Preesall Underground Gas Storage Facility Lancashire

Responses to Comments by the Halite Energy Group on the first round of Representations

3.462R Issue 1:

The question is whether a major earthquake at the Preesall brine field could change the properties of the halite. I am not an expert on this subject and on this basis I raised queries with the British Geological Survey (BGS) on 6 October 2014 to establish what the risk would be at the abandoned brine field in the event of a major earthquake. I have copied below the content of my email to which I have not yet had a response:-

Dear Mr Musson

I refer to our emails in 2011 regarding the 3 large pipes that fractured during an earthquake and your view that this was caused by subsidence. However, local people with knowledge of the site disagree as the annual ICI surveys did not show any changes in the levels of the adjacent well heads.

It is, however, possible that the earthquake brought about the collapse of cavern BW88's marl roof and some years later a Crown Hole developed. A significant collapse could have created a pressure wave hundreds of metres below ground which broke the pipes near the surface. The location of the break and the 20mm horizontal misalignment of the pipes following the earthquake would be consistent with this scenario; although BW 88 is over 300 metres away from the pipe breakage point. If this is this case, your opinion that the damage was due to subsidence would be correct.

Had the earthquake been bigger and closer to BW 88 the Crown-Hole shown on the attached collage of photos could have developed in minutes rather than the years it took to reach this state?

Is it possible that a Crown-Hole Development of this nature precipitated by a large earthquake would not only affect near surface structures but also the stability of adjacent caverns?

Can we be sure that a major earthquake at Preesall would not cause the group of brine caverns shown in the attached Cavern Instability Risks file to collapse. These brine caverns are close to proposed gas storage sites and several are considered by Mott MacDonald to be a high stability risk. T**his risk is considered to be low because a local earthquake may not occur for a million years; but it could happen a few years down the line when the storage caverns are full of gas! The Heysham Atomic Power Plant only 9 miles away is I understand designed to withstand an earthquake of 6.5 magnitude. If there is an earthquake risk for a nuclear plant it is difficult to understand why the same logic is not applied to the design of gas caverns close to populated areas.**

Expert geological opinion is that there has been no movement of the faults at Preesall for over a million years but can anyone predict what effect a large earthquake would have on faulted halite riddled with unstable caverns?

A conservative view would be to question the suitability of the Preesall halite for storing volatile gas particularly when there are other salt beds in more remote locations free of existing caverns and faults.

After I was told of the potential danger of gas storage at Preesall I purchased a copy of the BGS Internal Report CR/05/183N which covered the known geological information. I have been told that the halite near Stublach and Lostock where gas storage caverns are being formed is more stable than that at Preesall but I have not been able to find details of this on the internet. Has a similar document to that for Preesall been published showing the geology and the formations in the Cheshire halite?

I thank you for your previous consideration of these important matters and look forward to receiving guidance on the geological information.

Kind regards

Edward Greenwood

Japan ignored the nuclear risk at Fukushima and this proved to be an expensive mistake.

The Fukushima Nuclear Accident Independent Investigation Commission found the nuclear disaster was "manmade" and that its direct causes were all foreseeable. The report also found that the plant was incapable of withstanding the earthquake and tsunami. The government body promoting the nuclear power industry (METI) all failed to meet the most basic safety requirements, such as assessing the probability of damage. The

recommendation to relocate the emergency generators to a higher level was ignored on the basis that the plant was reaching the end of its working life.

Some members of BGS staff are supportive of the Preesall UGS but whether the adverse impacts of gas storage could outweigh the benefits needs clarification.

If the earthquake risk exists at the brine field it is not sufficient to gamble that statistically it will not happen. When designing the Heysham Nuclear Plant the consequences of a large earthquake was taken into account and the same vigilance should be applied to gas storage in densely populated areas.

3.471R Issue 2:
Critical to the stability of the gas storage caverns is the safe distances from the unstable brine wells. Professr Rohaka's Rules states a minimum of 4 times the maximum cavern radius between existing brine wells and gas storage caverns. This Rule has been applied on Mott MacDonald Drawing MMD-277663-G-DR-00-XX-0002. In preparing this drawing the cause of the ICI pipes breaking during a small earthquake was not considered because HEGL told me they had no knowledge of this event. The British Geological Survey takes the view that the earthquake could not have been of sufficient magnitude to break the pipes therefore the cause must have been subsidence. However ICI monitored surface heights of the brine wells and there was no subsidence of the adjacent brine wells BW 100, 101, 105 and 106. Mott MacDonald show these caverns as low instability risk in their Baseline Risk Assessment and therefore they could not have contributed to the breakage.

The brine cavern that could have caused the damage was cavern BW88. It later developed a Crown-Hole and in all probability it was the pressure wave of the initial collapse that caused the breakage. In their analysis of Crown-Hole collapses Mott MacDonald's estimate of BW 88's diameter is 63 metres. This would make the distance between the point where the pipes broke and the side of cavern BW88 over 9 times the cavern's radius.

The safe distance between unstable Brine Wells and Gas Storage Caverns is fundamental to the safety of the Storage Facility. Clearly if a small earthquake can result in damage of this nature, there is an argument that 4 times cavern radius is not a safe distance from unstable brine wells if a large earthquake occurs at Preesall.

The legacy of the brine wells has been recently modified and now omits all but 3 of the unstable high risk caverns. The sonic surveys of the brine wells adjacent to the proposed gas storage caverns I understand has not been considered by the IPC or the HSE. HEGL advised me that these surveys were not part of the Planning Application and not public information.
Adding a factor of safety could make some if not most of the 19 caverns too close to the unstable brine wells and certainly closer than any at Stublach.

3.478R Issue 3:
Fossil fuel will not last for ever and before it is totally depleted energy storage will play a vital role in in the renewable energy market. Salt caverns can be used to store vast amounts of energy. See 3.503R below

3.478R Issue 4:
I am advised by Storengy Ltd that the caverns at their Stublach site are over 300 metres apart. There is only one fault near the site which is a long way from any cavern and the nearest existing cavern is 1500 metres away. Planning Permission had been granted for the facility with this layout when Storengy bought the site and the arrangement was consistent with other sites they have in France. I gathered that LCC, WBC nor any Councillors had visited the site or made enquiries at the Storengy to obtain a second opinion. This arrangement has proved safe and they take the view that any reduction of safety standards should be undertaken on a step by step basis. Reducing factors of safety will make Preesall a much greater risk than Stublach.

3.481R Issue 5:

At Stublach there is only one fault and none of the gas Storage Caverns is closer to this than 300 metres. Because there is only one fault the halite will be more homogeneous and less prone to structural defects than that at the Preesall brine field.

3.484R Issue 6:

When I visited Stublach I was told that the cavern layout had already been determined when GDF purchased the site. GDF's in-house experts checked the design and it was consistent with the arrangement they use in France.
I understand that only if a fault does not extend beyond the salt strata would they relax the 300 metre distance rule. A reduction to 200 metres may be considered if the fault does not extend beyond the halite and for a cavern adjacent to a minor fault a minimum distance of 150 metres may be used. Whilst these Rules are not published I have no reason to doubt that Storengy Ltd at Stublach would confirm the above.
By comparison the HEGL formula allows a 3 cavern radii from the fault which may be reduced for small sealed faults or increased for large active faults
Example:-
HEGL would form their cavern No 3 which is 65 metres diameter less than 100 metres from the Burn-Naze Fault but GDF, Storengy's parent company would not allow it to be closer than 300 metres.
Applying the GDF Rules used in France to the two polygons at Preesall would result in only caverns 5, 8 and 10 complying with the rule giving a volume of 79.4 M Cm compared with 567M Cm shown in the HEGL assessment.

3.488R Issue 7:-

It is reported in the "Halite Reponse to the Independent Geological Assessment" that the properties of the halite at Preesall and Cheshire are similar. The caverns in Cheshire that are designed to operate at differing pressures have greater separation distances than those at Preesall where the Rohakr Rules are applied. As a result the Preesall caverns will be less able to withstand any unanticipated forces which may arise during the working life of the facility.
GDF have their own in-house experts with extensive experience in cavern design and they have no reason or obligation to publish the Rules they have authenticated over many decades. It is likely that they have taken the conscious decision to make their facilities safe
I cannot find evidence that the proposed layout design formula has been tested over an extended period at a similar faulted salt bed.
In discussing gas cavern operation, the KBB report appears to confirm that long term tests have not been carried out. On Page 12 Para 4 it states - "Because the "huff and Puff"- operation has just come up during the last few years, no long term experiences are available at this type of cavern operation.
The question is at which sites have HEGL's experts applied and tested the Rules they have put in place for Preesall.
Paragraphs 2.3.4, 3.3.12 and 3.3.28 in the "Halite Response to the Independent Geological Assessment" lead one to believe that HEGL's experts have used the Rules they advocate for Preesall at Stublach; this is clearly not the case where cavern spacing's are much greater.
The assessment focuses on the commercial downside risk of not being able to store enough gas but when more precise seismic data is obtained this may not be the case. It may be possible to store enough gas to make the project more commercially viable if the apparently untested procedures are used.
The conclusions in the Independent Geological Assessment do not cover this aspect and so allows the profit motive to take precedence over safety.

3.495R Issue 8:

There have been a number of reports in the local Press in 2012 and 2013 which lead the public to believe that the project will create 3000 local jobs. At least one such assertion was attributed to HEGL's Chief Executive and another to the Chair of Fleetwood Town Council. On 18 February 2014 Fleetwood Town Council made a Representation to the IPC which States. "This proposal will once approved bring 3000 much needed well paid jobs

over the period. This together with apprenticeships and training will produce a dramatic effect on our unemployment totals now standing at 8.6% together with infrastructure development much needed in our area"
In the 3.496 Halite responses, paragraph 3.192 quotes more realistic figures of 200 to 300 full time jobs during construction. Most of the work entails highly skilled mechanical workers with many years of training. With the decline of the shipping and chemical industries in Fleetwood there are very few people of working age with these skills. Local employment will be in building and civil work which is likely to average only 20 to 30 jobs. When ICI operated the brine site most of the labour force lived on the east side of the river. In this scenario the jobs for Fleetwood people are likely to be less than ten after the early work on the pumping facility is completed.
From Alan Marsh's letter it seems the majority of his constituents have been duped into thinking that the project will create significant prosperity in the Town and as a consequence ignore the risks.
HEGL commissioned a report by Regeneris Consulting Ltd on the Economic Impacts of their UGS facility which does not set out in clear terms the local employment prospects. It is no credit to HEGL that they have been party to this charade to win support for their high risk venture.

3.497R Issue 9
There is no demand for the brine that would be produced by forming caverns to create the King Street UGS Facility. When the Stublach site is completed King Street could take over the supply of brine to the chemical industry. The alternative is to construct an expensive pipe line to discharge brine into the River Mersey. The demand for gas storage is such that there is not an overwhelming commercial case for incurring this expense.
If the demand for gas storage increases, improved market conditions would make it viable to form offshore brine storage caverns where there is an abundance of halite. Brine disposal will not be a problem added to which the potential risk to the community at Preesall would be avoided.

3.501R Issue 11:
The market demand for gas storage is such that the viability is questionable unless cheap supplies can be obtained. At the moment there is not a shortage of natural gas in the world without fracking and with careful management the situation is manageable. The less economically viable options referred to above will become available as fossil fuel supplies are depleted.

3.503R Issue 12:
Initial steps are now being taken for Wales to produce all its electricity from the tides and it is only a matter of time before the UK will produce at least 20% of its electricity from tidal power. The long term cost of electricity from this source is inexpensive and will still be available long after we have consumed all the fossil fuel.
The sooner we start using this resource the longer fossil fuel will last and the greater will be the contribution to limiting global warming
Using compressed air in conjunction with liquid air and suitably modifying salt caverns allows vast amounts of energy to be stored whether it is from wind, nuclear or other carbon free sources.
Whilst the Secretary of State has to make a decision on gas storage he has also to take a view regarding long term power supplies.

Edward Greenwood

29 October 2104

THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE) RULES 2010

Preesall Underground Gas Storage Facility, Lancashire

HALITE'S COMMENTS ON FIRST ROUND REDETERMINATION REPRESENTATIONS

Rule No:	**20**
Document Ref:	**H42**
Author:	**Berwin Leighton Paisner LLP** **Adelaide House** **London Bridge** **London** **EC4R 9HA** **t: +44 (0)20 3400 1000**
Date:	**10 September 2014**
Version Number:	**1**

Contents

INDEX TO INDIVIDUAL REPRESENTATIONS & RESPONSES

1 INTRODUCTION

1.1 This document has been prepared on behalf of Halite Energy Group Limited ("**Halite**") in respect of its proposals to construct and operate an Underground Gas Storage ("**UGS**") Facility with a total capacity equivalent to 900 million cubic metres of gas to provide an operational working capacity of up to 600 million standard cubic metres and associated infrastructure ("the **Project**") at Preesall, Lancashire.

1.2 An application for a Development Consent Order ("**DCO**") for the Project was submitted by Halite in November 2011 and was subject to examination by The Planning Inspectorate ("**PINS**") as the 'Examining Authority' ("**ExA**") between April and October 2012. The ExA's 'Report of Findings and Conclusions and Recommendation to the Secretary of State' (the "**ExA Report**") was provided to the Secretary of State in January 2013 and the ExA recommended that 'the Order be made, subject to modifications'.

1.3 The Secretary of State rejected the application in his letter of 9 April 2013 (the "**SoS Decision Letter**").

1.4 The High Court (Patterson J) quashed the decision of the Secretary of State on 17 January 2014 because, in particular, of (i) unfairness in the manner in which the ExA had reached its conclusions as to what the ExA had regarded as inadequate geological information and (ii) an incorrect interpretation of policy in paragraph 2.8.9 of EN-4. The application for development consent now falls to be re-determined by the Secretary of State.

1.5 In accordance with Rule 20(2) of The Infrastructure Planning (Examination Procedure) Rules 2010, on 8 April 2014 the Secretary of State notified Interested Parties of the matters on which he required further representations to be submitted by 9 May 2014.

1.6 Halite submitted the following documents on 9 May 2014 in response to the Secretary of State's letter of 8 April 2014:

1.6.1 **H26** - Response to the Statement of Matters Raised by the Secretary of State pursuant to Rule 20(2) of the Infrastructure Planning (Examination Procedure) Rules 2010 prepared by Barton Willmore dated 8 May 2014 ("**Halite's Response to the SoS Statement of Matters**")

1.6.2 **H27A** - Report with reference "CR/13/122" entitled "Results of an interpretation of newly acquired seismic lines over the Preesall Saltfield, NW Lancashire: their relevance to proposed areas for salt cavern gas storage development ('planning polygons')" prepared by the British Geological Survey dated 9 May 2014 (the "**Updated BGS Report**")

1.6.3 **H27B** - Appendices to report with reference "CR/13/122" entitled "Results of an interpretation of newly acquired seismic lines over the Preesall Saltfield, NW Lancashire: their relevance to proposed areas for salt cavern gas storage development ('planning polygons')" prepared by the British Geological Survey dated 9 May 2014 (the "**Appendices to the Updated BGS Report**")

1.6.4 **H28** - Report with reference GKF/0/J/0002 entitled Halite Energy Gas Storage; Preesall Gas Storage Project; Revision of Cavern Field Layout prepared by Geostock dated 9 May 2014 (the "**Geostock Cavern Field Layout Report**")

1.6.5 **H29** - Report with reference GKF/0/J/0003 entitled Halite Energy Gas Storage; Preesall Gas Storage Project; Revision of Working Gas Volume prepared by Geostock dated 9 May 2014 (the "**Geostock Working Gas Volume Report**")

1.6.6 **H30** - Updated Geological Summary Report prepared by Mott MacDonald dated 9 May 2014 ("**Updated GSR**")

1.7 A number of representations were received by the Secretary of State by 9 May 2014 from other Interested Parties in response to his letter of 8 April 2014.

1.8 On 31 July 2014 the Department of Energy and Climate Change wrote to interested parties, including Halite, to request representations on:

1.8.1 the Independent Geological Assessment dated July 2014 (the "**Senergy Report**"); and

1.8.2 the representations which the Secretary of State had received by 9 May 2014, i.e. during the first consultation round.

1.9 This document sets out Halite's response to those first round representations. A full list of those first round representations is provided at Appendix 1. This document also offers clarification for the Secretary of State at Section 5 (*Corporate Responsibility Fund*) below in respect of his reference to a Corporate Responsibility Fund at paragraph 11 of the SoS Decision Letter.

1.10 Halite's response to the Senergy Report can be found in the separate document entitled "Halite Response to the 'Independent Geological Assessment' produced by Senergy (GB) Limited", given document reference H43, and which has been submitted on the same date as this document.

2 DEFINED TERMS AND CROSS-REFERENCES

2.1 For ease, this document uses the following defined terms:

"**Appendices to the Updated BGS Report**" Appendices to report with BGS reference "CR/13/122" entitled "Results of an interpretation of newly acquired seismic lines over the Preesall Saltfield, NW Lancashire: their relevance to proposed areas for salt cavern gas storage development ('planning polygons')" prepared by the British Geological Survey dated 9 May 2014 and given DCO application reference "**H27B**"

"**COMAH**" The Control of Major Accident Hazards (COMAH) Regulations

"**DCO**" development consent order

"**ExA Report**" the ExA's 'Report of Findings and Conclusions and Recommendation to the Secretary of State' published in January 2013

"**GCC**" gas compressor compound

"**Geostock Cavern Field Layout Report**" Report with Geostock reference GKF/0/J/0002 entitled Halite Energy Gas Storage; Preesall Gas Storage Project; Revision of Cavern Field Layout prepared by Geostock dated 9 May 2014 and given DCO application reference "**H28**"

"**Geostock Working Gas Volume Report**" Report with Geostock reference GKF/0/J/0003 entitled Halite Energy Gas Storage; Preesall Gas Storage Project;

Revision of Working Gas Volume prepared by Geostock dated 9 May 2014 and given DCO application reference "**H29**"

"**Halite**" Halite Energy Group Limited

"**Halite's Response to the SoS Statement of Matters**" Halite's Response to the Statement of Matters Raised by the Secretary of State pursuant to Rule 20(2) of the Infrastructure Planning (Examination Procedure) Rules 2010 prepared by Barton Willmore dated 8 May 2014 and given reference "**H26**".

"**LCC**" Lancashire County Council

"**LEMSP**" Landscape and Ecological Management Strategy Plan

"LPA" Local Planning Authority

"**Planning Polygons**" the proposed areas of cavern development identified within the DCO application

"**Project**" underground gas storage scheme subject of the DCO Application

"**PWC**" PricewaterhouseCoopers LLP

"**SoS Decision Letter**" the Secretary of State decision letter of 9 April 2013

"**UGS**" Underground Gas Storage

"**Updated BGS Report**" Report with reference "CR/13/122" entitled "Results of an interpretation of newly acquired seismic lines over the Preesall Saltfield, NW Lancashire: their relevance to proposed areas for salt cavern gas storage development ('planning polygons')" prepared by the British Geological Survey dated 9 May 2014 and given reference "**H27A**"

"**Updated GSR**" Updated Geological Summary Report prepared by Mott MacDonald dated 9 May 2014 and given reference "**H30**"

"**WBC**" Wyre Borough Council

3 RESPONSES TO REPRESENTATIONS

3.1 Halite's response to the representations submitted by Interested Parties further to the Secretary of State's letter of 8 April 2014 is provided in the following order:

- WBC and LCC as the LPAs;
- Protect Wyre Group as a principal community objector; and
- Other agencies and individuals.

3.2 For each party, the main issues raised are set out along with Halite's response. The application for the DCO has, save for the matter of capacity, already been subject to detailed examination by the ExA. In the interests of avoiding repetition of submissions made during that examination, this document provides the relevant references to the ExA Report and SoS Decision Letter where:

3.2.1 an issue raised has already been fully addressed in the ExA Report and SoS Decision Letter; and

3.2.2 since issue of the SoS Decision Letter, there has been no material change in circumstance raised in a representation or otherwise requiring a reconsideration of the issue.

3.3 The representations submitted by the following contained no issues requiring a response and Halite, therefore, provides no response in this document: The Environment Agency; Natural England; English Heritage; the Coal Authority; The Equality and Human Rights Commission; the Yorkshire Dales National Park Authority; Network Rail; Utility Grid Installations, GTC, Independent Pipelines, Quadrant Pipelines and The Electricity Network jointly; and the Highways agency.

3.4 Halite notes that PINS has received a number of representations supporting the Project. These are listed at Appendix 2 to this document. The key points arising from these representations are summarised for ease at Section 4 (*Representations in Support*) below.

3.5 **Note that responses to in this document to representations in respect of geology, capacity and national need should be read in conjunction with Halite's response to the Senergy Report in the separate document entitled "Halite Response to the 'Independent Geological Assessment' produced by Senergy (GB) Limited", given document reference H43, and which has been submitted on the same date as this document.**

Wyre Borough Council

3.6 **Issue 1:** Request for future minor realignment of brine discharge pipeline to accord with WBC's sea defence scheme at Rossall

3.7 **Halite response**: As described in the exchange of correspondence of 10 September 2014 between Rowena Gornall, Senior Estates Surveyor of WBC, and Will Bashall, Halite's agent, and the appended agreed meeting note at Appendix 3, WBC and Halite continue to engage in positive dialogue on this matter and have agreed in principle (subject to contract) an approach which would address WBC's concerns.

3.8 By way of background to this issue, as set out at paragraph 3.10 of "Halite's Comments on Local Impact Reports, Relevant Representations, Written Representations and Comments on Responses to the Examining Authority's First Round of Written Questions" of 3 July 2012 (document reference H3), WBC noted during the Examination that it had secured funding to carry out a coastal defence scheme between Rossall and Fleetwood which would include the area of the proposed sea wall crossing for the brine pipeline outfall comprised in the Project. WBC shared design detail for its revetment works and construction of a new slipway at Rossall and Halite provided design detail of the proposed sea wall crossing for the brine pipeline. As a result, the DCO which the ExA recommended be made (and appended at Appendix D of the ExA Report) contained the following provisions:

(a) Article 3 (development consent etc. granted by the Order) and Schedule 1 (authorised development) granted development consent for the authorised development, which included Work No. 16J as follows:

> "**Work No. 16J— A brine discharge pipeline within and adjacent to Rossall Promenade including a pressure pipeline laid in trench beneath the promenade**; all to be constructed not less than 1 metre below ground surface and not more than 10 metres below ground surface, **or affixed to the existing modified**

sea wall to descend to and beneath the foreshore to a depth of not less than 1 metre below the foreshore and not more than ten metres beneath the foreshore; and pipe protection where appropriate, all permanent or temporary, full or partial, removal of the existing promenade surfacing, access ramps and retaining walls from the landward and seaward sides of the promenade, **modifications to and breaking through the sea wall to allow the passage of the pipeline beneath the promenade to the foreshore, modifications to the promenade rear flood wall including the provision of flood gates and the construction of an observation platform/shelte**r**, including new steps, retaining walls and revetments to access the foreshore**." [emphasis added]

(b) As it was envisaged at the time that WBC might progress its proposed sea defence scheme at Rossall before Halite commenced the Project, Halite and WBC agreed Requirement 4 in Schedule 9 (requirements), which states as follows:

"4.—(1) The authorised development shall not be carried out otherwise than in accordance with the approved development plans.

(2) Notwithstanding sub-paragraph (1), no works to the sea wall crossing and observation platform comprising part of **Work No. 16J** of Schedule 1 (authorised development) **shall commence until details of the layout, scale, external appearance and means of access of the sea wall and crossing and observation platform have been submitted to and approved by the relevant planning authority**. Works to the sea wall crossing and observation platform must be carried out in accordance with the approved details." [emphasis added]

(c) Under article 5 (limits of deviation), Work No. 16J must be constructed within the limits of deviation set out on Sheet 2 of 23 of the Works Plans (document reference 2.3)

(d) The ExA Report considered and recommended approval of the book of reference and land plans which, amongst other things, contain necessary rights for Halite to modify the sea wall at Rossall to accommodate the brine outfall and the observation platform.

3.9 The DCO which the ExA Report recommended be made therefore contained provision for the necessary consents and land rights for the construction, operation and maintenance of the above alignment of Halite's brine discharge pipeline. It also contained provision for WBC to approve the details of the layout, scale, external appearance and means of access of the sea wall and crossing and observation platform *in respect of the alignment of the brine discharge pipeline which the ExA had recommended be approved*.

3.10 However, as indicated at item 1 of WBC's representation of 8 May 2014, WBC has since the close of the Examination issued planning permission for its sea defence works and commenced construction, and therefore expresses a preference for a *different* alignment of Halite's brine discharge pipeline to that in the DCO which was the subject of the Examination.

3.11 Further to a series of constructive, recent meetings between Halite, WBC Engineering Services and Balfour Beatty, the approved contractors carrying out the

· granted to WBC a legal charge over the fund.

8.93 **On the basis that the s106 agreement would secure funding for both compulsory acquisition compensation and decommissioning costs, we consider the Funding Statement (APP25) and the provisions set out in the s106 agreement are adequate to support a compelling case for the grant of compulsory acquisition powers.** "[emphasis added]

3.461 In other words, the ExA were aware of the relevant financial position at the planning stage and were satisfied with it for the purposes of the DCO being made. There has been no material change of circumstances since that time.

Edward Greenwood

3.462 **Issue 1:** Faults in Preesall Salt could cause gas migration

3.463 **Halite response:** See paragraph 3.21 above, where Halite has addressed the point, raised by PWG, by reference to conclusions in the ExA Report that "the risk of gas leakage from below ground infrastructure is acceptable." The Secretary of State concurred with the approach to safety (see paragraph 20 of the SoS Decision Letter).

3.464 The assessment of risks due to gas migration and faulting was specifically considered by LCC/WBC when agreeing the statement of common ground on geology (document reference SoCG1). SoCG1 states that:

> "The Geological Summary Report presents an adequate representation of the geology which is sufficiently well defined to establish areas in which it is possible to locate caverns. An indicative layout of caverns has been prepared to fit within the defined areas. The geology has been sufficiently defined **for an analysis of the risks from gas migration to be assessed** and surface subsidence to be calculated." [emphasis added]

3.465 LCC/WBC have been advised since the 2005 Canatxx application by their technical experts, Atkins, who had previously considered that insufficient geological evidence existed to support the schemes then proposed. SoCG1 was agreed by LCC/WBC, with support from Atkins, on the basis of the geological evidence submitted with the DCO application for the current scheme.

3.466 The newly acquired seismic reflection survey and the geological assessment that have now been undertaken and reported by BGS in the Updated BGS Report (document references H27A and H27B) provide evidence of the characteristics of the halite in terms of the top and bottom of the salt body, its depth, thickness and the location and classification of faults and other hazards.

3.467 The geological information is summarised in paragraph 2.0 of Halite's Response to the SoS Statement of Matters (document reference H26). In particular, paragraphs 2.11 to 2.13 of H26 summarise the nature and relevance of faults in the Planning Polygons, i.e. that there are two types of fault within the Preesall halite:

3.467.1 The 2013 seismic reflection survey has confirmed the absence of any significant post-depositional faults within the Planning Polygons;

3.467.2 Syn-depositional faults, which can be considered as part of the sediment body instead of a discrete discontinuity related to later tectonism. These faults have healed within the salt body during the subsequent deposition, compaction and

diagenesis of the halite. This type of fault in salt bodies does not pose the same design issues for cavern development as post-depositional faults.

3.468 Further detail on faulting types can be found in the Updated BGS Report (document reference H27A).

3.469 The maps for top and base halite, halite thickness and faults updated the 3D geological model in the Updated BGS Report were provided to Geostock for it to consider indicative cavern location, design and storage volumes. Further detail on the implications of faulting for cavern distances to faults, and thus on cavern size, can be found in paragraph 2.3 of the Geostock Cavern Field Layout Report (document reference H28). This is based on Geostock's overall cavern design expertise and specific experience at similar salt bodies in Cheshire. Cavern design and layout will of course be subject to consideration by the Competent Authority (the HSE and the EA) under the COMAH regime.

3.470 Based on Geostock's cavern design and layout, the Geostock Working Gas Volume Report (document reference H29) provides estimated free volumes of the 19 caverns and the estimated gas capacities, namely a total free cavern volume of 6.8 million cubic metres and 324million cubic metres working gas. In other words, the Secretary of State can have a high degree of confidence in work carried out by Halite and its team on faulting.

3.471 **Issue 2:** Project should be designed to withstand earthquakes

3.472 **Halite response**: The ExA Report stated as follows:

> "5.129 The Applicant has submitted a Seismic Desk Study which shows that the Preesall UGS facility would be located in an area of low seismic activity (APP42). **Furthermore, due to the depth of the UGS facilities they would not be subject to large forces during a seismic event**. A greater risk may apply to subsurface pipelines particularly near surface liquefiable deposits and the possible failure of the wells connecting the storage caverns to the surface (APP42, paragraphs S2 and S3). The seismic hazard is low given the proposed location of the storage caverns **(i.e. away from known active faults)** and the low level of earthquake activity in the surrounding region (APP42, paragraph S2)." [emphasis added]

3.473 It should be noted that the recorded seismic events occur at depths of greater than 4kms and are related to known deep crustal structures distant to the area of the Project.

3.474 The ExA Report continues as follows:

> 5.133 The Applicant has also stated that in the event of a seismic event, it would be possible to monitor parameters such as gas pressure, flow rate, fluid pressure in the annulus and gas composition to assess casing integrity. **Pipeline design, with the capacity to accommodate some ground displacement, and a monitoring regime to detect leakage would be developed as part of the technical justification within the COMAH process** (REP207, paragraphs 5.84 and 5.85).
>
> 5.134 SoCG1 states that **the risk of seismic activity to the development of UGS at Preesall is low. We agree with this conclusion**." [emphasis added]

3.475 The detailed design of the facility would have to be in accordance with the standards operating at the time and **Halite** would need to justify the design to the Competent Authority through the COMAH process**,** prior to approval to construct and then to operate.

3.476 **Issue 3:** Preesall salt could be put to better use

3.477 **Halite response**: See paragraphs 3.414 to 3.416, where Halite addresses this point.

3.478 **Issue 4:** Alternative site at Stublach in Cheshire is much safer

3.479 **Halite response**: The application for the DCO is to be determined on its own merits. Nevertheless, Stublach is no more inherently safe than other areas and no evidence is provided to the contrary.

3.480 See paragraphs 3.19 to 3.26 above, which provide detail on where the ExA Report and SoS Decision Letter expressed satisfaction on the matter of safety for the purposes of considering whether the DCO should be made.

3.481 **Issue 5:** Proposed caverns are too close to faults

3.482 **Halite response:** LCC/WBC, supported by LCC's technical adviser Atkins, agreed a statement of common ground (document reference SoCG1) with Halite in respect of geology and cavern design. This concluded that:

> "The Geological Summary Report presents an adequate representation of the geology which is sufficiently well defined to establish areas **in which it is possible to locate caverns**. An indicative layout of caverns has been prepared to fit within the defined areas. The geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed and surface subsidence to be calculated. The risk of seismic activity has been assessed by international experts as negligible. The risks from historic salt abstraction have been assessed and will not impact on the proposed scheme. An indicative cavern layout has been defined which has a working gas capacity of 600m3." [emphasis added]

3.483 A new cavern layout has been prepared by Geostock, an international firm of geologists and cavern designers (see the Geostock Cavern Field Layout Report (document reference H28). See also the response to Issue 1 at paragraph 3.462 above, which sets out why the Secretary of State can have a high degree of confidence in work carried out by Halite and its team on faulting.

3.484 **Issue 6:** Applying GDF and Eon rules about the positioning of caverns near fault lines, the site could only hold a working gas volume of 80 million cubic metres

3.485 **Halite response:** As far as Halite is aware, there are no published GDF or Eon rules about cavern positioning and no evidence is presented in the representation in question to suggest what these rules might be. Furthermore no evidence is provided regarding the methodology for the calculation of 80 million cubic metres.

3.486 A new cavern layout has been prepared by Geostock, an international firm of geologists and cavern designers, that takes accounts of cavern proximity to faults (see the Geostock Cavern Field Layout Report (document reference H28). Geostock has experience within the UK and Europe and has worked with many companies. Geostock has also provided an estimate of the working gas volume for the revised

cavern layout (the Geostock Working Gas Volume Report (document reference H29)).

3.487 The Updated GSR (document reference H30) summarises the working gas volumes based on the refined 3D geological model which has used the worst credible interpretation of the base salt, giving the thinnest probable salt thickness and hence lowest likely working gas volume. Even this results in an anticipated static total storage capacity of up to 537 million cubic metres and static working storage capacity of up to 324 million cubic metres at standard temperature and pressure. When cycling of caverns is considered, the effective (12 month) operational working gas capacity is 3888 million cubic metres.

3.488 **Issue 7:** Assertion that Professor Rokahr's rules erode conventional approaches by safety taken by other gas storage companies

3.489 **Halite response:** As far as Halite is aware**,** there are no conventional rules for cavern design. Each facility is project specific. No evidence is presented in the representation in question to demonstrate what these rules might be and how they would be eroded by the Rokahr design rules.

3.490 LCC/WBC, supported by LCC's technical adviser Atkins, agreed a statement of common ground (document reference SoCG1) with Halite in respect of geology and cavern design. This concluded that:

> "The Geological Summary Report presents an adequate representation of the geology which is sufficiently well defined to establish areas in which it is possible to locate caverns. An indicative layout of caverns has been prepared to fit within the defined areas. The geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed and surface subsidence to be calculated. The risk of seismic activity has been assessed by international experts as negligible. The risks from historic salt abstraction have been assessed and will not impact on the proposed scheme. An indicative cavern layout has been defined which has a working gas capacity of 600m3." [emphasis added]

3.491 Professor Rokahr is an acknowledged expert in cavern construction in salt. He has advised many companies on cavern design and construction (see appendix 5 of "Halite's Response to Examining Authority's Further Written Questions" (document reference H5 for a summary of his curriculum vitae. His conservative preliminary recommendations for the location and design of caverns were considered to be cautious, appropriate for the planning consent stage of the Project. After the planning consent stage, specific numerical analysis would be undertaken for each cavern as part of the preparation of pre-construction and pre-operational safety plans submitted to the Competent Authority under COMAH. The Secretary of State approved the principle of this approach so far as it related to safety (see paragraph 20 of the SoS Decision Letter).

3.492 The ExA Report agreed that the design recommendations were acceptable for the planning stage, stating as follows:

> "5.70 We asked the Applicant for evidence of which international geological bodies have endorsed the recommendations intended for cavern design and examples where they have been applied to UGS. The Applicant has not provided any examples and responded that there are no international or national standards for the design of caverns, and that **the design recommendations were developed by Professor Rokahr based on**

his 30 years' experience of cavern design in salt (REP207, paragraph 5.38).

[…]

5.72 In view of the detailed involvement of the Competent Authority in the structural design of the caverns as part of the COMAH process, **we consider that the design recommendations and the indicative layout provided are acceptable for planning purposes at this stage*, but with the important proviso that the layout is subject to the validation of the 3D model***." [emphasis added]

3.493 As the seismic investigation and the geological assessment that have now been undertaken by BGS in the Updated BGS Report (document reference H27A and H27B) provide evidence of the characteristics of the halite in terms of the top and bottom of the salt body, its thickness and the distance to faults and other hazards, the result is that Halite has progressed beyond the initial cavern layout for which the Rokahr design recommendations were appropriate.

3.494 In respect of comparison with other schemes, the ExA Report did not consider that this was appropriate (see paragraph 5.1) and concluded that the DCO application scheme should be considered on its own merits. Nevertheless, it is deeply inaccurate for the representation to assert that Professor Rokahr's rules "erode conventional approaches by safety taken by other gas storage companies". In any event, the comprehensive suite of geological documents referred to in paragraph 3.29 above in respect of the capacity of the Project, and the Secretary of State's confirmation in accordance with policy that safety is appropriately a matter for the stringent processes of COMAH, mean that such an unsubstantiated assertion is no longer relevant.

3.495 **Issue 8:** The Project will not create 3000 new jobs and to promote the Project as a creator of significant employment for Fleetwood residents is misleading

3.496 **Halite response:** See paragraph 3.192 above where Halite has addressed the point made by Ben Wallace MP. Again, this representation does not accurately reflect Halite's application submissions on employment: no reference is made to thousands of jobs or to the Project as a creator of significant employment in the locality. The ExA Report and SoS Decision Letter, however, capture the position accurately.

3.497 **Issue 9:** Further sites in Cheshire are a better alternative

3.498 **Halite response:** Halite notes that permission has been granted for a UGS facility at King Street, Cheshire in the same salt body that extends to Preesall. Construction at King Street has not, however, commenced and as set out in Halite's response at paragraphs 3.106 to 3.111 above there is a need for all UGS projects in the UK to come forward i.e. there is a need for King Street, Preesall and all other consented UGS facilities to be implemented if the security of supply is to be provided.

3.499 Further, as part of a robust, flexible, distributed energy grid, storage points need to embedded around the system and not simply located in one place. As the then Department for Business, Enterprise and Regulatory Reform stated on pages 10 and 11 of its document entitled "Gas Storage in your area – your questions answered" of 2007:

"Where can gas be stored?

The storage of gas onshore and offshore is only possible in certain areas with the required geology and geological structures. These are present in a limited number of locations in Great Britain.

[…]

Further important factors will be the ease of access to the 'gas grid', either the National Transmission System (NTS) or the local pipeline network, as a pipeline will need to connect the facility to the NTS, as well as the availability of suitable surface sites for the well heads and gas processing plants, environmental and planning constraints, and obviously the cost and economic viability of the project.

[…]

Why are some areas seeing multiple storage developments?

As above, there are only limited regions in the UK where it is possible to store gas underground, due to geological suitability. **In these areas a number of suitable storage facilities may exist, and for this reason they can be more prone to development**. Equally other parts of the UK may be more prone to other types of gas infrastructure development, for example import facilities for Liquefied Natural Gas (LNG) in deep harbours along the UK coastline.." [emphasis added]

3.500 In other words, the clear message is that if regions have the potential to add to the energy grid, and with it increase security of energy supply, then it is critical that they should do so.

3.501 **Issue 11:** No immediate need for additional gas storage

3.502 **Halite response:** See paragraphs 3.106 to 3.111 above, where the question of need is addressed.

3.503 **Issue 12**: It would be preferable to use the site for compressed air energy storage from tidal power generation offshore

3.504 **Halite response**: As there are no off-shore tidal power generation projects in the vicinity of the site, Halite is not aware of any requirement for compressed air storage at Preesall. Even if there were such a need, this is not the application that is before the Secretary of State for his determination.

Duerscough

3.505 **Issue 1:** Suitability of the geology and risk of gas migration

3.506 **Halite response:** As set out in paragraph 3.0 of Halite's Response to the SoS Statement of Matters (document reference H26), the geological data supporting Halite's application demonstrates that each of the requirements of paragraph 2.8.9 of NPS EN-4 in respect of the suitability of the geology at the site for the type of underground gas storage proposed are met.

3.507 See paragraph 3.21 above, where Halite has addressed the point on gas migration, raised by PWG, by reference to conclusions in the ExA Report that "the risk of gas leakage from below ground infrastructure is acceptable" because of the nature of the risk and the stringent COMAH safety regime enforced by the Competent