

# Testing Validates the Use of Atlas for Restoration of Extensive Wall Loss

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Colombia

### Summary

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A Colombian natural gas pipeline operator was searching for a repair solution that could successfully remediate an extensive wall loss on a 20-inch natural gas pipeline. The specification established for validating the repair included remediation of pipeline wall deterioration caused by external corrosion. CSNRI, in collaboration with [Aplika Control Corrosión S.A.S](#), developed a repair solution using [Atlas™](#) carbon fiber composite system to restore the integrity of the pipeline in accordance with ASME PCC-2 and ISO 24817 standards.



*Photo caption:*

*Prior to the repair, the surface was prepared to near-white metal via media blasting.*

### Benefits

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- Permanent repair with minimal interruption of pipeline operation during installation.
- The flexible repair system can be installed on deformations and in areas with limited space/access.
- Suitable for any pipe geometries (straight, elbow, tee) including irregularities and welds without pipe size limitation.
- Installed and inspected with cost-effective field labor.
- Reduces time and cost in the trench by repairing more anomalies in less time.
- Can be installed over non-injurious hard spots and laminations with low installation risk, reducing the total repair length, cost and time required compared to steel sleeves.
- User-friendly (no hot work, non-conductive repair, light product)
- Fast curing, allowing the excavation to be covered in less than 24 hours.

### Challenge

External corrosion caused wall loss on a carbon steel natural gas pipe (API 5L X60). A repair solution was required that would arrest the corrosion and fully restore the structural integrity of the pipe. The injurious defect length (axial) was 10 inches with a defect width (hoop) of five inches, and a wall loss percentage of nearly 80%.

### Solution

CSNRI engineered a solution using Atlas. As the most-tested carbon fiber composite solution for the permanent repair and rehabilitation of pipelines and piping structures, Atlas is highly engineered to permanently restore the original strength of damaged pipelines. The repair was designed to restore the integrity and function of the pipeline according to the specified operating conditions, which included a design pressure of 1200 psi and an operating temperature of 80°F. The system as designed guarantees a minimum service life of 50 years to repair defects caused by external corrosion with thickness losses of up to 80%.



## Manage consent

To repair the defect, Aplika Control Corrosión prepared a 36-inch surface area with abrasive blasting according to the SSPC-SP 10 near-white metal cleaning method. The anchor profile was measured at random points in the installation area, ensuring a minimum profile of 60 microns on the surface and permissible minimum environmental conditions for proper installation (RH < 90% and temperature variation > 3°C).

Next, EPN 242 putty was used to rebuild the geometry of the pipe and ensure uniform load transfer. PPR 290 adhesive primer was applied as a corrosion inhibitor, followed by a layer of fiberglass impregnated with SFE 206 using the two-layer offset method.

Based on the operating conditions of the line and the characteristics of the defect, an installation of 12 layers of Atlas composite material was applied using the offset method, covering a repair length of 24". A compression film was used to cover the repair area, allowing for curing after perforation.



*The pipe geometry was smoothed with EPN 242 putty prior to the application of the Atlas wrap.*



*Fiberglass impregnated with SFE 206 was applied over the PPR 290 primer.*



*Next, 12 layers of Atlas were applied in an offset manner.*



*Compression film was applied over the repair and perforated, then allowed to cure.*

## Results

Approximately 24 hours after installation, hardness measurements were conducted on site in the reinforced areas, ensuring that the data surpassed the established minimum permissible limit (76 Shore D). The repair, which was completed in two hours, restored the structural integrity of the line for scheduled tests.

After cycling, the test specimen with the Atlas composite system was subjected to a burst test. The objective was to evaluate the performance of the Atlas repair system and study the impact of internal pressure on the repaired specimen. The results revealed that the reinforced specimen, exposed to over 2800 psi, exceeded design expectations by over two times, as the failure occurred outside of the repair zone.

The test demonstrated that the Atlas composite system had the best performance in burst tests and strength compared to other evaluated systems available in the Colombian market, ranking first for non-metallic reinforcements with thickness losses of up to 80%.



*The repair was tested to 2800 psi, resulting in a failure to the pipe body, but not to the Atlas repair, which was designed for 1200psi.*



*The burst test revealed that the Atlas system outperformed all other non-metallic reinforcements for repairing pipe with wall loss of up to 80%.*