

Clean Filtration Technologies, Inc.

CFT Turboclone™ Demo System

Case Study

Pilot Trials Show CFT Turboclone™ Filter Effective in Filtering Produced Water

Pilot trials in Colorado, Utah, and Wyoming demonstrated that the CFT Turboclone filter is effective at filtering produced water down to 20 and 15 μm . ▶



Opportunity

A large oil and gas exploration and production company and a natural gas water management company were searching for a self-cleaning filtration system to treat produced water prior to well injection. Original configurations included media filtration, settling systems, and bag filters. However, these systems are costly and present environmental and safety hazards. The CFT Turboclone™ system offered a low-maintenance solution that would be more cost-effective than conventional systems.

Treatment Goals

The treatment goal was to filter solids down to at least 25 μm using a system that would provide high water recovery without chemicals or consumable filters.

Test Arrangement

A CFT Turboclone demonstration system with either a 20- μm or a 15- μm membrane was installed at facilities in Erie, Colorado; Vernal, Utah; and Wamsutter and Pinedale, Wyoming. Plant engineers evaluated system performance and collected samples for external laboratory analysis. Operation was scheduled for 8 hours per day. Other parameters included:

- Flow rate = 10.5 gpm
- Feed pressure = 20 psi
- Pressure drop = 1 to 3 psi over entire test period

Results

The pilot trial was deemed a successful demonstration of the technology. The CFT Turboclone system consistently filtered produced water to 20 to 15 μm with between 49 and 74% removal of insoluble solids (in Vernal, Utah) while producing a consistent stream of filtrate with 99.5% water recovery. Production installations are planned in Erie and Rifle, Colorado, and Vernal, Utah, during fourth quarter, 2010.

Case Study Details

Background

Solids removal from produced water is a major issue in the oil and gas industry. For years, this industry has been dominated by old technologies, including settling systems, media filtration, hydrocyclones, cartridge filters, and bag filters.

In the summer of 2010, a large oil and gas exploration company in Colorado set out to find cost-effective, chemical-free solutions for solids removal for their produced water prior to well injection. They had been using bag filters in their centralized injection sites for over 30 years. With a major facilities upgrade in their future, this company began searching for a self-cleaning, low maintenance, nonconsumable, cost-effective filtration alternative that would provide over 99.5% water recovery.

Later that summer, at Pinedale, Wyoming, a large natural gas water management company was searching for a similar solution for solids removal from produced water as a stand-alone system for well injection and as a prefiltration system coupled with ultrafiltration, reverse osmosis, and distillation systems.

CFT Turboclone Filter

The CFT Turboclone™ filter is a patented, self-cleaning, low-maintenance device that handles high loads of suspended solids in a single-stage, immediate process. It is specifically engineered to resist fouling and remove solids from difficult-to-treat feed streams through the use of:

- Particle separation by hydrocyclone for large particle removal.
- Cross-flow membrane filtration for smaller particle removal.
- A constant self-cleaning mechanism that virtually eliminates the need for backwash cycles.

Project Development

The oil production company established a test environment for three competing self-cleaning filtration systems from Amiad Corp., Eaton Corp., and Clean Filtration Technologies, Inc. Each company was given a two-week window to demonstrate their equipment onsite in Colorado at the company's production facility. The supplier with the best results would be asked to repeat the tests at locations in Utah and Wyoming.

The natural gas water management company established a test environment at Pinedale, Wyoming (Figure 1), with worst-case flowback and produced water, directly from a settling pit.

Installation

To satisfy the 99.5% water recovery rate requirement, CFT configured the system at each site to drain the concentrated solids periodically into a cone-bottom settling tank.

In Erie, Colorado, the system was tested for a two-week period to experience the full range of produced water, and in Vernal, Utah, and Wamsutter, Wyoming, it was tested for three days each. The Pinedale site conducted a four-day test.

Figure 1. Test site at Pinedale, Wyoming.



Water Treatment Performance

During each pilot trial, the CFT Turboclone filter removed solids to 20 µm while providing over 99.5% water recovery. In Vernal, Utah, 20- and 15-µm filters were successfully tested with insoluble solids removal between 49 and 74% (Table 1). The CFT Turboclone filter provided a consistent supply of filtered water without fouling or added chemicals, regardless of the quality of the source water.

Table 1. Independent laboratory testing, Vernal, Utah: Insoluble solids before and after CFT Turboclone filter.

Samples / Membrane	Prefilter Solids (mg/L)	Postfilter Solids (mg/L)	Difference (mg/L)	Reduction (%)
#1 / 20 µm	116	38	78	67
#2 / 20 µm	66	33.5	32.5	49
#3 / 15 µm	57	24.4	32.6	57
#4 / 15 µm	45.6	11.8	33.8	74

Conclusions

The CFT Turboclone™ filter provided effective filtration for produced water prior to well injection, providing a lower cost alternative to bag filtration. In a comparison to two other self-cleaning systems, the CFT Turboclone was deemed the most effective. It also outperformed all viable solutions for a worst-case scenario involving flowback and produced water.

Production installations are planned in Erie and Rifle, Colorado, and Vernal, Utah, during fourth quarter, 2010.

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The CFT Turboclone™ filter is manufactured under U.S. patent 7,632,416 with other patents pending. The information contained in this publication is considered accurate and is intended to be used as a guide. This information is subject to change without notification.

Clean Filtration Technologies, Inc., does not assume any liability for the accuracy and completeness of the data in this publication. Temperature ratings, flow rates, and quality of source can be affected by a number of factors. End users should perform their own tests to determine suitability for each application.

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