



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

MAY 31 2002

Mr. Greg N. Constien
President
Conoco Inc.
1000 S. Pine
Ponca City, OK 74602-1267

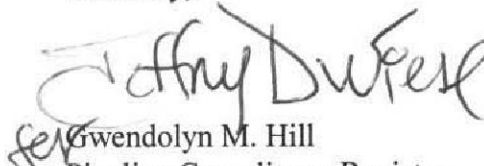
Re: CPF No. 3-2002-5011H

Dear Mr. Constien:

Enclosed is a Corrective Action Order issued by the Associate Administrator for Pipeline Safety in the above-referenced case. It requires you to take certain corrective actions with respect to the operation of your Kansas City Pipeline.

Service is being made by certified mail and facsimile. Your receipt of the enclosed document constitutes service of that document. The terms and conditions of this Corrective Action Order are effective upon receipt.

Sincerely,


Gwendolyn M. Hill
Pipeline Compliance Registry
Office of Pipeline Safety

Enclosure

VIA CERTIFIED MAIL (RETURN RECEIPT REQUESTED) AND TELECOPY

**DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, DC 20590**

In the Matter of
Conoco Inc.
Respondent.

CPF No. 3-2002-5011H

CORRECTIVE ACTION ORDER

Purpose and Background

This Corrective Action Order is being issued, under authority of 49 U.S.C. § 60112, to require Conoco Inc. (Respondent) to take the necessary corrective action to protect the public and environment from potential hazards associated with a failure on the 8-inch portion of Respondent's petroleum products Kansas City Pipeline, which runs from El Dorado, Kansas, to Parkville, Missouri. Pursuant to 49 U.S.C. § 60117, the Central Region, Office of Pipeline Safety (OPS) initiated an investigation of the failure.

Preliminary Findings

- On May 22, 2002, a failure occurred on Respondent's Kansas City Pipeline, a part 10-inch diameter (120.8 miles) and part 8-inch diameter (72 miles) petroleum products pipeline. The pipeline is a total of 195.22 miles long and runs in a northeasterly direction from Boyer Station (Milepost, or "MP," 1) in El Dorado, Kansas, to Parkville Terminal (MP 194.7) in the Riverside and Parkville suburbs of Kansas City, Missouri.
- The pipeline originates at Boyer Station. From Boyer Station to Waverly Station (MP 119.1), an out-of-service pump station site, the pipeline is 10 inches in diameter. The 8-inch portion of the pipeline runs from Waverly Station to Parkville Terminal. Between Waverly Station and Parkville Terminal is Edgerton Station (MP 155.3). The failure occurred between the Waverly and Edgerton stations, approximately 20 miles upstream of Edgerton Station.
- The Kansas City Pipeline is used to transport gasoline and diesel fuel.
- The failure occurred in the 8-inch part of the line, near milepost (MP) 136.4, just south of Ottawa, Kansas, and north of Highway I-35.

- The failure resulted in a release of approximately 2000 barrels of unleaded gasoline, which did not ignite. There were no deaths or injuries.
- The failure occurred on farmland, specifically, a wheat field. The spilled gasoline contaminated the soil surfaces in the vicinity of the failure. The product flowed from the failure site into road ditches. Respondent told OPS it placed booms in nearby creeks to contain potential runoff from the spill. Reports do not indicate any discharge into water.
- The pipeline is approximately 4 miles from the Marais des Cygnes River. The pipeline crosses a few creeks between the failure site and the Marais des Cygnes River. The pipeline crosses other streams between Waverly and Edgerton, Kansas.
- The line is routed through predominantly rural areas of Kansas. Approximately two miles of the pipeline lie in a residential area in Ottawa, Kansas. Three farmhouses, each within a quarter mile of the failure site, and another farmhouse, within 3/8 of a mile of the failure site, were evacuated as a safety precaution. Prevailing winds carried strong gasoline vapors in the direction of two farmhouses. There is a housing development within 1 1/2 miles of the location of the pipeline failure.
- The maximum operating pressure of the 8-inch segment of the Kansas City line is 1,011 psig. On May 22, 2002, at approximately 7:49 a.m., when the failure occurred, Respondent's controller, in Houston, noted on the SCADA system that the suction pressure at the Edgerton Station dropped from 466 to 0 in a matter of seconds. Respondent calculated the pressure at the failure location to be 617 psig.
- Following the failure, Respondent's Kansas City personnel isolated the failure site by manually closing the upstream mainline valve at MP 133.7 and the downstream valve at MP 139.50. The entire Kansas City line was out of service following the failure.
- Respondent cut out 4 joints of pipe at the failure site and replaced them.
- The failed segment of the pipeline was manufactured by Youngstown Sheet & Tube Corporation prior to construction of the line in 1936, and is 8-inch x 0.277 inch wall thickness, low frequency electric-resistance welded (ERW) pipe. The pipe appears to have been manufactured to the API Spec. 5L, Grade B, produced to a modified 40,000 psi minimum yield strength. The 8 inch segment of the Kansas City Pipeline is constructed predominantly of this pipe. In 1988, the 44 miles of 10 inch pipe immediately upstream of the Waverly Station was replaced.
- The preliminary investigation indicates the failure initiated in the longitudinal seam. The rupture propagated along the longitudinal seam. The length of the rupture is approximately 39 inches long.

- The pipeline exhibited signs of selective corrosion along the longitudinal seam at the location of the failure and also at other locations in three of the four joints of pipe that were removed during the repair. In addition, three sleeves from previous repairs, possibly addressing corrosion, were on the pipe in the vicinity of the failure.
- OPS observed that the pipe exposed at the failure site is poorly coated. Cathodic protection at the site appeared to be adequate.
- Respondent has stated it will conduct a metallurgical analysis of the failed pipe to determine the cause of failure.
- In 1988 the entire Kansas City Pipeline was pressure tested. In 1997 a metal loss tool was run through the line. In May of 2000 Respondent acquired additional ownership interests from Equilon Pipeline Company, LLC. That same year Respondent hydrotested the pipeline from the Edgerton Station (north of the failure location) to the end of the pipeline in Parkville, MO.
- Respondent owns 66.7 % of the pipeline. Shell Pipeline Company, LP (formerly Equilon Pipeline Company, LLC), owns 33.3%. Equilon operated the pipeline prior to May, 2000. Respondent has operated the pipeline since May, 2000.
- OPS identified low-frequency ERW pipe to be subject to failures in the longitudinal seam because of manufacturing defects. OPS issued Alert Notices on January 28, 1988, and again on March 8, 1989, to inform pipeline operators of the problem. Failures of the longitudinal seam of the pipe had been caused by the growth over time of manufacturing defects in the ERW seams. Selective corrosion of the seam and cyclic fatigue contribute to the growth of these defects. Although OPS review has also shown that in many cases pipelines that had been hydrostatically tested had operated safely since they were tested, there are also cases in which selective corrosion or cyclic fatigue have led to operating failures many months or years after the test.
- In a letter dated May 24, 2002, to Mr. Ivan A. Huntoon, Regional Director, OPS, Respondent stated that it would operate the pipeline at restricted pressures and undertake corrective actions to ensure safe operation.
- Respondent returned the pipeline to service on May 25, 2002. Respondent is operating the pipeline using restricted pressures arrived at in consultation with OPS.
- Respondent's integrity management program for the Kansas City Pipeline had scheduled for 2003 a data review of a 1997 internal inspection tool run. Respondent also scheduled for 2004 hydrostatic testing of those sections of the pipeline, from the Waverly to Edgerton stations, that were originally constructed in 1936.

1. Maintain the following operating and pressure restrictions:
 - A. At Waverly Station
 1. The high line pressure shutdown is to be set not to exceed 500 psig.
 2. The high bypass automatic control sequence controlling the Boyer Station discharge pressure is to be set not to exceed 480 psig.
 3. The high suction alarm alerting the control center operator to lower the Boyer Station discharge set point to reduce pressure and flow is to be set not to exceed 470 psig.
 - B. At Edgerton Station
 1. The high line suction pressure shutdown is to be set not to exceed 330 psig.
 2. The high bypass automatic control sequence controlling the Boyer Station discharge pressure is to be set not to exceed 285 psig at Edgerton Station suction.
 3. The high suction alarm alerting the control center operator to lower the Boyer Station discharge set point to reduce pressure and flow is to be set not to exceed 250 psig at Edgerton Station suction.

These restrictions shall remain in place until written approval, pursuant to Item 11, is obtained from the Director, Central Region, OPS.

2. Regarding the segment of the pipeline between the Waverly and Edgerton stations, perform analysis of 1997 internal inspection tool results as soon as practicable. After performing the analysis, make the repairs suggested by the analysis by December 31, 2002.
3. Regarding the segment of the pipeline between the Waverly and Edgerton stations, complete the hydrostatic test of the Waverly to Edgerton segment of the pipeline by September 1, 2003.
4. Conduct a detailed metallurgical analysis of the pipe that failed on May 22, 2002 to determine the cause and contributing factors. Submit a copy of the report of this analysis to the Regional Director, Central Region, OPS, within one week of your receipt of the report. The metallurgical analysis shall include evaluation for possible influence of cyclic fatigue and selective seam and crevice corrosion.
5. Submit a written plan, with a schedule, to verify the integrity of the line from Waverly Station to Edgerton Station. The plan must provide integrity testing that addresses all known or suspected factors in the failure, including if relevant:
 - A. Internal inspection tool surveys and remedial action. The type of internal inspection tools used shall be technologically appropriate for assessing the system based on the type of failure that occurred on May 22, 2002.
 - B. A detailed description of the inspection and repair criteria that will be used in the field evaluation of the anomalies that are excavated. This is to include a description of how any defects are to be graded and the schedule for repairs or replacement.

- C. An evaluation of the line for areas of damaged or disbonded coating, including but not limited to, a close-interval, current interrupted, pipe-to-soil potential survey.
 - D. Integration of all available data from internal inspections, metallurgical analyses, and historical data, including repair and cathodic protection records.
 - E. Hydrostatic pressure testing of the line segment, including a detailed metallurgical analysis of each seam failure that occurs during the hydrostatic pressure testing of the line. Pressure testing must consider a short-duration high pressure test to a pressure of 100% SMYS or 1.39 x MOP, as appropriate to the identified cause and contributing factors to the failure on May 22, 2002.
 - F. A schedule and means for providing the results and data for testing programs performed to the Central Region.
6. Each element of the plan identified in item number 5 must be approved by the Regional Director, Central Region, OPS, who may provide approvals incrementally. Implement the plan as approved.
7. If a determination is made that internal inspection is necessary, provide the Regional Director, Central Region, OPS, with a report of the results of the internal inspection within 2 weeks of receipt of the report, including the identification (and location) of any anomalies that remain in the 8-inch line that have not yet been evaluated or repaired and the criteria used for classifying the anomalies for evaluation. Include your schedule for completing the evaluation and repair of these anomalies.
8. Conduct an Operational Reliability Assessment (ORA) of all applicable Kansas City line ERW sections designed to examine the structural soundness and assure safe operation of the system. Submit proposed plan for conducting the ORA for approval by the Regional Director within 60 days of the issuance of this Order. The ORA shall include the following:
- A. Analysis of the operating conditions over the history of the operation of the pipeline, including but not limited to pressures, surges, and cycling. Base the analysis on all available data to determine factors that may have contributed to the failures.
 - B. Metallurgical examination of samples of pipe from each failure that occurs during hydrostatic testing that is not readily and conclusively identified as having failed because of damage from external forces or general corrosion not associated with the weld seam, in order to determine the cause of and any contributing factors to the failure.
 - C. Performance of appropriate fracture mechanics calculations to correlate the actual size of defects experienced with theoretical predictions of failure pressure versus defect size. Fracture mechanics analysis shall be performed as pressure test and metallurgical examination data are available. This analysis will be conducted by an independent fracture mechanics specialist. Respondent may propose an alternative method if it ensures an equivalent level of safety for the pipeline.

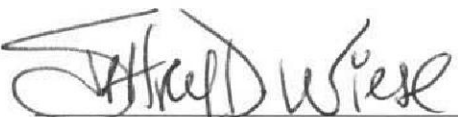
- D. Failure analysis calculations and estimated pipe life calculations, that consider pipe specifications, typical defect size, pipeline operating pressures and pressure fluctuations, and other factors significant to the probable pipe service life

Complete the ORA, and submit a final ORA Report to the Regional Director, Central Region, OPS, within six months after completion of the hydrostatic testing specified in paragraphs 3 and 5E.

- 9. Develop a maximum operating pressure at which the pipeline may be safely operated after completion of the hydrostatic testing and ORA.
- 10. Provide the Regional Director with the following reports:
 - A. Advance Notice of Testing. The report must provide 48 hours of advance notice to the Regional Director of any testing.
 - B. Monthly summary reports on the results of hydrostatic testing of each section completed during the previous month. These summary reports shall provide information as to type of failure, failure pressure, method of repair, and location of failure.
 - C. Reports of any metallurgical analyses conducted to determine cause and contributing factors of failures as soon as the reports are available.
 - D. Reports of pressure test results after completion of testing. The reports must include, at a minimum, pressure and temperature recording charts and logs and deadweight calibration test data.
- 11. Respondent may request approval from the Regional Director, to increase its operating pressure above the restricted pressure of Item 1, based on showing that the hazard has been abated or that a higher pressure is justified based on an analysis showing that the pressure increase is safe considering all known defects, anomalies and operating parameters of the pipeline. The Regional Director's determination will be based on cause of failure and provision of evidence that mitigation actions taken by the operator provide for the safe operation of the pipeline. Appeals to determinations of the Regional Director in this regard will be subject to the decision of the Associate Administrator for Pipeline Safety.
- 12. The Regional Director, Central Region, OPS may grant an extension of time for compliance with any of the terms of this order for good cause. A request for an extension must be in writing.

The procedures for the issuance of this Order are described in Part 190, Title 49, Code of Federal Regulations, § 190.233, a copy of which is enclosed, is made part of this Order and describe the Respondents' procedural rights relative to this Order.

Failure to comply with this Order may result in the assessment of civil penalties of not more than \$25,000 per day and in referral to the Attorney General for appropriate relief in United States District Court.


for Stacey Gerard
Associate Administrator
for Pipeline Safety


Date Issued