From: Jim Kelsey [redacted]
Sent: 04 August 2017 02:52
To: [redacted]; Parish Clerk (Pulborough); [redacted]
Amanda Jupp; [redacted] Parish Clerk (West Chiltington); [redacted] Chris Bartlett; Jane Moseley; Patricia Arculus; Nick Herbert; [redacted]
Subject: Kelsey 4Aug17

Dear Representatives of the people,

I am sorry for the breadth I have had to broadcast this letter. It doesn't make you less important. You are a lynch-pin in a very complex structure and all must play their part. . .

With reference to the recent letter sent out by Brian Alexander, on behalf of Stephen Sanderson which claims an 'increasingly hostile' attitude from Nicola Peel and the Broadford Bridge Action Group. Firstly I would like to say something about Nicola herself.

I have known Nicola for nine years and known of her for sixteen. She has devoted her adult life to helping people, particularly with indigenous people's rights to clean water. She has, through this, seen the impact of the spread of oilfields through the South American river valleys and that ecosystems and local interests are cast aside as secondary to the quest for oil and profit. These oil companies were the bigger beasts of the industry, not small operations which live or die by their day to day investors (such as UKOG). These companies lied to the locals and left a trail of broken promises ***and*** spilt oil as they went. Please do not underestimate the impact of this industry if it is not held to the highest standards.

Now I believe that UKOG are perhaps among the better of this new breed of small prospectors and producers but that does not mean that they are incapable of lying, taking risks, cutting down their detractors or ignoring safety concerns in their pursuit of profit.
We are lucky to have someone like Nicola to ask those difficult questions and pursue the answers.

Nicola is forthright not aggressive, passionate not threatening, and yes she can be intimidating to someone not used to that sort of honesty.

There have been some claims made by many of those opposed to the wealden oilfield and this well in particular which have been passed on from other action groups and which have proved to be irrelevant or exaggerated when used against the Broadford Bridge Well. However, they have served the purpose of making UKOG engage more with the local community and press in order to reassure and win back hearts and minds. This is of course welcome.

Some questions that Nicola and others have asked remain unanswered. Responses such this week's letter to Parish, District and County Councillors from UKOG not only dodge her questions, but have the tone of hot oil poured from above a drawbridge.

The question of Reactions and Reparations in the event of a major overground or underground spill has not been addressed by the company nor, it seems, by the regulatory bodies, the permit issuing bodies or the policy makers. This is not a minor issue. Oil wells of all types do fail or blow out or plume or open pathways to aquifers or cause seismic activity or subsidence. None of these is likely but all of these are possible. This question is born of experience not theory. The more drill pads, the higher the risk.

This is why it is a “breach of collective moral and legal duty to act solely in the public interest”. **Here there is a risk and it is the people, their land and their living that are put at risk, but no-one is accountable for that risk**. And it would be the local authority who would bear the brunt of the financial burden if an incident were to occur.

With regard to the "so called Experts" thread of these recent UKOG missives, UKOG have paid a respected Hydrogeology firm. BBAG have employed two respected hydrogeology firms both of which have perceived a risk and highlighted measures which could be taken to mitigate it. One of these measures is a more extensive water and air testing regime in which the "protectors' are already engaged. (See Drill or Drop). Other measures include early warning systems in the well itself and seismic recording. We would also like to see the site safety sheets published in order to confirm to the unconvinced that the substances used in operations there tally with the announcements of the company.

I would like to draw your attention to the fault through which this well has in all likelihood been drilled. Drilling into a fault is not unusual in the oil industry as a sealed fault is a trap for oil or gas. The "intense fracturing" present in the calcareous mudstone (kimmeridge micrite limestone) and in the shale formation may well be due to it being drilled through in the fracture zone of the fault. This may have implications both for the future productivity of the well and the methods which may have to be used in the future outside the heavily fractured area. This is because we do not know whether the "light oil" which haunts these crevasses has journeyed there from above, beside or deep below.

I would like to draw your attention to a couple more things before I sign off. The first thing is the fault itself, which,were it to reach the surface would appear on the A29 somewhere around Adversane. Or at least that's what one of our "so called" and very well lettered experts has informed me. I have received a report from a local of oil seeping in a corner of a field close to this line. This local was not one of the protestors, more slightly worried but expecting a nodding donkey. They were wondering whether they should extract it themselves, maybe get rich. . . The oil seepage was several years ago. It was there when they moved in in 2005 or 2006. the same time I moved back to this area. Now it may be a buried truck or plane but its enough to make me worry about the permeability of that fault at times of seismic stress.

The second point is the Environment Agency's assessment of the importance and connectivity of the secondary aquifer systems around the well. I enclose extracts from their detailed report on the minor aquifers from only 13 years ago. (The last paragraph is from Michael S Bruno in 2002 and not in the E.A. text). These indicate that the hydrogeology around the site is far more complex than UKOG or the E.A. have indicated and that their data must have been based on a flimsy appraisal of the aquifer systems. These paragraphs detail the mechanisms by which these aquifers could carry pollution to our river systems.

All power to your collective elbows.

Yours most sincerely , Jim Kelsey. Stopham Estate.

Extracts from “The physical properties of minor aquifers in England and Wales”

Hydrogeology Group
Technical Report WD/00/04
Environment Agency R&D Publication 68

Groundwater transport

“It is recognised that the study of the movement of pollutants in groundwater is significantly more complex than that of predicting borehole behaviour or estimating resources. Generally, in resource investigations it is not necessary to know the flow paths of groundwater, except in broad terms. However, fundamental to under-standing groundwater pollutant movement, or to defining source protection zones is a knowledge of flow paths. The complex hydraulic nature of many British aquifers, caused principally by fracturing, layering or both, makes the prediction of subsurface pollutant transport a challenge. This report may help users recognise these complexities and so promote realistic modelling of pollutant transport and source protection zones.”

“Local groundwater flow may be hard to predict, however, due to the lateral discontinuity of the sandy beds. Perched water tables are common.”

“The Lower Cretaceous/Upper Jurassic aquifers are dominantly sands or poorly cemented sandstones, and water movement is principally through the matrix. As rock sequences these strata comprise alternating sands and mud-stones, frequently forming multi-aquifer systems. However, the layers are not always laterally persistent, adding to the complexity of the aquifer system.”

“The structure of the Weald principally reflects the generally extensional regime of underlying faulting of the Jurassic strata. Step faulting and subsequent erosion associated with this extension limits the preserved thickness of the Wealden both to the north against the London Platform and to the south over the Hampshire / Dieppe High. Reactivation of these faults in the reverse sense, and low amplitude folding in the Early Neogene as the result of the ‘Alpine’ compression, has resulted in the complex block-like structure of the Wealden strata. Their continuity has been greatly affected by these later movements.

“A local effect that can also occur is enhancement of permeability along the plane of faulting itself, such that even though regionally the fault creates a barrier boundary, the fault itself is transmissive. In some parts of the Weald the general effect of the faulting has been to break up the beds in such a way that erosion has left outliers of water-bearing beds resting on impermeable older formations. These outliers act as isolated reservoirs, and usually have small springs at their margins, which may sometimes be used for small domestic supplies. Faults may also enhance the ease of groundwater recharge and abstraction because of the fracturing and general disturbance. This may be especially the case along valley sides where cambering has opened up vertical tension joints.”

“The Wealden strata are also known to be greatly affected by valley bulge and cambering. This process, mainly the result of Pleistocene periglacial erosion, can locally cause great disruption of strata, and groundwater flow through these disturbed sequences is very complicated.

(Figure 5.15 illustrates the numerous faults and resulting structural complexity across the Weald. Figure 5.16 shows diagrammatically the local effects associated with competent bed movements as a result of valley bulge and cambering. The extensive faulting has hydrogeological implications as discussed in 5.3.3.10.)”

“The most significant aquifers in the Weald are the Ashdown Formation and the Tunbridge Wells Formation of the Hastings Group, with the former being the more important aquifer of the two. The two aquifers are separated by the Wadhurst Clay Formation, which generally acts as an aquiclude, confining the underlying Ashdown Formation. The hydrogeology of the Ashdown Formation is complex and not well understood. The aquifer is thought to be a stack of discontinuous layers allowing groundwater movement between and through them. The lack of correlation of water levels even between closely situated boreholes is a further indication of a patchy, multi-layered aquifer, without a single water table. The presence of faulting in the area causes large variations in water level, which have not been well studied or documented. “

“Lithological variations within the Ashdown and Tunbridge Wells formations affect groundwater flow, as clay horizons split the sandstone into a multi-layered aquifer, often resulting in perched water tables. Groundwater flow is further complicated as different segments of the same aquifer can become compartmentalised as a result of erosion, leaving blocks of aquifer isolated as erosional outliers.”

“Where the Ashdown Formation is confined by the Wadhurst Clay Formation, the recharge mechanism is unclear. Many major abstractions from the Ashdown Formation are some way from the outcrop, and it is thought that recharge may occur via fault-generated conduits between the sandstone layer in the Wadhurst Clay Formation and the Ashdown Formation. Faulting may also juxtapose the Ashdown Formation against the Tunbridge Wells Formation, allowing recharge to the Ashdown Formation to occur.”

“Nature and extent of confinement:
There are several major clay horizons which act as confining strata; many have subordinate sandstones or limestones which may act as local aquifers in themselves.

The Hastings Group is confined by the overlying Weald Clay Group. The latter is essentially an impermeable, confining clay formation, although it contains thin, silty sandstones and limestones which may yield small local supplies.

The Tunbridge Wells Formation is divided into Upper and Lower units by the Grinstead Clay Formation, which acts as an aquiclude.

The Grinstead Clay Formation also contains a number of more permeable horizons of sandstone and limestone, however, these are rarely used for water supply.

The Wadhurst Clay Formation, between the Tunbridge Wells Formation and the Ashdown Formation, is also essentially an aquiclude, although again it contains thin sandstones and limestones from which supplies have been obtained. A 146 day pumping test in the Ashdown Formation at Maythem Farm [TQ 8667 2825] indicated that there is significant leakage from the Wadhurst Clay Formation.”

“Aquifer properties
The aquifers within the Hastings Group contain a variety of lithologies which range in grain size from medium-grained sands to silty clays, and in degree of cementation from hard sandstone to poorly consolidated sand; hence groundwater flow varies greatly in type (both intergranular and fracture flow) and in rate.

Available references are poor in this area and there is limited understanding of the relative importance of matrix and fracture flow. Aquifer thicknesses also vary and structural complexities arise as a result of the folding and faulting which have affected these beds. Consequently the forecasting of aquifer properties in these strata is difficult, and the chances of borehole success are rather less than in other, less complex, areas.”

“The variability in lithology and the effects of structure may cast some doubt on the true meaning of the transmissivity and storage coefficients obtained from pumping tests carried out on these geometrically complex aquifers.”

“As groundwater flow within the Tunbridge Wells Formation is both intergranular and through joints, well yields tend to be variable and combined with the problem of siltation it has sometimes proved necessary to excavate adits to obtain and maintain productive capacity.”

“The main controls on permeability and transmissivity of the aquifers of the Hastings Group are lithology and degree of cementation, both of which show great variation. Furthermore, faults and folding add a structural complexity. Thus prediction of aquifer properties is difficult.”

“Effect of structures:
As described above, the general structure controls the overall flow of groundwater in the Weald: that is a pericline with the strata dipping away from the centre. However, the simple periclinal arrangement is greatly complicated by a series of minor folds, roughly parallel to the main axis of the Weald. A characteristic of these folds is that the anticlines are asymmetrical, having steeply dipping northern and gently sloping southern limbs. Groundwater tends to flow in the direction of dip: towards the axes of synclines and away from the axes of anticlines.

Faulting also has a major effect on the hydrogeological regime. Strike faulting which throws the Wadhurst Clay Formation against the Ashdown Formation can cause partial or complete reduction in the hydraulic continuity between adjacent blocks of Ashdown Formation. For example, if faulting causes a juxtaposition of the Wadhurst Clay Formation against the Ashdown or Tunbridge Wells formations, the fault is likely to act as a barrier to groundwater flow and compartmentalisation of the aquifer may occur.

However, it is uncertain whether faults always act as boundaries. Faulting may also juxtapose the Ashdown and Tunbridge Wells formations either against themselves or against each other, in which case groundwater flow may still occur, although possibly to a lesser extent. The possibilities include movement of groundwater from adjacent fault blocks, although it could alternatively be accounted for by a leaky aquifer condition. At Chase Wood, where faults exist close to the borehole, a short pumping test did not reveal the presence of barrier boundaries. It seems nearby faults are not acting as a complete barrier to groundwater movement."

"Although the Jurassic limestone aquifers are characterised by high secondary permeabilities, as the minor aquifers are generally thin, transmissivities are relatively low. They also have low storage coefficients. Water resources are limited, both yields and water levels often falling significantly after only a few hours pumping. Furthermore, where formations are highly fissured pumping can affect sources some distance away. Where fractured, the limestones are highly vulnerable to pollution. Groundwater quality is generally hard and often poor, possibly saline or containing hydrogen sulphide from decomposing pyrites in the shales."

"There are, again, limited data available for the Kimmeridge Clay of Dorset. The Main Oil Shale Band at Portesham gave an initial yield of 1200 m^3/d from a shaft. A 305 mm diameter borehole 39 m deep at StokeWake yielded 120 m^3/d for three hours from the Kimmeridge Clay in 1947. It later collapsed, was cleaned out and relined and became dry in 15 minutes when pumping at between 78 and 85 m^3/d. Kimmeridge Clay water contains iron and often has a high total dissolved solids content (Bristow et al., 1995)."

The weight of sediments above an oil-and-gas-bearing geologic formation is partially supported by the rock matrix and by the pressurized fluid or gas within the rock pore space. When fluid pressure is reduced, more of the load is transferred to the rock matrix, and the pressure-depleted formation compacts slightly. Subsurface compaction, if significant or if the formation is relatively shallow, can produce measurable surface subsidence. Formation compaction can induce compression and buckling damage within the producing interval. More importantly, significant formation compaction also induces small-scale slip on bedding planes and faults within the reservoir and overburden material, causing severe shear damage to wells. (Michael S Bruno 2002)