	ARCADE, TOWN OF	03/03/1992
WYOMING COUNTY	ARCADE, VILLAGE OF	03/03/1992
WYOMING COUNTY	ATTICA, TOWN OF	04/30/1986
WYOMING COUNTY	BENNINGTON, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	CASTILE, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	CASTILE, VILLAGE OF	05/28/1982 (M)
WYOMING COUNTY	COVINGTON, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	EAGLE, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	GAINESVILLE, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	GAINESVILLE, VILLAGE OF	02/15/1985 (M)
WYOMING COUNTY	GENESEE FALLS, TOWN OF	05/01/1984
WYOMING COUNTY	JAVA, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	ORANGEVILLE, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	PERRY, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	PERRY, VILLAGE OF	07/29/1977 (M)
WYOMING COUNTY	PIKE, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	PIKE, VILLAGE OF	06/18/1982 (M)
WYOMING COUNTY	SHELDON, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	SILVER SPRINGS, VILLAGE OF	01/20/1984 (M)
WYOMING COUNTY	WARSAW, TOWN OF	12/23/1983 (M)
WYOMING COUNTY	WARSAW, VILLAGE OF	11/18/1981
WYOMING COUNTY	WETHERSFIELD, TOWN OF	07/16/1982
WYOMING COUNTY	WYOMING, VILLAGE OF	08/03/1981
YATES COUNTY	BARRINGTON, TOWN OF	03/09/1984 (M)
YATES COUNTY	BENTON, TOWN OF	01/20/1984 (M)
YATES COUNTY	DRESDEN, VILLAGE OF	06/15/1981
YATES COUNTY	DUNDEE, VILLAGE OF	03/01/1988 (L)
YATES COUNTY	ITALY, TOWN OF	03/07/2001
YATES COUNTY	JERUSALEM, TOWN OF	01/20/1984 (M)
YATES COUNTY	MIDDLESEX, TOWN OF	09/29/1989
YATES COUNTY	MILO, TOWN OF	07/18/1985 (M)
YATES COUNTY	PENN YAN, VILLAGE OF	06/15/1981

TABLE 3.4

Summary of FEMA Flood Insurance Rate Map (FIRM) Availability

County	Community Name	Current FIRM Effective Date
YATES COUNTY	POTTER, TOWN OF	03/23/1984 (M)
YATES COUNTY	RUSHVILLE, VILLAGE OF	06/05/1985 (M)
YATES COUNTY	STARKEY, TOWN OF	12/3/1987
YATES COUNTY	TORREY, TOWN OF	12/3/1987

Notes:
(NSFHA) - No special flood hazard area - All Zone "C"
(M) No elevation determined - All Zone "A", "C", and "X"
(L) Original FIRM by letter - All Zone "A", "C", and "X"
(S) Suspended community, not in the National Flood Program.
(X) Community not in National Flood Program
(>) Date of current effective map is after the date of this report.
Source: FEMA "Community Status Book Report – June 29, 2011."
(http://www.fema.gov/fema/csb.shtm)

This page intentionally left blank.

New York State

DEC

Appendix 2

1992 SEQRA Findings Statement on the GEIS on the Oil, Gas and Solution Mining Regulatory Program

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

September 1, 1992

Findings Statement

Pursuant to the State Environmental Quality Review Act (SEQR) of the Environmental Conservation Law (ECL) and the SEQR Regulations 6NYCRR Part 617, the New York State Department of Environmental Conservation makes the following findings.

Name of Action

Adoption of the Final Generic Environmental Impact Statement (GEIS) on the Oil, Gas and Solution Mining Regulatory Program.

Description and Background

In early 1988, the Department of Environmental Conservation released the Draft GEIS on the Oil, Gas and Solution Mining Regulatory Program. The Draft GEIS comprehensively reviewed the environmental impacts of the Department's program for regulating the siting, drilling, production and plugging and abandonment of oil, gas, underground gas storage, solution mining, brine disposal, geothermal and stratigraphic test wells. Six public hearings were held on the Draft GEIS in June 1988.

The Final GEIS was released in July 1992. It contains individual responses to the hundreds of comments received on the Draft GEIS. The Final GEIS also includes more detailed topical responses addressing several controversial issues that frequently appeared in the comments on the draft document.

Together, the Draft and Final GEIS and this Findings Statement will provide the groundwork for revisions to the Oil, Gas and Solution Mining Regulations (6NYCRR Parts 550-559). These regulations are being updated to more accurately reflect and effectively implement the current Oil, Gas and Solution Mining Law (ECL Article 23).

The Draft GEIS included suggested changes to the regulations in bold print throughout the document. In the interests of environmental protection and public safety, a significant

number of the suggested regulatory changes are already put in effect as standard conditions routinely applied to permits. All formal regulation changes, however, must be promulgated in accordance with the State Administrative Procedure Act (SAPA) requiring separate review, public hearings and approval. Further public input during the rulemaking process may cause some of the new regulations, when they are eventually adopted, to differ from those discussed in the GEIS. Any regulations adopted that differ significantly from those discussed in the GEIS will undergo an additional SEQR Review and Determination.

Location

Statewide.

DEC Jurisdiction

Jurisdiction is provided by the Oil, Gas and Solution Mining Law (ECL Article 23).

Date Final GEIS Filed

The Final GEIS was filed June 25, 1992/#PO-009900-00046. The Notice of Completion was published in the Environmental Notice Bulletin July 8, 1992.

Facts and Conclusions Relied Upon to Support the SEQR Findings

The record of facts established in the Draft and Final GEIS upholds the following conclusions:

1. The **unregulated** siting, drilling, production, and plugging and abandonment of oil, gas, solution mining, underground gas storage, brine disposal, geothermal and stratigraphic test wells could have potential negative impacts on every aspect of the environment. The potential negative impacts range from very minor to significant. Potential impacts of **unregulated** activities on ground and surface waters are a particularly serious concern. The potential negative impacts on all environmental resources are described in detail in Chapters 8 through 14 and summarized in Chapter 16 of the Draft GEIS.

2. Under **existing regulations and permit conditions**, the potential environmental impacts of the above wells are **greatly reduced** and most are reduced to non-significant levels. The extensive mitigation measures required under the existing regulatory program are described in detail in Chapters 8 through 14 and summarized in Chapter 17 of the Draft GEIS.

3. The potential environmental impacts associated with the activities covered by the Oil, Gas and Solution Mining Regulatory Program also have economic and social implications. For example, it is less expensive to prevent pollution than pay for remediation of environmental problems, health care costs, and lawsuit expenses. The State also receives significant economic benefits from the activities covered by the regulatory program. The regulated industries provide jobs and economic stimulus through the purchase of goods and services, and the payment of taxes, royalties and leasing bonuses. Additional information on the potential economic impacts associated with the activities covered by the regulatory program is provided in Chapter 18 of the Draft GEIS.

4. The Department's routine requirement of: 1) a program-specific Environmental Assessment Form (EAF) with <u>every</u> well drilling permit application, 2) a plat (map) showing the proposed well location, and 3) a pre-drilling site inspection, allows the Department to:

   - reliably determine potential environmental problems, and
   - select appropriate permit conditions for mitigating potential environmental impacts.

   The EAF is printed in its entirety and discussed in detail on pages FGEIS 30-34 of the Final GEIS. Information on the permit application review process is summarized in Chapter 7 of the Draft GEIS.

5. The majority of the industry's activity centers on drilling individual oil and gas wells for primary production. For purposes of this Findings Statement, standard oil and gas operations are defined as:

- any procedure relevant to rotary or cable tool drilling procedures, and
- production operations which do not utilize any type of artificial means to facilitate the recovery of hydrocarbons.

The basic features of standard oil and gas operations are described in detail in Chapters 9 through 11 of the Draft GEIS.

6. The diverse types of wells covered by the regulatory program have enough design and operational characteristics in common to group them according to their potential environmental impacts. Design and operational aspects of these wells are described in detail in Chapters 9 through 14 of the Draft GEIS.

7. The magnitude of potential environmental impacts associated with any proposed well covered by the regulatory program is strongly influenced by the types of natural and cultural resources in the well's vicinity. New York State's environmental resources are described in Chapter 6 of the Draft GEIS. Most of the information on the potential environmental impacts of the regulated activities on these environmental resources can be found in Chapter 8 of the Draft GEIS, which deals with siting issues. Additional information on potential impacts related to specific stages (drilling, completion, production, plugging and abandonment) of well operation can be found in Chapters 9 through 11 of the Draft GEIS. Additional information on potential environmental impacts related specifically to enhanced oil recovery, solution salt mining, underground gas storage and waste brine disposal can be found in Chapters 12 through 15 of the Draft GEIS.

8. The range of future alternatives concerning the activities covered by the Oil, Gas and Solution Mining Regulatory Program can be divided into three basic categories: 1) prohibition on regulated activities, 2) removal of regulation, and 3) maintenance of status quo versus revision of existing regulations. A prohibition on these regulated activities would deprive the State of substantial economic and natural resource benefits. Complete removal of regulation would lead to severe environmental problems. While the existing regulations and permit conditions provide significant environmental protection, there is still room to improve the efficiency and effectiveness of the program. Revision of the existing regulations is the best alternative. Chapter 21 of the Draft GEIS contains a more detailed assessment of the environmental, economic, and social aspects of each alternative.

SEQR Determinations of Significance

The SEQR determinations on the significance of the environmental impacts associated with the activities covered by this regulatory program are presented in the following table. The determinations are supported by the conclusions listed above, which in turn are supported by the referenced sections of the Draft and Final GEIS.

SEQR DETERMINATIONS

Agency Action	Environmental Impact	Explanation
a. Standard individual oil, gas, solution mining, stratigraphic, geothermal, or gas storage well drilling permits (no other permits involved).	not significant	Rules and regulations and conditions are adequate to protect the environment. The Draft and Final GEIS satisfy SEQR for these actions. A site-specific EAF is required with the permit application.
b. Oil and gas drilling permits in State Parklands.	may be significant	Site-specific conditions of State Parklands are not discussed in the Draft and Final GEIS. Further determination of significant environmental impacts is needed for State Parklands. A site-specific EAF is required with the permit application.
c. Oil and gas drilling permits in Agricultural Districts.	may be significant	Rules and regulations and conditions are adequate to protect the environment. For most oil and gas operations in Agricultural Districts which utilize less than 2½ acres the GEIS satisfies SEQR. If more than 2½ acres are disturbed, this is a Type I action under 6NYCRR Part 617 and an additional determination of significance is required. A site-specific EAF is required with the permit application.
d. Oil and gas drilling permits in the "Bass Island" fields.	not significant	Special conditions and regulations under Part 559 are adequate to protect the environment. The Draft and Final GEIS satisfy SEQR for these actions. A site-specific EAF is required with the permit application.

e. Oil and gas drilling permits for locations above aquifers.	not significant	Rules and regulations and special aquifer conditions employed by DEC have been developed specifically to protect the groundwater resources of the State. The Draft and Final GEIS satisfy SEQR for these actions. A site-specific EAF is required with the permit application.
f. Oil and gas drilling permits in close proximity (less than 1,000 feet) to municipal water supply wells.	always significant	A supplemental EIS is required dealing with the groundwater hydrology, potential impacts and mitigation measures. A site-specific EAF is required with the permit application.
g. Oil and gas drilling permits in proximity (between 1,000 and 2,000 feet) to municipal water supply wells.	may be significant	A supplemental EIS may be required dealing with the groundwater hydrology, potential impacts and mitigation measures. A site-specific assessment and SEQR determination are required. A site-specific EAF is required with the permit application.
h. Oil and gas drilling permits when other DEC permits required.	may be significant	A site-specific SEQR assessment and determination are needed based on the environmental conditions requiring additional DEC permits. A site-specific EAF is required with the permit application.
i. Plugging permits for oil, gas, solution mining, stratigraphic, geothermal, gas storage and brine disposal wells.	Type II *	By law all wells drilled must be plugged before abandonment. Proper well plugging is a beneficial action with the sole purpose of environmental protection, and constitutes a routine agency action.

* Under 6NYCRR 617.13, a Type II action is one which has been determined not to have a significant effect on the environment and does not require any other SEQR determination or procedure.

j. New waterflood or tertiary recovery projects.	may be significant	For major new waterfloods and new tertiary recovery projects, a site specific environmental assessment and SEQR determination are required. A supplemental EIS may be required for new waterfloods to ensure integrity of the flood. Also, a supplemental EIS may be required for new tertiary recovery projects depending on the scope of operations and methods used. A site-specific EAF is required with the permit application.
k. New underground gas storage projects or major modifications.	may be significant	A site-specific environmental assessment and SEQR determination are required. May require a supplemental EIS depending on the scope of the project. A site-specific EAF is required with the permit application.
l. New solution mining projects or major modifications.	may be significant	A site-specific environmental assessment and SEQR determination are required. May require a supplemental EIS depending on the scope of the project. A site-specific EAF is required with the permit application.
m. Spacing hearing.	not significant	Action to hold hearing is non-significant. A review and SEQR determination with respect to all other issues must be made before the hearing. Any permit issued subsequently will be reviewed on issues raised at hearing. A site-specific EAF is required with the permit application.
n. Variance hearing.	not significant	Action to hold hearing is non-significant. A review and SEQR determination with respect to all other issues must be made before the hearing. Any permit issued subsequently will be reviewed on issues raised at hearing. A site-specific EAF is required with the permit application.

o. Compulsory unitization hearing.	not significant	Action to hold hearing is non-significant. A review and SEQR determination with respect to all other issues must be made before the hearing. Any permit issued subsequently will be reviewed on issues raised at hearing. A site-specific EAF is required with the permit application.
p. Natural Gas Policy Act pricing recommendations.	none	Action only results in recommendations to Federal Energy Regulatory Commission; therefore, action is not subject to SEQR.
q. Brine disposal well drilling or conversion permit.	may be significant	The brine disposal well permitting guidelines require an extensive surface and subsurface evaluation which is in effect a supplemental EIS addressing technical issues. An additional site specific environmental assessment and SEQR determination are required. A site-specific EAF is required with the permit application.

SEQR Review Procedures

Upon filing of this Findings Statement, the following SEQR Review procedures will be adopted for the Oil, Gas and Solution Mining Regulatory Program:

1. A shortened program-specific Environmental Assessment Form (EAF) will continue to be required with every well drilling permit application, regardless of the SEQR determination listed in the previous table. Information required by the EAF is considered to be an essential part of the permit application. It contains vital site-specific information necessary to evaluate the need for individual permit conditions.

2. In the following cases where the GEIS satisfies SEQR, Department staff will no longer make Determinations of Significance and a Negative or Positive Declaration under SEQR will no longer be required so long as projects conform to the descriptions in the Draft and Final GEIS:

   - Standard individual oil, gas, solution mining, stratigraphic test, geothermal or gas storage well drilling permits,
   - Oil and gas drilling permits in the "Bass Islands" field, and
   - Oil and gas drilling permits for locations above aquifers.

3. In addition to the short program-specific EAF, permits for the following projects will also require detailed site-specific environmental assessments using the Long-Form EAF published in Appendix A of 6NYCRR Part 617. A site or project-specific EIS may also be required for the following projects depending upon the information revealed in the permit application and accompanying EAF's:

   - Oil and gas drilling permits in Agricultural Districts if more than two and one-half acres will be altered by construction of the well site and access road.
   - Oil and gas drilling permits in State Parklands.
   - Oil and gas drilling permits when other DEC permits are required.

- Oil and gas drilling permits less than 2,000 feet from a municipal water supply well.
- New major waterflood or tertiary recovery projects.
- New underground gas storage projects or major modifications.
- New solution mining projects or major modifications.
- Brine disposal well drilling or conversion permits.
- Any other project not conforming to the standards, criteria or thresholds required by the Draft and Final GEIS.

Other SEQR Considerations

In conducting SEQR reviews, the Department will handle the topics of individual project scope, project size, lead agency, and coastal resources as described below.

1. Project scope - Each application to drill a well will continue to be considered as an individual project. An applicant applying for five wells will continue to be treated the same as five applicants applying to the Department individually, since the wells may not be drilled at the same time or in the same area. Planned future wells might not be drilled at all depending on the results of the first well drilled.

   The exceptions to this are proposed new or major expansions of solution mining, enhanced recovery or underground gas storage operations which require that several wells be drilled and operated for an extended period of time within a limited area.

2. Size of Project - The size of the project will continue to be defined as the surface acreage affected by development.

3. Lead Agency - In 1981, the Legislature gave exclusive authority to the Department to regulate the oil, gas and solution mining industries under ECL Section 23-0303(2). Thus, only the Department has jurisdiction to grant drilling permits for wells subject to Article 23, except within State parklands. To the extent practicable, the Department will actively seek lead agency designation consistent

with the general intent of Chapter 846 of the Laws of 1981.

4. Coastal Resources - On the program specific EAF that must accompany every drilling permit application, the applicant must indicate whether the proposed well is in a legally designated New York State Coastal Zone Management (CZM) Area. Neither the policies in the New York State CZM Plan, nor the provisions of individual Local Waterfront Revitalization Plans (LWRP's) are covered in the GEIS. Once an LWRP is adopted by a community, it is a legally binding part of the New York State CZM Plan. The Department cannot issue any drilling permit unless it is consistent with the New York State CZM Plan to the "maximum extent practicable."

CERTIFICATION OF FINDINGS TO ADOPT THE FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM

Having considered the Draft and Final GEIS, and having considered the preceding written facts and conclusions relied upon to meet the requirements of 6NYCRR Part 617.9, this Statement of Findings certifies that:

1. The requirements of 6NYCRR Part 617 have been met;

2. Consistent with the social, economic and other essential considerations from among the reasonable alternatives thereto, the action approved is one which minimizes or avoids adverse environmental effects to the maximum extent practicable; including the effects disclosed in the environmental impact statement, and

3. Consistent with social, economic and other essential considerations, to the maximum extent practicable, adverse environmental effects revealed in the environmental impact statement process will be minimized or avoided by incorporating as conditions to the decision those mitigative measures which were identified as practicable.

4. Consistent with the applicable policies of Article 42 of the Executive Law, as implemented by 19 NYCRR 600.5, this action will achieve a balance between the protection of the environment and the need to accommodate social and economic considerations.

Director
Division of Mineral Resources

Sept. 29, 1992
Date

This page intentionally left blank.

New York State

DEC

Appendix 3

Supplemental SEQRA Findings Statement on Leasing of State Lands for Activities Regulated Under the Oil, Gas and Solution Mining Law

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

SEQR File No.

P0-009900-00046

Supplemental
Findings Statement

Pursuant to the State Environmental Quality Review Act (SEQR) of the Environmental Conservation Law (ECL) and the SEQR Regulations 6NYCRR Part 617, the New York State Department of Environmental Conservation makes the following supplemental findings on the Final Generic Environmental Impact Statement (GEIS) on the Oil, Gas and Solution Mining Regulatory Program.

Name of Action

Adoption of supplemental findings on leasing of state lands for activities regulated under the Oil, Gas and Solution Mining Law (ECL Article 23).

Description and Background

In early 1988, the Department of Environmental Conservation released the Draft GEIS on the Oil, Gas and Solution Mining Regulatory Program. The Draft GEIS comprehensively reviewed the environmental impacts of the Department's program for regulating the siting, drilling, production and plugging and abandonment of oil, gas, underground gas storage, solution mining, brine disposal, geothermal and stratigraphic test wells. The findings statement issued on the Draft and Final GEIS in September, 1992 neglected to specifically mention DEC's program for leasing of State lands for these resource development activities.

Prior to adoption of the GEIS, proposed lease sales underwent a segmented review. Segmented reviews are permitted under certain circumstances if they are no less protective of the environment. This is true given the highly speculative nature of oil and gas leasing practices:

- It is impractical to review the potential environmental impacts of development activities at the leasing stage. Information on the placement of well sites is not generally known, even by the lessee. Not until a company successfully obtains a lease does it invest time and money in preparing the exploration and development plans that will be submitted to the Department for approval if the lessee wishes to commence operations.

- Most of the land leased will never be directly affected by development activities. Based on a 15 year record of the State's leasing program, less than one percent of all the State land leased has been subject to any direct impact.

- When the lessee does decide on a proposed well site on a State lease, the lessee must obtain a site-specific drilling permit from the Department. With eve well drilling permit application the Department requires: 1) a program-specific Environmental Assessment Form, 2) a plat (map) showing the proposed well location and support facilities, and 3) a pre-drilling site inspection that allows the Department to :
  - reliably determine potential environmental problems; and

- select appropriate permit conditions for mitigating potential environmental impacts.

- Possession of a lease does not a priori grant the right to drill on a lease. Nor is the lessee in any way guaranteed approval for their first-choice drilling location. Clauses included in the lease inform the lessee that any surface disturbing activities must receive Department review and approval prior. to their commencement. Leases also contain clauses recommended by other State agency staff that are necessary for protection of fish, wildlife, plant, land, air, wetlands, water and cultural resources on the leased parcels.

SEOR Determination of Significance

The Department has determined that the act of leasing State lands for activities regulated under ECL Article 23 does not have a significant environmental impact. This determination is supported by the facts listed above.

SEOR Review Procedures

Department staff will no longer make Determinations of Significance and Negative or Positive Declarations under SEQR for leases on State lands for activities regulated under ECL Article 23 at the time that the lease is granted; SEQR reviews will continue to be done as needed for site-specific development.

CERTIFICATION OF SUPPLEMENTAL FINDINGS ON THE FINAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM

Having considered the Draft and Final GEIS, and having considered the preceding written facts and conclusions relied upon to meet the requirements of 6NYCRR Part 617.9, this Supplemental Statement of Findings certifies that:

1. The requirements of 6NYCRR Part 617 have been met.

2. Consistent with the social, economic, and other essential considerations from among the reasonable alternatives thereto, the action approved is one which minimizes or avoids adverse environmental effects to the maximum extent practicable; including the effects disclosed in the environmental impact statement.

3. Consistent with the social, economic, and other essential considerations, to the maximum extent practicable, adverse environmental effects revealed in the environmental impact statement process will be minimized or avoided by incorporating as conditions to the decision those mitigative measures which were identified as practicable.

4. Consistent with the applicable policies of Article 42 of the Executive Law, as implemented by 19 NYCRR 600.5, this action will achieve a balance between the protection of the environment and the need to accommodate social and economic considerations.

/S/ April 19, 1993

Gregory H. Sovas, Director
Division of Mineral Resources

This page intentionally left blank.

New York State

DEC

Appendix 4

Application Form for Permit to Drill, Deepen, Plug Back or Convert A Well Subject to the Oil, Gas and Solution Mining Regulatory Program

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MINERAL RESOURCES

PRINT OR TYPE IN BLACK INK

APPLICATION FOR PERMIT TO DRILL, DEEPEN, PLUG BACK OR CONVERT A WELL SUBJECT TO THE OIL, GAS AND SOLUTION MINING LAW

THIS APPLICATION IS A LEGAL DOCUMENT. READ THE APPLICABLE AFFIRMATION AND ACKNOWLEDGMENT CAREFULLY BEFORE SIGNING.
For instructions on completing this form, visit the Division's website at www.dec.ny.gov/energy/205.html or contact your local Regional office.

PLANNED OPERATION: (Check one)
☐ Drill ☐ Deepen ☐ Plug Back ☐ Convert

TYPE OF WELL: (Check one)
☐ New ☐ Existing

Existing API Well Identification Number
31- | | | - | | | | | - | | - | | |

TYPE OF WELL BORE: (Check one)
☐ Vertical ☐ Directional ☐ Horizontal

NAME OF OWNER (Full Name of Organization or Individual as registered with the Division)	TELEPHONE NUMBER (include area code)
ADDRESS (P.O. Box or Street Address, City, State, Zip Code)	
NAME AND TITLE OF LOCAL REPRESENTATIVE WHO CAN BE CONTACTED WHILE OPERATIONS ARE IN PROGRESS	
ADDRESS–Business (P.O. Box or Street Address, City, State, Zip Code)	TELEPHONE NUMBER (include area code)
ADDRESS–Night, Weekend and Holiday (P.O. Box or Street Address, City, State, Zip Code)	TELEPHONE NUMBER (include area code)

WELL LOCATION DATA (attach plat)

COUNTY	TOWN	FIELD/POOL NAME (or "Wildcat")
WELL NAME	WELL NUMBER	NUMBER OF ACRES IN UNIT
7½ MINUTE QUAD NAME	QUAD SECTION	PROPOSED TARGET FORMATION

LOCATION DESCRIPTION

			Decimal Latitude (NAD83)	Decimal Longitude (NAD83)
Surface	0'	0	☐☐.☐☐☐☐☐☐	☐☐.☐☐☐☐☐☐
Top of Target Interval			☐☐.☐☐☐☐☐☐	☐☐.☐☐☐☐☐☐
Bottom of Target Interval			☐☐.☐☐☐☐☐☐	☐☐.☐☐☐☐☐☐
Bottom Hole	TVD	TMD	☐☐.☐☐☐☐☐☐	☐☐.☐☐☐☐☐☐

PROPOSED WELL DATA

WELL TYPE (check one)
☐ Oil Production ☐ Gas Production ☐ Brine ☐ Storage
☐ Injection ☐ Brine Disposal ☐ Geothermal ☐ Stratigraphic
☐ Other _____

PLANNED TOTAL DEPTH
TVD _____ ft.
TMD _____ ft.
Kickoff _____ TMD

PLANNED DATE OF COMMENCEMENT OF OPERATIONS

SURFACE ELEVATION (check how obtained)
_____ ft. ☐ Surveyed ☐ Topo Map ☐ Other _____

TYPE TOOLS
☐ Cable ☐ Rotary

PLANNED DRILLING FLUID
☐ Air ☐ Water ☐ Mud

NAME OF PLANNED DRILLING CONTRACTOR (as registered with the Division)	TELEPHONE NUMBER (include area code)

ON ATTACHED SHEET GIVE DETAILS FOR EACH PROPOSED CASING STRING AND CEMENT JOB INCLUDING BUT NOT LIMITED TO: Bit size, casing size, casing weight and grade, TVD and TMD of casing set, scratchers, centralizers, cement baskets, sacks of cement, class of cement, cement additives with percentages or pounds per sack, estimated TVD and TMD of the top of cement, estimated amount of excess cement and waiting-on-cement time.

FOR DIRECTIONAL OR SIDETRACK WELLS ALSO INCLUDE A WELL BORE DIAGRAM SHOWING THE LOCATION OF THE ITEMS INCLUDED IN THE ABOVE REFERENCED DETAILS.

DEPARTMENT USE ONLY

BOND NUMBER	
API WELL IDENTIFICATION NUMBER 31-	
RECEIPT NUMBER	
DATE ISSUED	

APPLICATION FOR PERMIT TO DRILL, DEEPEN, PLUG BACK OR CONVERT

WELL NAME	WELL NUMBER	NAME OF OWNER

COMMENTS:

AFFIRMATION AND ACKNOWLEDGMENT

A. For use by individual:

By the act of signing this application:

(1) I affirm under penalty that the information provided in this application is true to the best of my knowledge and belief; and that I possess the right to access property, and drill and/or extract oil, gas, or salt, by deed or lease, from the lands and site described in the well location data section of this application. I am aware that any false statement made in this application is punishable as a Class A Misdemeanor under Section 210.45 of the Penal Law.

(2) I acknowledge that if the permit requested to be issued in consideration of the information and affirmations contained in this application is issued, as a condition to the issuance of that permit, I accept full legal responsibility for all damage, direct or indirect, of whatever nature and by whomever suffered, arising out of the activity conducted under authority of that permit; and agree to indemnify and hold harmless the State, its representatives, employees, agents, and assigns for all claims, suits, actions, damages, and costs of every name and description, arising out of or resulting from the permittee's undertaking of activities or operation and maintenance of the facility or facilities authorized by the permit in compliance or non-compliance with the terms and conditions of the permit.

_____
Printed or Typed Name of Individual

_____ _____
Signature of Individual Date

B. For use by organizations other than an individual:

By the act of signing this application:

(1) I affirm under penalty of perjury that I am _____ (title) of _____ (organization); that I am authorized by that organization to make this application; that this application was prepared by me or under my supervision and direction; and that the aforenamed organization possesses the right to access property, and drill and/or extract oil, gas, or salt by deed or lease, from the lands and site described in the well location data section of this application. I am aware that any false statement made in this application is punishable as a Class A Misdemeanor under Section 210.45 of the Penal Law.

(2) _____ (organization); acknowledges that if the permit requested to be issued in consideration of the information and affirmations contained in this application is issued, as a condition to the issuance of that permit, it accepts full legal responsibility for all damage, direct or indirect, of whatever nature and by whomever suffered, arising out of the activity conducted under authority of that permit; and agrees to indemnify and hold harmless the State, its representatives, employees, agents, and assigns for all claims, from suits, actions, damages, and costs of every name and description, arising out of or resulting from the permittee's undertaking of activities or operation and maintenance of the facility or facilities authorized by the permit in compliance or non-compliance with the terms and conditions of the permit.

_____
Printed or Typed Name of Authorized Representative

_____ _____
Signature of Authorized Representative Date

New York State

DEC

Appendix 5

Environmental Assessment Form (EAF) For Well Permitting

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

85-16-5 (1/07)--10b

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF MINERAL RESOURCES

ENVIRONMENTAL ASSESSMENT FORM

Attachment to Drilling Permit Application

WELL NAME AND NUMBER

NAME OF APPLICANT	BUSINESS TELEPHONE NUMBER ( )

ADDRESS OF APPLICANT

CITY/P.O.	STATE	ZIP CODE

DESCRIPTION OF PROJECT (Briefly describe type of project or action)

PROJECT SITE IS THE WELL SITE AND SURROUNDING AREA WHICH WILL BE DISTURBED DURING CONSTRUCTION OF SITE, ACCESS ROAD, and PIT AND ACTIVITIES DURING DRILLING AND COMPLETION AT WELLHEAD.

(PLEASE COMPLETE EACH QUESTION--Indicate N.A., if not applicable)

LAND USE AND PROJECT SITE

1. Project Dimensions. Total Area of Project Site _____ sq. ft.
   Approximate square footage for items below:

		During Construction (sq. ft.)	After Construction (sq. ft.)
a. Access Road	(length x width)		
b. Well Site	(length x width)		

2. Characterize Project Site Vegetation and Estimate Percentage of Each Type Before Construction:

   _____ % Agricultural (cropland, hayland, pasture, vineyard, etc.) _____ % Forested _____ % Wetlands

   _____ % Meadow or Brushland (non agricultural) _____ % Non vegetated (rock, soil, fill)

3. Present Land Use(s) Within ¼ Mile of Project (Check all that apply)

   ☐ Rural ☐ Suburban ☐ Forest ☐ Urban ☐ Agricultural ☐ Commercial ☐ Park/Recreation
   ☐ Industrial ☐ Other _____

4. How close is the nearest residence, building, or outdoor facility of any type routinely occupied by people at least part of the day? _____ ft.

   Describe _____

ENVIRONMENTAL RESOURCES ON/NEAR PROJECT SITE

5. The presence of certain environmental resources on or near the project site may require additional permits, approvals or mitigation measures--Is any part of the well site or access road located:

a. Over a primary or principal aquifer?	☐ Yes	☐ No	☐ Not Known
b. Within 2,640 feet of a public water supply well?	☐ Yes	☐ No	☐ Not Known
c. Within 150 feet of a surface municipal water supply?	☐ Yes	☐ No	☐ Not Known
d. Within 150 feet of a lake, stream, or other public surface water body?	☐ Yes	☐ No	☐ Not Known
e. Within an Agricultural District?	☐ Yes	☐ No	☐ Not Known
f. Within a land parcel having a Soil and Water Conservation Plan?	☐ Yes	☐ No	☐ Not Known
g. In a 100 year flood plain?	☐ Yes	☐ No	☐ Not Known
h. In a regulated wetland or its 100 foot buffer zone?	☐ Yes	☐ No	☐ Not Known
i. In a coastal zone management area?	☐ Yes	☐ No	☐ Not Known
j. In a Critical Environmental Area?	☐ Yes	☐ No	☐ Not Known
k. Does the project site contain any species of animal life that are listed as threatened or endangered?	☐ Yes	☐ No	☐ Not Known
If yes, identify the species and source of information _____			
l. Will proposed project significantly impact visual resources of statewide significance?	☐ Yes	☐ No	☐ Not Known
If yes, identify the visual resource and source of information _____			

CULTURAL RESOURCES

6. Are there any known archeological and/or historical resources which will be affected by drilling operations? ☐ Yes ☐ No ☐ Not Known

7. Has the land within the project area been previously disturbed or altered (excavated, landscaped, filled, utilities installed)? ☐ Yes ☐ No ☐ Not Known

If answer to Number 6 or 7 is yes, briefly descrbe _____

EROSION AND RECLAMATION PLANS

8. Indicate percentage of project site within: 0-10% slope _____ % 10-15% slope _____ % greater than 15% slope _____ %

9. Are erosion control measures needed during construction of the access road and well site? ☐ Yes ☐ No ☐ Not Known

If yes, describe and/or sketch on attached photocopy of plat _____

10. Will the topsoil which is disturbed be stockpiled for reclamation use? ☐ Yes ☐ No

11. Does the reclamation plan include revegetation? ☐ Yes ☐ No

If yes, what plant materials will be used? _____

12. Does the reclamation plan include restoration or installation of surface or subsurface drainage features to prevent erosion or conform to a Soil and Water Conservation Plan? ☐ Yes ☐ No

If yes, describe _____

ACCESS ROAD SITING AND CONSTRUCTION

13. Are you going to use existing or common corridors when building the access road? ☐ Yes ☐ No
Locate access road on attached photocopy of plat.

DRILLING

14. Anticipated length of drilling operations? _____ days.

WASTE STORAGE AND DISPOSAL

15. How will drilling fluids and stimulation fluids:

a. Be contained? _____

b. Be disposed of? _____

16. Will production brine be stored on site? ☐ Yes ☐ No

If yes:
How will it be stored? _____

How will it be disposed of? _____

17. Will the drill cuttings and pit liner be disposed of on site? ☐ Yes ☐ No

If yes, expected burial depth? _____ feet

ADDITIONAL PERMITS

18. Are any additional State, Local or Federal permits or approvals required for this project? ☐ Yes ☐ No

	Date Application Submitted	Date Application Received
Stream Disturbance Permit (DEC)		
Wetlands Permit (DEC or Local)		
Floodplain Permit (DEC or Local)		
Other _____		

PREPARER'S SIGNATURE	DATE
NAME/TITLE (Please print)	
REPRESENTING	

Suggested Sources of Information for Division of Mineral Resources Environmental Assessment Form

3. LAND USE
   Sources: Local Planning Office
   Town Supervisor's Office
   Town Clerk's Office

5a. PRIMARY OR PRINCIPAL AQUIFER
   Sources: Local unit of government
   NYS Department of Health
   NYSDEC, Division of Water--Regional Office
   Availability of Water from Aquifers in New York State--United States Geological Survey
   Availability of Water from Unconsolidated Deposits in Upstate New York--United States Geological Survey

5b. PUBLIC WATER SUPPLY
   Sources: Local unit of government
   NYS Department of Health
   NYS Atlas of Community Water Systems Sources, NYS Department of Health, 1982
   Atlas of Eleven Selected Aquifers in New York State, United States Geological Survey, 1982

5c. AGRICULTURAL DISTRICT INFORMATION
   Sources: Cooperative Extension
   DEC, Division of Lands and Forests
   NYS Department of Agriculture and Markets
   DEC, Division of Environmental Permits--Regional Office
   DEC, Division of Mineral Resources--Regional Office

5f. SOIL AND WATER CONSERVATION PLAN
   Sources: Landowner
   County Soil and Water Conservation District Office

5g. 100 YEAR FLOOD PLAIN
   Sources: DEC Division of Water
   DEC, Division of Environmental Permits--Regional Office
   DEC, Division of Mineral Resources--Regional Office

5h. WETLANDS
   Sources: DEC, Division of Fish and Wildlife--Regional Office
   DEC, Division of Mineral Resources--Regional Office

5i. COASTAL ZONE MANAGEMENT AREAS
   Sources: Local unit of government
   NYS Department of State, Coastal Management Program
   DEC, Division of Water (maps)
   DEC, Division of Environmental Permits--Regional Office

5k. THREATENED OR ENDANGERED SPECIES
   Sources: DEC, Natural Heritage Program--Albany
   DEC, Division of Environmental Permits--Regional Office

6. ARCHEOLOGICAL OR HISTORIC RESOURCES
   Sources: NYS Office of Parks, Recreation and Historic Preservation circles and squares map
   DEC, Division of Environmental Permits--Regional Office

18. ADDITIONAL PERMITS NEEDED
   Sources: DEC, Division of Environmental Permits--Regional Office
   DEC, Division of Mineral Resources--Regional Office
   NYS Office of Business Permits

This page intentionally left blank.

New York State

DEC

Appendix 6

PROPOSED
Environmental Assessment Form
Addendum

Updated August 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

PROPOSED EAF ADDENDUM REQUIREMENTS
FOR HIGH-VOLUME HYDRAULIC FRACTURING

REQUIRED INFORMATION

- Minimum depth and elevation of top of objective formation or zone for entire length of wellbore
- Estimated maximum depth and elevation of bottom of potential fresh water, and basis for estimate (water well information, other well information, previous drilling at pad, published or private reports, etc.)
- Identification of proposed fracturing service company and additive products, by product name and purpose/type
    - Documentation of the applicant's evaluation of available alternatives for the proposed additive products that are efficacious but which exhibit reduced aquatic toxicity and pose less risk to water resources and the environment
- Proposed volume of water and each additive product to be used in hydraulic fracturing
- Proposed % by weight of water, proppants and each additive
- Water source for hydraulic fracturing
    - If a newly proposed surface water source (not previously approved by the Department as part of a well permit application):
        - Type of withdrawal (stream, lake, pond, groundwater, etc.)
        - Location of water withdrawal point, status of RBC approval if applicable
        - List and location of all private water wells within 500 feet of the proposed water withdrawal point
        - For proposed withdrawals from lakes and ponds:
            - Estimates of the maximum change in storage resulting from the proposed withdrawals, including estimates of inflow into the water body, precipitation onto water surface, existing and proposed water withdrawals, evaporation from water surface, and releases from water body
        - For proposed groundwater withdrawals:
            - Identification of and shortest distance to any wetland within 500 feet of the proposed withdrawal point
            - Results of pump testing as referenced in the SGEIS, including evaluation of any potential influence on wetland(s) within 500 feet
        - Indicate if an Article 15 permit is required and status
        - Size of drainage area above withdrawal point (in mi^2)
        - Indicate whether there is a USGS gage on the stream; if yes:
            - Distance to stream gage
            - Upstream or downstream of stream gage
            - Changes in stream flow (e.g., other withdrawals, diversions, tributary input) between gage and withdrawal point
            - Years of stream gage data available and period of record
    - If a previously proposed or Department-approved surface water source:
        - API # of well permit application associated with previous proposal or approval

- Scaled distance from surface location of well and closest edge of well pad to:
  - Any known water supply reservoir, river or stream intake, water well or domestic-supply spring within 2,640 feet, including public or private wells, community or non-community systems
  - Any primary or principal aquifer boundary, perennial or intermittent stream, wetland, storm drain, lake or pond within 660 feet
  - All residences, occupied structures or places of assembly within 1,320 feet
- Capacity of rig fueling tank(s) and distance to:
  - Any public or private water well, domestic-supply spring, reservoir, perennial or intermittent stream, storm drain, wetland, lake or pond within 500 feet of the planned location(s) of the fueling tank(s)
- Available information about water wells and domestic-supply springs within 2,640 feet
  - Well name and location
  - Distance from proposed surface location of well
  - Shortest distance from proposed well pad
  - Shortest distance from proposed centralized flowback water impoundment
  - Well depth
  - Well's completed interval
  - Public or private supply
  - Community or non-community system (see NYSDOH definitions)
  - Type of facility or establishment if not a residence
- Identification of any well listed in Department's Oil & Gas Database, or any other abandoned well identified by property owners or tenants, within the spacing unit of the proposed well and/or within 1 mile (5,280 feet) of the proposed well location. For each well identified, provide the following information:
  - Well name and API Number
  - Distance from proposed surface location of well to surface location of existing well
  - Well Type
  - Well Status
  - Well Orientation
  - Quantity and type of any freshwater, brine, oil or gas encountered during drilling, as recorded on the Department's Well Drilling and Completion Report
- Information about the planned construction and capacity of the reserve pit, if any, and an indication of the timing of the use of a closed-loop tank system (e.g., surface, intermediate and/or production hole)
- Information about the number and individual and total capacity of receiving tanks for flowback water
- If proposed flowback vent/flare stack height is less than 30 feet, then documentation that previous drilling at the pad did not encounter H_2S is required
- Description of planned public access restrictions, including physical barriers and distance to edge of well pad
- Identify the EPA Tiers of the drilling and hydraulic fracturing engines used, if these use gasoline or diesel fuel. If particulate traps or Selective Catalytic Reduction (SCR) are not used, provide a description of other control measures planned to reduce particulate matter and NO_x emissions during the drilling and hydraulic fracturing processes

- If condensate tanks are to be used, provide their capacity and the vapor recovery system to be used
- If a wellhead compressor is used, provide its size in horsepower. Describe the control equipment used for NO_x
- If a glycol dehydrator is to be used at the well pad, provide its stack height and the capacity of glycol to be used on an annual basis
- Information on the status of a sales line and interconnecting gathering line to the well or multi-well pad (i.e., is there currently a line in place or is one expected to be in place prior to conducting hydraulic fracturing operations to facilitate a Reduced Emissions Completion [REC])
    - If REC will not be used, the following must be provided
        - an estimate of how much total gas (MMcf) will be vented and flared during flowback
        - an estimate of how much total gas (MMcf) was previously vented and flared during flowback on the same well pad in the previous 12 months
- Well information with respect to local planning documents
    - Identify whether the location of the well pad, or any other activity under the jurisdiction of the Department, conflicts with local land use laws or regulations, plans or policies
    - Identify whether the well pad is located in an area where the affected community has adopted a comprehensive plan or other local land use plan and whether the proposed action is inconsistent with such plan(s)

REQUIRED ATTACHMENTS

- Scaled, stamped well plat showing the following:
    - Plan view of wellbore including surface and bottom-hole locations
    - Well pad close-up showing placement of fueling tank(s), reserve pit and receiving tanks for flowback water
    - Vertical section of wellbore showing the land surface elevation and wellbore elevation with an indication of the minimum depth of the wellbore within the objective formation or zone as required above
- A Material Safety Data Sheet (MSDS) for each additive product proposed for use in hydraulic fracturing, if not already on file with the Department
- Topographic map of area within at least 2,640 feet of surface location showing:
    - above features and scaled distances
    - location and orientation of well pad
    - location of access road
    - location of any flowback water pipelines or conveyances
- Evidence of diligent efforts by the well operator to determine the existence of public or private water wells and domestic-supply springs within one half-mile (2,640 feet) of any proposed drilling location or centralized flowback water impoundment if proposed
    - List of municipal officials contacted for water well information and printed copies of responses
    - List of property owners and tenants contacted for water well information
    - List of adjacent lessees contacted for water well information

  - Printed results of EPA SDWIS search (http://oaspub.epa.gov/enviro/sdw_form_v2.create_page?state_abbr=NY)
  - Printed results of Department Water Well search (http://www.dec.ny.gov/cfmx/extapps/WaterWell/index.cfm?view=searchByCounty)
- Evidence of diligent efforts by the well operator to determine the existence and condition of abandoned wells within the proposed spacing unit and/or within one mile of the proposed well location
  - Printed results of Department Oil & Gas database search
  - List of property owners and tenants contacted for abandoned well information
- For a newly proposed water withdrawal, topographic map showing:
  - The location of the proposed withdrawal
  - All private water wells within 500 feet of the proposed water withdrawal point
  - For proposed surface water withdrawals:
    - Drainage area above the withdrawal point
  - For proposed groundwater withdrawals:
    - Identification of and shortest distance to any Department-regulated wetland within 500 feet of the proposed withdrawal point
- Invasive Species Management Plan that includes:
  - Survey of the entire well site, documenting the presence, location, and identity of any invasive plant species;
  - Specific protocols or best management practices for preventing the spread or introduction of invasive species at the site;
  - Specific protocols for the restoration of native plant cover on the site; and
  - Identification of any Certified Pesticide Applicator, if applicable.
- A Partial Site Reclamation Plan that describes the methods for partially reclaiming the site after well completion. Partial reclamation shall be compatible with sound environmental management practices and minimize negative environmental impacts.
- A description of methods for final reclamation of the well site following plugging of all the wells on the well pad. Reclamation methods shall be compatible with sound environmental management practices and minimize negative environmental impacts from the well pad.
- Proposed fluid disposal plan, pursuant to 6 NYCRR 554.1(c)(1)
  - Planned transport of flowback water and production brine off of well pad – trucking or piping
    - If piping, describe construction including size, materials, leak prevention and spill control measures
  - Planned disposition of flowback water and production brine – treatment facility, disposal well, reuse on same well pad, reuse on another well pad, centralized flowback surface water impoundment, centralized tank facility, or other (describe)
    - If a treatment facility in NY:
      - Name, owner/operator, location
      - SPDES permit # and date if applicable
      - If a POTW, date of Department approval to receive flowback water (attach a copy of approval notification)
      - Brief description of facility and treatment if not a POTW

        - If a disposal well in NY:
            - SPDES permit # and date
            - EPA UIC permit # and date
        - If a centralized tank facility in New York:
            - Location, affirmation of ownership or permission
            - Certification of compliance with 360-6.3
- Proposed cuttings disposal plan for any drilling requiring cuttings to be disposed of off-site including at a landfill.
    - Planned disposition of cuttings – landfill or other (describe)
        - If a landfill in NY:
            - Name, owner/operator, location
            - Part 360 permit # and date if applicable
- Proposed blow-out preventer (BOP) use and test plan for all drilling and completion operations including:
    - Pressure rating of any:
        - Annular preventer
        - Rams including a description of type and number of rams
        - Choke manifold and connecting line (from BOP to choke manifold)
    - Timing and frequency of testing and/or visual inspection of BOP and related equipment including any scheduled retesting of equipment. Test pressure(s) and duration of test(s) including an explanation as to how the test pressure was determined
    - Test pressure(s) and timing for any internal pressure testing of surface, intermediate and production casing strings, and duration of test including an explanation as to how the test pressure was determined
    - Test pressure (psi/ft) and anticipated depth (TVD-ft) of any surface and/or intermediate casing seat integrity tests
        - If a casing seat integrity test will not be conducted on a casing string with a BOP installed on it, an explanation must be provided why such a test is not required and how any flow will be managed
    - System for recording, documenting and retaining the results of all pressure tests and inspections, and making such available to the Department
    - Copy of the operator's well control barrier policythat identifies acceptable barriers to be used during identified operations
    - Minimum distance from well for remote actuator (powered by a source other than rig hydraulics)
- Transportation plan developed by a NYS-licensed Professional Engineer, that specifies proposed routes and includes a road condition assessment.
- Noise mitigation plan, including any proposed mitigation measures for any occupied structure within 1,000 feet.
- If a new well pad is proposed in a Forest or Grassland Focus Area and involves disturbance in a contiguous forest patch of 150 acres or more in size or a contiguous grassland patch of 30 acres or more in size, then the Applicant should not submit this EAF or a well permit application prior to conducting a site-specific ecological assessment in accordance with a

detailed study plan that has been approved by the Department. The need and plan for an ecological assessment should be determined in consultation with the Department and will consider information such as existing site conditions, existing covertype and ongoing and historical land management activities. The completed ecological assessment must be attached to this EAF and must include, at a minimum:

- a compilation of historical information on use of the area by forest interior birds or grassland birds;
- results of pre-disturbance biological studies, including a minimum of one year of field surveys at the site to determine the current extent, if any, of use of the site by forest interior birds or grassland birds;
- an evaluation of potential impacts on forest interior or grassland birds from the project;
- additional mitigation measures proposed by the applicant; and
- protocols for monitoring of forest interior or grassland birds during the construction phase of the project and for a minimum of two years following well completion.

REQUIRED AFFIRMATIONS

- Any surface water withdrawal associated with this well pad will only occur when flow is above the appropriate threshold as described in the SGEIS
- Applicable FIRM and Flood Boundary and Floodway maps consulted, and proposed well pad and access road are not within a mapped100-year floodplain
- Baseline residential well sampling, analysis and ongoing monitoring will be conducted and results shared with property owner as described in SGEIS and permit conditions
- Unless otherwise required by private lease agreement, the access road will be located as far as practical from occupied structures, places of assembly and unleased property
- HVHF GP authorization for stormwater discharges will be obtained prior to site disturbance
- Operator will prepare and adhere to the following site plans, which will be available to the Department upon request and available on-site to Department inspector while activities addressed by the plan are occurring:
    - a visual impacts mitigation plan consistent with the SGEIS
    - a noise impacts mitigation plan consistent with the SGEIS
    - a greenhouse gas impacts mitigation plan consistent with the SGEIS
    - an invasive species mitigation plan which includes:
        - -the best management practices listed in the SGEIS and
        - seasonally appropriate site-specific and species-specific physical and chemical control methods (e.g., digging to remove all roots, cutting to the ground, applying herbicides to specific plant parts such as stems or foliage, etc.) based on the invasive species survey submitted with the EAF Addendum
    - an acid rock drainage (ARD) mitigation plan consistent with the SGEIS for on-site burial of Marcellus Shale cuttings from horizontal drilling in the Marcellus Shale if the operator elects to bury these cuttings
- Operator will utilize alternative hydraulic fracturing additive products that exhibit reduced aquatic toxicity and pose less risk to water resources and the environment, unless demonstrated to DMN's satisfaction that they are not equally effective or feasible

- Operator will prepare and adhere to an emergency response plan (ERP) consistent with the SGEIS that will be available on-site during any operation from well spud (i.e., first instance of driving pipe or drilling) through well completion. -A list of emergency contact numbers for the area in which the well site is located must be included in the ERP and the list must be prominently displayed at the well site during operations conducted under this permit
- Operator will adhere to all well permit conditions and approved plans, including requirement for Department approval prior to making any change
- Operator will adhere to best management practices for reducing direct impacts to terrestrial habitats and wildlife consistent with the SGEIS (see Section 7.4.1.1)

ADDITIONAL SUBMISSION REQUIRED PRIOR TO SITE DISTURBANCE

- Copy of any road use agreement between the operator and local municipality

ADDITIONAL SUBMISSION REQUIRED AT LEAST 48 HOURS PRIOR TO WELL SPUD

- Copy of the ERP in electronic form

This page intentionally left blank.

New York State

DEC

Appendix 7

Sample Drilling Rig Specifications

Provided by Chesapeake Energy

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

ATTACHMENT A
RIG SPECIFICATIONS
Example #1

National Cabot 900
Working Depth: 12,000'

DRAWWORKS:	National Model 2346 – Mechanical – Grooved for 1 1/8'' drilling line. Air operated, water cooled Eaton Assist Brake
ENGINES:	2 - Cat C-15 (475HP ea.) with Allison Transmissions
MAST:	NOV - 117' - 350,000 SHL on 8 lines
SUBSTRUCTURE:	NOV - 18' Floor Height /15' Working Height
TRAVELING EQUIPMENT:	IDECO UTB – 265 Ton Block and Hook
ROTARY TABLE:	27 ½'' with 440,000# capacity
TUBULARS:	12,000' - S-135 - 4 1/2''x 16.60# per foot w/ XH connections 18 - 6 ½'' collars with NC46 connections
MUD PUMPS:	2 – National 9-P-100 with Cat 3508 Mechanicals (935HP ea.)
MUD SYSTEM:	3 - Tank, 900 BBL total
SOLIDS CONTROL EQUIPMENT:	Shakers: 2 – NOV D285P-LP Desander: Brandt - 2 - 10" Cones Desilter: Brandt - 12 - 4" Cones Agitators: 6 – Brandt with 36'' Impellers
BOP EQUIPMENT:	1 - Shaffer LXT - 11" 5M - Double Ram 1 – Shaffer Spherical - 11" 5M - Annular
CLOSING UNIT:	Koomey - 6 Station - 160 Gallon; 3000 psi
CHOKE MANIFOLD:	3'' x 4'' - 5M, 1 Hydraulic Choke and 1 Manual Choke
GENERATORS:	2 - Caterpillar 545 kW, Powered by 2 Cat C-18's
AUXILARY EQUIPMENT:	Water Tank: 400 BBL Fuel Tank: 10,000 Gallons
SPECIAL TOOLS:	2 - Braden PD12C Hydraulic Hoist Hydraulic Pipe Spinner Oil Works OWI-1000 Wire line with 12,000' of wire

Rig Specifications
Example #2

---

610 Mechanical 750 HP
Working Depth: 14,000'

DRAWWORKS: National 610 Mechanical
Wichita 325 Air Brake

ENGINES: 2 – Caterpillar C-18's, 600 HP Each

MAST: Dreco 142' 550,000 SHL on 10 Lines

SUBSTRUCTURE: Dreco 20' Box on Box

TRAVELING EQUIPMENT: Block-Hook: Ideco UTB-265-5-36

ROTARY TABLE: National C-275

COMPOUND: National 2 Engines

TORQUE CONVERTERS: 2 – National C195

MUD PUMPS: 2 – National 9-P-100, Independent Drive Cummins QSK38, 920 HP

MUD SYSTEM: 2 – Tank, 750 BBL total w/100 BBL Premix

SOLIDS CONTROL EQUIPMENT:
Shakers: 2 – National Model DLMS-285P
Desander: National with 2 - 10" Cones
Desilter: National with 16 - 4" Cones

BOP EQUIPMENT: 1 – Shaffer LWS Type 11" 5M
1 – Shaffer Spherical Type 11: 5M

CLOSING UNIT: Koomey 6 Station 180 Gallon; 1 Air and 1 Electrical Pump

CHOKE MANIFOLD: 4'' x 3'' 5M, 2 Adjustable Chokes

GENERATORS: 2 – Cat 545 kW, Powered by 2 Cat C-18's

AUXILARY EQUIPMENT:
Water Tank: 500 BBL
Fuel Tank: 12,000 Gallons

SPECIAL TOOLS:
ST-80 Iron Roughneck
Pipe Spinner: Hydraulic
Auto Driller: Satellite
Totco EDR (Rental)
Separator/Trip Tank Combo (Rental)
Hoists: 1 – Thern 2.5A Air Hoist
1 - Braden PD12C Hydraulic Hoist

Rig Specifications
Example #3

SpeedStar 185K -- 515 HP
Working Depth: 8,000'

ENGINE: 1 – Caterpillar C-15 with Allison Transmission

MAST: SpeedStar – 61' – 185,000 LB SHL
Setback Capacity of 7,000' – 3.5" Drill Pipe

SUBSTRUCTURE: Box Type – 7'6" Working Height

MUD PUMP: 1 – MP5

MUD SYSTEM: 2 – Tank, 600 BBL

BOP EQUIPMENT: 11" x 3M Annular

CLOSING UNIT: Townsend 4 Station, 80 Gallon

CHOKE MANIFOLD: 3'' x 3'' 5K with 1 Hydraulic Choke

GENERATORS: 2 – Onan 320 kW with Cummins Engines

DRILL PIPE: 7,500' OF 3.5" 13.30 LB/FT with IF Connections

DRILL COLLARS: 12 – 6 ½"

AIR SYSTEM: 3 – Ingersoll Rand 1170/350 Air Compressors
2 – Single Stage Boosters

AUXILARY EQUIPMENT: Water Tank: 250 BBL
Fuel Tank: 3,500 Gallons

SPECIAL TOOLS: 2 – Braden PD12C Hydraulic Tub Winches
Myers 35GPM Soap Pump
Martin Decker Geolograph
Wireline Unit with 10,000' of Line

This page intentionally left blank.

New York State

DEC

Appendix 8

Casing & Cementing Practices Required for All Wells in NY

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

New York State Department of Environmental Conservation
Casing and Cementing Practices

SURFACE CASING

1. The diameter of the drilled surface casing hole shall be large enough to allow the running of centralizers in recommended hole sizes.

RECOMMENDED CENTRALIZER-HOLE SIZE COMBINATIONS		
Centralizer Size Inches	**Minimum Hole Sizes Inches**	**Minimum Clearance Inches**
4-1/2	6-1/8	1-5/8
5-1/2	7-3/8	1-7/8
6-5/8	8-1/2	1-7/8
7	8-3/4	1-3/4
8-5/8	10-5/8	2
9-5/8	12-1/4	2-5/8
13-3/8	17-1/2	4-1/8

NOTE: (1) If a manufacturer's specifications call for a larger hole size than indicated in the above table, then the manufacturer's specs take precedence.

(2) Check with the appropriate regional office for sizes not listed above.

2. Surface casing shall extend at least 75 feet beyond the deepest fresh water zone encountered or 75 feet into competent rock (bedrock), whichever is deeper, unless otherwise approved by the Department. However, the surface pipe must be set deeply enough to allow the BOP stack to contain any formation pressures that may be encountered before the next casing is run.

3. Surface casing shall not extend into zones known to contain measurable quantities of shallow gas. In the event that such a zone is encountered before the fresh water is cased off, the operator shall notify the Department and, with the Department's approval, take whatever actions are necessary to protect the fresh water zone(s).

4. All surface casing shall be a string of new pipe with a mill test of at least 1,100 pounds per square inch (psi), unless otherwise approved. Used casing may be approved for use, but must be pressure tested before drilling out the casing shoe or, if there is no casing shoe, before drilling out the cement in the bottom joint of casing. If plain end pipe is welded together for use, it too must be pressure tested. The minimum pressure for testing used casing or casing joined together by welding, shall be determined by the Department at the time of permit application. The appropriate Regional Mineral Resources office staff will be notified six hours prior to making the test. The results will be entered on the drilling log.

5. Centralizers shall be spaced at least one per every 120 feet; a minimum of two centralizers shall be run on surface casing. Cement baskets shall be installed appropriately above major lost circulation zones.

6. Prior to cementing any casing strings, all gas flows shall be killed and the operator shall attempt to establish circulation by pumping the calculated volume necessary to circulate. If the hole is dry, the calculated volume would include the pipe volume and 125% of the annular volume. Circulation is deemed to have been established once fluid reaches the surface. A flush, spacer or extra cement shall be used to separate the cement from the bore hole spacer or extra cement shall be used to separate the cement from the bore hole fluids to prevent dilution. If cement returns are not present at the surface, the operator may be required to run a log to determine the top of the cement.

7. The pump and plug method shall be used to cement surface casing, unless approved otherwise by the Department. The amount of cement will be determined on a site-specific basis and a minimum of 25% excess cement shall be used, with appropriate lost circulation materials, unless other amounts of excesses are approved or specified by the Department.

8. The operator shall test or require the cementing contractor to test the mixing water for pH and temperature prior to mixing the cement and to record the results on the cementing ticket.

9. The cement slurry shall be prepared according to the manufacturer's or contractor's specifications to minimize free water content in the cement.

10. After the cement is placed and the cementing equipment is disconnected, the operator shall wait until the cement achieves a calculated compressive strength of 500 psi before the casing is disturbed in any way. The waiting-on-cement (WOC) time shall be recorded on the drilling log.

11. When drive pipe (conductor casing) is left in the ground, a pad of cement shall be placed around the well bore to block the downward migration of surface pollutants. The pad shall be three feet square or, if circular, three feet in diameter and shall be crowned up to the drive pipe (conductor casing), unless otherwise approved by the Department.

WHEN REQUESTED BY THE DEPARTMENT IN WRITING, EACH OPERATOR MUST SUBMIT CEMENT TICKETS AND/OR OTHER DOCUMENTS THAT INDICATE THE ABOVE SPECIFICATIONS HAVE BEEN FOLLOWED.

THE CASING AND CEMENTING PRACTICES ABOVE ARE DESIGNED FOR TYPICAL SURFACE CASING CEMENTING. THE DEPARTMENT WILL REQUIRE ADDITIONAL MEASURES FOR WELLS DRILLED IN ENVIRONMENTALLY OR TECHNICALLY SENSITIVE AREAS (i.e., PRIMARY OR PRINCIPAL AQUIFERS).

THE DEPARTMENT RECOGNIZES THAT VARIATIONS TO THE ABOVE PROCEDURES MAY BE INDICATED IN SITE SPECIFIC INSTANCES. SUCH VARIATIONS WILL REQUIRE THE PRIOR APPROVAL OF THE REGIONAL MINERAL RESOURCES OFFICE STAFF.

INTERMEDIATE CASING

Intermediate casing string(s) and the cementing requirements for that casing string(s) will be reviewed and approved by Regional Mineral Resources office staff on an individual well basis.

PRODUCTION CASING

12. The production casing cement shall extend at least 500 feet above the casing shoe or tie into the previous casing string, whichever is less. If any oil or gas shows are encountered or known to be present in the area, as determined by the Department at the time of permit application, or subsequently encountered during drilling, the production casing cement shall extend at least 100 feet above any such shows. The Department may allow the use of a weighted fluid in the annulus to prevent gas migration in specific instances when the weight of the cement column could be a problem.

13. Centralizers shall be placed at the base and at the top of the production interval if casing is run and extends through that interval, with one additional centralizer every 300 feet of the cemented interval. A minimum of 25% excess cement shall be used. When caliper logs are run, a 10% excess will suffice. Additional excesses may be required by the Department in certain areas.

14. The pump and plug method shall be used for all production casing cement jobs deeper than 1500 feet. If the pump and plug technique is not used (less than 1500 feet), the operator shall not displace the cement closer than 35 feet above the bottom of the casing. If plugs are used, the plug catcher shall be placed at the top of the

lowest (deepest) full joint of casing.

15. The casing shall be of sufficient strength to contain any expected formation or stimulation pressures.

16. Following cementing and removal of cementing equipment, the operator shall wait until a compressive strength of 500 psi is achieved before the casing is disturbed in any way. The operator shall test or require the cementing contractor to test the mixing water for pH and temperature prior to mixing the cement and to record the results on the cementing tickets and/or the drilling log. WOC time shall be adjusted based on the results of the test.

17. The annular space between the surface casing and the production string shall be vented at all times. If the annular gas is to be produced, a pressure relief valve shall be installed in an appropriate manner and set at a pressure approved by the Regional Mineral Resources office.

WHEN REQUESTED BY THE DEPARTMENT IN WRITING, EACH OPERATOR MUST SUBMIT CEMENT TICKETS AND/OR OTHER DOCUMENTS THAT INDICATE THE ABOVE SPECIFICATIONS HAVE BEEN FOLLOWED.

THE CASING AND CEMENTING PRACTICES ABOVE ARE DESIGNED FOR TYPICAL PRODUCTION CASING/ CEMENTING. THE DEPARTMENT WILL REQUIRE ADDITIONAL MEASURES FOR WELLS DRILLED IN ENVIRONMENTALLY OR TECHNICALLY SENSITIVE AREAS (i.e., PRIMARY OR PRINCIPAL AQUIFERS).

THE DEPARTMENT RECOGNIZES THAT VARIATIONS TO THE ABOVE PROCEDURES MAY BE INDICATED IN SITE SPECIFIC INSTANCES. SUCH VARIATIONS WILL REQUIRE THE PRIOR APPROVAL OF THE REGIONAL MINERAL RESOURCES OFFICE.

This page intentionally left blank.

New York State

DEC

Appendix 9

EXISTING
Fresh Water Aquifer Supplementary Permit Conditions Required for Wells Drilled in Primary and Principal Aquifers

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

FRESH WATER AQUIFER SUPPLEMENTARY PERMIT CONDITIONS

Operator: Well Name:
API Number:

1. All pits must be lined and sized to fully contain all drilling, cementing and stimulation fluids plus any fluids as a result of natural precipitation. Use of these pits for any other purpose is prohibited.

2. All fluids must be contained on the site and properly disposed. If operations are suspended and the site is left unattended at any time, pit fluids must be removed from the site immediately. After the cessation of drilling and/or stimulation operations, pit fluids must be removed within 7 days. Disposal of fluids must be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit.

3. Any hole drilled for conductor or surface casing (i.e., "water string") must be drilled on air, fresh water, or fresh water mud. For any holes drilled with mud, techniques for removal of filter cake (e.g., spacers, additional cement, appropriate flow regimes) must be considered when designing any primary cement job on conductor and surface casing.

4. If conductor pipe is used, it must be run in a drilled hole and it must be cemented back to surface by circulation down the inside of the pipe and up the annulus, or installed by another procedure approved by this office. Lost circulation materials must be added to the cement to ensure satisfactory results. Additionally, at least two centralizers must be run with one each at the shoe and at the middle of the string. In the event that cement circulation is not achieved, cement must be grouted (or squeezed) down from the surface to ensure a complete cement bond. In lieu of or in combination with such grouting or squeezing from the surface, this office may require perforation of the conductor casing and squeeze cementing of perforations. This office must be notified _____ hours prior to cementing operations and cementing cannot commence until a state inspector is present.

5. A surface casing string must be set at least 100' below the deepest fresh water zone and at least 100' into bedrock. If shallow gas is known to exist or is anticipated in this bedrock interval, the casing setting depth may be adjusted based on site-specific conditions provided it is approved by this office. There must be at least a 2½" difference between the diameters of the hole and the casing (excluding couplings) or the clearance specified in the Department's Casing and Cementing Practices, whichever is greater. Cement must be circulated back to the surface with a minimum calculated 50% excess. Lost circulation materials must be added to the cement to ensure satisfactory results. Additionally, cement baskets and centralizers must be run at appropriate intervals with centralizers run at least every 120'. Pipe must be either new API graded pipe with a minimum internal yield pressure of 1,800 psi or reconditioned pipe that has been tested internally to a minimum of 2,700 psi. If reconditioned pipe is used, an affidavit that the pipe has been tested must be submitted to this office before the pipe is run. This office must be notified _____ hours prior to cementing operations and cementing cannot commence until a state inspector is present.

6. If multiple fresh water zones are known to exist or are found or if shallow gas is present, this office may require multiple strings of surface casing to prevent gas intrusion and/or preserve the hydraulic characteristics and water quality of each fresh water zone. The permittee must immediately inform this office of the occurrence of any fresh water or shallow gas zones not noted on the permittee's drilling application and prognosis. This office may require changes to the casing and cementing plan in response to unexpected occurrences of fresh water or shallow gas, and may also require the immediate, temporary cessation of operations while such alterations are developed by the permittee and evaluated by the Department for approval.

7. In the event that cement circulation is not achieved on any surface casing cement job, cement must be grouted (or squeezed) down from the surface to ensure a complete cement bond. This office must be notified _____ hours prior to cementing operations and cementing cannot commence until a state inspector is present. In lieu of or in combination with such grouting or squeezing from the surface, this office may require perforation of the surface casing and squeeze cementing of perforations. This office may also require that a cement bond log and/or other logs be run for evaluation purposes. In addition, drilling out of and below surface casing cannot commence if there is any evidence or indication of flow behind the surface casing until remedial action has occurred. Alternative remedial actions from those described above may be approved by this office on a case-by-case basis provided site-specific conditions form the basis for such proposals.

8. This office must be notified _____ hours prior to any stimulation operation. Stimulation may commence without the state inspector if the inspector is not on location at the time specified during the notification.

9. The operator must complete the "Record of Formations Penetrated" on the Well Drilling and Completion Report providing a log of formations, both unconsolidated and consolidated, and all water and gas producing zones.

10. If the well is a producer, holding tanks with water-tight diking capable of retaining 1½ times the capacity of the tank must be installed for the containment of oil, brine and other production fluids. Disposal of fluids must only be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit.

11. **Any deviation from the above conditions must be approved by the Department prior to making a change.**

New York State

DEC

Appendix 10

PROPOSED
Supplementary Permit Conditions
For High-Volume Hydraulic Fracturing

Updated August 2011

Revised Draft
Supplemental Generic Environmental Impact Statement

This page intentionally left blank.

PROPOSED Supplementary Permit Conditions for High-Volume Hydraulic Fracturing

Note: The operator must comply with all provisions of Attachment A and Attachment B as noted at the end of this document, along with Attachment C when applicable.

Planning and Local Coordination

1) All operations authorized by this permit must be conducted in accordance with the following site-specific plans prepared by the operator, available to the Department upon request, and available on-site to a Department inspector while activities addressed by the plan are taking place:

   a) a visual impacts mitigation plan consistent with the SGEIS; and

   b) a greenhouse gas emissions impacts mitigation plan consistent with the SGEIS.

2) An emergency response plan (ERP) consistent with the SGEIS must be prepared by the well operator and be available on-site during any operation from well spud (i.e., first instance of driving pipe or drilling) through well completion. A list of emergency contact numbers for the area in which the well site is located must be included in the ERP and the list must be prominently displayed at the well site during operations conducted under this permit. Further, a copy of the ERP in electronic form must be provided to this office at least 3 days prior to well spud.

3) The county emergency management office (EMO) must be notified of the well's location including latitude and longitude (NAD 83) as follows:

   a) prior to spudding the well;

   b) first occurrence of flaring while drilling;

   c) prior to high-volume hydraulic fracturing, and;

   d) prior to flaring for well clean-up, treatment or testing. A flare permit from the Department is required prior to any flaring operation for well clean-up, treatment or testing.

   A record of the type, date and time of any notification provided to the EMO must be maintained by the operator and made available to the Department upon request. In counties without an EMO, the local fire department must be notified as described above.

4) The operator shall adhere to the Department-approved transportation plan which shall be incorporated by reference into this permit. In addition, issuance of this permit does not provide relief from any local requirements authorized by or enacted pursuant to the New York State Vehicle and Traffic Law. Prior to site disturbance, the operator shall submit to the Department a copy of any road use agreement between the operator and municipality.

5) Prior to site disturbance (for a new well pad) or spud (for an existing pad), the operator must sample and test residential water wells within 1,000 feet of the well pad as described by the SGEIS, and provide results to the property owner within 30 days of the operator's receipt of

laboratory results. If no residential water wells are available for sampling within 1,000 feet, either because there are none of record or because the property owner denies permission, then wells within 2,000 feet must be sampled and tested with the property owner's permission.

6) Ongoing water well monitoring and testing must continue as described by the SGEIS until one year after hydraulic fracturing at the last well on the pad. More frequent or additional monitoring and testing may be required by the Department in response to complaints or for other reasonable cause.

7) Water well analysis must be performed by an ELAP-certified laboratory. Analyses and documentation that all test results were provided to the property owner must be maintained by the operator. The results of the analyses (data) and delivery documentation must be made available to the Department and local health department upon Department request at any time during the period up to and including five years after the permitted hydrocarbon well is permanently plugged and abandoned under a Department permit. If the permitted hydrocarbon well is located on a multi-well pad, all residential water well data and delivery documentation must be maintained and made available during the period up to and including five years after the last permitted hydrocarbon well on the pad is permanently plugged and abandoned under a Department permit.

Site Preparation

8) Unless otherwise required by private lease agreement and in consideration of avoiding bisection of agricultural fields, to the extent practical the access road must be located as far away as possible from occupied structures, places of assembly and unleased property.

9) Unless otherwise approved or directed by the Department, all of the topsoil in the project area stripped to facilitate the construction of well pads and access roads must be stockpiled, stabilized and remain on site for use in final reclamation.

10) Authorization under the Department's General Permit for Stormwater Discharges Associated with High-Volume Hydraulic Fracturing (HVHF GP) must be obtained prior to any disturbance at the site.

11) Piping, conveyances, valves and tanks in contact with flowback water must be constructed of materials compatible with flowback water composition, and in accordance with the fluid disposal plan approved by the Department pursuant to 6 NYCRR 554.1(c)(1).

12) Any reserve pit, drilling pit or mud pit on the well pad which will be used for more than one well must be constructed as follows:

    a) Surface water and stormwater runoff must be diverted away from the pit;

    b) Pit volume may not exceed 250,000 gallons, or 500,000 gallons for multiple pits on one tract or related tracts of land;

    c) Pit sidewalls and bottoms must adequately cushioned and free of objects capable of puncturing and ripping the liner;

    d) Pits constructed in unconsolidated sediments must have beveled walls (45 degrees or less);

e) The pit liner must be sized and placed with sufficient slack to accommodate stretching;

f) Liner thickness must be at least 30 mils, and;

g) Seams must be factory installed or field seamed in accordance with the manufacturer's recommendations.

Site Maintenance

13) Secondary containment consistent with the Department's Spill Prevention Operations Technology Series 10, Secondary Containment Systems for Aboveground Storage Tanks, (SPOTS 10) is required for all fueling tanks;

14) To the extent practical, fueling tanks must not be placed within 500 feet of a public or private water-well, a domestic-supply spring, a reservoir, a perennial or intermittent stream, a storm drain, a wetland, a lake or a pond;

15) Fueling tank filling operations must be manned at the fueling truck and at the tank if the tank is not visible to the fueling operator from the truck, and;

16)Troughs, drip pads or drip pans are required beneath the fill port of a fueling tank during filling operations if the fill port is not within the secondary containment.

17) A copy of the SWPPP must be available on-site and available to Department inspectors while HVHF GP coverage is in effect. HVHF GP coverage may be terminated upon the plugging and abandonment of all wells on the well pad in accordance with Department-issued permits.

18) Two feet of freeboard must be maintained at all times for any on-site pit.

19) Except for freshwater storage pits, fluids must be removed from an on-site pit prior to any 45-day gap in use (i.e., from the completion date of the well) and the pit must be inspected by a Department inspector prior to resumed use.

Drilling, Stimulation and Flowback

NOTE: Wildcat Supplementary Conditions may be separately imposed in addition to these. Unless superseded by more stringent conditions below, the Department's Casing and Cementing Practices also remain in effect.

20) Lighting and noise mitigation measures as deemed necessary by the Department may be required at any time.

21) The operator must provide the drilling company with a well prognosis indicating anticipated formation top depths with appropriate warning comments prior to spud. The prognosis must be reviewed by all crew members and posted in a prominent location in the doghouse. The operator must revise the prognosis and inform the drilling company in a timely manner if

drilling reveals significant variation between the anticipated and actual geology and/or formation pressures.

22) Individual crew member's responsibilities for blowout control must be posted in the doghouse or other appropriate location and each crew member must be made aware of such responsibilities prior to spud of any well being drilled or when another rig is moved on a previously spudded well and/or prior to the commencement of any rig, snubbing unit or coiled tubing unit performing completion work. During all drilling and/or completion operations when a BOP is installed, tested or in use, the operator or operator's designated representative must be present at the wellsite and such person or personnel must have a current well control certification from an accredited training program that is acceptable to the Department (e.g., International Association of Drilling Contractors). Such certification must be available at the wellsite and provided to the Department upon request.

23) Appropriate pressure control procedures and equipment in proper working order must be properly installed and employed while conducting drilling and/or completion operations including tripping, logging, running casing into the well, and drilling out solid-core stage plugs. Unless otherwise approved by the Department, a snubbing unit and/or coiled tubing unit with a BOP must be used to enter any well with pressure and/or to drill out one or more solid-core stage plugs.

24) Pressure testing of the blow-out preventer (BOP) and related equipment for any drilling and/or completion operation must be performed in accordance with the approved BOP use and test plan, and any deviation from the approved plan must be approved by the Department. Testing must be conducted in accordance with American Petroleum Institute (API) Recommended Practice (RP) 53, RP for Blowout Prevention Systems for Drilling Wells, or other procedures approved by the Department. Unless otherwise approved by the Department, the BOP use and test plan must include the following provisions:

    a) A system for recording, documenting and retaining the results of all pressure tests and inspections conducted during drilling and/or completion operations. The results must be available to the Department at the wellsite during the corresponding operation, and to the Department upon request at any time during the period up to and including five years after the well is permanently plugged and abandoned under a Department permit. If the well is located on a multi-well pad, all pressure testing records must be maintained and made available during the period up to and including five years after the last well on the pad is permanently plugged and abandoned under a Department permit. The record for each pressure test, at a minimum, must identify the equipment or casing being tested, the date of the test, the minimum and maximum test pressures in psig, the test medium (e.g., water, brine, mud, air, nitrogen) including its density, test duration, and the results of the test including any pressure drop;

    b) A well control barrier policy developed by the operator that identifies acceptable barriers to be used during identified operations. Such policy must employ, at a minimum, two mechanical barriers capable of being tested when conducting any drilling and/or completion operation below the surface casing. In no event shall a stripper rubber or a stripper head be considered an acceptable barrier;

    c) BOP testing prior to being put into service. Such testing must include testing after the BOP is installed on the well but prior to use. Pressure control equipment,

including the BOP, that fails any pressure test must not be used until it is repaired and passes the pressure test, and;

d) A remote BOP actuator which is powered by a source other than rig hydraulics that is located at least 50 feet from the wellhead. All lines, valves and fittings between the BOP and the remote actuator and any other actuator must be flame resistant and have an appropriate rated working pressure.

25) The operator must detect, if practical, and document all naturally occurring methane in the conductor hole, if drilled, and the surface hole. Further, in accordance with 6 NYCRR 554.7(b), all freshwater, brine, oil and gas shows must be documented on the Department's *Well Drilling and Completion Report*. In the event H_2S is encountered in any portion of the well, all regulated activities must be conducted by the operator in conformance with American Petroleum Institute Publication API RP49, "Recommended Practices For Safe Drilling of Wells Containing Hydrogen Sulfide."

26) Annular disposal of drill cuttings or fluid is prohibited.

27) All fluids must be contained on the site until properly removed in compliance with the fluid disposal plan approved in accordance with 6 NYCRR 554.1(c)(1) and applicable conditions of this permit.

28) A closed-loop tank system must be used instead of a reserve pit to manage and contain drilling fluids and cuttings for any of the following:

a) horizontal drilling in the Marcellus Shale without an acid rock drainage mitigation plan for on-site burial of such cuttings, and;

b) any drilling requiring cuttings to be disposed of off-site including at a landfill.

29) With respect to the closed-loop tank system, cuttings may be removed from the site in the primary capture container (e.g., tank or bin) or transferred onsite via a transfer area to a secondary container or truck for offsite disposal. If a cuttings transfer area is employed, it must be lined with a material acceptable to the department. Transfer of cuttings to an onsite stock pile is prohibited, regardless of any liner under the stock pile. Offsite transport of all cuttings must be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit. The *Drilling and Production Waste Tracking Form* must be completed and retained for three years by the generator, transporter and destination facility, and made available to the Department upon request during this period. If requested, the generator is responsible for producing its originating copy of the *Drilling and Production Waste Tracking Form* and the completed form with the original signatures of the generator, transporter and destination facility.

30) Only biocides with current registration for use in New York may be used for any operation at the wellsite. Products must be properly labeled, and the label must be kept on-site during application and storage.

31) With respect to all surface, intermediate and production casing run in the well, and in addition to the requirements of the Department's "Casing and Cementing Practices" and any approved centralizer plan for intermediate casing, the following shall apply:

a) Casing must be new and conform to American Petroleum Institute (API) Specification 5CT, Specifications for Casing and Tubing (April 2002), and welded connections are prohibited;

b) casing thread compound and its use must conform to API Recommended Practice (RP) 5A3, RP on Thread Compounds for Casing, Tubing, Line Pipe, and Drill Stem Elements (November 2009);

c) at least two centralizers (one in the middle and one at the top) must be installed on the first joint of casing (except production casing) and all bow-spring style centralizers must conform to API Specification 10D for Bow-Spring Casing Centralizers (March 2002);

d) cement must conform to API Specification 10A, Specifications for Cement and Material for Well Cementing (April 2002 and January 2005 Addendum). Further, the cement slurry must be prepared to minimize its free water content in accordance with the same API specification and it must contain a gas-block additive;

e) prior to cementing any casing string, the borehole must be circulated and conditioned to ensure an adequate cement bond;

f) a spacer of adequate volume, makeup and consistency must be pumped ahead of the cement;

g) the cement must be pumped at a rate and in a flow regime that inhibits channeling of the cement in the annulus;

h) after the cement is pumped, the operator must wait on cement (WOC):
   1. until the cement achieves a calculated (e.g., performance chart) compressive strength of at least 500 psig, and
   2. a minimum WOC time of 8 hours before the casing is disturbed in any way, including installation of a blow-out preventer (BOP). The operator may request a waiver from the Department from the required WOC time if the operator has bench tested the actual cement batch and blend using mix water from the actual source for the job, and determined that 8 hours is not required to reach a compressive strength of 500 psig, and;

i) A copy of the cement job log for any cemented casing in the well must be available to the Department at the wellsite during drilling operations, and thereafter available to the Department upon request. The operator must provide such to the Department upon request at any time during the period up to and including five years after the well is permanently plugged and abandoned under a Department permit. If the well is located on a multi-well pad, all cementing records must be maintained and made available during the period up to and including five years after the last well on the pad is permanently plugged and abandoned under a Department permit.

32) The surface casing must be run and cemented immediately after the hole has been adequately circulated and conditioned. This office must be notified _____ hours prior to surface

casing cementing operations. *(Blank to be filled in based on well's location and Regional Minerals Manager's direction.)*

33) Intermediate casing must be installed in the well. The setting depth and design of the casing must consider all applicable drilling, geologic and well control factors. Additionally, the setting depth must consider the cementing requirements for the intermediate casing and the production casing as noted below. Any request to waive the intermediate casing requirement must be made in writing with supporting documentation and is subject to the Department's approval. Information gathered from operations conducted on any single well or the first well drilled on a multi-well pad may serve to form the basis for the Department waiving the intermediate casing requirement on subsequent wells in the vicinity of the single well or subsequent wells on the same multi-well pad.

34) This office must be notified _____ hours prior to intermediate casing cementing operations. Intermediate casing must be fully cemented to surface with excess cement. Cementing must be by the pump and plug method with a minimum of 25% excess cement unless caliper logs are run, in which case 10% excess will suffice. *(Blank to be filled in based on well's location and Regional Minerals Manager's direction.)*

35) The operator must run a radial cement bond evaluation log or other evaluation approved by the Department to verify the cement bond on the intermediate casing. The quality and effectiveness of the cement job shall be evaluated by the operator using the above required evaluation in conjunction with appropriate supporting data per Section 6.4 "Other Testing and Information" under the heading of "Well Logging and Other Testing" of American Petroleum Institute (API) Guidance Document HF1 (First Edition, October 2009). Remedial cementing is required if the cement bond is not adequate for drilling ahead (i.e., diversion or shut-in for well control).

36) Production casing must be run to the surface. This office must be notified _____ hours prior to production casing cementing operations. If installation of the intermediate casing is waived by the Department, then production casing must be fully cemented to surface. 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). Any request to waive any of the preceding cementing requirements must be made in writing with supporting documentation and is subject to the Department's approval. The Department will only consider a request for a waiver if the open-hole wireline logs including a narrative analysis of such and all other information collected during drilling from the same well pad or offsetting wells verify that migration of oil, gas or other fluids from one pool or stratum to another will be prevented. *(Blank to be filled in based on well's location and Regional Minerals Manager's direction.)*

37) The operator must run a radial cement bond evaluation log or other evaluation approved by the Department to verify the cement bond on the production casing. The quality and effectiveness of the cement job shall be evaluated by the operator using the above required evaluation in conjunction with appropriate supporting data per Section 6.4 "Other Testing and Information" under the heading of "Well Logging and Other Testing" of American Petroleum Institute (API) Guidance Document HF1 (First Edition, October 2009). Remedial cementing is required if the cement bond is not adequate to effectively isolate hydraulic fracturing operations.

38) The installation of an additional cemented casing string or strings in the well as deemed necessary by the Department for environmental and/or public safety reasons may be required at any time.

39) Under no circumstances should the annulus between the surface casing and the next casing string be shut-in, except during a pressure test.

40) If hydraulic fracturing operations are performed down casing, prior to introducing hydraulic fracturing fluid into the well the casing extending from the surface of the well to the top of the treatment interval must be tested with fresh water, mud or brine to at least the maximum anticipated treatment pressure for at least 30 minutes with less than a 5% pressure loss. This pressure test may not commence for at least 7 days after the primary cementing operations are completed on this casing string. A record of the pressure test must be maintained by the operator and made available to the Department upon request. The actual hydraulic fracturing treatment pressure must not exceed the test pressure at any time during hydraulic fracturing operations.

41) Prior to commencing hydraulic fracturing and pumping of hydraulic fracturing fluid, the injection lines and manifold, associated valves, frac head or tree and any other wellhead component or connection not previously tested must be tested with fresh water, mud or brine to at least the maximum anticipated treatment pressure for at least 30 minutes with less than a 5% pressure loss. A record of the pressure test must be maintained by the operator and made available to the Department upon request. The actual hydraulic fracturing treatment pressure must not exceed the test pressure at any time during hydraulic fracturing operations.

42) The operator must record the depths and estimated flow rates where fresh water, brine, oil and/or gas were encountered or circulation was lost during drilling operations. This information and the Department's *Pre-Frac Checklist and Certification* form including a treatment plan, must be submitted to and received by the regional office at least 3 days prior to commencement of high-volume hydraulic fracturing operations. The treatment plan must include a profile showing anticipated pressures and volumes of fluid for pumping the first stage. It must also include a description of the planned treatment interval for the well [i.e., top and bottom of perforations expressed in both True Vertical Depth (TVD) and True Measured Depth (TMD)].

43) Fracturing products other than those identified in the well permit application materials may not be used without specific approval from this office.

44) This permit does not authorize the use of diesel as the primary carrier fluid (i.e., diesel-based hydraulic fracturing).

45) The operator may conduct hydraulic fracturing operations provided 1) all items on the checklist are affirmed by a response of "Yes," 2) the *Pre-Frac Checklist And Certification* and treatment plan are received by the Department at least 3 days prior to hydraulic fracturing, and 3) all other pre-frac notification requirements are met as specified elsewhere. The operator is prohibited from conducting hydraulic fracturing operations on the well without additional Department review and approval if a response of "No" is provided to any of the items in the *Pre-Frac Checklist and Certification*.

46) Hydraulic fracturing operations must be conducted as follows:

a) Secondary containment for fracturing additive containers and additive staging areas, and flowback tanks is required. Secondary containment measures may include, as deemed appropriate by the Department, one or a combination of the following; dikes, liners, pads, impoundments, curbs, sumps or other structures or equipment capable of containing the substance. Any such secondary containment must be sufficient to contain 110% of the total capacity of the single largest container or tank within a common containment area. No more than one hour before initiating any hydraulic fracturing stage, all secondary containment must be visually inspected to ensure all structures and equipment are in place and in proper working order. The results of this inspection must be recorded and documented by the operator, and available to the Department upon request;

b) At least two vacuum trucks must be on standby at the wellsite during the pumping of hydraulic fracturing fluid and during any subsequent flowback phases;

c) Hydraulic fracturing additives must be removed from the site if the site will be unattended;

d) Any hydraulic fracturing string, if used, must be either stung into a production liner or run with a packer set at least 100 feet below the deepest cement top. An adequately sized, function tested relief valve and an adequately sized diversion line must be installed and used to divert flow from the hydraulic fracturing string-casing annulus to a covered watertight steel tank or covered watertight tank made of another material approved by the Department in case of hydraulic fracturing string failure. The relief valve must be set to limit the annular pressure to no more than 95% of the working pressure rating of the casings forming the annulus. The annulus between the hydraulic fracturing string and casing must be pressurized to at least 250 psig and monitored;

e) The pressure exerted on treating equipment including valves, lines, manifolds, hydraulic fracturing head or tree, casing and hydraulic fracturing string, if used, must not exceed 95% of the working pressure rating of the weakest component;

f) The hydraulic fracturing treatment pressure must not exceed the test pressure of any given component at any time during hydraulic fracturing operations;

g) All annuli available at the surface must be continuously observed or monitored in order to detect pressure or flow, and the records of such maintained by the operator and made available to the Department upon request, and;

h) Hydraulic fracturing pumping operations must be immediately suspended if any anomalous pressure and/or flow condition is indicated or occurring including a significant deviation from the treatment plan (i.e., profile showing anticipated pressures and volume of fluid for pumping the first stage) provided to the Department with the *Pre-Frac Checklist and Certification* or any other anticipated pressure and/or flow condition. Suspension of operations due to an anomalous pressure and/or flow condition is considered a non-routine incident which must be reported in accordance with the General Provisions of these supplementary permit conditions. In the case of suspended hydraulic fracturing pumping operations and non-routine incident reporting of such, the operator must receive Department approval prior to recommencing hydraulic fracturing activities in the same well.

47) The operator must make and maintain a complete record of its hydraulic fracturing operation including the flowback phase, and provide such to the Department upon request at any time during the period up to and including five years after the well is permanently plugged and abandoned under a Department permit. If the well is located on a multi-well pad, all hydraulic fracturing records must be maintained and made available during the period up to and including five years after the last well on the pad is permanently plugged and abandoned under a Department permit. The record for each well must include all types and volumes of materials, including additives, pumped into the well, flowback rates, and the daily and total volumes of fluid recovered during the first 30 days of flow from well. The record must also include a complete description of pressures exhibited throughout the hydraulic fracturing operation and must include pressure recordings, charts and/or a pressure profile. A synopsis of the hydraulic fracturing operation must be provided in the appropriate section of the Department's *Well Drilling and Completion Report* which must be provided to the Department within 30 days after completing the well in accordance with 6 NYCRR 554.7.

48) Flowback water is prohibited from being directed to or stored in any on-site pit. Covered watertight steel tanks or covered watertight tanks constructed of another material approved by the Department are required for flowback handling and containment on the well pad. Flowback water tanks, piping and conveyances, including valves, must be constructed of suitable materials, be of sufficient pressure rating and be maintained in a leak-free condition. Fluid transfer operations from tanks to tanker trucks must be manned at the truck and at the tank if the tank is not visible to the truck operator from the truck. Additionally, during transfer operations, all interconnecting piping must be manned if not visible to transfer personnel at the truck and tank.

49) The venting of any gas originating from the target formation during the flowback phase must be through a flare stack at least 30 feet in height, unless the absence of H_2S has been demonstrated at a previous well on the same pad. Gas vented through the flare stack must be ignited whenever possible. The stack must be equipped with a self-ignition device.

50) A reduced emissions completion, with minimal flaring (if any), must be performed whenever a sales line and interconnecting gathering line are available during completion at any individual well or a multi-well pad.

51) This permit authorizes a one-time single-stage or multi-stage high-volume hydraulic fracturing operation as described in the well permit application materials, subject to the *Pre-Frac Checklist and Certification* and any modifications required by the Department. Any subsequent high-volume re-fracturing operations are subject to the Department's approval after:
    a) review of the planned fracturing procedures and products, water source, proposed site disturbance and layout, and fluid disposal plans;

    b) a site inspection by Department staff, and;

    c) a determination of whether any other Department permits are required.

Reclamation

52) Fluids must be removed from any on-site pit and the pit reclaimed no later than 45 days after completion of drilling and stimulation operations at the last well on the pad, unless the

Department grants an extension pursuant to 6 NYCRR 554.1(c)(3). Flowback water must be removed from on-site tanks within the same time frame.

53) Removed pit fluids must be disposed, recycled or reused as described in the approved fluid disposal plan submitted pursuant to 6 NYCRR 554.1(c)(1). Transport of all waste fluids by vehicle must be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit. The *Drilling and Production Waste Tracking Form* must be completed and retained for three years by the generator, transporter and destination facility, and made available to the Department upon request during this period. If requested, the generator is responsible for producing its originating copy of the *Drilling and Production Waste Tracking Form* and the completed form with the original signatures of the generator, transporter and destination facility.

54) If any fluid or other waste material is moved off site by pipeline or other piping, the operator must maintain a record of the date and time the fluid or other material left the site, the quantity of fluid or other material, and its intended disposition and use at that destination or receiving facility.

55) Cuttings contaminated with oil-based mud and polymer-based muds must be contained and managed in a closed-loop tank system and not be buried on site, and must be removed from the site for disposal in a 6 NYCRR Part 360 solid waste facility. Consultation with the Department's Division of Materials Management (DMM) is required prior to disposal of any cuttings associated with water-based mud-drilling and pit liner associated with water-based mud-drilling where the water-based mud contains chemical additives. Any sampling and analysis directed by DMM must be by an ELAP-certified laboratory. Disposal must conform to all applicable Department regulations. The pit liner must be ripped and perforated prior to any permitted burial on-site and to the extent practical, excess pit liner material must be removed and disposed of properly. Permission of the surface owner is required for any on-site burial of cuttings and pit liner, regardless of type of drilling and fluids used. Burial of any other trash on-site is specifically prohibited and all such trash must be removed from the site and properly disposed. Transport of all cuttings and pit liner off-site, if required by the Department or otherwise performed, must be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit. The *Drilling and Production Waste Tracking Form* must be completed and retained for three years by the generator, transporter and destination facility, and made available to the Department upon request during this period. If requested, the generator is responsible for producing its originating copy of the *Drilling and Production Waste Tracking Form* and the completed form with the original signatures of the generator, transporter and destination facility.

56) A site-specific acid rock drainage (ARD) mitigation plan consistent with the SGEIS must be prepared by the operator and followed for on-site burial of Marcellus Shale cuttings from horizontal drilling in the Marcellus Shale if the operator elects to bury these cuttings. The plan must be available to the Department upon request, and available on-site to a Department inspector while activities addressed by the plan are taking place.

57) The operator must fully implement the Partial Site Reclamation Plan described in the approved application materials.

58) Final reclamation of the wellsite must be approved by the Department. Unless otherwise approved by this office, well pads and access roads constructed for drilling and production operations must be scarified or ripped to alleviate compaction prior to replacement of topsoil.

Reclaimed areas must be seeded and mulched after topsoil replacement. Any proposal by the operator to waive these reclamation requirements must be accompanied by documentation of the landowner's written request to keep the access road and/or well pad.

General

59) The operator must follow applicable best management practices (BMPs) for reducing direct impacts at individual well pads described in Section 7.4.1.1 of the SGEIS.

60) The operator must fully implement the Invasive Species Management Plan described in the approved application materials.

61) The operator must follow applicable best management practices (BMPs) for reducing the potential for transfer and introduction of invasive species described in Section 7.4.2.2 of the SGEIS.

62) The operator must complete the "Record of Formations Penetrated" on the *Well Drilling and Completion Report* providing a log of formations, both unconsolidated and consolidated, and depths and estimated flow rates of any fresh water, brine, oil and/or gas. In accordance with 6 NYCRR 554.7, the well operator must provide the Department with the *Well Drilling and Completion Report* within 30 days after completing the well.

63) Any non-routine incident of potential environmental and/or public safety significance must be verbally reported to the Department within two hours of the incident's known occurrence or discovery, with a written report detailing the non-routine incident to follow within twenty-four hours of the incident's known occurrence or discovery. Non-routine incidents may include, but are not limited to: -casing, drill pipe or hydraulic fracturing equipment failures, cement failures, fishing jobs, fires, seepages, blowouts, surface chemical spills, observed leaks in surface equipment, observed pit liner failure, surface effects at previously plugged or other wells, observed effects at water wells or at the surface, complaints of water well contamination, anomalous pressure and/or flow conditions indicated or occurring during hydraulic fracturing operations, or other potentially polluting non-routine incident or incident that may affect the health, safety, welfare, or property of any person. Provided the environment and public safety would not be further endangered, any action and/or condition known or suspected of causing and/or contributing to a non-routine incident must cease immediately upon known occurrence or discovery of the incident, and appropriate initial remedial actions commenced. The required written non-routine incident report noted above must provide details of the incident and include, as necessary, a proposed remedial plan for Department review and approval. In the case of suspended hydraulic fracturing pumping operations and non-routine incident reporting of such, the operator must receive Department approval prior to recommencing hydraulic fracturing activities in the same well.

64) Flowback water recovered after high-volume hydraulic fracturing operations must be tested for NORM prior to removal from the site. Fluids recovered during the production phase (i.e., production brine) must be tested for NORM prior to removal.

65) Periodic radiation surveys must be conducted at specified time intervals during the production phase for Marcellus wells developed by high-volume hydraulic fracturing completion methods. Such surveys must be performed on all accessible well piping, tanks, or equipment that could contain NORM scale buildup. The surveys must be conducted for as long as the facility remains in active use. If piping, tanks, or equipment is to be removed,

radiation surveys must be performed to ensure their appropriate disposal. All surveys must be conducted in accordance with NYSDOH protocols.

66) Production brine is prohibited from being directed to or stored in any on-site pit. Covered watertight steel, fiberglass or plastic tanks, or covered watertight tanks constructed of another material approved by the Department, are required for production brine handling and containment on the well pad. Production brine tanks, piping and conveyances, including valves, must be constructed of suitable materials, be of sufficient pressure rating and be maintained in a leak-free condition.

67) Production brine which is removed from the site must be disposed, recycled or reused as described by the well permit application materials. Transport of all waste fluids must be undertaken by a waste transporter with an approved 6 NYCRR Part 364 permit. The *Drilling and Production Waste Tracking Form* must be completed and retained for three years by the generator, transporter and destination facility, and made available to the Department upon request during this period. If requested, the generator is responsible for producing its originating copy of the *Drilling and Production Waste Tracking Form* and the completed form with the original signatures of the generator, transporter and destination facility.

Any deviation from the above conditions must be approved by the Department prior to making a change.