

# Memorandum



**Date** 15<sup>th</sup> May 2006  
**To** Neil Jackson  
**From** Mike Acton  
**Subject** Comments on Draft "UKOPA Mechanical Damage Model – Implementation Options"

## Comments on Draft "UKOPA Mechanical Damage Model – Implementation Options" (issued 12 May 2006)

Neil

Thank you for giving us an opportunity to comment on your draft note summarising the options for implementing the new UKOPA mechanical damage model. The note gives a good summary of the issues, but we do have a few comments, in particular on the recommendation of Option 2, which we believe is illogical. I have tried to set out my reasoning below:

- UKOPA has funded the development of a new limit state model by Advantica, which represents a significant step forward in the modelling approach to failures of pipelines due to mechanical damage. Perhaps inevitably, this is more sophisticated than the established model, and shows a sensitivity to parameters that were not previously so important. As it turns out, some of the input parameters required to run the model are not well known, hence the probabilistic treatment, and the likely cause of the conservatism observed in comparison with operating experience of actual failures.
- The uncertainty has been recognised, and will be addressed (at least in part) by future experimental work. [There may be other options that UKOPA could pursue in parallel (e.g. sampling of actual pipeline material properties) that could help.]
- PIE has carried out a separate study, taking the existing model FFREQ, and replacing the limit state component with the new UKOPA limit state model. They find that both the old FFREQ model and the hybrid FFREQ/UKOPA model are closer to the historical experience than the SRA model, and that the existing FFREQ model arguably gives the best fit of all three, albeit it may not be conservative in all cases. The reasons why the hybrid model is believed to give superior performance have not been determined.
- The FFREQ model is tried and tested through use over many years, and PIE's work has confirmed that FFREQ's predictions are broadly consistent with historical data. It is not perfect, but at least its limitations are well understood. In my opinion, there is no sound technical basis for moving to the hybrid FFREQ/UKOPA model in preference to FFREQ.
- Continuing to use the FFREQ model is consistent with the vast majority of the pipeline risk assessments carried out previously for National Grid (and the independent Networks), and I think that the other disadvantages of Option 3 are perhaps less serious than suggested in your note:
  - 2 years is not an unreasonably long timescale to wait for the results. Bear in mind that it will also take time before a new hybrid model has been developed, tested and documented sufficiently to be robust for operational use.



Ashby Road  
Loughborough  
Leicestershire, LE11 3GR UK

Tel +44 (0) 1509 282000  
Fax +44 (0) 1509 264646  
www.advantica.biz



- There may be issues over the ownership of the results, but we have found with other JIPs (c.f. PIPESAFE and the PSG) that these are not insurmountable. For example, it should be possible to use the new data to derive more appropriate correlations or distributions for use by UKOPA, but only members of PRCI/EPRG will have access to the detailed data should they wish to undertake more detailed analysis of their own.
- The value of the work funded by UKOPA should still be realised. The new limit state model is available as a research tool now, and once better experimental data becomes available, will become the basis of the new UKOPA model. The work to date justifies the continued use of the existing model until the new mode is sufficiently robust to be implemented more widely, and this is an important result. Developing a hybrid model to a state where it is sufficiently robust, tested and documented will take further effort and money, and in our opinion is unnecessary.

So, in conclusion, Advantica recommends Option 3, effectively to put further model development on “hold” until better information is available to refine the SRA approach, and to continue using the established FFREQ model in the interim. This can be justified technically by comparison with the historical data and is the lowest cost option. We recommend that the work initiated by PIE to compare the FFREQ predictions with historical data is documented (Advantica would be pleased to assist with this) and the reasoning behind the selection of Option 3 developed for presentation to HSE if required.

Yours sincerely,

Mike Acton

Advantica

01509 282122



Ashby Road  
Loughborough  
Leicestershire, LE11 3GR UK

Tel +44 (0) 1509 282000  
Fax +44 (0) 1509 264646  
[www.advantica.biz](http://www.advantica.biz)

STERNER SOFTWARE

Registered in England No. 3294136