

# Hydraulic Fracturing Fluid Product Disclosure - STATE 8-60 16-1H

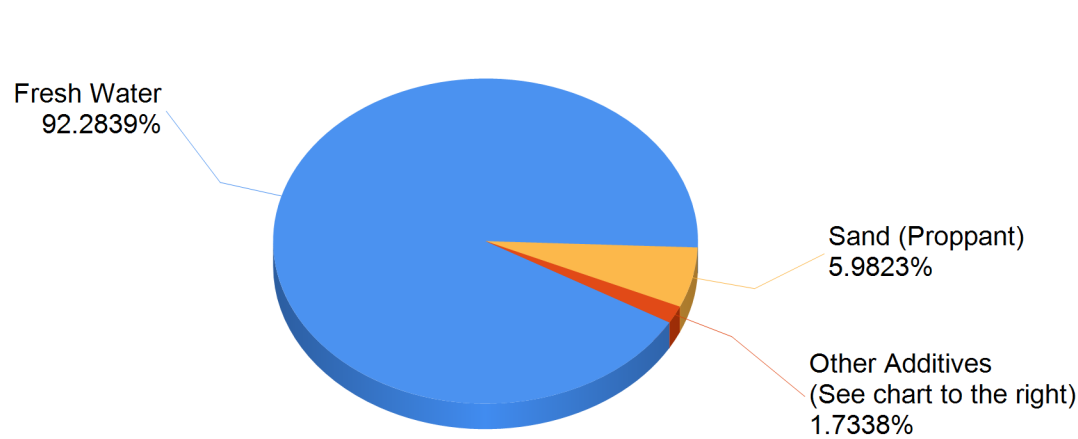
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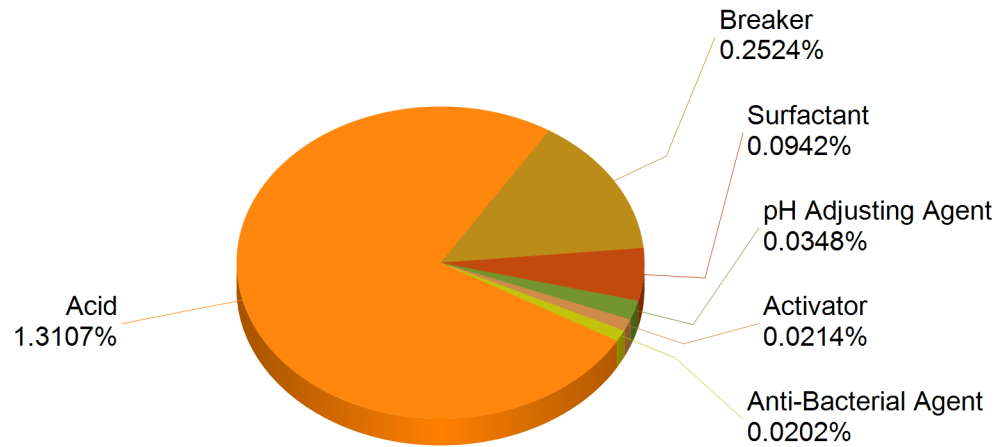
API #	0512332812	County	WELD	Fracture Date	4/12/2011
Surface Casing Depth (ft)		State	COLORADO	Proppant Mass Pumped (lbs)	3,430,340
True Vertical Depth of Well (ft)	6,334.0	Longitude	-104.093005	Water Volume Pumped (gals)	2,393,840
Play	NIOBRARA	Latitude	40.667845	Frac Fluid Volume Total (gals)	2,593,995
Well Type	HORIZONTAL	Lat/Long Projection	NAD27	Total Fluid Mass Pumped (lbs)	23,981,754

Product Type	Purpose	Downhole Result	Other Common Uses	Product Name	Total Volume Used in Well	Overall % by Total Volume
Water	Expand fracture and deliver sand	Some stays in formation while remainder returns with natural formation water as "produced water" (actual amounts returned vary from well to well)	Landscaping, manufacturing	Fresh Water	2,393,840	92.2839 %
Sand (Proppant)	Allows the fractures to remain open so the gas can escape	Stays in formation, embedded in fractures (used to "prop" fractures open)	Drinking water filtration, play sand, concrete and brick mortar	Sand (Proppant)	155,181	5.9823 %
Acid Package Hydrochloric Acid Corrosion Inhibitor Iron Control	Helps dissolve minerals and initiate cracks in the rock	Reacts with minerals present in the formation to create salts, water, and carbon dioxide.	Swimming pool chemical and cleaner	HCL HYDROCHLORIC ACID	34,000	1.3107 %
Breaker	Allows a delayed break down the gel	Reacts with the "crosslinker" and "gel" once in the formation making it easier for the fluid to flow to the borehole. Reaction produces ammonia and sulfate salts which are returned in produced water.	Used in hair coloring, as a disinfectant, and in the manufacture of common household plastics	VICON NF BREAKER	6,547	0.2524 %
Surfactant	Used to increase the viscosity of the fracture fluid	Generally returned with produced water, but in some formations may enter the gas stream and return in the produced natural gas.	Used in glass cleaner, multi-surface cleansers, antiperspirant, deodorants and hair-color	LOSURF-300D	2,444	0.0942 %
pH Adjusting Agent	Maintains the effectiveness of other components, such as crosslinkers	Reacts with acidic agents in the treatment fluid to maintain a neutral (non-acidic, non-alkaline) pH. Reaction results in mineral salts, water and carbon dioxide which is returned in produced water.	Used in laundry detergents, soap, water softener and dish washer detergents	BA-20	903	0.0348 %
Activator	Used to trigger a chemical reaction involving another additive (such as crosslinkers or breakers) or resin coated proppants (synthetic sands).	Undergoes chemical reaction downhole. Results in mineral salts, water and carbon dioxide which is returned in produced water.	Used in laundry detergents, soap, water softener and dish washer detergents	CAT-3	555	0.0214 %
Anti-Bacterial Agent	Eliminates bacteria in the water that produces corrosive by-products	Reacts with micro-organisms that may be present in the treatment fluid and formation. These micro-organisms break down the product with a small amount of the product returning in produced water.	Disinfectant; sterilizer for medical and dental equipment	BE-7	525	0.0202 %

Hydraulic Fracturing Fluid Breakdown by Volume



Details for the Other Additives worth 1.7338% of Total Volume



Hydraulic Fracturing Fluid Product Component Information Disclosure - STATE 8-60 16-1H  
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Supplier	Product Type	Product Name	Total Product Pumped (gals)	Total Product Mass (lbs)	Component Listed on MSDS	Chemical Abstract Service Number (CAS #)	MAXIMUM Component Concentration of Product (% by Mass)	MAXIMUM Component Mass Pumped (lbs)	MAXIMUM Component Concentration Pumped (% by Mass)	MAXIMUM Parts per Million (PPM) by Mass
HALLIBURTON ENERGY SERVICES	Acid	HCL HYDROCHLORIC ACID	34,000	306,612	Hydrochloric Acid	007647-01-0	15.00%	45,992	0.19178%	1,918
	Breaker	VICON NF BREAKER	6,547	66,148	Sodium Chloride	007647-14-5	30.00%	19,844	0.08275%	827
					Sodium Chlorite	007758-19-2	10.00%	6,615	0.02758%	276
	pH Adjusting Agent	BA-20	903	8,294	Ammonium Acetate	000631-61-8	100.00%	8,294	0.03458%	346
					Acetic acid	000064-19-7	30.00%	2,488	0.01038%	104
	Activator	CAT-3	555	4,912	EDTA/Copper chelate	N/A	30.00%	1,474	0.00615%	61
	Anti-Bacterial Agent	BE-7	525	5,304	Sodium Hypochlorite	007681-52-9	30.00%	1,591	0.00664%	66
					Sodium Hydroxide	001310-73-2	5.00%	265	0.00111%	11
	Surfactant	LOSURF-300D	2,444	18,367	Ethanol	000064-17-5	60.00%	11,020	0.04595%	460
					Heavy Aromatic Naphtha (Naphtha, Petroleum Naphtha, Catalytic Reformed Naphtha, Heavy Paraffinic Distillate)	064742-94-5	30.00%	5,510	0.02298%	230
					Naphthalene	000091-20-3	5.00%	918	0.00383%	38
					Nonyl Phenol Poly Ethylene Glycol Ether Blend	127087-87-0	5.00%	918	0.00383%	38
					1,2,4 Trimethylbenzene	000095-63-6	1.00%	184	0.00077%	8

All component information listed was obtained from supplier Material Safety Data Sheets (MSDS). The Occupational Safety and Health Administration (OSHA) sets the criteria for the disclosure of this information. Please note that Federal Law protects "proprietary", "trade secret", and "confidential business information" and the criteria for how this information is reported on an MSDS is subject to 29 CFR 1910.1200 (i). As a result, the Operator does not have the legal authority to disclose any supplier "proprietary", "trade secret", or "confidential business information".