Kimmeridge Oil & Gas Limited is a wholly-owned subsidiary of UK Oil & Gas Investments PLC

BROADFORD BRIDGE: THE FACTS, NOT THE FICTION

Dear Resident,

Please excuse this intrusion. I'm writing to you to hopefully allay any fears you may have about Kimmeridge Oil & Gas Limited (KOGL) and our upcoming exploration drilling activities at the Broadford Bridge well site (Adversane Lane). KOGL is a 100% owned subsidiary company of UK Oil & Gas Investments PLC (UKOG), a publicly-listed company on AIM. I am Chairman of both companies.

Please find attached a document that KOGL made available at a meeting with West Chiltington Parish Council and Billingshurst Parish Council last month, giving details about the Broadford Bridge drilling site. We hope you find it useful.

As you will see, following extensive public meetings and consultation, regulatory permissions to drill an exploratory borehole at the site were granted by West Sussex County Council (WSCC) in 2013 and the Environment Agency (EA) in 2014. A modern hard-standing, sealed well pad was constructed in late 2014. KOGL now plans to drill an exploratory well designated as Broadford Bridge-1 in the near future.

We have been fully aware of a pressure group in the area who have been spreading extraordinary levels of misinformation about our planned activity, which is causing unnecessary alarm to some residents. However, the feedback we have received regarding public responses to the EA regarding our application has been largely in support.

However, the scaremongering has reached unsettling levels and we feel compelled to respond. We are aware of a meeting taking place at Pulborough Village Hall on Sunday 30th April. We have been advised not to attend because we are not guaranteed a fair hearing.

The main concern has centred around us using "acidisation" techniques which has been erroneously and mischievously linked to massive hydraulic fracturing, "fracking". We are not fracking. We do not want to or need to, because the Kimmeridge Limestones rocks that we are targeting are naturally-fractured by mother nature.

Although much of this subject has been dealt with in our attached document "10 Things You Need to Know About Broadford Bridge", we now feel compelled to give a more detailed explanation:

1. The acid used in our operations is solely dilute hydrochloric acid (15% acid, 85% water). We are not using any other acid. The same acid is present naturally in people's stomachs and it is also used in domestic limescale removers (these are typically around 8-11% acid). See note 4 below on the use of acid in wells for drinking water.
2. Hydrofluoric acid, which is mentioned by some environmentalists, is not used to dissolve limestone (i.e. rock made mostly of Calcium Carbonate, Ca CO_3). It is used to dissolve silica oxide (i.e. sandstone) so is not applicable for our limestone reservoirs. Hydrofluoric acid is very corrosive and, as a matter of policy, **we would not use it** in any of our site operations, now or ever.
3. The chemical reaction between hydrochloric acid and limestone (i.e. rock comprised of calcium carbonate, $CaCO_3$) has been known for over 150 years. The acid reacts with calcium carbonate to form water, calcium chloride ($CaCl_2$) and carbon dioxide. In the reaction with

the limestone the acid is used up (the correct term is “neutralised”, i.e. it no longer exists as an acid). The process dissolves the calcium carbonate converting it to calcium chloride which is highly soluble. $CaCl_2$ is a major constituent of seawater and human bones, so it is a naturally occurring salt and harmless.

4. Matrix acidisation simply means using acid to dissolve some of the rock surrounding the wellbore. Rock matrix just means the framework of the individual grains of sediment forming the rock. In-between the rock grains are pores filled with fluid, so these are the spaces through which fluid can flow i.e. oil and/or water. The acid is put into the pores of the rock and when it contacts the calcium carbonate it dissolves some of the limestone rock grain. This effectively makes the pores larger and enables fluids to flow more freely, so in both water wells and oil wells this means that the wells can flow more than they did before acidisation.
5. This technique has been used for over 120 years in both the drilling of water wells by the water industry for tap/drinking water and subsequently by the oil industry. It is an old and established oilfield/water well technology and practice. The acid used by the drinking water industry in the UK’s limestone reservoirs (mostly chalks), is typically stronger than KOGL will use. It is 20% to 30% acid and hence 80% to 70% water. It’s safe to use in wells used for drinking water because the acid reacts and is neutralised. After acidisation, water wells are also fully cleansed and the water treated before being used for the supply of public drinking water. **So, acidisation is safe for drinking water supply and is a standard technique used by the water industry.**
6. Based on published well data, acidisation has been used in just about every oil production well in a limestone reservoir in the Weald Basin (SE England) and in the Midlands. The technique is also being used in a limestone reservoir in the UK’s Wytch Farm oil field in Dorset (Western Europe’s largest onshore oil field). **It is also important to understand that acidisation is a one-time process**, used only when an oil well is first tested or prepared for production. It is not repeated on a regular basis. UKOG used this technique in our Horse Hill-1 well tests last year, safely and successfully. Note that the acid is put into rocks thousands of feet below any fresh water bearing horizons and directly and solely into the oil and salty water-bearing oil reservoir. Critically, acidisation is done in an oil well comprising three cemented steel casings (concentric pipes). There is therefore no possibility of a leak to the surface or to shallow rocks.
7. In order to get the acid, or any fluid, in contact with the rock surrounding the well, the acid must be introduced at an equal or slightly higher pressure than exists naturally in the rock. Remember that the rocks we are looking at lie thousands of feet below the surface.
8. The pressure the acid is injected at is far too low to fracture the rock. So, the acidisation technique KOGL is using is not fracking by any shape or form.

We fear that the ill-informed pressure group will throw any counter information back at us with more and more unfounded accusations. All we can do it deal in facts, not fiction.

We also note that other questions on the pressure group’s agenda include:

FALSE CLAIM: Chemical use is greater in acidisation than in hydraulic fracking.
FACTUAL ANSWER: This is simply not true. As explained above, our limestone oil reservoir (which is thousands of feet below ground and behind three thick, cemented steel casings) involves using a diluted acid wash. Typically, this involves about 100 barrels (approximately 3,600 gallons) of mostly water (i.e. 85 barrels of water and 15 barrels HCl). Fracking uses millions of gallons of stimulation fluid consisting of over 90% water and sand plus chemical additives used to lubricate, prevent bacteria from forming in the injected water and to permit the sand to be carried more efficiently.

FALSE CLAIM: Solid and liquid waste will be toxic, highly saline and radioactive, a risk to groundwater, surface water and soil should accidents occur.
FACTUAL ANSWER: This is not true. The Environment Agency regulate waste through the Mining Waste Permit. This specifies the wastes and how they are labelled, transported and treated. The drilling fluids we will use are derived from natural, biodegradable, non-hazardous plant-derived material. We do not need to, or are permitted to, inject any radioactive material into the subsurface. We are required by the EA to monitor all fluids derived from the subsurface for naturally occurring

radioactive material (NORM). We know that the fluids produced from our flow tests from the Kimmeridge Limestones at Horse Hill do not contain any naturally occurring radioactivity. We also know that the Kimmeridge rock composition is consistent over the entire SE of the UK. The same Portland and Kimmeridge rocks outcrop naturally along the Dorset Heritage Coast and present zero hazard to humans. The solid waste from the well will consist of rock fragments, known as "cuttings" derived from the rocks and traces of the biodegradable drilling fluid. The fluids naturally present in the Kimmeridge rocks will be flowed to the surface during the testing period, and will, hopefully, consist of 100% dry oil, as was the case at our Horse Hill-1 well. There is a possibility that some water present naturally within the rocks could also be produced, which would have a salinity of approximately 40,000 parts per million, or about the same salinity as sea water. All waste fluids used in the drilling and testing process, together with any produced formation water and solid rock waste, will be sent to one of the many EA approved and licenced disposal sites in the south of England (see below). Dry oil will be shipped to Fawley refinery.

FALSE CLAIM: The EA Midlands office stated that there are no suitable disposal facilities in southern England.
FACTUAL ANSWER: Again, this is not true. The Mining Waste Permit would not have been granted in 2014 if this was the case. There are several designated sites, licenced by EA, for different waste products, however the majority of the waste produced from the site will be sent to EA licenced specialist facilities in Kent.

FALSE CLAIM: The risk of spills and other accidents.
FACTUAL ANSWER: Operations are designed to mitigate against the risk of any spills. The site is self-contained and zero discharge, even rainwater is collected and transported to EA licenced disposal sites. The well site is specifically designed to prevent any spill from penetrating into the ground underneath as it is underlain by an impermeable liner below the site's main hardstanding layer. All chemicals and oil tanks have a secondary walled containment system, while the site's perimeter ditch is designed to catch any spills and prevent them from leaving the site. All soil has been removed from underneath the site and is stored in the soil mound along the site's southern perimeter. The impermeable membrane lies upon the underlying impermeable Weald clay rock formation.

FALSE CLAIM: Wells may be acidised repeatedly and there is little research on the subject of repeated acidisation.
FACTUAL ANSWER: This is totally untrue. The acidisation process in the Kimmeridge limestones is a one-time process prior to flowing oil from the well, as stated above. This process has been standard practice in the global oil industry within limestone reservoirs for 120 years, has been carried out in the Weald for over 30 years, and it is widely used by the water industry in the supply of drinking water.

FALSE CLAIM: Climate change. The Government has made a commitment to reduce carbon emissions so drilling hundreds of new oil wells is totally inappropriate.
FACTUAL ANSWER: Producing oil local to the UK population reduces carbon emissions since it avoids the need to transport oil vast distances from countries such Saudi Arabia and Russia. The other clear benefits include employment, tax revenues to the Treasury and security of supply in the post-Brexit era.

FALSE CLAIM: The Weald is very faulted. Faults are complex and unpredictable in their hydrogeological behaviour and should be regarded as leaky. The site is situated near a fault which could take liquids to the River Arun.
FACTUAL ANSWER: This is factually incorrect. The faults in the Weald, as in any basin, are predictable in their nature, as is their likely transmissivity to fluids given knowledge of the geology and tectonic stresses in the basin. The faulting is well understood from the dense coverage of seismic coverage over the basin. The stress field and geology in the Weald is well known from measurements from the 100 or more legacy wells drilled in the basin over the last 40 years. The Weald basin is subject to a present day compressive stress regime with a maximum compressive stress direction of approximately south to north. The Weald's predominant east-west fault trend is therefore not open or dilated (i.e. open to the vertical transmission of fluids) as they are under

extensive compressional forces which close them shut. If the faults were open and leaky as is claimed, then the significant volumes of known hydrocarbons generated within the Weald's Jurassic rocks should be seen to seep at surface in places all over the Weald. To our knowledge no hydrocarbon seeps are recorded in the Weald. Additionally, the faults in the area of the site do not penetrate to the surface as they terminate at the base of the impermeable clays of the Weald Clay rocks, which cover the entire central area of the Weald. Furthermore, there are no viable (potable water) aquifers near Broadford Bridge or underlying the site from which drinking water is derived. As previously described, the site is zero discharge and therefore no fluids can possible escape from the site into the catchment of any nearby rivers.

I hope this is useful and we will endeavour to keep you updated about a start date for our activities at the well site. However, if you have further concerns, please contact us via info@ukogplc.com.

With best wishes,

Stephen Sanderson | Executive Chairman and CEO
UK Oil & Gas Investments PLC