PLANT PROFILE:

Dawson Creek Water Treatment Plant

The City of Dawson Creek's water source comes from the Kiskatinaw River which is located in the Kiskatinaw watershed, consisting of over 2800km^2 of land. The headwaters are located at Bearhole Lake ending with the Kiskatinaw River which winds itself to the location where the raw water is pumped from. This location is approximately 20km west of Dawson Creek. Over the years the watershed has seen increased pressures from logging, ranching and oil and gas activity but with active support, networking with many agencies, and with watershed stewardship; the city is working to ensure that the Kiskatinaw River will remain a viable resource for our community for many years to come.

Hansen Reservoir
(100 Million US Gal.)

Hart Reservoir
(6 Million US Gal.)

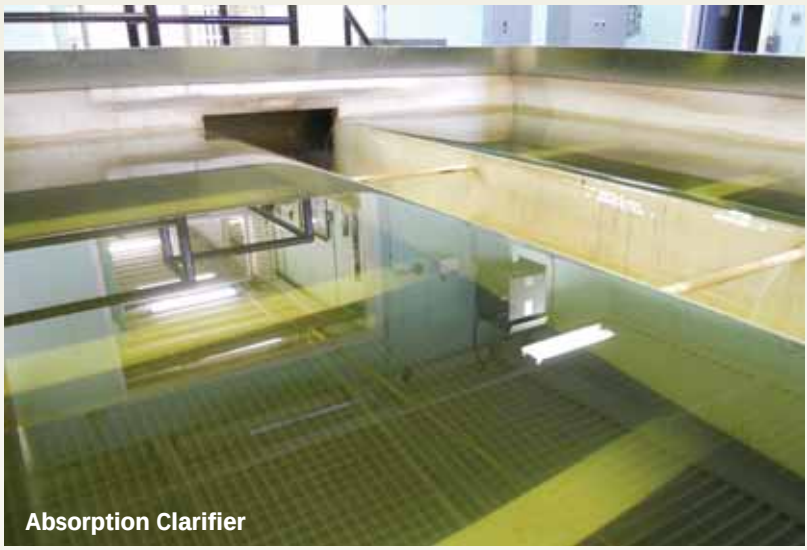
The raw water is pumped into one of five raw water reservoirs to allow for particle separation. With a total capacity of 186,000,000 US Gallons, water is able to settle to a lower turbidity prior to it entering the water treatment plant. Turbidity from the river can range from 10 NTU to 150 NTU within a few hours and remain high for a period of time but we have the option of shutting our pumps due to our significant storage.

Trail Reservoir
(80 Million US Gal.)

Main Clarifier

CLARIFIERS

Raw water enters the EOCP Level IV Water Treatment by gravity feed from Trail Reservoir. The water chemistry entering the WTP has high color, NTU, hardness, and taste and odors depending on the time of year. The flow is then split into 2 trains – one for the main clarifier and one for the adsorption clarifier. The main clarifier consists of tube settlers which is only used approximately 20% of the time as most of our water is run through the adsorption clarifier. After the water has been processed through the clarifiers, the water is mixed and distributed equally over the filters.



Absorption Clarifier

In 1991, the WTP was upgraded with the addition of the adsorption clarifier. The adsorption clarifier was implemented because of its unique function. The clarifier involves no settling steps. The adsorption clarifier uses the principle of the adsorption of solids onto a solid surface. This process does not depend on the formation of a large floc and can use less than 10-50% of the raw water chemicals that are required in other treatment plants. The addition of raw water chemical is controlled via aquaritrol which feeds the minimum level of coagulant to achieve optimum coagulation. The adsorption clarifier is a very simple piece of the process in terms of operations that incorporates mixing, flocculation, and the ability of solids removal in one process. You can note that conventional water treatment requires three stages for this process to take place, but with the adsorption clarifier it is an all in one process. Flocculation takes place in the adsorption

the City of Dawson Creek
BRITISH COLUMBIA
"the Capital of the Peace"


Filter Banks 5 and 6

clarifier as the coagulated water passes through the media and interfaces with the vast number of previously attached solids over a high surface area. Both flocculation and solids removal efficiency is enhanced when solids attach to the media particles. The solids removal is accomplished by attachment to the 1.2 m deep solid adsorption media, (polyethylene beads) and also to the previously removed solids. The media consists of large grains and it has the capacity to store great quantity of solids with little head loss. After a specific amount of flow has passed through the adsorption clarifier a backwash is automatically initiated. The backwash process which somewhat resembles the backwash process of a mixed or dual media filter takes approximately 10 minutes.

FILTRATION

Water is then gravity fed into one of three banks of mixed media filters. Bank A and B filters are the original filters of the water Treatment Plant. In 2000, the WTP was upgraded and two additional filters were added into the process. The new filters are Bank C of the process. With the addition of these filters, the WTP water quality was substantially increased. Due to the raw water chemistry, the City of Dawson Creek had to look at ways of reducing taste, odors, TOC, and THM limits. In 2003 the City of Dawson Creek went even further and installed a treatment process referred to as GAC treatment (Granular Activated Carbon). The process has been used exclusively for taste and odor control. The theory behind this process involves adsorption – a physical/chemical activity leading to accumulation of water impurities at the solid-liquid interface. The GAC process helps us meet the ever increasing water regulated guidelines, and assure we are distributing safe, potable, and esthetically pleasing water to our community. The GAC is divided into two trains which allow isolation for maintenance. Every three to six months the GAC is backwashed and the media is measured to ensure carry over loss is minimal.


GAC Treatment

DISINFECTION

As the water is treated through the physical process and eventually through the GAC, the water is then disinfected with both UV and hypo chlorination before is it pumped into the distribution system. The water passes through two in-line UV reactors which alters the DNA of the bacteria. Each reactor is designed for a flow of roughly 1.5M USGD with consistent UVT readings >74%. With recent optimization of filter performance, we have been able to achieve higher UVT readings nearing 80%. To carry a residual, 12% sodium hypochlorite is added to try and maintain a finished clear well Cl2 residual of about 1 mg/l prior to it leaving the Water Treatment Plant.

continues on page 6

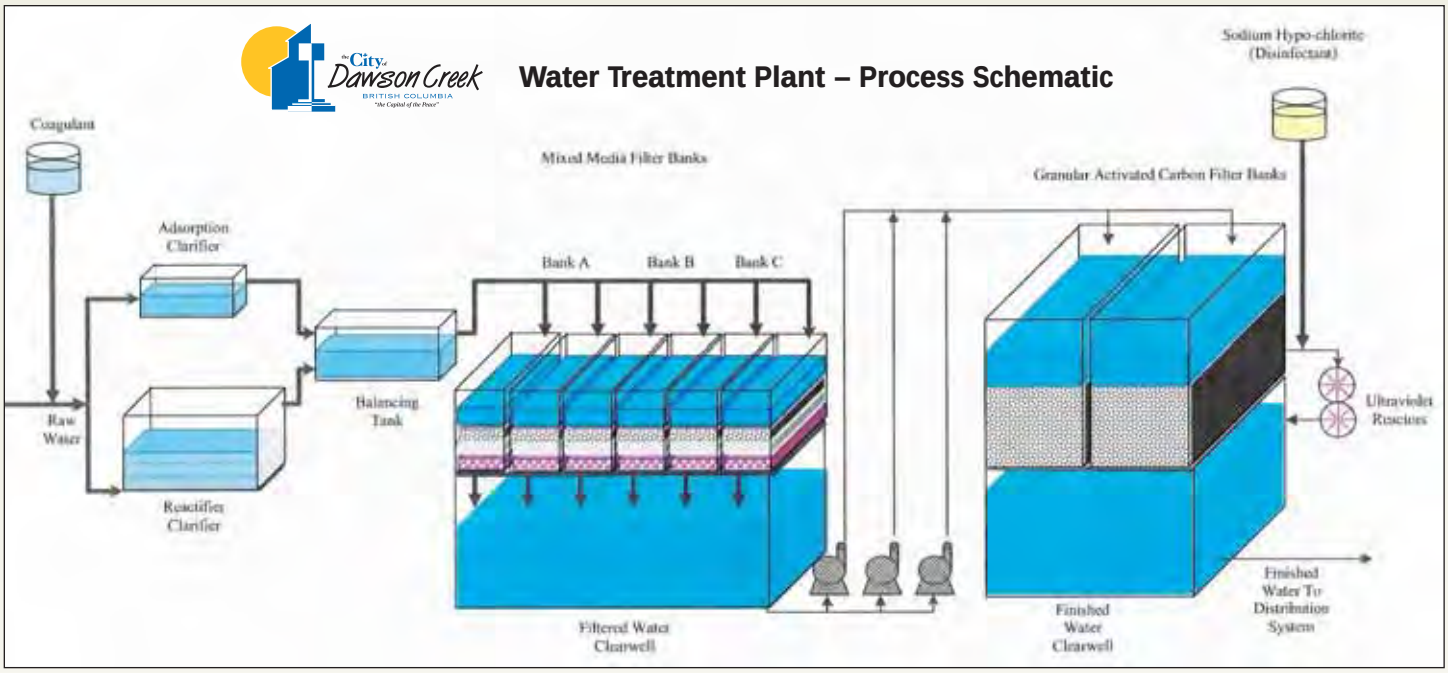
Operator Profiles Dawson Creek

Kevin Walters, Dawson Creek's newest Operator

The City of Dawson Creek has a unique situation with operation of two state-of-the-art treatment facilities; the water treatment plant described in the attached article and a wastewater treatment plant that has been created through a joint partnership with Shell Canada who will reuse the highly treated effluent up to 50 km away. By cross-training their staff, this relatively small community has a multifunctional operations crew including their manager that hold WWT-I to WWT-III certificates with these same Operators holding WT-OIT to WT-III. They also hold certificates in Water Distribution and Wastewater Collection. The operations team includes **Kerry DeVuyst** (#1223) who has been with the City for over thirty years and holds WWT-III, WTIII, & WWC-II; **John Kalinczuk** (#3275 – WWT-II, WT-III, WD-IV), a graduate of Okanagan College Water Quality Technology Program, who recently joined the City after ten years in Salmon Arm; **Mike Linthorne,** (#7752 - WT-OIT, WD-OIT) a graduate of Thompson Rivers University, Water Treatment Technology Program and the University of Northern BC; and their newest Operator, **Kevin Walters** (#7894) holds a WWT-I certificate after many years of work in related fields including as a red seal welder, power engineer, and Registered On-site Wastewater Practitioner (ROWP).

DISTRIBUTION

Once the water has been processed, the water is either pumped from the Water Treatment Plant or Gravity fed into the EOCP Level IV Water Distribution System. The City of Dawson Creek currently has a single reservoir with a capacity of 1,836,358 US Gallons = 6,941,433ML. We try to maintain an operating capacity of about 70% for emergency situations. Operating within this level allows the Water Treatment Plant to continually process water without having the WTP cycle on and off. This spring we are installing a submersible mixer that is permanently attached to our treated, in town, Parkhill Reservoir floor for enhanced mixing and Cl2 residuals. We also supply water to the Village of Pouce Coupe which has a population of about 1000 people. Last year a new treated water reservoir with constant mixing was brought on line for the residences of Pouce Coupe to provide better quality water, fire supply and storage. All testing performed relating to the distribution system is within the guidelines and is done bi-weekly. Quarterly analysis of minerals, THM and HAA's are submitted as well.



Water Plant Information

Main Clarifier Volume	136,906 US Gallon Capacity – 1200 GPM max. clarification with sludge blanket
Adsorption Clarifier	Capacity – 1,500 US GPM / 2,000 MPG when high (NTU > 24)
Filters	4 Filters – 12'×13' = 156ft2/filter = 624 ft^2 total surface area 2 Filters (New) – 12'×16' = 192ft^2 each x 2 = 384 ft2 total filter area *Total Filter Surface Area = 1008 ft^2*
Clear Well	Filtered Clear Well #1 = 78,000 US Gallons Filtered Clear Well #2 = 70,000 US Gallons *Total Filtered Volume = 148,000 US Gallons*
Finished Clear Well Volume	315,000 US Gallons

Water Quality Data

Avg. Raw Water NTU Entering WTP	4NTU
NTU After Filtration	< 0.2NTU
NTU After GAC Treatment	< 0.05NTU
Chemical Dosing	7 – 8.5mg/l Clear PAC
Colour – Raw Water	> 50 color units
Colour – Finished Water	< 7 color units
PH	7.8 – 8.5pH
Hardness	> 200
Average Daily Flow – Winter	1.8 million US Gal/day = **6.8MLD**
Average Daily Flow – Summer	2.5 – 2.8 million US Gal/day = **9.4 – 10.5MLD**

— Thanks to John Kalinczuk, Water Resource Manager, City of Dawson Creek