



The Australian Pipeline Research Program

The Way Forward

Presentation by

Max Kimber





Pipeline Research & Technology – Where are we going?

◆ First – some history

- ◆ Australia's petroleum pipeline industry began in 1964 with the Moonie to Brisbane Oil Pipeline
- ◆ Followed by gas pipelines to Brisbane, Melbourne and Adelaide in 1969
- ◆ Built to American Standard ASME B31.4 (liquids) and B31.8 (gas)
- ◆ ASME pipeline standards derived from US experience in 1950s.
- ◆ ASME standards are based on experience and use empiricism in place of science



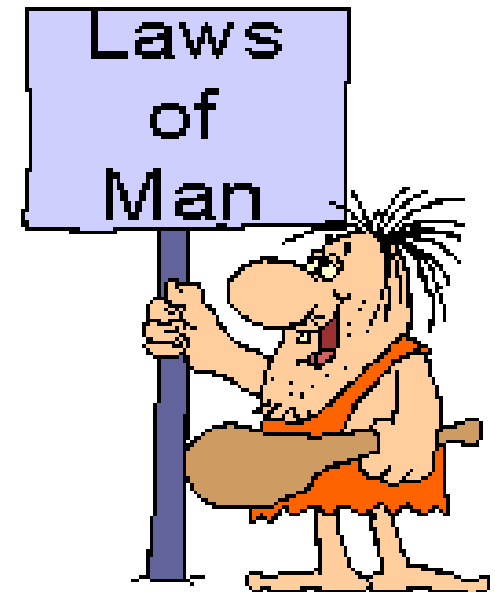


◆ History – continued

- ◆ Empiricism: *noun* the system which accepts only knowledge based on direct experience; the practice of empirical methods; the dependence on experience alone without formal education; quackery. [Chambers Dictionary]

◆ Harsh, but true.

- ◆ We have called this the “Laws of Man”





◆ History – continued

- ◆ During the 1980s, the pipeline industry began to carry out a form of co-operative research with the aim to put science into our standards
- ◆ Driven by Pipeline Authority, Gas & Fuel Corp, Pipelines Authority of SA, SECWA and AGL
- ◆ In 1983 Pipeline Authority and PASA joined US based Pipeline Research Committee
- ◆ Tapped into both North American and European research
- ◆ Small group on Standards Committee including Ken Bilston, Leigh Fletcher, Kingsley Davis and Max Kimber decided that the Australian Pipeline Standard should reflect the “Laws of Nature” i.e. science





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- ◆ History – continued
 - ◆ AS2885-1987 was the first attempt to link knowledge derived from research to a practical standard
- ◆ Co-operative research and its application to the Standard continued e.g.:
 - ◆ coatings for station pipework
 - ◆ threshold stress for stress corrosion cracking
 - ◆ the science of cold field bending
 - ◆ engineering critical assessment of pipeline girth welds
 - ◆ pipeline damage due to third party activities



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- ◆ Informal research programs brought pipeline engineers & technicians together to exchange ideas
- ◆ Supported by CEOs through Pipeline Operators' Group (Started by AGL, TPA and PASA in 1977)
- ◆ Shared experiences without the threat of collusion or competition
- ◆ SCC failure of Moomba Sydney in 1982 provided a benchmark for shared experience and research



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- ◆ Lesson: Stress Corrosion Cracking was a big problem in 1980s. We must not forget that.



*Pipeline Failures due to SCC on
Moomba to Sydney and Gathering
Pipelines*





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- ◆ These failures taught us a lot about fracture propagation and control
- ◆ Does anyone remember?
- ◆ With higher operating pressures and higher grade steels and possibly rich gas, we need to remember!
- ◆ Do we have a research project to address this?
- ◆ What about our APIA Australian Pipeline Research Program?



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- ◆ Fracture propagation, pipe wall defects, pipeline damage, corrosion, coatings have all featured in our research programs since 1996.
- ◆ 2003 Program:
 - ◆ Effect of Transient Loss of Cathodic Potential
 - ◆ Effect of Factors Related to Hydrogen Cracking for In-service Welds (Project with PRCI)
 - ◆ Field Applied Coatings to Cold, Damp Pipework
 - ◆ Fracture Propagation Control
 - ◆ Hydrotest Software Development
 - ◆ Yield to Tensile Strength of Pipe Steel



◆ What does the Research Program Cost?

Research Program	Cash Cost (\$A)	Total Cost Including In-Kind and Subsidies (\$A)
1996 – 1998	600	2.0 million
1998 – 2000	617	2.0 million
2000 – 2002	653	1.1 million
2003	290	0.7 million

◆ What value does the Research Program add to Australia's pipeline industry?

- ◆ In excess of \$200 million in 10 years



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- ◆ Links with Pipeline Research Council – International and European Pipeline Research Group
- ◆ In negotiation for 2 – 3 years
- ◆ MOU signed September 2002
- ◆ Each has access to others' research
- ◆ Sponsors only
- ◆ Confidentiality important
- ◆ Joint Technical Meeting Berlin May 2003



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Where to in the future, as the technical leaders and innovators who made this possible are made redundant, lose interest or lack financial support? My observations:

- ◆ Pipeline companies and consultants do not allow their engineering staff to get involved to the extent required to learn the required skills to take over
- ◆ There is no reservoir of young talent in the pipeline companies or consultants
- ◆ Knowledge and enthusiasm must be captured before it dissipates
- ◆ Most pipelines investors do not understand their assets
- ◆ Design, Operating and Maintenance outsourced
- ◆ We have de-skilled the industry to a dangerous level





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- ◆ This was no more clearly demonstrated than by the Longford Gas Plant failure:



*Photo from Report of
Longford Royal Commission
1999*



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- ◆ The Longford Royal Commission said:
 - ◆ Esso relocated all its engineers away from plant
 - ◆ Isolation of engineers denied Longford Plant and its operators appropriate knowledge and training
 - ◆ Removal of engineers required a new risk assessment and evaluation
 - ◆ No risk assessment took place
- ◆ Does any pipeline owner/licensee review mandatory risk assessment when operations are reorganised and people are “let go”?
- ◆ Most probably not!



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- ◆ Do you want this to happen and be found wanting by the courts?





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- ◆ Longford showed us that threats to energy supplies have serious social and economic impact
- ◆ Gas pipeline companies (among others) must be “High Reliability Organisations” – “HRO”
- ◆ That is, a special class of firms that operate essential infrastructure
- ◆ Firms with redundancy of systems – NOT committed to making people redundant – e.g. Air Traffic Control





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- ◆ *The High-Reliability Theory, suggests that nobody can guarantee safety, but an HRO is constantly aware of the possible hazards and cultivates this awareness:* [From Perrow, Spiekhout & Hopkins]
- ◆ *“HROs act as if there is no such thing as a localised failure, and suspect instead that causal chains that produce failures are long and wind deep inside the system”.* [From Perrow, Spiekhout & Hopkins]
- ◆ Our pipeline owning & operating companies must learn this lesson.....
- ◆ And revise and review it constantly



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- ◆ High Reliability Organisations must:
- ◆ Be “learning organisations” – learn from incidents
- ◆ Have close contact between:
 - ◆ Engineering
 - ◆ Operations
 - ◆ Maintenance
 - ◆ Management
- ◆ Be prepared to listen to and act on BAD NEWS
- ◆ Be active, not passive
- ◆ But most of all.....





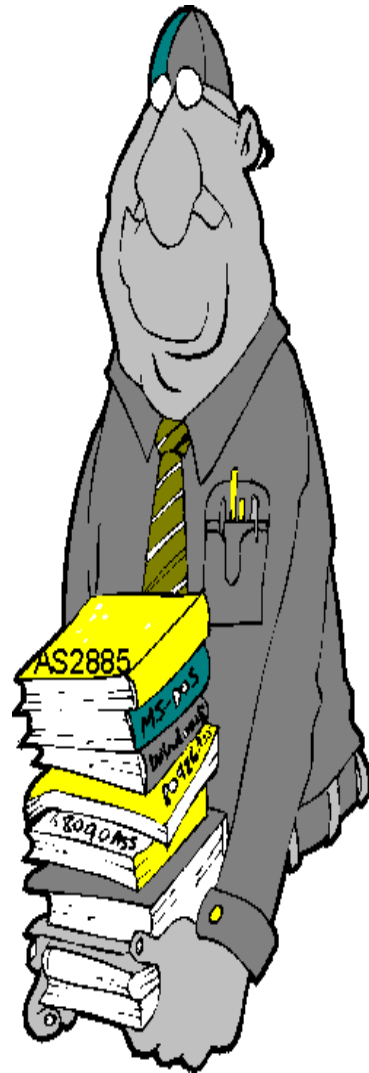
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- ◆ Pipeline companies must have the skills and experience to design, construct, operate and maintain their assets – AS2885 demands it!
- ◆ Diverse and comprehensive engineering skills and experience must be applied to every aspect
BUT.....
- ◆ We have run out of the skills base or “fat” that we allegedly built up under government or benign private ownership



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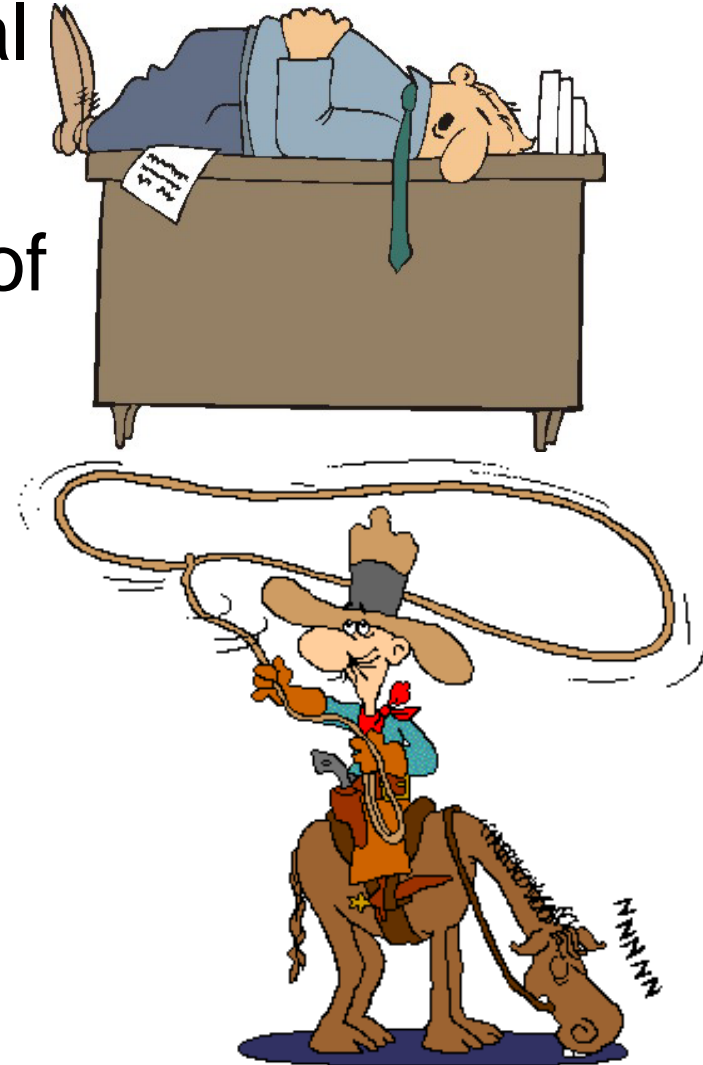
- ◆ Our research has spawned the best pipeline standard in the world
- ◆ It is a “thinking person’s” standard
- ◆ As such, it provides us cheaper, better, safer, more efficient pipelines
- ◆ But we are running out of “thinking persons” at all levels – referred to as “too much overhead”
- ◆ The industry’s pre-occupation with economic regulation has dulled its sensitivity to a much bigger, but less obvious technical problem





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- ◆ Most of the industry is in denial
- ◆ And.....
- ◆ Support for the technical part of the industry has never been worse
- ◆ What are YOU going to do about it?
- ◆ Are you content to be one of the Complacent Cowboys:





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- ◆ If you ignore the problem, it won't go away.
- ◆ It's likely to catch you unawares!

