Water Treatment Plant Year-end Report for 2011

Water demand

The total influent volume of water drawn from the Assiniboine River for treatment was approximately 4.34% higher in 2011 than in 2010. 2011 had an influent volume of 6,597,251 m3, as compared to 6,322,605 m3 in 2010.

Excess water was required due to the draining the pretreatment process due to the high amount of sand and other material being trapped in the process system. This material was the result of the prolonged flooding on the Assiniboine River.

Treated effluent decreased by 4.2% as effluents were 5,664,551 m3 in 2011 as compared to 5,863,567 m3 in 2010.

The volume of water used internally for the treatment process in 2011 was 3.95% of the influent volume, as compared to 4.52% used in 2010. The lower percentage of process water is the result of better operation of the treatment process (sand filters, granular activated carbon filters and the under-drain system monitoring and reduced pretreatment down time) which allows for better backwashing with less water wasted.

Raw Water Quality

The raw water quality for the past year has high turbidity and hardness along with higher river flows due to extended flooding. The average raw water hardness for the winter months; January, February, March, October, November and December 2011, was 508 ppm. The raw water hardness average for the other six months was 371 ppm. The treated water average hardness was 244 ppm and 182 ppm for the respective periods. The 2010 yearly average hardness for Raw Water was 392 ppm and Treated Water was 200 ppm. The 2011yearly average hardness for Raw Water was 439 and Treated Water was 213 ppm. The increases were due to the extended flooding throughout 2011.

Turbidity peaks were coincident with the spring runoff, flooding and the draining of the Assiniboine River impoundment area in the fall. The Actiflo clarifier was able to reduce the high levels of turbidity to minimize the impact on the downstream treatment process. Removal of sand and silt from the impoundment area was scheduled for early 2012 and is proceeding until spring thaw.

Flushing of the Assiniboine River Channel, upstream of the dam. The silt and sand shown on the left side of photo to be removed in early 2012.

The flood water flows caused problems with heavy turbidity and sticks entering the pump well and disabling pumps. Large quantities of grass and other vegetation were carried in with the raw water causing the hydrocyclones in the Pretreatment Building to plug. Operator overtime and shift changes were required to service equipment around the clock to insure water production continued. The problems with the River impoundment area are being addressed by the Province and they are removing the silt and sand from the south side of the impoundment area. This will provide temporary reprieve from the overtime requirements and pump damage as they plan to remove more sediment over the next few years.

Silt removal

Distribution System Water Quality

Distribution testing for 2011 was completed on weekly basis for Total Coliforms and Escherichia Coli. All Drinking Water Regulation treatment parameters were met. Metals sampling and testing was conducted on bimonthly basis for the assessment of lead concentrations found in some household service lines. The samples were sent to an independent lab and all results forwarded, by the lab, to the Manitoba Water Stewardship Office of Drinking Water Officer for our area. The practice of running cold water for 2 to 3 minutes, following extended periods of non-use, and before consuming, is recommended for all homes with lead services. More information may be obtained from the City's web page.

Water Quality Monitoring and Analyses

The 2011 annual audit report from the Office of Drinking Water, as prepared by the Drinking Water Officer for the Portage la Prairie area, was submitted to the City in February 2012. Manitoba Water Stewardship and the City of Portage la Prairie will continue implementing testing changes at the Water Treatment Plant to enhance the water quality and will continue to work jointly with the local Drinking Water Officer.

The attached graphs for the Hardness shows the Raw Water was higher than the seasonal trend with higher hardness due to flooding throughout the year. There was a greater influence of ground water entering the river due to high water levels throughout the year. High hardness levels were prevalent during the latter part of the year and the effluent hardness rose accordingly. The low levels of hardness are shown during the spring runoff also.

The attached graph for the Turbidity shows the Raw Water peaks in the spring during run off and again in the fall during the reservoir maintenance drain down for service work on the Dam. The effluent turbidity follows the yearly trend also. There were several peak turbidity events that followed rain fall entering the river flow. Pump damages occurred during the flood period due to sand and debris entering the raw water chamber. Higher than normal turbidities throughout the year with higher than normal river flows caused variable operational changes needed to maintain water quality for consumers.

The graph for the effluent pH shows some peaks above 8.5 due to over-feed of sodium hydroxide. The raw water pH tends to follow seasonal trends for highs and lows and is adjusted with Sodium Hydroxide to maintain positive Langlier Index to prevent metal corrosion and metals from leaching into the water due to low pH.

The Graph for Fluoride shows a wide range of feeds due to product feed amounts. The bulk product is read by level and then converted in amount of product feed. The operator's estimate can be high or low and result in the difference from mass feed rate to test results. The test results are from the morning sample and represent the reading in the effluent water at that time and not as a daily average. Cost of chemical testing negates the continuous sampling over a 24 hour time line. The average level of Fluoride feed was reduced late in 2009 to 0.7 mg/L, which has been deemed optimum by Health Canada, and we continued to feed at the lower rate during 2011. Low feeds of the Fluoride were temporary due to container changes.

At present we are exceeding the Tri-halomethane (THM) regulation for our drinking water due to high runoff and levels of dissolved carbon in the Assiniboine River. The taste and odor is removed by the activated carbon but shows higher levels of other total organic carbon (TOC) that could react with chlorine to form THM'S. The graphs tend to show a problem that might be in the chemistry of the raw water that could affect the Granular Activated Carbon (GAC) by shortening the effective life of the product. The effective removal of THM-forming compounds is limited. The expected life rating of the GAC media life is well below the original anticipated three years, but the replacement of the GAC media annually, or more frequently, would be cost prohibitive. Monitoring of the raw and treated water will continue in an effort to detect problems within the raw water that would cause this. Further studies with chemical treatment alternatives will continue in 2012 to help find a solution for the elevated THM's.

The graph for the chlorine feed shows low free chlorine concentration in April and December due to component failure. The feed units were corrected and levels returned to normal within 5 hours. The effluent chlorine levels are higher as it enters the distribution system. Weekly sampling of the distribution areas for chlorine residual was done and samples sent to an independent lab for analyses and reporting to the Drinking Water Officer and Water Plant Management. All samples were shown to be free of Total Coliform and Escherichia Coli.

Flooding of the Assiniboine River gave concerns to water levels reaching the Water treatment Plant. Staff from various areas of the City of Portage la Prairie took steps to build dikes and use other means to prevent water from back flowing into the treatment processes. All pumps and backup gas units were checked and located in areas for quick operation if required. The gas pumps were not required as ice moved freely downstream and water levels were maintained at slightly above bank level near the Water treatment Plant.

Major Maintenance

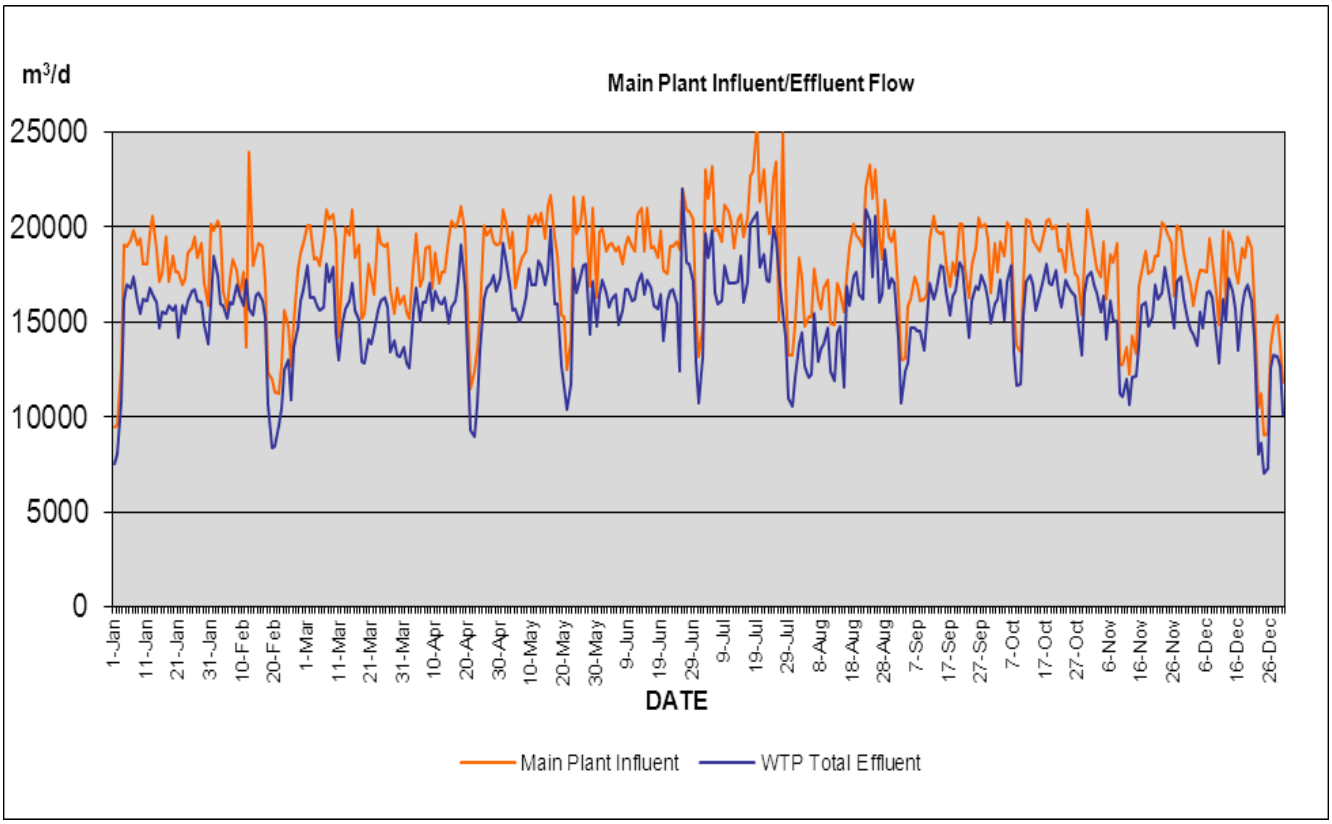
Restoration work on the number 1 clarifier was finished in early February 2011. The number 2 clarifier had the gear driven drives changed over to chain drives which resulted in less structural vibration and noise in the plant.

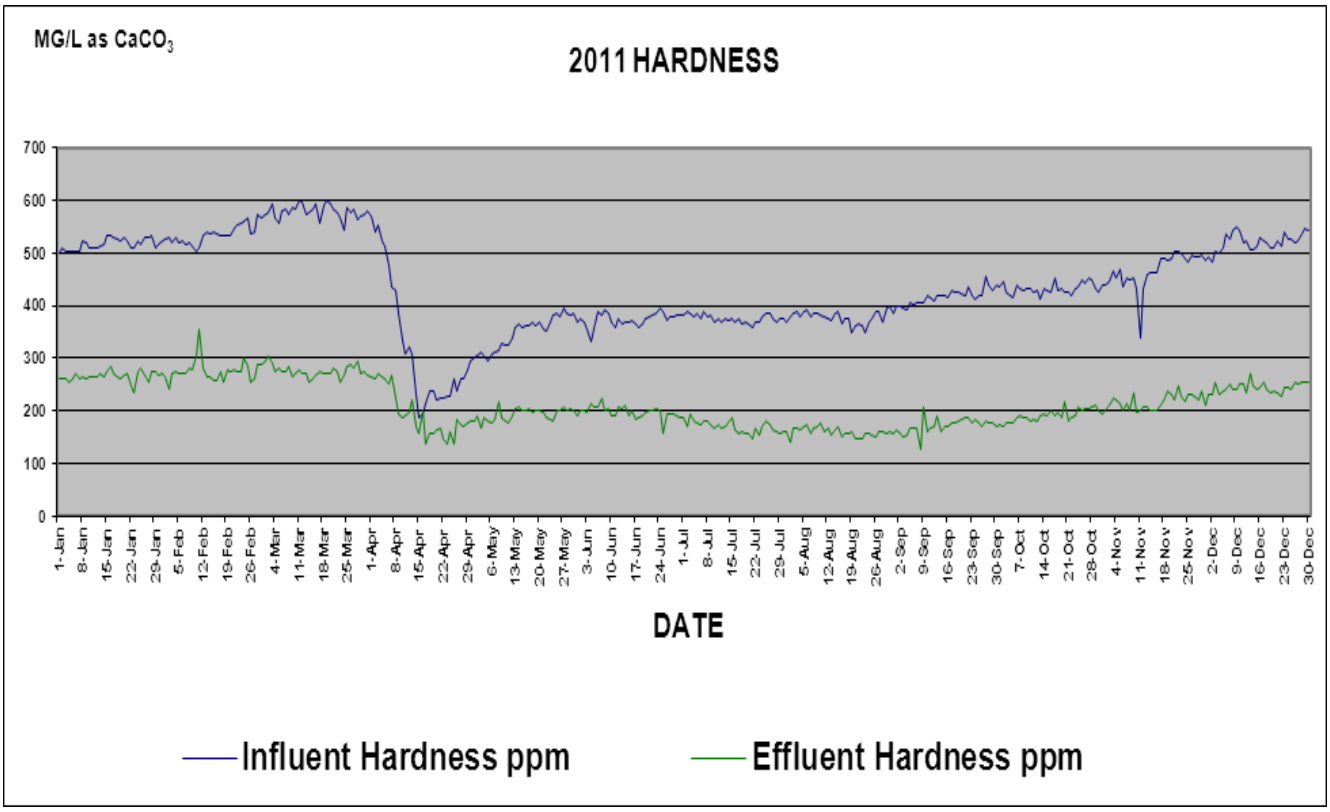
The plant was kept in operation during maintenance work and plant shutdowns were done in a manner so as to keep the consumers supplied with water.

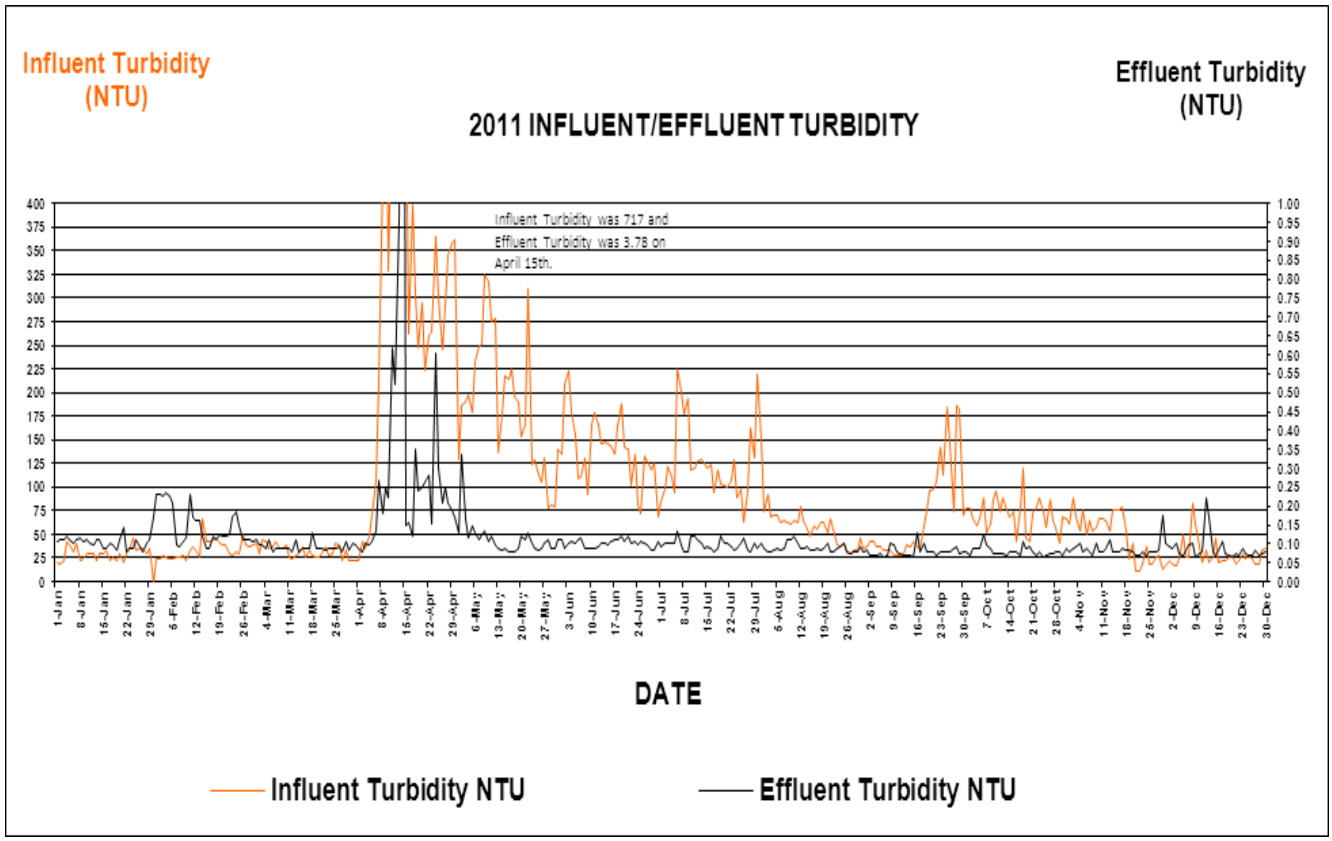
Operating staff will continue to abide by all Government operational requirements and work with the local Drinking Water Officer to insure the best quality of water for all persons.

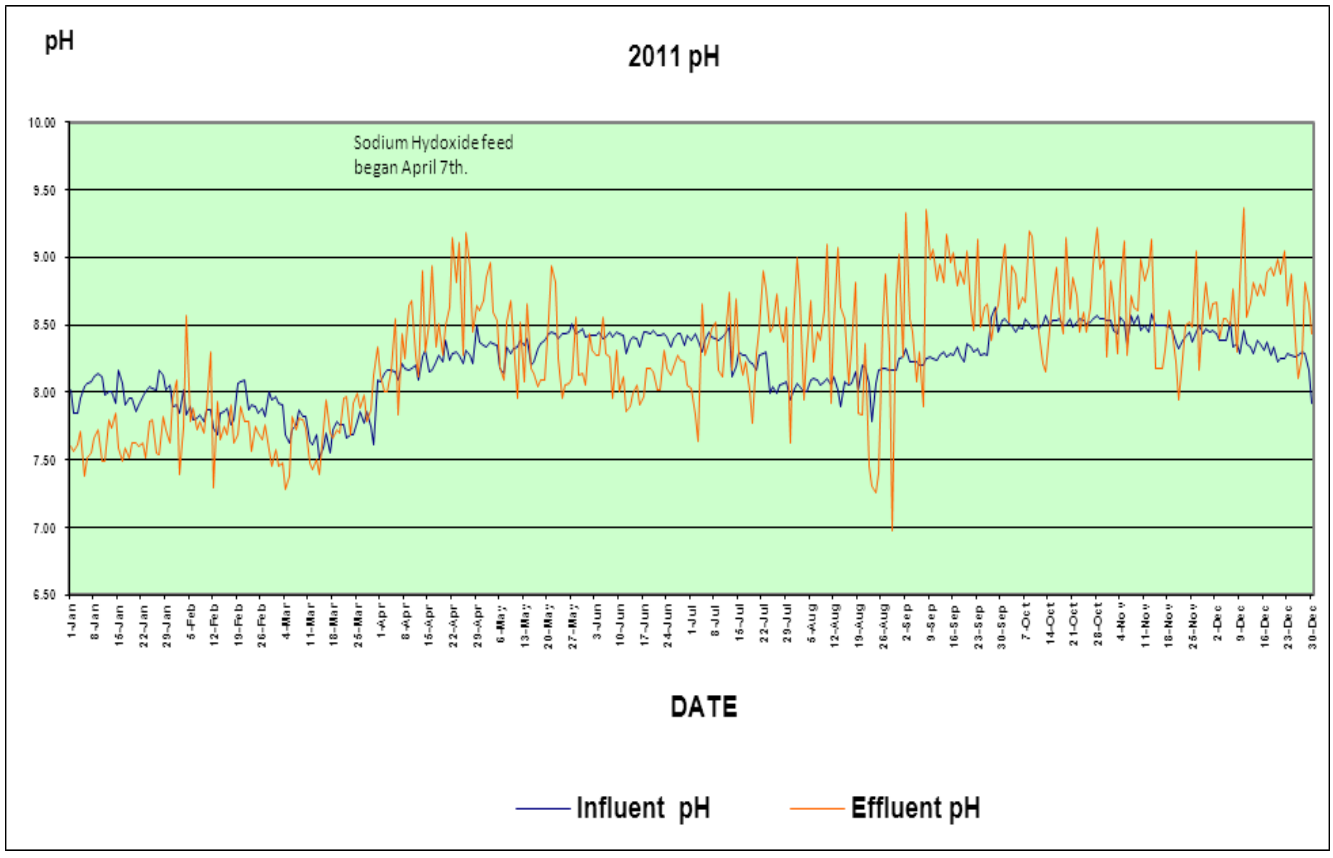
City of Portage la Prairie Water Treatment Plant - 2011 Annual Data Summary

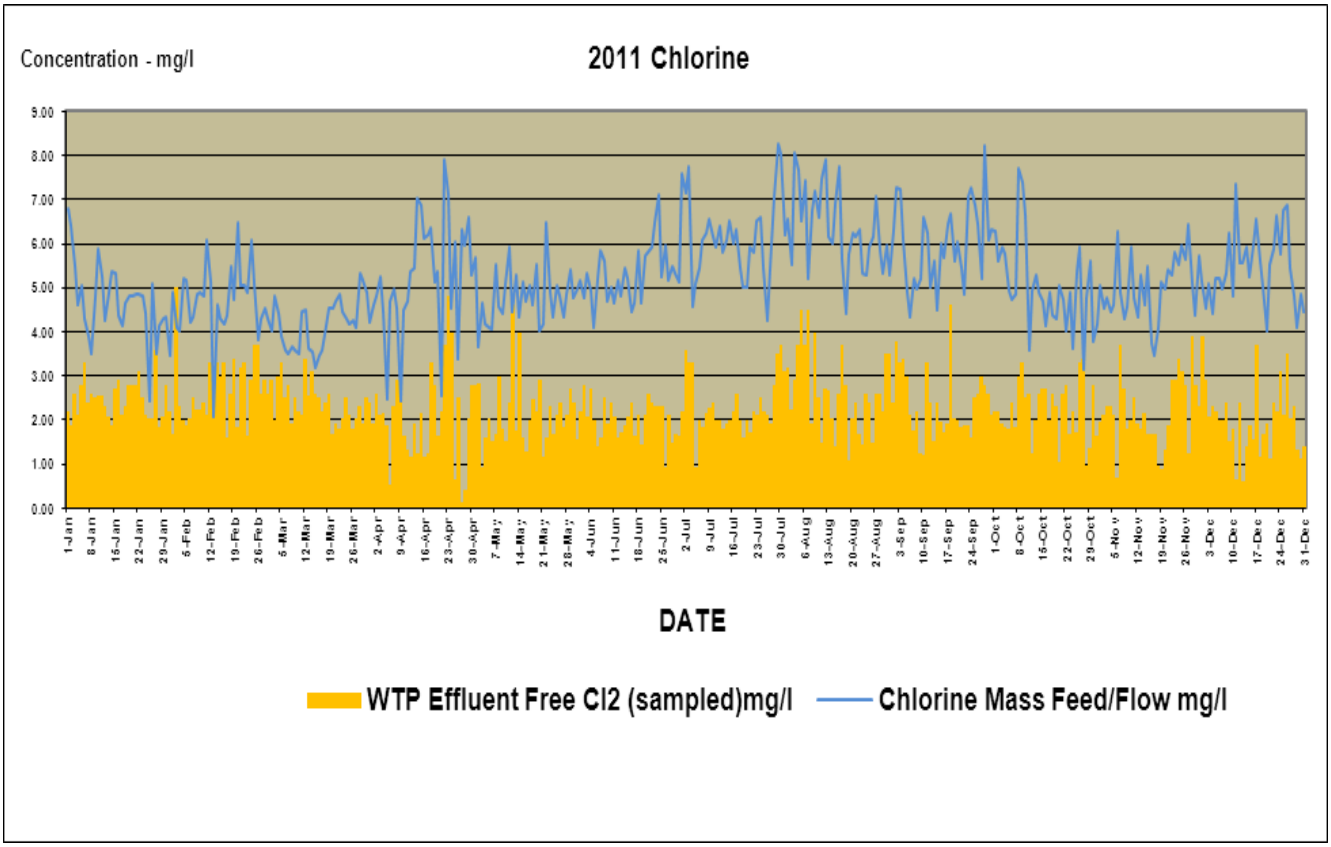
	Influent Hardness ppm	Effluent Hardness ppm	Influent Turbidity NTU	Effluent Turbidity NTU	Influent pH	Effluent pH	WTP Effluent Free Cl_2 (sampled)mg/l	W.T.P. Effluent Fluoride (Sampled) mg/l	WTP Reservoir Influent Flow m3	Reservoir Effluent less process water m3
TOTAL ANNUAL									6,207,050	5,664,551
AVERAGE	**439**	**213**	**95**	**0.12**	**8.2**	**8.3**	**2.3**	**0.8**	**17,006**	**15,519**
PEAK DAY	600	356	717	3.78	8.6	9.4	5.0	1.4	25,730	22,032
90th PERCENTILE	553	274	214	0.16	8.5	8.9	3.3	1.0	19,808	17,882
MEDIAN	428	202	61	0.09	8.3	8.3	2.2	0.8	17,580	16,075
WINTER AVG	508	244								
SUMMER AVG	370	182								

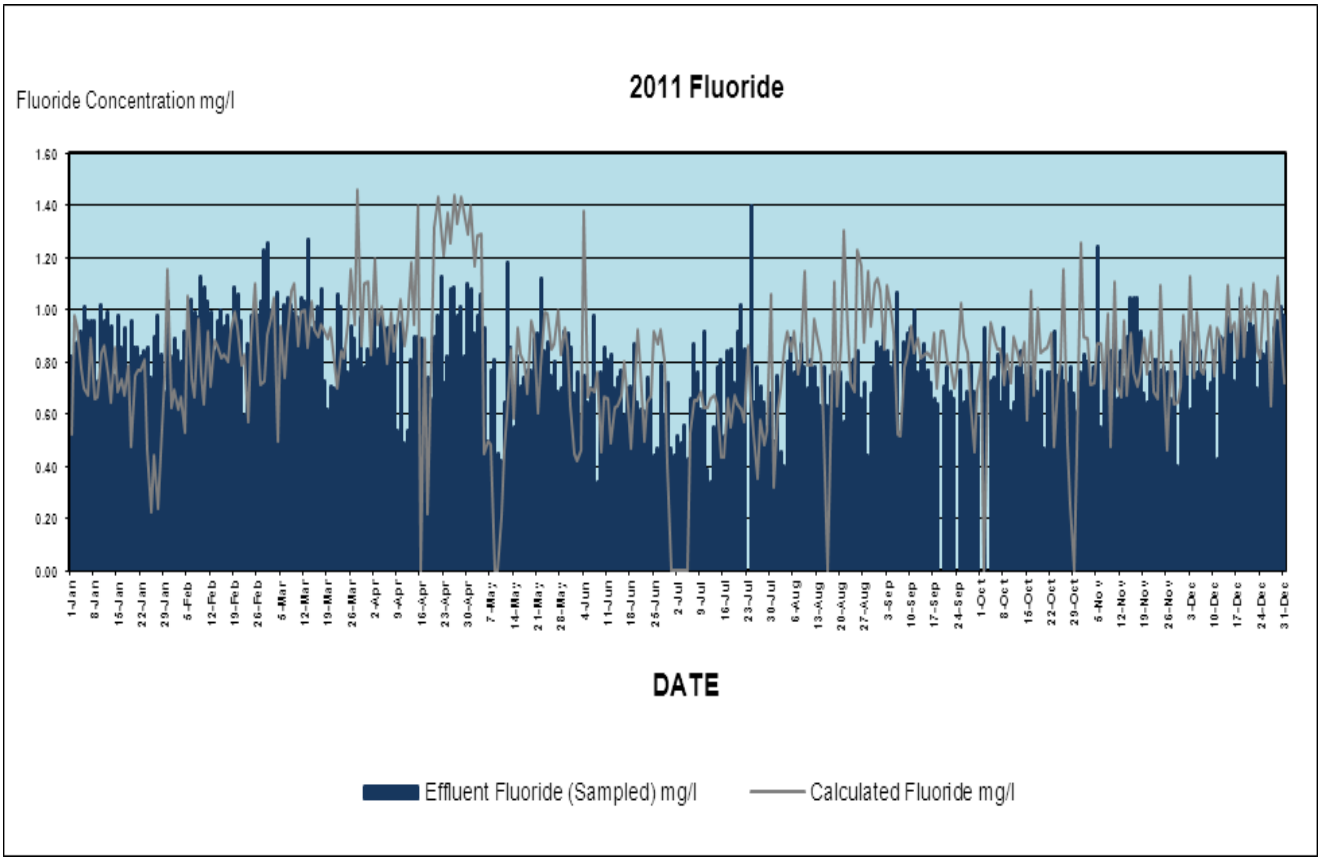

m3/d
Main Plant Influent/Effluent Flow
25000
20000
15000
10000
5000
0
1-Jan
11-Jan
21-Jan
31-Jan
10-Feb
20-Feb
1-Mar
11-Mar
21-Mar
31-Mar
10-Apr
20-Apr
30-Apr
10-May
20-May
30-May
9-Jun
19-Jun
29-Jun
9-Jul
19-Jul
29-Jul
8-Aug
18-Aug
28-Aug
7-Sep
17-Sep
27-Sep
7-Oct
17-Oct
27-Oct
6-Nov
16-Nov
26-Nov
6-Dec
16-Dec
26-Dec
DATE
Main Plant Influent
WTP Total Effluent

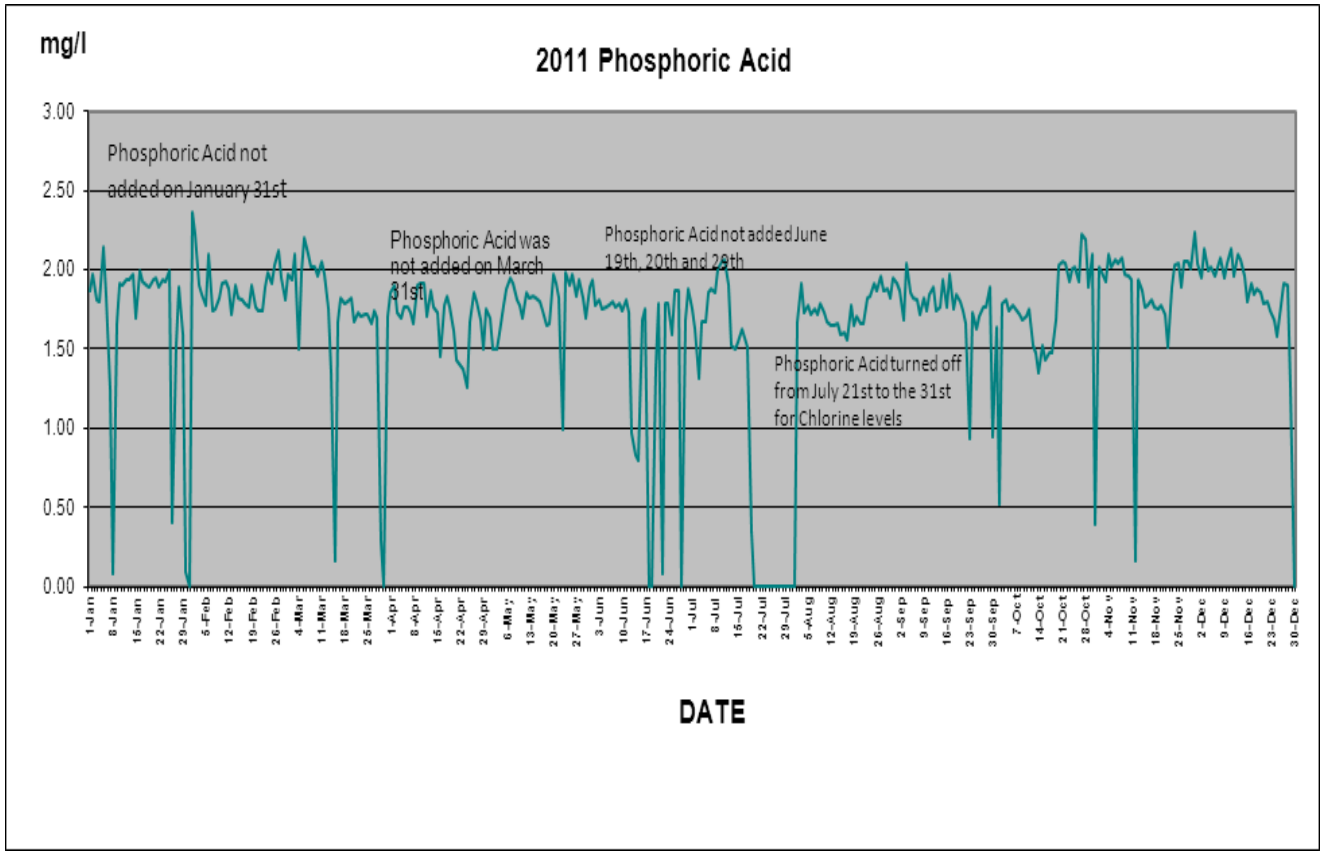

MG/L as CaCO3
2011 HARDNESS
700
600
500
400
300
200
100
0
1-Jan
8-Jan
15-Jan
22-Jan
29-Jan
5-Feb
12-Feb
19-Feb
26-Feb
4-Mar
11-Mar
18-Mar
25-Mar
1-Apr
8-Apr
15-Apr
22-Apr
29-Apr
6-May
13-May
20-May
27-May
3-Jun
10-Jun
17-Jun
24-Jun
1-Jul
8-Jul
15-Jul
22-Jul
29-Jul
5-Aug
12-Aug
19-Aug
26-Aug
2-Sep
9-Sep
16-Sep
23-Sep
30-Sep
7-Oct
14-Oct
21-Oct
28-Oct
4-Nov
11-Nov
18-Nov
25-Nov
2-Dec
9-Dec
16-Dec
23-Dec
30-Dec
DATE
Influent Hardness ppm
Effluent Hardness ppm


Influent Turbidity (NTU)
2011 INFLUENT/EFFLUENT TURBIDITY
Effluent Turbidity (NTU)
Influent Turbidity was 717 and Effluent Turbidity was 3.78 on April 15th.
DATE
Influent Turbidity NTU
Effluent Turbidity NTU


pH
2011 pH
Sodium Hydoxide feed began April 7th.
DATE
Influent pH
Effluent pH


2011 Chlorine
Concentration - mg/l
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1-Jan
8-Jan
15-Jan
22-Jan
29-Jan
5-Feb
12-Feb
19-Feb
26-Feb
5-Mar
12-Mar
19-Mar
26-Mar
2-Apr
9-Apr
16-Apr
23-Apr
30-Apr
7-May
14-May
21-May
28-May
4-Jun
11-Jun
18-Jun
25-Jun
2-Jul
9-Jul
16-Jul
23-Jul
30-Jul
6-Aug
13-Aug
20-Aug
27-Aug
3-Sep
10-Sep
17-Sep
24-Sep
1-Oct
8-Oct
15-Oct
22-Oct
29-Oct
5-Nov
12-Nov
19-Nov
26-Nov
3-Dec
10-Dec
17-Dec
24-Dec
31-Dec
DATE
WTP Effluent Free Cl2 (sampled)mg/l
Chlorine Mass Feed/Flow mg/l


2011 Fluoride
Fluoride Concentration mg/l
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1-Jan
8-Jan
15-Jan
22-Jan
29-Jan
5-Feb
12-Feb
19-Feb
26-Feb
5-Mar
12-Mar
19-Mar
26-Mar
2-Apr
9-Apr
16-Apr
23-Apr
30-Apr
7-May
14-May
21-May
28-May
4-Jun
11-Jun
18-Jun
25-Jun
2-Jul
9-Jul
16-Jul
23-Jul
30-Jul
6-Aug
13-Aug
20-Aug
27-Aug
3-Sep
10-Sep
17-Sep
24-Sep
1-Oct
8-Oct
15-Oct
22-Oct
29-Oct
5-Nov
12-Nov
19-Nov
26-Nov
3-Dec
10-Dec
17-Dec
24-Dec
31-Dec
DATE
Effluent Fluoride (Sampled) mg/l
Calculated Fluoride mg/l


mg/l
2011 Phosphoric Acid
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Phosphoric Acid not added on January 31st
Phosphoric Acid was not added on March 31st
Phosphoric Acid not added June 19th, 20th and 28th
Phosphoric Acid turned off from July 21st to the 31st for Chlorine levels
1-Jan
8-Jan
15-Jan
22-Jan
29-Jan
5-Feb
12-Feb
19-Feb
26-Feb
4-Mar
11-Mar
18-Mar
25-Mar
1-Apr
8-Apr
15-Apr
22-Apr
29-Apr
6-May
13-May
20-May
27-May
3-Jun
10-Jun
17-Jun
24-Jun
1-Jul
8-Jul
15-Jul
22-Jul
29-Jul
5-Aug
12-Aug
19-Aug
26-Aug
2-Sep
9-Sep
16-Sep
23-Sep
30-Sep
7-Oct
14-Oct
21-Oct
28-Oct
4-Nov
11-Nov
18-Nov
25-Nov
2-Dec
9-Dec
16-Dec
23-Dec
30-Dec
DATE