

Koch Pipeline Reduces Leaks With Strict Monitoring And Maintenance

by **Lew Bullion**, Senior Editor

Long before the industry was faced with sweeping government mandates prompted by headline-making incidents, Koch Pipeline Company had already begun an ambitious effort to upgrade maintenance programs for its pipelines.

The privately held company, headquartered in Wichita, KS, operates more than 11,000 miles of liquids lines in the United States. Through an aggressive environment, health and safety pipeline integrity initiative, it has reduced its reportable crude and refined products releases from 143 in 1995 to 6 in 2000, a reduction of 96 percent.

Was there one "magic bullet" that made the accomplishment possible? Ask the manager with the vantage point to see the overall picture. Pat McCann, senior vice president-operations, believes the company's success stems not from one big step but rather from "a series of literally hun-

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dreds of good decisions related to pipeline integrity." According to McCann, the measures include:

- Proactive frequent inspections;
- Repairing, replacing and idling pipe sections based on those findings; and
- Formalized process and procedures to manage overall operation.

"Our pipeline systems extend along a corridor running through the central part of the United States from Texas and Louisiana north through Minnesota and Wisconsin," said McCann, who joined Koch Hydrocarbon Company as an analytical chemist soon after his graduation from Wichita State University in 1976. He was named to his current position with the pipeline company in 1998.

The company operates about 5,600 miles of gas liquids lines, 2,000 miles of crude oil pipelines, 1,500 miles of refined products



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lines and 1,900 miles of lines carrying anhydrous ammonia which is used for fertilizer.

Beginning in the late 1980s, Koch acquired a number of gathering and transmission systems, some of which needed considerable work. Since that time, company managers have continually improved their ongoing effort to upgrade and maintain the system.

A history of pipeline spills dating back to 1990 resulted in Koch eventually agreeing to pay a \$30 million penalty in early 2000. Koch also agreed to contribute \$5 million to a variety of environmental projects in Texas, Kansas and Oklahoma to resolve the issues.

The company's aggressive efforts in the 1990s meant that, by 1990-94, before the federal suits were filed, Koch had already reduced crude oil pipeline leaks by more than 70 percent while increasing pipeline mileage by more than 25 percent. Over the next three years, Koch further reduced crude oil pipeline leaks by another 22 percent.

In 2000, Koch transported approximately 650 million barrels of liquids - more than 27 billion gallons - through its pipeline system. It experienced only 13 agency reportable spills with a total of about one quart of product reaching water, McCann said.

Koch's efforts have not gone unnoticed by industry officials and others in various jurisdictions, including Mike Cantrell, chairman of the Oklahoma Energy Resources Board.

"Koch has always had a policy of complete and accurate reporting of spills, along with a policy of immediate and thorough cleanup and remediation. If all of our industry had always been as sensitive and responsible, we would be much better off today," Cantrell said.

Smart Piggings Helps

"An important part of our pipeline integrity program is preventing corrosion," McCann explained. "We have initiated a very aggressive smart pigging program which includes utilizing smart pigs to inspect our pipelines and then we repair or upgrade accordingly. That program is responsible for the significantly reduced number of corrosion leaks."

As part of its pigging program, Koch has worked with vendors to develop a pig to examine its anhydrous ammonia lines. A cooperative effort with vendors was necessary because of the uniqueness of the system. McCann said that it is one of only two such systems in operation.

"Developing the new ammonia pig may be the most recent example of Koch's aggressiveness in addressing environmental, health and safety issues," McCann noted.

"There has not been a high-resolution smart pig available for anhydrous ammonia service. Over the past few years, we've worked with vendors—most recently Magpie—to develop one. We've gotten three consecutive runs that appear to be providing good data. That will definitely help our integrity management program in the future," he said.

Koch Pipeline Environment, Safety & Health Program In A Nutshell

Koch Pipeline Company operates about 13,500 miles of pipelines throughout North America. The lines carry a wide range of products including crude oil, refined products, natural gas liquids and anhydrous ammonia.

Koch's pipeline control center in Wichita, KS, is the hub for the company's remote pipeline monitoring and control. From this vantage point, operators manage the company-operated pipelines nationwide around the clock.

Koch's safety programs include monitoring of its lines in three ways:

- By computer—around the clock;
- By local personnel—field technicians and other personnel perform systematic inspections of lines and associated equipment to ensure integrity; and
- Aerial patrol—pilots fly frequent inspections of pipelines right of way.

Part of the company's protection plan includes cathodic protection directed by employees who have been certified as Cathodic Protection Specialists or Corrosion Specialists by the National Association of Corrosion Engineers (NACE).

Koch uses smart pigs, hydrostatic testing and other aggressive inspection and maintenance efforts. In recent years, the company has increased its public education efforts and taken steps to enhance its employee training programs.

Universal Repair Standards

In the "distant past," McCann recalled, Koch Pipeline divisions often worked independently of one another. This arrangement prevented an easy sharing among maintenance teams of the most efficient and effective practices. That has now changed.

"It boils down to better communication," he said. "Management, both corporate and field, have had meetings with all of our employees to carefully explain our vision of achieving a corporate-wide consensus and commitment to superior environmental, health, and safety performance.

"Then our four field divisions have direct responsibility for environmental, health and safety performance," he said, adding, "We have corporate groups as well, such as the corrosion control specialists, who have co-ownership of the performance."

The two groups mesh in teams that are trained by in-house experts and many also have training from external certifying agents. Today, the technical teams consistently meet high expectations, McCann said. They observe a universal standard of repair and maintenance and are empowered to exceed those standards wherever conditions warrant, he said.

Disciplines cross on each team, including specialists in technical areas such as information technology, mapping, training, and right-of-way inspection.

An example of Koch's universal practices and procedures is a pipe assessment/prioritization model. This model manages massive amounts of data on such subjects as steel type, coating, how the line was installed, soil conditions and population density around the segment. Entering this data into a computer model helps the technical teams prioritize line segments and determine the action to be taken.

Consistency of maintenance performance is aided by written how-to guidelines such as maintaining right of way; inspecting a pipe water crossing and repair criteria.

Standardization has also helped the company's efforts in updating its system-wide maps. Maps have always been essential to Koch, but what has been improved is the consistency in which facilities are mapped along with the information included on the maps. This allows a technician to easily interpret maps anywhere on the system, McCann said.

High-Tech Tool

A key step to pipeline improvement came through Koch's development and implementation of Katapult, a powerful computer-based technology with associated process changes that is designed to enhance pipeline safety.

Placed into operation in 1997, the Katapult monitoring program uses mathematical fluid-flow models to analyze more than 125,000 data points coming in by satellite from the companies' pipeline systems each minute.

The system's fluid-flow models, which apply to relatively non-compressible fluids, were crafted by specialists to encompass variations in temperature and pressure in portions of the pipe-line system.

The data management and fluid-flow modeling capabilities of the system have resulted in an increased ability on the part of operators to detect possible leaks and spot potentially hazardous situations where an incident might occur. The computer can sense potential problems by comparing actual operating conditions with the theoretical models in its memory. This helps increase safety and enhance compliance with environmental regulations.

The system can also help improve flow efficiency. By running "what if" scenarios,

Katapult helps planners locate bottlenecks and streamline planned enhancements to the pipeline systems. Katapult has been honored by Computerworld magazine and the Smithsonian Institution where it was inducted into the Smithsonian's Permanent Research Collection as one of the nation's leading technological innovations.

Efforts Recognized

Koch's efforts to ensure environmental protection and safety enhancement along its pipelines have not gone without recognition or encouragement. The company's Minnesota pipeline system won that state's Office of Pipeline Safety's Operator of Choice award for transporting 6.4 billion gallons of crude oil without a reportable spill.

In Texas, the Texas Railroad Commission (RRC) regularly audits Koch's pipeline operations and in 1997, the agency completed a comprehensive audit of 6,836 miles of pipelines owned by Koch. The results showed Koch Pipeline Company had 60 percent fewer violations than the industry average in the state.

Expectations for industry pipeline companies are increasing. As an example of the much tougher mandates that liquids pipelines are facing, on Feb. 1, 2002, operators of intrastate transmission and gathering lines in Texas that are subject to 49 CFR 195 were required to designate whether they will follow a risk-based analysis program or a

prescriptive plan for managing pipeline safety on facilities under state jurisdiction.

Operators using the risk-based plan must complete at least 50 percent of the initial assessments of their lines by Jan. 1, 2006 and the remainder by Jan. 1, 2011. Those using the prescriptive plan need to complete the initial integrity testing by Jan. 1, 2011.

Looking Ahead

The future of pipeline operations is being shaped by federal legislation. Working from its position as a proven leader in pipeline integrity procedures, Koch Pipeline Company has allied with other companies to urge Congress to pass bipartisan pipeline safety legislation that would increase safety and enhance public confidence in the interstate network. They seek congressional support for the U.S. Department of Transportation's recent actions in developing rules for periodic testing of pipelines, implementing a pipeline personnel qualification program and increasing data collection.



Koch supports pipeline safety legislation eventually passed by Congress to fund the Office of Pipeline Safety (OPS) adequately to enable it to gather the data needed to understand accident causes. The company is asking Congress to support public education in an effort to reduce the incidence of third-party damage to pipelines.

"As we pursue ever safer, ever cleaner operations, government and industry must work together to improve pipeline safety. Koch has actively supported meaningful and effective legislation that accomplishes that goal," McCann concluded. **PEGJ**