

VIRGINIA DEPARTMENT OF HEALTH  
ENGINEERING DESCRIPTION SHEET

DATE: March 31, 2010

<b>WATERWORKS NAME</b>	Timberlake Crossing	<b>WATERWORKS CLASS:</b> IV
<b>COUNTY/CITY:</b>	Franklin County	<b>TYPE:</b> Community

**LOCATION:** From the Town of Rocky Mount, take Route 40 east for 2.2 miles to Booker T. Washington Highway (SR 122); turn left onto State Route 122, proceed for 11.5 miles; turn left onto Hardy Road (SR 636); proceed 0.6 miles; turn right onto Middle Valley Road (SR 677); proceed for 1.8 miles; turn right onto Northridge Road (SR 678); proceed 0.1 miles; turn left onto Idlewood Road (SR 677); proceed for 0.4 miles; turn left onto Grimes Creek Lane, waterworks is located at entrance.

**OWNER:** Petrus Environmental Services, Inc.  
**Contact:** Gregory T. Flory, P.E.  
1807 Murry Road, Unit O)  
P. O. Box 21173  
Roanoke, VA 24018  
**Phone:** (540) 344-9800

**OPERATOR:** Licensed Class IV Operator Required  
**PERMIT NUMBER:** 5067951  
**EFFECTIVE DATE:** March 31, 2010  
**TYPE OF TREATMENT:** pH adjustment and iron and manganese removal  
**SOURCE:** One drilled well  
**DESIGN CAPACITY:** 15,200 gpd and 49 residential connections

**DESCRIPTION OF THE WATERWORKS**

This waterworks consists of a drilled well, iron and manganese removal treatment system, 0.020-MG atmospheric-type storage tank and distribution system that includes 6-inch and 4-inch waterlines with associated appurtenances.

**Well #1:** This Class IIB well is located at the entrance to the development off Grimes Creek Lane, approximately 30 feet south of the proposed treatment building. The well was drilled on March 4, 2004 to a total depth of 305 feet and is cased and pressure grouted to a depth of 85 feet. The well is provided with 6-inch steel casing. During the yield and drawdown test performed during March 2004, the well yielded 50 gpm at a drawdown depth of 240 feet. A submersible well pump is provided in the well capable of delivering 42 gpm at 310 feet TDH. The well is provided with a 6 ft x 6 ft x 6 inch concrete pad with 4-inch floor drain. A pitless adapter and well cap with vent and drawdown gauge are provided. Water is pumped from the well to the treatment building where the 2-inch diameter line is provided with a check valve, water meter, sample tap (hose bibb at entrance to treatment building and extended to lab sink), pressure gauge, screened blowoff, and isolation valve. An HOA switch is provided for automatic/manual control of the well pump. Water level electrodes in the 0.020-MG storage tank will control the activation of the well pump.

**Iron and Manganese Removal:** The treatment system is located in a 24 feet by 24 feet concrete and frame building adjacent to the atmospheric-type storage tank. Raw water is delivered through the treatment building before filling the proposed 0.020-MG storage tank. The design includes pretreatment chemical addition of soda ash, sodium hypochlorite, and potassium permanganate solutions by chemical feed pumps with associated solution tanks. The soda ash, sodium hypochlorite, and potassium permanganate dosing pumps will have capacities of 190 gpd, 14 gpd, and 3 gpd respectively, and is added from separate 150, 100, and 50-gallon solution tanks respectively. The chemical feed pumps are activated simultaneously with the well pump. A flow switch will prevent chemical addition if no flow occurs in the line. The chemically treated water is delivered to a 1,500-gallon contact tank before being routed to two 36-inch diameter manganese greensand pressure filters. Appurtenances for each filter will include sample taps at the points between the anthracite, the manganese treated greensand, and the midpoint of the manganese greensand; pressure gauge at each inlet/outlet line; water meter on each inlet line; ball valves; and air release valves on top of each filter. The normal filtration rate is limited to 3 gpm/ft<sup>2</sup> for a total rate of 42 gpm. Each filter is backwashed from the distribution system through a 2 HP centrifugal pump. The backwash rate design is 83 gpm for approximately 12 gpm/ft<sup>2</sup> rate. The backwash pump suction line is provided with an isolation valve, pressure gauge and sample tap (can serve as entry point tap). The pump discharge line is provided with a check valve, isolation valve and pressure gauge. Each filter backwash supply line is provided with isolation valve and water meter. Additional sample taps are located at the inlet/outlet line to the 1,500-gallon contact tank, and the lab area sink for raw, pretreated, post treated, and finished water. Air release valves are provided on waterlines at high points for treated water and filters. The backwash waste is directed outside the treatment building to two 1,000-gallon settling tanks in series and on-site disposal drainfield system. A laboratory sink and bench are provided. Test equipment for pH, chlorine residual, and iron and manganese analysis is provided by the waterworks operator. The treatment building is provided with heating, lighting, and ventilation. A heat pump is provided for the building.

#### CAPACITY EVALUATION OF THE WATERWORKS

Design Basis: Based on Commonwealth of Virginia *Waterworks Regulations*  
One Equivalent Residential Connection (ERC) = water usage of 400 gpd

##### 1. Source Capacity:

Well No.	Well Yield (gpm ÷ 0.5 gpm/ERC x 400 gpd/ERC)		Pump Capacity (gpm x 1440 min/day)		Effective Capacity gpd
	gpm	gpd	gpm	gpd	
1	50	40,000	42	60,480	40,000

A single well water system is limited to 49 residential connections

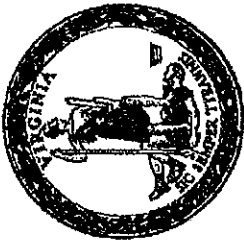
2. Treatment Capacity: Two 36-inch diameter filters @ 3 gpm/ft<sup>2</sup>  
Each filter has 7.07 ft<sup>2</sup> of filter area  
2 filters x 7.07 ft<sup>2</sup> x 3 gpm/ft<sup>2</sup> = 42 gpm  
42 gpm x (1440 min/day – 25 min/day for backwash) = 59,430 gpd produced  
Daily backwash losses (83 gpm x 15 min) + (21 gpm x 10 min) = 1,455 gpd  
Effective Treatment Production: 59,430 gpd – 1,455 gpd = 57,975 gpd

3. Storage Capacity:      Atmospheric-type storage tank = 0.020 MG  
Effective storage capacity based on a minimum tank water level of 993.5 feet elevation  
Effective Vol. =  $\pi (10\text{ft})^2 \div 4 \times (1006.5\text{ ft} - 993.5\text{ ft}) = 1021\text{ ft}^3 = 7637\text{ gallons}$   
 $7637\text{ gallons} \div 200\text{ gal/ERC} = 38\text{ ERCs}$   
 $38\text{ ERCs} \times 400\text{ gpd/ERC} = 15,200\text{ gpd}$

Conclusions:

This waterworks is permitted for a design capacity of 15,200 gpd, due to limited storage capacity described above, and 49 residential connections until a second well is provided. This permit does not suspend, minimize, or otherwise alter this owner's obligation to comply with applicable federal, state, or local laws and regulations or permits.

RLP:jk



Commonwealth of Virginia  
Department of Health  
Office of Drinking Water

## Waterworks Operation Permit

Petrus Environmental Services, Inc. is hereby granted permission to operate a Class IV community waterworks having a design capacity of 15,200 gpd and 49 residential connections at Timberlake Crossing located in Franklin County in accordance with Title 32.1 of the Code of Virginia, and the *Waterworks Regulations* of the Virginia Department of Health (12 VAC 5-590). This permit is issued in accordance with Construction Permit No. 501705 dated June 1, 2005 and with the understanding that this owner will operate the waterworks in accordance with Part II, "Operation Regulations for Waterworks," of the *Waterworks Regulations* of the Virginia Department of Health and any variances or special requirements noted below. This permit does not suspend, minimize, or otherwise alter this owner's obligation to comply with applicable federal, state, or local laws and regulations or permits.

Variances, Exemptions, or Special Permit Requirements issued: ( ☒ ) None ( ) See Attached

An Engineering Description Sheet is attached dated March 31, 2010

PERMIT NO.: 5067951

EFFECTIVE DATE: March 31, 2010

APPROVED

P.E.

Director, Office of Drinking Water  
for the State Health Commissioner pursuant to VA Code § 2.2-604