Exciting times for pipeline risk management

by W. Kent Muhlbauer, WKM Consulting, Austin, Texas, USA

Armed with modern and robust risk assessment techniques, we are now better able to manage risks. 'Better' means more consistently, efficiently, and defensibly. Decision making no longer needs to be relegated to debate among area managers or accommodation of pre-set budgets that are rarely truly risk-based. This is the exciting part – the ability to manage risks in an objective, transparent way.

However, even with good risk *assessment* information, risk *management* is not without challenges. Challenges arise not because of the processes we use but only because of the complexities of the real world. This is an important distinction.

Our risk analyses methods should ONLY appear complex when the underlying phenomena are complex. When the science, engineering, or economic models that describe the real-world phenomena are complex, then at least some of that complexity will likely appear in our risk analyses.

Managing risks does not mean eliminating risk, as has been discussed in previous articles. Let's examine the multidimensional nature of what pipeline risk management does mean. An early decision must involve the acceptability of the current risk level. That is, answering the question: is it already safe enough? With a recommended philosophy of 'continuous improvement', the answer will rarely be 'yes'. However, the answer can often be 'the risk is low enough that further risk reduction here is not a high priority'.

The determination of 'acceptable' (or 'tolerable') risk involves dimensions such as: 'acceptable to whom?', 'acceptable for what time period and over what space?'. Addressing the first requires knowledge of all stakeholders and their individual cost/benefit calculus of how the pipeline impacts them. The second is more subtle, requiring us to recognise that some risks may be acceptable for short segments of pipe or for short periods of time, even though the same risk is not tolerable for longer lengths or longer time.

Perhaps the most common risk management choice is to reduce risk where ever it is feasible. This typically suggests the employment or improvement of risk mitigation measures. The perhaps less obvious associated dimensions include: over what space (length of pipeline), to what degree, when, and for what future period.

Evaluating potential risk mitigation projects requires analyses of both the risk and the economics associated with the project. It is not in any stakeholders' interest for the pipeline owner or operator to spend inefficiently. Risk reduction analyses is often a comparison with the status quo, i.e. not performing the potential project.

Consider the following risk management scenario. A large subdivision is planned over and all around an older high pressure pipeline. An associated increase in third party damage potential is recognised. This new risk is estimated to be US$800 per year of additional Expected Loss (EL) over 4,000 ft (1,219 m) of the pipeline.

Options to manage this increased risk are identified and analysed. The options are:

1. Place a protective concrete slab over the damage
2. Increase patrol of the damaged area.

These two options are compared as follows.

The concrete cap would be installed over 4,000 ft of pipeline at a cost of US$200,000. It is estimated to have negligible influence on potential consequences of pipeline failure but should reduce probability of failure by 90 per cent. That is, only one in ten of the potential damaging third party incidents would actually cause a failure while nine out of ten would be successfully thwarted by the new slab. This lowers the EL to US$200 per year for the 4,000 ft where the slab is installed.

The alternative of increased patrol is estimated to cost US$10,000 per year and, for logistical efficiency reasons, would cover not only the 4,000 ft impacted by the new subdivision, but an additional 25,000 ft (7,620 m) of pipeline. So, a total of 29,000 ft (8,839 m) of the pipeline would benefit. The frequencies and detection capabilities of the potential new patrols are estimated to cause a minor reduction in both failure probability and consequence potential for the 29,000 ft of pipeline.

The risk reductions for the 4,000 ft and the 25,000 ft segments are assessed and estimated to be a total of US$300 per year for the 4,000 ft segment and a reduction of US$100 per year for the neighbouring 25,000 ft segments that also benefit from the increased patrol.

The multitude of numbers in this example makes this appear to be a fairly complex economic decision. It does indeed reflect the complexity of the real-world situation. But, having undertaken the above analyses, the problem is now solvable with simple algebra. We compare the initial costs and the on-going costs of each option against total risk reduction achieved by each. We can look at future years, consider the cost of capital, and any other dimensions we choose to add.

With such a quantification of risk, the decision makers can now make fully informed decisions. If there remain disagreement among decision makers, it should revolve around the real challenges rather than emotional and opinion-based notions of risk levels and mitigation effectiveness.

The challenges and nuances of managing risks today make the management processes very serious but also exciting. Removing the 'one size fits all' template and the emotional pitfalls of the 'let's meet and discuss options' approach, frees the manager to analyse, gain additional insights, and really understand the impacts of his decisions. P

Evaluating potential risk mitigation projects requires analyses of both the risk and the economics associated with the project. It is not in any stakeholders' interest for the pipeline owner or operator to spend inefficiently. Risk reduction analyses is often a comparison with status quo.

W. Kent Muhlbauer is a regular columnist for *Pipelines International*, author of *Pipeline Risk Assessment: the Definitive Approach and its Role in Risk Management*, and presenter of the Advanced Pipeline Risk Management course run internationally with Clarion Technical Conferences and Tiratsoo Technical.

For more information, visit **www.pipelinerisk.net**