

## Appendix F: Chemical Additives

### Hydraulic Fracturing Fluid Additive List

JAGDAG public document Jan 2018					
Substance	Status	Source	Phase	Use	Max Conc.
Aluminium sulphate	Non hazardous pollutant	JAGDAG, 2001	Fracturing	Cross Linker	10 Kg/m3
Anionic Polyacrylamide	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Gelling agent	4.9 Kg/m3
Boron - as boron (III)	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	
Understood as Boric Acid	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	0.72 Kg/m3
Understood as Sodium TetraBorate	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	0.55 Kg/m3
Understood as Potassium Borate	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	1.14 Kg/m3
Understood as Sodium Borate Anhydrous	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	0.25 Kg/m3
Understood as Sodium TetraBorate Decahydrate (Borax)	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	1.1 Kg/m3
Understood as Ulexite	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	0.25 Kg/m3
Ethylene glycol	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Carrier	10 lt/m3
Gluteraldehyde	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Preservative	0.1 lt/m3
Sodium tetraborate	Non hazardous pollutant	JAGDAG, 2001	Fracturing	Gelling agent	4.9 Kg/m3
Polyacrylamide (anionic)	Non hazardous pollutant	JAGDAG, 2017	Fracturing	Cross Linker	0.55 Kg/m3
Guar Gum	Non hazardous pollutant	EA Standard Rules	Fracturing	Gelling agent	4.2 Kg/m3

#### Biocides

Additives in Products	Status	CAS
Gluteraldehyde	Non-hazardous	111-30-8

#### Hydrate Management

Additives in Products	Status	CAS
Methanol	Non-hazardous	67-56-1

JAGDAG June 2018 Consultation					
Substance	Status	Source	Phase	Use	Max Conc.
2-butoxyethanol/ ethylene glycol monobutyl ether	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Carrier	50 lt/m3
Acetic acid	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	pH buffer/activator	10 lt/m3
Alcohols C6-C10 ethoxylate	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Cleanup/flowback aid	2 lt/m3
Ammonium chloride	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Clay Control/Brine	30 Kg/m3
Amorphous silica fume	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Carrier	0.012 Kg/m3
Calcium chloride	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Clay control	30 Kg/m3
Citric acid	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	pH buffer/activator	10 lt/m3
Crystalline silica, quartz	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Proppant	
Diammonium peroxidisulphate	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Gel Breaker	1.2 Kg/m3
D-limonene	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Cleanup/flowback aid	10 lt/m3
Isopropanol	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Cleanup/flowback aid	10 lt/m3
Methanol	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Cleanup/flowback aid	10 lt/m3
Sodium carbonate (Soda ash)	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	pH buffer	3 Kg/m3
Sodium carboxymethyl cellulose	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Gelling Agent	3.6 Kg/m3
Sodium gluconate	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Delay agent	4.8 Kg/m3
Sodium hydroxide/ caustic soda	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	pH Buffer/Activator	3 Kg/m3
Sorbitol	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Delay agent	2.4 Kg/m3
Tetrapotassium ethylenediaminetetraacetate	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Scale-control	20 lt/m3
Tetrasodium ethylenediaminetetraacetate	Summary Non_Hazardous	JAGDAG Consultation june 2018	Fracturing	Scale-control	20 lt/m3

Previous Onshore Oil and Gas submissions					
Substance	Status	Source	Phase	Use	Max Conc.
Aluminium Sulphate	Non- hazardous	Third Energy Application	Fracturing	Cross Linker	10 Kg/m3
Calcium Carbonate	Non- hazardous	Environment Agency Balcombe Hydrogeological assessment	Drilling/ Fracturing	Weighting Agent/Fluid Loss	10 Kg/m3
Carboxymethylcellulose sodium salt	Non- hazardous	Environment Agency Balcombe Hydrogeological assessment	Drilling/ Fracturing	Gelling agent	3.6 Kg/m3
Hemicellulase Enzyme	Non- hazardous	Third Energy Application	Fracturing	Gel Breaker	4 Kg/m3
Potassium Chloride	Non- hazardous	Environment Agency Balcombe Hydrogeological assessment	Drilling/ Fracturing	Clay Control/Brine	70 Kg/m3
Sodium Bicarbonate (60%-100%)	Non- hazardous	Third Energy Application	Fracturing	pH Buffer	0.36 Kg/m3
Sodium Chloride	Non- hazardous	Third Energy Application	Fracturing	Clay Control/Brine	70 Kg/m3
Sodium Gluconate	Non- hazardous	Third Energy Application	Fracturing	Delay agent	4.8 Kg/m3
Sodium Persulfate	Non- hazardous	Third Energy Application	Fracturing	Gel Breaker	1.2 Kg/m3
Xanthan Gum	Non- hazardous	Environment Agency Balcombe Hydrogeological assessment	Drilling/ Fracturing	Gelling agent	4.8 Kg/m3