



September 2, 2020

Jessica Penetar, PE
Cascade Earth Sciences
3511 Pacific Blvd SW
Albany, OR 97321

Re: **Nestucca Valley Elementary School (PWS ID #90595)
New Well #4 (SRC-AD) and Arsenic, Iron, and Manganese Treatment (EP-A)
Conditional Approval (PR #44-2019)**

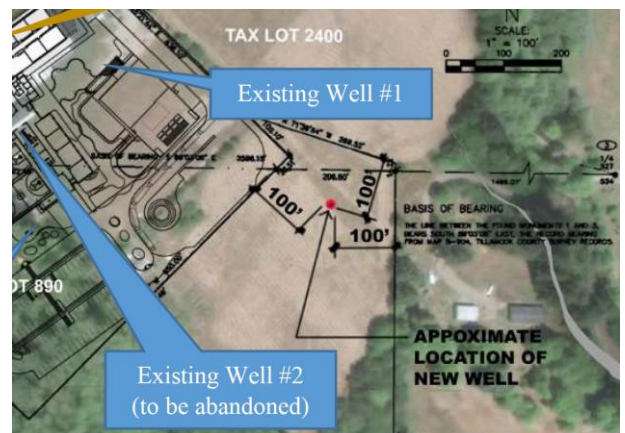
Dear Ms. Penetar:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the new well and AdEdge treatment system on behalf of the Nestucca Valley Elementary School in Tillamook County. The project includes the development of a new well #4 (SRC-AD) and treatment system (WTP-A/EP-A) to serve the school as shown in the schematics on page 7 of this letter.

On March 12, 2019, our office received plans showing the location of a newly constructed Well #4 and treatment system. A plan review fee of \$825 was received on March 18, 2019, submitted with the site plans for Well #4, and on April 26th, 2019, I provided a Site Plan Approval letter for well #4.

On August 7, 2020 I received plans for the AdEdge treatment system, fire suppression system details, and well log (TILL52871). On August 14, 2020 we spoke about the need for wellhead details, lab results from well sampling, water rights information, and easement information and that the well log had been sent to our geologist, Tom Pattee, for review.


This Conditional Approval letter addresses conditions discussed on August 14th, included in the April 26, 2019 Site Plan Approval letter, and other conditions needed to be met for Final Approval. Also addressed are the results of Tom Pattee's well log evaluation and initial monitoring requirements once operational.



The project is approved for construction provided the following conditions are met:

Conditions for approval of the well:

1. A single set of raw (untreated) water quality data including coliform bacteria, [IOCs](#) (including nitrate, nitrite and arsenic), [SOCs](#), and [VOCs](#) are submitted. These are to be taken from the new well's raw water sample tap at the wellhead.
2. Plans are submitted that show the above-ground wellhead structure detail including the well house, concrete slab, drainage, pump-to-waste piping and plans and specifications for reconnection of the well to the water system.
3. A copy of the Water Right Permit from the Oregon Water Resourced Department, if a water right permit is required (or correspondence from OWRD that a water right is not needed).
4. Documentation showing the 100-ft radius of control around the well (e.g., recorded easement, etc.)

For specific rule requirements regarding wells, see  [OAR 333-061-0050\(2\)\(a\)](#)

Conditions for approval of the treatment system:


1. The pressure tank must have bypass piping, a way to drain it and a pressure gauge.
2. The Norwesco tank must have:
 - a. A vented lid w/integral screen designed for potable water applications or have separate vent pipe with downward turned elbow.
 - b. Overflow piping that drains to daylight and terminates in screen or flap valve.
 - c. A drain to daylight (the overflow can tee into the drain line downstream of the drain shut-off valve and use the same discharge to daylight piping with a single flap valve and/or insect screen)
3. For the chlorination system:
 - a. A DPD type test kit for sodium hypochlorite monitoring is needed
 - b. Provide the make/model of disinfection pump to verify NSF-61
 - c. Provide NSF-60 documentation of sodium hypochlorite
 - d. Demonstrate the chlorinator piping is designed to prevent contamination of the potable supply by backflow of untreated water or water having excessive chlorine (e.g., an air gap for filling the chlorine solution tank and/or an RP if potable site water is used as carry water for the chlorine, etc.).
 - e. Demonstrate or describe how the disinfection injection will be proportional to plant flow.
4. An Operation and Maintenance manual is needed that addresses how to operate the arsenic treatment system, how and when to backwash system, and process control


monitoring for arsenic and sodium hypochlorite (oxidant). Monitoring for secondaries including iron and manganese should also be included as applicable.


5. Treated water lab test results showing arsenic levels are below 0.010 mg/l when well #4 is in use. Note: [OAR 333-061-0050\(4\)\(b\)\(F\)\(xii\)](#) identifies oxidation/filtration as a “Best Available Technology or “BAT” for arsenic V and indicates the following iron to arsenic ratio may be needed:

(xii) Central treatment using oxidation/filtration for Arsenic V (to obtain high removals, iron to Arsenic ratio must be at least 20:1).

6. Treated water lab test results showing the system is absent of coliform bacteria to demonstrate disinfection of new facilities and method of disinfection.
7. Demonstrate that the potable system (including wells #3 and #4 and the treatment system) are adequately protection from backflow contamination in accordance with [OAR 333-061-0070](#).

For specific rule requirements regarding storage/pressure tanks, see  [OAR 333-061-0050\(6\)](#).

For specific rule requirements regarding disinfection, see  [OAR 333-061-0050\(5\)](#).

For specific rule requirements regarding testing and disinfection of new facilities, see  [OAR 333-061-0050\(10\)](#)

To receive Final Approval:

1. Provide written correspondence or documentation demonstrating how each of the conditions above have been met.
2. Complete and submit the [Project Final Approval Request](#) form on-line at the link below:

<https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/DRINKINGWATER/PLANREVIEW/Documents/project-update-form.pdf>

3. The form and documentation of conditions having been met may be e-mailed to me at evan.e.hofeld@dhsosha.state.or.us

Following the receipt of Final Approval:

1. The new well and treatment system may be placed into service.
2. The following sampling is needed once the system is placed into service:
 - Complete two 6-month demonstration rounds (e.g. 7/1/20 – 12/31/20, 1/1/21 – 06/30/21, etc.) of lead and copper tap sampling at 10 sites. This is required due

to the installation of a new well and treatment system. Future monitoring will depend upon the results of this demonstration monitoring.

- Complete quarterly [DBP](#) sampling for 4 consecutive calendar quarters (e.g. 10/1/20 – 12/31/20, 1/1/21 – 3/31/21, 4/1/21 – 6/30/21, etc.). Quarterly sampling is already in effect due to a prior MCL exceedance, but is also required due to a change in the disinfection system. Future sampling will depend upon this quarterly monitoring.
- Arsenic monitoring will require sampling the treated water once each month for three consecutive months and then once each quarter for three consecutive quarters. Depending upon results, monitoring may be reduced to once each year on an on-going basis. This is due to the presence of arsenic in Well #4.

Geologist Well Log Evaluation Results:

The well log (TILL 52871) was submitted to our geologist, Tom Patte, who provided the results of his evaluation to me on August 18, 2020. As shown below, Mr. Pattee found that the well was adequately constructed and sealed such that the well's construction minimized impacts from nearby land use practices, however, the shallow unconfined aquifer the well draws water from, is sensitive to nearby land use practices. Mr. Pattee noted the relative high risk associated with parking lots within 100-ft of the well, which can be mitigated with proper stormwater/runoff management.

As Built Well Construction Evaluation for Plan Review and/or Setback Waiver:

- ☒ Well/Spring meets current construction standards.
☐ WRD special construction standards, see well log or Comments.
- ☐ Well/Spring construction does not meet construction standards.
☐ Not sealed to appropriate depth. Recommended depth: _____
☐ Not appropriate seal materials
☐ Open to more than one aquifer
☐ Seal info missing or unknown
☐ Seal not constructed properly (☐ Insufficient sealant volume ☐ Insufficient annular space)
- ☐ Susceptible construction, but grandfathered source. Consider for reconstruction if nitrate \geq 5mg/L or confirmed *E. coli* at source.
- ☐ Susceptible well construction, not approved for use.

Comments: This well is 138 ft deep and is cased to the bottom of the hole. A casing seal was installed to a depth of 28 ft, 27 ft into a 50 ft thick clay/silt layer. Water enters the well through perforations in the casing between 125 and 135 ft below ground level. Sensitivity Analysis results suggest that well construction is not sensitive to nearby land use practices.

Nature of Aquifer Evaluation:

Aquifer Nature: ☐ Confined aquifer ☐ Semi-confined aquifer ☒ Unconfined aquifer

Comments: This well draws water from a shallow unconfined gravel aquifer. The aquifer is overlain by a 50 ft thick silt/clay layer. Sensitivity Analysis results suggest that the aquifer is highly sensitive to nearby land use practices.

Construction Setback Waiver Info:

- ☒ Facility Profiler review for additional contamination info:
- ☒ Not applicable, Facility Profiler doesn't track releases from this type of contaminant source.
 - ☐ Facility Profiler does not indicate a spill or chemical release related to the sanitary setback violation.
 - ☐ Facility Profiler indicates that there is a spill or chemical release related to the sanitary setback violation.

Hydrogeologist comments regarding hazards within Sanitary Setback: Due to its unconfined nature, the aquifer that this well draws water from is considered to be highly sensitive to land use practices within the 100 ft sanitary setback. Parking lots with more than 50 parking spaces are considered to represent a high risk to groundwater quality due to leaks and small spills of automotive fluids which can be transported into the aquifer by stormwater. If the stormwater collection system is designed to remove stormwater from the sanitary setback, the sanitary hazard would be minimized.

Recommendations:

1. Although minimum sampling previously mentioned is required, it is recommended that additional monitoring be done as necessary to ensure arsenic levels are below 0.010 mg/l under all possible operating scenarios (e.g., sampling for arsenic when well #4 is placed into use and monthly arsenic sampling when well #4 is in use for more than a month, at least until experience has shown that the treatment is effective).
2. Provide for sample taps to be able to monitor the backwash recycle stream for signs of excessive or increasing arsenic levels.
3. Follow the System Startup procedures provided by AdEdge:

6.0 SYSTEM STARTUP

6.1 Startup Requirements

The Startup and Commissioning Plan should be reviewed to understand the requirements necessary for startup. It should be noted that the initial backwash water during startup testing will not go to the Backwash Recycle Tank and therefore temporary provisions are required. It should also be noted that initial forward flow during startup testing will not go to system distribution and therefore temporary provisions are required.

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Nestucca Valley Elementary School (PWS #90595)

PR #44-2019 - New Well #4 (SRC-AD) and Arsenic, Iron, and Manganese Treatment (EP-A)

September 2, 2020

Any correspondence should reference Plan Review #44-2019 and can be emailed to me at evan.e.hofeld@state.or.us or mailed to:

Attn: Evan Hofeld
OHA-Oregon Drinking Water Program
PO BOX 14450
Portland, OR 97293-0450

If you have any questions, please feel free to call me at 971-673-0419 (office) or 503-504-8222 (mobile).

Sincerely,



Evan Hofeld, Regional Engineer
OHA - Drinking Water Services

cc: Bob Hurliman, Nestucca Valley Elementary – PO Box 99, Cloverdale, OR 97112
Annette Pampush, Tillamook County Environmental Health

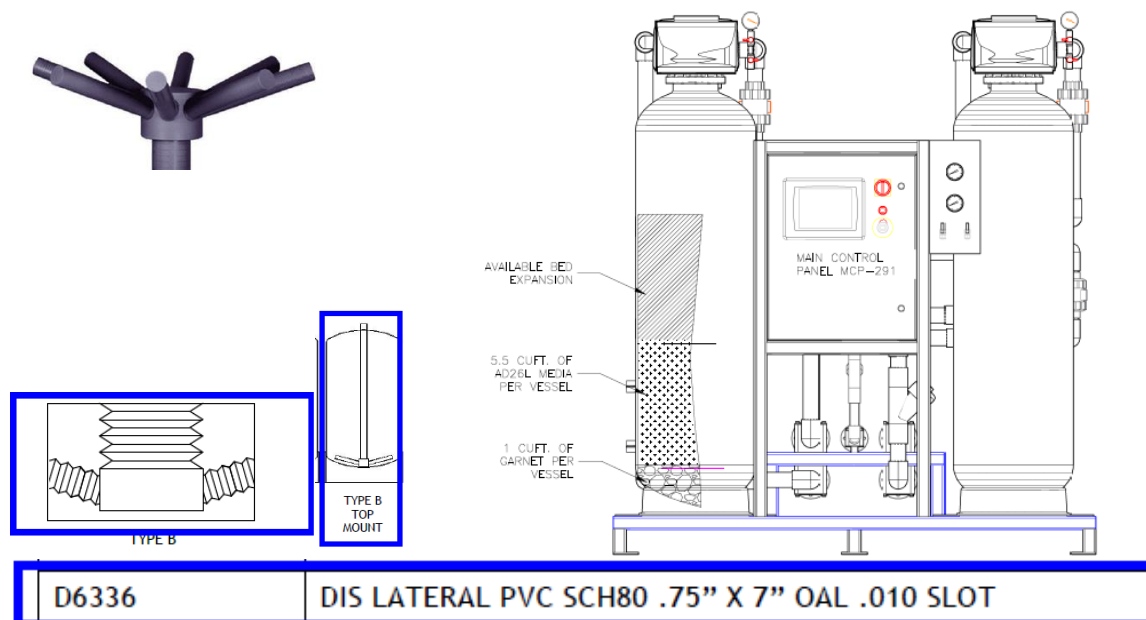
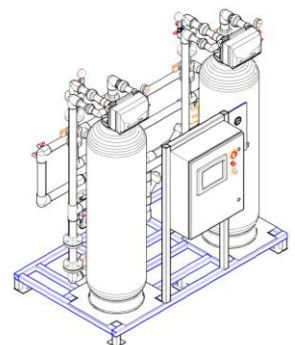
System description:

The system is configured such that Well #1 supplies water for the fire suppression system only, while Well #3 (the well to be used the most) and newly constructed Well #4 supply the potable system as well as the fire suppression system. Wells #1, #3 and #4 are protected from the fire supply by a double check (DC) valve and the potable supply (downstream of wells #3 and #4) is proposed to be protected with a reduced principal (RP) backflow prevention device

Water from wells #3 and #4 combine prior to injection of sodium hypochlorite for oxidation and residual maintenance disinfection. The chlorinated water then flows to an AdEdge package filtration system (model #APU26-1865CO-2-2815-PLC). In order to ensure full oxidation of iron and manganese, a free chlorine residual of 0.5 mg/l (minimum) of treated water after filtration is recommended by AdEdge to ensure complete oxidation.

The AdEdge system consists of two composite pressure vessels (18" dia. X 65" tall fitted with Fleck #2815 control valves) designed to operate in parallel with a radial-type PVC underdrain system at the bottom of each vessel (suspended from the top as shown below) overlain by garnet gravel. The filters are programmed to backwash once a day and are operated in a continuously regenerative mode (the media is backwashed and rinsed sequentially [remaining filter off-line] such that the media is regenerated each day of operation).

ADEGE TREATMENT



The filter media in each vessel is manganese dioxide (AdEdge media product AD26L, 5.5-ft³ per vessel) over top of 1-ft³ of Carbon Enterprises, Inc. #8/12 garnet gravel (d₁₀ = 1.85, UC = 1.65 – 2) covering the underdrain piping.

AD26L MEDIA SPECIFICATIONS	
Removal Mechanisms.....	Rapid Oxidation /Adsorption/ Autocatalytic Adsorption
Removal Efficiency.....	>95%
H2S Capacity.....	250-300 gr/ft3
Size	20 x 40 mesh
Color.....	Black
Physical Form.....	Granular Particulate
Moisture Content.....	<0.5%
Bulk Density.....	95 lbs/cu ft
MnO2 Content.....	15%
Certifications.....	NSF 61

AD26L

Iron, Manganese, Sulfide & Arsenic Removal



The Fleck #2815 control valves fitted at the top of each vessel allows flow to be routed for three operating modes:

- 1) Service (forward flow to potable tank) - chlorinated water flows down through the media from the top of the vessel to the filter effluent at the bottom at 20 gpm.
- 2) Backwash (reverse flow to 1,650 Cone bottom HDPE backwash settling waste tank) - potable water supplies backwash water which flows from the bottom of the vessel (through the filter effluent valve) and up through the media to a waste line at 35 gpm. A backwash can initiate based on a set volume of water, time in operation, differential pressure exceeds 10 psig, or manually be the operator.
- 3) Rinse (forward flow to backwash waste tank) – follows the backwash by filtering (as in Service mode) to a waste valve.

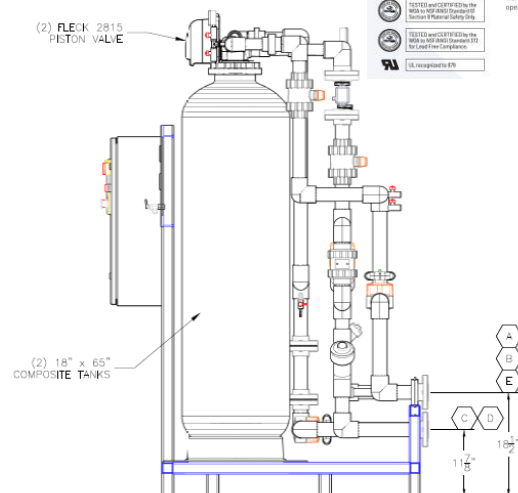
2815 COMMERCIAL VALVE 1-1/2 INCH STAINLESS STEEL CONTROL VALVE

MADE IN THE USA



FEATURES - BENEFITS

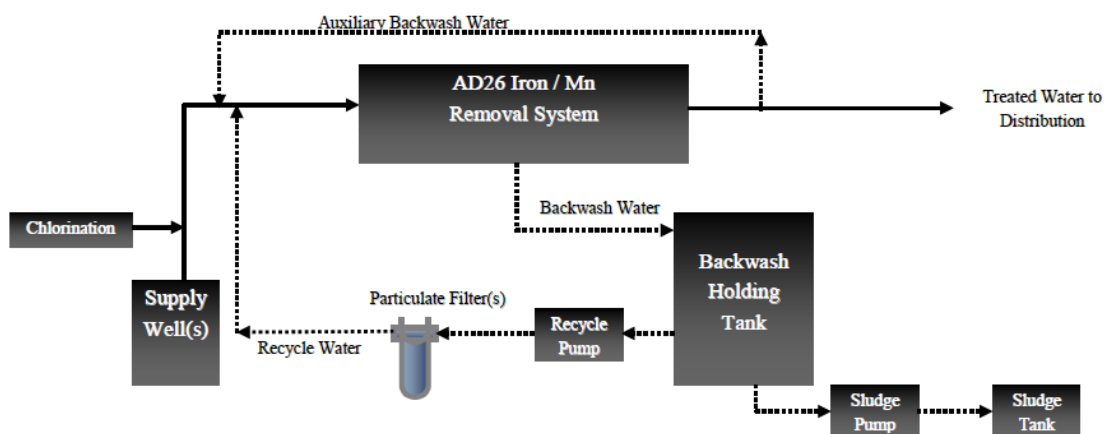
- 316 grade stainless steel valve body for superior strength and durability
- Continuous service flow and backwash rates of 70 GPM
- Backwash capability accommodates softener tanks up to 30" in diameter and filter tanks up to 30" in diameter
- Fully adjustable 3- or 5-cycle control for efficient and reliable water treatment system operation
- Designed for single or multiple tank systems
- Corrosion resistant, VCR stabilized
- NSF/ANSI 61 listed cover provides protection against water intrusion
- Hydraulically balanced composite piston for durable sealing and performance
- One-piece seal and spacer cartridge simplifies service



The AdEdge H₂Zero™ Backwash Recycle System operates such that backwash wastewater is decanted from the cone bottom backwash settling tank and sent through a 5-micron polyfelt bag filter prior to being injected at 2 gpm back into the feed side of the filtration system between chlorine injection and filtration as shown below.

AdEdge H₂Zero Backwash Recycle System & Control

Iron and Manganese Treatment System Schematic



www.fsifilters.com
1-800-348-3205



FILTER VESSELS

CBF-P-0012-C-0150-N-02-N-02-N-06-A-1-N

Bag Filter Housings

FSPN Vessels | FSPN E-Z Open | CBF 11, 12 Vessels | BFNP 13, 14 Vessels |
QX4 Filter Vessel | SBF Compact Bag Vessels | FMC Drum Filters

Cartridge Filter Housings

FSCM Cartridge Filter Vessels

Plastic Filter Housings

X100 Convertible Filter Housing | XL234 Modular Filter Housings

Specialty Filter Housings

Basket Strainers

CBFP 11, 12 Vessels ~ HOW TO ORDER

CBF-P-0012-C-0150-N-02-N-02-N-06-A-1-N

CBF	P	0012	A	0150	N	02	F	02	F	06	A	1	N	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1 Model Number CBF						7 Inlet Size Use basic pipe size with the following exceptions: 02 = 2" 03 = 3"				10 Outlet Type See Inlet Type for code letter				
2 Bag Style P = PolyLoc® (standard on CBFP)							8 Inlet Type C = Sanitary fitting D = Flange, din E = European EN Flange F = Flange, slip-on, raised face, std. N = Female NPT P = Plain pipe S = Special T = Plain OD Tube				11 Nozzle Configuration 02 = Side In/Bottom Out 06 = Side In/Side Out, Offset 08 = Side In/Side Out, Same Side See the nozzle configuration chart			
3 Number of Bags 0011 = (1) #1 bag 0012 = (1) #2 bag														
4 Vessel Material A = Carbon Steel B = 304 Stainless Steel C = 316 Stainless Steel														
5 Vessel Pressure Rating (PSI) 0150														
6 Coating/Lining Material A = Electropolish N = None S = Special X = Passivation								9 Outlet Size See Inlet Size for codes						
												12 Internal Usage A = Standard		
												13 Lid Opening Type 1 = Hinge, std.		
													14 Jacket Type N = None	

BAG FILTER HOUSINGS CBFP 11, 12 Vessels

Introduction

When looking for a cost-effective single-bag filter vessel that is both durable and reliable, look to the FSI CBFP series vessels. Although the standard CBFP series vessels do not carry an ASME Code stamp, you can still realize the benefits of an economic filter vessel that is manufactured to the same high standards and engineering expertise that characterizes all of our other FSI vessels.

Features

- Offset, Side Inlet with Side Outlet (same side or opposite), or Side Inlet with Bottom Outlet configuration available
- Positive bag seating without the use of a manual hold-down device
- Single gasket cover seal
- Connections sizes available in either 2" or 3" NPT or flange

How To Order

Example: PE - 25 - G - 2 - RPO - WE		PO - 5 - G - 2 - RPO - NSF																											
MATERIALS & MICRON RATING Beta (Polyester) = BB Microns = 1, 10, 12 Polyester Felt = PE Microns = 1, 5, 10, 25, 50, 100, 200 Polypropylene Felt = PO Microns = 1, 5, 10, 25, 50, 100 Polyester Multifilament Mesh = PEM Microns = 75, 100, 150, 200, 250, 300, 400, 600, 800 Nylon Monofilament Mesh = NMO Microns = 5, 10, 25, 50, 75, 100, 150, 200, 250, 300, 400, 600, 800 Polypropylene Microfiber = POMF Microns = 1, 3, 8, 19 Polyester Microfiber = PEMF Microns = 1, 3, 8, 19 Oil Removal = OA Microns = 10, 25		BAG CONSTRUCTION WE = Welded Construction (Not available on POMF or PEMF) No Symbol = Sewn (BB) BAG STYLES S = Galvanized Carbon Steel Ring S-SS = 304 Stainless Steel Ring RPO = Molded Polypropylene Rosedale Top RPE = Molded Polyester Rosedale Top BAG SIZES (Inches) <table> <tr> <th></th><th>Dia.</th><th>x Length</th></tr> <tr> <td>1</td><td>7.2</td><td>x 16</td></tr> <tr> <td>2</td><td>7.2</td><td>x 32</td></tr> <tr> <td>3</td><td>4.3</td><td>x 8</td></tr> <tr> <td>4</td><td>4.3</td><td>x 12</td></tr> <tr> <td>7</td><td>5.7</td><td>x 15</td></tr> <tr> <td>8</td><td>5.7</td><td>x 21</td></tr> <tr> <td>9</td><td>5.7</td><td>x 32</td></tr> <tr> <td>12</td><td>8.4</td><td>x 34</td></tr> </table> BAG FINISH G = Felt - Glazed or Singed (Standard with RPO and RPE top) P = Plain Finish		Dia.	x Length	1	7.2	x 16	2	7.2	x 32	3	4.3	x 8	4	4.3	x 12	7	5.7	x 15	8	5.7	x 21	9	5.7	x 32	12	8.4	x 34
	Dia.	x Length																											
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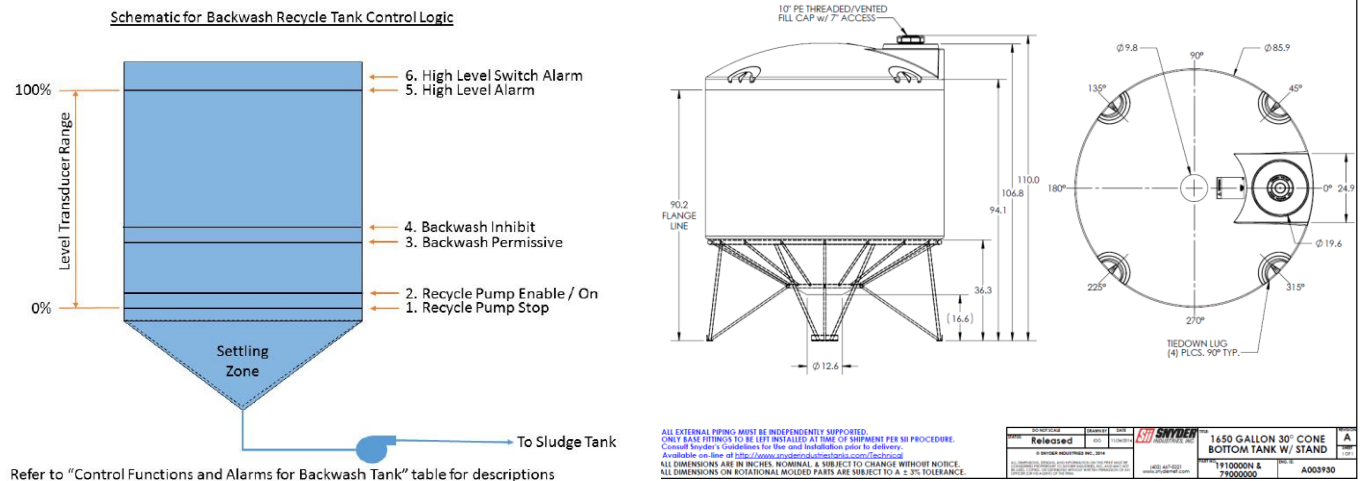
The recycle process logic is as follows:

After a backwash, the recycle pump turns ON if the following conditions are met:

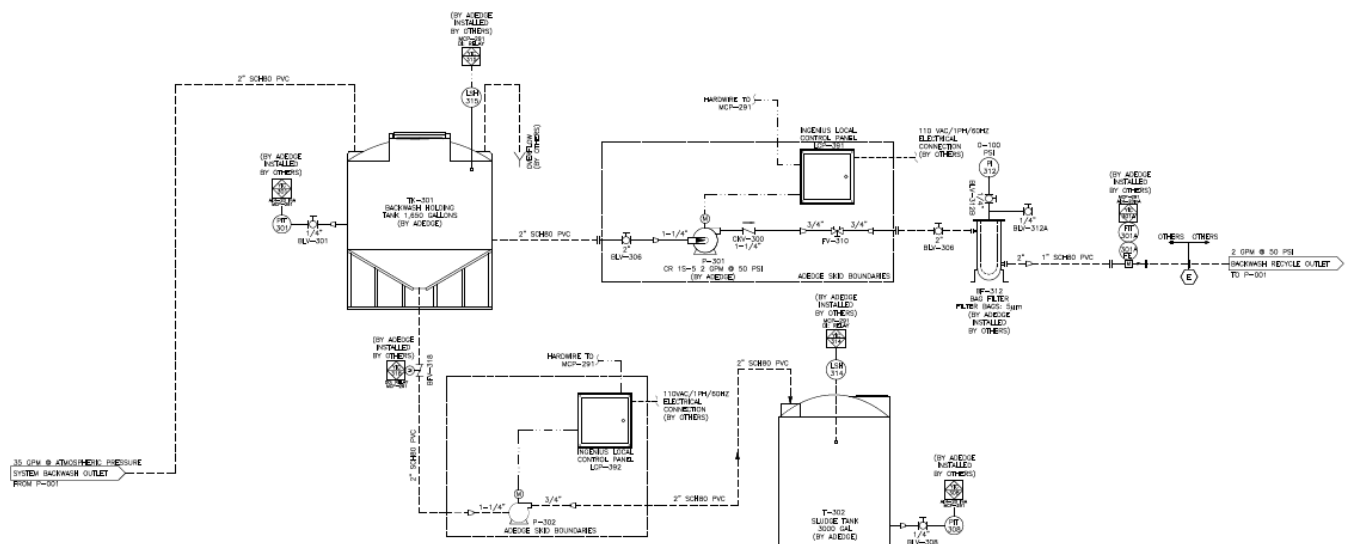
1. The established settling time has been met
2. If water level is above the Recycle Pump Enable set point (Set Point No. 2); AND
3. The well pump is running

Pumping of the recycle water from the backwash tank will STOP when one or both of the following conditions are met:

1. If water level in the backwash tank drops below Recycle Pump Stop set point (Set Point No. 1); OR
2. The well pump turns OFF and no service flow is occurring in the system to distribution



There is also a 3,000-gallon flat bottom HDPE sludge tank, which is used to contain the solids until they are eventually hauled off for disposal.



AdEdge Design Specifications

Parameter	Description
AdEdge System Model	APU26-1865CO-2-2815-PLC
Design Flow Rate	20 gpm max (22 gpm with backwash recycle)
Design Pressure	50 psi max
Pressure Vessels	Two (2) 18-inch dia. x 65-inch height
Operation	Parallel
Hydraulic Loading Rate	5.7 gpm/ft ²
Media Quantity	11 cuft AD26L
Anticipated Media Life	10 Years
Underbedding	8 x 12 Garnet / ~ 2 ft ³ (1 ft ³ per vessel)
Backwash Flow Rate	35 gpm
Wastewater Volume per Event	700 gallons (approximately)
Mounting	Composite Fiber skid-mounted, pre-piped

4/1/2020

Design Basis

System Design

20	Design flow - gpm
1.26	Design flow - liters / sec
5	Design flow - cubic meters / hr
18	inches vessel diameter
2	No vessels
17	BW design flow (gpm/sq ft)
5.66	gpm/sq foot design
11.3	gpm/sq foot design - one vessel off-line (if applicable)
35	gpm BW rate
8	total minutes of upflow BW
2	total minutes of rinse
10	total minutes of upflow BW + rinse
350	Gallons of BW water per vessel
700	Total gallons of BW water with all vessels
3	Total Cubic Meters of BW water - All vessels
5.5	media quantity (cf ft per vessel)

Backwash Frequency

31%	Percent Well Utilization
4.13	ppm, Raw water Fe
0	ppm, Coagulant as Fe
0.472	ppm, Raw water Mn
10,714	Gallons Treated before BW needed
1.2	Est. (24 hour) days between BW based on utilization

Sludge and Recycle Calculations

700	Gallons of water generated per BW event (all vessels)
25%	Reserve Capacity of BW holding tank
875	Approx. size of BW holding tank, gallons
862	Approx gals of non-dewatered sludge per month
2,586	Approx. sludge volume (6 months)

Nestucca Valley Elementary School

PWS #41 90595

36925 US 101, Cloverdale, Oregon

Township 4S, Range 10W, Section 27

