

BERNIER CARR & ASSOCIATES PC

HAMLET OF MADRID
SeaQuest Water Treatment
Project No. 99-063

Prepared for:
Town of Madrid
3529 County Route 14
Madrid, New York 13660

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SCOPE

The purpose of this report is to present the results of monitoring of the sequestering chemical feed program since its addition to the water distribution system. This report includes the sodium, iron, and lead and copper monitoring; a summary of consumer complaints, a summary of the amount of water pumped and the minimum/maximum and average chemical doses; and recommendations concerning any needed changes to the treatment or procedures.

LOCATION & BACKGROUND

The Hamlet of Madrid is located in northern St. Lawrence County approximately 9 miles south of the St. Lawrence River and 8.5 miles northwest of Potsdam on NYS Route 345. The Hamlet consists of year-round residents and a few institutional/commercial and miscellaneous establishments.

The existing water district is supplied by two (2) drilled municipal wells within the water district. Based on the water treatment plant's operating records water demands average 57,000 gallons per day. The water supply is considered a hard water with a marginally high iron content. Many residents have individual cartridge filters installed in their homes to help remove the "red color" from the water. The only water treatment prior to the sequestering chemical program started in January 2000 was chlorination. The chlorine contact basin consists of a 24 inch diameter, 162 foot long ductile iron pipe located between the well sites and the treatment plant building.

The existing water distribution system is a composite of several phases of replacement. The original distribution system was constructed of 4 inch, 6 inch, and 8 inch unlined cast iron water mains and was installed in 1915. In the 1980's sections of this system were replaced with 8 inch cement lined ductile iron pipe; however, there are some remaining water mains that are part of the original system. The distribution system also contains a 500,000 gallon water storage tank.

CURRENT TREATMENT

Water is currently pumped from the two municipal wells into the water treatment plant control building. Prior to entering the building the water is treated with sequestering chemical and chlorine as recommended in the Bernier, Carr & Associates report dated November 16, 1999. Sequestrant and chlorine levels are checked daily by the water system operator. After chemical feed the treated water passes through the chlorine contact basin through the control building and out into the distribution system. A summary of well water test results is shown to provide a description of the raw water quality:

Water Sample Test Results

Well No. 1		5/16/84	6/14/84	6/15/84	2/5/98	6/28/99	8/17/99
pH		7.1	7.7	7.6		7.6	7.5
Total Dissolved Solids	mg/L	337	331	331		354	329
Alkalinity	mg/L	188	213	213		204	215
Chloride	mg/L	30	33	30		30.8	26.6
Hardness	mg/L		226	226	226	<1 *	229
Langlier Index		-1.25				-4.2 *	0.1
Sulfate	mg/L	57	50	50	45.3	47	44
Calcium	mg/L	23	128	128	49.5	< 0.5 *	51.1
Iron	mg/L		0.44	0.43	0.247	< 0.04 *	0.324

Well No. 2		6/7/84	6/8/84	6/26/84	2/5/98	6/28/99	8/17/99
pH		7.6	7.6	7.8		7.5	7.55
Total Dissolved Solids	mg/L	307	314	304		299	304
Alkalinity	mg/L	210	210	200		224	231
Chloride	mg/L	32	32	47		12.2	13.1
Hardness	mg/L	222	224	214	231	128	238
Langlier Index		0.25				0.1	0.2
Sulfate	mg/L	42	46	49	41.2	43	43
Calcium	mg/L	120	122	120	50.6	51.3	50.8
Iron	mg/L	0.4	0.4	0.3	0.32	0.346	0.239

* Well No. 1 was sampled in the treatment plant after the water softener. These numbers have been affected because of that.

Water containing the elevated levels of iron as shown in the above table can turn red upon exposure to the atmosphere or upon the addition of chlorine. A portion of the distribution system contains unlined cast iron pipes which can cause further red water problems. Common and frequent complaints prior the sequestering chemical addition were in water appearance, staining of fixtures, and occasional laundry staining.

The Hamlet of Madrid chose a sequestering chemical as a possible solution to their persistent red water problems. The specific sequestering chemical chosen was SeaQuest manufactured by AquaSmart. See attached product information and Material Safety Data Sheets. SeaQuest is a blended phosphate which stabilizes the iron and manganese in solution. Reportedly the chemical will dissolve tuberculation as well. Seaquest's dosage has been limited to 10 ppm by NYSDOH. The recommended dosage from the manufacturer was 2.0 ppm. The Town began with approximately 1.5 ppm dosage throughout the first two months. In March the dosage was increased to the manufacturer's recommended 2.0 ppm and has remained at that level.

Start-up of the SeaQuest chemical feed system began on January 14, 2000. Throughout the first six months of the SeaQuest trial period complaints from consumers were virtually non-existent. Only one red water complaint was received during the first six month trial period. The Town indicated that a change in the water system operations corresponded to the same time period that the complaint was received.

As indicated in the background section of this report many residents have individual cartridge filters installed in their homes to decrease the red color in the water. Throughout the trial period the Town noted a decline in the number of filter replacements that were necessary and the time between filter replacements has been increased.

The first hydrant flushing after start-up of the sequestering system occurred on March 13, 2000. The Town had recently read the water meters and discovered that more water meters than normal were not working. The manufacturer of SeaQuest was contacted. The manufacturer recommended raising the dosage to the 2.0 ppm that they had originally recommended and to flush the system. The system was flushed and the dosage rate was raised on March 14, 2000. During this hydrant flushing the town indicated that the water from the hydrants took less time to clear up, and the town did not receive any complaints of red water either during or after the flushing. Reportedly previous hydrant flushings caused numerous complaints even though they were done during the night at a time when minimal usage was occurring. Since the first flushing the Town has now gone to flushing the hydrants during their normal work hours because they have not been receiving complaints.

In mid-November 2000 several complaints were received. These complaints were not from red water but were described as small particles in the water which would settle out of the water. Again the Town noted that at the same time the complaints were received they had been having trouble with one of the well pumps. Reportedly, the pump would not run steadily causing agitation in the distribution system near the well pumps. The system was

flushed and no further complaints were received.

Attached please find a table showing SeaQuest levels for the six month trial period. The table contains maximum/minimum and average monthly chemical doses and the monthly average amount of water pumped.

CONCLUSIONS & RECOMMENDATIONS

Summary

Overall, consumer complaints have sharply declined since the start-up of the SeaQuest system.

Town has experienced decreased hydrant flushing duration and frequency. Complaints during flushing have also declined.

Individual cartridge filters at consumers homes require replacement less frequently.

Based upon the sodium, iron, and lead and copper results received to date all items are under the Maximum Contaminant Levels. We recommend that the Hamlet of Madrid continue the addition of SeaQuest and daily monitoring.