



TOWN OF LAKE COWICHAN WATER TREATMENT PLANT



December 2020 Operations Performance Report



December Highlights

- Plant continued to achieve filtered water turbidity below 0.30 NTU. Four multi-day rain and one snow events occurred during the month.
- Air-locking of the coagulation system began on December 13 and reoccurred throughout month requiring corrective action by operator to prime the system. Considerations being made to modify the system for January:
 - Inspect the tank
 - Inspect the foot valve
 - Install a flooded suction line to the pumps.
- ESC took away computer monitoring the HVAC system for repair.

Timeline

Tuesday, December 1 – Discussion with Stantec regarding outstanding plant deficiencies.

Thursday, December 3 – Replaced tube for Soda Ash peristaltic pump P-641.

Tuesday, December 8 – Monthly testing conducted. Aluminum is 0.264 mg/L which is above the 0.1 mg/L as stipulated in the Operating Permit.

Sunday, December 13 – Primed coagulant pumps to remove air-lock.

Thursday, December 14 – Results from monthly aluminum test came in above the 0.1 mg/L. Results from November came in at 0.157 mg/L. Will monitor zeta testing to maintain -16 mV to minimize aluminum addition in water from PAC. Will begin testing aluminum in raw water for January.

Thursday, December 17 – Technician from ESC (Alan) here on site to look at HVAC. Took computer away to diagnose issue.

Monday, December 21 – Heavy snowfall. Power outage.

Thursday, December 24 – Primed coagulant pumps to remove air-lock. Plant had been filtering to waste in early morning resulting in higher inflow to the lagoon. Both filter running again by 08:39. Replaced backflow preventor for the polymer system.

Friday, December 25 – Reset the system for UV-311.

Wednesday, December 30 – Dave cleaned the raw water turbidity analyzer from 13:00 to 13:50. Further reduced coagulant as heavy rains had passed.



Performance Standards

The Operating Permit for the Town of Lake Cowichan Water System dated October 21, 2020 stipulates the following performance requirements:

PARAMETER	GUIDELINE
Turbidity	≤ 0.3 NTU in ≥ 95% of samples
	Never to exceed 1 NTU
<i>Giardia</i> and <i>Cryptosporidium</i>	2.5-Log (99.7%) removal coagulation, flocculation and filtration
	1-Log (90%) inactivation via UV
Viruses	1-Log (90%) removal coagulation, flocculation and filtration
	3-Log (99.9%) inactivation via UV
Free Available Chlorine	Sufficient for CT _{CALC} and not to exceed 4.0 mg/L
Trihalomethane (THM)	≤ 0.100 mg/L
Haloacetic Acid (HAA)	≤ 0.080 mg/L
Total Aluminum	≤ 0.1 mg/L
pH	Be between 7.0 and 10.5
Microcystin-LR	≤ 1.5 µg/L

Calculate *Giardia lamblia* log inactivation

Table 1 - 3-log inactivation of *Giardia lamblia* (designated as CT_{99.9})

Chlorine Conc. (mg/L)	Temperature 15°C						
	pH						
	≤ 6.0	6.5	7.0	7.5	8.0	8.5	9.0
≤ 0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156

Conclusion: Our retention time of 364.8 minutes • mg/L is 4.1-fold that as required for 3-Log removal of *Giardia lamblia* as per Table 1 above.

Table 2 - 4-log inactivation of viruses (designated as CT_{99.99})

Temperature (°C)	pH	
	6-9	10
0.5	12	90



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5	8	60
10	6	45
15	4	30
20	3	22
25	2	15

Conclusion: Our retention time of 364.8 minutes • mg/L is 61-fold that as required for 4-Log virus removal as per Table 2 above.

Water Quality Results

Monthly Testing Results

	Al- (mg/L)	TN (mg/L)	TP (µg/L)	Microcystin (µg/L)	THM (µg/L)	HAA (µg/L)
MAC	0.10				100	80.0
October (27)	0.049	0.047	4.70	0.06	20.4	10.71
November (24)	0.157			-		
December	0.264	0.38	2.47	-		

Discussion on Aluminum

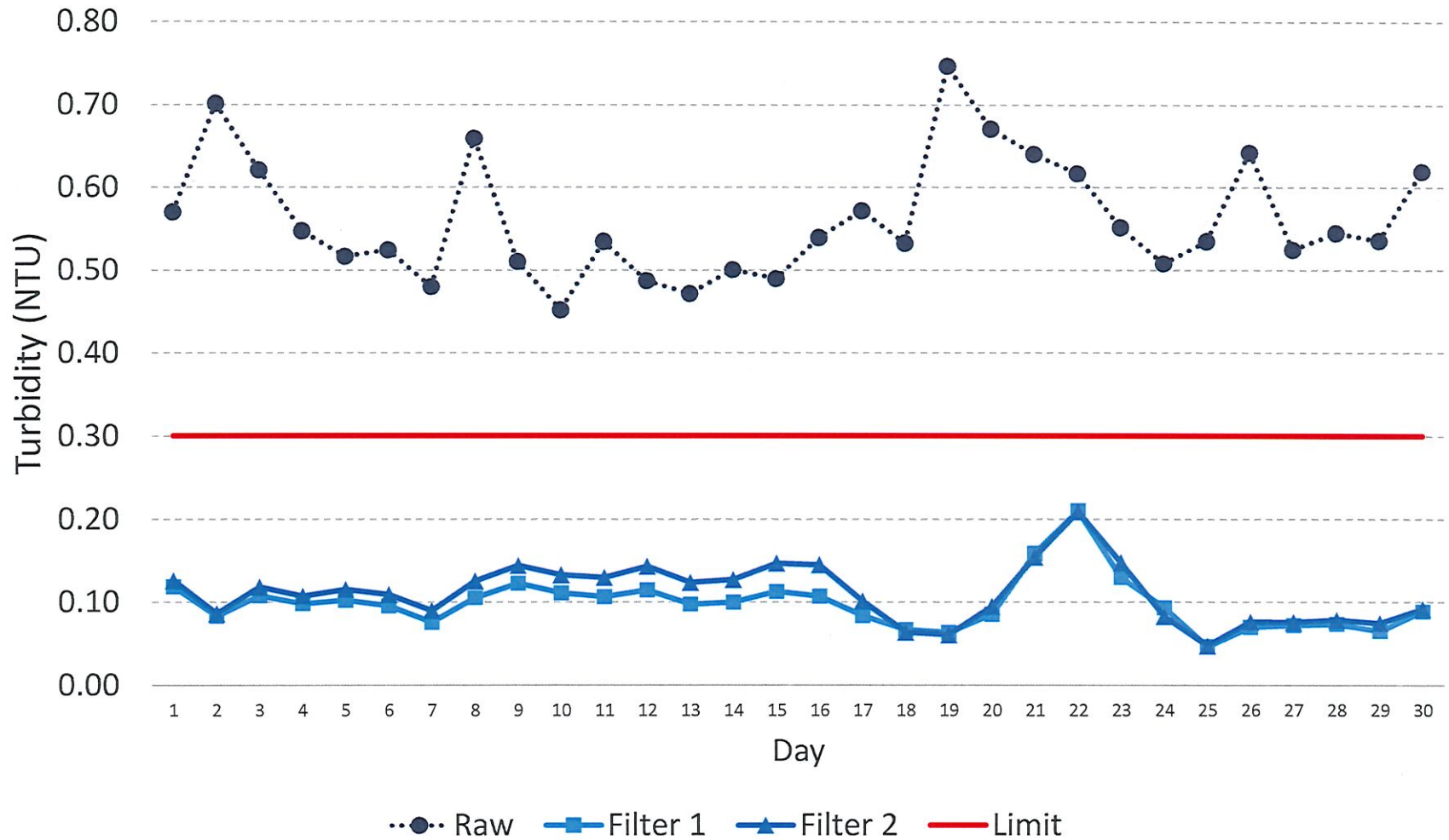
Aluminum results are increasing above the maximum acceptable concentration (MAC) as stipulated in the Operating Permit. The coagulant used in the Town of Lake Cowichan water treatment plant is polyaluminum chloride (PAC) which uses aluminum as the positive charge in the coagulation process to achieve low turbidity.

Zeta potential tests are used to maintain coagulation dosages at the low end of the effective curve. For the month of December a zeta potential of -16 mV was targeted. A lower zeta potential results in higher turbidity.

Beginning in January, accompanying raw water samples will be taken to determine the background concentration of aluminum from Cowichan Lake.

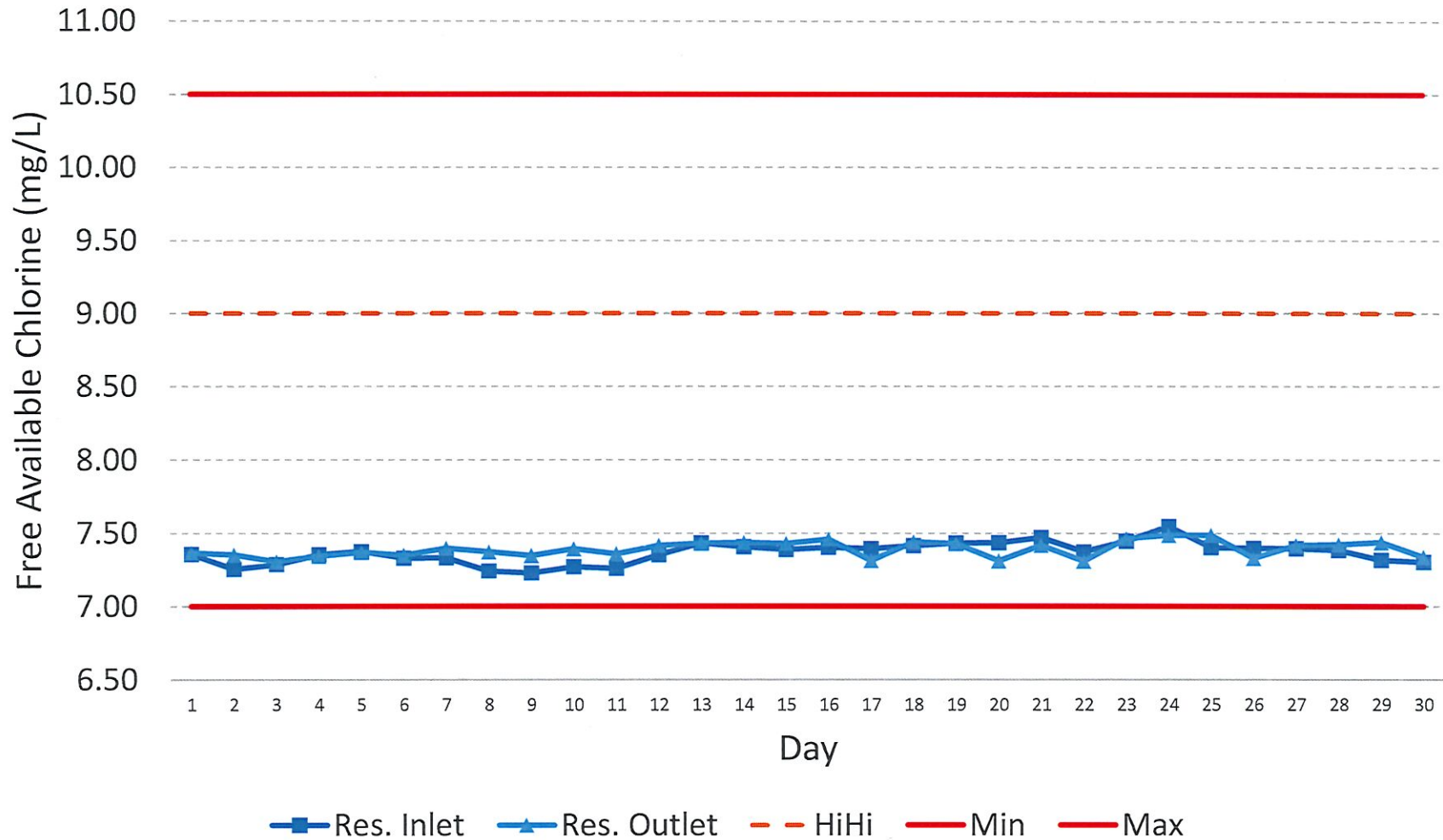
Turbidity (Dec 2020)

Source: SCADA Daily Averages



Reservoir pH (Dec 2020)

Source: SCADA Daily Averages



Total Precipitation (Dec 2020)

Source: Environment Canada - North Cowichan Station

