



*Files
see lines 112*

DCA00-MP009

Attachment 5

MEMORANDUM

TO: Distribution
DATE: March 9, 1998
FROM: Principal Engineer and Principal Engineer
PLACE: Central Engineering
SUBJECT: Line 1103 Failure

Background

On Tuesday, January 27th, 1998, at approximately 1:45 a.m. Gas Control noticed a pressure drop at Guadalupe Station and immediately determined that a failure had occurred on the California Mainline System. The Station was shut down at 2:00 a.m. and personnel were dispatched to the site. A fire was discovered on the pipeline right-of-way and valves were immediately shut-in. Valve 13.5 (MP 111+3608.2) at Guadalupe Station and Valve 15 (MP 127+1398) were shut in at 3:25 and 3:45 a.m. respectively. The fire was out at 4:15 a.m. Station Discharge pressure Guadalupe Station at the time of rupture was 830 psig with the MAOP of the pipeline being 836 psig.

The failure excavated a crater between the ruptured ends of the 30 inch diameter 1103 Line and uncovered the adjacent 26 inch diameter 1100 Line at approximately MP 117. Evaluation of the 1100 Line by nondestructive techniques revealed that, while the coating had been burned off, there was no degradation of the material properties. The 1100 Line was returned to service shortly after the assessment was completed. The rupture occurred an estimated 180' north of Highway 62/180.

Pipeline database records indicate that this pipe was installed in 1950, is 30 inch diameter, 0.335 wall thickness, Grade X52, manufactured by Republic, using the double submerged arc weld (DSAW) process.

Eyewitness Reports

Residents of the area indicated that before the fire was extinguished at approximately 4 a.m. The first person on the scene was an employee of the Texas Highway Department. He indicated that there was no wind and the fireball rose straight up to an estimated height of 600 feet.

Visual Site Examination

A survey of the pipe segments ejected from the rupture was conducted. Piece numbering was assigned counterclockwise from the east starting immediately adjacent to the rupture crater.

Fragment #1 was located an estimated 18 feet east of the crater and was lying on a line approximating east-southeast. This piece contained a girth weld which was manually applied. The end closest to the crater shows signs of heating. No corrosion damage was noted.

Fragment #2 was located a measured 390 feet to the north of the rupture crater, was approximately 20 feet long and contained a girth weld which had been applied by an automatic welding machine. No corrosion damage was noted on this fragment.

Fragment #3 was located an estimated 180 feet west and 25 feet north of the pipeline ROW centerline and contained a segment of manually applied girth weld. No corrosion damage was noted on this fragment.

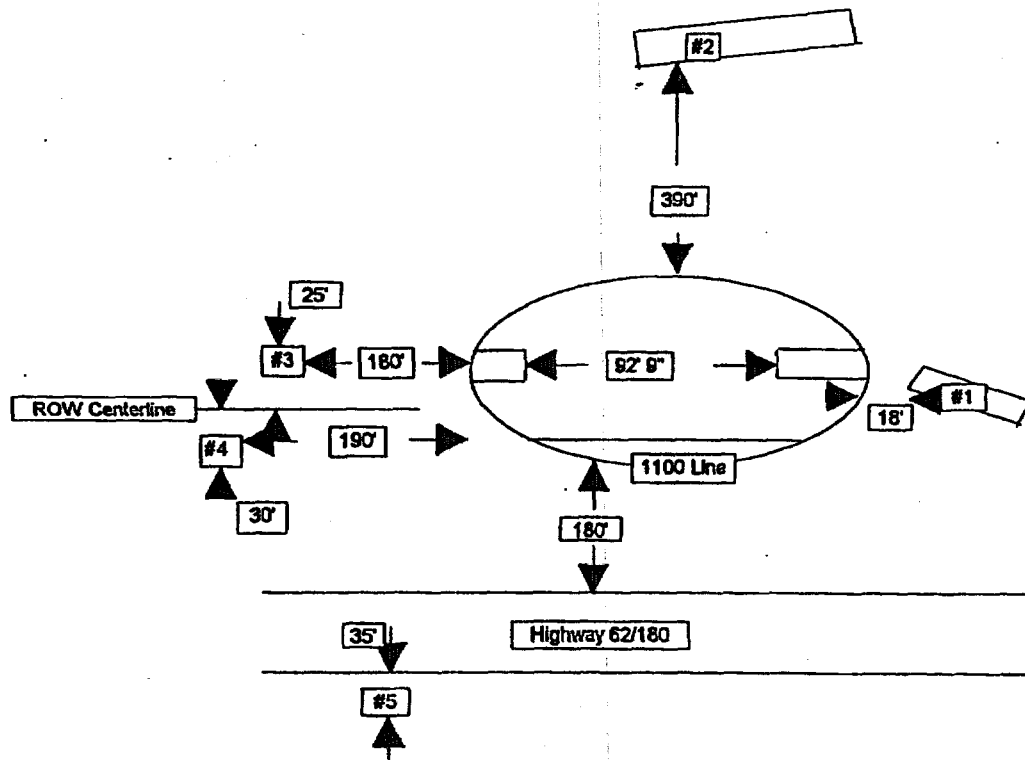
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Fragment #4 was located an estimated 190 feet west and 30 feet south of the ROW centerline. The fracture appeared to have occurred in the bottom of this piece. This fragment contains a 3 foot segment of manually applied girth weld, and the fracture ran in the girth weld for about 8 inches. This piece also suffered severe distortion and bending on the side oriented to the southwest, which was also imbedded in the dirt an unknown depth, making examination of lower edge impractical at the site. The opposite side contained an area with general corrosion approximately 20 inches long. Wall thinning in this area appears to have reduced the pipe wall down to 0.130 inches from the nominal 0.335 inches. Chevron patterns were noted on the fracture surface pointing back toward the thinned area. No coating remained on this fragment of pipe.

Fragment #5, which was found approximately 35 feet to the south of Highway 62/180, was a small triangular piece measuring approximately 4 feet by 2 feet, - this piece contained shear lips all the way around the fracture surface and contained no long seam or girth weld segments. No coating remained on the pipe fragment and no corrosion damage was observed on the pipe surface.

Except for the relatively small area of general corrosion on Fragment #4, which initiated the rupture, the surface condition of all portions of ejected and exposed pipe looked good, with no corrosion noted.

Highway 62/180 suffered heat damage which consumed the pavement binding tar and 575 feet of pavement was in need of repair. The burn radius varied from 500 to 550 feet from the rupture crater.

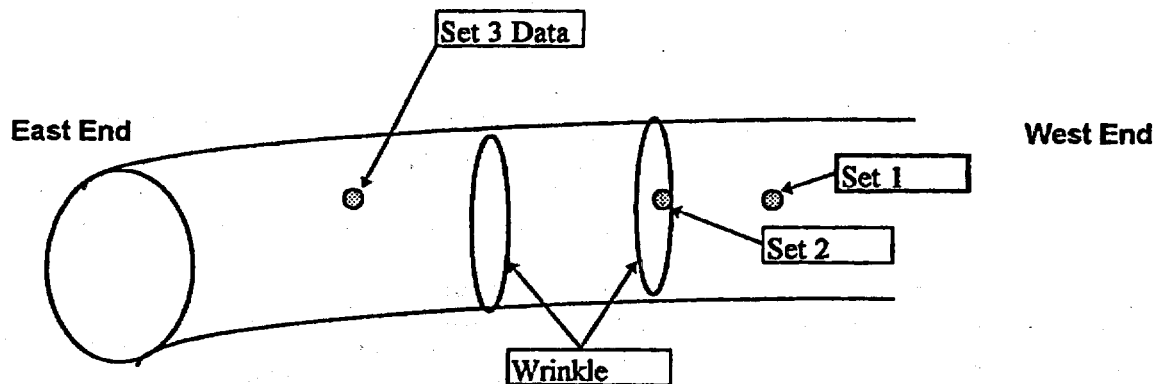


1100 Line Integrity Verification

The 1103 Line rupture and subsequent gas flow exposed a portion of the adjacent 26 inch diameter 1100 Line, which was located an estimated 20 to 25 feet to the south, parallel to the 1103 Line centerline. The pipe was exposed from

about 5 to 2 o'clock looking east along the pipe as shown in Figures 1 and 2. The coating was burned off the majority of the exposed pipe and two wrinkle bends from original construction were visible toward the eastern end. Three random areas on the pipe were hardness tested to ensure that the rupture and subsequent fire had not affected the mechanical properties of the pipe. Hardness readings were taken in an area toward the center of the crater, on one of the exposed wrinkle bends and at an area which was thought to have been shielded from the gas escaping from the eastern end of the piping. All hardness readings were consistent with that of unaffected pipe. Hardness readings from the testing are included. The surface oxide coating was consistent with that of mill scale and not of pipe which had been subjected to direct flame impingement. The wrinkle bends were nondestructively examined for cracking using dry magnetic particles, with no cracking found. The line was returned to service based upon the findings of the evaluation.

Brinell Hardness (H _B) Readings		
Set 1	Set 2	Set 3
125	169	127
115	173	125
118	173	125
119	170	125
120	169	124
119	171	125



Pipe Ends Exposed in Rupture Crater

The top 25 inches of pipe were turned back at the top of the remaining western pipe end. This seemed to indicate that the adjoining piece was ejected backward out of the ditch toward the west. This rupture occurred at an automatic machine applied girth weld located at this end. About 24 inches of girth weld remained between the 3 to 6 o'clock position when looking west. All 360 degrees of the pipe end fracture showed shear lips indicating ductile deformation.

The east end of the rupture showed greater heat effect than the western end. The pipe is egged on an axis running from 2 o'clock to 7 o'clock, with the greatest distortion being in the upper right quadrant. There is a bulge between the 11 o'clock and 3 o'clock positions, looking east. The remaining pipe contained shear lips for the full 360 degrees around the rupture surface.