

DRINKING WATER TREATMENT PLANT

LIQUID OXYGEN SUPPLY FOR OZONE GENERATION

CASE STUDY #4

Overview

Duchesne County (Utah) wanted to build a new water treatment plant, designed to double the area's water output. They decided to pre-treat the water with ozone instead of chlorine. Ozone pre-treatment requires specialized bulk storage and piping of liquid oxygen (LOX) at cryogenic temperatures to supply the ozone generator. Given these constraints, Chart Inc. was consulted to supply an engineered turn-key solution for the Duchesne Valley plant.

Situation and Design Challenges

The new plant sought to utilize ozone treatment of the water for secondary disinfection, reducing the formation of chlorine byproducts and enhancing the flavor and odor of the water. To supply the ozone generator, the Duchesne plant must maintain a steady supply of cryogenic liquid oxygen – this means storing it in bulk, at extremely low temperatures, then converting it to gas on demand. Chart Inc. supplied a 6,000 gallon vacuum-insulated tank and vaporizer system to hold the liquid oxygen at -297 F (-182 C).

Designing a system to use gas at such extreme conditions requires specialized knowledge and engineering expertise. Beyond the storage tank, vaporizer, and piping, the firm needed industry experts to advise them on selection of components. Chart provided all the parts for field assembly, including the piping and regulation system. This supplied the client with a turn-key solution that could be plugged seamlessly into the entire water treatment system, giving the contractor single-source accountability for their entire oxygen supply system.

Additionally, Chart was even able to accommodate some unusual requests in the design. For example, the plant required very specialized, difficult to procure electric-actuated valves (instead of the typical air-actuated valve). Their engineers worked with the client to help them implement custom piping, specialized valves, and an unusual type of steel that the requirements specified.



About Duchesne Valley Water Treatment Plant

- \$39.4 million plant
- Double water output to 8 million gallons per day
- Maximum oxygen gas flow rate of 1,117 Standard Cubic Feet/Hour (SCFH)



Innovation. Experience. Performance.™

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Equipment:

HS-6000SC-175CS vessel with all stainless steel piping

- Capacity: 6000 gallons of Liquid Oxygen (LOX)
- Maximum design flow usage of 23 days without refilling
- High thermal performance and efficiency (low heat leak) - 0.22% per day
- Internet data monitoring of liquid level and pressure

Ambient Vaporizer and Regulation System

- 1,170 SCFH (2) Thermax ambient vaporizer for optimum efficiency
- Switcher valve system for 24/7 operation of vaporizers (one in use while the other thaws)



System installation at site

Results

The result was a completed oxygen storage system, to feed the Ozone Pre-Treatment Generator. The Ozone Generation system was completed as promised, within budget, and is expected to be commissioned as planned. The manufacturing of a turn-key system within Chart's plant provides the necessary environment for optimum design, build, and quality control, eliminating installation and start-up failures.

The Duchesne plant is expected to complete construction in October 2010, with a go-live date set for 1st Quarter, 2011.



Piping and Valves

- Electric-actuated valves instead of air-actuated valves
- T316 Steel for all tubing and piping, instead of T304