



**Kimmeridge Oil & Gas Limited
Broadford Bridge-1 Exploration Well**

Environment Agency Approved Drilling Fluids and Chemicals

17.1/2" Hole Section

| Formulation | The drilling fluid is primarily water |
|------------------------|--|
| Pure-Bore ¹ | Modified plant starch |
| Ultra-Bore | Natural bentonite clay, increases density of fluid when required |

12.1/4" Hole Section

| Formulation | The drilling fluid is primarily water |
|---------------------------|--|
| Pure-Bore ¹ | Modified plant starch |
| Pure-Bore LV ¹ | As above but with lower viscosity |
| Sodium bicarbonate | Baking soda, increases density of drilling fluid |
| Citric acid | pH balancer to reduce drilling fluid alkalinity after cementing (commonly known as lemon or lime juice) |
| Potassium sulphate | Reduces swelling of shales and clays, (often used as a plant fertiliser, commonly known as sulphate of potash) |

8.1/2" Hole Section

| Formulation | The drilling fluid is primarily water |
|---------------------------|---|
| Pure-Bore ¹ | Modified plant starch |
| Pure-Bore LV ¹ | As above but with lower viscosity |
| Sodium bicarbonate | Baking soda, increases density of drilling fluid |
| Sodium Chloride | Common salt, increases density of drilling fluid |
| Citric acid | pH balancer to reduce drilling fluid alkalinity after cementing (commonly known as lemon or lime juice) |
| Potassium chloride | Increases density of drilling fluid and prevents clay swelling, (commonly used as a medicine, food-additive and fertiliser) |

Cement & Cement additives

| | |
|-----------------|---|
| Class G cement | Plain Portland cement (waterproof impermeable concrete) made to high spec and tolerances |
| | Additives used where specific circumstances require |
| Tuned Spacer E+ | Increases cement viscosity (thickens cement) |
| CFR-8L | Dispersant- used to aid mixing of the cement |
| Gas Stop | Used to stop air & any natural occurring gasses from entering the cement during setting (reacts with gas to form a gel) |
| Halad-300L NS | Prevents water/fluid in unhardened cement from entering surrounding porous rock. Loss of fluids results in rapid hardening with lessened strength and integrity |
| HR-4L | Increases thickening/hardening time of cement (retarder) |
| NF-6 | Minimises trapped air bubbles in cement (de-foamer) |
| Silicate | Lightweight additive (extender) to reduce cement density |

Well Completion Fluids

| | |
|--------------|---|
| Protekt 4144 | Restricts growth of sulphur and methane producing bacteria in well bore |
| Protekt 4200 | Depletes oxygen level in well fluids to inhibit rusting of steel casing |
| Protekt 4852 | Steel corrosion Inhibitor |



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Contingency Products

| | |
|---------------------------------|---|
| Biocide CT-60/03 | Restricts growth of sulphur and methane producing bacteria in well bore |
| Oxygen scavenger CT31/02WT | Depletes oxygen level in well fluids to inhibit rusting of steel casing |
| Corrosion inhibitor CT-17/02 WT | Steel corrosion inhibitor |

Notes:

1. Pure-Bore is a water based drilling fluid made from natural plant-derived starches. It is non-toxic, biodegradable and the only drilling fluid formally approved by DEFRA for use in public drinking water supply wells. It is also registered with the UK Government's Centre for Environment Fisheries and Aquaculture Science (CEFAS) and with PLONOR (Pose Little or No Risk to the Environment, OSPAR list for offshore disposal).