



# Project Overview

## CORROSION REPAIR OF STEEL PIPE WITH CARBON FRP

Name: San Juan Generating Station, PNM  
Type: Industrial Facility  
Location: Farmington, NM  
Completed: October 2007

### PROBLEM

Due to corrosion damage some sections of a 10-ft diameter pipe and 4 ft raisers had lost significant wall thickness, which compromised the structural integrity of the pressurized pipelines. Design requirements called for additional strength in both hoop and longitudinal directions. Access for the pipe was available only through a 30-inch diameter manhole. This required re-design and manufacturing of the equipment.

### SOLUTION

A special QuakeWrap® Carbon fabric was developed for this project to achieve the strengthening requirements with a **single layer** of carbon fabric – instead of **two layers** as the original design called for. Samples were constructed and tested to demonstrate the feasibility of the solution. 50-inch wide bands of carbon fabric were applied in the hoop direction, with a single overlapping joint along the bottom of the pipe. To avoid galvanic corrosion of the steel as a result of direct contact with the carbon fabric, a layer of glass fabric was applied first to the steel surface. The entire repaired section was coated with a layer of high chemical resistant coating.



## Technical Highlights

- 10-ft and 4ft diameter steel pipe segments strengthened with Carbon FRP.
- Specially designed carbon fabric was used; this fabric allowed the pipe to be strengthened with only a single layer of fabric, compared to the previous phases at the same site that were done with two layers
- All equipment was re-designed and/or modified so that it could fit into the pipe through the 30-inch diameter manholes.
- 4 ft vertical raisers were repaired using under very tight spaces and using a special scaffolding system suspended on cables.

## Credits

Engineering and Materials: QuakeWrap, Inc., Tucson, AZ  
FRP Installation Subcontractor: FRP Construction, Tucson, AZ  
General Contractor: Riley Industrial Services, Farmington, NM

***This project received the 2008 Award of Excellence from the International Concrete Repair Institute (ICRI).***

*“The FRP Retrofit Experts”*

