VIRGINIA DEPARTMENT OF HEALTH
ENGINEERING DESCRIPTION SHEET

DATE: August 9, 2013

WATERWORKS NAME	Compass Cove	**WATERWORKS CLASS:** IV
COUNTY/CITY:	Franklin County	**TYPE:** Community

LOCATION: From the Town of Rocky Mount, take State Route 122 (northeast) for approximately 13.7 miles. Turn right (east) onto State Route 616 (Scruggs Road) and proceed approximately 8.8 miles. The waterworks is located on the north side of state Route 616, just before the intersection of State Routes 616 and 940.

OWNER: Petrus Environmental Services, Inc.
Contact: David Petrus
1807 Murry Road, Unit O
P. O. Box 21173
Roanoke, Virginia 24018
Phone: (540) 344-9800

OPERATOR: Licensed Class IV Operator Required

PERMIT NUMBER: 5067083

		Amended
EFFECTIVE DATE:	July 30, 2008	August 9, 2013

TYPE OF TREATMENT: Iron and manganese removal

SOURCE: Three drilled wells

DESIGN CAPACITY: 78,000 gpd

DESCRIPTION OF THE WATERWORKS

The Compass Cove water system supplies potable water to Compass Cove Subdivision and the Sunset Point Subdivision. The waterworks consists of three drilled wells, iron and manganese removal treatment system, a 0.044-MG atmospheric storage tank, and distribution system that include 8-inch and 6-inch diameter waterlines with associated appurtenances.

Well No. 1: This Class IIB well is located 30 feet west of the treatment building. The well was drilled on January 10, 2003 to a total depth of 405 feet and is cased and pressure grouted to a depth of 81 feet. The well is provided with 6-inch diameter steel casing. During the yield and drawdown test performed during January 2003 simultaneously with Well No. 2, the well yielded 30 gpm at a drawdown depth of 340 feet. A submersible well pump is provided in the well, capable of delivering 30 gpm at 390 feet TDH. The well is provided with a 6 ft x 6 ft x 6 inch concrete pad, pitless adapter and well cap with vent and drawdown

gauge. Water is pumped from the well to the treatment building where the independent 2-inch diameter line is provided with a check valve, water meter, sample tap, pressure gauge, screened blow off, and isolation valve, prior to combining with the well discharge line from Well No. 2. HOA switches are provided for control of the well pump. Water level electrodes in the atmospheric storage tank control the activation of the well pump.

Well No. 2: This Class IIB well is located 70 feet south of the treatment building. The well was drilled on January 14, 2003 to a total depth of 405 feet and is cased and pressure grouted to a depth of 78 feet. The well is provided with 6-inch diameter steel casing. During the yield and drawdown test performed during January 2003 simultaneously with Well No. 1, the well yielded 28 gpm at a drawdown depth of 351 feet. A submersible well pump is provided in the well capable of delivering 28 gpm at 450 feet TDH. The well is provided with a 6 ft x 6 ft x 6 inch concrete pad, pitless adapter and well cap with vent and drawdown gauge. Water is pumped from the well to the treatment building where the independent 2-inch diameter line is provided with a check valve, water meter, sample tap, pressure gauge, screened blow off, and isolation valve, prior to combining with the well discharge line from Well No. 1. HOA switches are provided for control of the well pump. Water level electrodes in the atmospheric storage tank control the activation of the well pump.

Well No. 3: This Class IIB well is located on the opposite side of State Route 616 from the treatment building, approximately 600 feet south west of the treatment building. The well was drilled on July 13, 2004 to a total depth of 305 feet and is cased and pressure grouted to a depth of 80 feet. The static water level was measured at 40 feet. The well is provided with 6-inch steel casing. During the yield and drawdown test performed during August 9-11, 2004, the well yielded 52 gpm at a drawdown depth of 241 feet. A submersible well pump is provided in the well capable of delivering 48 gpm at 390 feet TDH. The well is provided with a 6 ft x 6 ft x 6 inch concrete pad, pitless adapter and well cap with vent and drawdown gauge. Water is pumped from the well to the treatment building where the independent 2-inch diameter line is provided with a check valve, water meter, sample tap, pressure gauge, screened blow off, and isolation valve. HOA switches are provided for control of the well pump. Water level electrodes in the atmospheric storage tank control the activation of the well pump.

Iron and Manganese Removal: The treatment system is located in a 30 foot by 24 foot concrete and frame building adjacent to Compass Cove Drive near Scruggs Road (SR 616). Raw water is combined from Well Nos. 1, 2 and 3 within the treatment building and is delivered to the atmospheric storage tank and distribution system after treatment. 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 have capacities of 8 gph, 11 gpd, and 3 gpd, respectively, and are added from separate 150-, 55-, and 55-gallon solution tanks, respectively. The chemical feed pumps are activated simultaneously with the well pumps. The chemically treated water is delivered to a 2,500 gallon contact tank before going to the two 42-inch diameter manganese greensand pressure filters. Appurtenances for each filter includes 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 flow; water meter on each inlet line; ball valves; and air release valves on top of each filter. The normal filtration rate is 3 gpm/ft^2 for a total capacity of 58 gpm. Each filter is backwashed from the distribution system. The backwash rate design is 115 gpm for approximately 12 gpm/ft^2 rate. Additional sample taps are located at the 2,500 gallon contact tank, and the lab area sink for raw, pretreated, post treated, and finished water. Air release valves are provided on waterlines at all high points within the treatment building. 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, as well as test equipment for pH, chlorine residual, and iron and manganese analysis. The treatment building is provided with heating, lighting, and ventilation. A heat pump is provided for the building.

Atmospheric Storage Tank: The atmospheric tank is located approximately 900 feet north-west of the treatment building. The base of the tank is at an elevation 922 feet with an overflow elevation of 982 feet. The tank has a diameter of 11 feet and a height of 60 feet. Appurtenances for the tank include a screened vent, roof access hatch, 6-inch diameter overflow, 6-inch diameter drain with valve, 8-inch diameter inlet rising to elevation 936.5 feet, separate 8-inch diameter outlet line with check valve, water level indicator and access ladder (cut off at 7 feet from the base of the tank with safety climb device and cage), and two 24-inch hinged manways. The water tank must maintain a minimum water level of 927 ft elevation in order to maintain a minimum of 20 psi water pressure to all service connections.

Distribution System: The distribution system consists of approximately 1,980 linear feet of 8-inch diameter waterlines and 5,600 linear feet of 6-inch diameter waterlines with associated appurtenances.

CAPACITY EVALUATION OF THE WATERWORKS

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

Source Capacity:

Well No.	Well Yield (gpm÷0.5gpm/ERCx400gpd/ERC)		Pump Capacity (gpm x 1440 min/day)		Effective Capacity
	gpm	gpd	gpm	gpd	gpd
1	30	24,000	30	43,200	24,000
2	28	22,400	28	40,320	22,400
3	52	41,600	48	69,120	41,600
				TOTAL	**88,000**

Treatment Capacity: Two 42-inch diameter manganese greensand filters @ 3 gpm/ft^2

Each filter has 9.6 ft^2 of filter area

2 filters x 9.62 ft^2 x 3 gpm/ft^2 = 58 gpm

58 gpm x (1440 min/day – 25 min/day for backwash) = 82,070 gpd produced

Daily backwash losses (115 gpm x 15 min) + (29 gpm x 10 min) = 2,015 gpd

Effective Treatment Production: 82,070 gpd – 2,015 gpd = 80,055 gpd

Storage Capacity: Atmospheric-type storage tank – 0.044 MG

Effective storage capacity based on a minimum tank level of 927 foot elevation

Effective Vol. = π (11 ft)^2 ÷ 4 x (982 ft – 927 ft) = 5,227 ft^3 = 39,099 gallons

39,099 gallons ÷ 200 gal/ERC = 195 ERCs

195 ERCs x 400 gpd/ERC = 78,000 gpd

Conclusions:

This waterworks is permitted for a design capacity of 78,000 gallons/day due to limited storage capacity described above. 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:ga

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 78,000 gpd at Compass Cove 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 Operation Permit No. 5067083 dated July 30, 2008 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 August 9, 2013

PERMIT NO.: 5067083

EFFECTIVE DATE: August 9, 2013

APPROVED John J. Aulbach II, PE

John J. Aulbach II, P.E., Director, Office of Drinking Water
for the State Health Commissioner pursuant to VA Code § 2.2-604