

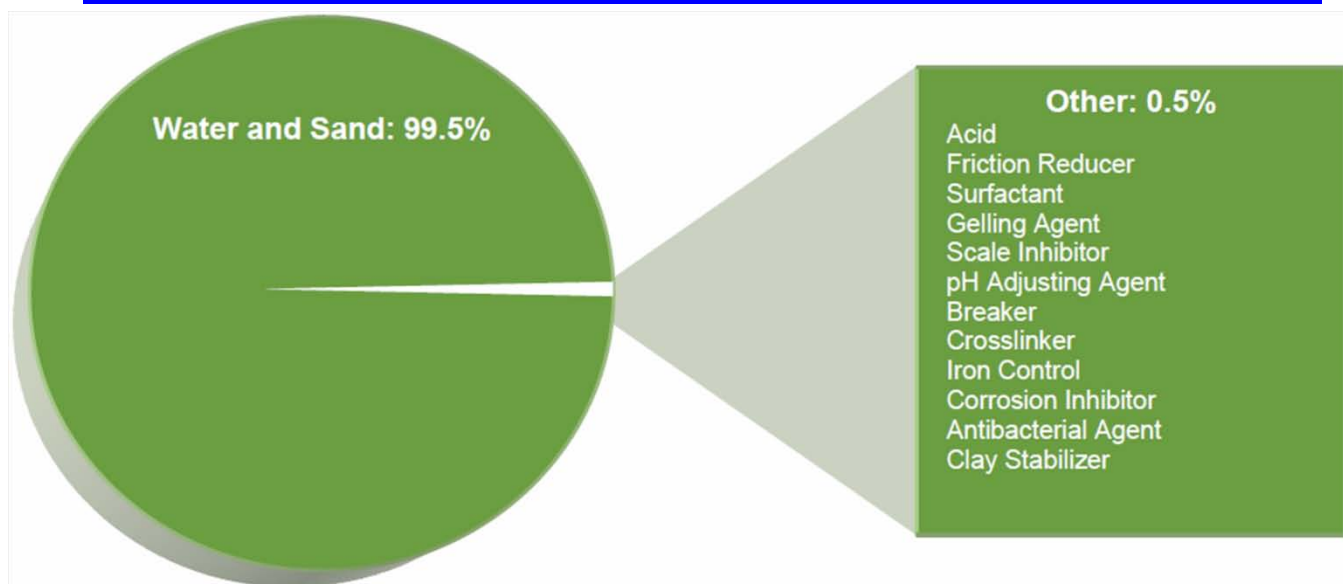
Chesapeake Posts Contents of Fracturing Fluid Used in Barnett Shale

There has been testimony before Congress and a lot of discussion about the ingredients used in fracturing fluids and accusations by anti-drilling groups and some environmentalists that fear our frac fluids might endanger water supplies. With the depths and cement-to-surface flow we have to use to protect the fresh water zones in Texas, that will not happen with any wells drilled since early in the last century. It is a requirement to have all of the information on fresh water formations, provide old electric logs and have a letter stating how deep the state engineers want us to protect the fresh water formations and how deep we have to set surface casing before we can even apply for a drilling permit from the RRC in Texas. That surface casing remains with the hole forever, even after it is plugged and abandoned.

Most companies consider the information proprietary on our drilling fluids and our fracturing fluids although most use the same ingredients but not in the same quantities and certainly not all of the ingredients as it pertains to frac fluids in the Barnett Shale. Such is the case we found in research on the Chesapeake website as we do on all Barnett Shale operator websites looking for new or unusual stories that may not be common oil patch knowledge.

Some may be surprised to see that Chesapeake lists gel and breaker in their Barnett Shale list when most operators moved away from gels to 'slick water' in the last decade. Wonder if that combination, along with 16 frac stages and 1.5 mile lateral, is why they have the biggest well in the Barnett Shale which made 13 million cubic feet of gas per day in its peak month of production? They have been showing using small amounts of gel for several years, as I recall on their G-1 reports but not in exact quantities.

Source: [http://www.chk.com/Media/BarnettMediaKits/Barnett Hydraulic Frac Fact Sheet.pdf](http://www.chk.com/Media/BarnettMediaKits/Barnett_Hydraulic_Frac_Fact_Sheet.pdf)



FRACTURING FLUID ADDITIVES, MAIN COMPOUNDS AND COMMON USES

<u>Additive Type</u>	<u>Main Compound</u>	<u>Purpose</u>	<u>Common Use of Main Compound</u>
Acid	Hydrochloric acid or muriatic acid	Helps dissolve minerals and initiate cracks in the rock	Swimming pool chemical and cleaner
Antibacterial agents	Glutaraldehyde	Eliminates bacteria in the water that produce corrosive by-products	Disinfectant; sterilizer for medical and dental equipment
Breaker	Ammonium Persulfate	Allows a delayed break down of the gel	Used in hair coloring, as a disinfectant, and in the manufacture of common household plastics
Corrosion inhibitor	Formamide	Prevents the corrosion of the well casing	Used in pharmaceuticals, acrylic fibers and plastics
Crosslinker	Borate salts	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps and cosmetics
Friction reducer	Petroleum distillate	"Slicks" the water to minimize friction	Used in cosmetics including hair, make-up, nail and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickens the water in order to suspend the sand	Thickener used in cosmetics, baked goods, ice cream, toothpaste, sauces and salad dressings
Iron control	Citric acid	Prevents precipitation of metal oxides	Food additive; food and beverages; lemon juice ~7% citric acid
Clay stabilizer	Potassium chloride	Creates a brine carrier fluid that prohibits fluid interaction with formation clays	Used in low-sodium table salt substitute, medicines and IV fluids
pH adjusting agent	Sodium or potassium carbonate	Maintains the effectiveness of other components, such as crosslinkers	Used in laundry detergents, soap, water softener and dish washer detergents
Proppant	Silica, quartz sand	Allows the fractures to remain open so the gas can escape	Drinking water filtration, play sand, concrete and brick mortar
Scale inhibitor	Ethylene glycol	Prevents scale deposits in the pipe	Used in household cleansers, de-icer, paints and caulk
Surfactant	Isopropanol	Used to reduce the surface tension of fracturing fluids to improve liquid recovery from the well after the frac	Used in glass cleaner, multi-surface cleansers, antiperspirant, deodorants and hair color
Water	Water	Used to expand fracture and deliver proppant (sand)	Landscaping, manufacturing