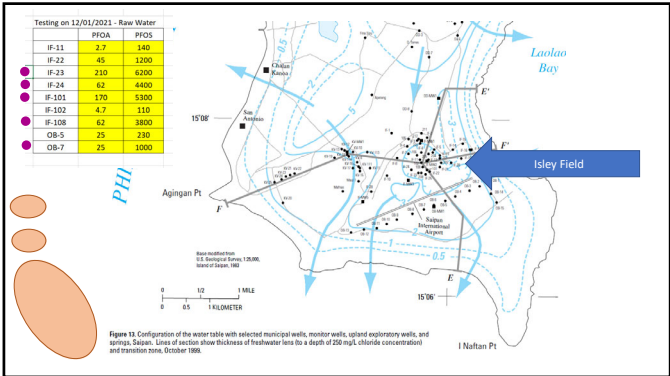


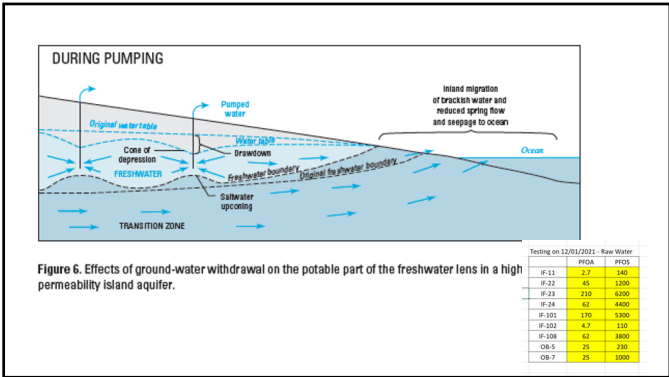
10-Wellhead GAC Filters at Isley Field

Vendor: Calgon Carbon
Contractor: Tropex Garden
Owner/Engineer: CUC
Funded by: US EPA Region 9
Completion: ~6/2021

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Wellhead GAC Filters

Key Components:
Well: 50 GPM
Air Release Valve
Y-Strainer: 2"
Lead Vessel: 2,000# GAC
Lag Vessel: 2,000# GAC
Ball Valves: 2"
Lifting Eyes
Media Drain / Water Drain

Auxiliary Components:
Flow Meter
Pressure Gauges
Sample Tap

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Y-Strainers

YPT - YHT
Y TYPE STRAINER - THREADED ENDS
PVC (MODEL YPT) & CPVC (MODEL YHT)

Key Components:
Check Velocity of water to less than 5 fps to avoid headloss.
50 gpm = 0.11 cfs
2" PVC = 0.022 s.f.
Velocity = 0.11 cfs / 0.02 s.f.
Velocity = 5 feet per second

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Pressure Vessel – Series

63 cubic feet * 31 #/cf = ~2,000 # of media

Key Components:
*Water flow paths are vertical and vertical at the surface of the filter media bed resulting in flow capacities up to 15 gpm per sf.
48" Diameter = 12.56 sf
50 gpm / 12.56 sf = 4.0 gpm per sf.
10 minute Empty Bed Contact Time
12.56 sf * 5.5 vertical feet = 67 cf
50 gpm / 7.5 = 6.7 cf/min
67 cf / 6.7 cf/min = 10 minutes

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Pressure Vessel

Name	Abbreviation	CAS Number	Carbon Chain Length	Molecular Weight (g/mole)
Perfluoro octanesulfonic acid	PFOS	3769-29-1	C8	500.13
Perfluoro octanoic acid	PFOA	335-67-1	C8	414.07
Perfluoro hexanesulfonic acid	PFHxS	255-66-4	C6	400.11
Perfluoro hexanoic acid	PFHxA	307-34-4	C6	314.05
Perfluoro butanesulfonic acid	PFBS	875-75-3	C4	300.1
Perfluoro butanoic acid	PFBA	875-22-4	C4	214.04

IF-24	12/1/2021
PFHxA	59 ppt
PFBS	47 ppt
PFHxA	47 ppt
PFHxA	25 ppt
PFNA	9.4 ppt
PFDA	1.40 ppt
PFHxS	1000 ppt

Key Concept:

MTZ – Mass Transfer Zone.

- Typically about 3' in water.
- MTZ – The portion of the bed in which adsorption is occurring is called the Mass Transfer Zone.
- Expect varying results within the MTZ

Removal Factors

- Sulfonic Acid easier than Acid
- C10 > C8 > C6 > C4
- Higher Molecular Weight = easier
- High Kow = easier

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What happens with the Well Pump?

PUMP PERFORMANCE – 61570 (1 – 7.5 HP)

Vertical Multistage Well Pumps typically can handle a wide range of Head conditions.

Adding 4 psi of pressure drop should barely move the production point (50 gpm to 49 gpm).

Example:

- 5 HP 50 gpm @ 225 ft
- 5-HP ~47 gpm @ ~235 ft

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M2000s Arrived Filled

Our filter tanks are manufactured in-house of isophthalic or vinylidene fluorinated polymers with a maximum working pressure of 50 psi. The following is a sectional view of a C200 vertical filter tank and internal components (see Figure A):

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M2000s Arrived Filled

Calgon Carbon
A Kuraray Company

FILTRASORB® 400-M
Granular Activated Carbon for Municipal Specifications

0.54 g/cc = 33 #/cf
63 cf * 33 #/cf = ~2,000#

VERY IMPORTANT: We recommend a first layer of gravel with a minimum granular size of 1 to 2 mm (3/16 to 1/8"). This layer should just cover the lateral arms. The second layer should be .4mm to .35 mm granular size up to the level suggested for each size of filter.

Specifications	FILTRASORB 400-M
Bed Depth, mm (in)	1000 (mm)
Moisture by Weight	2% (max)
Effective Size	0.55-0.75 mm
Uniformity Coefficient	1.5 (max)
Abrasiveness Number	75 (max)
Trace Capacity Number, mg/cc	10 (min)
Screen Size by Weight, US Sieve Series	On 12 mesh
Through 40 mesh	5% (max)
Through 60 mesh	4% (max)

Typical Properties*	FILTRASORB 400-M
Apparent Density (tamped)	0.54 g/cc
Water Extractables	<1%
Non-Waterables	<1%

*For general information only, not to be used as purchase specifications.

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M2000s Arrived Filled

Typical Pressure Drop
Based on a backwashed and segregated bed

2.3' of H2O Head ~ 1 psi
4"/ft * 5.5' = 22" = ~2', so less than 1 psi typically
Additional losses from diffusers, headers, pipe, valves, bends, and other.

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Certificate of Pressure Test

Model: 20100001
Filter Serial Number: 20100001
Date of Testing: July 21, 2010

Test Description: Filter Hydrostatic pressure test.

Test Plan: F400-USA, 2010-0001, Jacksonville, FL, 2010.

Pressure: 100 psi.

Test Results: Pass.

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GAC must be backwashed prior to startup

This is very clean 200' deep aquifer water. The need for operational backwashes after startup are very infrequent, maybe none.

Typical Bed Expansion During Backwash

Based on a backwashed and expanded bed

Initial backwash removes the fines of the F400m.

Backwash

1. One Vessel at a Time.
2. Discharge to Ground (backwash).
3. Operation Series Setup.
4. Discharge to Ground (filter to waste).
5. Commence Operations.

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Air Vent (Top of Tank)

Localized High Spot

Open the Vent Periodically.

If you get sudden and unexpected pressure increase, it's typically air lock.

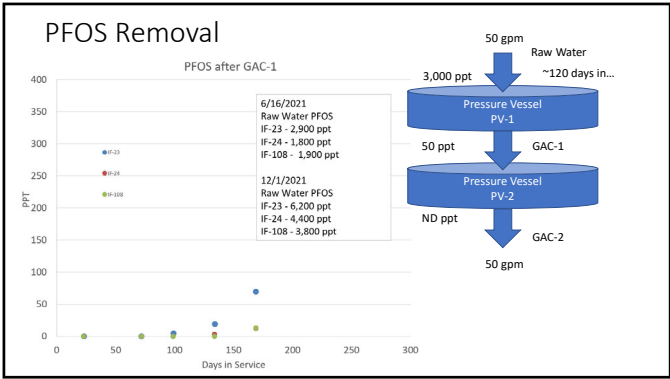
1. Backwashing Procedures.
2. Startup Procedures.
3. Unscheduled power outages (restarts).
4. Periodically.

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IF-28

3-Day Average of for Each Month (3 days near the end of the month)

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Carbon Replacement

Open Manway

Open Media Drain

Water Drain (tank may or may not have this)

Possible ways to empty it:

1. Vacuum Line from the top
2. Slurry Line from the Bottom.
3. Careful not to damage components.

M2000 Re-fill:

1. Fill vessel 1/2 full of water to protect the Effluent Headers.
2. Gravel underdrain.
3. F400M GAC addition.
4. Backwash.
5. Filter to Waste.
6. Return to Service.
7. Purge air during steps and after.

VERY IMPORTANT: We recommend a first layer of gravel with a minimum granular size of 1 to 2 mm (3/64 to 1/8"). This layer should just cover the lateral arms. The second layer should be .4mm to .55 mm granular size up to the level suggested for each size of filter.

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Carbon Replacement

F400 Filter Media (Coal Based) ~2000# per vessel

Gravel

Find the best way to fill vessels from super sacks.

Find the best way to collect the spent carbon.

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