

# Hydrogen Sulfide Removal

Forced Draft Aerator and Vertical Pressure Filters

CASE STUDY

**Location:** Clarks, Louisiana  
**Owner:** Town of Clarks  
**Engineer:** Pan American Engineers  
**Contractor:** CDG Construction

## EPA Compliance

Clarks, Louisiana services just over 350 water connections. The wells servicing the connections consistently produced poor quality water. With many consumer complaints and failure to meet EPA regulations, the town decided to construct a new water treatment plant.

Elevated concentrations of iron and manganese, along with moderate concentrations of hydrogen sulfide gas, resulted in poor aesthetic qualities, including unpleasant taste and odor.

## Equipment Selection

Prior to construction of the new water treatment plant, Clarks was using a charcoal gravity filter. While this filter was removing some contaminants, finished water continually fell short of drinking water standards. The combination of high contaminant concentrations and a limited budget created design challenges.

Due to the amount of hydrogen sulfide in the water, the engineer selected an aeration and filtration system as the most

Water Quality			
	EPA Standards	Raw Water	Treated Water
pH	6.5-8.5	6.4-6.8	6.5-7.6
Temperature	-	23-24°C	21-23°C
Iron	0.3 mg/L	1.9-2.7 mg/L	< 0.3 mg/L
Manganese	0.5 mg/L	0.043-0.126 mg/L	< 0.05 mg/L
Hydrogen Sulfide	0.05 mg/L	Detectable	Not Detectable

efficient and cost effective contaminant removal system.

In 2009, WesTech was contracted to supply all major process equipment, including: one (1) forced draft aerator (3.5 ft square x 13.25 ft high) and two (2) vertical pressure filters (8 ft diameter).

Forced Draft Aerator	
Quantity	1 aerator
Footprint	12 ft <sup>2</sup>
Design Flow	225 gpm
Loading Rate	18 gpm/ft <sup>2</sup>
Media	PVC slats 2 c-c

WesTech's forced draft aerators are an effective method to oxidize iron and manganese as well as to strip dissolved gases. With few moving parts and minimal maintenance, forced draft aerators reduce the need for chemical additives

and minimize treatment costs. During aeration, hydrogen sulfide is stripped from the water while iron, manganese, and the remaining hydrogen sulfide are oxidized. To allow further oxidation of manganese, aerated water is held in a detention tank prior to filtration.

Vertical Pressure Filters	
Quantity	2 filters
Size	8 ft diameter
Flow per filter	175 gpm
Loading Rate	3 gpm/ft <sup>2</sup>
Filter Area	100 ft <sup>2</sup>
Backwash Rate	19 gpm/ft <sup>2</sup>

Pressure filters operate under the same principles as gravity filters, with a few distinct advantages. Pressure filters require no re-pumping after filtration, overcome high headloss, and allow for

longer run times between backwashes. Clarks backwashes the pressure filters every 48 hours. "The backwash system is really tremendous," said operator Thomas Benson. He was impressed that the system provided "perfect water" even with the infrequent backwash.

WesTech's dual media vertical pressure filters are an effective way to remove iron, manganese, and hydrogen sulfide. The filter media depth was customized to match the water quality and remove contaminants. To increase contaminant removal, filter media was coated with WesTech's Manganese ANTHRA/SAND™ process.

Manganese ANTHRA/SAND media catalytically removes soluble manganese and hydrogen sulfide, as well as particulate iron from water in the exact same manner as manganese greensand.

At startup, WesTech conditions its iron and manganese removal media with the Manganese ANTHRA/SAND process after it has been placed in the filter. This in situ conditioning consists of soaking the media for 24 hours in a solution of

potassium permanganate and manganese sulfate. The media is then continuously fed with a chlorine oxidant during operation to provide permanent regeneration.

### Customer Satisfaction

Pressure filters with Manganese ANTHRA/SAND produce high quality water at a fraction of the traditional media cost. Manganese ANTHRA/SAND media is conditioned onsite, which means costs solely include granular media and chemical treatment. Manganese ANTHRA/SAND has many other advantages over manufactured manganese greensand, including: media sizes can be matched to water quality, media is easily recoated in place if needed, and materials are readily available.

Through the aeration, detention, and filtration process Clarks was able to remove hydrogen sulfide and reduce iron and manganese to well below EPA limits. WesTech took the holistic approach to contaminant removal by supplying a complete system of the highest quality.

Operators are pleased with the simplicity of operation and the high water quality provided. Benson said that, "Everything can be operated with just a push of a button." He said that, of any system he has worked on, the WesTech system was by far the most simple and that he has not had a problem with it in the over two years he has been there.

Residents are also very happy with the water quality. The Mayor of Clarks received many emails expressing gratitude for the improved taste and odor associated with the new system.



**Vertical Pressure Filters**



**Forced Draft Aerator**

Pressure Filter Media	
<b>Anthracite Coal Media</b>	
Depth	18 in
Effective Size	0.9-1.1 mm
<b>Silica Sand Media - Manganese ANTHRA/SAND™</b>	
Depth	18 in
Effective Size	0.3-0.35 mm
<b>Support Gravel Media</b>	
Depth	4 in
<b>Total Media Depth</b>	<b>34 in</b>