WUTC DOCKET: UW-170924
EXHIBIT: SH-16
ADMIT ☑ W/D ☐ REJECT ☐

Exh. SH – 16
Docket UW 170924
Witness: Sarah Hand

BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

SARAH HAND AND GRETCHEN HAND, a married couple Complainant, v. RAINIER VIEW WATER COMPANY, INC., Respondent.	DOCKET UW 170924 **EXHIBIT 16 TO TESTIMONY OF COMPLAINANT SARAH HAND**

EXHIBIT 16

TO TESTIMONY OF

Sarah Hand

March 19, 2018

Sanitary Survey Report for Rainier View's Southwood Water System

NIGEL S. MALDEN LAW, PLLC
711 Court A, Suite 200
Tacoma, Wa. 98402
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844-273-6067 *f*

November 9, 2016 Bob Blackman Rainier View Water Co PO BOX 44427 Tacoma, WA 98448-0427	Southwood Water System ID #82844	
	County:	Pierce
	System Type:	Community
	Operating Permit Color:	Green
	Surveyor:	Virpi Salo-Zieman
	Inspection Date:	October 3-4, 2016

Thank you, Jimmy, and Chuck for meeting with me to conduct a sanitary survey of this water system. Sanitary surveys are the Office of Drinking Water's (ODW) way to inspect public water systems through a field visit. ODW is also able to offer technical assistance to help utilities improve their system operations and ensure that public health is protected.

This report documents the findings of this survey. In general, your water system is in good condition and you have been consistently making improvements to better serve your customers. Items that need your attention are summarized below and bolded throughout the report. **Please respond to all the identified observations and findings within 30 days from the date of this report and provide documentation demonstrating the findings addressed or your plan for addressing them.**

SIGNIFICANT DEFICIENCIES* - COMPLETE THE ITEMS BELOW BY DECEMBER 16, 2016.

1. Unprotected openings were present at several wellheads. **Please visit all the wells and ensure they are adequately sealed.** Out of the ones we inspected during the survey, the following must be addressed:
    a. S46 Behm well #3 – install new screen on the vent and seal in between the two separate casings
    b. S21 Fir Meadows well #1 – Seal the open hole at the wellcap and replace the electrical box
    c. S22 Fir Meadows Well #2 – Secure the well vent and fix the electrical conduit
    d. S27 Fir Meadows well #4 – Seal the opening around the water level probe cable
    e. S11 Quiet Village Two Well #1 – Replace the electrical box or seal adequately
    f. S19 Lauradel Well #1 – Seal the opening around the water level probe cable
    g. S20 Lauradel Well #2 – Secure well vent, ensure water level probe cable entry is sealed, fix the leaking valve, and install a screen or an elastomeric valve to the outlet of the waste line.
2. There is no visible air gap or other backflow prevention device on the backwash line at Shining Mountain treatment plant. **Please clarify how the backwash recycle system is being plumbed and install appropriate backflow prevention device or an air gap.**

SIGNIFICANT FINDINGS - COMPLETE THE ITEM BELOW BY JANUARY 31, 2016, PER YOUR CORRECTIVE ACTION PLAN.**

3. Provide pictures on the reservoir vents showing the vents structure and screening. Also provide pictures on the reservoir overflows showing them adequately protected.

OBSERVATIONS AND RECOMMENDATIONS

4. Install screens on the outlets of the air-vacuum release valves at Behm pump station.
5. Consider extending the well casing at S48, Eastwood Park well, which is flush to the pump house floor. Installing a ring around it would help to minimize the flooding risk. Also provide CT6 level disinfection of the source as a precautionary measure. Based on our discussion, the plan is to decommission this source once the water rights have been transferred to the Centennial well.
6. Develop and implement a DBP monitoring plan. For assistance, please call Jolyn Leslie at (253) 395-6762.
7. Spread out coliform sampling throughout the month.
8. You should have access to inspect the backwash vaults at Shining Mountain. This will be required if you start recycling the settled backwash water into the treatment plant.
9. The emergency sources needs to be properly sealed as well to prevent aquifer contamination. If a well is not going to be usable for emergency purposes, it should be properly decommissioned.
10. Install a pressure relief valve on the discharge side of the pump at Thrift near the bladder tank.
11. 185th Reservoir does not have a vent. Please install a screened vent to the reservoir to allow replacement air into the tank as needed to.
12. Fir Meadows Reservoir's overflow appeared capped. You should open this and install 90 degree turn down and a screen at the end.
13. Work on improving your monthly report form to also include pH and the iron and manganese test results for the treatments in place.
14. Consider requesting another required position of a certified Water Distribution Manager operator for this system. You have plenty of certified staff, but only one mandatory WDM3 position.

SYSTEM INFORMATION

Southwood Water System serves close to 15,000 connections and more than 40,000 people on a daily basis in Graham area, South Pierce County. Rainier View Water Company owns and operates this water system as an investor. The last water system plan was approved in 2011. The company is also regulated by Utilities and Transportation Commission.

There are a total of five separate pressure zones. The two largest ones called Southwood 620 zone and Sound 680 zone. These zones used to be their own water systems. Together these zones serve ~13,000 ERUs. Lost Creek pressure zone in the east of Sound pressure zone serves around 1,000 ERUs, Thrift 955 Zone further east and Upper Thrift 1010 Zone together serve about 300 ERUs. According to the 2011 water system plan, the system served 14,340 ERUs in 2011. The anticipated daily demand in 2016 was 4.7 MGD.

This water system has 24 actively used sources and an intertie with City of Tacoma. Additionally there are numerous emergency sources and an emergency intertie with Firgrove mutual water system. The system has a total reservoir capacity of close to 10 MG, although not all of it is usable. There are also 10 pump stations and

several pressure reducing valves in between the zones. Most of the facilities are controlled and monitored through the system's SCADA. A few sites are still operated by timers due to lack of adequate radio signals (such as the Quiet Village site). The average day demand in the system has been 250 gpd/ERU. The maximum daily demand for design purposes has been 700 gpd/ERU.

Power generators are at Beverly Park, Southwood S04, Tannenbaum Wellfield and at Thrift Tank site. These were planned so that each pressure zone has a generator.

SECTION 1: SOURCE

There are 24 active wells. 18 of these and four emergency sources were inspected during the survey. The sources and notes are listed in the enclosed spreadsheet. In general, the pump houses were all clean and the wells appeared in good condition. However, there were multiple unprotected openings at the wellheads. Please see the findings under the notes column in the spreadsheet. These are also listed under the significant deficiencies or observations above. **Please inspect all the other active wellheads to ensure they are adequately sealed.**

SECTION 2: DISINFECTION

This system is required to maintain detectable disinfectant residual throughout the distribution system. All active sources are chlorinated using 12.5% sodium hypochlorite injection. A typical entry point residual is 0.5-0.8mg/L and based on the monthly reports, distribution residual varies, but has been consistently detectable. Several distribution sites are monitored daily. Almost all wellsites have online chlorine analyzers that are linked with the SCADA. The system does daily grabs on each well site and can verify the accuracy of the online analyzer.

Coliform contamination has been detected at Sally Hubert Source, S07, which is not being used. The Eastwood Park well may be perforated at several aquifers and should be disinfected to CT6 standard. CT is a product of chlorine concentration in mg/L and contact time in minutes. The current operational regime is that the well will fill the reservoir and then the reservoir volume is pushed to the distribution system by two pumps that are on from 5pm to 9pm. This operational regime does not allow adequate contact time, because at the end of the booster pump cycle, there will be very little water left in the reservoir and the well has turned on after 2ft drop in reservoir. If you were to change this operational regime for instance so that the reservoir level is never less than 20,000 gallons (about half of the tank) and only one booster pump would turn on at a time, you would achieve 13 minutes of contact time in the tank. The contact time is calculated as 10% of the lowest daily volume divided by the highest flow out of the tank (150gpm if only one pump could run at a time). {10%*20,000/150gpm=13min}. You would then achieve CT6 by maintaining a minimum of 0.5mg/L chlorine residual at the exit of the reservoir.

CHEMICAL TREATMENT	1	
	Yes	No
*Operated & maintained properly	☒	☐
*RPBA or air gap between the chemical tank and fill waterline	☒	☐
**Post treatment sample tap	☒	☐
Schematic of treatment facilities available	☒	☐
Adequate chlorine residual test kit available	☒	☐
Test kit calibrated and maintained properly	☒	☐

CHEMICAL TREATMENT	1	
	Yes	No
Chemical feed proportional to flow	☒	☐
**Approved chemicals used	☒	☐

DISINFECTION COMPLIANCE	1	
	Yes	No
Disinfection required	☒	☐
CT required	☒	☒
**Minimum CT met at all times	☐	☐
Peak flow used to calculate CT	☐	☐
**Monthly report submitted	☒	☐
Residuals maintained in distribution system	☒	☐
Daily residuals recorded	☒	☐

SECTION 3: OTHER TREATMENTS

Iron and Manganese Removal Treatment

Iron and manganese are prevalent contaminants in the system's sources. Oxidation and filtration treatments have been installed at five sites and two other ones are currently under design. All these treatments use ATEC technology and chlorine as an oxidant. The performance have been generally good, with exception of Shining Mountain. Behm and Shining Mountain treatments were designed with backwash recycle, but that is not being used. The backwash water is drained or irrigated at site instead. The system is using the ATEC controllers for adjusting the length of the backwash and their SCADA system to control the backwash frequency. The backwash will be triggered by run time, total volume treated, or time since last backwash. These are all adjustable parameters.

S#	Source name	# and size of filters	Current bw set point	Length & rate of backwash	Backwash disposal/recycle
S18	Country Park Two Well #1 BJN453				
S39	Emerald Terrace Well #1 ABA845	ATEC (5) 18" D filters			
S40	Shining Mountain Well #1 ACW500	ATEC (6) 48" D filters, 700gpm		4min at 175gpm	settling tanks and then spray irrigation, recycle designed, but not being used
S45	Silver Creek Well #1 AKJ211	ATEC (4) 48" filters		2min	drainfield
S46	Behm Well #3 AHL762	ATEC (4) 48" filters, 400gpm		3min	settling tanks, drainfield, recycler designed, but not being used

Treated water iron and manganese must be tested monthly. A field kit is acceptable for this testing. **Please consider including the results in the monthly reports.**

At Shining Mountain site, the backwash water is led to one of the two above-ground steel storage tanks. There are also two buried concrete tanks, but it is unclear how they are plumbed together. The hatches were all buried. According to the design drawings, the backwash water is first led to the vault in the ground and there is supposed to be a RPBA on the pipe leading to the vault. Then it flows to the second vault after which it is pumped to the first steel tank from where it is then pumped to the front of the plant. The drawing does not appear to reflect the system layout as it is today. **Please clarify the plumbing arrangement at this site and ensure adequate backflow prevention device is in place.**

Corrosion Control – pH adjustment using sodium hydroxide
This system is required to provide corrosion control treatment. Sodium silicates were applied throughout the system until about 4 years ago, when the system switched to pH adjustment with sodium hydroxide (caustic soda). The target pH is 7.4 at the entry point. The caustic is not applied at each source and the system is currently working with a consultant to evaluate their corrosion control performance and if additional treatment would be needed.

The treatment is being applied at S04 Southwood well #4, S14 Morrey Glen wellfield, S15 Oak Hill well #1, S30 185th St well #1, and S34 Tannenbaum wellfield.

Each treatment uses 25% caustic soda that is delivered by a truck on site. Each site have online pH monitor and several alarms for preventing accidental overfeed. The probes are checked twice a month. If pH reaches a certain level, the caustic feed is automatically stopped and it cannot be reactivated without a visit at the site. There are flood alarms in the chemical building as well. The alarms are tested monthly and the meters are calibrated quarterly. The chemical pumps also have calibration cylinders in place allowing frequent checking on dosages. The feed is based on a base dose with 20% increments. When a pump is calibrated, the new ml/min numbers are inserted in the PLC on site and the system will automatically calculate the current dosages based on that calibration curve.

SECTION 4: DISTRIBUTION SYSTEM

The distribution is well looped and designed to provide fire flow. The mains are 6" to 16" in diameter, majority being 8 and 12" pipe. The historical distribution system leakage have been relatively high, because there have been some unmetered customers. Almost all of these are now metered with only about 45 more to go. According to the system's records, the DSL is well below 10% now.

FEATURES	Yes	No
Service area and facility map	☒	☐
Minimum pressure requirements met	☒	☐
Service meters (reading frequency _____)	☒	☐
Leak detection program	☒	☐
Water system leakage (%)	12.4%	
Number of breaks within last year		
Main break response protocol	☒	☐
Adequate valving for flushing and pipe repair	☒	☐
Blow-offs on dead ends	☒	☐
Routine flushing (frequency quarterly)	☒	☐
Routine valve exercise (frequency _____)	☒	☐

CROSS CONNECTION CONTROL (Community Systems)	**Yes**	**No**
System has enabling authority	☒	☐
Ongoing hazard inspections	☒	☐
High hazards identified	☒	☐
High hazards protected	☒	☐
Annual testing	☒	☐
System has installation standards	☒	☐
CCS on staff or under contract	☒	☐
Cross connections observed have been eliminated	☒	☐

This system has an active cross connection control program. The testing record is quite remarkable, although the number of high hazard facilities for the size of the system is fairly low. Southwood is mostly residential community and so this may be an accurate representation of the system. The system has submitted the annual summary reports.

SECTION 5: FINISHED WATER STORAGE

Sixteen reservoirs totaling to 9.75MG of storage serve the system. The reservoirs are cleaned every three years. The tanks are climbed regularly to inspect the top.

#	Pressure Zone	Visited?	Reservoir Name	Design Capacity (MG)	Description
1	SW		Southwood	0.33	Steel narrow and tall tank. Is the lead control for the pressure zone. Floats in SW zone.
2	SW	Yes	Quiet Village	0.03	Horizontal steel tank, hatch is bolted down, overflow in the back of the tank. Calls out for the Quiet Village Two well and supplies Quiet Village pump station that works on a timer.
3	SW		Morrey Glen	0.04	Supplied by Morrey Glen wellfield
4	SW		Rocky Woods	0.04	
5	SW		Centennial	0.14	
6	SW		Spanaway	1.7	Floats in SW zone
7	SW	Yes	Eastwood park	0.7	Rectangular concrete reservoir, supplied by Eastwood well.
8	S	Yes	185th st.	0.05	Rectangular, partially buried concrete tank, septic tank lid as access hatch. **Consider installing a screened vent on the tank.** Fed by 185th well.
9	S	Yes	Silver creek	4.1	Steel tank, main control for the Sound pressure zone. Fed by Silvercreek well.

10	S	Yes	Fir meadows	0.08	Concrete Mt Baker Silo at the Fir meadows well site next to the railroad. The overflow appeared to be plated. **Install a 90degree turn down and a screen on the overflow.** Fed by the Fir Meadows wells.
11	S		Indian springs	0.11	
12	LC	Yes	Behm #1 & #2	0.16	Twin concrete tanks painted green at Behm site. Fed by Behm wells
13	LC	Yes	Behm #3	0.4	Steel tank at Behm site, plans to install PAX reservoir mixer, fed by Behm wells.
14	T	Yes	Thrift #1	0.27	Steel tank at Thrift Site, fed by Thrift wells
15	T	Yes	Thrift #2	1.7	Steel tank at Thrift site, fed by Thrift wells
16			246th	0.04	

TOP OF RESERVOIR	Res #1		Res #2		Res #3		Res #4		Res #5		Res #6		Res #7		Res #8	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Hatch: Locked	☒	☐	☒	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
*Hatch: Watertight seal or gasket	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☒	☐	☐	☐	☒	☐
Hatch: Over-lapping cover	☒	☐	☐	☒	☒	☐	☒	☐	☐	☐	☒	☐	☐	☐	☒	☐
*Screened air vent	☒	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒
*Openings sealed/protected	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐

FEATURES	Res #1		Res #2		Res #3		Res #4		Res #5		Res #6		Res #7		Res #8	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Separate inlet/outlet	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
Accessible drain outlet	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
*Protected overflow outlet	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐
*Overflow line discharges into a sanitary sewer with an air gap	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Operational water level gauge	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒
Bypass piping or isolation possibility	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
**Protected from unauthorized entry	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Low level alarms	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐
Sample tap at outlet	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Structure in good condition	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Clear of excessive vegetation	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐

TOP OF RESERVOIR	Res #9		Res #10		Res #11		Res #12		Res #13		Res #14		Res #15		Res #16	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Hatch: Locked	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☐	☐
*Hatch: Watertight seal or gasket	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Hatch: Over-lapping cover	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☐	☐
*Screened air vent	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
*Openings sealed/protected	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

FEATURES	Res #9		Res #10		Res #11		Res #12		Res #13		Res #14		Res #15		Res #16	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Separate inlet/outlet	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Accessible drain outlet	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
*Protected overflow outlet	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
*Overflow line discharges into a sanitary sewer with an air gap	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Operational water level gauge	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Bypass piping or isolation possibility	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
**Protected from unauthorized entry	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Low level alarms	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Sample tap at outlet	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Structure in good condition	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐
Clear of excessive vegetation	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐

MAINTENANCE	Reservoirs
Frequency of interior cleaning and inspection	Every three years
Frequency of appurtenance inspection	
Frequency of routine site visit	Daily

SECTION 6: PRESSURE TANKS

There are not many pressure tanks. Most of the pump stations are equipped with variable frequency or speed drivers that minimize transients.

SECTION 7: BOOSTER PUMPS AND FACILITIES

PZ	Inspected	Site	MGD	gpm	Description	Pumps
SW	No	Rocky Woods	0.40	250	Pumps from the Rocky Woods reservoir to the Southwood pressure zone.	(2) 7.5hp pumps
SW	No	Morrey Glen	0.90	600	Pumps from the Morrey Glen reservoir to the Southwood zone. In SCADA call-out list.	(2) 300gpm 20hp pumps with VFD
SW	No	Centennial	2.50	1760	Pumps from the centennial reservoir to the Southwood zone.	(1) 260gpm 15 hp pump (2) 750gpm 30hp pumps (fire flow)
SW	Yes	Quiet Village	0.20	150	Pumps from the Quite Village reservoir to the Southwood zone on a timer.	(1) 15 hp 150gpm pumps
SW	Yes	Eastwood park	0.50		Two pumps on timers that pump from the reservoir to the Southwood zone.	(2) 150gpm each.
S	Yes	Tacoma intertie	4.30	3,000	Two pumps, VFD, solenoid valves for soft start and transient attenuation. Pumps to Sound zone, is on SCADA call out list.	(2) 1,500gpm 50hp pumps
S	Yes	185th	0.50	330	Pumps from the 185th reservoir to Sound pressure zone, is on SCADA call-out list, but operation is time-limited.	(2) 165gpm pumps 15 hp
S	Yes	Fir meadows	1.70	1,200	Single pump in the same pump house with Fir Meadows well 1, pumps from the fir meadows reservoir to the South pressure zone, on SCADA call-out list.	(1) 1,200gpm 75hp pumps
S	No	Indian springs	1.30	875	Pumps from Indian Springs Reservoir to the Sound pressure zone.	(3) 175gpm 5hp pumps, VFD (1) 350gpm 7.5hp pump, VFD
LC	Yes	Behm	3.90	2,700	Two pumps that move water from the Behm reservoirs to the Lost Creek pressure zone.	(1) 1,000gpm 50 hp pump, VFD (1) 1,700 gpm 100 hp pump
T	No	224th street	1.70	1,200	Moves water from Sound to Lost Creek pressure zone.	(1) 125hp 1200gpm pump, VFD
UT	No	Country Park	1.20	850	Pressure controlled pump station that supplies Upper Thrift from Thrift pressure zone.	(1) 150gpm 5hp VFD (2) 350gpm 7.5hp pumps
T	Yes	Thrift	?	?	Single pump that increases the pressure on about 6 homes around the reservoir site. Includes one 81 gallon bladder for pump protection. Constrolled by pressure 40/60psi	

BOOSTER PUMPS	185th		Thrift		Quiet Village		Tacoma intertie		Eastwood Park		Behm		Fir Meadows	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Number of pumps	2		1		1		2		2		2		1	
Isolation valves	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Pressure relief valve	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒
Pump failure alarm	☒	☐	☐	☒	☐	☒	☒	☐	☐	☒	☒	☐	☒	☐

BOOSTER PUMPS	185th		Thrift		Quiet Village		Tacoma intertie		Eastwood Park		Behm		Fir Meadows	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Protected from flooding	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Redundant pumps	☒	☐	☐	☒	☐	☒	☒	☐	☒	☐	☒	☐	☐	☒
Equipment in good condition	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Generator available	☐	☒	☒	☐	☐	☒	☐	☒	☒	☐	☐	☒	☐	☒
Generator has automatic startup	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Generator fuel source														
Structure in good condition	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒	☐
Pressure tanks	☐	☒	☒	☐	☐	☒	☐	☒	☐	☒	☐	☒	☐	☒

Please screen the outlet of the air-vacuum release valves at Behm pump station.

Please add a pressure relief valve on the discharge side of the Thrift pump station near the bladder tank.

SECTION 8: WATER QUALITY MONITORING AND REPORTING

All monitoring is current and satisfactory. Sources 1, 2, 12, 25, and 39 have exceeded the secondary MCL for manganese. Source 2, and 32 exceed the secondary MCL for iron.

Nitrate has been creeping up in some of the systems sources, namely above 3 mg/L results have been measured at sources 2, 4, 14, 15, 30 and 34. The source 28 has a historical sample result of 10.3mg/L for nitrate, but this source is not in use and the system plans to replace this well with a deeper well at the same site.

Refer to the Water Quality Monitoring Schedule for your monitoring requirements and status. If you have any questions on source monitoring, please contact Steve Hulsman at (253) 395-6777.

COLIFORM	Yes	No
Monitoring adequate	☒	☐
Monitoring plan adequate	☒	☐
Monitoring plan followed	☒	☐
# of violations since last survey	None	

Southwood system must collect 40-50 coliform sample each month. All routine and most of the repeat sites have sampling stations. This system also have an approved triggered source monitoring plan.

Please begin taking coliform samples evenly throughout the month instead of during the first two weeks.

Also, please ensure you have an E. coli response plan just in case.

LEAD & COPPER	Yes	No
Monitoring adequate	☒	☐
Results below action level	☒	☐
Optimal Water Quality Parameters achieved	n/a	

Some sources have the requirement to be treated to reduce corrosion. The system is currently working with a consultant to evaluate if more sites would need treatment. You should also consider taking background water quality data throughout the distributions system to establish a baseline for your system. This would mean pH, alkalinity and calcium. Your coliform sampling sites would be good for this purpose as well.

DISINFECTION BYPRODUCTS	Yes	No
Monitoring adequate	☒	☐
Monitoring plan adequate	☐	☒
Monitoring plan followed	☐	☒
Results satisfactory	☒	☐

This system is collecting DBP samples from two sites each quarter. This is a schedule of reduced monitoring for a surface water system. As we discussed during the survey, if the surface water represent less than 5% of the total water in the system, you may be classified as a groundwater system. As a groundwater system, reduced sampling schedule would two sample sets annually.

Also, you should not change sample sites each quarter, but rather stick with the ones with highest historical results during the quarter of highest historical results. If you change sites in quarterly samples, the locational running annual average cannot be calculated.

Develop a DBP monitoring plan and contact Jolyn Leslie in our office for assistance in selecting the monitoring sites.

SECTION 9: SYSTEM MANAGEMENT AND OPERATIONS

This system appeared very well operated, maintained, and managed. You have done a lot of progress over the years.

PROJECT/PLANNING	Yes	No
System approved	☒	☐
Current WSP/SWSMP	☒	☐
Year WSP/SWSMP approved	2011	
Emergency response plan	☒	☐
Financial plan	☒	☐

REPORTING	Yes	No	N/A
WFI reviewed and updated with purveyor	☒	☐	---
Consumer confidence report (Community only)	☒	☐	☐
Water use efficiency report (Municipal Water Suppliers)	☒	☐	☐
Cross connection control annual report (> 1000 conn)	☒	☐	☐

OPERATOR CERTIFICATION

This system is required to have WDM3 and WTPO1 certified operators. The system have 16 certified operators listed. You could contact our operator certification program and request additional required operator positions. For instance, Lakewood Water District has a WDM3 and WDM2 set as the required operators.

OPERATIONS	Yes	No
Operational records maintained	☒	☐
Complaints followed up	☒	☐
Complaints documented	☒	☐
# of complaints recorded at ODW (since last survey)	1	
Operation and maintenance program	☒	☐
Previous survey deficiencies/findings corrected, if no list below.	☒	☐

CLOSING

This system can qualify for the reduced frequency of Sanitary Surveys of once every 5 years, if all the identified significant deficiencies are addressed by the timelines indicated in this report.

The Drinking Water Regulations require that all Group A public water systems have a sanitary survey every 3-5 years. In order to receive credit for the survey, a sanitary survey fee must be paid. Enclosed is an invoice for $2677.50. Please remit your complete payment in the form of a check or money order within thirty days of the date of this letter in the enclosed envelope or send payment to: **DOH, Revenue Section, P.O. Box 1099, Olympia, WA 98507-1099**.

If you have any questions, please contact me at (253) 395-6761 or by e-mail at virpi.salo-zieman@doh.wa.gov.

Sincerely,

Virpi Salo-Zieman
Office of Drinking Water, Regional Engineer

cc: Tacoma-Pierce County Health Department

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WATER MANAGEMENT LABORATORIES INC.
1515 80th St. E.
Tacoma, WA 98404
(253) 531-3121

INORGANIC CHEMICALS (IOCS) REPORT

System ID No: NA	System Name: Fir Meadows		
Lab/Sample No: 08963795	Date Collected: 11-18-16	DOH Source No: NA	
Multiple Source Nos: NA	Sample Type: B	Sample Purpose: I	
Date Received: 11-18-16	Date Reported: 11.22.16	Supervisor: [signature]	
County: Pierce	Date Digested: NA	Group: (A) B Other	
Sample Location: Well #4 - wellhead			
Send Results & Bill To: Rainier View Water Company PO Box 44427 Tacoma, WA 98448		Remarks:	

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	NA	mg/L	0.001	0.01	0.01			200.8	
5	Barium	↓	mg/L	0.1	2	2			200.8	
6	Cadmium		mg/L	0.001	0.005	0.005			200.8	
7	Chromium		mg/L	0.007	0.1	0.1			200.8	
11	Mercury		mg/L	0.0002	0.002	0.002			200.8	
12	Selenium		mg/L	0.002	0.05	0.05			200.8	
110	Beryllium		mg/L	0.0003	0.004	0.004			200.8	
112	Antimony		mg/L	0.003	0.006	0.006			200.8	
113	Thallium		mg/L	0.001	0.002	0.002			200.8	
116	Cyanide		mg/L	0.01	0.2	0.2			4500-CNF	
19	Fluoride		mg/L	0.2	2	4			300.0	
114	Nitrite - N		mg/L	0.1	0.5	1			300.0	
20	Nitrate - N		mg/L	0.2	5	10			300.0	
161	Total Nitrate/Nitrite	↓	mg/L	0.5	5	10			300.0	
	EPA REGULATED (Secondary)									
8	Iron	<0.1	mg/L	0.1		0.3		NO	3111B	DMS
10	Manganese	0.11	mg/L	0.01		0.05		YES	200.8	DMS
13	Silver	NA	mg/L	0.1		0.1			200.8	
21	Chloride	↓	mg/L	20		250			300.0	
22	Sulfate		mg/L	50		250			300.0	
24	Zinc	↓	mg/L	0.2		5			200.8	
	STATE REGULATED									
14	Sodium	NA	mg/L	5					200.8	
15	Hardness	↓	mg/L	10					2340C	
16	Conductivity		umhos/cm	70		700			2510B	
17	Turbidity		NTU	0.1					2130B	
18	Color		color units	15		15			2120B	
26	Total Dissolved Solids		mg/L	100		500			2540C	
111	Nickel	↓	mg/L	0.005					200.8	
	STATE UNREGULATED									
9	Lead	NA	mg/L	0.001					200.8	
23	Copper	↓	mg/L	0.02					200.8	

COMMENTS: Iron, Manganese

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INORGANIC CHEMICALS (IOCS) REPORT

System ID No: 82844H	System Name: Southwood - Silver Creek	
Lab/Sample No: 08964022	Date Collected: 12-15-16	DOH Source No: S45
Multiple Source Nos: NA	Sample Type: B	Sample Purpose: I
Date Received: 12-15-16	Date Reported: 12.19.16	Supervisor: LMC
County: Pierce	Date Digested: NA	Group: (A) B Other
Sample Location: Wellhead		
Send Results & Bill To: Rainier View Water Company P.O. Box 44427 Tacoma, WA 98448	Remarks: AR 182 R	

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	NA	mg/L	0.001	0.01	0.01			200.8	
5	Barium		mg/L	0.1	2	2			200.8	
6	Cadmium		mg/L	0.001	0.005	0.005			200.8	
7	Chromium		mg/L	0.007	0.1	0.1			200.8	
11	Mercury		mg/L	0.0002	0.002	0.002			200.8	
12	Selenium		mg/L	0.002	0.05	0.05			200.8	
110	Beryllium		mg/L	0.0003	0.004	0.004			200.8	
112	Antimony		mg/L	0.003	0.006	0.006			200.8	
113	Thallium		mg/L	0.001	0.002	0.002			200.8	
116	Cyanide		mg/L	0.01	0.2	0.2			4500-CNF	
19	Fluoride		mg/L	0.2	2	4			300.0	
114	Nitrite - N		mg/L	0.1	0.5	1			300.0	
20	Nitrate - N		mg/L	0.2	5	10			300.0	
161	Total Nitrate/Nitrite	↓	mg/L	0.5	5	10			300.0	
	EPA REGULATED (Secondary)									
8	Iron	0.12	mg/L	0.1		0.3		NO	3111B	JMS
10	Manganese	0.13	mg/L	0.01		0.05		YES	200.8	JMS
13	Silver	NA	mg/L	0.1		0.1			200.8	
21	Chloride	2	mg/L	20		250		NO	300.0	RL
22	Sulfate	2	mg/L	50		250		NO	300.0	RL
24	Zinc	NA	mg/L	0.2		5			200.8	
	STATE REGULATED									
14	Sodium	NA	mg/L	5					200.8	
15	Hardness	48	mg/L	10					2340C	RL
16	Conductivity	NA	umhos/cm	70		700			2510B	
17	Turbidity	↓	NTU	0.1					2130B	
18	Color	↓	color units	15		15			2120B	
26	Total Dissolved Solids	101	mg/L	100		500		NO	2540C	JGH
111	Nickel	NA	mg/L	0.005					200.8	
	STATE UNREGULATED									
9	Lead	NA	mg/L	0.001					200.8	
23	Copper	↓	mg/L	0.02					200.8	

COMMENTS: Alkalinity, Calcium, pH, Chloride, Hardness, Iron, Manganese, Sulfate, TDS
Sample exceeds the 15-minute holding time for pH measurement

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(253) 531-3121

INORGANIC CHEMICALS (IOCS) REPORT

System ID No: 02844H	System Name: Southwood - Silver Creek	
Lab/Sample No: 08964017	Date Collected: 12-15-16	DOH Source No: S45
Multiple Source Nos: NA	Sample Type: B	Sample Purpose: I
Date Received: 12-15-16	Date Reported: 12-16-16	Supervisor: LHL
County: Pierce	Date Digested: NA	Group: (A) B Other
Sample Location: Pre sample station		
Send Results & Bill To: Rainier View Water Company		Remarks:
P.O. Box 44427		AR182R
Tacoma, WA 98448		

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS		Method/Analyst	
	EPA REGULATED						Trigger?	MCL?		
4	Arsenic	NA	mg/L	0.001	0.01	0.01			200.8	
5	Barium	↓	mg/L	0.1	2	2			200.8	
6	Cadmium	↓	mg/L	0.001	0.005	0.005			200.8	
7	Chromium	↓	mg/L	0.007	0.1	0.1			200.8	
11	Mercury	↓	mg/L	0.0002	0.002	0.002			200.8	
12	Selenium	↓	mg/L	0.002	0.05	0.05			200.8	
110	Beryllium	↓	mg/L	0.0003	0.004	0.004			200.8	
112	Antimony	↓	mg/L	0.003	0.006	0.006			200.8	
113	Thallium	↓	mg/L	0.001	0.002	0.002			200.8	
116	Cyanide	↓	mg/L	0.01	0.2	0.2			4500-CNF	
19	Fluoride	↓	mg/L	0.2	2	4			300.0	
114	Nitrite - N	↓	mg/L	0.1	0.5	1			300.0	
20	Nitrate - N	↓	mg/L	0.2	5	10			300.0	
161	Total Nitrate/Nitrite	↓	mg/L	0.5	5	10			300.0	
	EPA REGULATED (Secondary)									
8	Iron	0.15	mg/L	0.1		0.3		NO	3111B	DMS
10	Manganese	0.13	mg/L	0.01		0.05		YES	200.8	DMS
13	Silver	NA	mg/L	0.1		0.1			200.8	
21	Chloride	↓	mg/L	20		250			300.0	
22	Sulfate	↓	mg/L	50		250			300.0	
24	Zinc	↓	mg/L	0.2		5			200.8	
	STATE REGULATED									
14	Sodium	NA	mg/L	5					200.8	
15	Hardness	↓	mg/L	10					2340C	
16	Conductivity	↓	umhos/cm	70		700			2510B	
17	Turbidity	↓	NTU	0.1					2130B	
18	Color	↓	color units	15		15			2120B	
26	Total Dissolved Solids	↓	mg/L	100		500			2540C	
111	Nickel	↓	mg/L	0.005					200.8	
	STATE UNREGULATED									
9	Lead	NA	mg/L	0.001					200.8	
23	Copper	↓	mg/L	0.02					200.8	

COMMENTS: Iron, Manganese

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INORGANIC CHEMICALS (IOCS) REPORT

System ID No: 82844H | System Name: Southwood - Silver Creek
Lab/Sample No: 08964022 | Date Collected: 12-15-16 | DOH Source No: S45
Multiple Source Nos: NA | Sample Type: B | Sample Purpose: I
Date Received: 12-15-16 | Date Reported: 12.19.16 | Supervisor: LM
County: Pierce | Date Digested: NA | Group: (A) B Other
Sample Location: Wellhead
Send Results & Bill To: Rainier View Water Company
P.O. Box 44427
Tacoma, WA 98448
Remarks: AR 182 R

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	NA	mg/L	0.001	0.01	0.01			200.8	
5	Barium		mg/L	0.1	2	2			200.8	
6	Cadmium		mg/L	0.001	0.005	0.005			200.8	
7	Chromium		mg/L	0.007	0.1	0.1			200.8	
11	Mercury		mg/L	0.0002	0.002	0.002			200.8	
12	Selenium		mg/L	0.002	0.05	0.05			200.8	
110	Beryllium		mg/L	0.0003	0.004	0.004			200.8	
112	Antimony		mg/L	0.003	0.006	0.006			200.8	
113	Thallium		mg/L	0.001	0.002	0.002			200.8	
116	Cyanide		mg/L	0.01	0.2	0.2			4500-CNF	
19	Fluoride		mg/L	0.2	2	4			300.0	
114	Nitrite - N		mg/L	0.1	0.5	1			300.0	
20	Nitrate - N		mg/L	0.2	5	10			300.0	
161	Total Nitrate/Nitrite	↓	mg/L	0.5	5	10			300.0	
	EPA REGULATED (Secondary)									
8	Iron	0.12	mg/L	0.1		0.3		NO	3111B	JMS
10	Manganese	0.13	mg/L	0.01		0.05		YES	200.8	JMS
13	Silver	NA	mg/L	0.1		0.1			200.8	
21	Chloride	2	mg/L	20		250		NO	300.0	RL
22	Sulfate	2	mg/L	50		250		NO	300.0	RL
24	Zinc	NA	mg/L	0.2		5			200.8	
	STATE REGULATED									
14	Sodium	NA	mg/L	5					200.8	
15	Hardness	48	mg/L	10					2340C	RL
16	Conductivity	NA	umhos/cm	70		700			2510B	
17	Turbidity	↓	NTU	0.1					2130B	
18	Color	↓	color units	15		15			2120B	
26	Total Dissolved Solids	101	mg/L	100		500		NO	2540C	JGH
111	Nickel	NA	mg/L	0.005					200.8	
	STATE UNREGULATED									
9	Lead	NA	mg/L	0.001					200.8	
23	Copper	↓	mg/L	0.02					200.8	

COMMENTS: Alkalinity, Calcium, pH, Chloride, Hardness, Iron, Manganese, Sulfate, TDS
Sample exceeds the 15-minute holding time for pH measurement

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INORGANIC CHEMICALS (IOCS) REPORT

System ID No: 02844H	System Name: Southwood - Silver Creek	
Lab/Sample No: 08964017	Date Collected: 12-15-16	DOH Source No: S45
Multiple Source Nos: NA	Sample Type: B	Sample Purpose: I
Date Received: 12-15-16	Date Reported: 12-16-16	Supervisor: LHL
County: Pierce	Date Digested: NA	Group: (A) B Other
Sample Location: Pre sample Station		
Send Results & Bill To: Rainier View Water Company P.O. Box 44427 Tacoma, WA 98448	Remarks: AR182R	

DOH#	ANALYTES	RESULTS	UNITS	SRL	TRIGGER	MCL	EXCEEDS Trigger?	EXCEEDS MCL?	Method/Analyst	
	EPA REGULATED									
4	Arsenic	NA	mg/L	0.001	0.01	0.01			200.8	
5	Barium	↓	mg/L	0.1	2	2			200.8	
6	Cadmium	↓	mg/L	0.001	0.005	0.005			200.8	
7	Chromium	↓	mg/L	0.007	0.1	0.1			200.8	
11	Mercury	↓	mg/L	0.0002	0.002	0.002			200.8	
12	Selenium	↓	mg/L	0.002	0.05	0.05			200.8	
110	Beryllium	↓	mg/L	0.0003	0.004	0.004			200.8	
112	Antimony	↓	mg/L	0.003	0.006	0.006			200.8	
113	Thallium	↓	mg/L	0.001	0.002	0.002			200.8	
116	Cyanide	↓	mg/L	0.01	0.2	0.2			4500-CNF	
19	Fluoride	↓	mg/L	0.2	2	4			300.0	
114	Nitrite - N	↓	mg/L	0.1	0.5	1			300.0	
20	Nitrate - N	↓	mg/L	0.2	5	10			300.0	
161	Total Nitrate/Nitrite	↓	mg/L	0.5	5	10			300.0	
	EPA REGULATED (Secondary)									
8	Iron	0.15	mg/L	0.1		0.3		NO	3111B	DMS
10	Manganese	0.13	mg/L	0.01		0.05		YES	200.8	DMS
13	Silver	NA	mg/L	0.1		0.1			200.8	
21	Chloride	↓	mg/L	20		250			300.0	
22	Sulfate	↓	mg/L	50		250			300.0	
24	Zinc	↓	mg/L	0.2		5			200.8	
	STATE REGULATED									
14	Sodium	NA	mg/L	5					200.8	
15	Hardness	↓	mg/L	10					2340C	
16	Conductivity	↓	umhos/cm	70		700			2510B	
17	Turbidity	↓	NTU	0.1					2130B	
18	Color	↓	color units	15		15			2120B	
26	Total Dissolved Solids	↓	mg/L	100		500			2540C	
111	Nickel	↓	mg/L	0.005					200.8	
	STATE UNREGULATED									
9	Lead	NA	mg/L	0.001					200.8	
23	Copper	↓	mg/L	0.02					200.8	

COMMENTS: Iron, Manganese