

The business of preventing leaks

Pat McCann, Koch Pipeline Company, L.P., USA, outlines the philosophy of 'Market Based Management'[®], and its particular application in pipeline integrity efforts.

At a first glance, it may seem odd to discuss philosophy and economic theory in conjunction with pipeline leak prevention. At Koch Pipeline, however, leaders believe a unique management approach (Market Based Management[®]) is the key factor in reducing agency reportable releases by 85% since 1995. It also lies behind the achievement of a safety record that is among the industry's best. By improving employee decision making (and ultimately business performance), the company is striving to create superior value for customers, shareholders, employees and communities.

Koch Pipeline, based in Kansas, USA, owns or operates 8000 miles of pipelines, carrying approximately 1.4 million bpd of crude oil, refined products and natural gas liquids. The company also operates multiple water borne and inland storage and distribution terminals. With a goal of 100% compliance 100% of the time, the company has reduced the number of agency reportable releases on its pipeline systems by more than half, from 64 in 1999 to 30 in 2003. The vast majority of these releases were related to station and terminal operations, rather than involving line pipe. It should be noted that the US Department of Transportation's Office of Pipeline Safety lowered the reporting threshold from 50 bbls to 5 gal. in 2002. In the same time period, the average volume released decreased from 269 to 6 bbls. Thus far into 2004, the company has transported 250 million bbls of liquids; with just eight spills totalling 29 bbls of product released.

The market based approach

Market Based Management (MBM) is the business philosophy and framework developed by Koch Pipeline's parent company, Koch Industries, Inc., and it has been used by company employees to capture profitable opportunities and create competitive advantages, including

developing innovative approaches to operations. Simply defined, the approach encourages and guides employees to think like principled entrepreneurs, committed to adding long term value to the marketplace and society.

MBM is a framework based on the key factors in a market economy that drive value creation, including a set of guiding principles that promote integrity, protection of the environment and safety excellence. These principles encourage employees to seek and make use of the best knowledge when making decisions, including ways to reduce pipeline releases. Building on experience gained over more than 50 years owning and operating pipelines in North America, Koch Pipeline's leaders help to set the vision (a key MBM dimension), and seek to attract and retain employees who demonstrate integrity, humility, teamwork, intellectual honesty and a desire to create real value. It is the entrepreneurial employees who build the work systems and accept responsibility for the daily implementation of leak prevention and detection efforts, continually aiming for improvement.

Recognising the significant role played by data gathering, review and information sharing in an organisation's success, another key dimension of MBM is knowledge systems. Koch Pipeline strives to improve its knowledge systems continuously, including information technology. For example, technology implemented across the operation helps employees monitor company pipelines remotely, to detect corrosion and to prevent and mitigate leaks. The control centre in Wichita, Kansas, spots potential problems via continually monitored electronically transferred pipeline data, which are compared to computer hydraulic models.

The company's integrity management programme integrates technological tools with a systematic approach to operations, including formalised processes for assessment, inspection, preventative



Figure 1. Koch Pipeline has reduced agency reportable releases by 85% since 1995, achieving a safety record among the industry's best.



Figure 2. 20 and 24 in. coupling systems for a Magpie metal loss tool and a TDW caliper tool were recently designed to inspect a crude oil line in a single run.



maintenance, evaluation and routine pipeline operation and monitoring.

MBM at a glance

Managers strive to make sure the five elements of MBM are in place throughout the company's operations:

- Vision: establish logical, unmistakable expectations.
- Virtue and talents: put the right people, with the right values and skills, in the right roles.
- Knowledge systems: facilitate learning and measure performance.
- Decision rights: define who is responsible and establish individual authority limits.
- Incentives: hold people accountable with appropriate rewards and consequences.



Figure 3. Koch Pipeline owns or operates pipelines that carry approximately 1.4 million bpd of crude oil, refined products and natural gas liquids (NGLs).

Table 1. Koch Pipeline Company agency reportable releases

Year	Number of releases	Average volume per release
1999	64	269
2000	43	38
2001	41	171
2002*	39	24
2003	30	6
2004**	8	4

Notes:

From 1995 to 2003, agency reportable releases on Koch Pipeline Company operated pipeline systems transporting crude oil, ammonia, natural gas liquids and refined products, have been reduced by 85%.

* In 2002, the reporting threshold was lowered from 50 bbls (2100 gal.) to 5 gal. Using the earlier reporting threshold, releases in 2002, 2003, and throughout June 2004, were 28, 15 and 3 respectively.

** Year to date data.

Table 2. Koch Pipeline Company safety performance

Year	OSHA* recordable incident rate	OSHA lost time incident rate
1999	0.98	0.0
2000	0.97	0.19
2001	0.94	0.16
2002	0.48	0.0
2003	0.79	0.0
2004**	0.0	0.0

Notes:

Koch Pipeline Company has earned recognition for its safety record. In 2003, the average industry recordable incident rate for liquid pipeline companies (as reported by the American Petroleum Institute) was 1.07 incidents per 200 000 hours worked. The lost time incident rate was 0.26.

* The US Occupational Safety and Health Administration establishes the standard industrial safety performance measurement.

** Year to date data.

MBM in action

In the past, leak detection systems were not consistently evaluated prior to application. As these systems were selected by individuals with compartmentalised knowledge and experience, they were not always optimally applied. Using the MBM framework, employees developed a consistent decision making process for evaluating and matching unique pipeline system characteristics to logical leak detection system capabilities. They also required a cross functional team to execute the process so that comprehensive knowledge could be utilised. Essentially, all Koch Pipeline leak detection systems have been assessed using this process, including the natural gas liquids pipeline systems.

Due to the high compressibility of natural gas liquids, pipelines transporting these products are a challenge for traditional leak detection systems. Integrating experience gained on the refined products and crude lines, however, a team of engineers, operators and field technicians attempted to apply leak detection principles to these special products. Koch Pipeline (KPL), working with software vendor Energy Solutions International, developed the Pipeline Leak Detection System (PLDS) to work effectively on the company's natural gas liquids pipelines. Using this real time transient modelling system, PLDS has been successfully applied on approximately 800 miles of NGL pipelines. From this pilot project, and after verifying leak detection sensitivity, Koch Pipeline is now incorporating this technology in other lines.

Innovative atmosphere

The market based approach encourages employees to recognise opportunities to improve systems, and provides the freedom to explore and innovate. For example, a recent leak prevention project illustrated employee innovation. A crude oil line was scheduled for both an inline corrosion and an inline dent inspection, which are typically performed with two separate tools in two runs. On this particular pipeline, the limited amount of oil available for transport during the required timeframe did not allow for two separate runs. Faced with this challenge, the integrity and reliability team, along with tool vendors and line schedulers, designed 20 and 24 in. coupling systems for a Magpie metal loss tool and a TDW caliper tool. The inspections were completed in a single run such that all integrity requirements were met and the project expense was less than for two runs.

The role of creative destruction

Not only do employees continuously strive to improve operations, techniques and processes, but the company also practices what economists refer to as creative destruction. Under this practice, Koch company employees search for opportunities to grow, as well as watch for signals from the market and their customers that they must change. Part of creative destruction is to evaluate all businesses, activities and assets regularly; determining the value they bring to the company and comparing that to their market value.

Conclusion

The company's employees in nine states make hundreds of decisions each day, which impact on the quality of services, and on the efficiency and reliability of the pipelines. Koch Pipeline has developed processes, procedures (and most importantly) talent to manage its operations. Company employees are continuously trained to recognise and address challenges. Through MBM, they earn the right to make decisions to improve the system, thus creating value for customers, shareholders, employees and communities.