

# GLOSSARY & ACROYNMS

## GLOSSARY

### **Annular Flow:**

The flow of formation gas in the annulus between the casing and bore hole.

### **Annular Space of Annulus:**

Space between casing and the wellbore, or between the tubing and casing or wellbore, or between two strings of casing.

### **Aquifer:**

It is defined as a wet underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, silt, or clay) from which groundwater can be usefully extracted for water well use. Aquifers may occur at various depths. Those closer to the surface are not only more likely to be used for water supply and irrigation, but are also more likely to be topped up by the local rainfall.

### **Barrel:**

(bbl) A volume of measurement equivalent to 42 U.S. gallons.

### **Borehole:**

It is defined as the generalized term for any narrow shaft bored in the ground, either vertically or horizontally. A borehole may be constructed for many different purposes, including the extraction of water or other liquid (such as petroleum) or gases (such as natural gas). Boreholes may be drilled using a drilling rig, or by a hand-operated rig. The machinery and technique to advance a borehole varies considerably according to manufacturer, geological conditions, and the intended purpose.

### **Brine:**

Comes with the flowback or “produced” water. A solution containing appreciable amounts of NaCl and/or other salts and chemicals; synonymous with salt water.

### **Brittle structures:**

i.e., faults, shear zones, fractures and other linear features.

### **Build-out:**

A planning tool that estimates the potential impact of cumulative development upon a town’s land area once all of the potentially developable land has been used for the purpose in question; it is by its nature “speculative”.

### **Carcinogen:**

A cancer causing substance.

### **Casing Pipe:**

It is defined as the pipe cemented in the well to seal off formation fluids and to keep the hole from caving in. Casing pipe is used in gas wells to reinforce the borehole. Sometimes several casings are used, one inside the other. The outer casing, called the

"surface pipe,' shuts out water and serves as a foundation for subsequent drilling. Steel pipe placed in a well.

**Compressor Stations:**

Facilities which increase the pressure on natural gas to move it in pipelines or into storage.

**Compulsory Integration:**

Established by New York State's Environmental Conservation Law, Article 23 Titles 5 and 9, passed by legislature in 2005, requires any property owner who does not have a gas lease to be forced to integrate their gas interests with those of the neighboring property owner who is willingly extracting gas by having a gas lease.

**Cuttings:**

(Drilling waste.) These are defined as chips and small fragments of rocks as the result of drilling that are brought to the surface by the flow of drilling mud as it is circulated, including but not limited to calcite, chalk, chert, clay, dolomite, feldspar, glaucomite, granite, gypsum, hematite, iron, kolivite, lime, maristone, mica, mudstone, pisolite, pyrite, quartz, sand, sandstone, shale, silica, silt, sulfur, and methane. Cuttings are screened out of the liquid mud system at the shale shakers and are monitored for composition, size, shape, color, texture, hydrocarbon content and other properties by the mud engineer, the mud logger and other on-site personnel. Cuttings can be important to geologist, who examines them for information concerning the type of rock being drilled. Chips of rock cut by the drill bit and brought to the surface by the drilling fluid. They indicate to the well site workers what kind of rocks are being penetrated and can also indicate the presence of oil or gas.

**Downspacing:**

(Infill wells) An increase in the number of wells beyond the density stated in DEC regulations so gas companies may extract more natural gas within an area; there are provisions in DEC regulations to do so.

**Edge Effect(s):**

The fragmentation of land that occurs around the development of a gas well pad, access roads, storage areas, and other related land to natural gas well operations. This causes loss of habitat and can result in lower biodiversity, introduction of invasive vegetation, pollution, and erosion. Edge effect can cause the natural variation to be lost and make the habitat unsuitable for the original ecosystem.

**Epicenter:**

The point on the earth's surface directly above the hypocenter or focus.

**Exploration:**

Geologic or physical activities related to the search for natural gas or other subsurface hydrocarbons including prospecting, geophysical and geologic seismic surveying and sampling techniques, which include, but are not limited to, core or rotary drilling or other excavation in the search and evaluation of natural gas deposits.

**Exploratory well:**

It is defined as any well drilled for the purpose of securing geological or geophysical information to be used in the exploration or development of oil, gas, geothermal, or other mineral resources, except coal and uranium, and includes what is commonly referred to in the industry as "slim hole tests," "core hole tests," or "seismic holes".

**Fairway:**

The portion of a shale formation that has favorable gas producing potential based on geologic and geochemical criteria.

**Fault:**

A fracture or fracture zone along which there has been displacement of the sides relative to each other. A planar or fracture in the Earth's crust across which there has been displacement.

**Fracture:**

The manner of breaking due to intense folding or faulting; discontinuity in rock due to mechanical failure by stress. The term may be used to describe cracks, joints, and faults.

**Fissure:**

A crack, break, or fracture in rocks.

**Flare:**

The burning of gas through a pipe.

**Flowback:**

Liquids produced following drilling and initial completion and clean-up of the well. It is water with chemicals and salts from fracking (fracing) gas wells. It consists of fracking fluid that has been injected into the wells returning to the surface, and "produced" (brine) water. Fracking load recovery can be between 15% and 40% of the volume of fluid injected into the well. Produced water picks up minerals from the shale formation, including barium, calcium, iron, magnesium, sulfur, and dissolved hydrocarbons plus naturally occurring radioactive substances (NORM).

**Gas lost:**

It is defined as the avoidable lost natural gas which is flared or vented i.e., natural gas not retained in the production system for sale or use. The Government Accountability Office report says about 50 billion cubic feet of natural gas has been needlessly lost every year during production on federal lands.

**Heavy Industry:**

*"A use engaged in the basic processing and manufacturing of materials and products predominately from extracted or raw materials, or a use engaged in storage of, or manufacturing processes using flammable or explosive materials, or storage or manufacturing processes that potentially involve hazardous or commonly recognized offensive conditions."* (American Planning Association)

Heavy industry is more specifically *"A use characteristically employing some of, but not limited to the following: smoke stacks, tanks, distillation or reaction columns, chemical processing or storage equipment, scrubbing towers, waste-treatment or storage lagoons, reserve pits, derricks*

*or rigs, whether temporary or permanent. Heavy industry has the potential for large-scale environmental pollution when equipment malfunction or human error occurs. Examples of heavy industry include, but are not limited to: chemical manufacturing, drilling of oil and gas wells, oil refineries, natural gas processing plants and compressor stations, petroleum and coal processing, coal mining, steel manufacturing. Generic examples of uses not included in the definition of "heavy industry" are such uses as: milk processing plants, dairy farms, garment factories, woodworking and cabinet shops, auto repair shops, wineries and breweries, warehouses, equipment repair and maintenance structures, office and communications buildings, helipads, parking lots, and parking garages and water wells serving otherwise allowed uses of the property. Agriculture and surface gravel and mining facilities shall not be considered heavy industry." (Town of Middlefield, NY)*

**Horizontal drilling:**

It is defined as deviation of the borehole at least 80 degrees from vertical so that the borehole penetrates a productive formation in a manner parallel to the formation. A single horizontal hole can drain a reservoir and eliminated the need for several vertical boreholes.

**Hydrogeology:**

The study of water flow in aquifers and the characterization of aquifers.

**Landowner's Royalty:**

It is defined as an interest customarily retained under an oil and gas lease by the person who has the power to grant an oil and gas lease and which bears no part of the cost of drilling or producing the oil and natural gas. It is an interest in production free of production costs retained by the lessor.

**Lease:**

It is defined as a legal document executed between a landholder who is the lessor and a company or individual who is the lessee that grants the right to exploit the premises for minerals. It is also the land or area where the production wells, stock tanks, separators, and other production equipment are located.

**Liquefied Natural Gas (LNG):**

Liquefied Natural Gas (LNG) is defined as the natural gas that has been converted temporarily to liquid form for ease of storage or transport. Liquefied natural gas takes up about 1/600th the volume of natural gas in the gaseous state. It is odorless, colorless, non-toxic and non-corrosive. Hazards include flammability, freezing and asphyxia.

**Marcellus shale:**

Also called as Marcellus Formation or Marcellus Subgroup or Marcellus Member is defined as a unit of marine sedimentary rock found in eastern North America. Named for a distinctive outcrop near the village of Marcellus, New York in the United States, it extends throughout much of the Appalachian Basin. The shale contains largely untapped natural gas reserves, and its proximity to the high-demand markets along the East Coast of the United States makes it an attractive target for energy development.

**Methane:**

It is defined as a chemical compound with the chemical formula CH<sub>4</sub>. It is the principal component of natural gas. Because it is a gas at normal temperature and pressure,

methane is difficult to transport from its source. In its natural gas form, it is generally transported in bulk by pipeline or LNG carriers, or by trucks.

**Microseisms (or microseismic events):**

Small bursts of 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.

**Microannulus:**

A type of impairment in cement bond quality. Can occur opposite poorly consolidated formations after cemented casing has been subjected to internal pressure. The application of internal pressure results in an expansion of the casing and the cement sheath into soft formations. Removal of the pressure and the resultant contraction of the pipe leaves a microannulus between the casing and the cement sheath. Can be produced, for example, by pressure testing, perforating, fracturing, or cement squeeze operations.

**Natural gas:**

It is defined as an odorless, colorless, tasteless, fossil fuel. Natural gas is largely methane (CH<sub>4</sub>) a naturally occurring gas that can also be produced by coal gasification. At times it contains ethane, propane, butane, pentane, helium and hexane.

**Natural gas conditioning and treating:**

Natural gas conditioning and treating is defined as the process that removes solids (sand, pipe scale, and dirt), water (dehydration), acid gases (hydrogen sulfide), and carbon dioxide and nitrogen. The residue gas from the NGL recovery section is the final, purified gas which is pipelined to the end-user markets.

**Natural gas liquids:**

Natural gas liquids (NGLs) are defined as the heavier hydrocarbons or ethane (C<sub>2</sub>H<sub>6</sub>), propane (C<sub>3</sub>H<sub>8</sub>), butane (C<sub>4</sub>H<sub>10</sub>), and natural gasolines which are need to separated through the process of absorption, condensation, adsorption, or other methods in gas processing or cycling plants before transportation of natural gas in pipelines. Typically, these liquids consist of propane and heavier hydrocarbons and are commonly referred to as lease condensate, natural gasoline, and liquefied petroleum gas.

**Natural Gas Operations:**

Operations include drilling, completion, stimulation, reclamation, production, maintenance, and plugging and abandonment of a well.

**Natural Gas Production Wastes:**

Any sludge, refuse, garbage, or other discarded materials that result from the exploration, drilling, or extraction of natural gas, including, but not limited to, solid, liquid, semisolid, and/or contained gaseous materials.

**NORM:**

Naturally Occuring Radioactive Materials. NORM includes radium 226 and 228, both are bone and lung seekers which can result in bone and lung cancer. Marcellus shale is

known to contain NORM concentrations at higher levels than surrounding rock formations.

**Operator:**

Operator is defined as the person or company, either proprietor or lessee, actually operating a well or lease, generally the oil or gas company that engages the drilling, service, and work over contractors. Operator acts as an agent for others who has primary responsibility for maintaining well operations and complying with state rules and regulations.

**Perennial Stream:**

A stream channel that has continuous flow in parts of its bed all year round during years of normal rainfall.

**Permeability:**

It is defined as a measure of the resistance offered by the rock to the movement of fluids through it. Permeability is one of the important properties of sedimentary rock containing petroleum deposits. The oil contained in the pores cannot flow into the wellbore if the rock in the formation lacks sufficient permeability. Such a formation is referred to as "tight."

**Plug:**

It is defined as to fill a well's borehole with cement or other impervious material to prevent the flow of water, gas or oil from one strata to another when a well is abandoned; to screw a metal plug into a pipeline to shut off drainage or to divert the stream of oil to a connecting line; to stop the flow of oil or gas.

**Produced water:**

It is defined as a term used in the oil industry to describe water that is produced along with the oil and gas. Oil and gas reservoirs have a natural water layer (formation water) that lies under the hydrocarbons. Oil reservoirs frequently contain large volumes of water, while gas reservoirs tend to have smaller quantities.

**Production:**

It is defined as the phase of oil and gas operations involved with well fluids extraction, separation, treatment, measurement, etc. It is the operation of bringing the well fluids to the surface and separating them, and storing, gauging, and otherwise preparing product for the pipeline. Also refers to the amount of oil or gas produced over a given period.

**Proppant:**

Grains of sand, ceramic or other particulates that prevent fractures from closing when the pressure of forced fracturing fluid is stopped.

**Sedimentary rock:**

Sedimentary rock is defined as a type of rock that is formed by sedimentation of material at the Earth's surface and within bodies of water. Sedimentation is the collective name for processes that cause mineral and/or organic particles (detritus) to settle and accumulate or minerals to precipitate from a solution. Particles that form a sedimentary rock by accumulating are called sediment.

**Seep:**

Also called as oil seep or petroleum seep is defined as a place where liquid or gaseous hydrocarbons escape to the earth's surface naturally. Seeps may occur above either terrestrial or offshore oil fields. The hydrocarbons may escape through fractures and fissures in the rock, between geological layers, or directly from an oil-bearing outcrop. These may be a significant source of pollution.

**Seismograph:**

Seismograph is defined as a device that records vibrations from the earth. In the exploration for oil and gas, a seismograph records shock waves set off by explorations detonated in the shot holes and picked up by geophones. This allows geoscientists to develop a map of the rock formations below the earth's surface.

**Seismology:**

Seismology is defined as the scientific study of earthquakes and the propagation of elastic waves through the Earth. The field also includes studies of earthquake effects, such as tsunamis as well as diverse seismic sources such as volcanic, tectonic, oceanic, atmospheric, and artificial processes (such as explosions). Controlled source seismology has been used to map salt domes, faults, anticlines and other geologic traps in petroleum-bearing rocks, geological faults, rock types, and long-buried giant meteor craters.

**Shale Gas:**

Shale Gas is defined as a natural gas produced from shale. Shale has low matrix permeability, so gas production in commercial quantities requires fractures to provide permeability. Shale gas has been produced for years from shales with natural fractures; the shale gas boom in recent years has been due to modern technology in hydraulic fracturing to create extensive artificial fractures around well bores.

**Shale shaker:**

Shale shaker is defined as a vibrating screen for sifting out rock cuttings from the drilling mud. Drilling mud returning from downhole carrying rock chips in suspension flows over and through the mesh of the shale shaker, leaving small fragments of rocks and are collected and examined by the geologist for information on the formation being drilled.

**Slickwater:**

Refers to a water based fracturing fluid with chemicals (friction reducing agents) added to increase the fluid flow in a well.

**Spacing:**

Distance separating wells in a field to optimize recovery of oil and gas.

**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.

**Surface geology:**

It is defined as the division that conducts the traditional work of a state geological survey: surface geologic mapping and research into the geology, paleontology, and mineral resources of the state. The major work effort is in the preparation of surface geologic

maps. Geologic maps provide the basic information needed for assessment of the distribution and availability of energy and mineral resources, location of geologic hazards, occurrence and availability of water resources, and the suitability of land for various uses.

**Significant Habitat:**

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.

**Turbidity:**

Amount of suspended solids in a liquid.

**Utica shale:**

A unit of marine sedimentary rock found in eastern North America that contains quantities of natural gas.

**Wellbore:**

Any hole drilled for the purpose of exploration for or extraction of natural resources such as water, gas or oil where a well may be produced and a resource is extracted for a protracted period of time. 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.

**WOC Time:**

“Waiting On Cement” time. Pertains to the time when drilling or completion operations are suspended so that the cement in a well can harden sufficiently.

**ACRONYMS**

CP	Town of Rensselaerville Comprehensive Plan, 2007
DEC	Department of Environmental Conservation
dSGEIS	Draft Supplemental Generic Environmental Impact Statement, 2011
EPA	Environmental Protection Agency
GEIS	Generic Environmental Impact Statement, 1992
GPM	Gallons Per Minute.
HF	Hydro-fracking; hydraulic fracturing, fracking
HVHF	High Volume Hydraulic Fracturing (using >300,000 gallons of water)
ICF	ICF International, a consulting firm.
PL NYS	Preservation League of New York State
SPEDES	State Pollutant Discharge Elimination System
TOC	Total Organic Carbon
TOR	Town of Rensselaerville
USDW	Underground Source of Drinking Water
WOC	Wait On Cement (time)

**Sources:**

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