



CASE STUDY

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Mazzei Injector Company, LLC

500 Rooster Drive

Bakersfield, California 93307-9555

TEL 661-363-6500

FAX 661-363-7500

www.mazzei.net

Iron Removal From Groundwater

Sidestream Injection Oxidizes Soluble Iron

Hickory Aquifer Groundwater Treatment Facility
City of San Angelo, TX, USA



The Problem: In 2008 Texas was facing an extended drought and the City of San Angelo was weighing its alternatives. The City felt the Hickory Aquifer well field was the best water option available, but this water contained significant amounts of radium and iron. Ion exchange technology was chosen to remove the radium from the water, but before that could happen, the iron would need to be removed from the water to avoid fouling of the ion exchange resin. The Hickory Aquifer Groundwater Treatment Facility typically had a flow rate of 2 - 8 MGD and pressure of 80 - 100 psi. In prepping the water for iron removal, it would be critical to sufficiently oxygenate the raw water while removing any undissolved gas bubbles—all without breaking pressure.



FIGURE 1. Venturi injector in GDT/PFR train

Description of Treatment: Mazzei's GDT™ process, designed to aerate and oxygenate a small percentage of the pipeline flow, and a full flow pipeline flash reactor™ (PFR) were selected as the cost effective method to aerate and oxygenate the well field's pressurized pipeline without breaking pipeline pressure head. The sidestream GDT process diverts a portion of the pipeline flow into a sidestream

pump, which increases the water pressure and creates a pressure drop across a Mazzei venturi injector (FIGURE 1). This pressure drop causes a suction in the injector which draws atmospheric air into the water. The venturi's outlet pressure, kept at or slightly above the pipeline pressure, drives the entrained air bubbles

into solution, increasing the sidestream's dissolved oxygen concentration. Any gas bubbles remaining in the injector effluent are rapidly removed by a GDT degas separator (FIGURE 4) and discharged through the separator's air relief valve. The highly oxygenated separator effluent is then blended back into the well field's pipeline flow through a Mazzei PFR (FIGURE 3)—a full flow, pipeline mixing device which rapidly transfers and blends sidestream liquids and gases at a minimal pressure loss of < 0.30 psi.

Following aeration by Mazzei's sidestream GDT process and PFR, the well field's pipeline flow passes into 15 minute, pressurized detention tanks to provide time for the insoluble ferrous iron to be oxidized to its insoluble ferric state. Next, media filtration is used to remove the oxidized iron—an acceptable level of total iron is achieved so the mainline flow can pass through the ion exchange beds with no fouling issues—and then flows into a wet well.



FIGURE 2. GDT/PFR System Control Panel



For additional information on how Mazzei can assist with your water treatment goals, contact us at:

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FIGURE 3. PFR



FIGURE 4. Degas Separators