Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
Texas

Oil Field Cleanup Reduces Chloride in the West Fork Trinity River

Waterbodies Improved

The Texas Commission on Environmental Quality (TCEQ) placed the West Fork Trinity River above Bridgeport Reservoir (segment 0812, which includes two assessment units [AUs]) on the state's 1998 Clean Water Act (CWA) section 303(d) list of impaired waters for failure to meet surface water quality standards for chloride. Project partners addressed total dissolved solids (TDS) and chloride contamination from oilfield activities in the Trinity River drainage basin by sealing abandoned, unplugged, noncompliant oil and gas wells; resealing improperly plugged wells; and implementing other best management practices (BMPs). Following restoration, TCEQ determined that segment 0812 met the state's standard for chloride and removed the segment from Texas' 2012 CWA section 303(d) list.

Problem

The West Fork Trinity River (segment 0812) is an intermittent stream in the headwaters region of the Trinity River Basin, slightly northwest of the Dallas–Fort Worth Metroplex. It begins in Archer County and flows 85 miles before emptying into Bridgeport Reservoir, an important water source for the Tarrant Regional Water District (Figure 1). To evaluate the segment's water quality, TCEQ divided the segment into two distinct AUs. The 20-mile lower segment is AU 0812 _ 01; the 65-mile upper segment is AU 0812 _ 02. The watershed is entirely within the North Central Prairie ecoregion, and the predominant land use in this part of the watershed is rangeland.

Fourteen water quality grab samples were collected at station 10972 between June 1, 1992, and May 31, 1997; the mean concentration was calculated to be 127 milligrams (mg) per liter (L). This value exceeded the site-specific chloride standard for segment 0812, which requires that the mean chloride concentrations remain below 100 mg/L for the assessment period. On the basis of these data, the state added an 85-mile-long segment of West Fork Trinity River above Bridgeport Reservoir (segment 0812, comprising AUs 0812 _ 01 and 0812 _ 02) to its list of impaired waters in 1998. The Trinity River drainage basin has had a history of excessive chloride loadings from nonpoint sources, both natural (e.g., natural saline-water seeps, runoff from naturally saline soil, and evaporation) and man-made (e.g., farming practices, leaking oil well casings, improper brine disposal, and leaks caused by over-pressurization of oil wells).

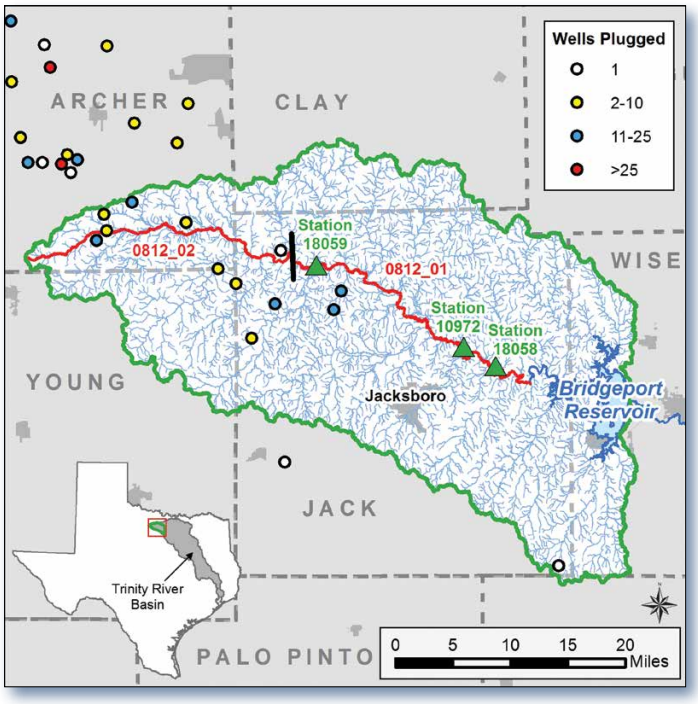

Figure 1. Segment 0812 and the wells plugged during the RRC project.

Texas establishes site-specific chloride water quality standards for every classified segment in the state on the basis of physical, chemical, and biological characteristics. High concentrations of chloride can negatively affect aquatic life, recreation, public water supply, and other beneficial uses of water resources. They can make drinking water unpalatable by causing a brackish, briny taste. Levels of chloride and TDS that are too high or too low can reduce the efficiency of wastewater treat-

ment plants, as well as the operation of industrial processes that use raw water.

Chloride is one of the substances that contribute to the TDS content of water. Corrosion or encrustation of metallic surfaces by waters high in TDS causes problems with industrial equipment and boilers, domestic plumbing, and home appliances that use water. TDS also affects water clarity. Higher TDS decreases the passage of light through water, thereby slowing photosynthesis by aquatic plants. Furthermore, water with high TDS levels heats up more rapidly and holds more heat, which might adversely affect aquatic life that has adapted to a lower temperature regime.

Project Highlights

The Railroad Commission of Texas (RRC) worked with TCEQ and the U.S. Environmental Protection Agency to use CWA section 319 funds to develop a saltwater minimization project in Archer and Jack counties, the area that includes segment 0812. The project, launched in 2004, was designed to address TDS and chloride contamination from oilfield activities in the Trinity River drainage basin. To reach this goal, the primary objective was to seal abandoned, unplugged, noncompliant oil and gas wells and to reseal improperly plugged wells.

From May 2004 until August 2007, RRC sealed 436 wells in Archer and Jack counties, 98 of which were in the segment 0812 watershed (see Figure 1). Beginning in 2003, the Texas State Soil and Water Conservation Board (TSSWCB) partnered with the Jack and Archer counties' soil and water conservation districts (SWCDs) and local landowners to implement BMPs in the watershed. During that effort, 15 water quality management plans, encompassing 7,204 acres, were developed and certified. TSSWCB and the SWCDs provided education and outreach by offering technical assistance to watershed landowners.

Results

TCEQ collected water quality monitoring data on West Fork Trinity River segment 0812 between December 1, 2003, and November 30, 2010. The data (provided in Figure 2) included 13 sample results from TCEQ station 10972, two from station 18058, and two from station 18059. The mean chloride concentration for these stations was 84 mg/L, below the site-specific mean standard of 100 mg/L

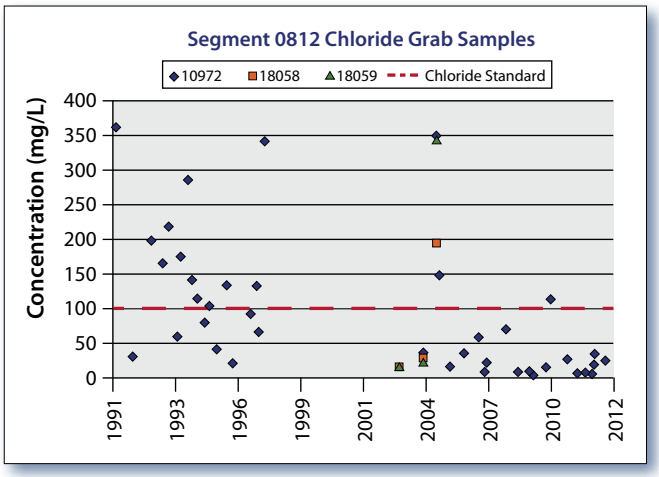

Figure 2. Chloride grab samples taken between 1991 and 2012 at TCEQ stations 10972, 18058, and 18059.

for the assessment period; therefore, segment 0812 was removed from Texas' 2012 CWA section 303(d) list of impaired waters.

Between December 1, 2010, and August 21, 2012, TCEQ collected eight samples at station 10972. The site had a mean chloride concentration of 17 mg/L for that period, which shows ongoing improvement and indicates that chloride levels are likely to continue meeting water quality standards during the upcoming 2014 assessment.

Partners and Funding

Funding for the well-plugging effort (initiated in 2004) was provided by the U.S. Environmental Protection Agency ($600,000 in CWA section 319 funds) and RRC ($481,430 in matching funds, including $243,144 from the Texas Oil Field Cleanup [OFCU] Fund). Funding for voluntary BMP implementation, as well as for education and outreach to agricultural producers, included $100,000 in CWA section 319 funds, more than $41,300 in state funds from TSSWCB, and over $45,000 in matching funds.

Since 1965 the state of Texas has maintained a well-plugging program through the OFCU Fund. A report developed by RRC in January 2000, entitled *Oil and Gas Well Plugging in Texas*, states that CWA section 319 funding, along with other funding initiatives, is "extremely important since there are insufficient funds in the OFCU Fund to plug all the abandoned wells in a reasonable period of time."

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