

## MUNICIPAL WATER

# IFM Designs and Installs an Iron Removal System at a Local Campground

IFM was contracted with a seasonal campground facility to improve their drinking water quality supplied to the campers. Several initial site visits and routine operational records of the existing water treatment plant determined the degraded water quality was due to high contaminant levels of Iron. By reducing the Iron levels of the raw well water, the water supply would increase in quality with considerations such as taste, odor, and color and allow the campground to maintain a facility with supreme services.

Iron is listed as a secondary contaminant with the National Primary Drinking Water Regulations (NPDWR). All secondary contaminant standards are used as a guideline to assist owners of a public water system with management suggestions to maintain clean water. Secondary contaminants are not enforced by the EPA as they are not considered to present any health threats. The SMCLs (secondary maximum contaminant levels) are a setpoint to maintain a drinking water supply with aesthetic conditions such as taste, color, and odor.

The SMLC for Iron is 0.3 mg/L and Iron levels above the 0.3mg/l SMCL will show noticeable side-effects such as staining linens and fixtures with reddish or orange colors. Iron also has the potential to give off a metallic taste to the drinking water, making it unpleasant for consumption.

The campground facility well-water measured Iron levels around 12mg/l (ppm), which is significantly above the SMLC of 0.3 mg/l and causing taste and color issues at the distribution points.

**DESIGN SOLUTION >** To address the excessive Iron levels IFM designed an oxidation-filtration treatment system to remove the rust-staining contaminant. The full-scale Iron removal system included:

- Chemical dosing of an oxidizing agent (Sodium Hypochlorite)
- Retention time to allow for the chemical reaction
- Multi-media filtration

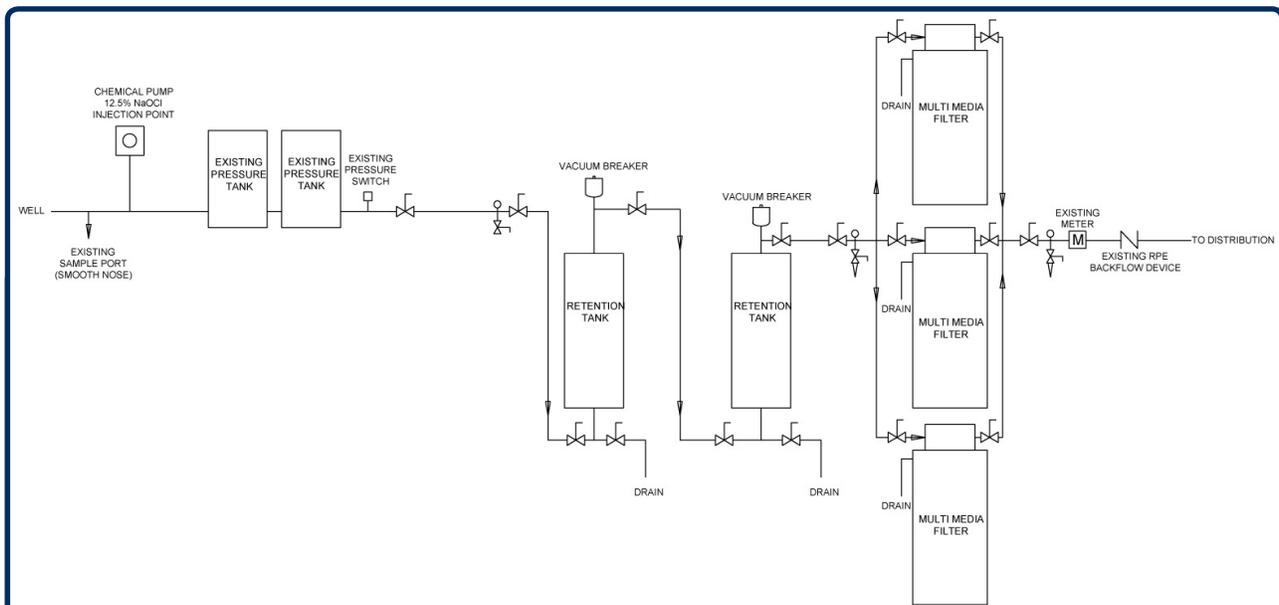


Figure No. 1

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Figure No. 1 – Iron Removal Treatment System Basic Process Flow

The system design included the use of the existing water treatment equipment as well as a layout design for integrating the new equipment in the limited space of the existing well house building. Figure No. 2 shows the recommended equipment layout.

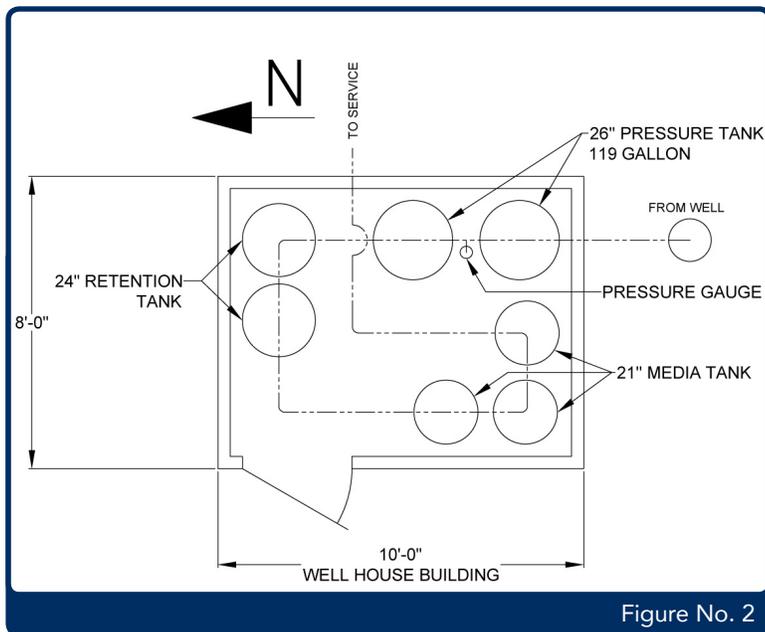


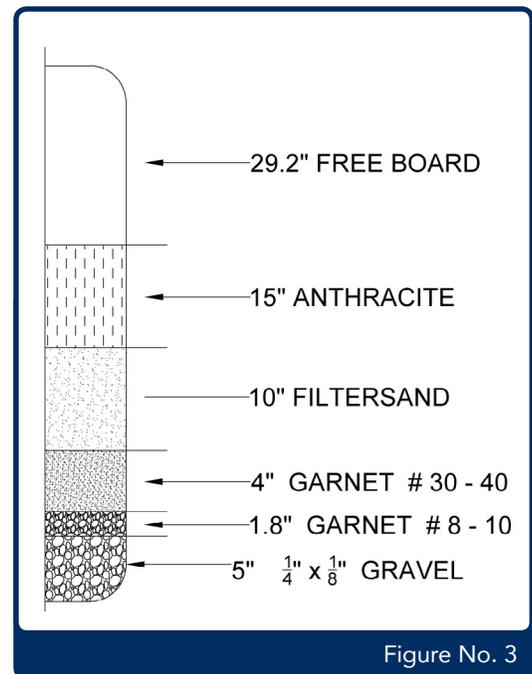
Figure No. 2 – System Layout Schematic

The chemistry behind the water treatment design starts with the basic chemical reaction of Ferrous Iron ( $\text{Fe}^{+2}$ ) to Ferric Iron ( $\text{Fe}^{+3}$ ). The sodium hypochlorite ( $\text{NaOCl}$ ) chemical injection oxidizes the Iron from the dissolved  $\text{Fe}^{+2}$  state to a precipitated  $\text{Fe}^{+3}$  state, allowing for filtration.

The design included retention tanks to allow for an extended reaction time to fully precipitate the Iron prior to filtration. Following the 20-minute retention time, the precipitated Iron is filtered-out via three (3) multimedia depth filters. The filters were designed with five (5) media layers of filtration plus a base gravel layer, as shown in Figure No. 3. The MMF's were installed in parallel form, to insure a full instantaneous supply to the distribution lines.

Figure No. 3 – Multi Media Layer Details

The full system design, installation, disinfection, and start-up procedures were reviewed and approved by the Ohio EPA. All project details were completed to meet the Recommended 10 State Standards as well as the AWWA Standards for Safe Drinking Water, as required by the Ohio EPA.



An additional service IFM provided during this project was assistance with the preparation and submittal of the Permit to Install (PTI) application with Ohio EPA. This PTI is to receive approval of the water treatment equipment addition to the existing Public Water System (PWS). With the coordination between IFM's Engineering Department and Operational Services Department all required operational details and submittal documents were completed and answered through one source. This availability along with IFM's standing rapport the OEPA availed the opportunity to complete a system upgrade through a streamline process.

Upon OEPA approval of the PTI, IFM delivered and installed a turn-key water treatment system in the

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existing well-house building. A continuous water supply to the facility was maintained during the installation and all equipment was disinfected prior to placing the new system online. Onsite operational training of the equipment was included with the project package.

Following the installation and system start-up IFM was further contracted to help the campground complete the **OEPA required Seasonal Non-community Public Water System Annual Start-Up Certification**. This certification checklist is required by the Ohio Administrative Code Rule 3745-81-51 and must be submitted to the Ohio EPA prior to providing water to the public each opening year.

IFM continues to take service calls to the system and collect the Total Coliform samples, as required by the Ohio EPA PWS facility specific Chemical Monitoring Schedule.

To speak with a water treatment professional today about your water quality needs, please call (866) 435-4436.

**Ohio** Ohio Environmental Protection Agency  
Division of Drinking and Ground Waters  
Seasonal Start-Up Certification Form  
(Revised 3/16/2018)

Water System Name: \_\_\_\_\_ PWS ID Number: OH \_\_\_\_\_  
Opening Date to the Public (mm/dd/yyyy): \_\_\_\_\_

**Activities Completed**  
Instructions: Each activity below corresponds with a section from the "Seasonal Public Water System Start-Up Requirements and Checklist." Check "Yes" or "N/A" as applicable for each section of the checklist that was completed. Please note that all applicable sections must be completed prior to submitting this form. **The local Ohio EPA District Office must receive this form on or before the opening date to the public.**

Yes	N/A	Activities:	Comments:
<input type="checkbox"/>	<input type="checkbox"/>	1. Completed pre-inspection activities	
<input type="checkbox"/>	<input type="checkbox"/>	2. Completed initial inspection	
<input type="checkbox"/>	<input type="checkbox"/>	3. Activated and pressurized the water system	
<input type="checkbox"/>	<input type="checkbox"/>	4. Completed repairs	
<input type="checkbox"/>	<input type="checkbox"/>	5. Disinfected and flushed entire system	
<input type="checkbox"/>	<input type="checkbox"/>	6. Verified treatment systems are operating properly	
<input type="checkbox"/>	<input type="checkbox"/>	7. Collected required total coliform start-up sample(s) from the distribution system (e.g., bathroom, campsite, trailer)	
<input type="checkbox"/>	<input type="checkbox"/>	8. Received safe ("absent") total coliform start-up sample result(s)	

**Certification**  
I hereby certify that I have completed the start-up procedures as outlined in the Ohio EPA policy document entitled "Seasonal Public Water System Start-Up Requirements and Checklist" and that all items are in compliance with Rule 3745-81-51 of the Ohio Administrative Code to the best of my knowledge.

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Signature of Owner Representative

Name (Printed): \_\_\_\_\_ Date: \_\_\_\_\_  
Telephone Number: \_\_\_\_\_ Title: \_\_\_\_\_  
Email Address: \_\_\_\_\_ Fax Number: \_\_\_\_\_

For further guidance, please see Ohio Administrative Code Rule 3745-81-51, the document entitled "Seasonal Public Water System Start-Up Requirements and Checklist," or contact your Ohio EPA district office.

**Reserved for Ohio EPA**  
Date Received: \_\_\_\_\_  
Reviewed By: \_\_\_\_\_  
Complete:  Yes  No  
Late:  Yes  No  
Date Reviewed: \_\_\_\_\_  
Analysis Complete Date(s): \_\_\_\_\_