

Hydraulic Fracturing Fluid Product Disclosure - HOFF 6-62 15-1H
CHESAPEAKE

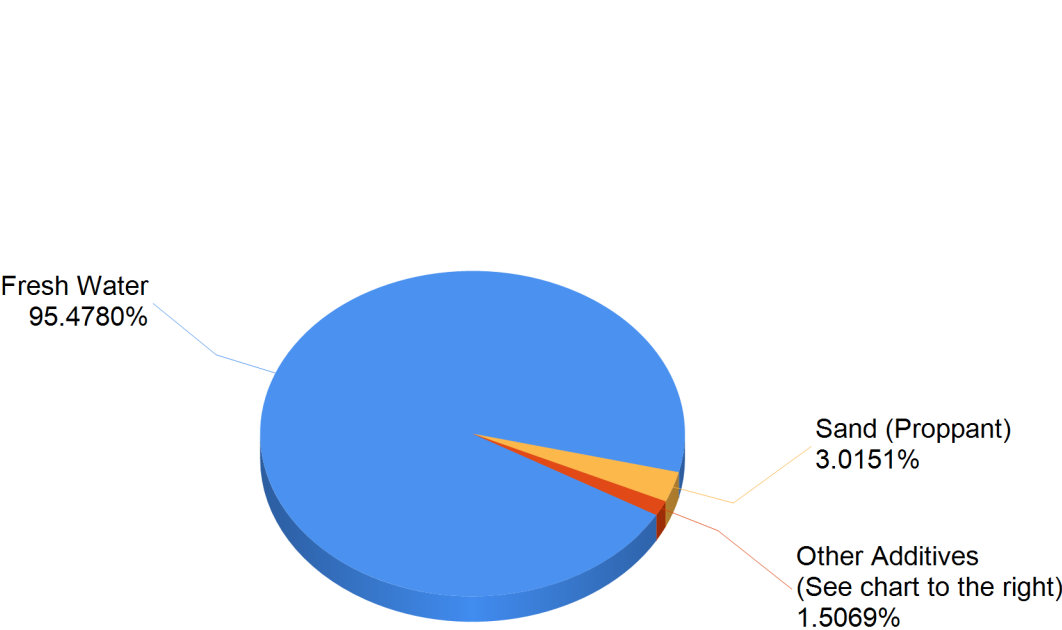


API #	0512332910	County	WELD	Fracture Date	11/28/2011
Surface Casing Depth (ft)		State	COLORADO	Proppant Mass Pumped (lbs)	1,240,900
True Vertical Depth of Well (ft)	6,449.3	Longitude	-104.305099	Water Volume Pumped (gals)	1,777,650
Play	NIOBRARA SHALE	Latitude	40.492803	Frac Fluid Volume Total (gals)	1,861,842
Well Type	HORIZONTAL	Lat/Long Projection	NAD 27	Total Fluid Mass Pumped (lbs)	16,342,060

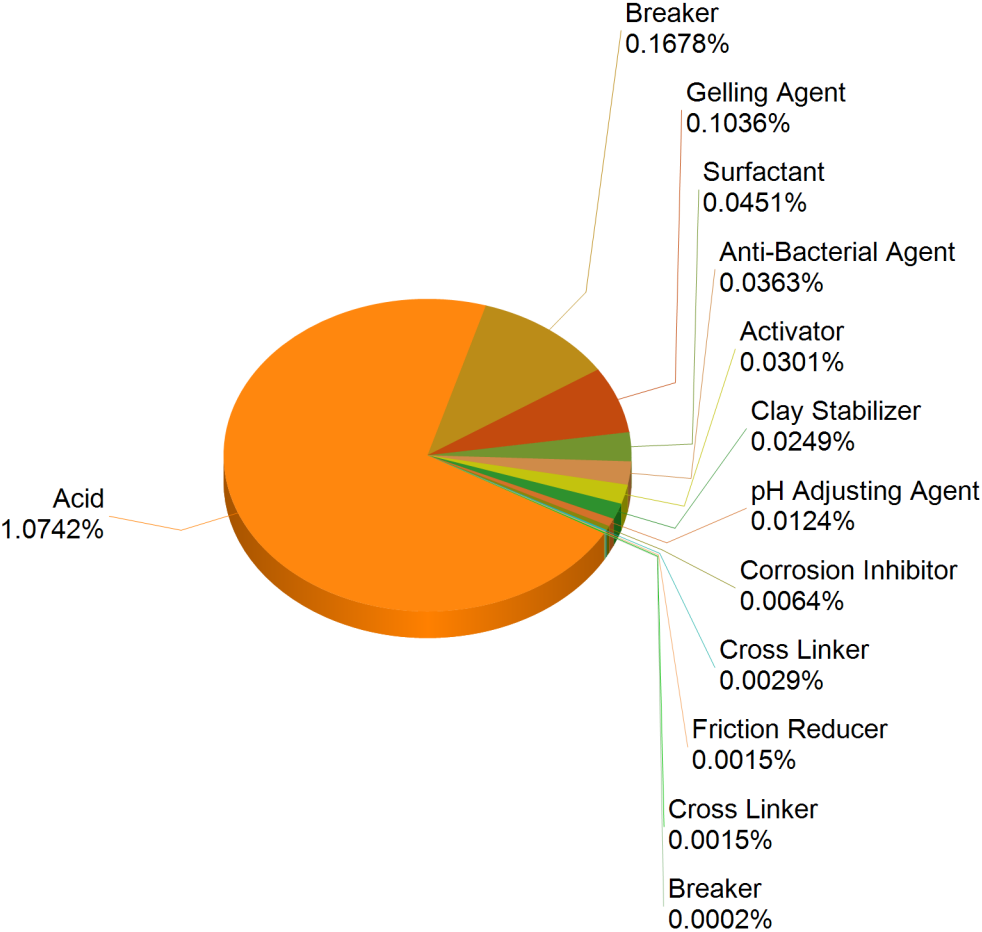
Product Type	Purpose	Downhole Result	Other Common Uses	Product Name	Total Volume Used in Well	Overall % by Total Volume
Water	Expand fracture and deliver sand	Some stays in formation while remainder returns with natural formation water as "produced water" (actual amounts returned vary from well to well)	Landscaping, manufacturing	Fresh Water	1,777,650	95.4780 %
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)	56,136	3.0151 %
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	FE ACID	20,000	1.0742 %
	Prevents the corrosion of the pipe	Bonds to metal surfaces (pipe) downhole. Any remaining product not bonded is broken down by micro-organisms and consumed or returned in produced water.	Used in pharmaceuticals, acrylic fibers and plastics	HAI-404M	120	0.0064 %
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	3,125	0.1678 %
				OptiKleen-WF	3	0.0002 %
Gelling Agent	Thickens the water in order to suspend the sand	Combines with the "breaker" in the formation thus making it much easier for the fluid to flow to the borehole and return in produced water.	Cosmetics, baked goods, ice cream, toothpaste, sauces, and salad dressings	WG-18	1,929	0.1036 %
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	840	0.0451 %
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	675	0.0363 %
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	560	0.0301 %
Clay Stabilizer	Creates a brine carrier fluid	Reacts with clays in the formation through a sodium - potassium ion exchange. Reaction results in sodium chloride (table salt) which is returned in produced water.	Used in low-sodium table salt substitute, medicines, and IV fluids	CLA-WEB	464	0.0249 %

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	230	0.0124 %
Cross Linker	Maintains fluid viscosity as temperature increases	Combines with the "breaker" in the formation to create salts that are returned in produced water.	Used in laundry detergents, hand soaps and cosmetics	CL-40	54	0.0029 %
				CL-37	28	0.0015 %
Friction Reducer	"Slicks" the water to minimize friction	Remains in the formation where temperature and exposure to the "breaker" allows it to be broken down and consumed by naturally occurring micro-organisms. A small amount returns with produced water.	Used in cosmetics including hair, make-up, nail and skin products	FR-66	28	0.0015 %

Hydraulic Fracturing Fluid Breakdown by Volume



Details for the Other Additives worth 1.5069% of Total Volume



Hydraulic Fracturing Fluid Product Component Information Disclosure - HOFF 6-62 15-1H
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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	FE ACID	20,000	178,690	Hydrochloric Acid	007647-01-0	30.00%	53,607	0.32803%	3,280
	Gelling Agent	WG-18	1,929	20,942	Guar Gum Derivative	N/A	100.00%	20,942	0.12815%	1,281
	Clay Stabilizer	CLA-WEB	464	4,301	Proprietary	N/A	60.00%	2,580	0.01579%	158
	Activator	CAT-3	560	4,957	EDTA/Copper chelate	N/A	30.00%	1,487	0.00910%	91
	pH Adjusting Agent	BA-20	230	2,113	Ammonium Acetate	000631-61-8	100.00%	2,113	0.01293%	129
					Acetic acid	000064-19-7	30.00%	634	0.00388%	39
	Anti-Bacterial Agent	BE-7	675	6,820	Sodium Hypochlorite	007681-52-9	30.00%	2,046	0.01252%	125
					Sodium Hydroxide	001310-73-2	5.00%	341	0.00209%	21
	Corrosion Inhibitor	HAI-404M	120	992	Aldehyde	N/A	30.00%	298	0.00182%	18
					Isopropanol (Isopropyl Alcohol, Propan-2-ol)	000067-63-0	30.00%	298	0.00182%	18
					Methanol (Methyl Alcohol)	000067-56-1	30.00%	298	0.00182%	18
					Chloromethylnaphthalene quinoline quaternary amine	015619-48-4	10.00%	99	0.00061%	6
	Cross Linker	CL-37	28	255	Triethanolamine zirconate	101033-44-7	100.00%	255	0.00156%	16
					Glycerine	000056-81-5	30.00%	77	0.00047%	5
					N-Propanol	000071-23-8	30.00%	77	0.00047%	5
		CL-40	54	559	Triisopropanolamine	000122-20-3	30.00%	168	0.00103%	10
	Friction Reducer	FR-66	28	248	Petroleum Distillate Hydrotreated Light	064742-47-8	30.00%	74	0.00045%	5

HALLIBURTON ENERGY SERVICES	Surfactant	LOSURF-300D	840	6,313	Ethanol	000064-17-5	60.00%	3,788	0.02318%	232
					Heavy Aromatic Naphtha (Naphtha, Petroleum Naphtha, Catalytic Reformed Naphtha, Heavy Paraffinic Distillate)	064742-94-5	30.00%	1,894	0.01159%	116
					Naphthalene	000091-20-3	5.00%	316	0.00193%	19
					Nonyl Phenol Poly Ethylene Glycol Ether Blend	127087-87-0	5.00%	316	0.00193%	19
					1,2,4 Trimethylbenzene	000095-63-6	1.00%	63	0.00039%	4
	Breaker	OptiKleen-WF	3	21	Sodium perborate tetrahydrate	010486-00-7	100.00%	21	0.00013%	1
		VICON NF BREAKER	3,125	31,573	Sodium Chloride	007647-14-5	30.00%	9,472	0.05796%	580
					Sodium Chlorite	007758-19-2	10.00%	3,157	0.01932%	193

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".