CLOSING SUBMISSIONS
on behalf of
DART ENERGY
re. Proposal at Letham Moss, Airth, Falkirk

by

Gordon Steele, QC

instructed by

DLA PIPER SCOTLAND LLP
S. TELFER

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1. INTRODUCTION

This appeal is in respect of an application made for planning permission in terms of the 1997 Act on 25th August 2012. The description was in the following terms:-

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997 AS AMENDED BY THE PLANNING ETC. (SCOTLAND) ACT 2006
ENVIRONMENTAL IMPACT ASSESSMENT (SCOTLAND) REGULATIONS 2011
PROPOSED DEVELOPMENT FOR COAL BED METHANE PRODUCTION, INCLUDING DRILLING, WELL SITE ESTABLISHMENT AT 14 LOCATIONS AND DEVELOPMENT OF INTER-SITE CONNECTION SERVICES, SITE ACCESS TRACKS, A GAS DELIVERY AND WATER TREATMENT, ANCILLARY FACILITIES AND INFRASTRUCTURE AND AN ASSOCIATED WATER OUTFALL

I stress that this is the only development that is before the Inquiry for determination. Accordingly this is the only application that is relevant. This must be looked at on its own merits. Any suggestion of other applications is mere speculation and should be ignored.

The application was accompanied by an EIA.

It is notable that there was no written request from Falkirk Council in accordance with Regulation 23 of the EIA Regulations. I here quote para. 127 of Circular 3/2011.

> "*Where the required information has not been provided the authority must use its powers under regulation 23 to require the applicant to provide further information concerning the relevant matters set out in Schedule 4. Any information provided in response to such a written request must, in accordance with regulation 24(`1), be publicised, and consulted on, in a similar way to the document submitted as an ES. The provisions of regulation 23 are without prejudice to the more general powers planning authorities have to request further information to enable them to deal with a planning application under regulation 24 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008.*"

Falkirk Council did not exercise the general power to request information.

Accordingly I submit one can be entirely satisfied that the EIA regulations have been satisfied, otherwise Falkirk Council would have used its powers under regulation 23. It did not do so.

It is important to stress that the EIA only requires to assess the likely significant effects - not every single possible effect. Indeed it is not even every possible significant effect only the likely significant effects that should be assessed.

It is also important to stress that any finding of significance does not imply the development is unacceptable (see EIA page 15, para. 2.46). There are many windfarm proposals which have many findings of significant effect yet are found to be acceptable overall and so planning consent is granted.

I submit that what is now required is for Scottish Ministers to take into account all the environmental information (which obviously includes the EIA), consider it, and state in the decision this has been done, prior to granting planning permission which of course I submit should be done (Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, Regulation 3).

One minor matter arises in relation to Airth 6/8. Mr Goold confirmed in evidence that Dart do not intend to drill Airth 6/8 for reasons set out in his precognition. If having considered all the environmental information and it is deemed appropriate, then a condition could be imposed to achieve that, or we could prepare and submit a unilateral Section 75 Agreement to that effect. However if on a full assessment of the information this is not deemed appropriate consent can simply be granted including Airth 6/8, albeit Dart will not drill that well. Whether this is appropriate or not will require a decision as to whether any condition or Section 75 meets the terms of the Circular.

Accordingly nothing turns on this minor matter, and I now consider the merits of the matter.

The 1997 Act Section 25 requires that the determination is made in accordance with the development plan unless material considerations indicate otherwise. Therefore I will consider matters in that order - the development plan, then material consideration. Then I will consider whether the environmental requirements of both the development plan and the relevant material considerations have been met. Thereafter I will consider the evidence of other parties.

2. THE DEVELOPMENT PLAN

The extant Development Plan for Falkirk comprises the approved Falkirk Structure Plan ("FSP") (2007) (Document DE1) and the adopted Falkirk Council Local Plan ("FCLP") (2010) (Document DE(P)4). In addition a small part of the site is covered by Stirling Council.

The Development Plan does not contain any policies specifically referring to coal bed methane development, but Falkirk Council intimated to the appellant in its EIA Scoping Response (Document DE23) that any assessment should be based on the minerals policies. These are considered below in so far as they are applicable to coal bed methane development, together with those generic policies that apply to all development proposals.

FSL Policy ENV8: General Principles for Mineral Working provides that proposals which pose an unacceptable risk to the amenity of communities or the local environment, which cannot be mitigated or eliminated by the use of planning conditions or agreements, will not be supported.

FCLP Policy EQ32: General Criteria for Minerals Development expands on FSP Policy ENV8 and provides that there will be a general presumption against new or extended mineral workings which:

1) Would have a significant adverse impact on the amenity of a community or smaller groups of houses which cannot be mitigated by planning conditions/agreements;

2) Would be visually intrusive from main transport corridors;

3) Would result in the permanent loss of or damage to prime quality agricultural land which cannot be restored to its previous condition;

4) Would have a significant adverse impact on the landscape of the area, with particular respect to Areas of Great Landscape Value and Green Belt;

5) Would have a significant adverse impact on internationally or nationally designated areas of nature conservation value, on locally designated sites, or on national and local priority habitats and specifies identified in the Falkirk Area Local Biodiversity Action Plan;

6) Would have a significant adverse impact on the character or setting of a Listed Building, Conservation Area, the Antonine Wall, Scheduled Ancient Monument or sites of archaeological or historic importance or site within the inventory of Gardens and Designed Landscapes; or

7) Would have a significant adverse impact on the water environment.

It is important realise that Falkirk Council did not use criteria 2 to 6 as reasons for objection and accordingly Falkirk Council accept that these issues have been satisfactorily addressed by the proposals. Other relevant Development Plan policies include:

FCLP Policy EQ33

FCLP Policy EQ33: Cumulative Impact of Mineral Workings requires that proposals for new or extended mineral workings will be assessed in terms of their cumulative impact on all settlements within 5km where there are existing workings or unimplemented consents in the area.

This policy is assessed within the Planning Statement (Document DE25) at paragraph 3.38. This matter is further examined in the Hearing statement by Mr Truscott, which confirms that no unacceptable cumulative impacts will be created by the proposed development.

FCLP Policy EQ34

FCLP Policy EQ34: Benefits from Mineral Extraction provides that in considering proposal for new or extended mineral workings, potential benefits accruing through development of the site will be taken into account in assessing any application. These include:

1) The removal of associated mineral deposits in one operation;
2) Avoiding the sterilisation of minerals by other development;
3) The provision of local employment; and
4) The removal of dereliction following working of the mineral and subsequent restoration and aftercare.

It is worth stressing that the local employment provision was outlined by Mr Bain, and I adopt his evidence. It is obvious even in general terms that given the nature and extent of the development proposed, a significant number of jobs will be created, which is equally obviously a significant advantage of the proposal in accordance with (3) above.

In addition not only is sterilisation of minerals avoided but in fact any future excavation of the coal will be assisted and facilitated because the methane will already have been extracted thereby removing a potential hazard. This is another advantage of the proposal consistent with (2) above.

Policy EQ35 is also relevant however all criteria are entirely satisfied so far as relevant. I refer to Mr Pollock's evidence at 9.14.

Various other policies are considered by Mr Pollock in his precognition at pages 13-18. I adopt that evidence.

STIRLING DEVELOPMENT PLAN

A small part, but nevertheless an important part of the proposal is covered by the Stirling Structure Plan and Stirling Local Plan.

Mr Pollock has fully considered all the relevant policies in his precognition at pages 18-23. However none of these policies relate specifically to CBM nor were any relied upon by Stirling Council except SD1 and ENV10.

In applying SD1 Councillor Brisley confirmed Stirling Council relied on AMEC and I consider this issue elsewhere.

Councillor Brisley accepted that Stirling Council had relied on ENV10 contrary to the profession advice of Stirling Council Planning Department. In addition the Committee had no other qualified advice in relation to this issue and did not even undertake a site visit. Accordingly Stirling Council's evidence on this issue must be treated with caution. Notwithstanding this the cumulative impacts of the proposal have indeed been considered and addressed. The full details are to be found with Mr Truscott's evidence. However it is of importance that the cumulative impacts referred to do not relate to the same type of development. In addition the evidence of Councillor Brisley in her precognition fails to recognise the existence of the adjacent embankment, or the gas treatment facility also adjacent, or nearby commercial cattery. It is simply incorrect to state "such buildings are incongruous in a relatively flat rural setting with mainly agricultural buildings …"

3. MATERIAL CONSIDERATIONS

3.1 Emerging Falkirk Development Plan

This draft was published in April 2013, and so takes into account the content of NPF2 and the current SPP but not NPF3, or the draft SPP. It is therefore more reflective of Government Policy than the previous Plan. The Plan has been subject to public consultation and has been submitted to Ministers with adoption anticipated in early 2015. It represents the "settled will of the Council". It is of importance because it does reflect to a large extent Government Policy in relation to CBM. Accordingly it is obviously a material consideration and one to which I submit some considerable weight should be given.

I draw particular attention to the following:-

(i) The plan acknowledges and identifies the "economic importance" of CBM, and in that context refers to PEPL133.

See para. 5.123

(ii) In addition para. 4.59 states that "exploration activity for coal bed methane west of Lothian is expected to continue and expand during the plan period, possibly leading to production in later years" [my underlining]

(iii) Of even greater significance is Policy RW02 which confirms "The extraction of coal bed methane will be supported where it is proven to be environmentally acceptable having regard to Policy RW03 and other LDP policies" [my underlining]

(iv) Accordingly it can be said with confidence that the settled will of Falkirk Council is to actively support the extraction of CBM where it is environmentally acceptable.

(v) Policy RWD3 provides the environmental tests. What is of significance is that Falkirk Council only rely on effects from underground development only on communities and water environment albeit this was advanced in terms of the predecessor Policy EQ32. Accordingly one can be satisfied that all other issues (2-6) are satisfied.

Emerging Stirling Development Plan

Stirling Council is also preparing a new plan, and it has been to Inquiry. During the evidence of Councillor Brisley it was revealed the Reporter's conclusions of the Inquiry were available. It is perhaps of interest to consider what Mr Pollock wrote in his precognition before he was aware of the Reporter's findings.

12.4 It is noted that two unresolved representations on the Proposed Plan relate to the inclusion of CBM extraction within Primary Policy 11 and the adequacy of the policy framework for the consideration of oil and gas development licensed by DECC.

12.5 It is understood that Stirling Council accepts that the Proposed Plan does not distinguish between different forms of gas extraction or minerals and that it applies an identical policy to all extractive industries from CBM to aggregate quarrying. Nevertheless, Stirling Council proposes that there should be no modification to the wording of Primary Policy 11. It does however note that the Stirling Council Local Development Action Programme refers to the production of Supplementary Guidance to support Primary Policy 11 and that this guidance could include details on CBM *"as and when the Scottish Government provide additional guidance on how planning authorities should address this issue"*.

12.6 Given that Primary Policy 11 of the Proposed Plan may be the subject of further modifications as a result of the examination, and given that Stirling Council have yet to produce further supplementary guidance in support of

this policy which might clarify how it will specifically determine applications for CBM, it is considered that Primary Policy 11 should be afforded limited weight in the determination of this appeal.

(i) Mr Pollock has of course been proved correct because the Reporter concluded:-

1. Scottish Planning Policy (SPP) (paragraph 237) makes it clear that development plans for areas covered by a Petroleum Exploration Drilling Licence (PEDL) should identify the factors that will be taken into account when deciding planning applications for wellheads and transmission infrastructure. SPP lists a number of relevant factors that may be included such as noise disturbance, potential pollution of land, air and water and the impact on local communities, the economy, the historic environment, natural heritage and transport infrastructure.

2. A new Draft SPP was published for consultation in April 2013. It sets out a broadly similar (my underlining) remit for local development plans in their approach to areas covered by PEDLs: It states that development plans should:

   i. recognise that exploration and appraisal is likely to be the initial focus of development activity, with production probably requiring a separate decision;
   ii. address constraints on production and processing;
   iii. identify factors that will be taken into account when determining planning applications for wellheads and transmission infrastructure; and
   iv. provide a consistent approach to extraction where licences extend across local authority boundaries (my underlining).

3. In January 2014 the Scottish Government issued a Position Statement on Scottish Planning Policy. It noted that Ministers are minded that the proposed policy changes in the Draft SPP on onshore oil and gas will go forward into the final version of the SPP. Scottish Government has convened

an Independent Expert Scientific Panel to look at the evidence on unconventional oil and gas. The Panel has expertise across the range of disciplines and will provide the SG with a well researched, peer-reviewed evidence base upon which policy can be developed.

4. In light of the existing and emerging policy advice from Scottish Government, I find that the 4 criteria (a) to (d) listed as part of Primary Policy 11 are wholly inadequate and fail to reflect the advice contained in SPP and the Draft SPP in relation to PEDL-related proposals. They do not identify relevant factors to be taken into account in assessing development proposals. Instead, the criteria are founded on a number of generalised development management issues more appropriately related to extractive industries such as quarrying or surface mining.

5. The planning authority intends to prepare Supplementary Guidance (SG) to support Primary Policy 11 and this would be adopted in 2015. In response to the representations, the planning authority suggests that the SG could be expanded to include details on unconventional gas extraction as and when Scottish Government provide additional guidance. However, this ignores the failure of Primary Policy 11 to reflect current Scottish Government advice already contained in SPP and as may be expected in the Draft SPP.

6. Therefore, in advance of preparation and agreement on the SG, I consider that Primary Policy 11 should be modified to recognise the prospect of proposals coming forward for wellheads and transmission infrastructure during the life of the plan and to identify the broad criteria against which these proposals will be assessed. These criteria should reflect advice in SPP. The SG could then set out more detailed assessment criteria and methodologies to guide prospective developers. However, it is too early in the evolution of national advice for Primary Policy 11 to be transformed into a spatial policy framework as suggested by Cllr Mark Ruskell. These are

matters to be considered at local development plan level once appropriate national guidance is available.

(ii) He recommended that:

> "Deleting all the existing wording of Primary Policy 11(d) and substituting "Proposals for the exploration, appraisal and the development of wellhead and transmission infrastructure for unconventional gas extraction (coal bed methane, shale gas and other forms of onshore oil and gas) shall be assessed against their impact on the environment, the economy, local communities, heritage, the historic environment, landscape assets and transport infrastructure. Proposals shall comply with the detailed advice in Supplementary Guidance to be prepared in support of Primary Policy 11."

It is of note of course important that the "recommendation" is in almost all cases mandatory.

In addition, it is of importance to consider the professional opinion of Stirling Council planning department.

> "It is not within the duties of the Planning Authority to list the particular risks associated with coal bed methane. The Scottish Environment Protection Agency are the regulatory body for the issues that have been raised here and would monitor and raise any issues that arose as part of a planning application and beyond, to production. It is therefore considered that no modifications should be made to the Plan in this respect."

In conclusion it is obvious that Stirling Council have not correctly identified or implemented Government Policy in relation to CBM. Accordingly the Reporter has added text and a policy which is genuinely supportive of CBM. This is in effect what Mr Pollock had earlier advocated and so enhances the credibility of his evidence while at the same time reducing the weight to be given to Stirling Council's evidence. In addition Stirling Council officials

have confirmed that SEPA are the regulating body and will monitor any issues raised up to and beyond production.

3.2. **Planning History**

The Planning History is extensive both in terms of the period of time and also the number of consents. I refer to the terms of the agreed document dealing with this issue. Certain conclusions may be drawn.

i. The principle of CBM drilling and extraction has been consented by the Planning Department/Council Committee on many many occasions. It is worth noting that even in delegated cases any Councillor has a period of time during which the Councillor may "call-in" any application if concerned about it. Accordingly by not doing so Councillors have accepted the approval.

ii. The consents are in various different locations across the PEDL 133. Some close to residential property some not so close.

iii. There have already been two separate consents for discharge to the Forth in different locations.

iv. One of the consents permits several drilling locations, several laterals, but also importantly a processing plant. The only difference apart from precise location is that the consent permits the generation of electricity not just the export of gas into the adjacent pipeline [P/10/0840/FUL Valid until 2031].

v. Many of the consents are live/extant consents and will remain so for many years, some until 2035. At least one has no time limit.

vi. Many consents have been implemented, as will be confirmed by the site visit.

Two further particularly important conclusions can be drawn.

vii. There has been drilling and gas extraction over a period of about twenty years. There is no evidence before the Inquiry of any complaint except one minor issue of noise spoken to by Mr Fraser. I refer to the evidence of Mr Hemfrey. This lack of complaints is quite remarkable given the amount of development, the level of

concern and public scrutiny. One can be certain that if there had been any issue of concern, complaints would have been made. In addition no complaints or concerns have been expressed by the Regulators who have regulated and supervised these activities over a period of about 20 years. This all amounts to a significant material consideration to which great weight should attach when considering the planning merits and whether there is any possibility of environmental harm.

viii. Secondly it is apparent that all the consents which the Appellant has implemented or is entitled to implement, do not have such stringent environmental controls and safeguards as are currently proposed. That means that from an environmental point of view it is clearly better to consent the current proposals which will have bespoke, stringent and precautionary safeguards in place rather than the *status quo* continuing. The *status quo* entitles Dart to develop and the operate a significant number of drilling locations, and plant without any such safeguards. It goes without saying therefore that environmentally it is much preferable to consent that which is before this Inquiry then allow the status quo to continue. The new consent will render redundant in a practical sense the existing consents.

3.3 **PEDL 133**

The very existence of PEDL133 which applies to the Appeal site is itself a material consideration.

Professor Hilston gave evidence on behalf of FOE regarding the PEDL. This evidence is helpful in understanding the requirements in obtaining a PEDL.

> *"PEDL licensing provides an alternative, more targeted system than auctions, for allocating exclusive, payable rights to search for and exploit oil and gas in geographical "blocks", for set time periods associated with exploration, appraisal and development. Applicants must prove technical competence, awareness of*

environmental issues and financial capacity before a PEDL is offered. Environmental awareness requires applicants "to demonstrate understanding of the environmental sensitivities and potential constraints on blocks both at the application stage and during any subsequent operations. Operators are also expected to comply with licence conditions set out in "model clauses" which include, inter alia, a requirement to avoid harmful methods of working, such as taking all practicable steps to "prevent the escape of petroleum into any waters in or in the vicinity of the Licensed Area."

The issuing of the PEDL confirms several things:

(i) The Applicant has "financial capacity"

(ii) Environmental issues have been considered and addressed to the satisfaction of Government

(iii) The applicant has proved "technical competence"

(iv) There is an expectation by Government and the Applicant that there will indeed be a search for and subsequent exploitation of CBM. This is in effect the first hurdle in the planning process. This is a material consideration in favour of granting permission. As Mr Pollock stated "The granting of the PEDL carries an expectation that development such as that now subject of this appeal will be progressed subject to granting of planning permission and with appropriate protection for the local environment" (para. 3.6).

3.4. **Coal Authority Consent**

Professor Hilston also gave helpful evidence regarding this issue.

"The Coal Industry Act 1994 states that ownership of CBM rests with the Crown and not the Coal Authority. Nevertheless, further consent via a "Coal Bed Methane Access Agreement", is also required from the Coal Authority before an operator is

able to work on coalfields or surface land owned by the Authority. The Authority's policy is not to grant access unless a PEDL licence has already been granted to the applicant by DECC.

The Coal Authority is placed under a statutory duty to have regard to the "desirability of the exploitation, so far as that is economically viable, of coal-bed methane in Great Britain". The 1994 Act is, however, severely deficient regarding environmental protection requirements: there is, for example, no statutory sustainable development duty placed on the authority such as is typically found in nmumerous, more modern statutes. To include only what might be identified as the economic element of sustainable development in the form of the "desirability" section above, without considering the environmental element to it, seems deficient. Nevertheless, as a matter of policy, the current application form for an access agreement does require applicants to provide certain environmentally important information, including "Details of measures the applicant would take to prevent or remedy spontaneous combustion, uncontrolled emissions of gas or water or other hazard directly or indirectly caused or related by the proposed activities."

Accordingly the Coal Authority have obviously considered it desirable to exploit the CBM at this location. In addition it is beyond doubt that DART have satisfied the Authority about any emissions of gas or water, about boreholes, and also all restoration proposals.

It can be said then that the approval by the Coal Authority is a further material consideration in favour of granting consent.

3.5. **Government Policy**

(i) SPP

Professor Hilston is yet again very helpful on this issue.

"Current Scottish Planning policy contains a somewhat one-sided presumption in favour of oil and gas related development, stating that "The aim is to maximise the potential of Scotland's oil and gas reserves in an environmentally acceptable manner as part of a strategy for achieving safe, secure and indigenous energy supply". The policy also states that development plans for areas covered by PEDL liceces should identify the factors that will be taken into account in deciding planning applications for wellheads and transmission infrastructure. Relevant factors are stated to include: "disturbance and disruption from noise, potential pollution of land, air and water, impact on communities and the economy, cumulative impact, impact on the natural heritage and historic environment, landscape and visual impact and transport impacts". Where PEDL licences extend across local authority boundaries, planning authorities are expected to "work together to ensure a consistent approach to on-shore oil and gas extraction, including the consideration of cumulative effects". The policy goes on to state a preference for non-road transport of the end-product, to require full site-restoration conditions and to prohibit drilling near homes and other noise-sensitive properties unless noise remains within acceptable levels."

I rely on Professor Hilston's accurate assessment that there is "a presumption in favour of oil and gas related development" and that the aim is to maximise the potential of gas reserves. Obviously environmental issues must be considered which I do elsewhere. However subject to environmental issues current Government Policy is a material consideration which is strongly in favour of consent being granted. This must be particularly so if the "end products" are transported by means other than road - exactly as proposed here.

Mr Pollock confirmed the foregoing at 6.2 of his precognition.

"Paragraph 236 states that "The aim is to maximise the potential of Scotland's oil and gas reserves in an environmentally acceptable manner as

part of a strategy for achieving safe, secure and indigenous energy supply". Coal bed methane is identified as being covered by this policy objective."

(ii) Draft SPP

The draft SPP continues to recognise the potential and importance of CBM. I refer to Mr Pollock's evidence paras. 7.1-7.8 of his precognition.

I rely particularly on the following

- the requirement to recognise the role of indigenous gas in maintaining a diverse supply and in improving security of supply (para. 167).
- the requirement that local plans should recognise that where a PEDL has been consented that exploration and appraisal is likely to be the initial focus of development [para. 173]
- Proposals for extraction should be permitted if significant impacts (not any I stress) can be adequately controlled or mitigated (para. 175)
- Directional drilling should be used when feasible to minimise impacts (para. 179). This clearly accepts that drilling may take place close to property albeit the well may be some distance away

(iii) SPP Position Statement

There was a campaign organised by FOE in relation to "fracking". Of course this means that the campaign was of little relevance to the current proposals. In any event despite FOE putting their own weight and resources behind it only a very modest number of responses/objections were achieved. Otherwise the position statement is of little relevance. Any panel will take a long time to report and it will be longer still for any policy to be developed. We do not know what the policy may be. It may give great support to CBM exploitation. It may well decide that buffers are not necessary at all given the evidence. Accordingly little if any weight should

attach to this document in circumstances where we have clear advice in the SPP and draft SPP.

(iv) PAN 51

I refer to the evidence of Mr Pollock at 8.1.

> *"Planning Advice Note 51 Planning, Environmental Protection and Regulation (Document DE(M) 25) is highly relevant, recognising the extensive regulatory regimes controlling the proposed development. These controls are described and examined in detail in Hearing Session 2. PAN51 states at paragraph 32:*
>
> *'32. Planning authorities and environmental protection bodies have different powers and functions which can on occasions overlap. It is however a long established policy that the planning system should not be used to secure objectives that are more properly achieved under other legislation.'"*

Accordingly one can and indeed should rely upon the regulators such as SEPA to secure other objectives.

3.6 **SEPA**

SEPA is the Government Agency which has *inter alia* responsibility for regulation, and using "regulatory tools that can be used to effectively control and mitigate the environmental impacts that may be caused by unconventional gas activities" [DEM73, page 3 para. 3] [my underlining].

The introduction to the regulatory guidance document is extremely enlightening regarding SEPA's role, responsibilities and advise. Accordingly I set it out in full here.

"1. This regulatory guidance deals with shale gas and Goal bed methane which are types of 'unconventional gas'.

2. We support the Scottish Government's energy policy to establish a diverse and balanced energy portfolio to provide Scotland with secure and affordable heat and electricity for decades to come. A diverse range of sources in Scotland's energy portfolio will make our energy system more resilient.

3. Along with other regulatory bodies we have a wide range of regulatory tools that can be used to effectively control and mitigate the environmental impacts that may be caused by unconventional gas activities. (my underlining)

4. We currently believe that these regulatory tools provide a high level of protection to the environment. Should further evidence demonstrate that this is not the case and more protection is required, we will support the Scottish Government in bringing forward further measures. (my underlining)

5. Our belief in there being a high level of protection is supported by the results of a recent report8 commissioned by the European Commission which concluded that the EU regulatory framework was sufficiently flexible to be adjusted to the specific requirements of unconventional gas operations. This does not preclude the possibility that additional legislation may be brought forward if gaps in existing legislation become apparent. (my underlining)

6. Under the Climate Change (Scotland) Act 2009 we have a duty to consider how Scotland can reduce the greenhouse gas emissions from regulated industry and businesses.

In addition I draw attention to the following:-

(i) Para. 17 which confirms that correct construction methods for boreholes will prevent leakage. (my underlining)

(ii) Para. 21 which confirms that C02 emissions will be reduced if gas displaces coal.

(iii) Importantly paras. 25 and 26 confirm that regulation of CBM is also required from DECC, the HSE and the Coal Authority. The order and timing of the necessary regulation is clearly set out in Figure 5. For the avoidance of any doubt regulation by the HSE and SEPA takes place after planning permission is granted.

I here set out the precise position in relation to SEPA's regulatory role: from the same document:

27. Article 11 3(j) of the Water Framework Directive (WFD) in conjunction with Article 6 of the groundwater daughter directive (Directive 200611 18IEC) provide a framework of regulations for adequately protecting groundwater. We control the impacts on groundwater through CAR. As coal bed methane and shale gas operations can have an adverse impact on the water environment (particularly groundwater) they are subject to controls under CAR.

28. Due to the potential impacts from coal bed methane and shale gas exploration and extraction activities, operators are advised to contact us at the earliest opportunity to discuss their plans.

30. As noted above, we control impacts on the water environment and other Water users using CAR. The following activities, associated with coal bed methane and shale gas exploration and extraction fall within the CAR regulatory regime:

1. Borehole construction: An application for a CAR complex licence will be required to allow a deep borehole (>200m) to be constructed and condition any maintenance or monitoring required to ensure that the borehole does not result in contamination of ground water. Once the borehole has been decommissioned to our satisfaction, the licence can be surrendered.

4. Abstraction of flow-back water; Where flow-back water and/or groundwater are abstracted from the borehole, an application for authorisation should be submitted to us, unless the activity falls under Activities 2 or 4 of Schedule 3

of CAR and the abstraction meets all the General Binding Rules for that activity.

5. Management of abstracted fluids: Discharges that are likely to have an impact on the water environment require prior authorisation under CAR, Re-injection of flow-back water is not capable of authorisation under CAR; flow-back water is classed as extractive waste and is regulated by the local authority through planning controls and the Extractive Waste Regulations.

31. Operators must submit a risk assessment and/or details of the borehole construction to us with their application for CAR authorisation to show that an adverse effects on the water environment or other water users will not be significant. The submission should include any mitigation measures that will be used to reduce adverse effects. Any authorisation granted will specify conditions to limit impacts and may also require a monitoring plan to be developed and agreed with SEPA and implemented by the operator.

32. Operators must provide details of all of the chemical additives contained in drilling and fracturing fluids. We can use this information in our examination of any application for injection, to ensure the substances involved are of a type and at a concentration that will not cause pollution of the water environment. The injection must also meet the appropriate WFD exemption. Operators have the right to claim that information contained within or attached to an application is commercially confidential. Further information is provided in the VAT Licence Applicant Guidance. (my underlining)

33 We will assess whether audit monitoring will be required based on the environmental risk assessment of the potential environmental impact of the activity. Where monitoring indicates that pollution of the water environment is occurring or has occurred as a result of any activity authorised by CAR, we will take action under CAR to stop any activity, prevent further impacts and remediate those that have happened.

36 We also have regulatory powers under PPC for certain activities, such as those involving refining of gas, gasification or other heat treatments, combustion, or disposal of solid and liquid wastes.

37 The PPC regulations are designed to control emissions to the environment from certain specified activities. If any of the following processing steps are necessary to satisfy statutory and contractual specifications, an application for a PPC permit will possibly need to be submitted and early engagement with ourselves is encouraged:

• Removal of the treatment chemicals or well contaminants from the extracted gas:

- gases, e.g. hydrogen sulphide, sour/acid gas, C02, mercaptens etc
- water;
- solids (sands, clay, potentially scale-like carbonates and sulphates, mercury etc);
- treatment chemicals added at well head.

•Removal of longer chain hydrocarbons
•Storage.
•Compression.

38 It should be stressed that the initial exploration for gas, drilling etc. does not fall into one of these activity descriptions and would not require a PPC permit However, to allow the processing of any gas on the site, a PPC permit must be in place (applied for, determined and where appropriate issued) prior to gas being accepted into the process, i.e. the treatment process must not begin unless a valid permit is in force.

39 On consideration of a PPC permit for an installation it may be necessary to consider existing and future drilling operations, if located on the same site, as directly associated activities. This would mean controls relating to the drilling operations and any injections into groundwater may be included in the permit and will come into effect at the point gas processing commenced. The PPC permit will require the

operator to monitor emissions to air / water / land from both point sources and fugitive emissions within the permit boundary.

46 The Environmental Liability (Scotland) Regulations 2009 (ELR) place operators of a wide range of activities (e.g. activities requiring a licence under CAR or a PPC permit) under obligations to take preventive measures where there is an imminent threat of environmental damage and to take remedial measures where their activities have caused environmental damage. Activities associated with unconventional gas extraction are likely to come within the scope of ELR. Operators must notify SEPA *if* they have caused land or water damage or if there is an imminent threat of such damage. Scottish Natural Heritage (SNH) (or Marine Scotland for the marine environment) should be notified in cases where the damage is likely to affect protected species and natural habitats. Further information on this subject is available on our website.
(http://www.sepa.org.uk/land/land_regulation.aspx)

49 From experience in the industry it is very likely that the fluids that flow-back to the surface after hydraulic fracturing will contain *naturally occurring radioactive materials* (NORM). The production of oil and gas is classed as a *NORM Industrial Activity* for which the Radioactive Substances Act **(1993)** (RSA93) provides threshold values for radioactive concentration. Above these the fluid will be classed as radioactive waste but below them RSA9S does not apply Based on experience, we are adopting a prudent position that unless the operator can demonstrate by measurements that the concentrations of NORM are below the threshold values, all developments will require an authorisation issued under RSA93, prior to the start of groundwater abstraction, for the accumulation and disposal of the fluids that flow back as radioactive wastes.

In conclusion on this issue one can be entirely satisfied that SEPA will regulate and control "effectively" any environmental issues that might arise: this will be done after any planning permission is granted. Accordingly great weight can attach to the fact that SEPA will regulate and control effectively all these issues if permission is granted. Any suggestion that SEPA cannot or will not fulfil these functions is without foundation. I refer to the evidence of Mr Pollock who was the only witness who gave evidence from an informed position as he has had regular dealings with SEPA.

Furthermore great weight must attach to the fact that SEPA do not object to the current proposals. This is particularly so given that SEPA have regulated and supervised drilling operations on this site over many years.

I refer to the consultation response dated 2/11/12 DE54. I also rely on the positive nature of the response.

Para. 1.1 "We welcome the commitment …"

Para. 3.1. "We welcome the inclusion of …" This of course relates to the wetlands.

Para. 4.3. "We are satisfied that the proposed works are in principle capable of consent under CAR …"

Para. 5.1. "The proposals for well abandonment are welcomed."

Para. 6.4. "… this approach is welcomed."

The positive tone and content of the response from the experienced Government regulator is a further factor in favour of granting consent for the proposal.

3.7 **Good Neighbour Agreement**

I refer to the agreement for its terms [DE112]. This was an initiative by Dart to try to give greater involvement, knowledge and control to the local community. This was all to be undertaken at the expense of Dart. The agreement involved the appointment of an independent assessor to monitor water quality. This it was hoped would have removed any uncertainties or fears or concerns that the local community have about this issue. However as Mr Appelbe confirmed (para. 6.1) the community did not wish any part in this well intentioned initiative on the basis quite clearly that this was the responsibility of SEPA. This reasoning, although understandable, does not sit happily with claims by others that SEPA cannot be relied upon or trusted to regulate, monitor and enforce!

3.8 **The Statement of Common Understanding**

I refer to the document for its entire terms. It confirms a great measure of agreement. Mr Telfer will consider it in more detail. Accordingly I say nothing more regarding it here, but adopt what Mr Telfer says.

4. ENVIRONMENTAL ISSUES

The Development plan and all other relevant material considerations strongly favour a grant of consent for the proposed extraction and exploitation of CBM at this site. However quite properly this strong policy support is subject to a consideration of all environmental issues, and a judgement being made that there will be no unacceptable impacts from the proposed development. I stress of course that the test is not no impact or effect - that would be an impossible test for any development. The test is unacceptable impacts, not even whether these are significant effects. Many developments have significant effects but are acceptable.

Accordingly I will now consider in a little detail the environmental issues. However again I stress that these issues must be looked at in the proper context.

(i) Planning permission exists for extensive development and exploitation of CBM already. Some consents have more than 20 years before expiry. These consents do not have the same environmental protection as we now propose. DART are entitled and doubtless will develop in accordance with these consents if the current proposal is refused. As a small example that will mean discharging treated water firstly by tankering to the holding tank, then discharging by means of a surface pipe on to the mudflats. It is obvious that this is much less environmentally acceptable than the system we currently propose. However using that current system will be a consequence of refusal.

(ii) DART or their predecessor have already satisfied several bodies in relation to environmental measures. I refer to the existence of the PEDL, Coal Board Authority permission, and of course SEPA approval confirmed by the letter of non-objection.

(iii) Development has taken place here for around 20 years, and DART have been involved directly or indirectly through Composite for around 10 years. There is no history of problems, complaints or enforcement action. Falkirk Council gave no

evidence about this. SEPA who has supervised and indeed regulated the entire process has no objections and has made no mention of any problems or difficulties.

The only issue was one complaint re noise which was dealt with by Mr Fraser. I submit this is all a remarkable achievement and a testament to the environmentally sound techniques employed here. It is also a testament to the engineering and drilling excellence at this site.

This is the background against which consideration must be given to the proposals for the future.

4.1 **Gas Delivery and Water Treatment Facility (GDWTF)**

In this regard I adopt the evidence of Mr Speirs who has a first class honours in Chemical Engineering and many years' experience of similar or indeed much more hazardous projects.

I simply quote the conclusions of his precognition.

4.1 The evidence presented describes how the proposed GDWTF would be designed, constructed, commissioned, operated, maintained, decommissioned arid dismantled in accordance with applicable legislation, standards and industry best practice guidance.

4.2 The evidence describes how construction of the QDWTP would require a Construction and Environmental Management Plan *(CEMP)* to be submitted to and approved in writing by Falkirk Council and Stirling Council as Planning Authorities in consultation with SEPA. The CEMP shall set out best practicable means to minimise the impact of construction activities 4.3 The Water Treatment Plant is described, showing how Produced Water from the CEM wells would be collected, treated and transferred to the outfall at the quality required by SEPA in the proposed CAR licence and how the resulting solids would be separated and removed from the Treated Water for disposal.

4.4 The operation of the GDWTF flare and vent are described; the vent would only *be* used infrequently (anticipated to be less frequent than once in ten years during normal operation) and for short durations (e.g. 15 minutes) in contingency situations; the flare would be used

for small releases of gas from pressure relief valves or from venting and purging operations Prior to maintenance.

4.5 The evidence presents how the GDWTF would be designed and operated to fully comply with the requirements of the proposed PPC permit from SEPA and in accordance with the necessary CAR licence.

4.6 The process technology and equipment proposed for use in the GDWTF are described and how their selection and specification would be in accordance with BAT such that the environmental impact of the process including emissions to air and discharges to water are minimised as far as practicable. The proposed process technology and equipment is comprised of proprietary, proven, industry standard items and s not considered novel.

4.7 The normal process control and independent safety control systems of the GDWTF are described and how manual operations on the GDWTF would be kept to a minimum through automation.

4.8 The evidence describes how the CUM gas would be compressed using two stages of rotary screw compressors and dehydrated using TEG in order to achieve the necessary final gas pressure in excess of 6900kPag and quality specification as agreed between Dart Energy and SON prior to odourisation and injection to the SON pipeline.

4.9 The dismantling and site restoration of the GDWTP is also described; main equipment items being removed *from* site for refurbishment or recycling, followed by dismantling of ancillary equipment and piping, removal of buried services and final restoration of the sire surface and removal of the perimeter fence in accordance with best practice and legislation at the time.

4.10 In accordance with Policy RWO3 “Assessment of Mineral Proposals” in the Falkirk Council Local Development Plan, the proposal for the GDW’I’P would include “a fully costed, appropriately phased scheme for restoration and aftercare, which secures benefits for the green network in terms of Policy 0N01, and will be secured through appropriate financial guarantees.”

In addition he gave additional evidence about flaring and venting simply because there seemed to be a fundamental misunderstanding about this issue by some people.

> *"Since the primary disengagement of methane gas from produced water occurs at the bottom of the well bore, the calculated quantity of methane which could remain dissolved in the water and subsequently be released is considered very small; in the region of a few kilogrammes per hour. It is proposed to allow this gas to disengage from the produced water in the controlled environment of the Water Treatment Plant on the GDWTF. The gas would be collected using an extraction system and treated in the onsite flare, to prevent the methane being released to atmosphere."*
>
> *"The proposed flare at the GDWTF would be of the enclosed ground flare type, and would ensure that the small quantities of methane arising from venting operations were prevented from being released to atmosphere by combustion of these, at a suitable temperature maintained by the flare control system, to ensure the emissions from the flare were in accordance with the limits set by SEPA.*
>
> *The flame would not be visible during operation since this type of flare, unlike the familiar elevated flares at the (Grangemouth refinery, is fully enclosed within a housing on all sides. The proposed flare would also be many times smaller than the refinery flares."*

There was no significant challenge to his evidence and so it must be, accepted I submit. In addition and of some importance is that fact that this evidence confirms that there is no realistic prospect of any members of the public coming into contact with the produced or treated water. It is quite simply impossible. Any suggestion to the contrary is without proper foundation and is simply unreasonable.

In addition it is important to recognise that the plant assessed is about three times the size of that which will actually be built and operated as a result of this consent. Much has been said about the fact that the Application is for a bigger plant than currently required. The answer to that is rather simple. Of course Dart has allowed for the possibility (no more than that) of future expansion. It would be absurd and unrealistic not to consider that possibility. It would be rather stupid to plan a site, including acquiring land for a site, which could in the

future become too small. This may involve a ransom situation in relation to land. It may involve knocking down buildings because a second generator could not fit in. In similar terms Falkirk Football Club have clearly allowed for the possibility of a fourth stadium. That does not mean it will ever be built. Nothing turns on this issue.

4.2 **Drilling**

Mr Sloan is a drilling engineer with very considerable experience and knowledge. He has drilled many wells most of which were horizontal, and a number in excess of 5 miles in length. In truth he was the only witness who truly knew about drilling and the engineering thereof. The best that Professor Smythe could offer was that he had on one occasion stood on a drilling platform in Murmansk. Interesting possibly, but of no relevance certainly!

I adopt all of Mr Sloan's evidence but repeat his conclusions here.

> *In overall conclusion, the well design and construction methodologies utilised at Airth reduce the risk of aquifer and air pollution to as low as reasonably practicable. These designs are reviewed and approved by independent specialists and are drilled within a regulatory regime which is robust and fit-for-purpose.*
>
> *The wells can be and are drilled safely and accurately, with precision and consistency in intersecting production wells and in following coal seams. At all times control is maintained over the bit and rapid and informed decisions can be taken based on real-time information.*
>
> *During well construction great care is taken to control fluids and levels are constantly monitored. The rig has dedicated, specialist equipment which can detect either fluid or gas discharge and allows immediate response and mitigation.*

Drilling Fluids

Much has been said about drilling fluids. However I ask you to accept the evidence of Mr Sloan, the only witness who has actually mixed and used drilling fluids. Indeed he has been covered in drilling fluids and even fallen into fluid pits (2.1.3 Rebuttal). He is accordingly

rather well qualified to speak about drilling fluids, unlike others who may be thought to be simply stirring up emotions and trouble in equal measure. Because this issue has attracted so much comment I set out in full Mr Sloan's evidence about drilling fluids.

5.1 The main functions of a drilling fluid are to: *1)* maintain well control over the fluids in the drilled formations via the drilling fluid's density or weight: 2) maintain wellbore integrity by controlling the drilling fluid's weight and or by controlling the drilling fluid's chemistry: 3) transport the drilled material (rock cuttings) to the surface quickly and efficiently and *4)* minimise losses of any drilling fluid to any porous, permeable drilled formations in the well.

5.2 The ideal fluid for Dart Energy's wells is fresh water: environmentally friendly, easy to use and cost effective. However, the physical properties of water are not ideal for use as a drilling fluid: water has a low viscosity so its cuttings carrying capability is limited, and water is not a thixotropic liquid (like tomato ketchup or paint) which will gel if it is not flowing, so its cuttings holding capacity is limited. Water can also react with many clay minerals found in a wide variety of rock formations leading to wellbore instability and collapse. For these reasons, polymers or clays and also salts such as Potassium Chloride or Calcium Sulphate are often added to water to modify the physical and chemical properties of water to make Water Based Drilling Fluid. Other additives such as citric acid or sodium carbonate may be added to maintain high or low pH in the drilling fluid. These properties are to balance with the natural fluids already in the strata.

5.3 Considerable data about the bore pressures and the chemical nature of the rock formations in the Airth area are available from the number of wells that have been drilled in the area. These offset wells show that the formations are normally pressured (le water column pressure) and that the formations are not reactive with water (ie there is no requirement to use inhibitive drilling fluids with potassium chloride or calcium sulphates).

5.4 Most of the offset wells have been drilled with water or with water plus various polymers. Those wells drilled with water did record problems with cuttings not being removed from the hole, problems not seen in the wells drilled with water plus polymers.

5.5 Conductor /Surface Casing: The proposed drilling fluid for this hole section is fresh water plus PureBoreTM polymer to provide viscosity and gels. PureBore is a starch derived biodegradable polymer which is certified by the Environment Agency (EA) as drinking water safe.

5.6 Intermediate Casing: The proposed drilling fluid for the intermediate hole is again freshwater plus polymer. The polymers will be PureBoreTM for viscosity and gels and may also require PAC for fluid loss control (ie to stop the drilling fluid seeping into any other formations), with small amounts of sodium carbonate to maintain the pH. PAC is a cellulose derived biodegradable polymer.

5.7 Reservoir Hole: The drilling fluid for the *6* inch hole sections will be the same as the drilling fluid used for the intermediate section: freshwater plus PureBoretM and PAC polymers.

5.8 Drill Fluid Preparation and Storage: The drilling fluid will be mixed on site by adding approved chemicals to the drill water using the rig's dedicated mixing faculties. All drilling fluids and the drill water will be stored and operated through a series of steel fluid tanks and the entire circulating system is designed to prevent any release of drilling fluids to the environment under normal operating conditions. In addition, the wellhead area will be enclosed in a cellar and all the drains on the drilling rig will go to a tank, to prevent any accidental spills of drilling fluid on the surface. All cuttings and used drilling fluid will be taken from the site, treated and disposed of in an approved manner by dedicated and licensed waste disposal contractors. The drilling fluid and cuttings are benign, and it is my understanding that they are placed in landfill with no issues.

5.9 Contingency Drilling Chemicals; in both hole sections, should minor losses (up to 1ObblsIhour) of drilling fluid to porous formations be experienced, a high viscosity “pill’ of the drilling fluid with a higher polymer concentration would be pumped to stop the losses, If major losses (more than —lObbls/hr) were experienced, the first step would be to pump a high viscosity pill. If this did not work, then a pill of sized calcium carbonate (ground up marble or limestone in distinct particle sizes) would be pumped to stem the losses. Stopping major losses is critical to maintaining well control and if the use of sized calcium carbonate was unsuccessful, other Lost Circulation Material (LCM) such as ground up nut shells, cellophane flakes, and ultimately, a cement plug, could also be pumped.

5.10 The planned drilling fluids and proposed methods of controlling fluid loss to the formation on this well, combined with the well design mean the potential risk of contamination of near surface aquifers at the drilling location is very low. The risks posed to Local water abstraction in the Airth area due to drilling and production operations are considered to be negligible.

5.11 The risks to surface water is also very low due the method of drilling fluid and drilling chemical storage and containment, drilling fluid mixing and the nature of the drilling chemicals: Pure Bore1’, PAC sodium carbonate, calcium carbonate and other approved chemicals do not pose a physical, health or major environmental hazard and all are listed on the Oslo-Paris Convention For The Protection Of The Marine Environment Of The North-East Atlantic (OSPAR) Pose Little or No Risk (PLONOR) list. Puresor&M is also certified as drinking water safe by the Environment Agency (EA)

In addition Mr Sloan gave a detailed response to the concerns listed by Dr Lloyd-Smith about fluids.

2.1.4 A7 — The chemicals listed are perfectly harmless in the quantities utilised and the descriptions proposed are worst case conditions. These chemicals are actually very commonly available (all can be bought on Amazon) and utilised in food production and

consumption:

Potassium Chloride (KC1) — can be purchased online or as Lo-Salt (66% KCl) in a supermarket. Sprinkled on or in food to season the same as Sodium Chloride (NaCl), but considered healthier in reduction of sodium consumption.

Soda Ash — utilised as water softener in detergent products and can be consumed as sherbet (fizzes in contact with saliva).

Xantham Gum — utilised as a thickener in ice cream and confectionary products.

Calcium Carbonate — taken as indigestion remedy eg Rennes

Citric Acid — used as a cooking product and naturally occurring in fruit.

2.1.4 A8 — This list of drilling fluid components is broadly correct, but again the link between the chemicals, quantities utilised and hazard presented *is* flawed. These chemicals if ingested in high quantities could cause health problems but that is true of any chemical including *water,* The actual quantities involved and actual exposure to these chemicals is limited. There are no planned use of corrosion inhibitors, defoamers, emulsifiers or breakers in the drilling fluid and these are not listed in our documents to regulatory bodies.

Given the nature of this evidence, it is very difficult indeed to understand why an experienced professional like Dr Lloyd-Smith continues to suggest that salt, citric acid, or other chemicals listed by her are hazardous and a threat to health. They are not and I submit that suggestion or allegation should not be made by a professional person acting reasonably and responsibly. In addition Dr Lloyd Smith and others refer to chemicals which the evidence confirms <u>will not be used</u>. In addition there is no realistic prospect of the pubic coming into contact with the drilling fluids whatever may be the composition. Accordingly there is <u>no proper basis</u> to suggest that drilling fluids are a risk to the public or public health. To do so and to continue to do so is irresponsible, unreasonable and wreckless.

4.3 **Outfall**

The evidence in regard to this issue was given by Dr Marsh who is both highly qualified and experienced. There was no significant challenge to his evidence. Accordingly I simply repeat his conclusions:-

1. Daft Energy propose to move the existing temporary surface discharge currently consented under a SEPA CAR Licence CAR/L/1017224 and subsequent Variation Notice CAR/L/1017224VN01 from north of Clackmannanshire Bridge to a location south of Kincardine Bridge and make it a permanent outfall pipe and diffuser discharge.

2. Subject to field monitoring and modelling requirement to satisfy SEPA and environmental guidelines for the new discharge, Dart Energy are seeking to apply the exact same CAR Licence conditions as the previous temporary discharge, for the new discharge location. SEPA currently specify water quality standards for the effluent discharge that Dart energy have to meet.

3. The proposed new outfall pipe and diffuser will discharge into the Fifth of Forth adjacent to environmentally sensitive sites designated as a Site of Special Scientific Interest (SSSI, Special Protection Area (SPA) and Ramsar site. The discharge and effluent plume will emerge at MLWS and impinge on the environmentally sensitive sites, but represents a betterment compared with the existing discharge which lies on the surface of the inter-tidal mudflats. (my underlining)

4. The proposed new outfall pipe will be directional-drilled under the inter-tidal mudflats in order not to disturb the flora and fauna. The new outfall will be a betterment *for a* number of reasons including i) it will be buried and therefore will no longer be vulnerable to potential damage; ii) it will remove traffic currently required to transport effluent from the GDWTF existing operations to the Fifth of Forth or tank storage at the side of the estuary; iii) no risk of potential spillage of effluent whilst in transit; iv) time-controlled discharge (see below) to prevent discharge during low velocity and shallow water conditions around LW, subject to final agreement with SEPA.

5. Initial characterisation monitoring of the proposed new outfall site was carried out by ETS to ensure environmental compliance under SEPA regulatory 10 guidelines, ETS made recommendations to Dart Energy who accepted them in their entirety and allowed the *work* to proceed unimpeded throughout.

6. SEPA provide generic guidance notes to ensure environmental compliance for outfall discharges including field data acquisition and computer modelling to ensure minimal initial dilution of the effluent is achieved within a defined area of the discharge known as the Mixing Zone. A key requirement is to ensure that any modelling accurately reflects the complexity of the receiving water, is ground-truthed with real data and can predict the potential water quality impact of a discharge. SEPA also provided Dart Energy with specific requirements to address concerns related to Dart Energy's effluent including the fact it is negatively buoyant and also has particulate (precipitate) present.

7. Characterisation of the new proposed outfall site was split into two phases, with the first phase of monitoring carried out in Spring 2013 comprising measurement of tidal currents, water column stratification, drogue tracking and bathymetry. A second more detailed phase of work including measurement of initial dilution, fate of particulate and modelling has not yet been carried out.

8. The initial characterisation assessment indicated tidal asymmetry between the duration and intensity of the flood tide versus the ebb tide with stronger tidal currents occurring during spring tides versus neap tides. The results indicated that at the proposed new outfall location, the water depth is very shallow for up to 2 hours before, during and up to 2 hours after LW, the tidal current velocities are very low during this period and the salinity is also low compared with the effluent at up to 45- 60ppt. it is therefore likely that there will be limited initial dilution of the effluent during these conditions. As a precaution, Dart Energy are proposing to store the effluent at the GDWTF during these periods of approximately 4 hours per flood-ebb tidal cycle (from predicted LW-2 to LW to LW+2). Daft Energy will then discharge effluent when tidal currents are stronger and there is greater water depth using a time-controlled discharge system; this will equate to effluent being pumped for approximately 8.5 hours of the 12.5 hours flood-ebb tidal cycle.

9. Pending further measurements, it Is estimated that the approximate combined (tidal and freshwater) volume discharge across the entire estuary channel at the proposed outfall discharge site is between 700 and 1700 m3 & for neap and spring tides respectively, subject to variation in rainfall and river flow. By comparison, the volume of effluent Dart Energy are discharging based on a consented daily discharge volume of 300 m3 per day, over the proposed *8.5* hour discharge period per flood-ebb tidal cycle (12.5 hours) is approximately equivalent to 0.005 m3 51; this is equates to more than 5 orders of magnitude smaller than the tidal and freshwater volume at that same point in the estuary.

I simply conclude on this topic by stressing that this is a significantly better proposal than the existing. However if this is refused the existing situation/*status quo* will continue to be used with all the risks and issues inherent with that surface system.

4.4 **Noise**

I rely on the evidence of Mr Fraser. His conclusions were:

"4.1. The temporary drilling operations for each site are relatively short in duration and are most akin to noise from a construction site. In the UK such temporary operations are typically subject to less onerous requirements, which takes account of their temporary nature and of practical considerations.

4.2. The noise predictions in the ES and supporting documents are based on worst case operational conditions and pessimistic assumptions. The prediction methods used are conservative and have been tested by monitoring at several operational sites over extended periods. My assessment is mainly based on WHO criteria intended to protect human health. There are practical, relatively simple measures available to mitigate noise from the temporary drilling operations, which use well proven noise mitigation techniques. 4,3. Noise from temporary drilling operations will not cause significant loss or amenity during the daytime or in the evening. Noise is predicted to comply with WHO night-time sleep disturbance criteria. The impacts are predicted to be insignificant based on the assessment framework suggested in 85 S22e2OOO. These impacts can be effectively controlled by appropriate planning conditions, but these conditions should take account of the practical difficulties of measurement in areas with higher ambient noise.

GDWTF

4.4. The GDWTF can be designed to ensure that the noise impacts do *not* cause significant adverse impacts. This installation can be effectively controlled by appropriate planning conditions.

Gas Production Sites

4.5. Noise from the *long-term operation* of the gas *production* sites is predicted to be well below WHO night-time sleep disturbance *criteria.* These installations are small scale, located at ground level and readily amenable to enclosure and acoustic screening using appropriate landscaping measures. The residual impact of the operational noise from the gas production sites is predicted to be of neutral significance."

There was no challenge to his evidence. There are no objections from Falkirk Council or Stirling Council on the basis of noise. Accordingly all professional witnesses agree there is no issue in relation to noise. There is no contrary evidence and accordingly the evidence of Mr Fraser must be accepted.

4.5 **NORM**

A detailed precognition was lodged by Mr Saleh together with a commentary on third party evidence. In light of Mr Saleh's evidence CCOF withdrew significant parts of the evidence of Dr Fairlie, accepting very properly that it was wrong, and exaggerated or overstated the position. Thereafter following discussion it was decided Dr Fairlie should not give evidence and instead a minute of a meeting was lodged. The Minute is before the Inquiry but amounts to "broad agreement" regard NORM. In all the circumstances I invite you to hold that CCOF had simply misunderstood the issue of NORM. In addition I invite you to accept the evidence of Mr Saleh which was unchallenged. His conclusions were:

"6.1 Overall, on the basis of literature reviewed, potential radiological impacts assessed the proposals for the management of NORM waste arisings put forward by Dart

Energy, and Dart Energy's commitment to complying with the regulatory requirements under the RSAO3, it is my professional opinion that the potential impacts that would arise from the management and disposal of NORM wastes from the proposed development can be considered to be insignificant.

6.2 The evidence presented above demonstrates compliance with regulatory requirements to the satisfaction of the regulatory authority, it is hoped that the evidence addresses the concerns put forward by Dr. Fairlie on behalf of CCoF, regarding potential radiological impacts that may arise from the proposed development."

4.6 **Geology, Hydrogeology, and Fugitive Emissions**

I will deal with the above issues together simply because the evidence came from three witnesses who overlapped with one another. It is of course important to stress that each witness was not just well qualified but very experienced. Mr Goold who is no longer directly employed by DART was led as a witness because he had extensive experience of the site and drilling on the site. Dr Cuff was flown over from Australia particularly to counter claims that were made about alleged problems in Australia. Dr Cuff has extensive knowledge about CBM exploitation in Australia have acted and advised both the private sector and Government there. In short Dr Cuff was one professional who was best placed to give the Inquiry an objective and accurate account of CBM exploitation in Australia. His evidence was truly the best possible evidence about this. In the circumstances I adopt all Dr Cuff's evidence and repeat his conclusions.

"12.1 Coal Bed Methane Associated Fugitive Gas Emissions

12.1.1 To interpret whether fugitive emissions can occur, or have occurred, it is necessary to understand that the mechanism for gas water flow in coal bed methane deposits is through a naturally present network of micro—fractures in coal known as cleats.

12.1.2 As a member of the Queensland Government Independent Scientific Panel, and our involvement with the three underground coal gasification pilots in Queensland, Australia, we appreciated how gas extraction projects proceeded in an evolutionary manner. From this experience, I am of the opinion that an assessment can only be made on currently available data.

12.1.3 Geological and hydrogeological models and monitoring programmes associated with most geologically based projects evolve through successive iterations of data acquisition and interpretation. A more complete understanding only evolves iteratively as the project develops. This accepts that the model must be dynamic and allow modifications arid improvements that are pertinent to the specific site, the environment and the community. To this end the Queensland Independent Scientific Panel adopted a whole of lifecycle" approach.

12.1.4 On this basis, it is my considered opinion that the levels of existing data are more than sufficient to provide an understanding of the risks associated with potential fugitive methane emissions that could be associated with the proposed operations.

12.1.5 It is also my opinion that regardless of the level of seismic coverage, in thin coal seams there is a likely presence of small scale faulting below the resolution of seismic surveys. It is considered that the small scale of this faulting is such that the probability of migration pathways extending significantly beyond their local context and linking with larger scale faults is negligible.

12.1.6 From consideration of the Coal Authority Mine Plans, it is concluded that the probability of encountering undocumented mine workings at the depth of target coals is low to negligible.

12.1.7 This conclusion is based upon consideration of all data provided by Dart, evaluations of a broad range of literature, and professional experience.

12.1.8 The detail of the data supplied **by** Dart and obtained from other sources gives confidence to the conclusion that the risk relating to non—infrastructure related sources of fugitive methane emissions is low to negligible.

12.1.9 An evaluation of the matters considered in this report, leads to the overarching conclusion that fugitive methane emissions along natural pathways in the geological succession at the Airth site have a negligible risk **of** Occurrence pre— during—, and post— operational stages.

12.1.10 It is also my opinion that the data available are more than sufficient to rebut the claims by AMEC, Professor Smythe and Dr Lloyd-Smith."

Mr Goold has very considerable experience both practical and academic. His evidence should be accepted I submit. His conclusions are:

"5.1 This precognition report has been *prepared to address three* geological topics in support of Dart Energy Ltd's Inquiry Statement for the Coalbed Methane Production Facility at Letham Moss, Airth. The *three areas covered comprise:* 1) evidence *of* coal permeability at Airth *and* an explanation of why Dart states hydraulic fracturing will not be required to exploit natural gas in their target coal seams; 2) an account of data sources acquired by Dart and how iterative geo-modelling is being used to avoid old mine workings and faulting in production laterals; and 3) a critique *of* a geological assessment for Dart's proposed development placed in the public domain by Professor David K Smythe and an explanation of pressure gradients and the impact of lateral blockage requested by AMEC.

5.1.1 A summary of findings with respect to permeability negating any need for hydraulic fracturing is as follows:

5.1.1.1 Coal recovered to surface in coring operations at Airth shows excellent visual indications of cleat, the primary means of permeability in coal.

5.1.1.2 Third party reservoir modelling of gas arid water production data from well 10A confirms that encouraging natural permeabilities exist within the Airth area (ranging between 0.5 milliDarcy and Just over 1.0 milliDarcy).

5.1.1.3 Dart's published production data from Airth 12 (peaking at 800,000 scfgd and sustained at 500,000 scfgd) Is another positive indicator, suggesting the encouraging permeability and reservoir exposure modelled for Airth 10A also exist in Airth 12.

5.1.1.4 Achievement of successful flow rates also depends critically on length of exposure to coal in production wells (amount of hole-in-coal) and not simply the existence of suitable natural permeability. Dart has continued a well-established trend by the previous operator of increasing hole-In- coal exposure through incremental advances in well steering technology.

5.1.1.5 In the light of evidence presented above that natural permeabilities at Airth are within a rule-of-thumb range deemed suitable for commercial developments in North America and Australia, together with Dart's demonstrated ability to construct tong horizontal production wells within the reservoirs and publically stated flow rates from Airth 12, it is concluded that Dart's assertion that hydraulic fracturing is not required to support commercial development at Airth is based on robust scientific principles.

5.1.2 A summary of the findings with respect to fault and mine working avoidance in production laterals is as follows:

5.1.2.1 Dart believes that faulting at any scale does not present a credible pathway for significant and rapid migration of fluids or natural gas to receptors at the surface or within the subsurface. However, it is acknowledged that faults do provide a risk to successful commercial development by creating flow barriers and limiting production efficiency.

5.1.2.2 Existing levels of data collated by Dart provide a robust basis for the proposed field development planning and are probably without precedent in Europe. Successful execution of challenging long horizontal wells in the Airth field between 2004 and 2010 by Composite Energy Ltd, which used original versions of this seismic data (not reprocessed) and all the borehole data and mine abandonment plans used by Dart, are used to confirm this assertion.

5.1.2.3 Sub-seismic faulting (<5m of throw) cannot be predicted and will always be a commercial risk for CBM development wells in thin (<1m thick) coal seams regardless of seismic coverage or type. This is a commercial risk acknowledged by SM operators globally and *is* ultimately factored into economic forecasts and planning once sufficient wells have been drilled to quantify the associated costs.

5.1.2.4 Avoidance of abandoned mine workings in Dart's target CBM reservoirs can be made by reference to public domain mine abandonment plans from the Coal Authority and digitised by Dart, Dart's 250m offset from abandoned workings in the Limestone Coal Formation in the Airth area, based on field flow characteristics, should be easily achievable.

5.1.2.5 Using established iterative exploratory modelling procedures, Dart's data holdings are deemed to be sufficiently extensive for initiating detailed well planning moving away from the original Airth pilot development area

and provide a highly optimal foundation for a model that can be adapted with new well data In an incremental and iterative approach. Avoidance of major faulting causing premature termination of *production laterals and risk of* interacting *with* abandoned mine workings is certainly feasible using this level of data

5.1.2.6 Iterative geological remodelling may necessitate amendment of well trajectory plans to be made with consents required from subsurface regulators and with approval from planning authorities."

In addition I now quote some of the re-examination of Mr Goold. I do this because I submit this in rather short form describes some of the central issues which seem in the past to have been an issue to some.

GS	Now in terms of the Black Warrior developments and there've been many many lateral wells drilled there - is that so?
Mr Goold	Yes, I believe nearly 4,000
GS	4,000. And is it your understanding that monitoring takes place as to whether there is fugitive emissions of methane or not, Mr Goold - what is your understanding and what is your understanding based on?
Mr Goold	It is my understanding that monitoring takes place in ground water bore holes. The reason for that is that the coals are located geologically, strategraphically, within protected aquifers and there is a need for these aquifers to be protected so the monitoring takes place in order to prove that CBM activities have not introduced any contaminants into the aquifers.
GS	To put another way that I can understand simply, does that mean that therc is in effect monitoring as to whether there is or is not fugitive emissions of methane?
Mr Goold	Yes

GS	And what do you understand to be the outcome of that monitoring which takes place in relation to ... I think you said about 4,000 was it ... wells or laterals, I'm not sure which
Mr Goold	There have been no incidents of fugitive methane
GS	And was that 4,000 wells or 4,000 laterals?
Mr Goold	It's 4,000 wells - I don't know how many of them are laterals
GS	Now, you said in evidence that there are impermeable layers throughout the appeal site. What is the importance or otherwise of that fact Mr Goold?
Mr Goold	Ok well there are two reasons why that's important. First of all, they are generally clay rich and during faulting, those lithologies which are clay rich, which are mudstones otherwise known as shales, give rise to material during the movement of the faults which are predominantly clay. And it's this clay which smears along the fault and effectively seals the fault and stops it from being a hydraulic conductor. These layers are also important in terms of vertical migration of fluids from lower levels to upper levels because they are very impermeable and they do not allow easy transmission of fluids or hydrocarbons through them into upper levels.
GS	If they are, as you say, very impermeable - does that add or subtract to the confidence that there will be no fugitive emissions of methane to or towards the surface?
Mr Gould	It adds to it, yes
GS	Adds. Is that perhaps an answer to the matter or partially an answer to the matter?
Mr Goold	No, that's an answer to the matter
GS	And how many of these impermeable layers do you say that there are?
Mr Goold	1 can't say off the top of my head but more than 20

GS	More than 20?
Mr Goold	Yes
GS	Very impermeable layers, each one of which would help to stop upwards fugitive emissions of methane is that so?
Mr Goold	Correct, yes
GS	Now just before we even get to the impermeable layers, why do you say that it is, it not impossible, unlikely that the gas would move in an upwards direction from the bore in which it is or surrounds. Why is that?
Mr Goold	Well the process of dewatering a reservoir by a well or horizontal lateral involves the removal of water and the creation of a pressure gradient from the coal towards the well bore, The well bore will be at or just above atmospheric pressure, whereas the coal reservoir is at hydrostatic pressure and that gradient draws the gas molecules in towards the well bore and in no other direction,
GS	Well I know absolutely nothing about physics Mr Goold you'll understand, but how would **it** be possible, as seems to be suggested to you, that a gas mixed with water or otherwise, it really doesn't matter, would move in the opposite direction against the pressure gradient. How would that be possible?
Mr Goold	It's not possible
GS	It's not possible?
Mr Goold	Its not possible
GS	So if it's not possible, is that an end of that matter?
Mr Goold	It is
GS	And do you assure this inquiry that that is physically impossible?
Mr	Yes

Goold	
GS	Well it's been put to you that there might be a little blockage of that lateral. What then Mr Goold? Is that a problem for us?
Mr Goold	It's not a problem. In the case that there is no route around the blockage, which is extremely unlikely …
GS	Now why do you say it's extremely unlikely - that's the first point
Mr Goold	Its extremely unlikely for two reasons. It depends what kind of blockage it was but if it was a rubblised section of well bore where the roof of the well bore had collapsed, there would still be permeability in the collapsed material, sufficient permeability for the gas and water to flow
GS	That is to follow the pressure gradient
Mr Goold	Indeed, yes
GS	So if there's any permeability in that blockage, the gas will still continue down the pressure gradient - is that correct?
Mr Goold	That's right
GS	Right, well let's go to the Domesday scenario that there's a solid blockage, like a piece of concrete, which of course would be impossible but something like that Mr Goold
Mr Goold	OK then there's another bypass mechanism whereby the coal itself provides the permeability
GS	So it would bypass if you like, go round that blockage?
Mr Goold	That's right because the coal is permeable
GS	Right, well let's suppose that ***even that*** is wrong and we're on to Domesday scenario U, UI or IV, I'm not sure which - if that's wrong, then what Dr Goold?
	Well what happens then is that the water then starts to flow back into the reservoir and the reservoir starts to re-pressurise. It will re-pressurise back to

Mr Goold	its original hydrostatic state. It will never pressurise up above hydrostatic and during that process of re-pressurisation, any liberated gas will then reabsorb into the coal and then a state of equilibrium will be achieved.
GS	Right, let's go through that slowly. At the start of the process of the water going back in, the pressure is still lower than the surrounding area - is that correct?
Mr Goold	That's correct
GS	So I presume it would tic impossible - correct me if' I'm wrong - for the gas to move against the gradient?
Mr Goold	That's right
GS	Then the lateral blocked section fills up with water - is that so? -
Mr Goold	That's right yes, and the surrounding reservoir
GS	And therefore the pressure increases back to the status quo -.. is that correct?
Mr Goold	Yes
GS	So at any stage during that process would it be practically or physically possible ***for*** the gas to flow against the gradient - albeit the *gradient* is decreasing?
Mr Goold	That's right - the gradient's decreasing but never reverses
GS	And eventually ... and I'm not sure how long it takes ... the pressure is restored to its **original** status quo - is that correct?
Mr Goold	That's correct yes
GS	And if the gas hasn't migrated upwards after all these years, why is it suddenly going to start migrating upwards now just because the pressure has returned to its former state?
Mr	It won't. It's reabsorbed on to the coal, thus physically sticking back on to the

Goold	coal
GS	How certain are you about all of this Dr Goold, because these are the central issues that are put against you that you've got entirely wrong you see
Mr Goold	Well it's the basic primary mechanism by which coal bed methane process works. It's not theory, it's fact
GS	To look at it simply -- would it defy the laws of physics for this to flow against the pressure gradient?
Mr Goold	Yes
GS	Now, another matter that was put to you is that if we bore, drill through a seam, go into another coal seam - this was Sir Crispin yesterday afternoon - we go through a coal seam, we go through a fault and we hit another coal 5eam, and it was suggested to you that the fault there would be a method, a conduit to the surface. Now could I just ask you to explain please the process that will take place if the lateral has gone through the coal seam, through a fault into another coal seam - what happens and how would that work? First thing, you start dewatering - is that correct?
Mr Goold	That's right, ok. So you start dewatering and the coal on both sides of the fault begins to desorb gas and water is flowing out of the coal seam into the pump and taking the gas with it.
GS	Well let's just assume the Domesday scenario put to you by CCoF that the fault actually is a conduit right to the surface. How is the dewatering going to work in that circumstance?
Mr Goold	Well its not because the fault will be full of water and the depressurisation process will not work
GS	So you wouldn't be able to deprcssurise - I know you disagree with this - but if the fault is a conduit to the surface you couldn't establish the pressure gradient could you?
Mr Goold	That's right

GS	So is that a point that can be properly taken against us, that somehow **we're** going to facilitate the gas going up to the surface through the fault?
Mr Goold	Well that's not going to happen It's not?
GS	It's not?
Mr Goold	It's not
GS	And I suppose if it was going to happen, it would be happening in any event right now - is that correct?
Mr Goold	That's right, **it** would have happened already, yes
GS	Because if that fault is a part of the surface then the gas would go up there anyway
Mr Goold	Yes
GS	Were *not going* to change that?
Mr Goold	No, that's right
GS	Now 3D or 2D as the case may be - if the question is whether faults are conduits or not, and we've explored the question or whether there are or are not *faults,* but if faults are conduits and that's the issue, how will 3D assist us?
Mr Goold	It won't assist us
GS	What conceivable difference could 3D make to establishing whether the fault is actually going to act as a conduit to the surface or otherwise>
Mr Goold	You can't tell that from 3D seismic
GS	So it is irrelevant if that is the issue

Mr Goold	Completely irrelevant

In addition Mr Graham gave detailed evidence on hydrogeology. His conclusions were:

"6.1.1 A number of ambiguous or scientifically unrealistic concerns have been expressed by third party objectors which relate to the hydrogeological environment beneath the proposed development area. These concerns are considered ill judged as they are based on the following selective or erroneous reasoning**:**

1) refusal to acknowledge that production and well design and associated infrastructure will provide a low risk of fugitive methane emissions either at depth or at the surface due to a double layer of casing and cement ensuring effective isolation of the borehole from the surrounding formations. Additionally not being satisfied that each borehole design will be controlled by the Coal Authority, HSE *and* DECC, and be verified *by* an accredited independent well examiner;

2) conflate the Australian experiences of coal seam gas production with CBM within the UK which are hydrogeologically distinct and not comparable;

3) confuse or deliberately associate the scheme with concerns associated with hydraulic fracturing that are not proposed at Airth or indeed would not be practical given the well designs presented. Furthermore, a condition of planning approval to exclude hydraulic fracturing would be acceptable to the appellant;

4) appear to reinterpret the geological stratigraphy, structure and lithology evidence as promoting rather than limiting hydraulic continuity between relatively *low* permeability strata;

5) confuse groundwater aquifer status of the Quaternary in assigning

'Principal Aquifer' status to all superficial deposits where in reality little groundwater is observed as a laterally continuous water table and no productive strata are identified;

6) suggest, In the absence of direct or appropriate indirect evidence, that significant fluid flow is taking place *within* the bedrock, including upwardly via faulting, where the evidence describes a very low mobility groundwater environment;

7) appear to suggest that pumping of less than 300 m3/day and associated depressurisation of target coal seams will lead to fugitive methane *migration in* the opposite direction to induced pressure gradients;

8) appear to conclude that pumping of less than 300 m3/day will not depressurise targeted permeable coal strata and immediately surrounding fractured lithologies but in fact depressurise near surface groundwater via open, highly permeable faults. This dewatering is suggested to occur despite the absence of Quaternary aquifers whilst not preferentially affecting intervening highly productive strata of the Passage Formation or even flooded former mine workings within the Coal Measures;

9) seem to consider that a maximum CAR limited pumping rate of 300 *m3/day,* representing 0.74% of the annual regional recharge to groundwater, is a significant abstraction with respect to surface groundwater resources within *coal* seams between about 700 and 1,000 metres depth;

10) seem to ignore or disagree with the conclusion drawn by SEPA, the principal national regulator for groundwater in Scotland, who remain satisfied that any impact on the water environment as a result of the proposed works (through for example borehole construction, groundwater abstraction or borehole abandonment and decommissioning), can be adequately controlled through the Water Environment (Controlled Activities)

(Scotland) Regulations 2011 (CAR) and that the proposed works are, in principle, capable of consent under CAR;

11) seem not to accept that observations of groundwater pumping and gas production rates will allow immediate deductions and responses to be made should coal seam depressurisation not take place as modelled;

12) seem to suggest that the methane production process involves the introduction of pollutants into groundwater where in fact none will do so; and

13) appear to maintain that macro diffusion-dispersion, sorption and degradation of methane over at least 700 metres of complex arid convoluted pathways between many geologically distinct and faulted strata will result in increases in concentration of methane within confined spaces *of* buildings or engineering works to be of concern as an explosive hazard.

6.1.2 Notwithstanding the above, the appellant has provided a commitment that methane will be monitored in air and within various depths of groundwater as part of mitigation measures to monitor for fugitive methane emissions. This voluntary approach, acceptable to the appellant to be made a condition of planning approval, is highly precautionary and will provide direct evidence on the status of methane concentrations at depth within groundwater and delineate any significant departures from pre—production groundwater conditions. Contingency measures in light of increasing methane concentrations *arising* from thermogenic sources could include the cessation of pumping or even the abandonment of an individual production site.

6.1.3 It is therefore concluded that due to the drilling and pumping methodology proposed, the low to negligible risk setting of the groundwater environment and mitigation in the form of methane monitoring of groundwater, the proposed CBM will riot have significant impacts.

In conclusion on environmental issues I submit that there is, on the basis of DART's evidence, no realistic possibility of any significant impact on the environment. As Dr Cuff put it repeatedly any risk is "negligible". Of course even this must be seen in the context that no scientist will ever say there is no risk. Accordingly if one accepts that a scientist will never state "no risk" confirming that any risk is "negligible" is as good as it gets from naturally conservative risk adverse scientists!

4.7 **Health Impacts**

There have been no reported or known incidents of any effect on health on or near this site notwithstanding drilling has taken place here for about 20 years. In addition, there is no evidence of any unambiguous link between gas extraction (including fracking) in Australia where the industry is wide spread and long standing. I will consider this issue in more detail later. All possible health impacts have been fully considered and explored in the Environmental Statement and also separately by Dr Buroni.

I invite you to accept all of the evidence of Dr Buroni who concluded that:

"7.1. Overall, having reviewed the ES and supporting information, and *having* regard for the regulatory process and responsibility of regulatory authorities, it is my professional opinion that the ES constitutes a thorough investigation of the potential health effects of the proposed project is compliant with all environmental standards set to protect health and changes in environmental health pathways neither present a concentration or exposure sufficient to quantify any adverse health outcome.

7.2 This conclusion is further supported in that none of the Dart CM operations within the area have breached any environmental regulations set to protect health, that no enforcement notice has ever been issued by any of the regulatory authorities, and that there is no evidence to suggest any adverse health outcome directly attributable to current local CBM operations."

4.8 **Air Quality/Climate Change**

In this regard I adopt the evidence of Mr Smythe. He was largely unchallenged. Accordingly I simply set out his conclusions.

10.2 My judgement of the overall air quality and climate change effects has been derived from:

i. atmospheric dispersion modelling of emissions from the three generators to be used to provide electricity to the Gas Delivery and Water Treatment Facility (GDWTF) and well sites;

ii. qualitative assessments of emissions from the flare, cold-vent, and fugitive emissions of odours; and

iii. a review of the potential for greenhouse gas emissions from this type of gas production, based on a review of the literature, evidence prepared by others and the relevant policy framework.

10.3 The proposed Coal Bed Methane (CBM) development comprises drilling, well site establishment at 14 discrete locations and inter-site connection services, a Gas Delivery and Water Treatment Facility (GDWTF), ancillary facilities, infrastructure and an associated water outfall point.

10.4 The principal sources of emissions during the operational phase are the combustion processes at the GDWTF, which includes up to three generators (only one generator is required during Phase One), a gas flare and two small gas burners for the dehydration units. Of these, the most important are the generators, which are designed to operate continuously.

10.5 As at any gas processing plant, there is the potential for emissions from the contingency relief of pressure via pressure relief valves, but this is an occasional source and is therefore not significant compared with normal operational emissions. Pressure relief valves would vent to the flare via a flare header, so there would be no direct emissions of methane from these sources. Enclosed flares are used as the preferred method of treating excess methane at this type of plant, giving rise to similar emissions in lower quantities and at higher temperatures than the generators.

10.6 The development area is rural and sparsely populated. Existing air quality is good and background concentrations of NO2 and PM10 are well-below the relevant annual- mean objectives.

10.7 The assessment of emissions from the facility has been undertaken using accepted methods, following SEPA and EA guidance. This is a conservative assessment as it considers emissions from three generators (for full field development) rather than the one proposed at Phase One.

10.8 There would be no significant emissions from traffic associated with the development and no significant dust generated.

10.9 The results of the dispersion modelling analysis demonstrate that air quality standards set to protect human health would not be exceeded and there would be no significant effects on ecological sites.

10.10 Other witnesses address the control of fugitive emissions from deep drilling and from above ground infrastructure, which is the purpose of good design and operation, together with process and safety monitoring, regulated by SEPA and the HSC.

10.11 The specific geological conditions at the development site, the nature of the CBM process, the specific design of the proposed development, and the management and

monitoring procedures that will be employed, mean that it is highly improbable that atmospheric releases of methane will occur, considering both the *potential* for controlled venting and that for fugitive emissions.

10.12 On the basis of the foregoing, there is no reason to suggest that this development is unusual *or* that it would *not* have the necessary controls in place anti it is reasonable to conclude that the greenhouse gas emissions associated with its operation are consistent with the relevant national policy framework for the exploitation of gas as an indigenous natural resource and are thus acceptable.

10.13 Having regard to the regulatory processes and controls imposed by SEPA and the HSE, I see no reason to refuse consent for this development on the grounds of potential effects on air quality or greenhouse gas emissions.

4.9 **Mitigation**

Any effects from the development have been mitigated by virtue of the design or choice of plant. An example of this is a quieter rig which will be used as required to reduce any sound impacts. Further examples are sound proofing to rigs, and use of bunds again to mitigate noise. I simply refer to all relevant witnesses for the precise detail.

In addition however conditions are proposed to ensure mitigation of any effects. There are many conditions which control such things as hours of operation and noise levels. The circular 3/2011 relating to EIA regulations specifically deals with mitigation being achieved by Conditions (paras. 136-139).

Paragraph 140 is of interest because this relates to developers adopting environmental management systems/monitoring systems. This is exactly what Dart propose in Condition 12 and the Methane Monitoring Plan. Accordingly Dart' actions are entirely consistent with, indeed encouraged by Government advice.

5. FALKIRK COUNCIL

5.1 Mr Hemfrey

Only one official of Falkirk Council gave evidence namely Mr Hemfrey. Mr Hemfrey works in the Development Plan area and accordingly his knowledge of the actual application was limited. Indeed he was at pains to point out that he had no responsibility to consider whether material considerations may justify grant of permission. Indeed Mr Hemfrey did not even mention the emerging Local Plan which is the settled will of Falkirk Council. Likewise there was no full or proper consideration given in the precognition to government policy relevant to this application. These ommissions by Falkirk Council are surprising. It is difficult to understand why Falkirk Council did not lead a relevant witness or witnesses. It may be of course that the answer lies in the fact that both the emerging plan and government policy favour the granting of consent.

Notwithstanding all of the foregoing Mr Hemfrey confirmed in his precognition that the proposed development conforms to the development plan in relation to all of the "above ground aspects". This was stated without even a consideration of any material considerations which I submit further favour approval. This evidence also rather conflicts with the position of Stirling Council. In addition Mr Hemfrey accepted that the original concerns were of "below ground aspects" were restricted to two consideration only namely EQ32 paras. 1 and 7. However during cross examination Mr Hemfrey accepted a number of important issues. I refer to the notes of my cross-examination. However in particular he accepted EQ32 para. 7 which relates to the water environment had been satisfied on the basis of the evidence led. In response to my question "We could assume that the amenity of houses will not be affected by the water environment for reasons we heard earlier in evidence - is that correct". Mr Hemfrey very very fairly answered "yes". Accordingly it was accepted the sole issue was fugitive gas affecting the houses. It was also accepted that if Professor Smythe gave evidence which was accepted that faults are sealed down to 500m, then that was an end of the Falkirk Council concerns and case. I did not even put to Mr Hemfrey of course that the evidence about faults being sealed was also consistent with the evidence of Dr Cuff, Mr Goold and Mr Graham. Importantly if faults are sealed then Falkirk

Council's opposition is at an end. Importantly the only evidence before the Inqiry is now that faults are indeed sealed.

In subsequent cross examination I asked Mr Hemfrey about conditions, the MM Plan and SEPA's regulatory role. In fairness to Mr Hemfrey he was not entirely familiar with these issues. However what he did accept is that these issues could or would give further comfort or indeed provide another way of resolving any concerns.

Mr Hemfrey also accepted that the lack of objection by SEPA is a material consideration as also is the knowledge that SEPA will regulate after permission is granted.

In addition importantly Mr Hemfrey accepted that PAN51 para 43 confirms Government advice that where SEPA has not objected an authority can only refuse on environmental grounds in "exceptional circumstances". In that event the onus is on the planning authority to demonstrate the reasons why the development is unacceptable. Mr Hemfrey confirmed that he and Falkirk Council could lead no evidence why the proposal was unacceptable. Accordingly Falkirk Council are acting contrary to PAN51 para 43. This must be unreasonable.

In conclusion on Mr Hemfrey's evidence he accepted that the original reasons for opposition were limited. However having heard the evidence one of the two concerns had been resolved (EQ32 para. 7). The other concern EQ32 para. 1 would be resolved if Professor Smythe's evidence is accepted, along with that obviously of Dr Cuff, Mr Goold and Mr Graham. Greater comfort would exist if appropriate conditions and the MMP were in place. Even greater comfort could be taken from the knowledge that SEPA and others would regulate the development thereafter. In short on the basis of Mr Hemfrey's evidence then there are no reasons to object or refuse.

5.2 Dr Salmon

Dr Salmon is a hydrogeologist employed by AMEC who have been appointed by Falkirk Council for the purposes of this Inquiry. However Dr Salmon had no previous experience of

CBM extraction proposals and so had to rely on Dart employees to help him understand the CBM process. Dr Salmon confirmed Dart had been accommodating and there had been good open discussions.

This had resulted in a very large measure of agreement between AMEC and Dart. A very significant part of Dr Salmon's precognition was devoted to explaining the comings and goings between the parties. Whether the time taken to reach that agreement was due to the lack of experience of Dr Salmon is also now irrelevant. I submit that the only thing that is now relevant is that agreement was reached on the majority of issues.

Dr Salmon confirmed by reference to his precognition that the following issues are now fully resolved and agreed:
Issue 1 (page 15)
Issue 3 (page 16)
Issue 5 (page 19)

In addition in relation to issue 6 Dr Salmon expressed reservations in his precognition that it would be "difficult to formulate" a water and methane monitoring plan. However the fact of the matter is that has now been done and condition 12 is agreed by all including Falkirk Council with advice from AMEC. Accordingly this issue is now entirely resolved. I adopt and rely on all of the evidence in relation to the foregoing. This then leaves only two issues for consideration.

Issue 4 - the issue of methane migration and fugitive emissions. It is important to recognise that Dr Salmon clearly states that "These risks do not definitely exist" (page 5). It is also clear that Dr Salmon gave no evidence about how migration may be possible. He merely indicated that there is insufficient data. In my submission there was more than sufficient data to confirm the position. However now the issue is beyond any possible reasonable argument given the evidence at the Inquiry.

On the one hand, no evidence was advanced by Dr Salmon that methane migration would occur. On the other hand evidence of a very detailed nature was given by Dr Cuff, Dr Goold

and Mr Graham that any risk is negligible. The process of dewatering ensure a pressure gradient which will ensure that gas will flow along the gradient to the borehole. It is impossible for the gas to do otherwise. Dr Goold explained in detail what would happen in the event of a rather unlikely total blockage - namely pressure would return to the *status quo* or hydrostatic equilibrium.

For ease of reference I refer to and adopt the re-examination of Mr Goold.

However the most interesting evidence came from Dr Smythe on behalf of CCOF. As accepted all the points about the pressure gradients. More importantly, he confirmed in evidence in chief that Dr Goold is correct that faults above 500m will be sealed.

This evidence was referred to by Dr Cuff on several occasions. Dr Cuff entirely agreed that any faults would be sealed. This means of course that it would not be possible for there to be any migration or fugitive emissions through faults that are sealed.

Professor Smythe was unable (in cross examination) to give the example of fugitive emissions anywhere in the world!

To summarise that is an end of any concern that ever existed about methane migration/fugitive emissions. All the evidence before the Inquiry is entirely consistent and must be accepted. There is no evidential basis to make any other finding. Dr Salmon and Falkirk Council should have accepted this, not to have done so is unreasonable.

Issue 2 - the possibility of drawing water from more than the coal seams. In order to satisfy Dr Salmon, and for no other reason, Dart undertook a "recharge - abstraction area analysis". It was hoped this might avoid the need for an Inquiry or at least such a lengthy Inquiry.

It has led to an acceptance that the Forth SPA, SSSI and Ramsay site will not dewater.

The analysis was broadly in accordance with Dr Salmon's expectation (page 49-3.3.2).

Dr Salmon also accepted in cross-examination that the analysis was done as he requested and he complemented Dart on that. He also accepted that it exaggerated the situation and so is a conservative analysis.

It is of note that Dr Salmon on the basis of a conservative/exaggerated analysis cannot suggest actual significant impacts (see page 49 3.3.2). There is no suggestion of a significant impact on the water environment which is obviously the reason Mr Hemfrey confirmed that para. 7 of EQ32 was no longer a valid objection.

It is important to stress that there is now no evidence before the Inquiry of a "significant impact on the water environment" (EQ32 para 7). The recharge analysis found out as Mr Graham explained that "even on a wholly unreasonable and pessimistic basis and contrary to other evidence, abstraction effects taking place at the surface could be incapable of generating significant hydrogeological impacts" (page 22 para 5.2.9).

Dr Salmon did not offer any contrary evidence, nor was this issue challenged. Mr Hemfrey withdrew that reason for objection. Accordingly this issue also is entirely resolved. It was unreasonable of Falkirk Council to continue with this issue to and during the Inquiry.

Dr Salmon in his last answer in cross examination confirmed that all issues could be resolved by Conditions and/or the knowledge of SEPA role. That confirms the unreasonable position of Falkirk Council.

On or two other issues arising from the evidence are worthy of comment:

(i) Dr Salmon accepted that baseline monitoring can take place after planning permission. (I refer to the cross examination and DEJ3.)

(ii) Indeed Dr Salmon went further and stated "I'm quite happy to say that you need baseline data close to when the development occurs" (cross examination). The above is taken from the transcript and is in conflict with the submission by Stirling Council (page 2 para. 3.3).

(iii) The foregoing resolves another possible issue.

(iv) Finally Dr Salmon confirmed that SEPA and other regulators would regulate the development and offer safeguards/protection in the event of permission being granted.

I now refer to the Falkirk Council Submission, Section 7 re Conditions. I make the following response.

(i) Falkirk Council have agreed the relevant conditions and the witnesses agreed the conditions would solve any problem.

(ii) The Corwall case is fundamentally different. English Heritage and the Wildlife Trust required surveys. The surveys related to bats, badgers and liverworts (para 72). This is all factually different to the current situation. Indeed the issue of bats, liverworts was so significant that discussion took place about altering the layout of the site. This is therefore fundamentally different to the current circumstances.

(iii) In comparison the case of Feeny is entirely supportive of our case. In Feeny it was decided that there was no likely effect on the SAC and therefore it was, not necessary to undertake an appropriate assessment. A condition was imposed the purpose of which was to assess and then eliminate the effects of a residual range of uncertainty between no harm and harm that was unlikely (para. 55 at page 1). That decision was upheld. This issue was further explained at paragraph 52.

> "51. The purpose therefore of the condition, in the light of that conclusion, is to assess and then eliminate the effects of the residual range of uncertainty between no harm and harm which is "unlikely". The uncertainty in the predictive data could not be eliminated by "baseline assessment"; it required measurement of what happened once the railway was in operation. That was where the uncertainty lay and no better predictions were available. A baseline assessment

of itself would have revealed nothing to assist, and an "appropriate assessment", of its nature, would not provide data from the railway in operation. It could not advance the state of knowledge.

52. A precise NOx baseline was necessary to have a level against which changes in NOx levels could be measured once the railway was in operation, and against which the proportion of those changes attributable to the railway could be measured for harmfulness, and to mitigate which measures previously identified under the scheme could be put in place. The reason for this is not because of ignorance about the condition of the SAC. In order to eliminate the uncertainty between no harm and "unlikely harm", the condition includes a scheme for monitoring actual NOx depositions from road and rail traffic which might be attributable to the railway project, then predicting those effects for ten years after the opening of the railway project, and a means of working out how much of the actual NOx depositions on the site are properly attributable to the railway project, (because it is that part which needs to be remedied or mitigated by the implementation of the scheme approved under this condition). There was also a scheme for a baseline survey and evaluation of the lowland hay habitat in the three SSSIs, and provision for future surveys if necessary, after the railway has opened, for the attribution properly to be made. Paragraph (vi) requires the scheme to provide the basis for determining what level of NOx from the opening of the railway project protects the SAC from harm. The scheme also has to provide for what is to happen by way of mitigation if those levels are exceeded, para (vii), and how those management measures are to be implemented; (para (viii). The range of possible management measures includes depasturing any affected areas so as to reduce the NOx from cattle."

The foregoing is precisely in point with what is suggested here. This case accordingly strongly supports our position.

(iv) The final case of Champion is largely irrelevant. In that case no EIA was regarded and paragraph 58 confirms this.

However paragraph 48 refers to Feeny slates -

> "48. That passage illustrates the point that a condition can in principle be imposed to address a situation falling short of one that is considered to involve a likelihood of significant adverse effects. That, as it seems to me, is how conditions 23 and 24 are to be viewed in the present case, though this case is stronger than Feeney because there is here no perceived "residual range of uncertainty" that the conditions are intended to address."

Accordingly for any relevance this case has it is supportive of our position.

<u>Conclusion on Falkirk Council Case</u>

It is of course of importance that Falkirk Council were involved in the scoping of the EIA. Falkirk Council accepted the EIA. Falkirk Council did not call for more information in terms of the Regulations. I refer to para 127 of Circular 3/2011. Accordingly Falkirk Council accepted the adequacy of the environmental information provided. The original reasons for objection were entirely inconsistent with the foregoing. At the Inquiry the only Council official accepted almost immediately that on the basis of the evidence he was aware of, one of the two concerns was entirely resolved. In addition he accepted that if Dr Smythe's evidence (which he had not heard) was as I indicated, then that resolved the other issue. Falkirk Council have therefore now no proper basis to object given the evidence.

6. STIRLING COUNCIL

The position of Stirling Council can be dealt with very rapidly indeed.

Firstly Stirling Council rely on AMEC. However the evidence of AMEC actually confirmed there are no significant issues remaining and in fact consent subject to conditions should be granted. Accordingly that part of Stirling Council's concern disappears.

Secondly Councillor Brisley suggested that cumulative impact justifies refusal. There is no basis for this for the following reasons:

- The land is not relatively flat (page 2 para 1). There is in fact an embankment which will visually screen the plant site from at least one direction. Trees and hedges screen another side where they are next to a former railway line - which is itself an example of development.
- The land is hardly in a "rural setting". On one side is a man made embankment, on another a former railway line and immediately adjacent is a gas plant/work of some size, which is surrounded by security fencing. A commercial cattery is in close proximity. Pylons exist nearby. Grangemouth with its vast industrial development is on the horizon, belching gas and flames. An untouched rural landscape this is most certainly not!
- The evidence advanced by Councillor Brisley was not supported by professionally qualified planners or landscape architects from Stirling Council.
- The Councillors had not troubled to seek advice from a professionally qualified experts outwith the Council before deciding there might be "cumulative impact".
- Worse still, the Councillors had not troubled with a site visit before deciding to advance the cumulative argument.
- All of the above may help explain why the "cumulative agreement" has no merit at all. The forms of development advanced are not of the same type and so the cumulative issue is not relevant. In any event there will be no significant intervisibility between the site and Durieshill (2.5 miles), Cowie

(1.5 miles), East Fallin (2 miles), Throsk (1 mile). No location was mentioned from which it would be possible to see the plant site and any of these locations.

The fact that the Beauly-Denny line will be built in the area further undermines the concept of a tranquil rural area which Councillor Brisley advanced. The same applies to any turbines which may or may not be built. In addition, all of this ignores the fact that DART have existing consents for drilling and developing a plant site in this very area.

In summary the argument by Stirling Council on this point is without foundation and entirely unreasonable.

7. CCOF

7.1 Dr Smythe

Professor Smythe was a very important witness at the Inquiry. He had been flown in from the South of France especially to give expert evidence on behalf of CCOF. Such was his importance and commitments that special arrangements were made to hear his evidence out of the normal order. It is evident that Dr Salmon had placed reliance on Professor Smythe's opinions and judgements from an examination of Dr Salmon's evidence including his precognition.

Accordingly it is important if not essential that the evidence and the background and approach of Professor Smythe is considered in a little detail.

I refer to and rely upon the entire cross examination of Professor Smythe which lasted a couple of hours or more. This I submit was illuminating and instructive. It confirms the mind set and approach of Professor Smythe. I propose to rehearse some of the main aspects of his answers and evidence from cross examination.

The Professor is retired and has been since 1998. He agreed he has been out of mainstream geology since 1998, because as he put it he had no longer has "slaves" to do "donkey work" for him. When the question was put directly again he answered with a simple "yes" that he has been out of the mainstream for fifteen years. Since his retiral he has lived in the South of France running a little business (in fact a B&B).

Professor Smythe accepted that in 1994 he had "persuaded" BNF to commission an initial 3D seismic survey which was undertaken by the Professor/Glasgow University. After many questions and lengthy answer the Professor agreed that BNF or Nirex did not commission any further 3D survey and did not use or rely upon the initial survey. Although Professor Smythe stated he was not sacked nor did he resign from any work for Nirex he did confirm that he appeared against Nirtex at the subsequent Inquiry and appeared on behalf of FOE. The Professor's interest if not insistence in relation to 3D seismic surveys has therefore been

longstanding. Interestingly BNF/Nirex having seen the Professor's initial survey declined to commission him again for a further 3D survey.

Professor Smythe then accepted fairly that despite his retiral he became involved in later proposals for storage in Cumbria. I think it fair to submit that the Professor has been rather outspoken and direct in his criticism in relation to this issue.

I draw attention to allegations by Professor Smythe relating to storage in Cumbria. The following are some of the criticisms and allegations made by Professor Smythe:-

- that was rather dishonest of DECC
- DECC dishonestly analysed certain information and manipulated results
- the Professor accused the government of being essentially underhand in their strategy
- DECC displayed an immense degree of incompetence in running this and previous consultations
- DECC ignored rational argument and evidence
- DECC was engaged over 15 years in a covert campaign
- DEFRA wilfully misleaded the public
- DECC and NDA continue to mislead the public
- DECC of being mistrusted and misrepresenting
- DECC of fabrication
- DECC of being afraid of science
- CoRWM cannot be trusted

The Professor accepted he had been extremely critical of regulators. I then questioned Professor Smythe about his evidence on behalf of himself and "no-one else" to the House of Lords Committee in relation to shale gas. That is document DEJ73. In this the Professor -

- accuses Halliburton of being misleading
- was “very critical” of not only Halliburton, but also the Royal Society and DECC
- accepted in a later answer that Halliburton are “not necessarily wrong” - this notwithstanding the early criticisms
- was and is critical of the Environment Agency (EA) and claims they have insufficient expertise
- criticises DECC - “absolutely”
- criticises Celtic Energy who stated 1200m of rock is an effective seal
- criticises Green Park/Dart in relation to the sealing properties of the overlying drift
- criticises the EA for accepting the foregoing [again the Professor accepted it is him against the EA]
- criticises various operators in relation to lack of information/seismic data “highly incompetent” he confirmed
- criticises West Sussex Council
- criticises the Lancashire - Quadrilla application for lack of information and those that consented it

In conclusion on this topic I asked whether the criticisms that the Professor has made in relation to other applicants or other regimes is virtually identical to those that he now makes of Dart today … (lack of information no 3D and the like). The Professor’s answer readily summed up the entire issue perfectly. “Yes and it is illustrating a certain pattern of inadequate regulation”. In short the Professor accepted that in truth his complaint is with the regulatory system and the inadequacy of the system. The other possibility as I put to the Professor later is that he simply misunderstands how the regulatory system works which is I submit the truth of the matter.

However the good Professor’s criticisms continued after lunch with criticisms of SEPA and the ability of look at the “big picture” and its “competence”. He confirmed he had no faith in SEPA.

However the Professor did accept part of the problem is that he has no confidence in SEPA.

In answer to the question "Your complaint really is one against the system" - the Professor replied - "I'm against certain parts of the system". At the same time he denied he was a "Punk Maverick" realising that that had been the purpose of initial questioning. Well whether the Professor is indeed a "Punk Maverick" is for other to judge. However in perhaps the most crucial set of answers the Professor accepted again "I'm anti the current system". Then he went on to confirm that he wanted to put himself in the position of regulator because he does not trust the regulators, and he accepted it was the Professor against the system "in a few minor instances".

In other passages of the cross examination it was apparent that the Professor has no real experience of drilling, despite criticising the techniques employed; had made fundamental errors in his initial assessment in CCOF13 and accordingly wished it to be disregarded. The Professor also made errors regarding Airth 6 and 8.

The Professor could not and did not make any criticism of Mr Goold's evidence about the Black Warrior Basin and indeed accepted the evidence about that issue. This is an important consideration given the evidence of Mr Goold. It is of equal importance that the Professor fairly accepted that there was "no fugitive emission of methane" at Blackpool despite a fracking operation there and an earthquake which caused damage to the pipe casing.

The Professor again importantly accepted that with dewatering there is a negligible risk of fugitive methane emissions. He admitted "100%" that dewatering gives the hydraulic gradient you want and "there is no problem".

The Professor had not looked at or considered Condition 12 or the Methane Monitoring Plan but "welcomed that".

He further stated he was content and withdrew his evidence (number 12 in rebuttal) as a result.

The single most important piece of evidence given by Professor Smythe indeed possibility the entire Inquiry however was given in evidence in chief. In response to a question from Sir Crispin the Professor gave another very long answer. I invite a detailed examination of the typed transcript. However the short point is that the Professor accepted that Mr Goold was correct that "faults are sealed up tight by the regional stress" and this is true down to 500m.

This at a stroke then is the end of any possible concern about fugitive emissions. It is of some note this evidence was given by the main and most important witness for CCOF.

Finally of course, in cross examination, having made the various concessions and admissions that I have referred to above the Professor accepted that he could give no examples of any fugitive methane emissions anywhere in the world. The answer was on this occasion short, simple, and to the point - "I cannot do that". In a sense that short direct answer when taken together with the evidence in chief that faults were sealed (due to pressure forces) down to 500m says it all. The conclusion must inevitably be that as the Professor correctly stated any faults are sealed down to 500m. Accordingly there is no possibility of any fugitive methane emission through those faults. This is precisely why the Professor could give no examples - because according to his own evidence it simply cannot occur. It is as simple and straightforward as that. This is the very issue that has been accepted elsewhere both in England and in America. It explains why there is no evidence of fugitive emissions through faults in these various locations. A great deal of time at the Inquiry was devoted to this issue. In truth it was Professor Smythe who despite criticising the system and virtually all who operate in it, gave the most compelling evidence as to why there will be no fugitive emissions through faults. Indeed in truth Professor Smythe has actually agreed with "the systems" assessment of this issue. That really is the end of this issue.

7.2 **Dr Lloyd Smith**

It is self evident that Dr Lloyd Smith is very experienced indeed in relation to UCG issues. I simply refer to the CV at page 1 of the precognition. It follows then that when Dr Lloyd Smith gives a talk, or makes allegations, about UCG the ordinary man in the street or member of the community will listen to, be influenced by, and attach weight to what Dr Lloyd Smith says.

It is therefore not just appropriate but actually essential that what Dr Lloyd Smith says is truthful, accurate and does not unnecessarily exaggerate issues. If this was to happen members of the community would be unnecessarily alarmed, misinformed and would base any objection on an incorrect improper factual basis.

I now will look at what actually happened. Dr Lloyd Smith gave a talk lasting around 20 minutes to members of the local community. This was at a time that the Dart application was very much a live issue. Indeed Dr Lloyd Smith confirmed in re-examination that she had been asked to speak about concerns with Dart.

Nowhere in the introduction to her speech did Dr Lloyd Smith make clear or even hint that what she was saying was not relevant to the Dart proposals at Airth. On the contrary the clear impression was given that this talk was relevant to the Dart proposal at Airth. That is so for the following reasons:

- On page 8 Dr Lloyd Smith refers to discharging to the Forth.
- At page 12 Dr Lloyd Smith apologies that Dart "came here" i.e. to Airth.
- At pages 4/5 Dr Lloyd Smith refers to SEPA. That is the regulator in Scotland and so also confirms she was talking about Dart's Scottish proposals.
- These factors confirm that the clear impression was given that the talk related to the Dart proposal at Airth.

In addition this same talk was shown on a video at a community meeting. This was discussed by Mr Bain and took place on 2/11/2012. This is extremely important because this was the first meeting of the local residents to discuss the application which had been lodged in August. The video shown was of the talk given which was the same as given in Falkirk later by Dr Lloyd Smith. Accordingly one can be certain that the content of the video/ talk did indeed influence local residents. It is also rather telling that template objection letters were provided at the end of the meeting (page 6 para 7 of CCOF 198) having been prepared before Dart explained the proposals. Furthermore it is beyond any doubt that Dr Lloyd Smith's talk was referred to and relied upon on several occasions in the "pro-forma" objection letter. Finally on this topic Mr Dick the landowner confirmed he had attended the talk by Dr Lloyd Smith and had been concerned and influenced by the content of the talk. There really can be no doubt that the talk by Dr Lloyd Smith has indeed significantly influenced the local community.

So it is important to consider the content of the talk, its accuracy and also the impression it gave or was designed to give.

I refer to the entire speech but draw attention to the following issues which were discussed but which have <u>no relevance</u> at all to the current proposals:-

(i) fracking was mentioned around 24 times
(ii) fracking fluids were discussed
(iii) produced water being used for dust suppression
(iv) produced water being stored in large lagoons
(v) hundreds of truck movements to transport liquid offsite
(vi) contamination of drinking water because it came from boreholes or creeks
(vii) contamination of rainwater for drinking water
(viii) gas seeps at the condamine river

In addition and much more seriously, Dr Lloyd Smith made various claims and allegations which are quite simply <u>without foundation</u>. I adopt the rebuttal of Dr Cuff for the detail but I give several examples:

(i) At page 12 Dr Lloyd Smith in discussing Australia states that "we have forced the Government into a two kilometre exclusion zone". This sounds convincing but is not true. The state of Queensland which produces about 98% of the NCG of Australia has no buffer zones at all as Dr Lloyd Smith was forced to accept in cross examination.

(ii) At page 10 Dr Lloyd Smith stated that the Queensland Government "still came up with the conclusion that some of the symptoms were related to some of the contamination released by the industry". This is quite simply untrue. The conclusion was quite the opposite and stated that "The available evidence <u>does not support</u> the concern that exposure to emissions from the CSG activities is the cause of the symptoms they have reported". [CCOF110 page 18]

(iii) The statements at page 4/5 that the composition of drilling fluids are not known. Worse still is the statement at page 5 "we have an unassessed mixture of carcinogens, cancer causing chemicals, neuro-toxins and endocrine disrupters and a range of other things". This is yet again quite simply untrue. I refer to the evidence of Mr Sloan, and the SEPA regulatory guidance which confirms details must be provided.

(iv) At page 11 Dr Lloyd Smith refers to a study by "The doctor who treats the incidents" doing a study, and clearly implies this confirms a direct link between the "industry" and health. This is also untrue. Dr McCarron very fairly confirmed that her study established **<u>no link</u>** between the industry and health issues. Indeed she was and is not the doctor who treats the residents. So that claim also was untrue.

Finally I quote Mr Smythe who was also rather critical of Dr Lloyd Smith. "In conclusion I find Dr Lloyd Smith's evidence on air quality adds nothing of value to the assessment process is misleading or misinformed and does not follow the correct scientific method in drawing on evidence, leading to the misrepresentation of evidence either deliberately or in error and cannot be relied upon".

7.3 **Dr McCarron**

Introduction

Dr McCarron is a GP based several hours drive time from the Tara region. However for reasons she explained Dr McCarron carried out a health survey of a small number of people living in the Tara region. Before considering the study it is useful I submit to set out the factual background at Tara which is significantly different from that which occurs at Airth or will occur at Airth.

Factual Position

The relevant factual position includes:

(i) Fracking

(ii) Fracking fluids

(iii) Produced water (including fracking fluids) stored in several ponds of "significant size"

(iv) "the volatiles from it just blow in the wind"

(v) hundreds of wells surrounding the houses and three fields actually inside the residential areas

(vi) drilling within 20m of residential property

(vii) these people are absolutely surrounded by the infrastructure of gas leaks - surrounded to the north … to the south … to the east .. to the west

(viii) produced water is sprayed on roads; the chemicals go into the dams

(ix) there is evidence that some humans used the dams for bathing

(x) dam water is used by humans in the gardens

(xi) rain water is collected from roofs for domestic use. Roofs could easily be contaminated by "volatiles blowing in the wind"

(xii) water was found to be contaminated with faeces and Ecoli

In conclusion on this issue it is no surprise that Dr McCarron accepted very fairly that there are significant differences between the factual position in Tara and here at Airth. The differences are I submit so significant that no comparison at all can properly be drawn.

Health Survey

The Health Survey given all of the differences detailed above, has no relevance at all to the current proposal.

In any event the survey cannot be relied upon. I make that submission for the reasons that Dr McCarron herself very fairly accepted that:

(i) there was no baseline monitoring done
(ii) there was no baseline environmental monitoring or baseline of any sort done
(iii) I don't have any of their past records I don't have present records either
(iv) that she had no experience of designing a survey questionnaire, or formulating such a report
(v) this is not a comprehensive health assessment
(vi) the report has significant limitations
(vii) there will be bias in the way the study participants have been selected
(viii) the report is not meant to be definitive.

It is critical also to realise that Dr McCarron also fairly accepted that-
"I did not conclude anything I reported symptoms"
"I did not say that that (health) related to gas I reported symptoms"

In particular I asked "Can we agree … that your report did not conclude that there was a direct relationship between the gas extraction and people's health at Tara …" Dr McCarron answered "That wasn't the purpose - the purpose was to report the symptoms". Shortly thereafter Dr McCarron in an answer asked for more research. However at no stage did she make a direct link between the gas extraction and health at Tara.

This then means that her evidence is consistent with the Government research (CCOF110). This was a much more extensive investigation by the Department of Health. The information sources are listed at pages 4/5. The conclusions were:

(i) The prevalence of complaints of specific symptoms within the total resident community is low compared to these comparison prevalence data for headaches, skin rashes and eye irritation.

(ii) Based on the clinical and environmental monitoring data available for this summary risk assessment, a clear link cannot be drawn between the health complaints by some residents in the Tara region and impacts of the local CSG industry on air, water or soil within the community. The available evidence does not support the concern among some residents that excessive exposure emissions from the CSG activities is the cause of the symptoms they have reported.

Conclusions

I submit that no weight should or could possibly attach to the evidence or report of Dr McCarron for the purpose of this Inquiry because:

(i) the factual background is entirely different
(ii) Dr McCarron fairly accepted the significant limitations of the report
(iii) Dr McCarron cannot and did not suggest any link between gas extraction and health
(iv) the Government report confirms there is no link.

7.4 **Mr Appelbe**

Mr Appelbe is convenor of the Local Community Council which is a consultee unlike CCOF itself. Mr Appelbe confirmed that Dart had hosted a meeting to explain the proposals at which "we were well received …" This "lengthy and useful meeting" was in addition to the normal consultation process. Mr Appelbe also confirmed that Dart had quite happily had email exchanges with him (as convenor) to further discuss/explain issues. In addition he confirmed the G20 document was "helpful". Mr Appelbe also confirmed that his CC had been offered the Good Neighbour Agreement, considered it but rejected it preferring to rely on SEPA. I quote para. 7.3 in which Mr Appelbe stated [DE112]:-

"This Community Council recognises the ongoing demand for energy. We all need energy in our modern society and it is right that research and development seeks to maximise technology for the production of energy. However, extraction must be safe, and where there are risks, proper safeguarding measures must be in place and should be seen to be in place. Given the information that we have researched and what we have been provided with to date, we are not convinced that the appropriate safeguarding measures are in existence."

In conclusion I suggest it is fair to say that Mr Appelbe and the Community Council have been fairly involved and engaged by Dart in the process. Perhaps if the Community Council had a little more understanding of the process and confidence in SEPA then there may well have been no objection.

7.5 **Professor Watterson**

Professor Watterson has been an academic for many years. He has never been on a UCG site, and clearly has limited knowledge of the practicalities of UCG extraction. No mention was made in his precognition that drilling had taken place for years. However, much of his precognition was devoted to Professor Watterson himself - in fact about 4 pages out of 10. In addition a further two pages were devoted to criticism of the HSE, the regulatory framework, SEPA and finally for good measure Health Protection Scotland. This may be interesting to some but relevant it is not. It is of course consistent with other evidence on behalf of CCOF but that does not make it relevant. It simply confirms that the CCOF are "anti system" as Dr Smythe accepted he was to some extent.

Dr Watterson had clearly not read all of Dart's evidence or listened to Dart's evidence. He had not seen or been made aware of the conditions. Dr Watterson had carried out no assessment/survey of local health issues.

I refer to the cross examination for further detail.
In conclusion no weight can or should attach to the brief precognition from Dr Watterson.

7.6 **Objections by CCOF**

The objections by or on behalf of CCOF must be viewed with caution. We know very little about CCOF. We do not know how many members there are, nor how often members meet. We do know that the community council, a statutory consultee, is keen to keep "clear blue water" between the community council and CCOF (Mr Appelbe). Whether this is because of the tactics employed by CCOF or whether a witness of CCOF clearly gave advice if not encouragement in relation to "direct action" is unknown. However what we do know is that the objections made by CCOF must be treated with very considerable caution indeed. I refer to everything I have already said about the three main witnesses who appeared on behalf of CCOF.

I also refer to the pro-forma objection form (CCOF 312D) which extends to many pages. It is clear that this document proceeds on a fundamental misunderstanding of the Dart proposals. It refers to fracking/shale gas. It relies on several occasions on Dr Lloyd Smith's speech which I submit is almost entirely irrelevant for present purposes. Claims that parts of the site are as close as 20m from "numerous residents' homes" are misleading. The claims such as "toxic chemicals some carcinogenic and 632 toxins - tons of chemicals would be discharged into the Forth" - "15 chemicals in treated waste all with links to serious disease and disordered appear" appear to be based on advice from Dr Lloyd Smith. In any event these claims are untrue and/or are exaggerations.

In short for all of the foregoing reasons no weight should attach to the objections in this pro-forma CCOF 312D.

7.7 **Conclusions on CCOF**

It is certain I submit that CCOF have been influenced by the talks and advice given by Dr Lloyd Smith. I have to submit with considerable regret that the talk given by Dr Lloyd Smith was not fair, reasonable or even relevant. It was entirely irrelevant. In addition worse still it was in parts untrue and or exaggerated. No such talk should have been given in the context of the Dart application. In that context it was misleading. Dr McCarron has confirmed, in stark comparison, that she does not suggest a link between health and gas extraction. She

fairly accepted significant differences between Tara and Airth. However this does not seem to have been understood or accepted by Dr Lloyd Smith.

In all the circumstances it is really little surprise that Mr Pollock said in evidence he thought local residents had been misled - and that he was annoyed by that state of affairs. I entirely agree. It is I submit more than regrettable that local residents have indeed been misled. This should not have happened. Those responsible have not been responsible. They have caused unnecessary concern and distress. I refer to Mr Buroni's evidence. CCOF's evidence must be treated with very great caution indeed.

Public opinion can of course be a material consideration but only if it based on an accurate assessment of the facts and also based on sound planning principles. CCOF members have I submit as stated by Mr Pollock been misled. In addition CCOF have given little or no attention to the Development Plan or other material considerations.

In all the circumstances little or no weight should attach to any objections by CCOF.

I now respond to the Closing Submission on behalf of CCOF. I make various points.

(i) The submission made about the various Dart companies is of no merit. This Inquiry is to consider land use planning issues. The Company names are not relevant. It will be for the regulators to ensure that the applicant has the necessary financial standing. Such considerations are irrelevant for today's purposes.

(ii) At pages 5/6/7/8 various cases consider tests in relation to the environment. The precautionary principle is considered in each case. This is helpful to our case. We propose precautionary measures entirely consistent with the precautionary principle. This is precisely why we propose all conditions, in particular Condition 12 and the Monitoring Plan. In addition I have also referred to the evidence of Dr Cuff who confirmed many times that any risk is "negligible".

It is also important to consider SPP para. 12 (page 7 para. 7) that the precautionary principle should not be used to impede development unnecessarily. In my submission that is precisely what CCOF are trying to do contrary to government policy.

(iii) Precedent - pages 12/13

This proceeds on a misunderstanding of the factual position. The submission refers to a situation where the proposal is "an integral part of an inevitably more substantial development". Quite simply that is not the evidence here. Mr Bain confirmed that it is not known if any more development will be applied for at all. I refer to the evidence on the matter. Accordingly this submission is irrelevant.

(iv) The submissions at page 13/14 about lack of information are not accurate. As one small example PM10 and PM2.5 were fully considered as Mr Smythe told us.

(v) Public Participation

This is important for all the reasons set out.

There has been a great deal of public participation. There has been a full consultative process, at least one public meeting addressed by Dart. Meetings/emails with Mr Appelbe. In addition we have had an Inquiry lasting several weeks with very full public participation. It really is quite unreasonable to suggest any lack of opportunity for the public to "express opinions" and/or participate.

(vi) I refer to page 17, 20(a). This is correct to identify that the "data is required to identify and assess the main effects which the project is likely to have …" This is not as stated ALL THE DATA to have AN EFFECT. That is not what is said at all. It is only the main effects. This is precisely what Dart have done - I refer to the evidence of all the witnesses.

(vii) The Gateshead case is considered at pages 23/24. However paragraph 34 summarises the points. This is precisely the position we are in and entirely supports our case. I invite you to hold that any "residual difficult" (if there is any) can indeed be left to the regulators.

(viii) Concern about Regulators (page 24/25)

There is nothing in this point at all. It is quite unreasonable to suggest government regulators cannot be relied upon or trusted.

In summary then the CCOF submissions may be lengthy but when properly analysed all the cases and the interpretation of the law actually supports our position.

8. FRIENDS OF THE EARTH

Friends of the Earth led two witnesses at the Inquiry session.

(i) Professor Hilston gave evidence that an "irrational decision" or "procedural failure" could lead to a Judicial Review. This may be true in general terms however it has no relevance in these proceedings. Any challenge to these proceedings would not be by Judicial Review but rather in terms of the 1997 Act. In any event if the decision maker has considered climate change it is difficult to imagine any Court interfering with the decision. Professor Hilston fairly accepts this at para. 6. In truth the evidence of Professor Hilston seems to amount to a warning that if a decision taker makes an error the decision may be challenged in Court. This is beyond dispute and is known by all involved in the planning system in Scotland. I can only repeat it seem a long way to come from Reading to inform the Inquiry about something so basic and obvious.

(ii) Dr Broderick gave evidence on climate change issues. I refer to my cross examination of Dr Broderick. However well intentioned climate change supporters may be, the simple fact is that it is impossible to obtain all Scotland's or the UKs energy from renewable sources in the immediate future. It is inevitable that electricity and gas will be produced/acquired from non-renewable sources. Indeed it is accepted that 89% of gas will be sourced from non-renewable sources. It is beyond doubt that gas is to be preferred to coal from a climate change perspective. In addition gas sourced from within the country will be more environmentally friendly than gas sourced from abroad. This is not just because the regulatory regime here will ensure the gas is obtained in an environmentally friendly manner which will eliminate or minimise any emissions, but also because there will be no transport "costs" such as ship or road tankers. If one is in any doubt about all of this Dr Broderick told us very helpfully about the experience in the USA. There the extraction and use of unconventional gas has contributed to a reduction of carbon emissions by 12% between 2005 and 2012. This is a very very significant reduction.

This is to be commended. A further benefit has of course been a significant reduction in gas prices in the USA.

Two further issues arise from Dr Broderick's evidence. Dr Broderick was properly concerned about monitoring and background levels (see para. 9). I submit this has all been fully addressed by other evidence about the conditions and the methane monitoring plan. Possibly Dr Broderick was not aware of this. Secondly, Dr Broderick has not considered the issue of security of supply. Government Policy is to encourage a secure supply of *inter alia* gas. Nothing would be more secure than a supply in the Central Belt of Scotland - it is even more secure than a supply from a rig in the North Sea. Great weight should attach to this factor. Finally it is of importance that Dr Broderick did not say anywhere that consent should be refused. He only argued that climate change is a factor to be considered. This is an identical position to Professor Hilston who accepted it was a material consideration to be taken into account. However neither of the two Friends of the Earth witnesses argued for refusal. Accordingly there is no evidence led by Friends of the Earth which would justify any suggestion of refusal of this appeal.

Finally in relation to the Closing Submission I ask that it is considered in detail against the evidence actually led by Friends of the Earth. The submission should only reflect that evidence.

9. CONCLUSIONS

The appeal must be determined in accordance with the development plan unless material considerations indicate otherwise. I submit that a fair and reasonable evaluation of all the relevant issues confirms that there is very considerable policy support for the proposals. The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011 state that the decision maker must consider "the environmental information". The interpretation section confirms that environmental information includes the environmental statement and any additional information. Environmental statement includes such information as is "reasonably required to assess the environmental effects of the development … which the applicant can reasonably be required to compile" (my underlining).

What is reasonable must be seen in context and against the existence of the various consents, the various regulators and evidence from elsewhere in the world. However I submit that when looked at reasonably and sensibly there can be no doubt that all possible environmental issues have been identified, considered and addressed entirely satisfactorily. In all the circumstances, including of course giving appropriate weight to all the significant advantages, I submit that permission should be granted subject only to the necessary conditions as discussed and agreed.

Finally I have had the advantage of reading the submission of Mr Telfer. I agree with and adopt that submission which will follow now.