



2023 ANNUAL WASTEWATER TREATMENT AND RECLAIMED WATER IRRIGATION SYSTEMS REPORT

ME-12214

Overview of the Community's Wastewater Lagoons and Effluent Irrigation

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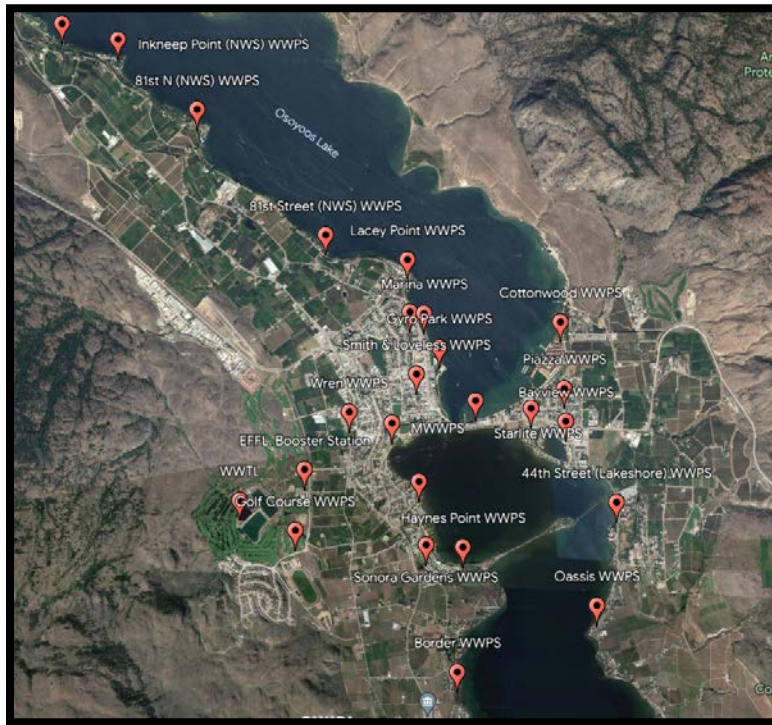
Description

The Town of Osoyoos operates a wastewater treatment plant (lagoon system) which is located on the west bench of Osoyoos (Lot 766, Plan 2476 and Lot 974, Plan 16985, SDYD). The Osoyoos' Lagoons consist of three aerated treatment cells and two storage ponds. These three cells at the wastewater treatment plant (WWTP) are classified as complete mix and partial mix, respectively. All aerated cells provide a means of separating the sludge from the wastewater before the reclaimed water is treated and stored in the large storage ponds for reuse in the summer months. Most of the influent the lagoons receive is pumped from our Main Lift, located on the corner of Kingfisher Drive and 89th Street (Legion Beach). Main Lift contains three large turbine pumps as well as five submersible pumps. Influent passes through 1.5mm drum screens to remove larger non-organic solids, which are transferred to mechanical compactors. Once a week the compressed and bagged solids are taken to the landfill. The Wastewater is then pumped through a force main directly to Lagoon aerated Cell #1. A secondary lift station is located at 4000 Golf Course Drive. This station services the Dividend Ridge Subdivision and contains two Vaughan chopper pumps. This station is the lowest point of the subdivision. The wastewater collects in a subsurface tank at this pump station where it is periodically pumped directly to the Lagoons. Solids are shredded by the chopper pumps.



Brief Overview of the Collection System

The Town of Osoyoos' wastewater collection system consists of approximately 51.1 kilometres of gravity mains and 18.1 kilometres of force main. Because of the topography of the Town there are a total of 21 separate pumping stations located at various strategic low-lying locations. These lift stations are necessary so that the wastewater is kept flowing toward the Main Lift at Legion Beach. Main Lift's original placement at Legion Beach is due to it being the lowest elevation point in Osoyoos. This makes it the natural location for the gravity mains to flow to. From here the gathered wastewater is pumped to the Lagoons. The only exception to this is Golf Course Pump Station, which is pumped directly to the Lagoons through its own force main.



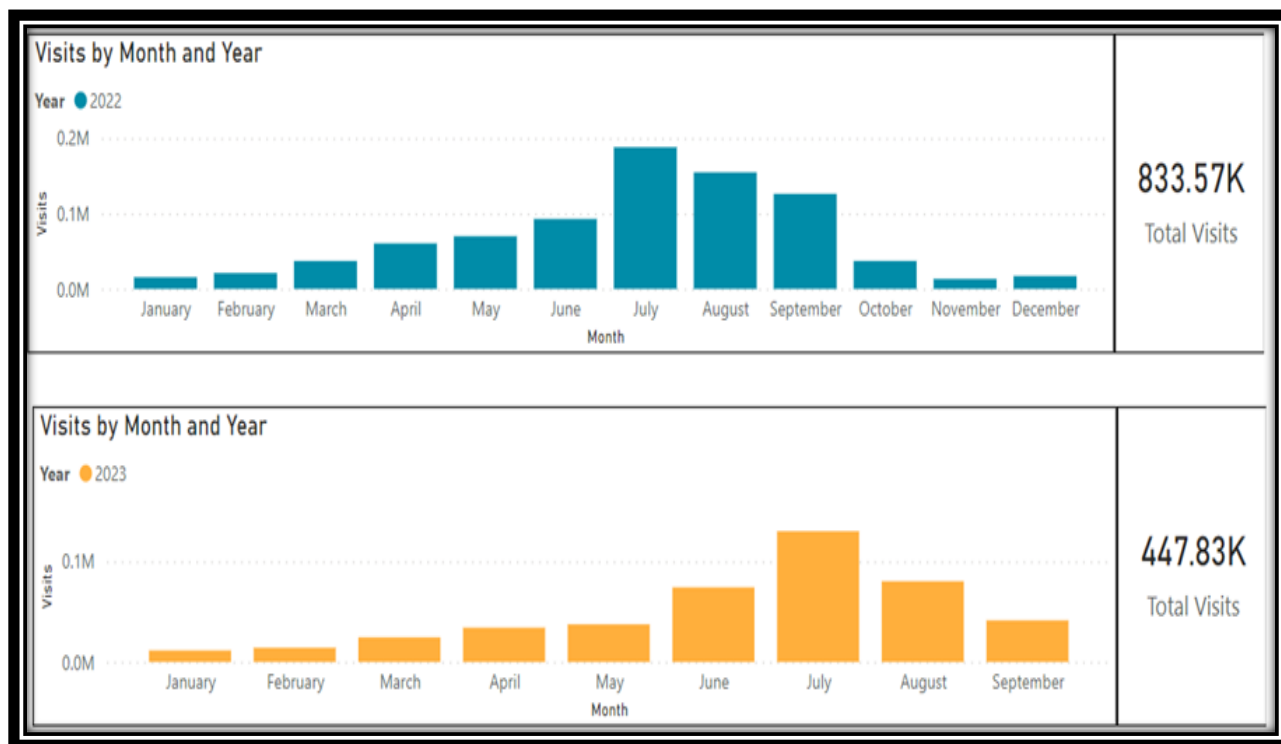
*Wastewater pipe network (above). Wastewater Pump Stations (pictured at top).

2023 Flow Rates

Influent Flow

Flowrates decreased in 2023 when compared to 2022. We believe this was due to the effect on tourism of the Eagle Bluff Wildfire. As the following graphs show:

2023 Visitor Centre Statistics:



*Courtesy of Destination Osoyoos

Total flow into the Lagoons amounted to 833,944 m³ which is an average of 2284.78 m³ a day or 26.44 L/s. Of this Golf Course WWPS contributed 53,611.2 m³ or 1.7 L/s. In 2022 the total flow was 906,035 m³ of which the Golf Course WWPS contribution was 54,162 m³. Per capita sewage flow rate assuming 8,000 users was 0.286 m³.

Compared to 2022, Summer flow (May to September) was down 40,645 m³ while winter flow (October to April) decreased 31,445 m³.

2023 Monthly Flow Chart:

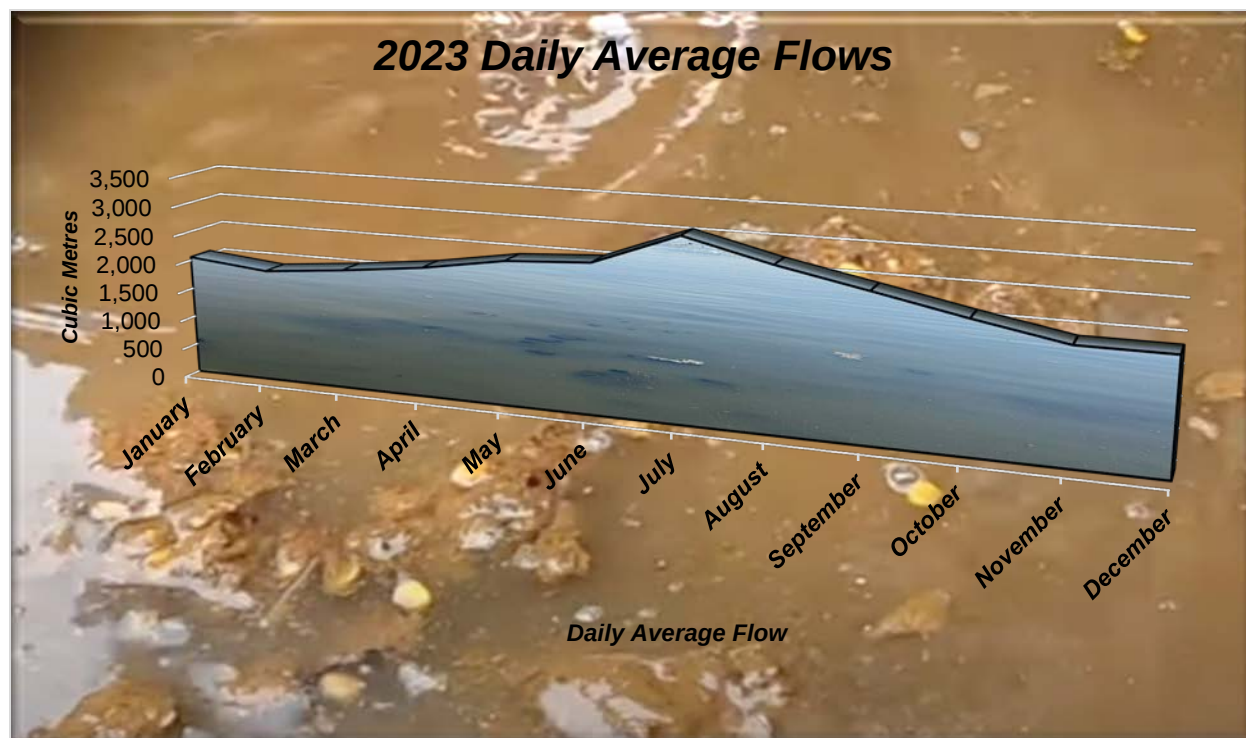
2023 Flow Wastewater Totals													
All Numbers in Cubic Metres	January	February	March	April	May	June	July	August	September	October	November	December	Totals
Main WWPS	59,862	50,489	59,594	61,978	70,737	71,150	89,941	79,419	68,273	61,898	52,540	54,452	780,333
Golf Course WWPS	3,777	3,314	4,071	4,458	5,035	4,795	5,330	5,143	5,003	4,794	4,095	4,152	53,967
Monthly Totals	63,639	53,803	63,665	66,436	75,772	75,945	95,271	84,562	73,276	66,692	56,635	58,604	833,944
Monthly Average	2,053	1,922	2,054	2,215	2,444	2,532	3,073	2,728	2,443	2,151	1,888	1,890	2,285

2017 – 2022 Monthly Flow Comparison Chart:

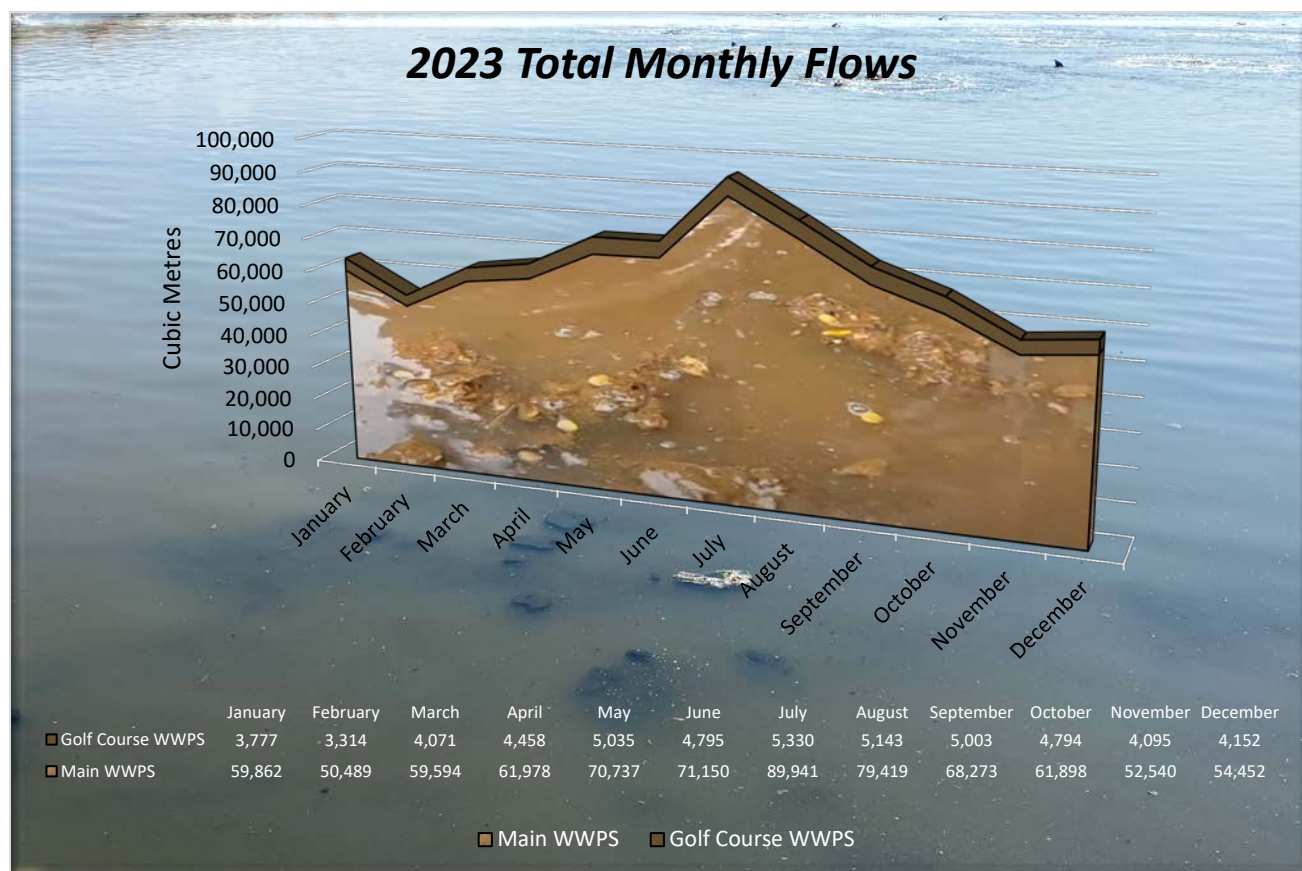
2022 Monthly Flows							
Month	E230277 Main Lift Station (m³)	E232882 Golf Course Lift Station (m³)	2022 Monthly Totals (m³)	2021 Monthly Totals (m³)	2020 Monthly Totals (m³)	2019 Monthly Totals (m³)	2017 Monthly Totals (m³)
January	61,140	3,902	65,042	61,634	61,289	61,144	59,886
February	54,964	3,847	58,811	56,335	56,636	55,302	56,320
March	62,106	4,303	66,409	64,972	62,283	64,145	62,640
April	63,454	4,521	67,975	63,770	59,325	63,601	61,997
May	71,229	4,589	75,818	70,902	67,563	70,726	75,009
June	79,236	4,661	83,896	76,994	76,744	76,568	79,411
July	99,011	5,321	104,332	99,216	102,448	98,750	96,265
August	95,078	5,670	100,748	98,176	106,325	98,153	99,749
September	76,067	4,610	80,677	78,112	88,123	77,100	75,508
October	68,805	4,813	73,617	65,810	76,788	65,184	66,681
November	57,833	3,871	61,704	58,075	66,256	57,318	58,421
December	62,952	4,055	67,006	58,957	65,240	58,292	56,583
TOTALS	851,873	54,162	906,035	904,695	889,020	846,282	848,470
Summer Flow (May-Sept)			445,470	434,898	441,203	421,297	434,898
Winter Flow (Oct-Apr)			460,564	469,797	447,817	424,985	469,797

These numbers put us well below our permit (ME-12214) projected annual daily average made for 2008 of 2,720 m³ and maximum month daily average of 4340 m³. (Our permit was issued December 18, 1998).

2023 Daily Average Flow Graph:



2023 Total Monthly Flow Graph:



2023 Irrigation Flow

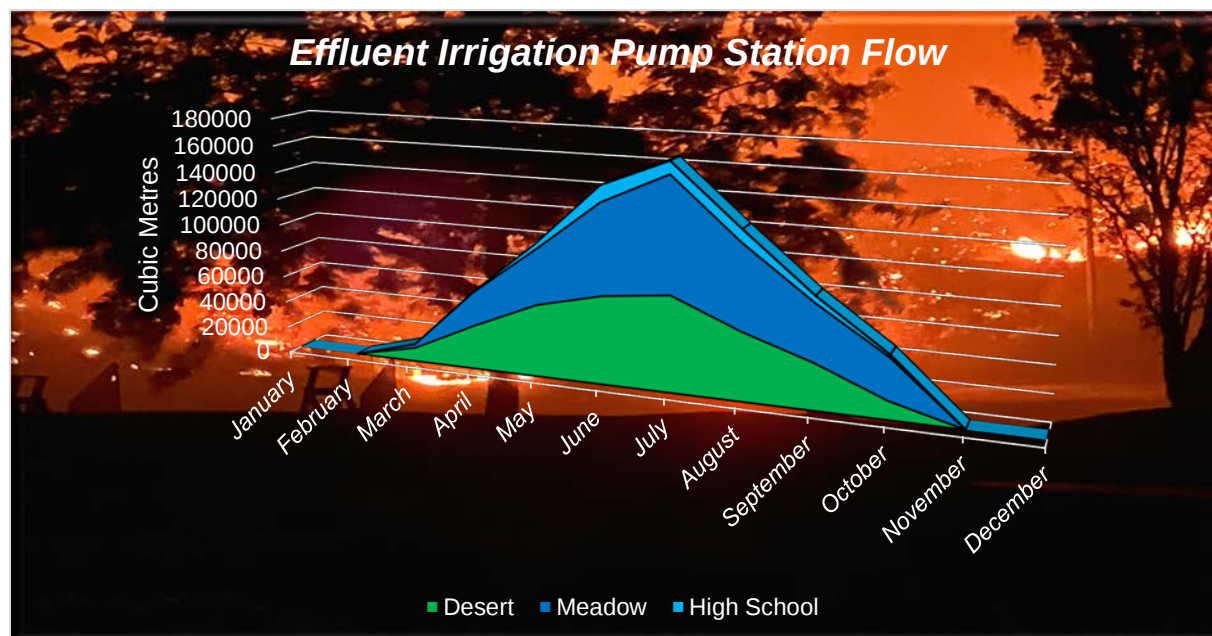
Total effluent flow during the 2023 season amounted to 729,230 cubic metres of which the majority was used by the Osoyoos' Golf Course. Desert Park Pump Station recorded 332,189 m3 of flow, Meadow Pump Station recorded 354,612 m3, while High School Pump Station recorded 42,429 m3. Meter readings show Desert Park using 105,299 m3.

Desert Park and High School Meter Readings:

<u>Meter Reads</u>	<u>Desert Park</u>	<u>Monthly</u>	<u>High School</u>	<u>Monthly</u>
<i>April 12/23</i>	261948.199	<i>start</i>	165205	<i>start</i>
<i>May</i>	295196.633	33248.434	165806	601
<i>June</i>	321463.647	26267.014	169979	4173
<i>July</i>	344256.18	22792.533	181990	12011
<i>August</i>	351889.563	7633.383	191178	9188
<i>September</i>	361265.079	9375.516	200603	9425
<i>October</i>	367246.963	5981.884	205667	5064
Totals	105298.764		42429	

*All in Cubic Metres.

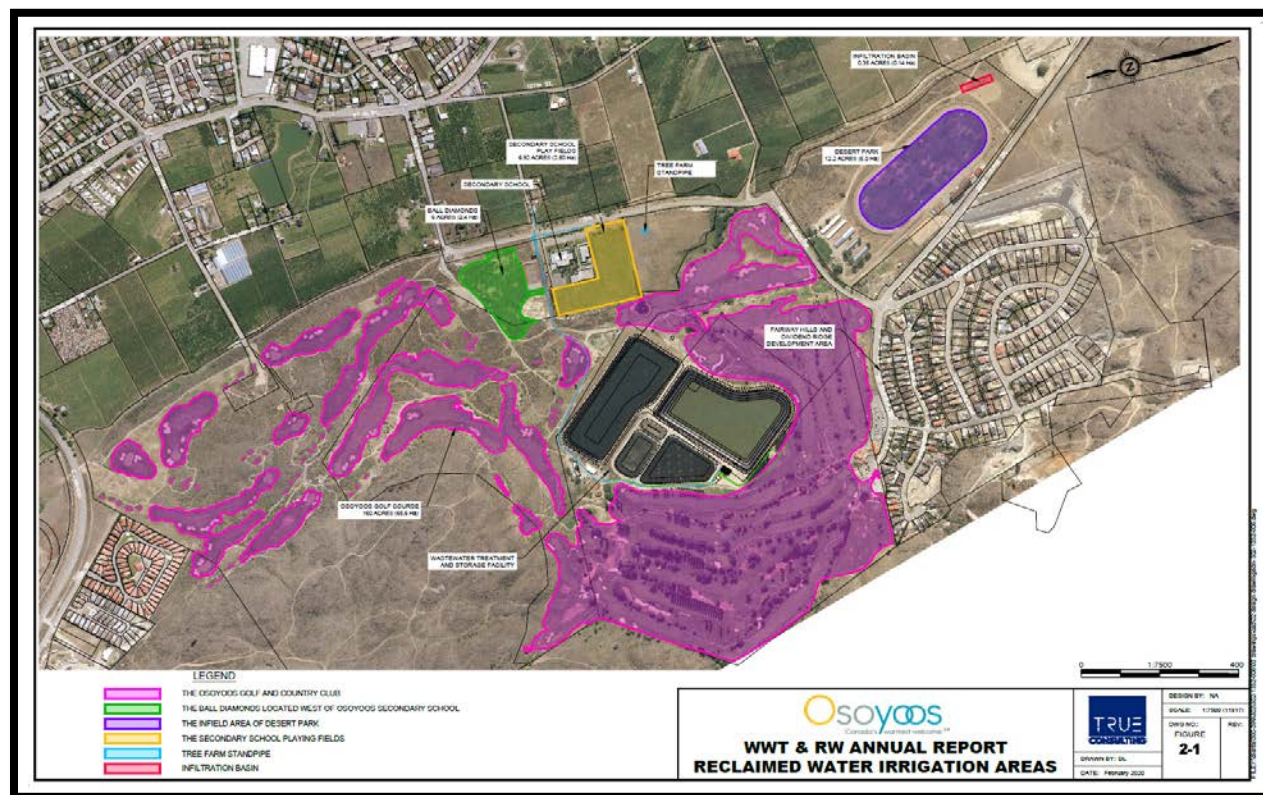
2023 Effluent Irrigation Pump Station Totals Graph:



*Background picture is the Eagle Bluff Wildfire burning at the edge of the Osoyoos Golf Course in 2023.

The effluent irrigation was turned on during the Eagle Bluff Wildfire event in Osoyoos, which most likely helped keep the fire at bay along the perimeter of the Golf Course.

Map of Effluent Irrigation Locations:



*Courtesy of TRUE Consulting.

Effluent flow in 2023 totaled 83,439 m³ less than 2022, when 812,669 m³ was used.

Effluent Irrigation Use			
<u>Location</u>	<u>Totals</u>	<u>Area</u>	<u>Used per M2</u>
High School Area	42429	2.8 ha	1.51 m³/y
Desert Park and Infiltration Basin	105299	n/a	n/a
Desert Park (Estimate)	60000	5 ha	1.2 m³/y
Golf Course and Playing Fields	581502	68 ha	.855 m³/y
Tree Farm Site	0	n/a	0

Sampling

Influent Quality

As per section 5.2 of our permit, an Influent monitoring program was conducted at the headworks (site E230037). Samples analyzed by CARO Analytical:

<u>Location</u>	<u>Headworks</u>		
<u>EMS site number</u>	<u>E230037</u>		
<u>Parameter</u>	Total phosphorus as P, mg/L	Ortho phosphorus as P, mg/L	Carbonaceous biochemical oxygen demand mg/L
<u>Frequency</u>	semi-annual	semi-annual	semi-annual
<u>Sample type</u>	grab	grab	grab
<u>Limit</u>			
January			
February			
March	3.66	4.29	99.7
April			
May* (See Note)			
June			
July			
August			
September	3.7	0.235	131
October			
November* (Note)			
December			

*All sample (CARO Analytical) documentation is available upon request

Effluent Quality

As per section 5.3 of our permit effluent quality was monitored throughout the year. In May we had experienced an out of compliance. This was most likely due to Spring turnover as the odor was extreme at the time. Cell #2 and #3 have been dredged since.

Location	Outlet of Cell #3								
EMS site number	E105001								
Parameter	Carbonaceous biochemical oxygen demand mg/L	Total suspended solids mg/L	Ortho phosphorus as P, mg/L	Total dissolved phosphorus as P, mg/L	Total nitrogen mg/L	Ammonia nitrogen, mg/L	Nitrate nitrogen, mg/L	Nitrite nitrogen, mg/L	Organic nitrogen, mg/L
Frequency	monthly	monthly	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual	semi-annual
Sample type	grab	grab	grab	grab	grab	grab	grab	grab	grab
Limit	<45	<60							
January	22.9	7							
February	15.2	14							
March	9.6	13	3.56	4.89	37.8	37.7	0.954	0.342	36.5
April	13.1	8							
May* (See Note)	56.7	78							
June	13.5	49.5							
July	7.1	14.3							
August	<5.9	11.6							
September	<6.3	5	4.74	6.79	27.9	23.6	0.757	1.38	2.19
October	<7.0	14							
November* (Note)	12.2	35.2							
December	Done	Done							

Sludge				
E230278				
Total Solids, %	Moisture Content, %	Volatile Suspended Solids, %	Total Kjeldahl Nitrogen, TKN	Strong Acid Leachable Metals, including: aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, silver, sodium, zinc.
annual	annual	annual	annual	annual
grab	grab	grab	grab	grab
23600		15600	590	See Below
	jar	Cell #2 Aerated July 7th 2023 Total Solids 4.8 Volatile Solids 3.5		
	jar	Cell #3 Aerated July 7th 2023 Total Solids 4.0 Volatile Solids 2.8		

Pilot May	55.0 / 74.0
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*All sample documentation is available upon request

*Jar Test Results:***Total Metals****Lagoon Jar Sample**

Aluminum, total 67.6 OG < 0.1 0.0050 mg/L 2023-10-24 RS1

Antimony, total < 0.00100 MAC = 0.006 0.00020 mg/L 2023-10-24 RS1

Arsenic, total 0.0325 MAC = 0.01 0.00050 mg/L 2023-10-24 RS1

Barium, total 4.92 MAC = 2 0.0050 mg/L 2023-10-24 RS1

Beryllium, total 0.00146 N/A 0.00010 mg/L 2023-10-24 RS1

Bismuth, total 0.0168 N/A 0.00010 mg/L 2023-10-24 RS1

Boron, total 0.808 MAC = 5 0.0500 mg/L 2023-10-24 RS1

Cadmium, total 0.0119 MAC = 0.007 0.000010 mg/L 2023-10-24 RS1

Calcium, total 1340 None Required 0.20 mg/L 2023-10-24 RS1

Chromium, total 0.467 MAC = 0.05 0.00050 mg/L 2023-10-24 RS1

Cobalt, total 0.0344 N/A 0.00010 mg/L 2023-10-24 RS1

Copper, total 0.662 MAC = 2 0.00040 mg/L 2023-10-24 RS1

Iron, total 279 AO 0.3 0.010 mg/L 2023-10-24 RS1

Lead, total 0.606 MAC = 0.005 0.00020 mg/L 2023-10-24 RS1

Lithium, total 0.0523 N/A 0.00010 mg/L 2023-10-24 RS1

Magnesium, total 93.3 None Required 0.010 mg/L 2023-10-24 RS1

Manganese, total 5.58 MAC = 0.12 0.00020 mg/L 2023-10-24 RS1

Molybdenum, total 0.0383 N/A 0.00010 mg/L 2023-10-24 RS1

Nickel, total 0.300 N/A 0.00040 mg/L 2023-10-24 RS1

Phosphorus, total 254 N/A 0.050 mg/L 2023-10-24 RS1

Potassium, total 38.4 N/A 0.10 mg/L 2023-10-24 RS1

Selenium, total 0.00538 MAC = 0.05 0.00050 mg/L 2023-10-24 RS1

Silicon, total 74.6 N/A 1.0 mg/L 2023-10-24 RS1

Silver, total < 0.000250 None Required 0.000050 mg/L 2023-10-24 RS1

Sodium, total 186 AO 200 0.10 mg/L 2023-10-24 RS1

Strontium, total 7.11 MAC = 7 0.0010 mg/L 2023-10-24 RS1

Sulfur, total 35.6 N/A 3.0 mg/L 2023-10-24 RS1

Tellurium, total < 0.00250 N/A 0.00050 mg/L 2023-10-24 RS1

Thallium, total 0.00142 N/A 0.000020 mg/L 2023-10-24 RS1

Thorium, total 0.00082 N/A 0.00010 mg/L 2023-10-24 RS1

Tin, total 0.0288 N/A 0.00020 mg/L 2023-10-24 RS1

Titanium, total 0.161 N/A 0.0050 mg/L 2023-10-24 RS1

Tungsten, total < 0.0050 N/A 0.0010 mg/L 2023-10-24 RS1

Uranium, total 0.0375 MAC = 0.02 0.000020 mg/L 2023-10-24 RS1

Vanadium, total 0.364 N/A 0.0050 mg/L 2023-10-24 RS1

Zinc, total 23.1 AO 5 0.0040 mg/L 2023-10-24 RS1

Zirconium, total 0.0176 N/A 0.00010 mg/L 2023-10-24 RS1

*CARO Analytical

Chlorine contact chamber site E207444 sampling:

Location	Chlorine Contact Chamber									
EMS site number	E207444									
Parameter	Faecal coliforms, MPN/100ml	Total coliforms, MPN/100ml	Total phosphorus, mg/L	Total nitrogen, mg/L	Chlorine residual, mg/L	Sodium, mg/L	Sulphate, mg/L	Carbonaceous biochemical oxygen demand, mg/L	Total suspended solids, mg/L	Turbidity, NTU
Frequency	monthly	monthly	monthly	monthly	weekly	monthly	monthly	monthly	monthly	monthly
Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Limit	<2.2 MPN				>0.5					
January										
February										
March	<1	<1	5.92	22.9	See	146	70.2	<6.2	7	
April	<1	<1	5.37	20.3		159	72.8	<8.3	5	
May	<1	<1	5.35	23.6		165	73.8	<4.8	<2	
June	<1	10	4.88	14.2	Weekly	169	73.7	<5.3	2.2	
July	<1	2	5.02	26.2		166	69	<6.2	<3.3	
August* (See Note)	<1	<1	3.57	21.6	Sampling	165	67.4	<5.9	<2	
September	<1	<1	6.15	24.1		170	61.3	<6.3	<2.0	
October	<1	<1	8.47	20.3		165	60.9	<7.0	7.4	
November	done	done	done		Below	done	done			
December	***Bottle Instructions also to the right***									
August Pilot*	<1	<1	3.69	17.6		165	66	<5.9	<2	

Weekly chlorine residual sampling:

Location	Chlorine Contact Chamber					
EMS site number	E207444					
Parameter	Chlorine Residual Mg/L					
Frequency	Weekly					
Sample type	Grab					
Limit:	1mg/L minimum					
Week of	mg/L	Week of	mg/L	Week of	mg/L	
27-Mar	8.4	05-Jun	7	14-Aug	3.6	
04-Apr	8.8	12-Jun	1.7	21-Aug	1.2	
11-Apr	8.8	19-Jun	1.71	28-Aug	0.03	
17-Apr	8.8	26-Jun	8.3	04-Sep	5	
24-Apr	8.1	03-Jul	8.3	11-Sep	6.6	
01-May	8.8	10-Jul	2.5	18-Sep	8.8	
08-May	6.2	17-Jul	7.1	25-Sep	8.8	
16-May	8.8	24-Jul	8.8	02-Oct	7	
22-May	5.4	31-Jul	3.7	09-Oct	8.8	
29-May	7.6	07-Aug	2.2	16-Oct	8.8	

Out of compliance on August 28th was due to equipment failure. Report 20230825 NCR Osoyoos Lagoons, Lack of Chlorine Residual was filed with the Ministry of Environment and Climate Change Strategy, Environmental Protection Division.

Operator's Certifications

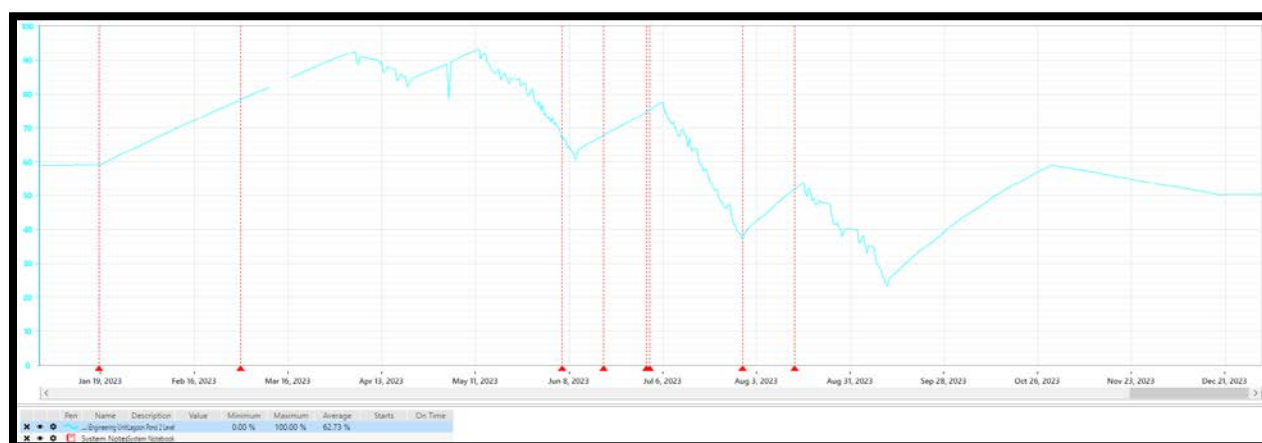
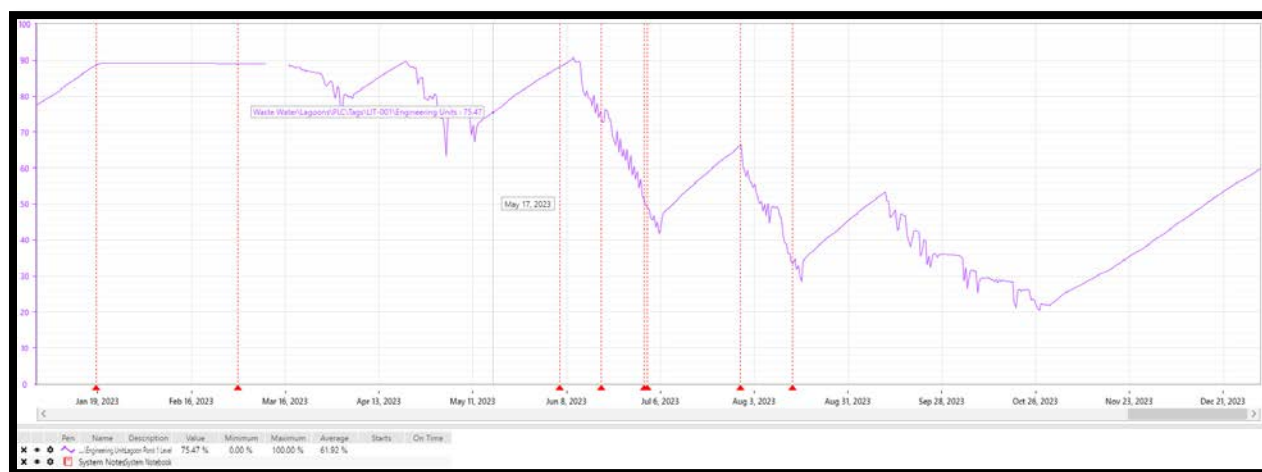
The following is a list of our current Operators and their EOCP certifications:

Operator	Position	Wastewater Collection Level	Wastewater Treatment Level
S. Kelly McDonald	Utilities Superintendent	III	II
David Stene	Operator	I	I
Karl Fichter	Operator	II	I
Gabriel Wood	Operator	OIT	OIT

In 2024 both Dave Stene and Karl Fichter will be writing their Wastewater Treatment level two Exam.

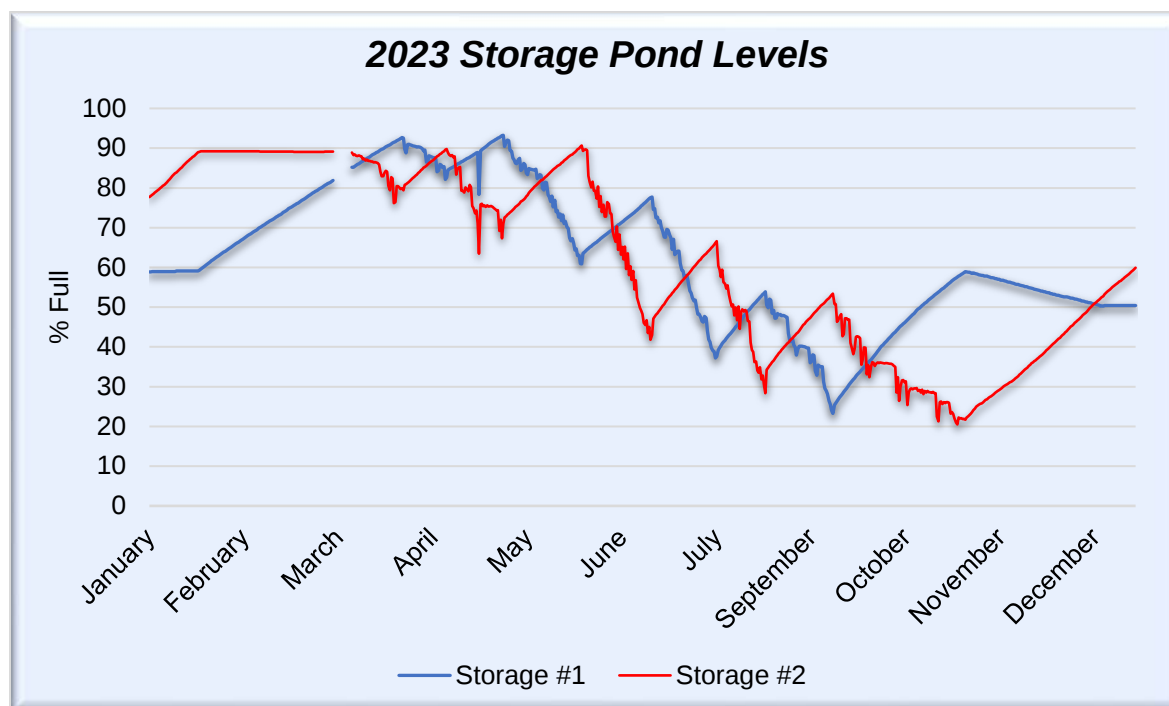
Storage Cells

Storage pond cell #1 and #2 2023:



*Monitored in real time by SCADA

Storage Cell #1 and #2 Combined:



Scheduled Maintenance Program

Our effluent storage ponds are monitored twenty-four hours a day seven days a week and programmed with alarms that contact the on-call operator for low and high level. Ponds are switched regularly during the irrigation season.

Main Pump Station, lagoon cells, and blower station are checked multiple times during the week physically as well as being monitored twenty-four hours a day by our SCADA system.

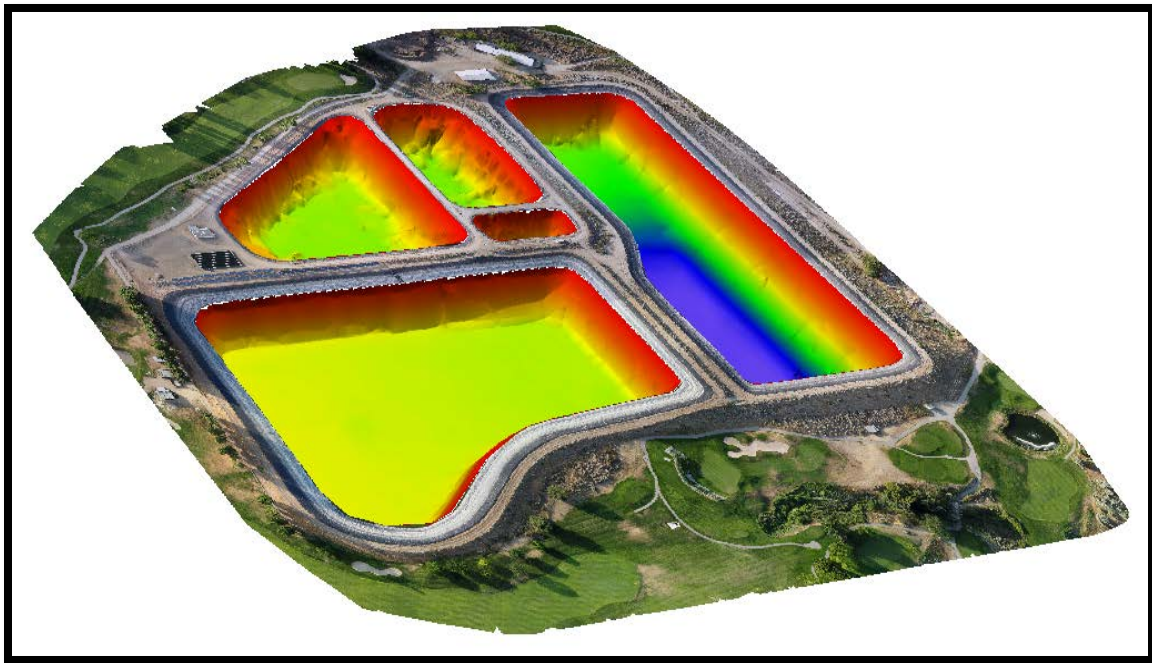
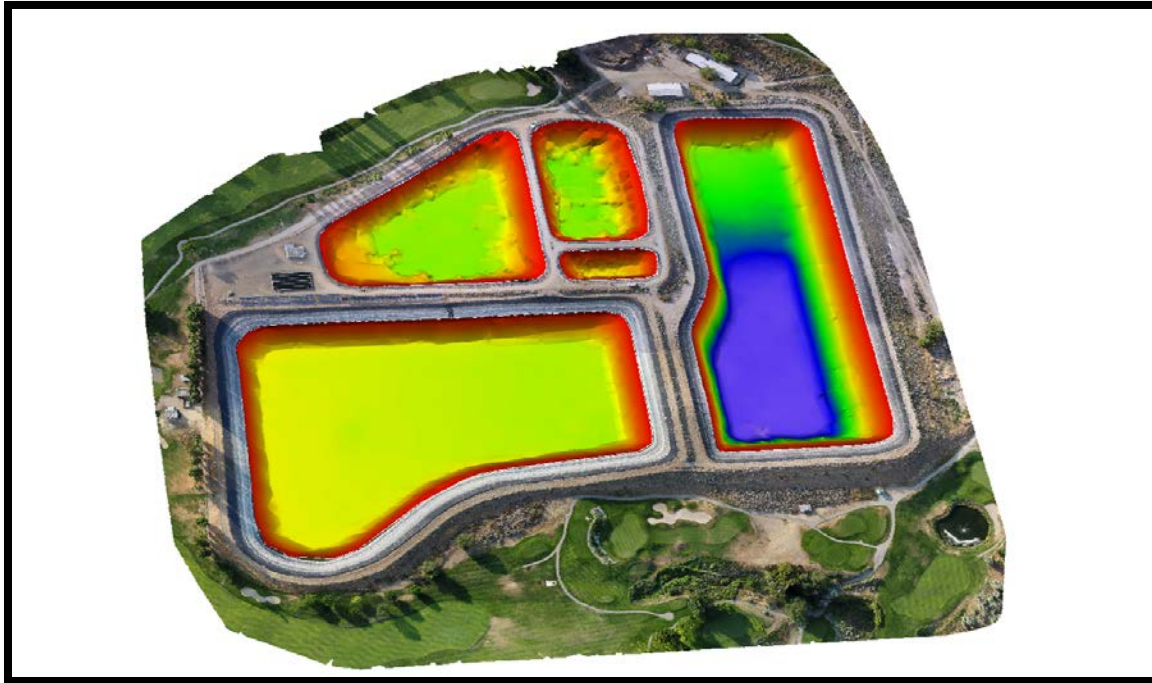
Records are kept of the following parameters physically:

- | | |
|--------------------|-------------------------------------|
| > Date | > PPD |
| > time | > CL2 Remaining |
| > Operator | > CL2 Demand |
| > security, | > Chlorine Total mg/L |
| > Pond 1 % | > Chlorine Free mg/L |
| > Pond 2 % | > Chlorine Demand mg/L |
| > Contact Tank % | > Ejector Supply PSI |
| > Desert M3 demand | > Filter: Side1, Side2 |
| > Meadow M3 demand | > Temp pH |
| > Combined M3 | > Dissolved Oxygen |
| > Total M3 | > Water Temp |
| > Total Hours | > Tonners |
| > Pump run time | > Blowers |
| > Pump amps H | > Pump Station |
| > PSI | > Total KWH of Lagoon Solar Array / |
| > GPM | |

Major Projects that Occurred in 2023

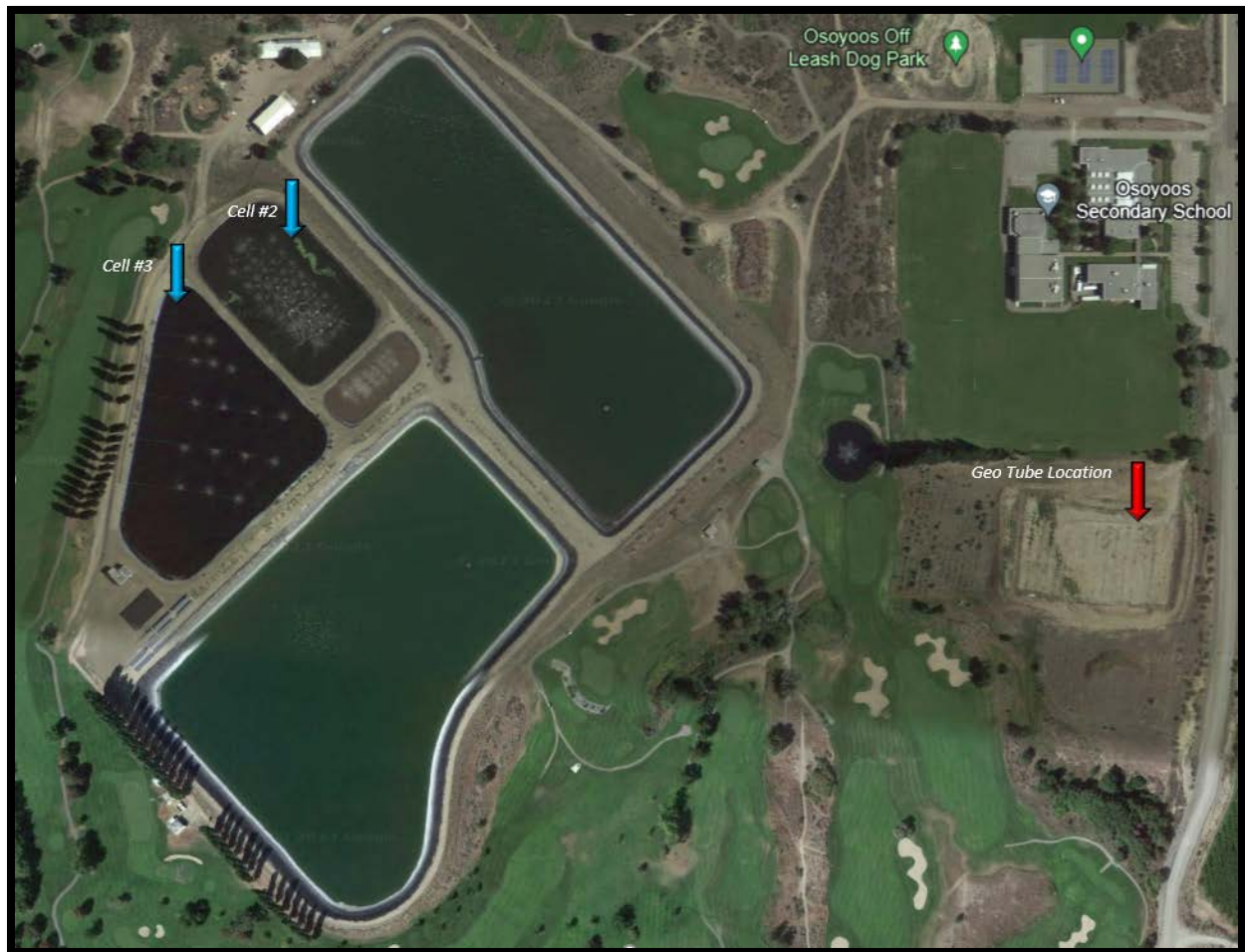
A full survey of our lagoon cells including the storage ponds was completed in July by Hydrasurvey from Edmonton Alberta. This was done as an investigation into possible causes of the extreme odor issues we had during Spring turnover. Sludge buildup was found in Cell #2 and #3. Quotes were obtained for sludge dredging after the survey was completed based off this information.

Sludge Survey Map:



Lagoon Dredging

Lambourne Environmental was awarded the contract and started work in November. A total of 77,500 kg of sludge was removed from Cells #2 and #3 and piped to Geo Tube bags adjacent to the previous bags.



As per our Operational Certificate and in consultation with our local Environmental Protection Officer, no bypass was needed, and Lagoon function was maintained throughout the process.



Lambourne Environmental dredging boat

Aerators were pulled cleaned and repaired in June by *CHB services*.

An *Osoyoos Sanitary System Infrastructure Master Plan* was also completed in 2023 by *TRUE consulting*. The recommendations are currently being reviewed and implemented. This document can be accessed at www.Osoyoos.ca.

Future Lagoon Capital Projects in 2024

A tender will go out during 2024 to start the preliminary design review and planning to address the treatment and odour concerns at the Wastewater Treatment Plant (WWTP), which will include Cell # 1 redesign, contact tank improvements, building retrofits, air supply improvements, general treatment improvements (Ultraviolet Disinfection), instrumentation improvements as well as increasing our green power generation options and initiatives.

This study is to address the ongoing odor issues Osoyoos is experiencing with its Lagoons.

Groundwater Monitoring Program

Monitoring Well Levels:

Location	MW-1-01		MW-02-01		MW-5-10		MW-6-10		MW-7-10		MW-8-10		MW-9-10		MW-10-21		MW-11-21	
Parameter	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*	Ground water level	Groundwater Quality Package*
Frequency	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual	Monthly	Semi Annual
Sample Type		Grab		Grab - Low Flow Method		Grab		Grab - Low Flow Method		Grab		Grab		Grab		Grab		Grab
January	9.24		8.05		8.75		empty		13.32		6.6		18.83		7.74		empty	
February	9.07		8.53		8.76		empty		12.5		6.45		14.88		7.74		empty	
March	9.15		8.75		8.74		empty		12.5		6.9		14.78		7.83		empty	
April	9.11	done	8.91	done	8.85	done	empty	empty	12.59	done	6.99	done	14.92	done	7.32	done	empty	empty
May	9.25		7.65		8.93		empty		12.6		5.88		14.78		7.5		empty	
June	9.57		7.73		8.93		empty		12.65		6.18		15.53		7.5		empty	
July	10.61		7.81		8.9		empty		12.89		6.56		14.55		7.71		empty	
August	10.66		7.88		8.84		empty		12.81		6.56		14.55		7.71		empty	
September	10.45	done	8.46	too low to sample	8.8	done	empty	empty	12.73	done	6.67	done	14.6	done	7.9	too low to sample	empty	empty
October	9.77		8.75		8.75		empty		12.67		6.79		14.5		7.98		empty	
November	9.3		9.14		8.75		empty		12.53		7.18		14.56		7.3		empty	
December	9.32		9.14		8.8		empty		12.57		7.49		14.56		7.12		empty	

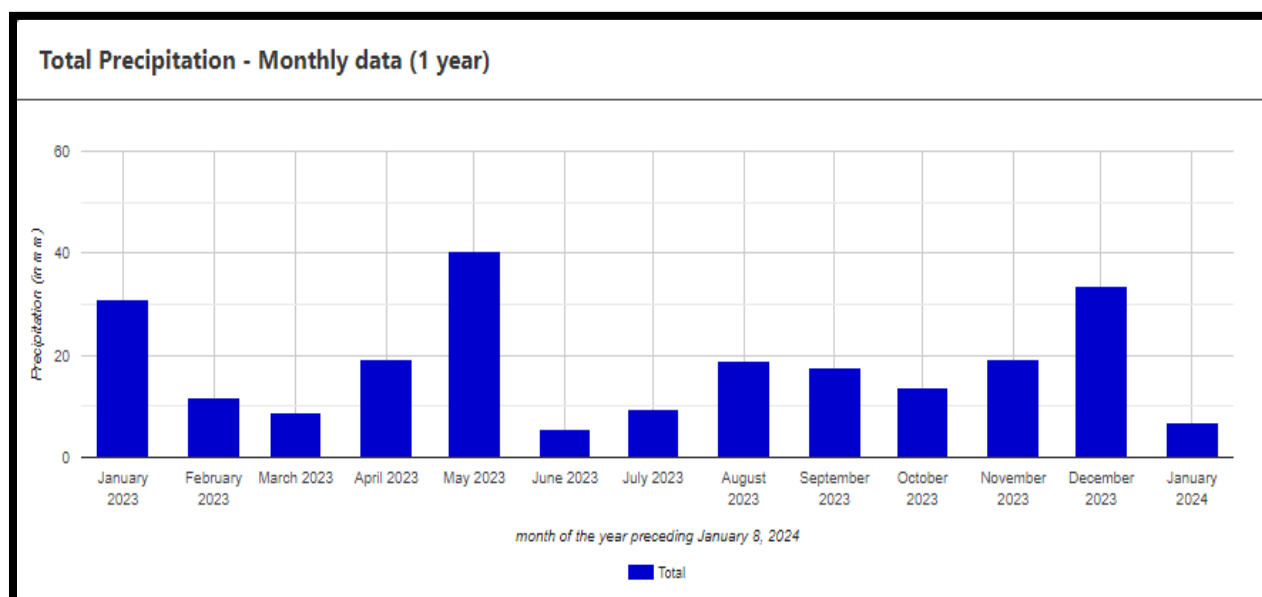
Groundwater April Sample Results:

LAB ID					23D2210-01	23D2210-02	23D2210-03	23D2210-04	23D2210-05	23D2210-06	23D2210-07
CLIENT ID					MW-8-10	MW-DP-10	MW-2-01	MW-9-10	MW-1-01	MW-7-10	MW-5-10
DATE SAMPLED					2023-04-19	2023-04-19	2023-04-19	2023-04-19	2023-04-19	2023-04-19	2023-04-19
DATE RECEIVED					2023-04-20	2023-04-20	2023-04-20	2023-04-20	2023-04-20	2023-04-20	2023-04-20
MATRIX					Water	Water	Water	Water	Water	Water	Water
General Method	Analyte	Units	MRL	Std (CDWQG)							
Anions	Chloride	mg/L	0.1	AO<=250	40.5	167	212	2.05	18.1	3.06	255
Anions	Nitrate (as N)	mg/L	0.01	MAC=10	5.21	14.7	18	0.137	0.025	<0.010	9.68
Anions	Nitrite (as N)	mg/L	0.01	MAC=1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calculated Parameters	Hardness, Total (as CaCO3)	mg/L	0.5	None Required	2140	334	442	144	511	249	562
Calculated Parameters	Nitrate+Nitrite (as N)	mg/L	0.01	N/A	5.21	14.7	18	0.137	0.025	<0.0100	9.68
General Parameters	Ammonia, Total (as N)	mg/L	0.05	None Required	<0.050	0.062	<0.050	<0.050	<0.050	0.059	0.163
General Parameters	Phosphorus, Total Dissolved	mg/L	0.005	N/A	0.0062	1.15	0.0409	0.0772	0.0124	0.0185	0.0084
General Parameters	Solids, Total Suspended	mg/L	2	N/A	5590	16	7.6	3.6	2.8	94.2	15
Total Metals	Calcium, total	mg/L	0.2	None Required	690	96.1	132	41.1	122	64.6	152
Total Metals	Magnesium, total	mg/L	0.01	None Required	101	22.8	27.1	10.1	50.2	21.3	43.9
Total Metals	Sodium, total	mg/L	0.1	AO<=200	56.9	139	99.3	16.6	40.4	12.5	123

Groundwater September Sample Results:

LAB ID					23I2325-01	23I2325-02	23I2325-03	23I2325-04	23I2325-05	23I2325-06
CLIENT ID					MW-8-10	MW-9-10	MW-1-01	MW-7-10	MW-5-10	LFMW-4-10
DATE SAMPLED					2023-09-19	2023-09-19	2023-09-19	2023-09-19	2023-09-19	2023-09-19
DATE RECEIVED					2023-09-19	2023-09-19	2023-09-19	2023-09-19	2023-09-19	2023-09-19
MATRIX					Water	Water	Water	Water	Water	Water
General Method	Analyte	Units	MRL	Std (CDWQGG)						
Anions	Chloride	mg/L	0.1	AO<=250	28.6	1.69	12.9	3.56	266	31.7
Anions	Nitrate (as N)	mg/L	0.01	MAC=10	6	0.132	<0.010	<0.010	9.61	<0.010
Anions	Nitrite (as N)	mg/L	0.01	MAC=1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Calculated Parameters	Hardness, Total (as CaCO3)	mg/L	0.5	None Required	1300	144	654	222	587	448
Calculated Parameters	Nitrate+Nitrite (as N)	mg/L	0.01	N/A	6	0.132	<0.0100	<0.0100	9.61	<0.0100
General Parameters	Ammonia, Total (as N)	mg/L	0.05	None Required	<0.050	<0.050	<0.050	0.051	<0.050	0.114
General Parameters	Phosphorus, Total Dissolved	mg/L	0.005	N/A	0.0054	0.078	0.0077	0.0218	0.0148	0.0105
General Parameters	Solids, Total Suspended	mg/L	2	N/A	114	4.8	162	11.6	21.2	4800
Total Metals	Calcium, total	mg/L	0.2	None Required	435	41.6	158	58.3	164	115
Total Metals	Magnesium, total	mg/L	0.01	None Required	51.7	9.62	63	18.5	43.2	39.1
Total Metals	Sodium, total	mg/L	0.1	AO<=200	42.5	16.5	42.4	13.3	123	35.2

2023 Monthly Precipitation for Osoyoos



2023 Osoyoos Monthly Precipitation	
Month	Precipitation in Millimetres
January	31.1
February	11.8
March	8.7
April	19.1
May	40.3
June	5.7
July	9.6
August	19
September	17.6
October	13.8
November	19.1
December	33.5

Appendix

- Thanks to Dave Gordin, Dave Stene, Karl Fichter, Gabe Wood and Manuel Mora for data collection and record keeping.
- All raw sample results obtained from CARO Analytical are available upon request.
- Groundwater monitoring information is available upon request.

- Environmental Protection Officer visited the lagoons in June. (Lagoons)
- Environmental Enforcement Officer performed a site inspection in October. (Lagoons)
- Attached: CARO Analytical raw sample data spreadsheet tabulated by month.

December 18, 1998

File: 76750-40/ME-12214(01)
PE-00086(02)

REGISTERED MAIL

Town of Osoyoos
PO Box 3010
Osoyoos BC V0H 1V0

Dear Ms. Elsie Lemke:

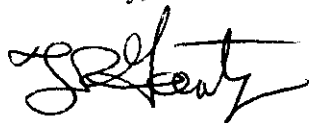
Enclosed is Operational Certificate ME-12214 issued under the provisions of the *Waste Management Act*. This Operational Certificate supercedes Permit PE-86 which is hereby cancelled in accordance with Section 18(12) of the *Waste Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the Operational Certificate. An annual fee will be determined according to the *Waste Management Permit Fees Regulation*.

This Operational Certificate does not authorize entry upon, crossing over, or use for any purpose of private or Crown lands or works, unless and except as authorized by the owner of such lands or works. The responsibility for obtaining such authority shall rest with the holder of the Operational Certificate. This Operational Certificate is issued pursuant to the provisions of the *Waste Management Act*, which makes it an offence to discharge waste without proper authorization. It is also the responsibility of the holder of the Operational Certificate to ensure that all activities conducted under this authorization are carried out with regard to the rights of third parties, and comply with other applicable legislation that may be in force.

This Operational Certificate may be appealed by persons who consider themselves aggrieved by this decision in accordance with Part 7 of the *Waste Management Act*. Written notice of intent to appeal must be received by the Regional Waste Manager within thirty (30) days.

Administration of this Operational Certificate will be carried out by staff from our Regional Office located at Suite 201, 3547 Skaha Lake Road, Penticton, B.C., V2A 7K2. Plans, data and reports pertinent to the Operational Certificate are to be submitted to the Regional Waste Manager at this address.

Yours truly,



T.R. Forty, P.Eng.
Assistant Regional Waste Manager
Pollution Prevention
Southern Interior Region

Enclosure



MINISTRY OF ENVIRONMENT,
LANDS AND PARKS

OPERATIONAL CERTIFICATE

ME-12214

Under the Provisions of the Waste Management Act

TOWN OF OSOYOOS

PO BOX 3010

OSOYOOS BRITISH COLUMBIA

VOH 1VO

is authorized to discharge effluent, from a municipal sewage collection and treatment system, to the ground by irrigation and infiltration, at Osoyoos, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the Waste Management Act and may result in prosecution.

1. AUTHORIZED DISCHARGES

- 1.1.** This subsection applies to the discharge of effluent from the municipal sewage treatment facility to the reclaimed water storage reservoirs. The flow is measured at the Legion Beach Lift Station, the Environmental Monitoring (EMS) site reference number for this site is E230277 and at the Desert Park lift station EMS site reference number E232882.

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Assistant Regional Waste Manager

- 1.1.1.** The maximum authorized rate of sewage wastes received, and therefore the maximum authorized rate of effluent to be discharged from the aerated sewage treatment lagoon system to the reclaimed water storage reservoirs, averaged on a monthly basis is the total of the flow from the Legion Beach Lift Station and the Desert Park lift station:

Year	Projection Annual Average	Projection Maximum Month Average
1997	1760 m ³ /day	2820 m ³ /day
1998	1800 m ³ /day	2880 m ³ /day
1999	1830 m ³ /day	2930 m ³ /day
2000	2030 m ³ /day	3250 m ³ /day
2001	2240 m ³ /day	3580 m ³ /day
2002	2410 m ³ /day	3860 m ³ /day
2003	2460 m ³ /day	3930 m ³ /day
2004	2510 m ³ /day	4010 m ³ /day
2005	2560 m ³ /day	4090 m ³ /day
2006	2610 m ³ /day	4170 m ³ /day
2007	2660 m ³ /day	4260 m ³ /day
2008	2720 m ³ /day	4340 m ³ /day

- 1.1.2.** The authorized works are sewage collection system, sewage and effluent pumping stations, pressure forcemain, and related appurtenances approximately located as shown on Site Plan A.

- 1.1.3.** The location of the sewage collection system is described generally as Osoyoos and surrounding area.

- 1.2.** This subsection applies to the discharge of effluent from the aerated sewage treatment lagoon system, after Cell #3, prior to storage. The Environmental Monitoring (EMS) site reference number for this discharge is E105001.

- 1.2.1.** The characteristics of the effluent discharged from the aerated sewage treatment lagoon system, after Cell #3, prior to storage, shall be equivalent to, or better than:

5 Day Biochemical Oxygen Demand	45 mg/L; and
Total Suspended Solids	60 mg/L.



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- 1.2.2. The authorized works are aerated sewage treatment lagoon system and related appurtenances approximately located as shown on attached Site Plan A.
- 1.2.3. The location of the aerated sewage treatment lagoon system facilities is Lot 766, Plan 2476 and Lot 974, Plan 16985, SDYD.
- 1.3. This subsection applies to the reclaimed water which is beneficially used for trickle and spray irrigation, after storage and chlorination. The EMS site reference number for this discharge is E207444.
 - 1.3.1. There is no maximum authorized rate of reclaimed water which may be beneficially used for irrigation.
 - 1.3.2. The authorized works are two (2) effluent storage reservoirs, chlorination facilities, spray and trickle irrigation facilities, and related appurtenances approximately as shown on attached Site Plan A.
 - 1.3.3. The locations where reclaimed wastewater may be irrigated are described generally as Osoyoos and surrounding area, as indicated in the approved Town of Osoyoos Liquid Waste Management Plan.
- 1.4. This subsection applies to the discharge of surplus effluent to the infiltration basin facilities. The EMS site reference number for this discharge is E218460.
 - 1.4.1. The Town of Osoyoos is authorized to discharge effluent that is surplus to the needs of the effluent irrigation system to an infiltration basin facility. There is no maximum authorized amount, as this is, in effect, a safety valve for the system.
 - 1.4.2. The authorized works are infiltration facilities and related appurtenances approximately as shown on attached Site Plan A.
 - 1.4.3. The location of the point of discharge is Lot 766, Plan 2476, and Lot 974, Plan 16985, SDYD.

2. ANNUAL PERMIT FEE CALCULATION

For the purposes of permit fee calculation, the following discharge factors have been assumed for the characteristics of the reclaimed wastewater discharged from the reclaimed wastewater storage reservoirs and beneficially used for irrigation:

- 2.1. The reclaimed water flow irrigated is assumed to equal the flow of sewage into the aerated sewage treatment system, as measured at the Legion Beach Lift Station (E230277) and Desert Park lift station (E232882).



T.R. Forty, P.Eng.
Assistant Regional Waste Manager

- 2.2.** The quality parameters to be used for permit fee calculation purposes are:

5 Day Biochemical Oxygen Demand	10 mg/L; and
Total Suspended Solids	10 mg/L.

3. REQUIREMENTS - GENERAL

3.1. Maintenance of Works, Emergency Procedures and Non-Compliance Reporting

Inspect the pollution control works regularly and maintain them in good working order. In the event of an emergency or condition which prevents the Town of Osoyoos from complying with a requirement of the Operating Certificate that would otherwise be applicable, that requirement will be suspended for such time as the emergency exists or as otherwise directed by the Regional Waste Manager provided that:

- 3.1.2.** The Town can demonstrate the exercise of due diligence in relation to the process, operation or event which has caused the emergency, and that the emergency has occurred notwithstanding this exercise of due diligence;
- 3.1.3.** The Regional Waste Manager has been immediately notified of the emergency; and,
- 3.1.4.** The Town is proceeding with due diligence to correct the emergency condition.

3.2. Bypasses

The discharge of effluent which has bypassed the designated treatment works is prohibited unless the approval of the Regional Waste Manager is obtained and confirmed in writing.

3.3. Process Modifications

The Town shall notify the Regional Waste Manager prior to implementing changes to any process that may affect the quality and/or quantity of the discharge. The approval of the Regional Waste Manager shall be received prior to implementing the process modifications.

3.4. Alternate Water Supply

The Town shall provide alternate water supplies if any privately owned well should be adversely affected by irrigation with reclaimed water, as determined by the Regional Waste Manager.



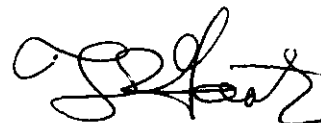
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Assistant Regional Waste Manager

3.5. Plans - New Works

- 3.5.1. Plans and specifications of any proposed new works, modifications or additions to the existing works authorized in this Operational Certificate, with the exception of the sewage collection system, shall be submitted to the Regional Waste Manager, and his written consent obtained before construction commences. Plans shall be signed and sealed by a Professional Engineer licensed to practise in the Province of British Columbia. The works shall be constructed in accordance with such plans.
- 3.5.2. Copies of all "as-built" plans and drawings for the sewage treatment system, signed and sealed by a Professional Engineer licensed to practise in the Province of British Columbia, shall be submitted to the Regional Waste Manager.
- 3.5.3. Retain a copy of all "as-built", plans of modifications and/or extensions to the sewage collection system for perusal by the Regional Waste Manager, or his designate, upon request.
- 3.5.4. Design and construct the irrigation works in accordance with best current agricultural practice, and in accord with:
- The "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia.
- The "B.C. Sprinkler Irrigation Manual" 1989 issue, prepared by the B.C. Ministry of Agriculture and Fisheries.
- The "B.C. Trickle Irrigation Manual" 1987 issue, prepared by the B.C. Ministry of Agriculture and Fisheries.
- The "Health and Safety Criteria for the Use of Reclaimed Wastewater", 1991, developed by the Ministry of Health and the Ministry of Environment.

3.6. Operation and Maintenance

- 3.6.1. Operate and maintain a system of preventative maintenance for the sewage treatment, reclaimed wastewater utilization and infiltration works.
- 3.6.2. Develop and maintain an Operation and Maintenance Manual for the sewage treatment, reclaimed wastewater utilization and infiltration works. The Operation and Maintenance Manual shall be completed by **December 31, 2003**. A copy of the Operation and Maintenance Manuals shall be retained at the treatment plant for inspection, by the Regional Waste Manager or designate.



T.R. Forty, P.Eng.
Assistant Regional Waste Manager

3.7. Facility Classification

Maintain the wastewater treatment facility classification as authorized in this Operational Certificate with the "Environmental Operator's Certification Program" (EOCP). The sewage treatment plant, reclaimed wastewater utilization system and the effluent disposal works are presently classified as a Level I facility.

3.8. Operator Certification

3.8.1. The works shall be operated and maintained by persons certified within and according to the program provided by the EOCP. Certification must be completed to the satisfaction of the Regional Waste Manager. In addition, the Regional Waste Manager shall be notified of the classification level of the facility and certification level of the operators, and changes of operators and/or operator certification levels within 30 days of any change. List of current Certified Operators shall be included in the annual report.

3.8.2. All operators in training (OIT) working at this facility currently classified by the EOCP as Level I, shall be required to successfully pass an OIT examination within three (3) months of commencement of employment at the facility. The OIT certificate shall be valid for fifteen (15) months from the date of issue. Prior to the expiry date of the OIT certificate, but not sooner than twelve (12) months from the date when the OIT commenced facility operation, the OIT shall successfully complete a Class I certification examination in order to continue to operate at the facility.

3.9. Improvement of Works

The Town shall acquire and/or reserve sufficient land for the construction or expansion of future sewage treatment facilities. The phasing of new works shall be in accord with the Town of Osoyoos Liquid Waste Management Plan.

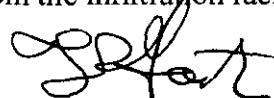
3.10. Infiltration Facilities

3.10.1. Details regarding any proposed discharge to infiltration shall be under the direction of a suitably qualified consultant. A copy of the proposed discharge details, including rate, volume and quality, and rationale for the discharge, is to be submitted to the Regional Waste Manager.

3.10.2. The use of the infiltration facilities shall occur only with the written authorization of the Regional Waste Manager.

3.10.3. The Town shall maintain a minimum freeboard of 0.5 m and ensure that there is no overflow from the infiltration facilities to the environment.

3.10.4. Surface drainage shall be diverted away from the infiltration facilities.



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Assistant Regional Waste Manager

3.10.5. Any residue removed from the infiltration facility shall be disposed of in a manner approved by the Regional Waste Manager.

3.10.6. Details of discharges to infiltration to be included in the Annual Report each year.

3.11. Fencing

The Operational Certificate holder shall erect a fence around the treatment plant facilities and such other areas, as required by the Regional Waste Manager. The height and type of fencing shall meet the approval of the Regional Waste Manager.

3.12. Odours

Should odours become objectionable, additional works shall be provided when so directed in writing by the Regional Waste Manager.

3.13. Influent Wastes Bylaw

In order to minimize the potential effect of heavy metals or other toxic materials in the effluent and/or sludge, amend as required, the Influent Wastes Bylaw, Building Bylaw, or other bylaws, to regulate the input of such wastes to the sewage collection system. The Town is encouraged to discourage the installation of devices to process household putrescible waste for disposal to the sewage collection system. Any amendments made to the Influent Bylaw shall be noted in the Annual Report.

3.14. Surface Water Diversionary Works

Surface water shall be intercepted and diverted away from the effluent treatment facilities to the greatest extent possible.

3.15. Signage

3.15.1. A suitable sign erected at the main entrance to the treatment plant site shall have the appropriate emergency phone numbers for use by the general public and others.

3.15.2. Prominent "No Trespassing" signs, acceptable to the Regional Waste Manager shall be erected and maintained around the reclaimed wastewater reservoir advising of the contents of the reservoir.

3.15.3. Prominent "NO TRESPASSING", signs shall be erected around agricultural and silvicultural sites irrigated with reclaimed wastewater, warning persons of the possible health hazard during the irrigation season and advising that the water used for irrigation is NOT POTABLE. The wording shall be in language or symbols readily comprehensible by the general public. e.g. "NO TRESPASSING - RECLAIMED WASTEWATER - DO NOT DRINK".



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Assistant Regional Waste Manager

3.16. Leakage

Operate and maintain the aerated lagoons and the reclaimed wastewater storage reservoirs to minimize fluid leakage. Leakage shall not aggravate or produce soil or bedrock instability or erosion, or contaminate ground or surface water.

3.17. Contingency Plan

The Town is to prepare a Contingency Plan that will address the appropriate course of action to be taken in any particular preconceived emergency situation. The Contingency Plan shall include Spill Procedures including other leaks and any potential point of concern in the collection, treatment and disposal systems. Attention is to be given to public safety and the protection of the environment. The Contingency Plan is to be completed by **December 31, 2003**, and updated annually, or as necessary, to reflect the current operation. A copy of the Contingency Plan, when complete shall be submitted to the Regional Waste Manager. Any changes or amendments to the Contingency Plan shall be included in the annual report.

3.18. Irrigation Plan

The Town is required to submit an Irrigation Plan of all new areas of land to be irrigated. The Irrigation Plan shall include: property location, owner, acreage, irrigation type, duration, rates, crops and intensity, or other wastewater use where reclaimed wastewater is beneficially used (i.e. dust control purposes).

To be included in the Irrigation Plan, a detailed Soils Assessment is required for any new areas of land to be irrigated.

Written authorization from the Regional Waste Manager is required prior to commencement of irrigation with reclaimed wastewater on any new areas.

A plan is to be submitted with the Annual Report each year showing all areas irrigated with reclaimed water during the previous year.

3.19. Soils Assessment

A detailed Soil Assessment shall be completed of any new agricultural areas to be irrigated. The Soils Assessment shall be submitted to the Regional Waste Manager and is to be included in the "Irrigation Plan", which shall be performed by a suitably qualified professional (Agrologist or Pedologist), using best current climate and soils data to substantiate that the proposed irrigation land is capable of accepting reclaimed wastewater for irrigation purposes. The Soils Assessment is to include any suggested restrictions or recommendations, also the assessment will include the recommendation as to the frequency required for further soil assessments of the agricultural areas irrigated.



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Assistant Regional Waste Manager

Written authorization from the Regional Waste Manager, to proceed with irrigation on any new agricultural area(s), must be received prior to commencing irrigation.

3.20. Sludge Management Plan

The frequency of withdrawal of sludge from the sewage treatment plant facilities and used for disposal and/or utilization shall be developed into a Sludge Management Plan. The Sludge Management Plan shall be prepared and submitted to the Regional Waste Manager for approval on or before **December 31, 1999**. The Sludge Management Plan shall be amended as required. Any changes or amendments to the Sludge Management Plan shall be included in the Annual Report.

4. REQUIREMENTS - RECLAIMED WASTEWATER IRRIGATION

4.1. Disinfection - Chlorination

- 4.1.1.** Disinfection shall be maintained in the reclaimed water discharged from the reclaimed water storage reservoirs to the irrigation system.
- 4.1.2.** Reclaimed water used for irrigation must have at least one hour of chlorine contact time at average flow rate. A chlorine residual of at least 1 mg/L must be maintained at all times, immediately prior to irrigating.
- 4.1.3.** Reclaimed water utilized for irrigation shall conform to the effluent irrigation guidelines developed by the B.C. Ministry of Health and Ministry of Environment, Lands and Parks. Fecal coliforms shall not exceed 200 MPN per 100 mL for agricultural, silvicultural and low public use lands, or exceed 2.2 MPN per 100 mL for high public use lands.

4.2. Annual Irrigation Period

- 4.2.1.** The authorized discharge period for irrigation using spray/trickle irrigation techniques is during the period **March 15 to November 15** each year.
- 4.2.2.** With the written authorization of the Regional Waste Manager, the irrigation schedule may be extended on a weekly basis beyond these limits. Any extension will be considered only upon receipt of a substantiated written request and submission of a soils assessment produced by a suitably qualified professional agrologist for those areas to receive irrigation.

4.3. Buffer Zones

- 4.3.1.** The requirement for formal buffer zones surrounding lands irrigated with reclaimed water is no longer in effect, however, buffer zones may be specified by the Regional Waste Manager.



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Assistant Regional Waste Manager

4.3.2. Reclaimed water applied by irrigation shall not be applied to the ground any closer than 15 metres from the edge of flowing streams or bodies of water.

4.3.3. There shall be no reclaimed water irrigated within 30 metres of any well or in-ground reservoir used for domestic supply purposes.

4.4. Surface Runoff

There shall be no surface runoff of irrigated reclaimed water from the irrigated lands.

4.5. Surfacing Reclaimed Water

Irrigation shall be managed in such a fashion as to preclude surfacing of irrigation tailwater downslope of the point of irrigation.

4.6. Spray Irrigation Drift

The following strategy shall be followed to minimize the necessity to shut down the irrigation system, or portions thereof, during windy conditions:

4.6.1. The reclaimed water irrigation system shall be managed in such a fashion as to preclude aerosol drift from leaving the irrigated lands.

4.7. Irrigation Rates

4.7.1. The general philosophy of the operation of the irrigation system shall be for beneficial utilization of reclaimed water, not disposal. This philosophy is necessary to prevent excessive irrigation and subsequent negative impact on the irrigated lands and lands downgradient of the irrigated lands.

4.7.2. Irrigation rates for spray irrigation shall not exceed the rates given in "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries.

4.7.3. Irrigation rates for trickle irrigation shall not exceed the rates given in "B.C. Trickle Irrigation Manual", dated 1987, prepared by the B.C. Ministry of Agriculture and Fisheries.

4.7.4. Irrigated lands shall be monitored to prevent saturation, erosion, surfacing tailwater, and instability both in the irrigated areas and downgradient of the irrigated lands.

4.8. Agricultural Products Lag Time

4.8.1. A three day lag time is required before uninspected livestock intended for human consumption are permitted on areas irrigated with reclaimed water. No lag time is required if livestock are subjected to the federal meat inspection program.



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Assistant Regional Waste Manager

- 4.8.2. A six day lag time is required before dairy cattle are permitted in areas irrigated with reclaimed water.
- 4.8.3. A three day lag time, after irrigation has ceased, is required before a crop intended for animal feed is harvested.

5. MONITORING PROGRAMS

5.1. Wastewater Flow - Monitoring Program

5.1.1. Flow Measurement - Legion Beach Lift Station

Provide and maintain a suitable flow measuring device and **record once per day**, at the **Legion Beach lift station**, the water discharged to the sewage treatment facility over a 24-hour period. The EMS site reference number for this site is **E230277**.

5.1.2. Flow Measurement - Desert Park Lift Station

Provide and maintain a suitable flow measuring device and record once per day, at the **Desert Park Lift Station**, the water discharged to the sewage treatment facility over a 24-hour period. The EMS site reference number for this site is **E232882**.

5.2. Influent - Monitoring Program

5.2.1. Grab Sampling

Install and maintain a suitable sampling facility at the **headworks of the plant** and obtain a grab sample of the plant influent **semi-annually** (a proportional continuous sampler is desirable, but not mandatory). The EMS site reference number for this site is **E230037**.

5.2.2. Analyses

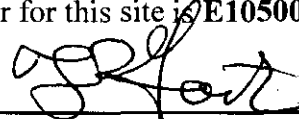
Obtain analyses of the influent sample for the following:

- (a) total phosphorus and ortho phosphorus, expressed as P in mg/L; and
- (b) 5-day biochemical oxygen demand, mg/L.

5.3. Effluent - Monitoring Program

5.3.1. Grab Sampling

The Town shall install and maintain a suitable sampling facility and obtain a grab sample of the effluent **from the aerated lagoons, after Cell #3 prior to storage**. The EMS site reference number for this site is **E105001**.



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5.3.2. Analyses

Obtain analyses of the sample for the following:

- a) 5-day biochemical oxygen demand, mg/L, **monthly**;
- b) total suspended solids (non-filterable residue), mg/L, **monthly**;
- c) total phosphorus, ortho phosphorus and total dissolved phosphorus, all expressed as mg/L P, **semi-annually**; and
- d) total nitrogen, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, and organic nitrogen, all expressed as mg/L N, **semi-annually**.

5.3.3. Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.

5.4. Storage Reservoir - Monitoring Program

5.4.1. Water Levels

Provide and maintain suitable staff gauges or other similar devices, as approved by the Regional Waste Manager, **in the two (2) reclaimed water storage reservoirs**. Take **weekly measurements** of the water levels in the storage reservoirs on a year round basis. The EMS site reference numbers for the reservoirs are as follows:

Storage Reservoir #1 (older reservoir to south) - **E230038**

Storage Reservoir #2 (new reservoir to north) - **E230039**

5.4.2. Storage Volumes

Calculate and record the corresponding volumes of reclaimed water contained in each storage reservoir on a **weekly basis** for graphical analysis.

5.5. Irrigation - Monitoring Program

5.5.1. Flow Measurement

Provide and maintain a suitable flow measuring device and record, on a **weekly basis**, the **reclaimed water irrigation volumes**, location/area, property owner, irrigation type, duration, rate, and crop or other use. Submit the monthly and annual summaries to the Regional Waste Manager with the Annual Report.

5.5.2. Grab Sampling

The Town shall obtain a grab sample of the reclaimed water, **during the irrigation season, from the discharge end of the chlorine contact chamber**. The EMS site reference number is **E207444**.



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5.5.3. Analyses

Obtain analyses of the sample for the following:

- a) fecal coliforms MPN/100 ml, **monthly**;
- b) total coliforms MPN/100 ml, **monthly**;
- c) total phosphorus mg/L, **monthly**;
- d) total nitrogen, mg/L, **monthly**; and
- e) chlorine residual, mg/L, **weekly**.

5.6. Sludge - Monitoring Program

5.6.1. Sampling

Obtain a representative sample of the sludge produced at the treatment plant **once per year from the first aerated lagoon, Cell #1**. The EMS site reference number is **E230278**.

5.6.2. Analyses

Obtain analyses of the sludge sample for the following:

Total solids (TS), g/L;
Moisture content, %;
Volatile suspended solids (V.S.S), g/L;
Total Kjeldahl Nitrogen (T.K.N.), g/L and g/kg dry solids;
Aluminum, mg/kg;
Arsenic, mg/kg;
Cadmium, mg/kg;
Calcium, mg/kg;
Chromium, mg/kg;
Cobalt, mg/kg;
Copper, mg/kg;
Iron, mg/kg;
Manganese, mg/kg;
Mercury, mg/kg;
Molybdenum, mg/kg;
Nickel, mg/kg;
Lead, mg/kg;
Silver, mg/kg;
Sodium, mg/kg; and
Zinc, mg/kg.

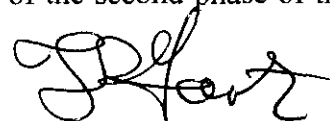


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- 5.6.3. Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.

5.7. Ground And Surface Water - Monitoring Program

- 5.7.1. A Ground and Surface Water Monitoring Program, shall be submitted to the Regional Waste Manager. The Monitoring Program shall be designed by a suitably qualified Professional Engineer (Hydrogeologist) or a Hydrogeological Technologist licensed to practice in the Province of British Columbia. The Monitoring Program is to establish with acceptable scientific accuracy, the groundwater flow pattern and nutrient removal capability of the soil to ensure reasonable notice of impending high phosphorus or nitrate levels that may adversely affect surface water, groundwater or domestic waterwells. The sampling, measurement frequency, water level elevations and analyses shall be conducted in accordance with the Monitoring Program upon its written authorization by the Regional Waste Manager.
- 5.7.2. The Monitoring Program will consist of two phases. The **first phase** will consist of an inventory of all existing ground and surface water monitoring sites. This inventory is to be completed and submitted to the Regional Waste Manager by **March 31, 1999**. The **second phase** of the program will assess and determine the most appropriate sites for monitoring; upgrade wells, if required; establish and install any additional new recommended monitoring sites; and submit the outline for Ground and Surface Water Monitoring Program. The second phase of the monitoring program is to be complete and submitted to the Regional Waste Manager by **December 31, 1999**.
- 5.7.3. The results of the Ground and Surface Water Monitoring Program is to be reviewed annually by a suitably qualified Professional Engineer (Hydrogeologist) or a Hydrogeological Technologist licensed to practice in the Province of British Columbia and any recommendations for changes to the Monitoring Program are to be included with the Annual Report each year.
- 5.7.4. The Ground and Surface Water Monitoring Program is to incorporate the existing EMS groundwater monitoring wells and the surface water monitoring sites that were previously monitored by the Ministry of Environment, Lands and Parks, or other agencies, and any proposed or future monitoring sites, as authorized by the Regional Waste Manager.
- 5.7.5. The Town shall provide precise latitude and longitude values, with an accuracy of at least plus or minus 10 metres, for each ground and surface water monitoring site established as part of the second phase of the Ground



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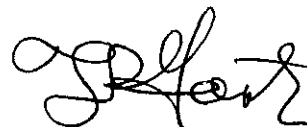
and Surface Water Monitoring Program, and for any additional sites that may be added each year. The data is to be submitted to the Regional Waste Manager with the Annual Report.

6. SAMPLING AND ANALYTICAL REQUIREMENTS

- 6.1. Proper care should be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc.
- 6.2. Occasional full chemical analysis of the main cations and anions and other characteristics may be required at the discretion of the Regional Waste Manager.
- 6.3. The Town is required to follow the terms and conditions of the Quality Assurance Regulation (EQDA), or other legislation that may be in effect at the time. Ten percent of the samples collected shall be duplicated to provide data quality assurance. Quality control information generated by the Permittee lab while analyzing parameters required by this Operational Certificate shall also be provided with the raw data required to be reported.
- 6.4. The sampling, flow and monitoring requirements specified in Section 8 (including all subsections) above shall be carried out in accordance with the appropriate procedures listed in the table below. Alternative test methods may be used provided that the alternative test methods are authorized by the Regional Waste Manager prior to performing the actual source testing. Test methods for parameters not listed below require the consent of the Regional Waste Manager.

LIQUID EFFLUENTS, SURFACE WATER, GROUND WATER, SOILS, SEDIMENTS, VEGETATIVE MATTER:		
Parameter	Source Testing Procedure	Analytical Procedure
Metals Nutrients Organics Toxicity	British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 1996 Permittee Edition	British Columbia Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials, March, 1994, Permittee Edition

The above manuals are available from Queen's Printer Publications Centre, P.O. Box 9452, Stn. Prov. Govt, Victoria, BC, V8W 9V7 (1-800-663-6105 or (250)387-4609). The above manuals are also available for inspection at all Pollution Prevention offices.



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7. REPORTING

7.1. General Reporting

- 7.1.1.** Maintain all monitoring data required for inspection by the Regional Waste Manager or his designate.
- 7.1.2.** The influent, effluent, spray/trickle reclaimed water irrigation, infiltration and sludge analyses and related flow data is to be submitted to the Regional Waste Manager such that they are received by the Regional Waste Manager within 30 days of the results being received, or produced, by the Town.
- 7.1.3.** Monitoring data shall be entered into EMS electronically and submitted in electronic and printed format satisfactory to the Regional Waste Manager.

7.2. Annual Reporting

- 7.2.1.** Submit an Annual Report which includes a summary of the results of all sampling and monitoring programs as specified in this Operational Certificate. Provide data interpretation and trend analyses where appropriate.
- 7.2.2.** The Annual Report is to be in a format which is suitable for review by the public and/or other government agencies.
- 7.2.3.** The Annual Report is due on or before 90 days following the end of a calendar year for that year's monitoring. Raw data, suitably tabulated, including the EDQA quality control information, are to be attached as appendices to the report.
- 7.2.4.** Maintain and submit records of the following, each year, which are to be part of the Annual Report:
 - 7.2.4.1.** Records of sewage flow to the aerated treatment lagoons as required under the Wastewater Flow - Monitoring Program.
 - 7.2.4.2.** Records of sewage treatment plant influent quality, as required under the Influent - Monitoring Program.
 - 7.2.4.3.** Records of effluent quality prior to the storage reservoirs as required in the Effluent - Monitoring Program.
 - 7.2.4.4.** Records of the elevations for both reclaimed water storage reservoirs and the corresponding annual storage volumes available, as required under the Storage Reservoir - Monitoring Program.
 - 7.2.4.5.** Records of the reclaimed water quality and volumes beneficially used, as well as, property location, owner, acreage, irrigation type,



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duration, rate, crop and intensity, or other use, where irrigation occurs, as required under the Irrigation - Monitoring Program.

- 7.2.4.6. Records of effluent quantity and quality for discharges to the infiltration facilities.
- 7.2.4.7. Records of sludge quality as per the Sludge - Monitoring Program.
- 7.2.4.8. Frequency of withdrawal and volumes for disposal and/or utilization, as required in the Sludge Management Plan.
- 7.2.4.9. Records of groundwater well elevations and ground and surface water quality, as required under the Ground and Surface Water - Monitoring Program.
- 7.2.4.10. Copy of the Annual Flow Summaries.
- 7.2.4.11. Copy of the Annual Irrigation Summaries.
- 7.2.4.12. Copy of monthly precipitation records for Osoyoos area (arrangements can be made to obtain precipitation information, contact Gary Myers, Climate Services, Environmental Canada, at 604-664-9067).



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APPENDIX A

Requirements of Reclaimed Wastewater Users

The holder of this Operational Certificate (The reclaimed wastewater supplier) shall be responsible for ensuring that contractual agreement(s) with each Reclaimed Wastewater User are in accordance with the Operational Certificate.

A copy of this Appendix is to be provided to EACH USER prior to the commencement of irrigation EACH YEAR.

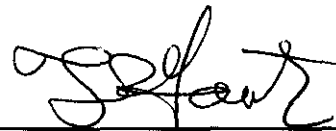
8. GENERAL REQUIREMENTS

8.1. Plans - New Works - New Agricultural Areas

- 8.1.1. Plans for modifications and/or extensions to the reclaimed water irrigation system shall be approved by a person qualified in the design of irrigation systems and the Irrigation Plan and the Soils Assessment is to be submitted to the Regional Waste Manager for authorization prior to the commencement of irrigation on new agricultural areas.
- 8.1.2. Design and construct the irrigation works in accordance with best current agricultural practice and the "Pollution Control Guidelines for Municipal Effluent Application to Land", dated January 1983, and any amendments thereto, issued by the Ministry of Environment of British Columbia, and also in accordance with the "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries or the "B.C. Trickle Irrigation Manual", dated 1987, prepared by the B.C. Ministry of Agriculture and Fisheries.

8.2. Construction Criteria

- 8.2.1. All reclaimed water user valves, shall be of a type, or secured in a manner, that permits operation by only personnel authorized by each wastewater user. All piping, valves and outlets should be clearly marked to differentiate reclaimed wastewater from domestic water. All reclaimed wastewater controllers, valves, etc., shall be affixed with reclaimed water warning signs. It is recommended that, where possible purple coloured pipe and fixtures be utilized to facilitate identification of reclaimed water piping and fixtures.



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- 8.2.2. Use or installation of hose-bibs on any irrigation system presently operating, or designated to operate with reclaimed wastewater, regardless of the hose-bib construction or identification, is not permitted.
- 8.2.3. There shall be at least a 3 metre horizontal and a 0.3 metre vertical separation (with domestic water pipeline above the reclaimed water pipeline) between all pipelines transporting reclaimed water and those transporting domestic water.
- 8.2.4. There shall be no connection between a potable water supply, irrigation water or industrial well, and piping containing reclaimed wastewater, except through an air gap separation or reduced pressure principle device.

8.3. Fencing

The reclaimed water user **may be** required by the Regional Waste Manager to erect a fence around the disposal area to restrict public access. The height and type of fencing shall meet the approval of the Regional Waste Manager.

8.4. Signage

- 8.4.1. Prominent "NO TRESPASSING", signs shall be erected around agricultural and silvicultural sites irrigated with reclaimed water, warning persons of the possible health hazard during the irrigation season and advising that the water used for irrigation is NOT POTABLE. The wording shall be in language or symbols readily comprehensible by the general public. e.g. "NO TRESPASSING - RECLAIMED WASTEWATER - DO NOT DRINK"
- 8.4.2. Warning signs shall be posted in sufficient numbers and size and at strategic locations to advise the public that reclaimed water is being used. Additional signage may be required as directed by the Regional Waste Manager.

9. GENERAL REQUIREMENTS - RECLAIMED WASTEWATER IRRIGATION

9.1. Buffer Zones

- 9.1.1. The requirement for formal buffer zones surrounding lands irrigated with reclaimed water is no longer in effect, however, a buffer zone may be specified by the Regional Waste Manager.
- 9.1.2. Reclaimed water applied by irrigation shall not be applied to the ground any closer than 15 metres from the edge of flowing streams or bodies of water.
- 9.1.3. There shall be no reclaimed water irrigated within 30 metres of any well or in-ground reservoir for domestic supply.



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9.2. Surface Runoff

- 9.2.1. There shall be no surface runoff of irrigated reclaimed wastewater from the irrigated lands.
- 9.2.2. The maximum ground slope shall not exceed 20% without the written consent of the Regional Waste Manager.

9.3. Surfacing Reclaimed Water

- 9.3.1. Irrigation shall be managed in such a fashion as to preclude surfacing of irrigation tail water down slope of the point of irrigation.
- 9.3.2. Irrigation shall be managed as to prevent ponding.

9.4. Spray Irrigation Drift

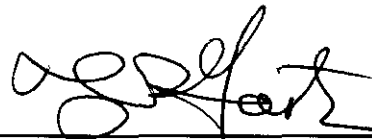
- 9.4.1. Reclaimed water shall be confined to the area designated and approved for irrigation with reclaimed water. The reclaimed water irrigation system shall be managed in such a fashion as to prevent aerosol drift from leaving the irrigated lands.
- 9.4.2. Precautions shall be taken to ensure that reclaimed water will not have contact with any facility or area not designated for reclamation, such as passing vehicles, buildings, domestic water facilities, fruit and vegetable gardens, or food handling facilities.
- 9.4.3. Drinking water facilities shall be protected from direct or wind blown reclaimed water spray.

9.5. Irrigation Rates

- 9.5.1. Irrigation rates for spray irrigation shall not exceed the rates given in "B.C. Sprinkler Irrigation Manual", dated 1989, prepared by the B.C. Ministry of Agriculture and Fisheries and irrigation rates for trickle irrigation shall not exceed the rates given in those given in "B.C. Trickle Irrigation Manual", dated 1987, prepared by the B.C. Ministry of Agriculture and Fisheries.
- 9.5.2. Soils of the irrigated lands will be monitored periodically or as otherwise directed by the Regional Waste Manager or the Town, to prevent saturation, erosion, and instability.

9.6. Agricultural Products Lag Time

- 9.6.1. A three day lag time is required before uninspected livestock intended for human consumption are permitted on areas irrigated with reclaimed water. No lag time is required if livestock are subjected to the federal meat inspection program.



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9.6.2. A six day lag time is required before dairy cattle are permitted in areas irrigated with reclaimed wastewater.

9.6.3. A three day lag time, after irrigation has ceased, is required before a crop intended for animal feed is harvested.

9.7. Insect and Vector Control

Adequate measures shall be taken to prevent the breeding of insects and other vectors of health significance, and the creation of odours, slimes or unsightly deposits.

9.8. Irrigation of Public Areas

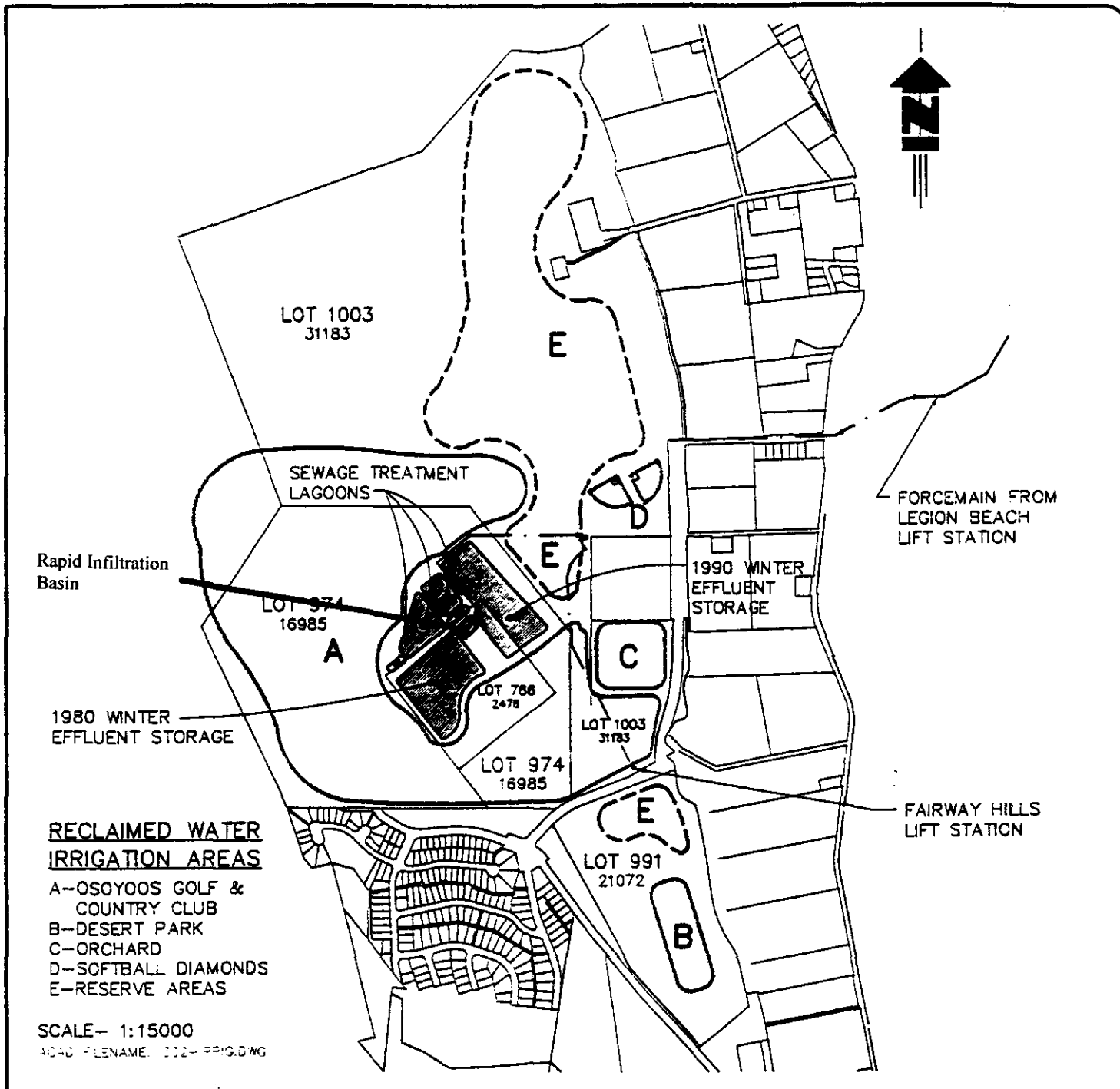
9.8.1. Irrigation on golf courses or cemeteries shall only be practised when the public are not present.

9.8.2. Golf score cards shall indicate that reclaimed water is used for irrigation on the golf course lands.

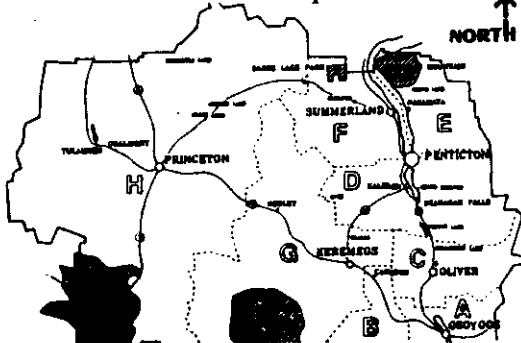


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Assistant Regional Waste Manager

SITE PLAN A



Location Map



Operational Certificate No.: ME-12214

Date: December 18, 1998

T.R. Forty

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Assistant Regional Waste Manager

CERTIFICATE OF ANALYSIS

REPORTED TO Osoyoos, Town of
PO Box 3010
OSOYOOS, BC V0H 1V0

ATTENTION Mike Lange

PO NUMBER Wastewater

PROJECT Wastewater- PE12214

PROJECT INFO

WORK ORDER 23A2417

RECEIVED / TEMP 2023-01-24 16:30 / 8.8°C

REPORTED 2023-01-30 12:15

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here:
<https://www.caro.ca/terms-conditions>

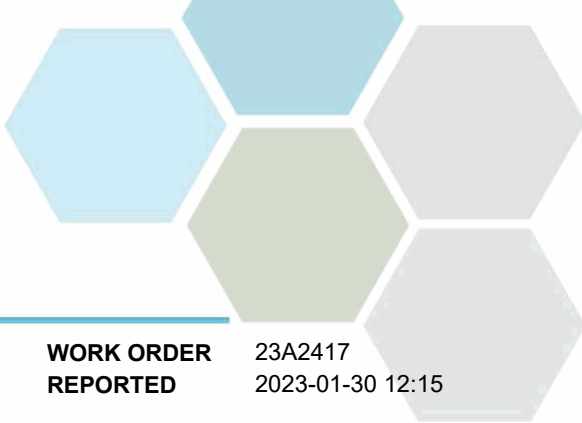
If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager

1-888-311-8846 | www.caro.ca

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 |
#108 4475 Wayburne Drive Burnaby, BC V5G 4X4



TEST RESULTS

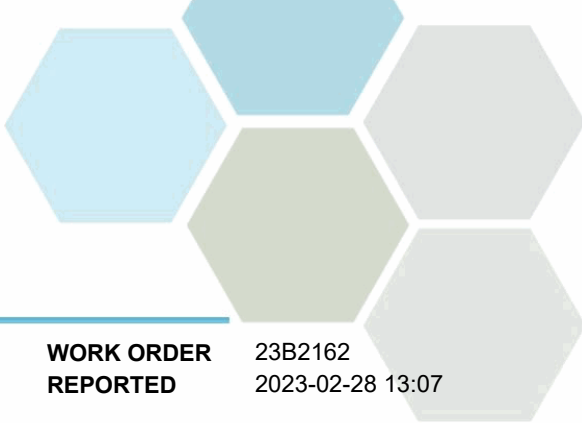
REPORTED TO PROJECT	Osoyoos, Town of Wastewater- PE12214	WORK ORDER REPORTED	23A2417 2023-01-30 12:15
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Analyte	Result	RL	Units	Analyzed	Qualifier
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E105001 Sewer Site (23A2417-01) | Matrix: Water | Sampled: 2023-01-24 09:45

General Parameters

BOD, 5-day Carbonaceous	22.9	2.0	mg/L	2023-01-30	
Solids, Total Suspended	7.0	2.0	mg/L	2023-01-27	



TEST RESULTS

REPORTED TO PROJECT	Osoyoos, Town of Wastewater- PE12214	WORK ORDER REPORTED	23B2162 2023-02-28 13:07
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Analyte	Result	RL	Units	Analyzed	Qualifier
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E105001 Sewer Site (23B2162-01) | Matrix: Water | Sampled: 2023-02-21 11:00

General Parameters

BOD, 5-day Carbonaceous	15.2	2.0	mg/L	2023-02-28	
Solids, Total Suspended	14.0	2.0	mg/L	2023-02-23	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23C3103
2023-04-04 11:09

Analyte	Result	RL	Units	Analyzed	Qualifier
E105001 Sewer Site (23C3103-01) Matrix: Water Sampled: 2023-03-28 08:40					FILT, PRES

Anions

Nitrate (as N)	0.954	0.010	mg/L	2023-03-30	
Nitrite (as N)	0.342	0.010	mg/L	2023-03-30	
Phosphate (as P)	3.56	0.0050	mg/L	2023-03-30	

Calculated Parameters

Nitrate+Nitrite (as N)	1.30	0.0100	mg/L	N/A	
Nitrogen, Total	37.8	1.00	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	37.7	0.050	mg/L	2023-03-31	
BOD, 5-day Carbonaceous	9.6	2.0	mg/L	2023-04-03	
Nitrogen, Total Kjeldahl	36.5	0.050	mg/L	2023-04-02	
Phosphorus, Total Dissolved	4.89	0.0050	mg/L	2023-03-30	
Solids, Total Suspended	13.0	2.0	mg/L	2023-03-29	

E207444 (23C3103-02) | Matrix: Water | Sampled: 2023-03-28 09:00

Anions

Nitrate (as N)	9.84	0.010	mg/L	2023-03-30	
Nitrite (as N)	0.183	0.010	mg/L	2023-03-30	
Sulfate	70.2	1.0	mg/L	2023-03-30	

Calculated Parameters

Nitrate+Nitrite (as N)	10.0	0.0100	mg/L	N/A	
Nitrogen, Total	22.2	0.500	mg/L	N/A	

General Parameters

BOD, 5-day Carbonaceous	< 6.2	2.0	mg/L	2023-04-03	
Nitrogen, Total Kjeldahl	12.2	0.050	mg/L	2023-04-02	
Phosphorus, Total (as P)	5.92	0.0050	mg/L	2023-03-30	
Solids, Total Suspended	7.0	2.0	mg/L	2023-03-29	

Microbiological Parameters

Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-03-29	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-03-29	

Total Metals

Sodium, total	146	0.10	mg/L	2023-04-03	
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E230037 (23C3103-03) | Matrix: Water | Sampled: 2023-03-28 09:00

Anions

Phosphate (as P)	4.29	0.0050	mg/L	2023-03-30	
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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23C3103
2023-04-04 11:09

Analyte	Result	RL	Units	Analyzed	Qualifier
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E230037 (23C3103-03) | Matrix: Water | Sampled: 2023-03-28 09:00, Continued

General Parameters

BOD, 5-day Carbonaceous	99.7	2.0	mg/L	2023-04-03	
Phosphorus, Total (as P)	3.66	0.0050	mg/L	2023-03-30	

Sample Qualifiers:

FILT The sample has been filtered for TDP in the laboratory. Results may not reflect conditions at the time of sampling.
PRES Sample has been preserved for TDP in the laboratory and the holding time has been extended.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23D0916
2023-04-19 14:04

Analyte	Result	RL	Units	Analyzed	Qualifier
E207444 (23D0916-01) Matrix: Water Sampled: 2023-04-11 09:25					
Anions					
Nitrate (as N)	5.08	0.010	mg/L	2023-04-12	
Nitrite (as N)	0.140	0.010	mg/L	2023-04-12	
Sulfate	72.8	1.0	mg/L	2023-04-12	
Calculated Parameters					
Nitrate+Nitrite (as N)	5.22	0.0100	mg/L	N/A	
Nitrogen, Total	25.5	0.400	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 8.3	2.0	mg/L	2023-04-17	
Nitrogen, Total Kjeldahl	20.3	0.050	mg/L	2023-04-14	
Phosphorus, Total (as P)	5.37	0.0050	mg/L	2023-04-13	
Solids, Total Suspended	5.0	2.0	mg/L	2023-04-14	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-04-12	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-04-12	
Total Metals					
Sodium, total	159	0.10	mg/L	2023-04-18	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23E2113
2023-05-24 15:33

Analyte	Result	RL	Units	Analyzed	Qualifier
E105001 Sewer Site (23E2113-01) Matrix: Water Sampled: 2023-05-16 10:50					
General Parameters					
BOD, 5-day Carbonaceous	55.0	2.0	mg/L	2023-05-23	
Solids, Total Suspended	74.0	2.0	mg/L	2023-05-17	
Pilot Plant (23E2113-02) Matrix: Water Sampled: 2023-05-16 10:50					
General Parameters					
BOD, 5-day Carbonaceous	56.7	2.0	mg/L	2023-05-23	
Solids, Total Suspended	78.0	2.0	mg/L	2023-05-17	
E207444 (23E2113-03) Matrix: Water Sampled: 2023-05-16 11:05					
Anions					
Nitrate (as N)	4.07	0.010	mg/L	2023-05-17	
Nitrite (as N)	0.334	0.010	mg/L	2023-05-17	
Sulfate	73.8	1.0	mg/L	2023-05-17	
Calculated Parameters					
Nitrate+Nitrite (as N)	4.41	0.0100	mg/L	N/A	
Nitrogen, Total	28.0	0.500	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 4.8	2.0	mg/L	2023-05-23	
Nitrogen, Total Kjeldahl	23.6	0.050	mg/L	2023-05-18	
Phosphorus, Total (as P)	5.35	0.0050	mg/L	2023-05-18	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-05-18	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-05-17	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-05-17	
Total Metals					
Sodium, total	165	0.10	mg/L	2023-05-24	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23F2694
2023-06-27 12:25

Analyte	Result	RL	Units	Analyzed	Qualifier
E105001 Sewer Site (23F2694-01) Matrix: Water Sampled: 2023-06-20 09:20					
General Parameters					
BOD, 5-day Carbonaceous	13.5	2.0	mg/L	2023-06-26	
Solids, Total Suspended	49.5	2.0	mg/L	2023-06-21	
E207444 (23F2694-02) Matrix: Water Sampled: 2023-06-20 09:35					
Anions					
Nitrate (as N)	9.98	0.010	mg/L	2023-06-21	
Nitrite (as N)	1.28	0.010	mg/L	2023-06-21	
Sulfate	73.7	1.0	mg/L	2023-06-21	
Calculated Parameters					
Nitrate+Nitrite (as N)	11.3	0.0100	mg/L	N/A	
Nitrogen, Total	25.5	1.00	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 5.3	2.0	mg/L	2023-06-26	
Nitrogen, Total Kjeldahl	14.2	0.050	mg/L	2023-06-25	
Phosphorus, Total (as P)	4.88	0.0050	mg/L	2023-06-22	
Solids, Total Suspended	2.2	2.0	mg/L	2023-06-21	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	10	1	MPN/100 mL	2023-06-21	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-06-21	
Total Metals					
Sodium, total	169	0.10	mg/L	2023-06-23	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23H2208
2023-08-23 10:19

Analyte	Result	RL	Units	Analyzed	Qualifier
Pilot Plant (23H2208-01) Matrix: Water Sampled: 2023-08-15 09:20					
Anions					
Nitrate (as N)	10.1	0.010	mg/L	2023-08-17	
Nitrite (as N)	1.77	0.010	mg/L	2023-08-17	
Sulfate	66.0	1.0	mg/L	2023-08-17	
Calculated Parameters					
Nitrate+Nitrite (as N)	11.9	0.250	mg/L	N/A	
Nitrogen, Total	17.6	0.250	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 5.9	2.0	mg/L	2023-08-22	
Nitrogen, Total Kjeldahl	5.76	0.050	mg/L	2023-08-20	
Phosphorus, Total (as P)	3.69	0.0050	mg/L	2023-08-18	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-08-18	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-08-16	HT1
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-08-16	HT1
Total Metals					
Sodium, total	165	0.10	mg/L	2023-08-21	

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23H2209
2023-08-23 10:20

Analyte	Result	RL	Units	Analyzed	Qualifier
E105001 Sewer Site (23H2209-01) Matrix: Water Sampled: 2023-08-15 09:00					
General Parameters					
BOD, 5-day Carbonaceous	< 5.9	2.0	mg/L	2023-08-22	
Solids, Total Suspended	11.6	2.0	mg/L	2023-08-18	
E207444 (23H2209-02) Matrix: Water Sampled: 2023-08-15 09:00					
Anions					
Nitrate (as N)	11.1	0.010	mg/L	2023-08-17	
Nitrite (as N)	1.68	0.010	mg/L	2023-08-17	
Sulfate	67.4	1.0	mg/L	2023-08-17	
Calculated Parameters					
Nitrate+Nitrite (as N)	12.8	0.100	mg/L	N/A	
Nitrogen, Total	21.6	0.500	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 5.9	2.0	mg/L	2023-08-22	
Nitrogen, Total Kjeldahl	8.82	0.050	mg/L	2023-08-20	
Phosphorus, Total (as P)	3.57	0.0050	mg/L	2023-08-18	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-08-18	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-08-16	HT1
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-08-16	HT1
Total Metals					
Sodium, total	165	0.10	mg/L	2023-08-21	

Sample Qualifiers:

HT1 The sample was prepared and/or analyzed past the recommended holding time.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 2311374
2023-09-19 16:44

Analyte	Result	RL	Units	Analyzed	Qualifier
E207444 (2311374-01) Matrix: Water Sampled: 2023-09-12 09:15					
Anions					
Nitrate (as N)	5.41	0.010	mg/L	2023-09-13	
Nitrite (as N)	0.313	0.010	mg/L	2023-09-13	
Sulfate	61.3	1.0	mg/L	2023-09-13	
Calculated Parameters					
Nitrate+Nitrite (as N)	5.73	0.100	mg/L	N/A	
Nitrogen, Total	24.1	0.500	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 6.3	2.0	mg/L	2023-09-19	
Nitrogen, Total Kjeldahl	18.4	0.050	mg/L	2023-09-17	
Phosphorus, Total (as P)	6.15	0.0050	mg/L	2023-09-14	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-09-13	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-09-13	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-09-13	
Total Metals					
Sodium, total	170	0.10	mg/L	2023-09-16	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 2311502
2023-09-19 16:42

Analyte	Result	RL	Units	Analyzed	Qualifier
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E230037 (2311502-01) | Matrix: Water | Sampled: 2023-09-12 08:20

Anions

Phosphate (as P)	0.235	0.0050	mg/L	2023-09-15	
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General Parameters

BOD, 5-day Carbonaceous	131	2.0	mg/L	2023-09-19	
Phosphorus, Total (as P)	3.70	0.0050	mg/L	2023-09-15	

E105001 Sewer Site (2311502-02) | Matrix: Water | Sampled: 2023-09-12 08:50

FILT,
PRES

Anions

Nitrate (as N)	0.757	0.010	mg/L	2023-09-15	
Nitrite (as N)	1.38	0.010	mg/L	2023-09-15	
Phosphate (as P)	4.74	0.0050	mg/L	2023-09-15	

Calculated Parameters

Nitrate+Nitrite (as N)	2.14	0.0100	mg/L	N/A	
Nitrogen, Total	27.9	1.00	mg/L	N/A	
Nitrogen, Organic	2.19	1.00	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	23.6	0.050	mg/L	2023-09-14	
BOD, 5-day Carbonaceous	< 6.3	2.0	mg/L	2023-09-19	
Nitrogen, Total Kjeldahl	25.8	0.050	mg/L	2023-09-17	
Phosphorus, Total Dissolved	6.79	0.0050	mg/L	2023-09-15	
Solids, Total Suspended	5.0	2.0	mg/L	2023-09-14	

Sample Qualifiers:

FILT The sample has been filtered for TDP in the laboratory. Results may not reflect conditions at the time of sampling.
PRES Sample has been preserved for TDP in the laboratory and the holding time has been extended.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23J1096
2023-10-17 14:30

Analyte	Result	RL	Units	Analyzed	Qualifier
E207444 (23J1096-01) Matrix: Water Sampled: 2023-10-10 00:00 To 2023-10-10 08:30					
Anions					
Nitrate (as N)	2.63	0.010	mg/L	2023-10-12	
Nitrite (as N)	0.357	0.010	mg/L	2023-10-12	
Sulfate	60.9	1.0	mg/L	2023-10-12	
Calculated Parameters					
Nitrate+Nitrite (as N)	2.99	0.0100	mg/L	N/A	
Nitrogen, Total	23.3	0.500	mg/L	N/A	
General Parameters					
BOD, 5-day Carbonaceous	< 7.0	2.0	mg/L	2023-10-17	
Nitrogen, Total Kjeldahl	20.3	0.050	mg/L	2023-10-16	
Phosphorus, Total (as P)	8.47	0.0050	mg/L	2023-10-12	
Solids, Total Suspended	7.4	2.0	mg/L	2023-10-14	
Microbiological Parameters					
Coliforms, Total (Q-Tray)	< 1	1	MPN/100 mL	2023-10-11	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-10-11	
Total Metals					
Sodium, total	165	0.10	mg/L	2023-10-13	

E105001 Sewer Site (23J1096-02) | Matrix: Water | Sampled: 2023-10-10 08:45

General Parameters					
BOD, 5-day Carbonaceous	< 7.0	2.0	mg/L	2023-10-17	
Solids, Total Suspended	14.0	2.0	mg/L	2023-10-14	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23K2499
2023-11-29 11:33

Analyte	Result	RL	Units	Analyzed	Qualifier
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E105001 Sewer Site (23K2499-01) | Matrix: Water | Sampled: 2023-11-21 09:05

General Parameters

BOD, 5-day Carbonaceous	12.2	2.0	mg/L	2023-11-27	
Solids, Total Suspended	35.2	2.0	mg/L	2023-11-23	

E207444 (23K2499-02) | Matrix: Water | Sampled: 2023-11-21 09:30

Anions

Nitrate (as N)	0.874	0.010	mg/L	2023-11-22	
Nitrite (as N)	0.156	0.010	mg/L	2023-11-22	
Sulfate	57.1	1.0	mg/L	2023-11-22	

Calculated Parameters

Nitrate+Nitrite (as N)	1.03	0.0100	mg/L	N/A	
Nitrogen, Total	19.9	1.00	mg/L	N/A	

General Parameters

BOD, 5-day Carbonaceous	< 4.7	2.0	mg/L	2023-11-27	
Nitrogen, Total Kjeldahl	18.8	0.050	mg/L	2023-11-23	
Phosphorus, Total (as P)	6.84	0.0050	mg/L	2023-11-23	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-11-23	

Microbiological Parameters

Coliforms, Total (Q-Tray)	26	1	MPN/100 mL	2023-11-22	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-11-22	

Total Metals

Sodium, total	173	0.10	mg/L	2023-11-25	
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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
Wastewater- PE12214

WORK ORDER REPORTED 23K2499
2023-11-29 11:33

Analyte	Result	RL	Units	Analyzed	Qualifier
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E105001 Sewer Site (23K2499-01) | Matrix: Water | Sampled: 2023-11-21 09:05

General Parameters

BOD, 5-day Carbonaceous	12.2	2.0	mg/L	2023-11-27	
Solids, Total Suspended	35.2	2.0	mg/L	2023-11-23	

E207444 (23K2499-02) | Matrix: Water | Sampled: 2023-11-21 09:30

Anions

Nitrate (as N)	0.874	0.010	mg/L	2023-11-22	
Nitrite (as N)	0.156	0.010	mg/L	2023-11-22	
Sulfate	57.1	1.0	mg/L	2023-11-22	

Calculated Parameters

Nitrate+Nitrite (as N)	1.03	0.0100	mg/L	N/A	
Nitrogen, Total	19.9	1.00	mg/L	N/A	

General Parameters

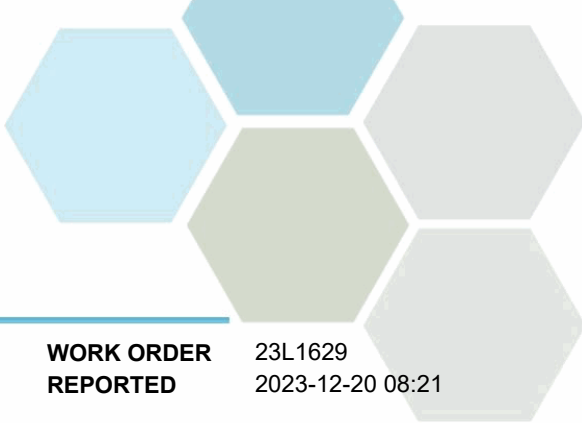
BOD, 5-day Carbonaceous	< 4.7	2.0	mg/L	2023-11-27	
Nitrogen, Total Kjeldahl	18.8	0.050	mg/L	2023-11-23	
Phosphorus, Total (as P)	6.84	0.0050	mg/L	2023-11-23	
Solids, Total Suspended	< 2.0	2.0	mg/L	2023-11-23	

Microbiological Parameters

Coliforms, Total (Q-Tray)	26	1	MPN/100 mL	2023-11-22	
Coliforms, Fecal (Q-Tray)	< 1	1	MPN/100 mL	2023-11-22	

Total Metals

Sodium, total	173	0.10	mg/L	2023-11-25	
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TEST RESULTS

REPORTED TO PROJECT	Osoyoos, Town of Wastewater- PE12214	WORK ORDER REPORTED	23L1629 2023-12-20 08:21
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Analyte	Result	RL	Units	Analyzed	Qualifier
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E105001 Sewer Site (23L1629-01) | Matrix: Water | Sampled: 2023-12-12 08:15

General Parameters

BOD, 5-day Carbonaceous	12.9	2.0	mg/L	2023-12-19	
Solids, Total Suspended	21.3	2.0	mg/L	2023-12-19	

CERTIFICATE OF ANALYSIS

REPORTED TO Osoyoos, Town of
PO Box 3010
OSOYOOS, BC V0H 1V0

ATTENTION Kelly McDonald

PO NUMBER Wastewater

PROJECT Lagoons

PROJECT INFO

WORK ORDER 23I2570

RECEIVED / TEMP 2023-09-19 16:33 / 13.5°C

REPORTED 2023-09-29 14:20

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



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Ahead of the Curve



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<https://www.caro.ca/terms-conditions>

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager



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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 23I2570
2023-09-29 14:20

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Cell #2 (23I2570-01) | Matrix: Water | Sampled: 2023-09-19 12:00

Calculated Parameters

Hardness, Total (as CaCO3)	1990	None Required	0.500	mg/L	N/A	
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General Parameters

Nitrogen, Total Kjeldahl	1480	N/A	0.050	mg/L	2023-09-25	
Solids, Total Dissolved	868	AO ≤ 500	15	mg/L	2023-09-26	
Solids, Total Suspended	28800	N/A	2.0	mg/L	2023-09-26	
Solids, Volatile Suspended	22200	N/A	2.0	mg/L	2023-09-26	

Total Metals

Aluminum, total	5.10	OG < 0.1	0.0050	mg/L	2023-09-25	
Antimony, total	0.00245	MAC = 0.006	0.00020	mg/L	2023-09-25	
Arsenic, total	0.0202	MAC = 0.01	0.00050	mg/L	2023-09-25	
Barium, total	2.81	MAC = 2	0.0050	mg/L	2023-09-25	
Beryllium, total	0.00018	N/A	0.00010	mg/L	2023-09-25	
Bismuth, total	0.0499	N/A	0.00010	mg/L	2023-09-25	
Boron, total	0.663	MAC = 5	0.0500	mg/L	2023-09-25	
Cadmium, total	0.00186	MAC = 0.007	0.000010	mg/L	2023-09-25	
Calcium, total	673	None Required	0.20	mg/L	2023-09-25	
Chromium, total	0.0185	MAC = 0.05	0.00050	mg/L	2023-09-25	
Cobalt, total	0.00287	N/A	0.00010	mg/L	2023-09-25	
Copper, total	2.36	MAC = 2	0.00040	mg/L	2023-09-25	
Iron, total	16.3	AO ≤ 0.3	0.010	mg/L	2023-09-25	
Lead, total	0.0159	MAC = 0.005	0.00020	mg/L	2023-09-25	
Lithium, total	0.0148	N/A	0.00010	mg/L	2023-09-25	
Magnesium, total	75.5	None Required	0.010	mg/L	2023-09-25	
Manganese, total	3.54	MAC = 0.12	0.00020	mg/L	2023-09-25	
Mercury, total	0.000645	MAC = 0.001	0.000040	mg/L	2023-09-25	HG1
Molybdenum, total	0.0512	N/A	0.00010	mg/L	2023-09-25	
Nickel, total	0.0516	N/A	0.00040	mg/L	2023-09-25	
Phosphorus, total	145	N/A	0.050	mg/L	2023-09-25	
Potassium, total	42.1	N/A	0.10	mg/L	2023-09-25	
Selenium, total	0.0109	MAC = 0.05	0.00050	mg/L	2023-09-25	
Silicon, total	22.2	N/A	1.0	mg/L	2023-09-25	
Silver, total	0.00307	None Required	0.000050	mg/L	2023-09-25	
Sodium, total	184	AO ≤ 200	0.10	mg/L	2023-09-25	
Strontium, total	5.64	MAC = 7	0.0010	mg/L	2023-09-25	
Sulfur, total	14.5	N/A	3.0	mg/L	2023-09-25	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-09-25	
Thallium, total	0.000103	N/A	0.000020	mg/L	2023-09-25	
Thorium, total	0.00015	N/A	0.00010	mg/L	2023-09-28	
Tin, total	0.00536	N/A	0.00020	mg/L	2023-09-25	
Titanium, total	0.0216	N/A	0.0050	mg/L	2023-09-25	
Tungsten, total	0.0013	N/A	0.0010	mg/L	2023-09-25	
Uranium, total	0.0218	MAC = 0.02	0.000020	mg/L	2023-09-25	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 23I2570
2023-09-29 14:20

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Cell #2 (23I2570-01) | Matrix: Water | Sampled: 2023-09-19 12:00, Continued

Total Metals, Continued

Vanadium, total	0.0245	N/A	0.0050	mg/L	2023-09-25	
Zinc, total	2.00	AO ≤ 5	0.0040	mg/L	2023-09-25	
Zirconium, total	0.00243	N/A	0.00010	mg/L	2023-09-25	

Cell #3 (23I2570-02) | Matrix: Water | Sampled: 2023-09-19 12:10

Calculated Parameters

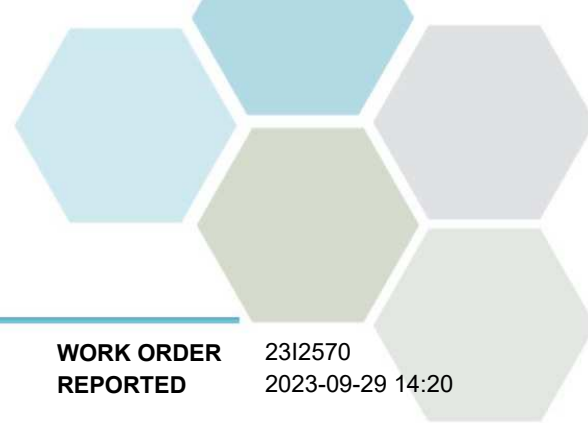
Hardness, Total (as CaCO3)	702	None Required	0.500	mg/L	N/A	
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General Parameters

Nitrogen, Total Kjeldahl	223	N/A	0.050	mg/L	2023-09-25	
Solids, Total Dissolved	768	AO ≤ 500	15	mg/L	2023-09-26	
Solids, Total Suspended	1210	N/A	2.0	mg/L	2023-09-26	
Solids, Volatile Suspended	893	N/A	2.0	mg/L	2023-09-26	

Total Metals

Aluminum, total	14.6	OG < 0.1	0.0050	mg/L	2023-09-25	
Antimony, total	0.00119	MAC = 0.006	0.00020	mg/L	2023-09-25	
Arsenic, total	0.0142	MAC = 0.01	0.00050	mg/L	2023-09-25	
Barium, total	2.01	MAC = 2	0.0050	mg/L	2023-09-25	
Beryllium, total	0.00050	N/A	0.00010	mg/L	2023-09-25	
Bismuth, total	0.0309	N/A	0.00010	mg/L	2023-09-25	
Boron, total	0.359	MAC = 5	0.0500	mg/L	2023-09-25	
Cadmium, total	0.00574	MAC = 0.007	0.000010	mg/L	2023-09-25	
Calcium, total	220	None Required	0.20	mg/L	2023-09-25	
Chromium, total	0.0277	MAC = 0.05	0.00050	mg/L	2023-09-25	
Cobalt, total	0.00256	N/A	0.00010	mg/L	2023-09-25	
Copper, total	1.78	MAC = 2	0.00040	mg/L	2023-09-25	
Iron, total	18.8	AO ≤ 0.3	0.010	mg/L	2023-09-25	
Lead, total	0.0521	MAC = 0.005	0.00020	mg/L	2023-09-25	
Lithium, total	0.0125	N/A	0.00010	mg/L	2023-09-25	
Magnesium, total	36.7	None Required	0.010	mg/L	2023-09-25	
Manganese, total	1.88	MAC = 0.12	0.00020	mg/L	2023-09-25	
Mercury, total	0.000530	MAC = 0.001	0.000040	mg/L	2023-09-25	HG1
Molybdenum, total	0.0213	N/A	0.00010	mg/L	2023-09-25	
Nickel, total	0.0343	N/A	0.00040	mg/L	2023-09-25	
Phosphorus, total	38.5	N/A	0.050	mg/L	2023-09-25	
Potassium, total	29.5	N/A	0.10	mg/L	2023-09-25	
Selenium, total	0.00538	MAC = 0.05	0.00050	mg/L	2023-09-25	
Silicon, total	18.7	N/A	1.0	mg/L	2023-09-25	
Silver, total	0.00222	None Required	0.000050	mg/L	2023-09-25	
Sodium, total	161	AO ≤ 200	0.10	mg/L	2023-09-25	
Strontium, total	2.15	MAC = 7	0.0010	mg/L	2023-09-25	



TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 23I2570
2023-09-29 14:20

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Cell #3 (23I2570-02) | Matrix: Water | Sampled: 2023-09-19 12:10, Continued

Total Metals, Continued

Sulfur, total	20.2	N/A	3.0	mg/L	2023-09-25	
Tellurium, total	< 0.00050	N/A	0.00050	mg/L	2023-09-25	
Thallium, total	0.000227	N/A	0.000020	mg/L	2023-09-25	
Thorium, total	0.00011	N/A	0.00010	mg/L	2023-09-28	
Tin, total	0.00464	N/A	0.00020	mg/L	2023-09-25	
Titanium, total	0.0176	N/A	0.0050	mg/L	2023-09-25	
Tungsten, total	< 0.0010	N/A	0.0010	mg/L	2023-09-25	
Uranium, total	0.00862	MAC = 0.02	0.000020	mg/L	2023-09-25	
Vanadium, total	0.0760	N/A	0.0050	mg/L	2023-09-25	
Zinc, total	4.15	AO ≤ 5	0.0040	mg/L	2023-09-25	
Zirconium, total	0.00053	N/A	0.00010	mg/L	2023-09-25	

Sample Qualifiers:

HG1 Sample bottle and preservation submitted is not suitable for Mercury analysis and analyte stability may be affected.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 2312570
2023-09-29 14:20

Analysis Description	Method Ref.	Technique	Accredited	Location
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Solids, Total Dissolved in Water	Solids in Water, Filtered / SM 2540 C* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Solids, Volatile Suspended in Water	Solids in Water, Filtered / SM 2540 E (2020)	Solids in Water, Filtered / Gravimetry (Ignited at 550C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO ₃ +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
OG	Operational Guideline (treated water)
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, September 2022\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 2312570
2023-09-29 14:20

General Comments:

The results in this report apply to the received samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Caro will dispose of all samples within 30 days of sample receipt, unless otherwise agreed. The quality control (QC) data is available upon request

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: bwhitehead@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

CERTIFICATE OF ANALYSIS

REPORTED TO Osoyoos, Town of
PO Box 3010
OSOYOOS, BC V0H 1V0

ATTENTION Kelly McDonald

PO NUMBER Wastewater

PROJECT Lagoons

PROJECT INFO

WORK ORDER 23J1912

RECEIVED / TEMP 2023-10-10 16:30 / 3.1°C

REPORTED 2023-10-26 14:03

COC NUMBER No Number

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

By engaging our services, you are agreeing to CARO Analytical Service's Standard Terms and Conditions outlined here:
<https://www.caro.ca/terms-conditions>

If you have any questions or concerns, please contact me at bwhitehead@caro.ca

Authorized By:

Brent Whitehead
Account Manager



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#108 4475 Wayburne Drive Burnaby, BC V5G 4X4

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 23J1912
2023-10-26 14:03

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
Cell #1 Sewer Site (23J1912-01) Matrix: Water Sampled: 2023-10-10 09:25						F2, PRES

Calculated Parameters

Hardness, Total (as CaCO3)	3730	None Required	2.50	mg/L	N/A	
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General Parameters

Nitrogen, Total Kjeldahl	590	N/A	0.050	mg/L	2023-10-23	
Solids, Total Suspended	23600	N/A	2.0	mg/L	2023-10-26	HT1
Solids, Volatile Suspended	15600	N/A	2.0	mg/L	2023-10-26	HT1

Total Metals

Aluminum, total	67.6	OG < 0.1	0.0050	mg/L	2023-10-24	RS1
Antimony, total	< 0.00100	MAC = 0.006	0.00020	mg/L	2023-10-24	RS1
Arsenic, total	0.0325	MAC = 0.01	0.00050	mg/L	2023-10-24	RS1
Barium, total	4.92	MAC = 2	0.0050	mg/L	2023-10-24	RS1
Beryllium, total	0.00146	N/A	0.00010	mg/L	2023-10-24	RS1
Bismuth, total	0.0168	N/A	0.00010	mg/L	2023-10-24	RS1
Boron, total	0.808	MAC = 5	0.0500	mg/L	2023-10-24	RS1
Cadmium, total	0.0119	MAC = 0.007	0.000010	mg/L	2023-10-24	RS1
Calcium, total	1340	None Required	0.20	mg/L	2023-10-24	RS1
Chromium, total	0.467	MAC = 0.05	0.00050	mg/L	2023-10-24	RS1
Cobalt, total	0.0344	N/A	0.00010	mg/L	2023-10-24	RS1
Copper, total	0.662	MAC = 2	0.00040	mg/L	2023-10-24	RS1
Iron, total	279	AO ≤ 0.3	0.010	mg/L	2023-10-24	RS1
Lead, total	0.606	MAC = 0.005	0.00020	mg/L	2023-10-24	RS1
Lithium, total	0.0523	N/A	0.00010	mg/L	2023-10-24	RS1
Magnesium, total	93.3	None Required	0.010	mg/L	2023-10-24	RS1
Manganese, total	5.58	MAC = 0.12	0.00020	mg/L	2023-10-24	RS1
Molybdenum, total	0.0383	N/A	0.00010	mg/L	2023-10-24	RS1
Nickel, total	0.300	N/A	0.00040	mg/L	2023-10-24	RS1
Phosphorus, total	254	N/A	0.050	mg/L	2023-10-24	RS1
Potassium, total	38.4	N/A	0.10	mg/L	2023-10-24	RS1
Selenium, total	0.00538	MAC = 0.05	0.00050	mg/L	2023-10-24	RS1
Silicon, total	74.6	N/A	1.0	mg/L	2023-10-24	RS1
Silver, total	< 0.000250	None Required	0.000050	mg/L	2023-10-24	RS1
Sodium, total	186	AO ≤ 200	0.10	mg/L	2023-10-24	RS1
Strontium, total	7.11	MAC = 7	0.0010	mg/L	2023-10-24	RS1
Sulfur, total	35.6	N/A	3.0	mg/L	2023-10-24	RS1
Tellurium, total	< 0.00250	N/A	0.00050	mg/L	2023-10-24	RS1
Thallium, total	0.00142	N/A	0.000020	mg/L	2023-10-24	RS1
Thorium, total	0.00082	N/A	0.00010	mg/L	2023-10-24	RS1
Tin, total	0.0288	N/A	0.00020	mg/L	2023-10-24	RS1
Titanium, total	0.161	N/A	0.0050	mg/L	2023-10-24	RS1
Tungsten, total	< 0.0050	N/A	0.0010	mg/L	2023-10-24	RS1
Uranium, total	0.0375	MAC = 0.02	0.000020	mg/L	2023-10-24	RS1
Vanadium, total	0.364	N/A	0.0050	mg/L	2023-10-24	RS1
Zinc, total	23.1	AO ≤ 5	0.0040	mg/L	2023-10-24	RS1



TEST RESULTS

REPORTED TO PROJECT	Osoyoos, Town of Lagoons	WORK ORDER REPORTED	23J1912 2023-10-26 14:03
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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
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Cell #1 Sewer Site (23J1912-01) | Matrix: Water | Sampled: 2023-10-10 09:25, Continued

F2, PRES

Total Metals, Continued

Zirconium, total	0.0176	N/A	0.00010	mg/L	2023-10-24	RS1
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Sample Qualifiers:	
F2	The sample was not field-preserved with HNO3 and was therefore preserved in the laboratory and held for at least 16 hours prior to analysis for total metals.
HT1	The sample was prepared and/or analyzed past the recommended holding time.
PRES	Sample has been preserved for TKN in the laboratory and the holding time has been extended.
RS1	The Reporting Limits for this sample have been raised due to high analyte concentration.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Osoyoos, Town of Lagoons

WORK ORDER REPORTED 23J1912
2023-10-26 14:03

Analysis Description	Method Ref.	Technique	Accredited	Location
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Nitrogen, Total Kjeldahl in Water	SM 4500-Norg D* (2021)	Block Digestion and Flow Injection Analysis	✓	Kelowna
Solids, Total Suspended in Water	SM 2540 D* (2020)	Gravimetry (Dried at 103-105C)	✓	Edmonton
Solids, Volatile Suspended in Water	SM 2540 E (2020)	Gravimetry (Ignited at 550C)	✓	Edmonton
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO ₃ +HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
OG	Operational Guideline (treated water)
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, September 2022\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user

General Comments:

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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 23D2210
2023-04-26 13:05

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-8-10 (23D2210-01) Matrix: Water Sampled: 2023-04-19 08:25						FILT, PRES

Anions

Chloride	40.5	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	5.21	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	

Calculated Parameters

Hardness, Total (as CaCO ₃)	2140	None Required	2.50	mg/L	N/A	
Nitrate+Nitrite (as N)	5.21	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0062	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	5590	N/A	2.0	mg/L	2023-04-24	

Total Metals

Calcium, total	690	None Required	0.20	mg/L	2023-04-25	RS1
Magnesium, total	101	None Required	0.010	mg/L	2023-04-25	RS1
Sodium, total	56.9	AO ≤ 200	0.10	mg/L	2023-04-25	RS1

MW-DP-10-21 (23D2210-02) | Matrix: Water | Sampled: 2023-04-19 08:40

FILT,
PRES

Anions

Chloride	167	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	14.7	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	

Calculated Parameters

Hardness, Total (as CaCO ₃)	334	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	14.7	N/A	0.100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.062	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	1.15	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	16.0	N/A	2.0	mg/L	2023-04-24	

Total Metals

Calcium, total	96.1	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	22.8	None Required	0.010	mg/L	2023-04-25	
Sodium, total	139	AO ≤ 200	0.10	mg/L	2023-04-25	

MW-2-01 (23D2210-03) | Matrix: Water | Sampled: 2023-04-19 08:55

FILT,
PRES

Anions

Chloride	212	AO ≤ 250	0.10	mg/L	2023-04-22	
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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 23D2210
2023-04-26 13:05

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-2-01 (23D2210-03) Matrix: Water Sampled: 2023-04-19 08:55, Continued						FILT, PRES

Anions, Continued

Nitrate (as N)	18.0	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	

Calculated Parameters

Hardness, Total (as CaCO ₃)	442	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	18.0	N/A	0.100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0409	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	7.6	N/A	2.0	mg/L	2023-04-24	

Total Metals

Calcium, total	132	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	27.1	None Required	0.010	mg/L	2023-04-25	
Sodium, total	99.3	AO ≤ 200	0.10	mg/L	2023-04-25	

MW-9-10 (23D2210-04) | Matrix: Water | Sampled: 2023-04-19 09:25

FILT,
PRES

Anions

Chloride	2.05	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	0.137	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	

Calculated Parameters

Hardness, Total (as CaCO ₃)	144	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.137	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0772	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	3.6	N/A	2.0	mg/L	2023-04-24	

Total Metals

Calcium, total	41.1	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	10.1	None Required	0.010	mg/L	2023-04-25	
Sodium, total	16.6	AO ≤ 200	0.10	mg/L	2023-04-25	

MW-1-01 (23D2210-05) | Matrix: Water | Sampled: 2023-04-19 09:35

FILT,
PRES

Anions

Chloride	18.1	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	0.025	MAC = 10	0.010	mg/L	2023-04-22	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 23D2210
2023-04-26 13:05

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-1-01 (23D2210-05) Matrix: Water Sampled: 2023-04-19 09:35, Continued						FILT, PRES

Anions, Continued

Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	
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Calculated Parameters

Hardness, Total (as CaCO ₃)	511	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.0250	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0124	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	2.8	N/A	2.0	mg/L	2023-04-24	

Total Metals

Calcium, total	122	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	50.2	None Required	0.010	mg/L	2023-04-25	
Sodium, total	40.4	AO ≤ 200	0.10	mg/L	2023-04-25	

MW-7-10 (23D2210-06) | Matrix: Water | Sampled: 2023-04-19 09:50

FILT,
PRES

Anions

Chloride	3.06	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	

Calculated Parameters

Hardness, Total (as CaCO ₃)	249	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.059	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0185	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	94.2	N/A	2.0	mg/L	2023-04-24	

Total Metals

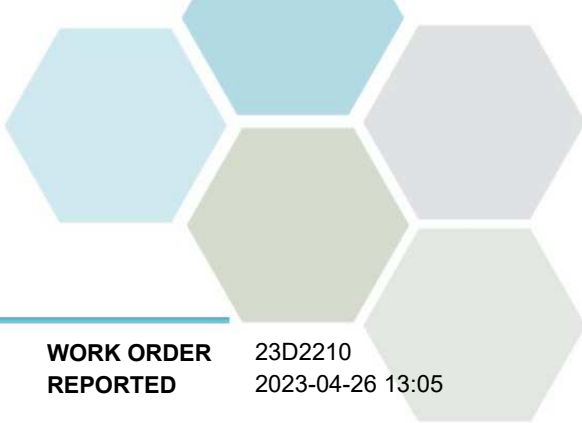
Calcium, total	64.6	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	21.3	None Required	0.010	mg/L	2023-04-25	
Sodium, total	12.5	AO ≤ 200	0.10	mg/L	2023-04-25	

MW-5-10 (23D2210-07) | Matrix: Water | Sampled: 2023-04-19 10:35

FILT,
PRES

Anions

Chloride	255	AO ≤ 250	0.10	mg/L	2023-04-22	
Nitrate (as N)	9.68	MAC = 10	0.010	mg/L	2023-04-22	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-22	



TEST RESULTS

REPORTED TO PROJECT	Osoyoos, Town of WB Groundwater (Comp)	WORK ORDER REPORTED	23D2210 2023-04-26 13:05
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Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-5-10 (23D2210-07) Matrix: Water Sampled: 2023-04-19 10:35, Continued						FILT, PRES

Calculated Parameters						
Hardness, Total (as CaCO3)	562	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	9.68	N/A	0.0100	mg/L	N/A	

General Parameters						
Ammonia, Total (as N)	0.163	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0084	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	15.0	N/A	2.0	mg/L	2023-04-24	

Total Metals						
Calcium, total	152	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	43.9	None Required	0.010	mg/L	2023-04-25	
Sodium, total	123	AO ≤ 200	0.10	mg/L	2023-04-25	

Sample Qualifiers:	
FILT	The sample has been filtered for Diss phos in the laboratory. Results may not reflect conditions at the time of sampling.
PRES	Sample has been preserved for Diss phos in the laboratory and the holding time has been extended.
RS1	The Reporting Limits for this sample have been raised due to high analyte concentration and/or matrix interference.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 23D2214
2023-04-26 13:04

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
LFMW-4-10 (23D2214-01) Matrix: Water Sampled: 2023-04-19 11:05						FILT, PRES
Anions						
Chloride	33.1	AO ≤ 250	0.10	mg/L	2023-04-24	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-04-21	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-04-21	
Calculated Parameters						
Hardness, Total (as CaCO ₃)	538	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-04-23	
Phosphorus, Total Dissolved	0.0147	N/A	0.0050	mg/L	2023-04-24	
Solids, Total Suspended	780	N/A	2.0	mg/L	2023-04-24	
Total Metals						
Calcium, total	136	None Required	0.20	mg/L	2023-04-25	
Magnesium, total	48.1	None Required	0.010	mg/L	2023-04-25	
Sodium, total	41.5	AO ≤ 200	0.10	mg/L	2023-04-25	

Sample Qualifiers:

FILT The sample has been filtered for Diss phos in the laboratory. Results may not reflect conditions at the time of sampling.
PRES Sample has been preserved for Diss phos in the laboratory and the holding time has been extended.

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 2312325
2023-09-26 12:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-8-10 (2312325-01) Matrix: Water Sampled: 2023-09-19 08:00						FILT, PRES

Anions

Chloride	28.6	AO ≤ 250	0.10	mg/L	2023-09-20	
Nitrate (as N)	6.00	MAC = 10	0.010	mg/L	2023-09-20	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-20	

Calculated Parameters

Hardness, Total (as CaCO ₃)	1300	None Required	1.00	mg/L	N/A	
Nitrate+Nitrite (as N)	6.00	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0054	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	114	N/A	2.0	mg/L	2023-09-22	

Total Metals

Calcium, total	435	None Required	0.20	mg/L	2023-09-23	RS1
Magnesium, total	51.7	None Required	0.010	mg/L	2023-09-23	RS1
Sodium, total	42.5	AO ≤ 200	0.10	mg/L	2023-09-23	RS1

MW-9-10 (2312325-02) | Matrix: Water | Sampled: 2023-09-19 08:15

FILT,
PRES

Anions

Chloride	1.69	AO ≤ 250	0.10	mg/L	2023-09-20	
Nitrate (as N)	0.132	MAC = 10	0.010	mg/L	2023-09-20	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-20	

Calculated Parameters

Hardness, Total (as CaCO ₃)	144	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	0.132	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0780	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	4.8	N/A	2.0	mg/L	2023-09-22	

Total Metals

Calcium, total	41.6	None Required	0.20	mg/L	2023-09-23	
Magnesium, total	9.62	None Required	0.010	mg/L	2023-09-23	
Sodium, total	16.5	AO ≤ 200	0.10	mg/L	2023-09-23	

MW-1-01 (2312325-03) | Matrix: Water | Sampled: 2023-09-19 08:30

FILT,
PRES

Anions

Chloride	12.9	AO ≤ 250	0.10	mg/L	2023-09-20	
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TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 2312325
2023-09-26 12:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-1-01 (2312325-03) Matrix: Water Sampled: 2023-09-19 08:30, Continued						FILT, PRES

Anions, Continued

Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-09-20	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-20	

Calculated Parameters

Hardness, Total (as CaCO ₃)	654	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0077	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	162	N/A	2.0	mg/L	2023-09-22	

Total Metals

Calcium, total	158	None Required	0.20	mg/L	2023-09-23	
Magnesium, total	63.0	None Required	0.010	mg/L	2023-09-23	
Sodium, total	42.4	AO ≤ 200	0.10	mg/L	2023-09-23	

MW-7-10 (2312325-04) | Matrix: Water | Sampled: 2023-09-19 08:50

FILT,
PRES

Anions

Chloride	3.56	AO ≤ 250	0.10	mg/L	2023-09-20	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-09-20	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-20	

Calculated Parameters

Hardness, Total (as CaCO ₃)	222	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	

General Parameters

Ammonia, Total (as N)	0.051	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0218	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	11.6	N/A	2.0	mg/L	2023-09-22	

Total Metals

Calcium, total	58.3	None Required	0.20	mg/L	2023-09-23	
Magnesium, total	18.5	None Required	0.010	mg/L	2023-09-23	
Sodium, total	13.3	AO ≤ 200	0.10	mg/L	2023-09-23	

MW-5-10 (2312325-05) | Matrix: Water | Sampled: 2023-09-19 09:15

FILT,
PRES

Anions

Chloride	266	AO ≤ 250	0.10	mg/L	2023-09-20	
Nitrate (as N)	9.61	MAC = 10	0.010	mg/L	2023-09-21	

TEST RESULTS

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 23I2325
2023-09-26 12:51

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
MW-5-10 (23I2325-05) Matrix: Water Sampled: 2023-09-19 09:15, Continued						FILT, PRES
Anions, Continued						
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-21	
Calculated Parameters						
Hardness, Total (as CaCO ₃)	587	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	9.61	N/A	0.0100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	< 0.050	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0148	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	21.2	N/A	2.0	mg/L	2023-09-22	
Total Metals						
Calcium, total	164	None Required	0.20	mg/L	2023-09-23	
Magnesium, total	43.2	None Required	0.010	mg/L	2023-09-23	
Sodium, total	123	AO ≤ 200	0.10	mg/L	2023-09-23	

LFMW-4-10 (23I2325-06) | Matrix: Water | Sampled: 2023-09-19 09:45

FILT,
PRES

Anions						
Chloride	31.7	AO ≤ 250	0.10	mg/L	2023-09-21	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2023-09-21	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2023-09-21	
Calculated Parameters						
Hardness, Total (as CaCO ₃)	448	None Required	0.500	mg/L	N/A	
Nitrate+Nitrite (as N)	< 0.0100	N/A	0.0100	mg/L	N/A	
General Parameters						
Ammonia, Total (as N)	0.114	None Required	0.050	mg/L	2023-09-25	
Phosphorus, Total Dissolved	0.0105	N/A	0.0050	mg/L	2023-09-22	
Solids, Total Suspended	4800	N/A	2.0	mg/L	2023-09-22	CST2, RA5
Total Metals						
Calcium, total	115	None Required	0.20	mg/L	2023-09-23	
Magnesium, total	39.1	None Required	0.010	mg/L	2023-09-23	
Sodium, total	35.2	AO ≤ 200	0.10	mg/L	2023-09-23	

Sample Qualifiers:

CST2 Sample contains fast setting very fine sediment
 FILT The sample has been filtered for TDP in the laboratory. Results may not reflect conditions at the time of sampling.
 PRES Sample has been preserved for TDP in the laboratory and the holding time has been extended.
 RA5 The sample cannot be accurately quantified due to matrix interference. Result is Semi-Quantitative.
 RS1 The Reporting Limits for this sample have been raised due to high analyte concentration.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 2312325
2023-09-26 12:51

Analysis Description	Method Ref.	Technique	Accredited	Location
Ammonia, Total in Water	SM 4500-NH3 G* (2021)	Automated Colorimetry (Phenate)	✓	Kelowna
Anions in Water	SM 4110 B (2020)	Ion Chromatography	✓	Kelowna
Hardness in Water	SM 2340 B* (2021)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Phosphorus, Total Dissolved in Water	SM 4500-P B.5* (2011) / SM 4500-P F (2021)	Persulfate Digestion / Automated Colorimetry (Ascorbic Acid)	✓	Kelowna
Solids, Total Suspended in Water	Solids in Water, Filtered / SM 2540 D* (2020)	Solids in Water, Filtered / Gravimetry (Dried at 103-105C)	✓	Kelowna
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

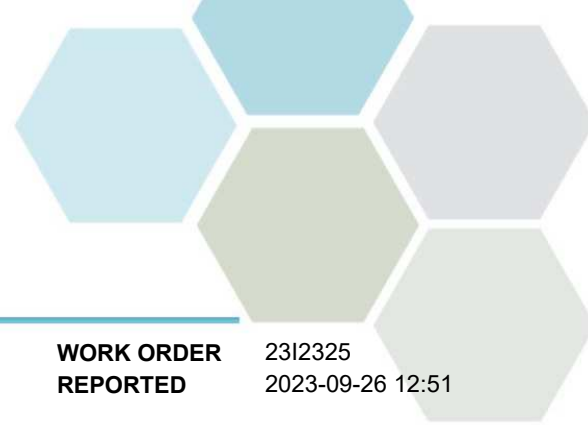
Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
AO	Aesthetic Objective
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Guidelines Referenced in this Report:

[Guidelines for Canadian Drinking Water Quality \(Health Canada, September 2022\)](#)

Note: In some cases, the values displayed on the report represent the lowest guideline and are to be verified by the end user



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Osoyoos, Town of
WB Groundwater (Comp)

WORK ORDER REPORTED 2312325
2023-09-26 12:51

General Comments:

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Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: bwhitehead@caro.ca

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