

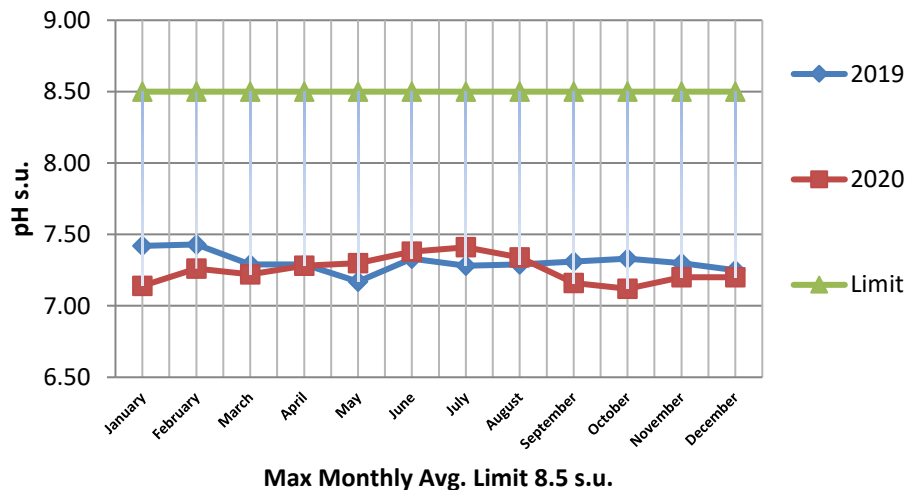
Annual Assesment of Flow and Waste Load for the City of Moses Lake Larson WWTP, Permit No. ST 8024

January 2020 to December 2020

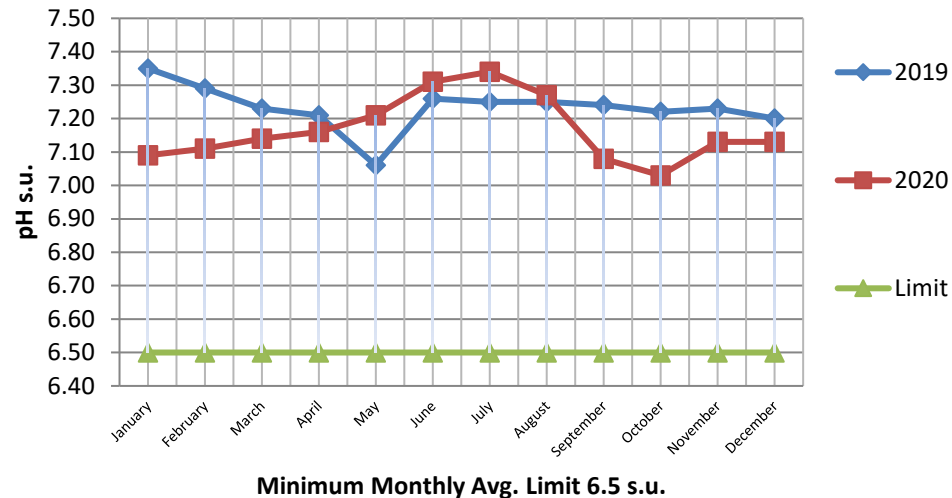
	Effluent Monthly Averages																	
	pH s.u.		CBOD5				TSS				TFDS	TKN as N	Nitrate	Ammonia	TN as N	DO	TEMP	Fecal
	Avg. Monthly Max	Avg. Monthly Min	MG/L Daily Max	MG/L Average	lbs/day Average	% REM	MG/L Daily Max	MG/L Average	lbs/day	% REM	MG/L Daily Max	MG/L	MG/L Daily Max	MG/l NH3 as N	MG/L Daily Max	MG/L	DEG. F	CFU/100 ml Daily Max
January	7.14	7.09	8	4	10	99	8	4	9	99	316	1.70	2.62	0.26	3.52	4.00	54	7
February	7.11	7.06	6	5	13	98	8	6	15	98	318	1.70	<0.66	0.27	<2.16	3.88	56	15
March	7.22	7.14	5	3	8	99	4	2	6	99	350	1.50	<1.29	0.38	<2.39	3.47	56	22
April	7.28	7.16	8	5	11	98	8	5	12	98	318	1.20	<0.86	0.16	<1.96	3.80	63	9
May	7.30	7.21	7	4	10	98	15	6	14	98	307	1.20	<0.21	0.17	<1.41	3.89	69	14
June	7.38	7.31	2	2	4	99	2	1	3	99	313	1.10	<0.55	0.12	<1.46	3.81	75	2
July	7.41	7.34	3	2	5	99	7	5	13	98	309	0.90	<3.27	0.15	<4.17	3.73	75	2
August	7.40	7.17	4	2	4	99	6	4	9	99	302	1.20	<1.31	0.21	<2.51	3.52	76	3
September	7.16	7.08	2	1	3	99	3	2	5	99	307	1.10	4.11	0.14	5.11	3.82	71	1
October	7.12	7.03	2	1	3	100	2	2	5	99	316	3.75	<2.13	0.29	<3.13	3.11	71	3
November	7.20	7.13	1	1	3	100	3	2	4	99	311	1.50	<3.16	0.14	1.50	3.40	59	1
December	7.20	7.13	2	1	3	100	5	3	8	99	321	1.40	<1.18	0.50	2.96	3.59	53	1
Max	7.41		8	5	13	100	15	6	15	99	350	3.75	4.11	0.50	5.11	4.00	76	22
Min		7.03																
Annual Average	7.24	7.15	4	3	6	99	6	4	9	99	316	1.52	3.37	0.23	3.27	3.67	65	7
Daily Maximum			15				23				1000							50
Monthly Average	6.5 to 8.5			10				15					6		8			

Quarterly February			Quarterly May			Quarterly August			Quarterly November			Annual February		
	Total	Units		Total	Units		Total	Units		Total	Units		total	units
Arsenic	2.72	ug/l	Arsenic	2	ug/l	Arsenic	1.9	ug/l	Arsenic	1.5	ug/l	Copper	3.80	ug/l
Cadmium	<0.3	ug/l	Cadmium	<0.3	ug/l	Cadmium	<0.3	ug/l	Cadmium	<0.3	ug/l	Iron	38.4	ug/l
Chromium	<4.7	ug/l	Chromium	<4.7	ug/l	Chromium	<4.7	ug/l	Chromium	<4.7	ug/l	Manganese	13.6	ug/l
Mercury	<0.2	ug/l	Mercury	<0.2	ug/l	Mercury	<0.2	ug/l	Mercury	<0.2	ug/l	Zinc	86.0	ug/l
Silver	<4.7	ug/l	Silver	<4.7	ug/l	Silver	<4.7	ug/l	Silver	<4.7	ug/l	Calcium	33.2	mg/l
												Magnesium	11.8	mg/l
												Potassium	23.0	mg/l
												Sodium	73.0	mg/l

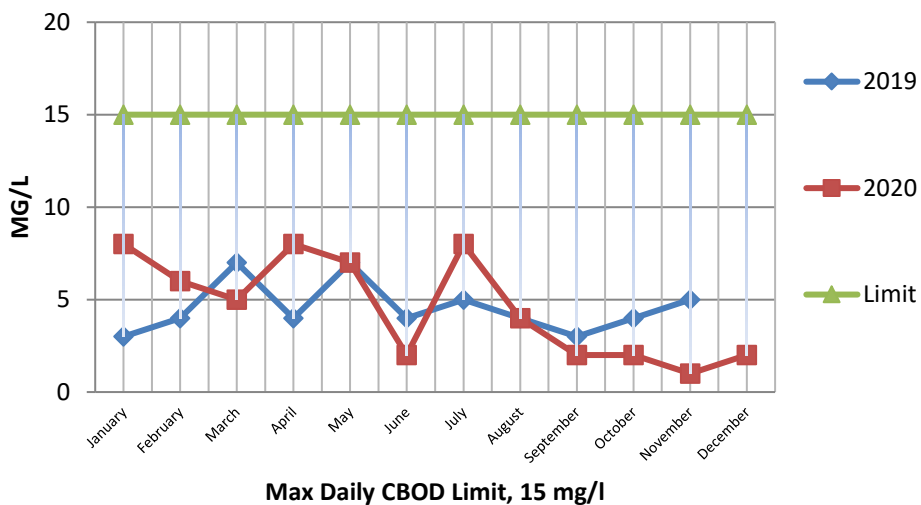
2019 & 2020 Larson WWTP
Maximum Average Monthly Effluent pH



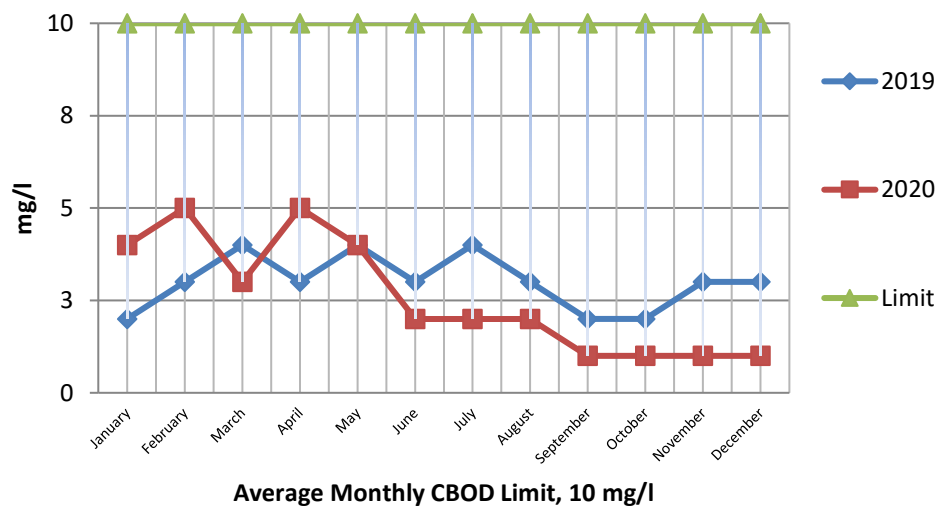
2019 & 2020 Larson WWTP
Minimum Average Monthly Effluent pH



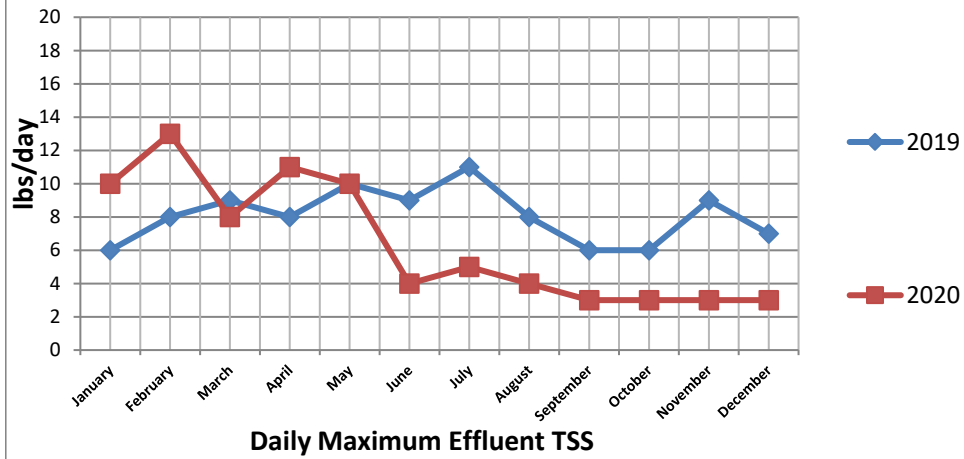
2019 & 2020 Larson WWTP
Daily Maximum Effluent CBOD



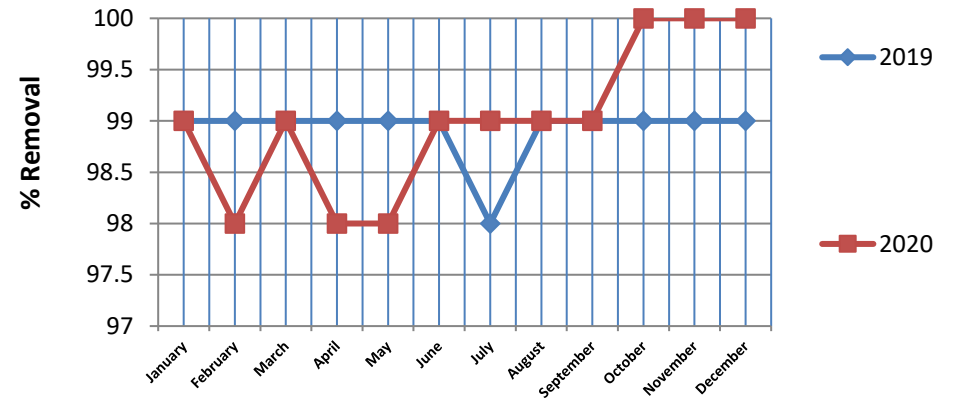
2019 & 2020 Larson WWTP
Monthly Average Effluent CBOD



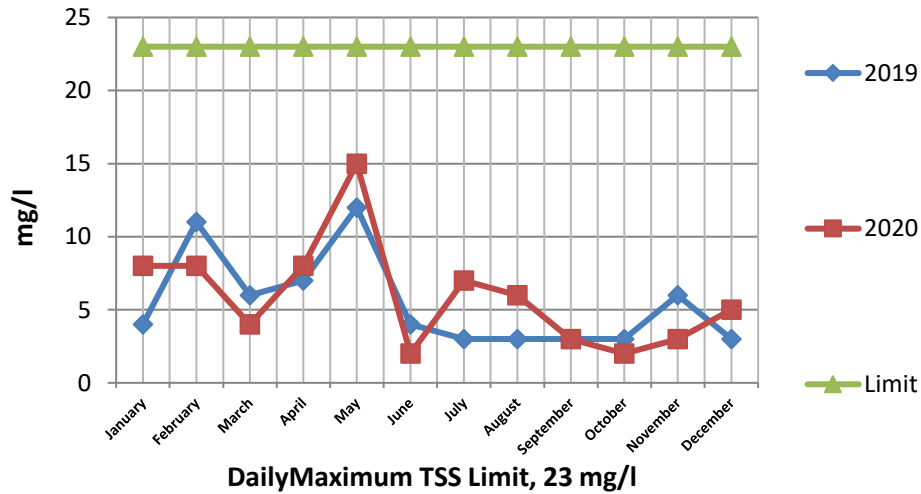
2019 & 2020 Larson WWTP
Average Effluent CBOD lbs.



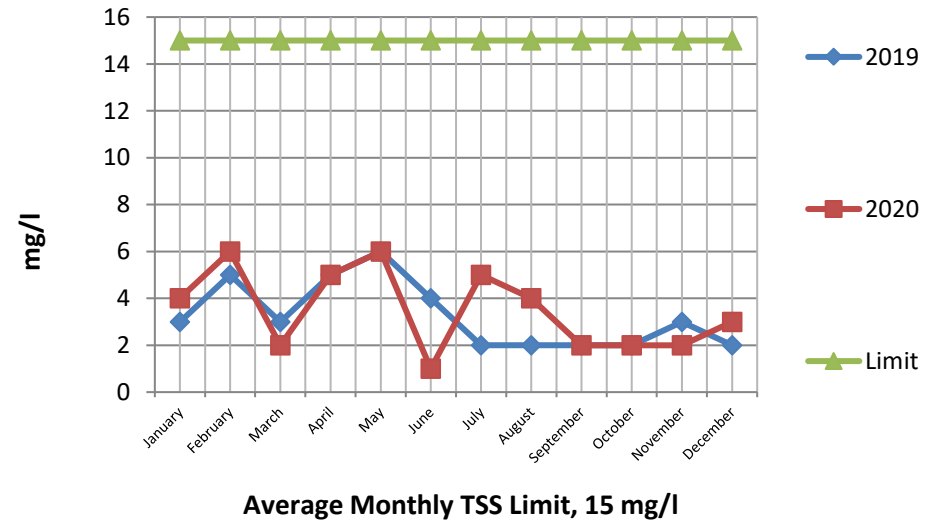
2019 & 2020 Larson WWTP
Average Effluent CBOD Removal



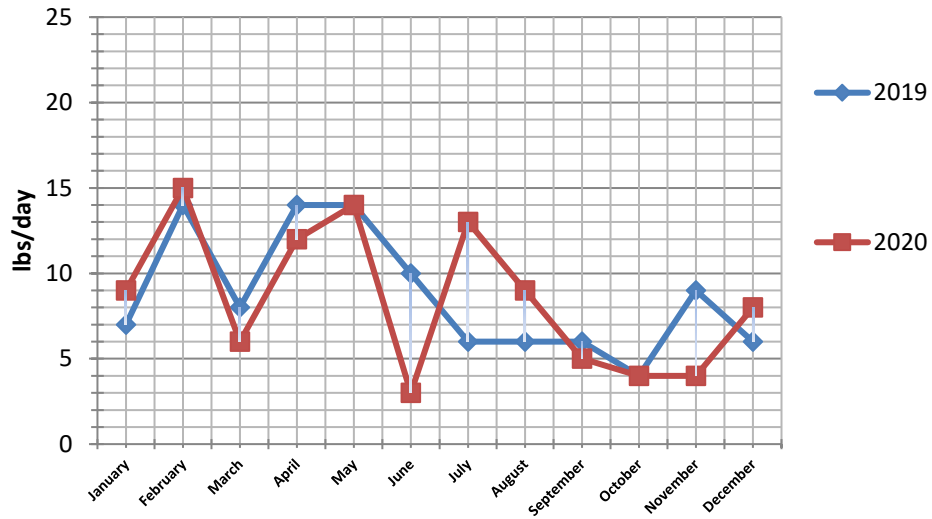
2019 & 2020 Larson WWTP
Daily Max, Effluent TSS



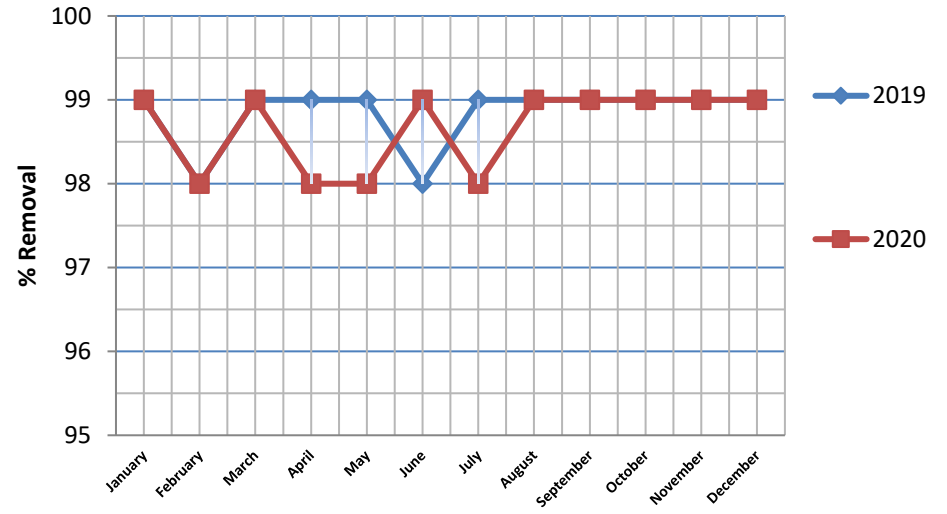
2019 & 2020 Larson WWTP
Monthly Average Effluent TSS



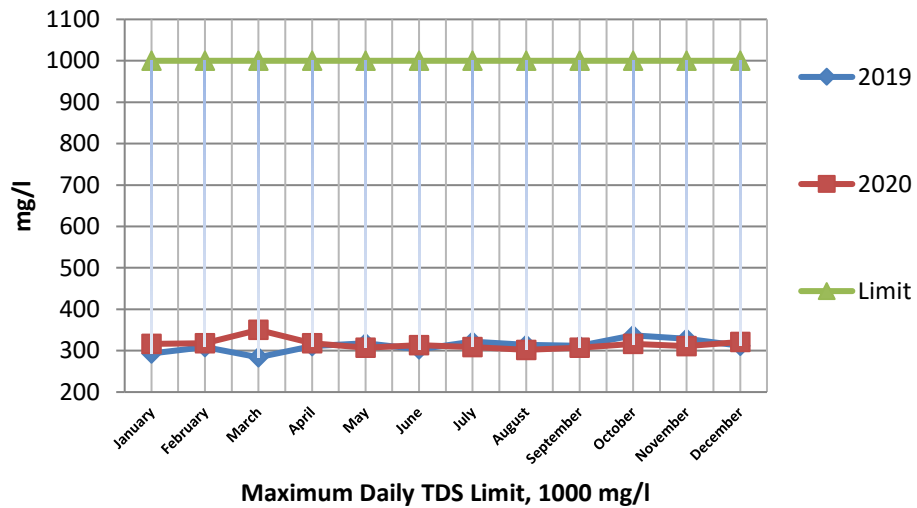
**2019 & 2020 Larson WWTP
Average Effluent TSS lbs.**



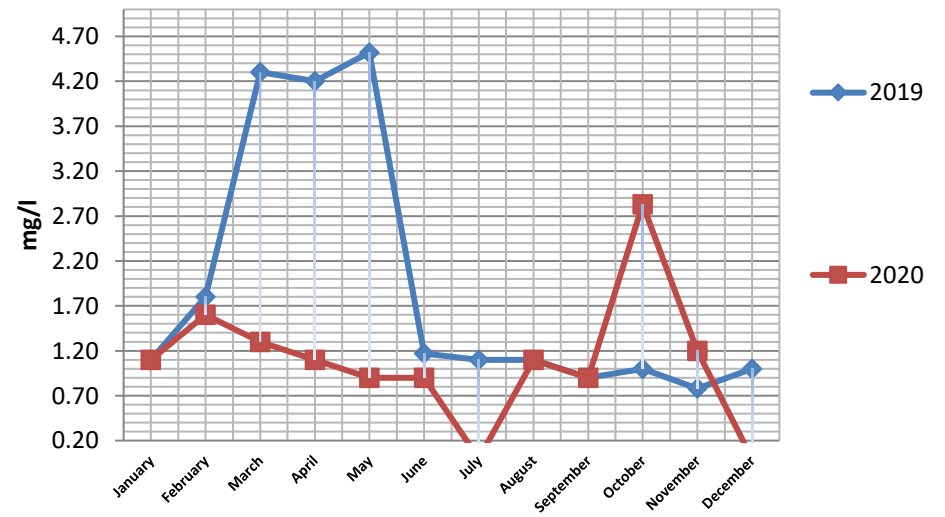
**2019 & 2020 Larson WWTP
Average Effluent TSS Removal**



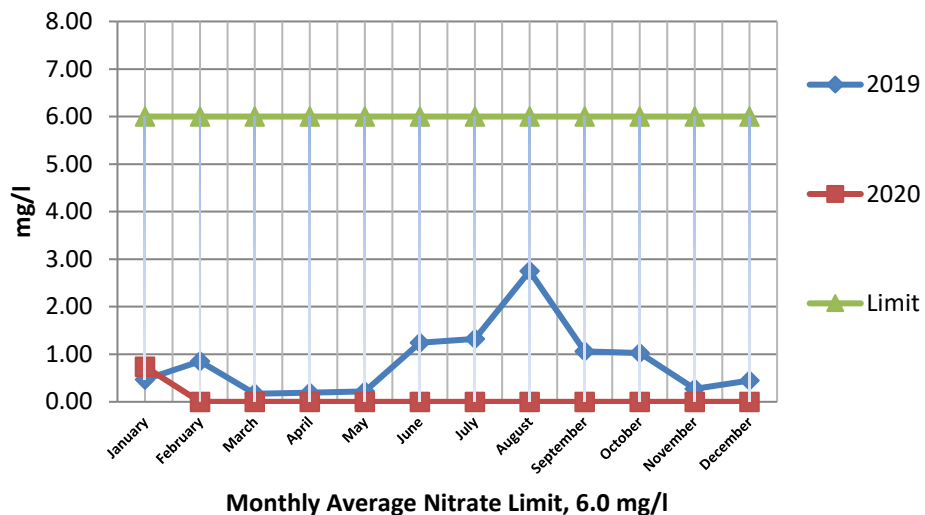
**2019 & 2020 Larson WWTP
Maximum Daily Effluent TDS**



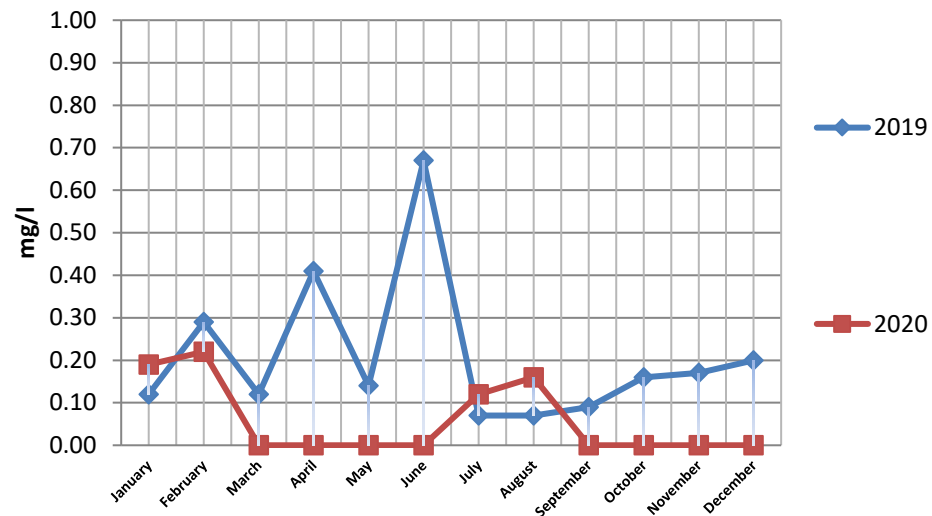
**2019 & 2020 Larson WWTP
Average Effluent TKN**



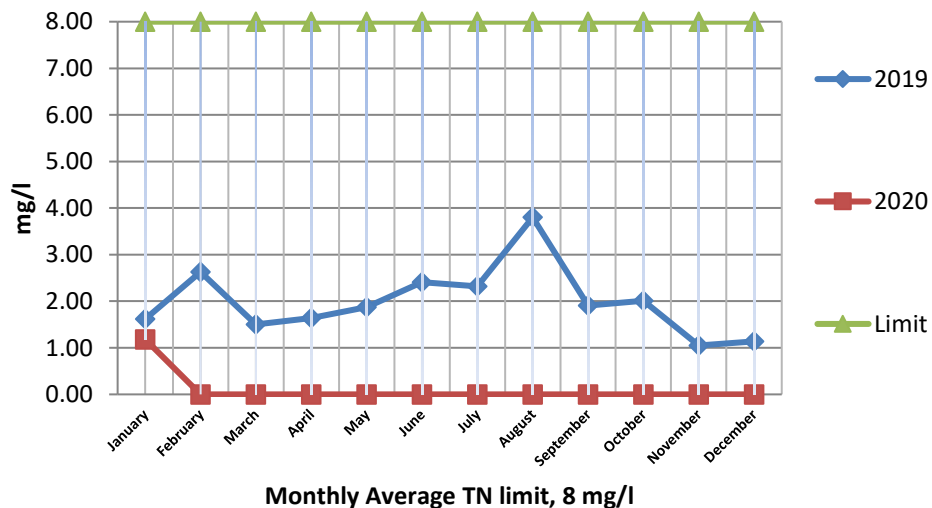
**2019 & 2020 Larson WWTP
Monthly Average Effluent Nitrate**



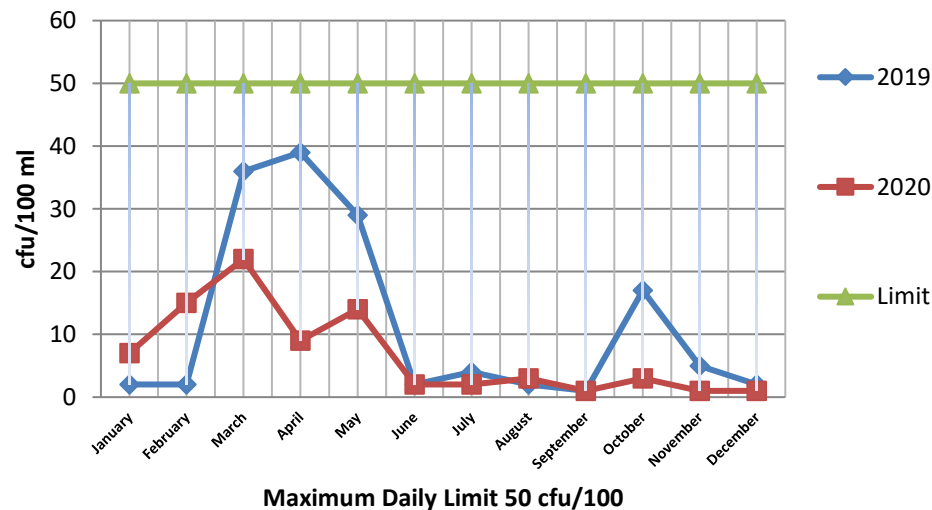
**2019 & 2020 Larson WWTP
Average Effluent NH3**



**2019 & 2020 Larson WWTP
Monthly Average Effluent TN**



**2019 & 2020 Larson WWTP
Daily Maximum Fecal Coliform**



Max Avg Monthly Effluent pH				Min. Avg Monthly Effluent pH				Daily Max Effluent CBOD			
	2019	2020	Limit		2019	2020	Limit		2019	2020	Limit
January	7.42	7.14	8.5	January	7.35	7.09	6.5	January	3	8	15
February	7.43	7.26	8.5	February	7.29	7.11	6.5	February	4	6	15
March	7.29	7.22	8.5	March	7.23	7.14	6.5	March	7	5	15
April	7.29	7.28	8.5	April	7.21	7.16	6.5	April	4	8	15
May	7.17	7.30	8.5	May	7.06	7.21	6.5	May	7	7	15
June	7.33	7.38	8.5	June	7.26	7.31	6.5	June	4	2	15
July	7.28	7.41	8.5	July	7.25	7.34	6.5	July	5	8	15
August	7.29	7.34	8.5	August	7.25	7.27	6.5	August	4	4	15
September	7.31	7.16	8.5	September	7.24	7.08	6.5	September	3	2	15
October	7.33	7.12	8.5	October	7.22	7.03	6.5	October	4	2	15
November	7.30	7.20	8.5	November	7.23	7.13	6.5	November	5	1	15
December	7.25	7.20	8.5	December	7.20	7.13	6.5	December	4	2	15

Monthly Average Effluent CBOD				Average Effluent CBOD lbs		Average % Removal CBOD	
	2019	2020	Limit		2019	2020	2020
January	2	4	10	January	6	10	99
February	3	5	10	February	8	13	99
March	4	3	10	March	9	8	99
April	3	5	10	April	8	11	99
May	4	4	10	May	10	10	99
June	3	2	10	June	9	4	99
July	4	2	10	July	11	5	99
August	3	2	10	August	8	4	99
September	2	1	10	September	6	3	99
October	2	1	10	October	6	3	99
November	3	1	10	November	9	3	99
December	3	1	10	December	7	3	99

Daily Max Effluent TSS				Monthly Avg. Effluent TSS				Average lbs Effluent TSS				Average % Removal TSS			
	2019	2020	Limit		2019	2020	Limit		2019	2020			2019	2020	
January	4	8	23	January	3	4	15	January	7	9	January		99	99	
February	11	8	23	February	5	6	15	February	14	15	February		98	98	
March	6	4	23	March	3	2	15	March	8	6	March		99	99	
April	7	8	23	April	5	5	15	April	14	12	April		99	98	
May	12	15	23	May	6	6	15	May	14	14	May		99	98	
June	4	2	23	June	4	1	15	June	10	3	June		98	99	
July	3	7	23	July	2	5	15	July	6	13	July		99	98	
August	3	6	23	August	2	4	15	August	6	9	August		99	99	
September	3	3	23	September	2	2	15	September	6	5	September		99	99	
October	3	2	23	October	2	2	15	October	4	4	October		99	99	
November	6	3	23	November	3	2	15	November	9	4	November		99	99	
December	3	5	23	December	2	3	15	December	6	8	December		99	99	

Max Daily Effluent TFDS				TKN as N Average			Nitrate + Nitrite Average				Effluent Ammonia avg		
	2019	2020	Limit		2019	2020		2019	2020	Limit		2019	2020
January	293	316	1000	January	1.10	1.10	January	0.47	0.74	6	January	0.12	0.19
February	309	318	1000	February	1.80	1.60	February	0.85	<0.44	6	February	0.29	0.22
March	284	350	1000	March	4.30	1.30	March	0.17	<0.6	6	March	0.12	<0.22
April	311	318	1000	April	4.20	1.10	April	0.19	<0.56	6	April	0.41	<0.9
May	318	307	1000	May	4.52	0.90	May	0.22	<0.21	6	May	0.14	<0.11
June	303	313	1000	June	1.17	0.90	June	1.24	<0.44	6	June	0.67	<0.23
July	322	309	1000	July	1.10	<0.70	July	1.32	<1.38	6	July	0.07	0.12
August	314	302	1000	August	1.10	1.10	August	2.75	<0.61	6	August	0.07	0.16
September	312	307	1000	September	0.90	0.90	September	1.06	<2.56	6	September	0.09	<0.10
October	337	316	1000	October	1.00	2.83	October	1.03	<1.29	6	October	0.16	<0.23
November	329	311	1000	November	0.78	1.20	November	0.27	<1.70	6	November	0.17	<0.09
December	312	321	1000	December	1.00	<0.9	December	0.45	<0.67	6	December	0.20	<0.16

Total N as N Monthly Average				DO			Temp			Fecal MAX			
	2019	2020	Limit		2019	2020		2019	2020		2019	2020	Limit
January	1.62	1.18	8	January	3.50	3.59	January	52	51	January	2	7	50
February	2.63	<2.03	8	February	3.68	3.88	February	48	56	February	2	15	50
March	1.50	<1.85	8	March	3.63	3.74	March	52	55	March	36	22	50
April	1.64	<1.64	8	April	3.17	3.80	April	59	63	April	39	9	50
May	1.87	<1.13	8	May	2.56	3.89	May	66	69	May	29	14	50
June	2.41	<1.01	8	June	3.12	3.81	June	71	75	June	2	2	50
July	2.32	<2.08	8	July	3.15	3.73	July	74	75	July	4	2	50
August	3.80	<1.99	8	August	3.97	3.52	August	76	76	August	2	3	50
September	1.91	<3.50	8	September	3.16	3.82	September	72	71	September	1	1	50
October	2.01	<2.39	8	October	3.48	3.75	October	62	71	October	17	3	50
November	1.05	<2.92	8	November	3.63	3.40	November	57	59	November	5	1	50
December	1.14	<1.74	8	December	3.63	3.59	December	53	53	December	2	1	50

Effluent

This is used for permit application information last used 2016

CBOD	max	min	avrg	toatal	TSS	max	min	avrg	toatal	TFDS	max	min	avrg	toatal			
		4	1	2	52		7	1	3	52		460	252	332	52		
dec		3	2	2	5	dec		5	1	3	5	dec		365	270	321	5
nov		4	1	2	4	nov		6	3	5	4	nov		428	374	385	4
oct		2	1	1	4	oct		6	2	3	4	oct		376	310	349	4
sep		3	1	2	5	sep		3	1	2	5	sep		354	264	308	5
aug		2	1	2	4	aug		3	2	2	4	aug		344	312	326	4
jul		4	2	3	4	jul		5	1	3	4	jul		444	318	357	4
jun		2	1	2	5	jun		4	1	2	5	jun		402	276	340	5
may		3	2	3	4	may		5	1	3	4	may		460	252	335	4
apr		4	2	3	5	apr		5	2	3	5	apr		454	298	346	5
mar		4	2	3	4	mar		5	1	3	4	mar		340	296	307	4
feb		3	1	2	4	feb		3	2	2	4	feb		332	254	304	4
jan		4	1	2	4	jan		7	1	4	4	jan		348	272	307	4

nh4	max	min	avrg	toatal	tkn	max	min	avrg	toatal	no3+no2	max	min	avrg	toatal
	3.11	<0.07	<0.31	52		5.00	0.90	1.42	52		<7.04	0	<1.81	52
dec	0.21	0.11	0.13	5	dec	1.7	1.4	1.5	5	dec	<7.04	<1.28	<4.72	5
nov	1.11	<0.07	<0.34	4	nov	2.4	1	1.5	4	nov	<2.44	<1.72	<2.09	4
oct	0.18	<0.07	<0.12	4	oct	1.5	1.1	1.33	4	oct	4.91	2.3	3.43	4
sep	0.23	0.12	0.15	5	sep	1.3	1.1	1.2	5	sep	3.08	<0.93	<1.80	5
aug	0.16	0.07	0.1	4	aug	1.3	1.2	1.25	4	aug	2.08	1.11	1.61	4
jul	0.18	<0.07	<0.12	4	jul	1.3	0.9	1.01	4	jul	<1.07	<0.74	<0.91	4
jun	0.43	0.09	0.18	5	jun	1.5	1	1.2	5	jun	2.21	<0.6	<0.92	5
may	0.55	0.38	0.46	4	may	1.5	1.2	1.33	4	may	<0.50	<0.42	<0.45	4
apr	0.23	<0.07	<0.16	5	apr	1.9	1.3	1.58	5	apr	<0.67	<.34	<0.51	5
mar	0.47	0.12	0.27	4	mar	2	1.3	1.65	4	mar	3.97	<0.42	<1.38	4
feb	0.42	0.15	0.24	4	feb	1.7	1.2	1.4	4	feb	1.63	<0.85	1.24	4
jan	3.11	0.15	0.95	4	jan	5	1.1	2.1	4	jan	3.11	0.23	0.95	4

pH	max	min	avrg	toatal	Fecal	max	min	avrg	toatal	DO	max	min	avrg	toatal
	7.32	6.54	6.89	365		15	1	5	53		4.60	0.38	2.95	365
dec	7.32	6.57	6.91	31	dec	4	2	2	5	dec	3.82	1.58	3.12	31
nov	7.32	6.73	7.03	30	nov	4	1	3	5	nov	3.19	2.28	2.74	30
oct	7.14	6.6	6.87	31	oct	4	1	3	5	oct	3.46	2.35	2.91	31
sep	7.16	6.78	6.97	30	sep	6	1	3	4	sep	3.27	2.02	2.65	30
aug	7.14	6.81	6.98	31	aug	2	1	1	4	aug	2.85	1.55	2.20	31
jul	7.2	6.72	6.96	31	jul	15	2	7	5	jul	2.76	0.38	1.57	31
jun	7.08	6.72	6.9	30	jun	8	1	6	4	jun	3.00	0.45	1.73	30
may	7.02	6.6	6.81	31	may	13	6	10	4	may	4.20	2.80	3.50	31
apr	6.94	6.54	6.74	30	apr	12	4	10	5	apr	4.25	3.30	3.78	30
mar	6.96	6.75	6.86	31	mar	13	7	10	4	mar	4.60	3.30	3.95	31
feb	6.86	6.82	6.84	28	feb	4	2	3	4	feb	4.40	2.91	3.64	28
jan	6.9	6.76	6.83	31	jan	7	1	4	4	jan	4.40	2.70	3.55	31

Calcium	max 27.90	Potassium	max 22.10	Copper	max 3.97
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February	27.90	February	22.10	February	3.97
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Magnesium	max 10.90	Sodium	max 82.00	Iron	max 306.00
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February	10.90	February	82.00	February	306.00
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Maganese	max 12.20	Lead	max 0.00
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February	12.20	February	<0.5
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Zinc	max 89.00
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February	89.00
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Table 1. Concentration of heavy metals in the water samples collected from the study area															
Arsenic					Chromium					Silver					
	max	min	avrg	toatal		max	min	avrg	toatal		max	min	avrg	toatal	
	2.74	1.86	2.20	4		<4.7	<4.7	<4.7	4		<4.7	<4.7	<4.7	4	
November	2.16			1	November	<4.7			1	November	<4.7			1	
August	2.02			1	August	<4.7			1	August	<4.7			1	
May	1.86			1	May	<4.7			1	May	<4.7			1	
feb	2.74			1	feb	<4.7			1	feb	<4.7			1	
Cadmium					Mercury										
	max	min	avrg	toatal		max	min	avrg	toatal						
	3.90	<0.3	<1.2	4		<0.2	<0.2	<0.2	4						
November	<0.3			1	November	<0.2			1						
August	<0.3			1	August	<0.2			1						
May	3.90			1	May	<0.2			1						
feb	<0.3			1	feb	<0.2			1						

	M-well 2					
					Max	Min
	February	May	August	November		
TOC	1.46	2.15	1.17	1.07	2.15	1.07
TDS	269	343	149	202	343	149
pH	6.99	6.45	7.03	6.78	7.03	6.45
Conductivity	512	540	215	400	540	215
Total Coliform	<1	<1	<1	<1	<1	<1
Nitrate+nitrite	<1.62	<1.20	<0.58	<2.03	<2.03	<0.58
TKN	0.3	0.4	0.5	0.4	0.5	0.3
Calcium	44.6	25.8	13.4	31.8	44.6	13.4
Chloride	31.4	36.9	<0.5	8.1	36.9	8.1
Maganesium	20.8	11.15	7.3	14	20.8	7.3
Potassium	8.95	10.2	7.5	6.8	10.2	6.8
Sodium	15.8	68	16	12.2	68	12.2
Cadmium	<0.3		<0.3		<0.3	<0.3
Chromium	<4.7		<4.7		<4.7	<4.7
Copper	9.6				9.6	9.6
iron	123	18.4	16.8	51	123	16.8
Lead	<0.5				<0.5	<0.5
Maganese	13.4				13.4	13.4
Mercury	<0.2		<0.2		<0.2	<0.2
Silver	<4.7		<4.7		<4.7	<4.7
Zinc	5.25				5.25	5.25

	Tag ID	Water elv	Latitude	Longitude
M-well 2	BCE-785	1080.87		
February		1079.99		
May		1081.60		
August		1081.60		
November		1080.28		

	M-well 3					
					Max	Min
	February	May	August	November		
TOC	1.85	2.35	2.3	2.71	2.71	1.85
TDS	294	306	399	374	399	294
pH	7.08	6.81	6.91	6.82	7.08	6.81
Conductivity	610	595	626	715	715	595
Total Coliform	<1	<1	<1	<1	0	0
Nitrate+nitrite	<3.51	<3.53	<4.51	<4.82	0	0
TKN	0.4	0.3	0.8	29	29	0.3
Calcium	22.5	34	27	29	34	22.5
Chloride	39.8	51	40	46.1	51	39.8
Manganese	9.8	13.45	12.75	11.95	13.45	9.8
Potassium	17	20	18.6	18.4	20	17
Sodium	70.5	86.5	79.5	84	86.5	70.5
Cadmium	<0.3		<0.3		0	0
Chromium	<4.7		<4.7		0	0
Copper	14.8				14.8	14.8
iron	40.8	34.8	26.8	180	180	26.8
Lead	<0.5				0	0
Manganese	13.4				13.4	13.4
Mercury	<0.2		<0.2		0	0
Silver	<4.7		<4.7		0	0
Zinc	<5.0				0	0

	Tag ID	Water elv
M-well 3	BCE-786	1079.65
February		1078.68
May		1080.23
August		1080.23
November		1079.46

	M-well 4					
					Max	Min
	February	May	August	November		
TOC	1.44	1.54	1.46	1.66	1.66	1.44
TDS	282	299	348	335	348	282
pH	7.38	6.82	7.43	7.15	7.43	6.82
Conductivity	570	531	541	618	618	531
Total Coliform	<1	<1	<1	<1	0	0
Nitrate+nitrite	<3.97	<4.01	<3.76	<4.64	0	0
TKN	0.3	<0.3	0.5	0.3	0.5	0.3
Calcium	46.6	49.8	48.2	52	52	46.6
Chloride	9.9	9.6	10.4	10.4	10.4	9.6
Manganese	20.55	19.6	22.55	21.8	22.55	19.6
Potassium	6.2	6.35	6.45	6.55	6.55	6.2
Sodium	32.4	32.1	33.4	36.2	36.2	32.1
Cadmium	<0.3		<0.3		0	0
Chromium	14.2		<4.7		14.2	14.2
Copper	<2				0	0
iron	104	14	<9.7	22.7	104	14
Lead	<0.5				0	0
Manganese	3				3	3
Mercury	<0.2		<0.2		0	0
Silver	<4.7		<4.7		0	0
Zinc	<5.0				0	0

	Tag ID	Water elv
M-well 4	ABT-554	1082.94
February		1082.51
May		1082.51
August		1083.77
November		1082.97

	Max	Min	Averg.
-	7.04	<1.28	0.13
-	2.44	<1.72	<0.34
	4.91	2.3	<0.12
	3.08	<0.93	0.15
	2.08	1.11	0.1
-	1.07	<0.74	<0.12
	2.21	<0.6	0.18
-	0.5	<0.42	0.46
-	0.67	<.34	<0.16
	3.97	<0.42	0.27
	1.63	<0.85	0.24
	3.11	0.23	0.95
	7.04		0.31