COMMONWEALTH of VIRGINIA

DEPARTMENT OF HEALTH

DIVISION OF WATER SUPPLY ENGINEERING

WATERWORKS OPERATION PERMIT

Arrowhead Water Company, Inc. Is Hereby Granted Permission

To Operate a community Waterworks Having a Design Capacity of 146 Equivalent Residential Connections or 58,400 gpd at Arrowhead Village Located In Franklin County (City, Town and/or County) In Accordance With the Provisions of Title 32.1, Chapter 6, Article 2, Section 32.1 - 172 Code of Virginia As Amended and Section(s) 3.14 Of the Waterworks Regulations of the Virginia Department of Health As Amended.

This Permit Is Issued In Accordance with Previously Issued Permits Waterworks Construction Permit No. 502990 dated 31 July 1990, Waterworks Construction Permit No. 1662 dated 21 November 1986, and Waterworks Construction Permit No. 1615 dated 29 July 1986

And With The Understanding That The Arrowhead Water Company, Inc. Will Operate the Waterworks in Accordance with Part 2 "Operation Regulations for Waterworks" of the Waterworks Regulations of the Virginia Department of Health and any Variances and/or Exemptions Noted Below.

Variances and/or Exemptions Granted (X) None ( ) See Attached.

PERMIT NO. 5067348

EFFECTIVE DATE 31 May 1991

RECOMMENDED _____
Director, Division of Water Supply Engineering

RECOMMENDED _____
Director, Office of Water Programs

APPROVED _____
State Health Commissioner

VIRGINIA DEPARTMENT OF HEALTH
ENGINEERING DESCRIPTION SHEET
WATER

DATE: 31 May 1991

CERTIFIED CLASS: IV

WATERWORKS NAME:	Arrowhead Village
COUNTY:	Franklin
LOCATION:	On the northwest side of Route 616 approximately 1¼ miles north of the intersection of Routes 616 and 122
OWNER:	Arrowhead Water Company, Inc. Attention: John Roberts 450 Anchor Drive Moneta, Virginia 24121 Telephone: (703) 721-1207
OPERATOR:	Terry Dooley Class IV P. O. Box 672 Moneta, Virginia 24121 Telephone: (703) 297-2396
PERMIT NUMBER:	5067348
DATE ISSUED:	31 May 1991
TYPE OF TREATMENT:	Disinfection, pH adjustment, iron, manganese and radium removal
SOURCE:	Two wells
DESIGN CAPACITY:	146 Equivalent Residential Connections (ERCs) or 58,400 gpd

DESCRIPTION OF SYSTEM:

This waterworks consists of the following: two wells; treatment facilities for disinfection, pH adjustment and iron, manganese, and radium removal; a 30,000-gallon standpipe; dual booster pumps; 2,500-gallon hydropneumatic tank; and water distribution lines. Construction Permit No. 1615 was issued on 29 July 1986 for construction of the standpipe and some of the water lines. Construction Permit No. 1662 was issued 21 November 1986 for construction of the well house with appurtenances and installation of well No. 1. Construction Permit No. 502990 was issued 31 July 1990 for the installation of a new well pump in well No. 1,

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installation of well No. 2, treatment facilities, booster pumps with hydropneumatic tank, and approximately 1,745 linear feet of 2-inch, 3-inch, 4-inch, and 6-inch diameter water lines.

Well No. 1 - Well No. 1 is located just northwest of Route 616 in front of the building for the treatment facilities. This well was drilled on 15-19 April 1985 to a depth of 320 feet. The 8-inch diameter steel casing is installed to a depth of 57 feet and the well is grouted to the same depth. The yield of the well is a minimum of 85 gpm determined over a 48-hour yield and drawdown test performed on 5-6 January 1986. The submersible pump, powered by a 10 HP electric motor and rated 82 gpm at 342 feet TDH is installed in the well at a depth of approximately 295 feet. The well head enclosure is provided with a heater, a lock, and concrete pad with floor drain. The 8-inch diameter well casing extends approximately 24 inches above the concrete pad. Appurtenances to the well include a screened vent and sanitary seal. The well discharge line is equipped with a screened blowoff, sample tap with vacuum breaker, check valve, gate valve, and air release valve. The water meter is provided in the treatment building.

Well No. 2 - This well is located on the northwest side of Route 616 approximately 150 feet north of well No. 1 and 425 feet south of the 30,000-gallon standpipe. The well was drilled in November 1986 to a depth of 300 feet. The 6-inch diameter steel casing was installed to a depth of 65 feet and the well is grouted to the same depth. The yield of the well was determined to be 25 gpm determined over a 48-hour yield and drawdown test performed 11-12 December 1986. A submersible pump powered by a 3 HP electric motor and rated 25 gpm at 345' TDH is installed in the well at a depth of approximately 228 feet. The well head enclosure is provided with a heater, a lock, and a concrete pad with a screened floor drain. The 6-inch diameter well casing extends approximately 18 inches above the concrete floor. Appurtenances to the well include a screened vent and sanitary seal. The well discharge line is equipped with a screened blowoff, air release valve, sample tap, check valve, and gate valve. A water meter is provided in the treatment building. Both well pumps will deliver water to the treatment facilities.

Treatment Facilities - The treatment facilities are located on the same lot as wells No. 1 and 2 and consist of the following: chemical addition - hypochlorite solution, soda ash, potassium permanganate; 2,500-gallon chemical contact tank; and four 42-inch diameter pressure manganese greensand filters.

Hypochlorite solution is added to the raw water by means of a diaphragm pump with a maximum capacity of 30 gpd. Soda ash is added to the raw water by means of a diaphragm pump with a maximum capacity of 100 gpd. Potassium permanganate solution is added to the raw water by means of a diaphragm pump with a maximum capacity of 30 gpd. Solution containers (55 gallons each for chlorine and potassium permanganate and 100 gallons for soda ash, all with mixers) are provided for the chemical solutions. A spare 30 gpd pump and 55-gallon solution tank are provided.

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A 2,500-gallon chemical contact tank provides approximately 22 minutes contact time at a flow rate of 115 gpm. The tank is provided with the following appurtenances: drain, pressure and vacuum relief valve, pressure gauge, access manhole, and sight gauge.

Four 42-inch diameter pressure filters with 18 inches of anthracite media and 18 inches of manganese greensand are provided. The filters are provided with the following appurtenances: meter on inlet and backwash lines, pressure gauge on inlet and outlet line, sample taps at the top, midpoint of the manganese greensand media, sample taps on each filter influent and effluent, solo control valve and access port on the side and hand port on top. The filters will be backwashed using system pressure with the backwash water being treated in two septic tanks installed in series followed by soil absorption field.

A laboratory sink with bench and sampling taps are provided. Testing equipment for analyses of iron, manganese, temperature, pH, alkalinity, and chlorine is provided. The filtered water is pumped to the standpipe storage tank.

Atmospheric-Type Storage Tank - A 30,000-gallon steel standpipe is provided to serve the development. The standpipe is provided with the following appurtenances: (1) screened vent, (2) drain, (3) access hatch with shoebox-type cover; (4) water level indicator, (5) access ladder, cutoff 10 feet above grade, (6) safety cage on access ladder, and (7) overflow. The tank will provide adequate pressure to the development except for lots (Lots 1-4 and 41-47) which will require booster pumping facilities to provide a minimum pressure of 20 psi.

Booster Pumps and Hydropneumatic Tank - Dual booster pumps are provided. Each pump is a Goulds Model 3656 with a 3 HP motor rated 147 gpm @ 62 feet TDH. The combined capacity of both pumps is 261 gpm @ 69 feet TDH. The operating range of the booster pumps will be 25 to 40 psi with the maximum service elevation being 960 feet above mean sea level. Appurtenances to the booster pump include the following: vacuum/pressure gauge on each pump suction line; pressure gauge on each pump discharge line; shutoff valves on suction and discharge lines; pressure gauge on each discharge line; and check valve on each discharge line.

Water Lines - Approximately 235 linear feet of 2-inch, 80 linear feet of 3-inch, 205 linear feet of 4-inch, and 5,690 linear feet of 6-inch diameter water lines with appurtenances are installed.

Design Basis: Based on 1982 Waterworks Regulations

1 Equivalent Residential Connection = 400 gpd

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Engineering Description Sheet: Arrowhead Village
31 May 1991
Page 4

Source:

Well Yield

Well No. 1 - 85 gpm
Well No. 2 - 25 gpm
Total - 110 gpm

110 gpm ÷ .5 gpm/ERC = 220 ERCs or 88,000 gpd

Well Pump Rate

Well No. 1 - 82 gpm
Well No. 2 - 25 gpm
Total - 107 gpm

107 gpm ÷ .5 gpm/ERC = 214 ERCs or 85,600 gpd

Treatment:

Capacity - 115 gpm
4 filters @ 28.9 gpm each - 115 gpm

115 gpm ÷ .5 gpm/ERC = 230 ERCs or 92,000 gpd

Storage:

Atmospheric Type - 28,518 gallons

Pressure - Effective 833 gallons
Total 29,351 gallons

29,351 gallons ÷ 200 gallons/ERC = 146 ERCS or 58,400 gpd

Therefore, based on the critical value above, this waterworks is permitted for a design capacity of 146 ERCs or 58,400 gpd.

TNH:jk