Question 6) Provide an assessment of the distances to geological faults relative to the wellbore and the proposed mining waste facility.

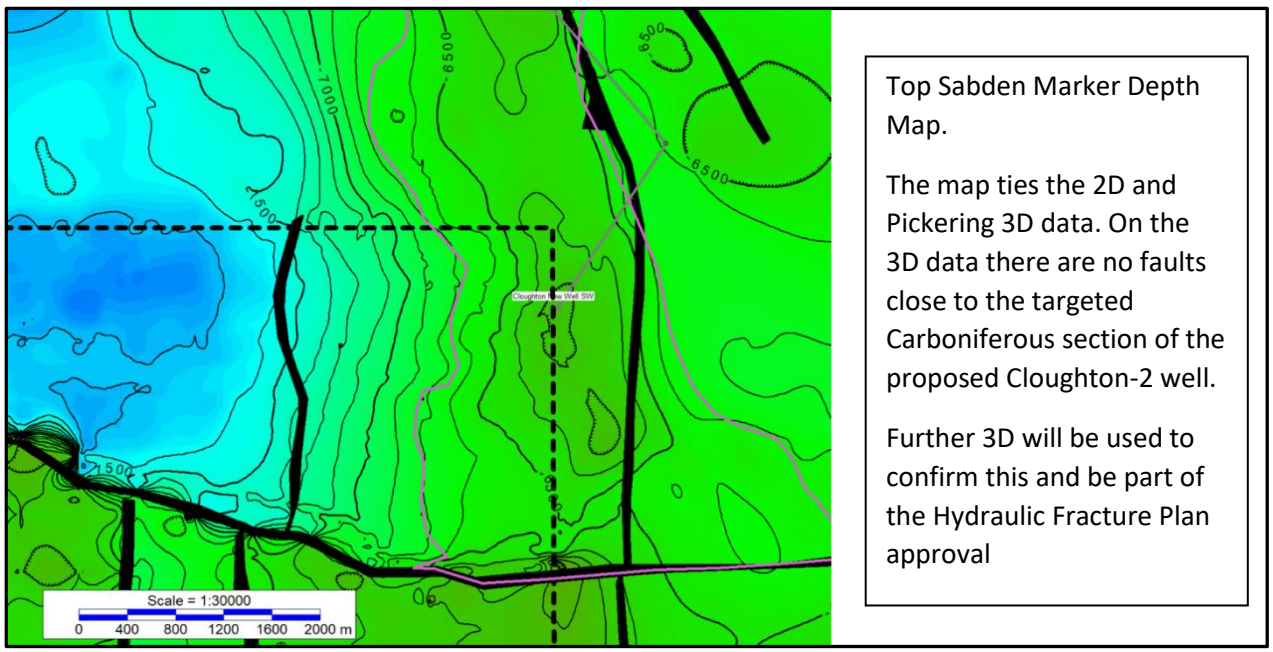
Reason: Faults have the potential to act as conduits for groundwater flow and additional information is required to understand the risks that the proposed proppant squeeze may have to groundwater in the geological faults in the sites geological stratigraphic sequence. Visual presentation of the distances from the wellbore of any faults would provide a greater understanding of these potential risks.

Currently the Cloughton Anticline is defined by 2D seismic data over most of the north and central part of the structures. Towards the SW of the structure there is good quality 3D seismic data available. The basal Zechstein section marked by the acoustic impedance contrast between the relatively soft Carboniferous sediments and the harder and seismically faster limestone above gives a modest seismic character.

Potential faults are evident on some of the 2D seismic lines but correlation of these events over distances exceeding 2km is difficult. Current mapping by Europa on the Carboniferous section shows no faulting within the Carboniferous on the 2D lines. Other operators have attempted to pick faults within the area on the 2D data and fault maps created. One such interpretation is shown below.

It should be noted that on current mapping within the existing 3D data these faults are not recognised (within the dashed black polygon) where better quality seismic data is present. The current data suggests there are no major faults present in the vicinity of the well and the target depths.

On the current mapping iteration faults can be seen but they are all some distance from the downhole location of the well.



Top Sabden Marker Depth Map.

The map ties the 2D and Pickering 3D data. On the 3D data there are no faults close to the targeted Carboniferous section of the proposed Cloughton-2 well.

Further 3D will be used to confirm this and be part of the Hydraulic Fracture Plan approval

The seismic quality and coverage that will be provided by the proposed 3D seismic data that Europa intend to shoot will significantly improve seismic resolution. The planned 3D seismic survey will help define any Carboniferous faults to avoid the well carrying out a proppant squeeze within any sensitive areas. The 3D will also allow a fine tuning of the structural definition and allow for fine tuning of the down hole location – to avoid any faults. This is a requirement for the hydraulic fracture plan.

Importantly it should be noted that faults younger than the Zechstein are well imaged on the 2D seismic data. The Peak fault is present within the area but the fault is Mesozoic in age and has been active from the Jurassic to the Tertiary. The fault is not active present day. Regional 2D seismic lines show the presence of the Peak Fault and the Cloughton structure is at the bottom end of the fault where is it dying out. The Cloughton-2 well will be drilled towards the SW away from the fault. A key piece of information however is the Peak fault "runs out" into the top of the Zechstein (a very common phenomenon) i.e. it is not present at all anywhere over the field structure at the target depth. The salt acts as a glide plane and the fault rolls into the top of the Zechstein before dying out. The same geological phenomenon occurs for faults at depth which approach the salts from below. Faults within the Carboniferous also do not penetrate through the Zechstein. The Zechstein is over 500m thick and a world class seal. Evaporites are plastic and ductile over geological time and typically do not allow faults or fluids to penetrate them where they have sufficient thickness.

The proppant squeeze in the Carboniferous section is over 1000m below the Peak Fault with the Zechstein in the middle. There are 2 types of fault present in the area – Carboniferous (and older faults) that die out into the Zechstein and Mesozoic faults that sole out onto the Zechstein. The Zechstein has held back highly buoyant gas for millions of years.

In terms of the potential for faults to act as conduits for groundwater flow, this indeed is possible. However is must be remembered that the Carboniferous section will be behind multiple casing strings and impermeable cements. There is no possibility from a well integrity stand point for proppant squeeze fluids entering the section above the zones where the proppant squeeze is to be carried out. The faults within the Mesozoic section will not be affected by the proppant squeeze operation, the maximum height of invasion is approximately 80m and there are thousands of metres of sediment in between including the world class Zechstein evaporites. This together with multiple layers of casing and cement mean the Mesozoic system is isolated from the Carboniferous system in the proposed operation. Geologically this is the case - the Zechstein has prevented the gas escape for millions of years.

In summary younger faults (like the Peak fault) do not penetrate the Zechstein and this phenomenon is seen widely in the Southern North Sea. The faulting above and below the Zechstein is of different ages with different methods of formation separated by the highly sealing and plastic Zechstein formation. Fluids within the Carboniferous section cannot enter the Mesozoic section via the formations or faults in a geological sense or via the well bore in an operational sense.