

Corrib Gas Pipeline

Comments on the Advantica Safety Review

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20th December 2005



Introduction

The Advantica report outlines a number of recommendations detailed in their executive summary as follows;

1. Risk based framework to be established to ensure transparency and consistency of the decision-making process
2. Thick wall pipe offers the main line of defense against threats to its integrity.
3. Appropriate measures have been identified to manage the additional hazards from unprocessed gas
4. Formal integrity management plan is established prior to construction, including the operational and maintenance philosophy, and that an independent audit and inspection regime for both the construction and operation of the pipeline is established.
5. Risk assessment submitted by Shell fails to recognise the uncertainty in the risk modeling for such high design pressures as 345 bar
6. Pressure in the onshore pipeline should be limited to enable the pipeline to be reclassified as a Class 2 (Suburban) pipeline, with a design factor not exceeding 0.3, and the pipeline design revised in accordance with PD 8010.
7. The pressure control systems proposed in the field design was found to be technically flawed, and reliability analysis to be carried out of the sub-sea pressure control and isolation systems specified in the field design to enable appropriate additional pressure control measures.
8. The pipeline would be expected to withstand the worst-case ground movement event however the recommendations made by AGECC should be followed in full and the proposed construction methods revised accordingly.
9. “The pipeline safety review addressed only the design and route of the onshore section of the Corrib upstream pipeline as proposed. It does not include detailed examination of the feasibility of alternative project design options, alternative pipeline designs or routes, and assumes that the gas transported through the pipeline is produced from the existing Corrib wells as identified. In the event that additional fields were proposed to be tied in to the pipeline at any future date, a full review would be required to consider issues such as extension of the life beyond the initial design life, changes in the fluids in the pipeline or changes in the operating pressures.

Provided that it can be demonstrated that the pressure in the onshore pipeline will be limited effectively, and that the recommendations made elsewhere in this report are followed, we believe that there will be a substantial safety margin in the pipeline design, and the pipeline design and proposed route should be accepted as meeting or exceeding international standards in terms of the acceptability of risk and international best practice for high pressure pipelines.”

Additional Recommendations are made in the body of the report as follows;

10. Fatigue usage of the pipeline due to variations in pressure to be monitored
11. Possible vibration effects on small bore pipework at the beach valve to be checked
12. Monitoring of pipeline stresses due to possible ground movement to be carried out
13. Additional ground movement analysis to be undertaken to account for the effects of bends, pipe orientation and increased depth of cover
14. Quality of the pipeline field joint coatings to be checked and inspected during construction
15. Insulation joint at the landfall to isolate the onshore and offshore cathodic protection systems to be installed
16. Internal corrosion rates to be re-evaluated and determination of corrosion rates to be included in a pipeline integrity management plan
17. Hydrotesting of the pipeline to be carried out to 105% SMYS (Specified Minimum Yield Strength)
18. An initial in-line pipeline inspection run to be undertaken during commissioning
19. Defect assessment and repair procedures for possible pipeline damage to be established, with appropriate repair materials and equipment to be available at the terminal
20. Arrangements for surveillance and landowner liaison to be specified
21. Procedure to be established for monitoring Hydrogen Sulphide (H₂S) levels and action to be taken if detected

Comments on the Advanticia Review

Summary

Within the restricted terms of reference of the Advanticia review, i.e. as outlined in Item 9 of their executive summary, an excellent report has been produced.

The report addresses issues raised by the author relating to proximity to buildings, fatigue, design of road crossings but does not fully address issues raised in my 1st Report concerning the granting of the Letter of Consent. The review addresses design issues relating to the beach valve station but does not address the planning requirements for this station.

It is unfortunate that Advanticia were restricted from commenting on alternative design options as I believe, with their expertise they could make a valuable contribution which would facilitate a resolution to the impasse that currently exists.

The following are my comments on the review.

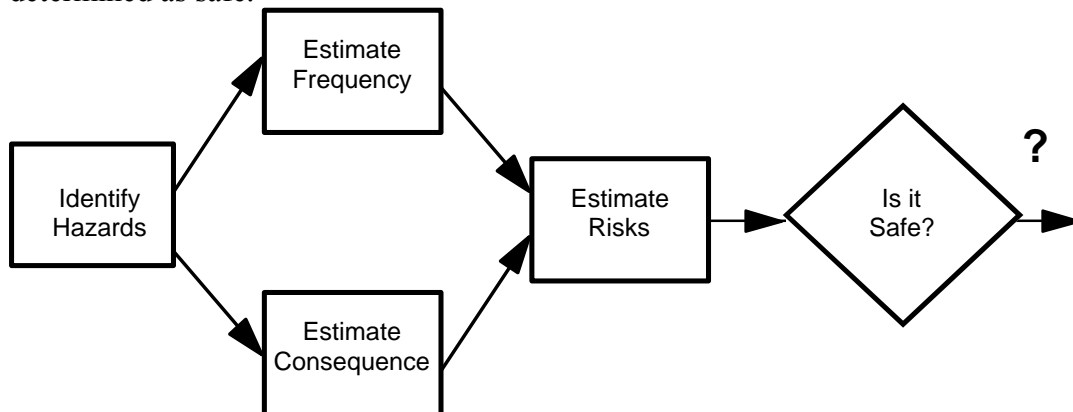
Beach Valve Station

To date the developer has not applied for planning permission of the beach valve station. The beach valve station will be similar in design to a standard transmission block valve station with a requirement for an access road and security fence. All existing block valve stations require planning permission. Although this station is located on the upstream pipeline there are no provisions under the Planning or Gas Acts which would exempt it from the requirement to have planning permission. Similar beach valve stations in the UK require and obtain planning permission.

Quantified Risk Assessment QRA

Advanticia have determined that the QRA carried out on behalf of the developer “*fails to recognise the uncertainty in the risk modelling for such high design pressures as 345 bar, and takes no account of societal risk to the local population as a whole.*”

Classical QRA methodologies require the following analysis before a facility can be determined as safe.



The above analysis clearly requires the designer to have accurate and realistic historical data records on the failure frequency and event consequences. For the Corrib Gas Pipeline, operating at 345 bar, historical data sources are not available to enable a reliable and realistic QRA to be carried out.

For this reason QRA is not appropriate for this pipeline and therefore a more prudent and realistic prescriptive approach to the design, as recommended by Advantica and as contained in the codes of practice, should have been used.

Terminal Selection Process

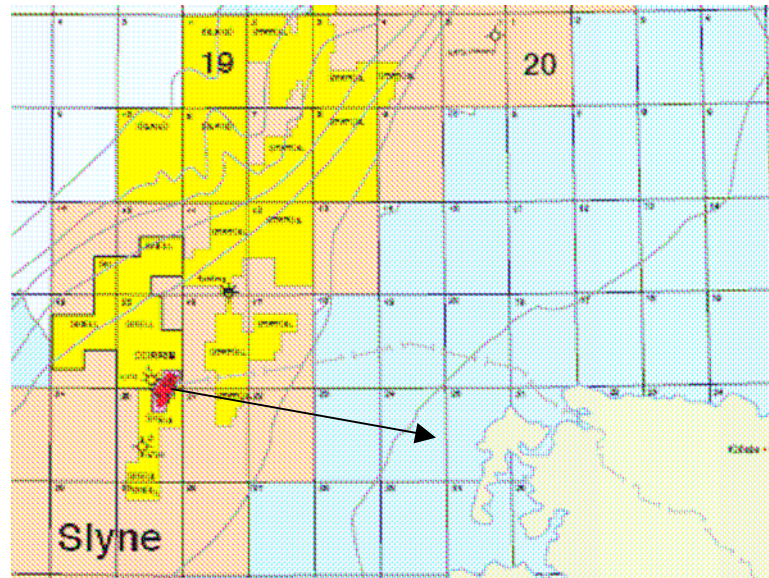
The selection of the Ballanaboy site should be reviewed given that the design of the upstream pipeline servicing the terminal is now different from the original. Advantica have now recommended a pressure limit of 144 bar and a design factor limit of 0.3. The location was also selected in advance of the Gas Act 2002 under which a more appropriate costal site could have been selected and acquired. Prior to the Gas Act 2002 the developer could not exercise CPO powers to acquire an optimum costal location for the terminal. The acquisition of the Ballanaboy site, from Coillte a Government agency, may have been a short term expedient, but it has shown itself to be a sub-optimal solution given the problems of routing upstream pipeline through populated areas unprecedented in pipeline practice.

Advantica have stated that

“it was important to minimise the length of the pipeline between the wells and the terminal. This meant that there was a preference for a landfall and terminal location that provided the shortest practical length of pipeline between the wells and the terminal.”

This important requirement is not apparent in the original design. If it was, it is more likely that a costal location would have been selected by the developer as is the practice in other countries.

In the light of the above and considering that the shortest distance between the wells and landfall is on the western coast of the Erris Peninsula it would be worthwhile to extend the scope of the Advantica review to identify or confirm the optimum location for the terminal.



A coastal location for the terminal would also be in the interests of Shell as it would not contain operating pressure restrictions which could prevent them from offshore tie-ins to future discoveries in deeper waters and at higher operating pressures. From a purely financial perspective a restriction of the upstream pipeline at 144 bar could devalue the current considerable offshore investment in pipelines and exploration. It also means that any future discoveries operating at a higher pressure would require an additional terminal at a coastal site, together with additional upstream pipelines requiring considerable additional unnecessary expense and planning. There are technical limits to pressure reduction facilities which can be installed at the wellhead due to problems associated with adiabatic cooling and hydrate formation. Shell should also now review the terminal location, regardless of the fact that it is in our human nature to continue to justify decisions already committed to rather than review the project in current circumstances. Considering the new restriction in upstream pressure, any additional cost of selecting a coastal location may be offset by the retention of the high value of offshore assets. The new site would require a new planning application, but a new planning application will be required in any event for the beach valve station in the current location.

Acquiring planning permission for the Ballinaboy site is one of the reasons why the project is behind schedule and even though this site was granted approval an alternative and more appropriate site could obtain approval in a much shorter timeframe as many of the issues relating to the terminal itself have been addressed in the current approval process. A change of site location would then only require site specific issues to be addressed.

The upstream pipeline and terminal are designed to have a life of between 30 - 40 years even though the Corrib field has an economic life of 17 – 20 years. Shell will be interested in utilizing the terminal and upstream pipeline to process future discoveries and therefore the design and location should anticipate this future requirement.

People living in close proximity to the upstream pipeline are concerned that any agreement for this pipeline, as recommended by Advantica could be reviewed, under current and future versions of PD 8010 by allowing an increase in operating pressure beyond 144 bar, following additional discoveries, particularly as the Corrib field has a life of 17 years, the pipeline has a design life of up to 40 years and the CPO grants a wayleave in perpetuity.

Letter of Consent

The letter of consent should be reviewed by Advanticia as it is the document which underpins and gives legal effect to the safety provisions of this pipeline and so is part of the current scope of the Advantica review.

The letter of consent is the document under the Gas Act which permits the developer to build and operate the pipeline.

The submission on which the letter of consent was sought including,

- the maximum allowable operating pressure,
- the inappropriate design factor,
- the discredited QRA,
- the independence of the original technical reviews,
- the flawed design on which the consent was sought,
- the absence of an appropriate design code,
- the absence of a formal integrity management plan,

indicates that the Letter of Consent granted by the Minister for the Marine and Natural Resources in 2002 was based on an unreliable design and inappropriate submission by the developer, and inadequate oversight by the Department for the Marine and Natural Resources.

Clearly the substantial matters on which consent was granted are in question and it is now necessary to set aside the current document and replace it with a consent for a pipeline which has integrity and which is legally enforceable.

Advantica should outline the key conditions which would be contained in a new letter of consent.

Overall the Advantica review has applied sound engineering analysis to a difficult problem. If the above comments are taken on board I believe that a resolution to this controversy can be found.

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