From: Edward Greenwood [redacted]
Sent: 10 September 2014 11:21
To: National Infrastructure Consents
Subject: PREESALL UNDERGROUND GAS STORAGE FACILITY

Giles Scott Head of National Infrastructure Consents

Dear Mr Scott
I thank you for your email dated 31 July 2104 and make the following representation.

I have been advised that the Health and Safety Executive do not have any experts in gas storage cavern design and consequently Professor Rokahr and his associates will determine what is safe at Preesall.

Although he is reported to have 30 years' experience in cavern designs other experts in the underground gas storage industry have no knowledge of the application of his theories. The only reference to his work shown on the net relates to Preesall where over the years he has issued conflicting advice regarding safety. In view of this I am uneasy that we are relying on his guidance.

Following the first phases of motorway construction in the UK “state of the art” opinion on bridge design was that the earlier structures had been over designed. It was argued by academic experts that the public were in effect paying a high insurance premium by making the bridges too strong.

It was later found that building fragile structures were not fit for purpose and they had to be strengthened raising the total expenditure too far in excess of the traditional build cost. Whilst this work was carried out we all experienced long delays during our motorway journeys.

Self-appointed experts on sea defences made the case that the breakwaters around our shores were unnecessary and as a consequence these structures were allowed to become dilapidated. There is an argument that the culmination of this policy has led to considerable damage around our coasts and only now after decades of neglect are vital maintenance work programmes being restored.

If Professor Rokahr’s Rules are over optimistic the consequences could be far worse than journey delays due to bridge strengthening or a stretch of railway line collapsing into the sea.

The British Geological Survey (BGS) Report CR/05/183N shows the halite at ICI caverns 129 and 130 as the thickest on the Preesall Brine Field. These caverns I understand in common with others on the site are about 100m in diameter.

In order to verify this I asked for details of the sonic surveys and the email response I received from the Halite Energy Group Ltd (HEG) on 23 June 2014 stated that the information was not part of the Application and is not in the public domain.

However, if my understanding is correct cavern 19 shown on the attached Halite drawing is too close to cavern 130 even to comply with Professor Rokahr's standards.

The Rokahr Rules state - "The distance between pre-existing caverns, brine well, water and gas wells that are sufficiently deep to potentially impact new cavern integrity,shafts and other man made subsurface features and wet rockhead should be at least 4 times the MAXIMUM cavern radius". **On the basis that cavern 130 is 100m diameter it should be at least 200m from cavern No19 not 150m which would be the case if the Halite drawing is correct.**

As the sonic information relating to cavern 129 and other caverns which have little or no pillar thickness is not part of the Application; can it be that BGS has not considered this data in taking a view?. Whilst not criticizing BGS this could be an omission.

The Reviews by Senergy and KKB Underground Technologies based on the latest seismic data anticipated that the proposed caverns will not hold the amount gas HEG predicted. This opinion could be proved wrong after greater seismic detail is obtained following the issue of a Draft Consent Order. Using the Rokahr Rules, HEG's original estimates may then be achievable.

However, the more conservative assessment widely used in the gas storage industry would not allow the proposed caverns to be formed.

It may be that the industry is too cautious and gas storage caverns can be safely operated much closer together and to any faults. Professor Rokahr's standards may have already been applied at sites with similarly faulted gas storage facilities which have stood the test of time for twenty years or more.

If this is not the case carrying out an experiment at a site adjacent to a densely populated area would be a high risk strategy; particularly if the formula to establish its safety is potentially unsound. A sensible step by step approach would be to first carry out these experiments at more remote locations.

A much safer method of testing if gas could be safely stored at Preesall would be to use the existing salt caverns for Adiabatic Compressed Air Energy Storage (CAES) or Isentropic Energy Storage (IES). Should there be a loss of air pressure it would not cause the damage that occurs with escaping natural gas.

The ICI caverns at Preesall can be adapted for this purpose if this is done in conjunction with a Wyre Tidal Power Plant. Over the last half century increased agricultural drainage and decades of neglect of the breakwaters has caused the River Wyre to become highly silted. Removing this build-up would restore the river to its natural state as is taking place in Somerset and enable more renewable energy to be generated by a Power Plant. Removing the volume of silt equal to that of a house would produce sufficient cheap electricity to go on powering a house for hundreds of years or more. This would make the cost of deepening the river to fill caverns negligible compared with the gain.

Expert opinion is that the River Wyre is the best location for a pilot tidal barrage for several reasons. The river is an ideal shape, narrow at the mouth and widening upstream; there are very few migratory fish and it needs to be established whether fish stocks could be increased alongside a Tidal Power Plant. The River Wyre would emulate the La Rance River where it has become a great asset for the area and a haven for wild life. All the wards in Fleetwood are deprived areas and the town is in greater need of the regenerative effect that a Tidal Power Plant would have than other towns along other rivers on the east side of the Irish Sea.

The material removed from the river could be used to selectively fill salt caverns adjacent to the CAES plant making the surrounding ground stable. A system of venting the caverns would be included to take account of expansion of the fill material as it is raised in temperature over time by surrounding halite. Filling the caverns would have a side effect removing pollutants deposited in the river by the chemical plants. Deepening the river would enable cheap granite chippings to be shipped direct to the plant to produce the heat sink required for the Adiabatic or Isentropic processes. A closed circuit air system operated in conjunction with liquid air and a brine filled cavern to provide the low grade heat would make the plant very efficient. The CAES cavern would be temperature controlled which together with the granite infill would make the whole area stable.

Isentropic energy storage is on the Isentropic Ltd web site which shows it can work efficiently with an operating pressure range of only 12 bar. The Plant would require two existing caverns and a greater number of caverns would have to be filled with river material and may increase the cost above compressed air energy storage.

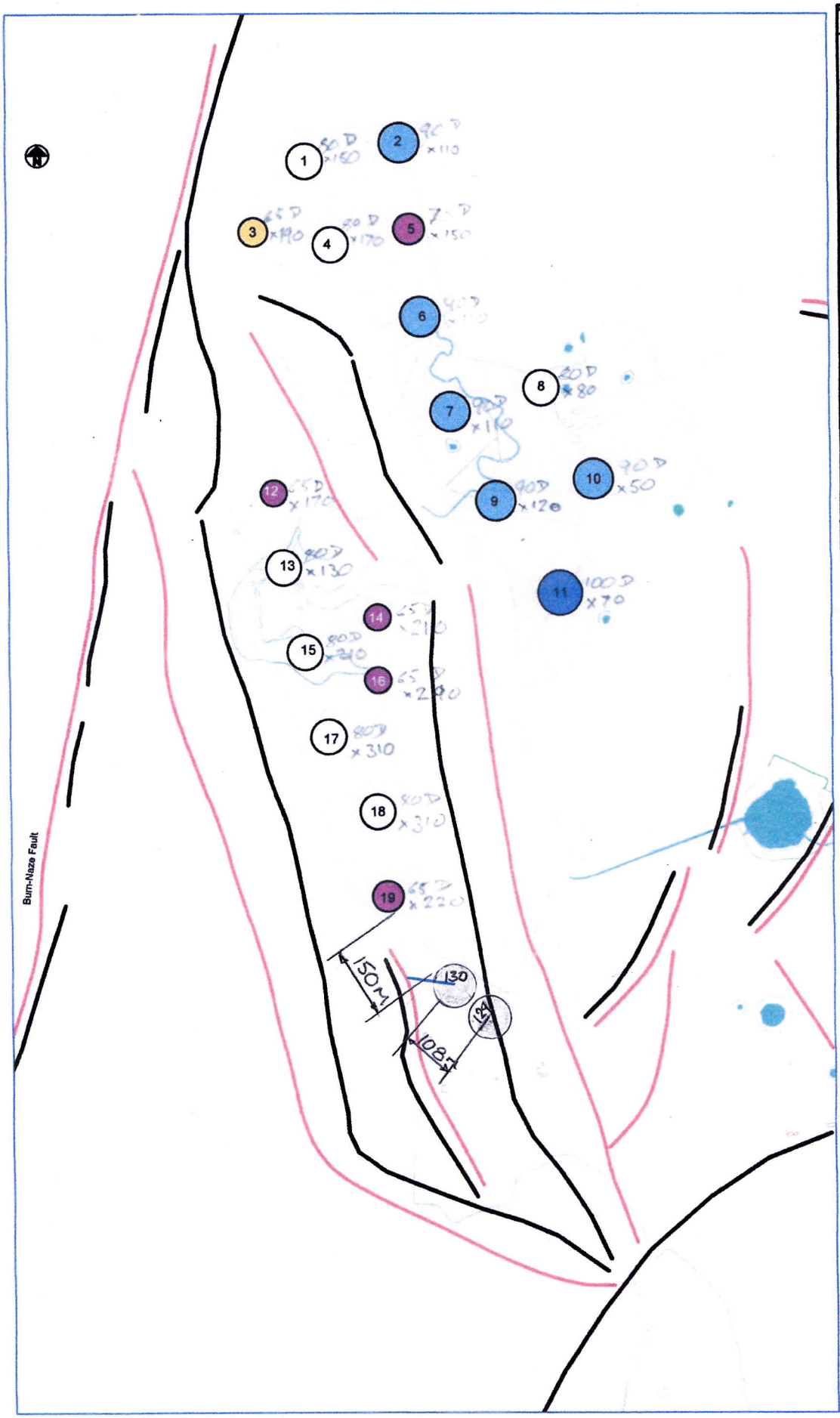
As with pumped energy storage all the machinery could be located below ground level and the plants would not spoil the existing landscapes.

CAES storage would be less per Mega Watt of installed capacity than pumped storage with an equal or greater operating efficiency.

Clearly this would have unquestionable long term benefits and be a far better option than storing explosive gas at Preesall.

Yours sincerely

Edward Greenwood



Project Number

Salt top fault
Salt Base fault
Area of Cavern Development
Project Boundary
60m Cavern
65m Cavern
70m Cavern
80m Cavern
90m Cavern
100m Cavern

Rev.	Date	Rev. List	Approved By

halite energy group

Halite Energy Group Limited
Unit 5 St. George's Court
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Kirkham PR4 2EF
Tel. No. 01772 672244

Project Name: Preesall Gas Storage

Drawing Title: Indicative Cavern Location Plan

Scale	Date	Drawn	Approved
1: 9000 @ A3	08 March 2011	G. G	E. G.

Drawing Number: D-9000-030 Rev.

CAD Drawing Name: K02060X00 D-9000-030