

LAKE VERMILION METAL and ANION ANALYSES in Surface Water

METAL/ANION →			Al	As*	B	Ca	Chloride	Cd*	Co	Cu*	Fe	Hg*	K	Mg	Mn	Na	Ni*	Nitrates	P (TP)	Pb*	Sulphate	Zn*
			ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ng/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ideal			<200	<340	< 0.5	< 20	<120	< 0.72	<1.8	< 1.3	< 1.0	< 144	< 164	< 1,000	< 0.05	< 250	< 52	< 10	< 0.0305	<0.065	< 600	< 0.12
				<10 drink					drink								continuous	drink		<0.015 drink	< 10 rice	
LOCATION	Date	Collector																				
Lake-wide	1943	DNR																				0.048
Lake-wide	1976-1993	EPA/MPCA																				0.038
Lake-wide	1984-2000	DNR																				0.03
Lake-wide, via Lake Assessment Program	summer 2000	MPCA																				0.024
Pike Bay, sw Hoodoo Pt	8.18.1983	MPCA																	<0.01			0.05
Pike Bay, sw Hoodoo Pt	8.17.1993	MPCA																				0.059
Pike Bay	summer 2000	MPCA																				0.029
Big Bay																						15.2
Big Bay																						7.3
Wakemup Bay																						0.022
Lake Outlet (Vermilion River Dam?)																						0.023
Lake -Wide average																						0.234
Lake -Wide average																						5.4
Lake -Wide average																						6
Big Bay, near Spider Island	2008	CLMP+																				0.029
Trout Lake portage																						8.5
Frazer Bay, near 36 island																						7.3
Niles Bay, near Zups point																						3.0
Pike Bay																						5.4
Wakemup Bay, near Comet island																						8.8
unknown, by Gary Whitenack	5.30.14	VLA																				0.027
Big Bay, between Spider & Stonich	summer 2015	?																				0.02
Big Bay, between Spider & Stonich	5.08 - 9.15	?																				0.02
Pike Bay, sw Hoodoo Pt	7.7.15	MPCA																				0.02
Armstrong Bay	8.7.16	VLA ?																				14.8
Mud Creek Bay																						9.6
East Two Rivers/Tower harbor	7.31.17	VLA ?																				12.7
East Two Rivers/Tower harbor	8.16-10.16	NRRI																				12.5
Hoodoo Pt																						10.6
West Two Rivers																						6.8
Head of the Lakes Bay	8.19.16	1854																				3.2 - 58.9
DO at 5 meters/~15 feet depth		DNR																				10.45 ave
Head of the Lakes Bay	2018-202	1854																				13.21 ave
Temp at 5 meters depth, July ave.		DNR																				0.028

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METAL/ANION →		Alkalinity	Chl-a	Coliform	DO	pH	Secchi	TDS	TSS	PFOS	Temp°F	GPS Location
		mg/L	µg/L	cfu	mg/L	pH	feet	mg/L	mg/L	ng/L		
Ideal		> 5 (20-200 typical)	< 20 >10 bloom	0 drink	> 5.5 fish	6.5 - 8.5	varies	< 500	< 1,200 drink	≤ 4 drink		
LOCATION	Date											
Lake-wide	1943											
Lake-wide	1976-1993		6.7									
Lake-wide	1984-2000		13.0									
Lake-wide, via Lake Assessment Program	summer 2000		6.9									
Pike Bay, sw Hoodoo Pt	8.18.1983		16.0		7.5	7.3	2.1					
Pike Bay, sw Hoodoo Pt	8.17.1993		2.6			7.36	1.3					
Pike Bay	summer 2000	35	9.5			7.5	3.2		5.6			
Big Bay		37	5.3			7.5	7.8		2.4			
Wakemup Bay		27	8.1			7.5	9.5		3.1			
Lake Outlet (Vermilion River Dam?)		31	4.6			7.3			2.5			
Lake -Wide average		32	6.3			7.5	8.2		3.4			
Big Bay, near Spider Island	2008	33	6.8			7.2	6.6		3.0			
Trout Lake portage												
Frazer Bay, near 36 island												
Niles Bay, near Zups point												
Pike Bay		21	3.2			6.8	1.1		3.1			
Wakemup Bay, near Comet island												
unknown, by Gary Whitenack	5.30.14											
Big Bay, between Spider & Stonich	summer 2015		9.52		0.59 ?				1.2			
Big Bay, between Spider & Stonich	5.08 - 9.15											
Pike Bay, sw Hoodoo Pt	7.7.15				7.57	8.02	4					
Armstrong Bay	8.7.16					7.8						
Mud Creek Bay						7.7						
East Two Rivers/Tower harbor	7.31.17											
East Two Rivers/Tower harbor	8.16-10.16											
Hoodoo Pt												
West Two Rivers												
Head of the Lakes Bay	8.19.16				7.08						72.1°	
DO at 5 meters/~15 feet depth												
Head of the Lakes Bay	2018-202											
Temp at 5 meters depth, July ave.											71°	

LAKE VERMILION METAL and ANION ANALYSES in Surface Water

METAL/ANION →			Al	As*	B	Ca	Chloride	Cd*	Co	Cu*	Fe	Hg*	K	Mg	Mn	Na	Ni*	Nitrates	P (TP)	Pb*	Sulphate	Zn*
			ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ng/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ideal			<200	<340	< 0.5	< 20	<120	< 0.72	<1.8	< 1.3	< 1.0	< 144	< 164	< 1,000	< 0.05	< 250	< 52	< 10	< 0.0305	<0.065	< 600	< 0.12
				<10 drink					drink								continuous	drink		<0.015 drink	< 10 rice	
LOCATION	Date	Collector																				
Cable Bay, east end	9.15.18	VLA				11.0																
East Two Rivers, Iron Ore bar bridge						28.5																
Pike River, above dam						15.9																
Pike River, below dam, under bridge						15.0																
Pike River, entering Pike Bay						15.9																
Stuntz Bay, north end						11.5																
Stuntz Bay, south end						11.1																
Trout River, as it empties into Vermilion						4.9																
West Two Rivers, south side of bridge						10.8																
Pike Bay, near Hoodoo, west of marked sunken island	7.1.19	MPCA																	0.023		10.9 ave	
Pike Bay, east of Whiskey island	6.19 - 7.19	MPCA																	0.026		10.9 ave	
Big Bay, n/w of Storich & sw of Spide	6.19 - 7.19	MPCA																	0.017		9.5 ave	
Wakemup Bay, ese Center island	6.19 - 7.19	MPCA																			3.85 ave	
Big Bay, west Birch Is/east Potato Is	end July, 2020	VLA																				
water temp at surface	end July, 2021																					
	end July, 2022																					
	end July, 2023																					
Big Bay, Spider Island, sw edge	8.3.20	DNR				11.6								5.68					0.023		12.1	
Trout Lake portage, sw side						9.6								4.33					0.020		7.9	
Frazer Bay, nw of Breezy Pt						10.4								4.75					0.020		9.2	
Niles Bay, mid-bay						9.0								4.01					0.040		7.2	
Wakemup Bay, nw of Center Island																			0.027		4.6	
East Two Rivers, Tower harbor, southside dock	9.25.20	VLA				49.2																
East Two Rivers, Iron Ore bar bridge, west						49.5																
East Two Rivers, snowmobile bridge south of Mesabi trail						46.2																
Pike River, east Hwy 169 & Wahsten bridge	9.29.20	MPCA																				
Pike Bay, sw Hoodoo Pt	10.8.20	MPCA																				
East Two Rivers, Tower harbor, southside dock	10.19.20	VLA				32.8																
East Two Rivers, Iron Ore bar bridge, west side						31.7																
East Two Rivers, snowmobile bridge south of Mesabi trail						31.9																
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						31.2																
Soudan monument culvert, draining Soudan mine & local storm run-off						127.0																
Tower waste water pond #3 (dry, but snowing)						57.9																

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METAL/ANION →		Alkalinity	Chl-a	Coliform	DO	pH	Secchi	TDS	TSS	PFOS	Temp°F	GPS Location
		mg/L	µg/L	cfu	mg/L	pH	feet	mg/L	mg/L	ng/L		
Ideal		> 5 (20-200 typical)	< 20 >10 bloom	0 drink	> 5.5 fish	6.5 - 8.5	varies	< 500	< 1,200 drink	≤ 4 drink		
LOCATION	Date											
Cable Bay, east end	9.15.18					7.8						
East Two Rivers, Iron Ore bar bridge						7.5						
Pike River, above dam						8.0						
Pike River, below dam, under bridge						7.9						
Pike River, entering Pike Bay						7.9						
Stuntz Bay, north end						7.7						
Stuntz Bay, south end						7.7						
Trout River, as it empties into Vermilion						7.4						
West Two Rivers, south side of bridge						7.1						
Pike Bay, near Hoodoo, west of marked sunken island	7.1.19				8.63		5					
Pike Bay, east of Whiskey island	6.19 - 7.19				7.26							
Big Bay, n/w of Storich & sw of Spide	6.19 - 7.19		3.6				7.5					
Wakemup Bay, ese Center island	6.19 - 7.19											
Big Bay, west Birch Is/east Potato Is	end July, 2020					6.8	5				79°?	47.51.301N, 92.17.219W
water temp at surface	end July, 2021						6				74°	47.50.922N, 92.17.606W
	end July, 2022						6					47.51.061N, 92.17.551W
	end July, 2023						5.5				73°	47.51.070N, 92.17.641W
Big Bay, Spider Island, sw edge	8.3.20	43	11.7			7.45	7.0	100				
Trout Lake portage, sw side		35	13.1			7.39	6.0	82				
Frazer Bay, nw of Breezy Pt		38	11.9			7.69	7.0	104				
Niles Bay, mid-bay		35	19.6			7.77	6.0	76				
Wakemup Bay, nw of Center Island		26	22.4				5.0	68				
East Two Rivers, Tower harbor, southside dock	9.25.20					7.7						
East Two Rivers, Iron Ore bar bridge, west						7.7						
East Two Rivers, snowmobile bridge south of Mesabi trail						7.7						
Pike River, east Hwy 169 & Wahsten bridge	9.29.20				7.37	7.62						
Pike Bay, sw Hoodoo Pt	10.8.20						5.0					
East Two Rivers, Tower harbor, southside dock	10.19.20					7.24						
East Two Rivers, Iron Ore bar bridge, west side						7.24						
East Two Rivers, snowmobile bridge south of Mesabi trail						7.34						
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						7.35						
Soudan monument culvert, draining Soudan mine & local storm run						7.31						
Tower waste water pond #3 (dry, but snowing)						8.34						

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METAL/ANION →			Al	As*	B	Ca	Chloride	Cd*	Co	Cu*	Fe	Hg*	K	Mg	Mn	Na	Ni*	Nitrates	P (TP)	Pb*	Sulphate	Zn*
			ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ng/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ideal			<200	<340	< 0.5	< 20	<120	< 0.72	<1.8	< 1.3	< 1.0	< 144	< 164	< 1,000	< 0.05	< 250	< 52	< 10	< 0.0305	<0.065	< 600	< 0.12
				<10 drink					drink							continuous	drink			<0.015 drink	< 10 rice	
LOCATION	Date	Collector																				
East Two Rivers, Tower harbor, southside dock	4.12.21	VLA				13.7																
East Two Rivers, snowmobile bridge south of Mesabi trail						13.2																
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						13.5																
Soudan monument culvert,draining Soudan mine & local storm run-off						23.6																
Tower waste water pond #3						55.2																
(after several days rain & melting snow)																						
East Two Rivers, Tower harbor, southside dock	6.18.21	VLA				39.1																
East Two Rivers, snowmobile bridge south of Mesabi trail						42.9																
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						37.3																
Soudan monument culvert,draining Soudan mine & local storm run-off						242.0																
Tower waste water pond #3						57.8																
Pike River, entrance to Pike Bay						18.7																
East Two Rivers, Tower harbor, by culvert	8.4.21	VLA				38.2							0.88	4.68	0.540	11.6						
East Two Rivers, Your Boat Club dock						35.5																
East Two Rivers, midway between YBC & Pike Bay entrance						22.7																
East Two Rivers, at Pike Bay entrance						16.9																
Big Bay, between Polato & Birch islands						11.4							1.36	5.48	0.041	4.73						
Wakemup Bay, Camp Vermilion dock						6.6							0.93	2.64	0.037	2.83						
(drought conditions)																						
Soudan Mine, required by MPCA	1999	Mine	3680						9.7	308	2100					300						
(high values)	2021		8						0.094	0.095	19					0.33						
	2022		34			124	(9.4.22)		0.291	<1.3	43					0.64						
(thru Sept)	2023		1580						0.15	6.3	1640											
Big Bay, near Spider Island	8.10.21	DNR				12.4								6.08							11.3	
Trout Lake portage		(Sta. 1-5)				10.8								4.94								9.14
Frazer Bay, near 36 island						11.3								5.14								9.46
Niles Bay, near Zups point						9.7								4.26								7.45
Wakemup Bay, near Comet island						6.9								2.78								4.93
Lake Riley, Eden Prairie/Chanhasen	8.9.21 -	MPCA																				
for reference - one of worst AIS	10.25.21						102 - 110															
lakes in Twin Cities																						
E2 Rivers, east Tower harbor by culvert	10.25.21	VLA				43.4					0.705	< 2.0	0.882	5.60	0.264	9.39			< 0.20	< 1.0		13.8
E2 Rivers by YourBoatClub (YBC) dock						41.7	30.9				0.662	< 2.0	1.15	5.31	0.302	8.8			< 0.20	< 1.0		12.9
Soudan Monument culvert						369.0	27.3				1.33	< 2.0	8.81	63.5	0.453	191			< 0.20	< 1.0		121.0
Pike River dam, under Hwy 77 bridge						18.4	890				0.616	< 2.0	2.52	17.1	0.276	8.81			< 0.20	< 1.0		44.8
(water level up 8" from drought)							18.5															

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METAL/ANION →		Alkalinity	Chl-a	Coliform	DO	pH	Secchi	TDS	TSS	PFOS	Temp°F	GPS Location
		mg/L	µg/L	cfu	mg/L	pH	feet	mg/L	mg/L	ng/L		
Ideal		> 5 (20-200 typical)	< 20 >10 bloom	0 drink	> 5.5 fish	6.5 - 8.5	varies	< 500	< 1,200 drink	≤ 4 drink		
LOCATION	Date											
East Two Rivers, Tower harbor, southside dock	4.12.21					6.98						
East Two Rivers, snowmobile bridge south of Mesabi trail						7.06						
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						7.23						
Soudan monument culvert,draining Soudan mine & local storm runoff						8.17						
Tower waste water pond #3						7.62						
(after several days rain & melting snow)												
East Two Rivers, Tower harbor, southside dock	6.18.21					7.9						
East Two Rivers, snowmobile bridge south of Mesabi trail						8.0						
East Two Rivers, snowmobile bridge Mesabi Tr/Junction Rd						7.7						
Soudan monument culvert,draining Soudan mine & local storm runoff						7.8						
Tower waste water pond #3						8.2						
Pike River, entrance to Pike Bay						7.9						
East Two Rivers, Tower harbor, by culvert	8.4.21					?						
East Two Rivers, Your Boat Club dock						6.8						
East Two Rivers, midway between YBC & Pike Bay entrance						7.0						
East Two Rivers, at Pike Bay entrance						6.9						
Big Bay, between Polato & Birch islands												
Wakemup Bay, Camp Vermilion dock												
(drought conditions)												
Soudan Mine, required by MPCA	1999					7.73			9.3			47.81.09N, 92.73.67W ?
(high values)	2021					7.5			<1			
	2022					7.4			9.8			
(thru Sept)	2023					7.4			6.9			
Big Bay, near Spider Island	8.10.21	42	19.9			8.00		132				
Trout Lake portage		37	12.7			8.25		90				
Frazer Bay, near 36 island		38	15.6			8.14		88				
Niles Bay, near Zups point		33	17.6			7.83		76				
Wakemup Bay, near Comet island		24	13.4			7.64		56				
Lake Riley, Eden Prairie/Chanhassen	8.9.21 -				0.62	7.1 - 8.03	4.9	391				
for reference - one of worst AIS	10.25.21											
lakes in Twin Cities												
E2 Rivers, east Tower harbor by culvert	10.25.21					6.6						
E2 Rivers by YourBoatClub (YBC) dock						6.7						
Soudan Monument culvert						7.1						
Pike River dam, under Hwy 77 bridge						6.8						
(water level up 8" from drought)												

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METAL/ANION →			Al	As*	B	Ca	Chloride	Cd*	Co	Cu*	Fe	Hg*	K	Mg	Mn	Na	Ni*	Nitrates	P (TP)	Pb*	Sulphate	Zn*	
			ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ng/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Ideal			<200	<340	< 0.5	< 20	<120	< 0.72	<1.8	< 1.3	< 1.0	< 144	< 164	< 1,000	< 0.05	< 250	< 52	< 10	< 0.0305	<0.065	< 600	< 0.12	
				<10 drink					drink								continuous	drink		<0.015 drink	< 10 rice		
LOCATION	Date	Collector																					
Soudan monument culvert,draining Soudan mine	5.11.22	VLA				61.7				0.43					0.14								
E2 River, Mesabi Tr west of Junction Rd		record high				14.7				<0.01					0.04								
E2 River, Tower harbor		water				15.7				<0.01					0.05								
E2 River, YBC dock		1359.66'				14.8				<0.01					0.05								
Pike River dam, under Hwy 77 bridge		(5.23.22)				6.5	5.3			<0.01					0.05						13.4		
Big Bay, near Spider Island, WQ-1?	6.14.22	DNR				11.6								5.69					0.026		12.7		
Trout Lake portage, WQ-2?		(Sta. 1-5)				8.4								3.72					0.022		8.0		
Frazer Bay, near 36 island, WQ-3?						10.5								4.86					0.029		10.0		
Niles Bay, near Zups point, WQ04?						9.8								4.39					0.041		8.5		
Wakemup Bay, near Comet island, WQ-5?						6.5								2.29					0.032		6.6		
Tower waste water pond #3	6.29.22	VLA	50	< 2.0	0.115	58.8	87.8	<0.0001	< 0.50	<0.0050	0.319	1.03	6.13	8.44	0.208	53.6	< 5.0	0.26	1.53	<0.0005	9.9	<0.0200	
Soudan monument culvert,draining Soudan mine & local storm ru		water level	599	< 2.0	<0.100	159.0	368.00	<0.0001	15.6	0.4660	1.64	57.2	5.52	31.7	0.284	72.4	36.6	0.650	0.012	0.000917	94.8	0.0433	
E2 River, Mesabi Tr west of Junction Rd		1358.35'	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
E2 River, Tower Harbor			50	< 2.0	<0.100	24.8	7.38	<0.0001	< 0.50	<0.0050	0.541	1.17	<0.50	2.82	0.11	4.34	< 5.0	< 0.03	0.214	<0.0005	1.9	<0.0200	
E2 River, YBC dock			50	< 2.0	<0.100	24.5	7.67	<0.0001	< 0.50	<0.0050	0.565	0.99	<0.50	2.79	0.137	4.00	< 5.0	< 0.03	0.029	<0.0005	1.9	<0.0200	
E2 River, entrance to Pike Bay			82	< 2.0	<0.100	23.2	8.35	<0.0001	< 0.50	<0.0050	0.727	1.67	<0.50	3.49	0.139	4.61	< 5.0	< 0.03	0.033	<0.0005	3.2	<0.0200	
W2 River, near Hwy 169 bridge			103	< 2.0	<0.100	19.8	6.74	<0.0001	< 0.50	<0.0050	1.90	3.71	3.21	2.05	0.133	3.21	< 5.0	0.04	0.035	<0.0005	3.0	<0.0200	
Pike River, below dam under Hwy 77 bridge			182	< 2.0	<0.100	15.3	16	<0.0001	0.70	<0.0050	3.25	5.19	2.03	14.9	0.360	9.80	< 5.0	0.08	0.047	<0.0005	18.9	<0.0200	
Stuntz Bay			< 50	< 2.0	<0.100	11.2	8.85	<0.0001	< 0.50	<0.0050	0.138	1.42	1.15	5.26	0.042	5.35	< 5.0	< 0.03	0.023	<0.0005	13.3	<0.0200	
Cable Bay			< 50	< 2.0	<0.100	12.7	8.89	<0.0001	< 0.50	<0.0050	0.134	1.37	1.25	5.81	0.028	5.76	< 5.0	< 0.03	0.027	<0.0005	13.5	<0.0200	
Big Bay, near Spider Island "hole"			< 50	< 2.0	<0.100	9.5	8.87	<0.0001	< 0.50	<0.0050	<0.100	1.23	1.25	4.08	0.013	5.76	< 5.0	< 0.03	0.027	<0.0005	13.5	<0.0200	
Trout River, as it empties into Ver.			< 50	< 2.0	<0.100	3.9	3.85	<0.0001	< 0.50	<0.0050	<0.100	1.06	0.82	2.99	<0.010	3.22	< 5.0	< 0.03	0.013	<0.0005	6.4	<0.0200	
Frazer Bay, nw Breezy Pt			< 50	< 2.0	<0.100	9.7	7.54	<0.0001	< 0.50	<0.0050	<0.100	0.74	0.98	3.1	<0.010	3.29	< 5.0	< 0.03	0.015	<0.0005	10.8	<0.0200	
Niles Bay, mid bay			< 50	< 2.0	<0.100	11.5	6.91	<0.0001	< 0.50	<0.0050	<0.100	0.66	0.99	5.41	0.011	4.39	< 5.0	< 0.03	0.015	<0.0005	8.5	<0.0200	
Wakemup Bay, nw of Center Island			< 50	< 2.0	<0.100	6.5	4.53	<0.0001	< 0.50	<0.0050	<0.100	0.63	0.91	2.59	<0.010	3.30	< 5.0	< 0.03	0.014	<0.0005	4.0	<0.0200	
Black Bay, mid bay			234	< 2.0	<0.100	3.5	2.34	<0.0001	< 0.50	<0.0050	0.765	4.48	0.85	1.27	0.045	2.20	< 5.0	< 0.03	0.082	<0.0005	1.4	<0.0200	
Wolf Bay, near Vermilion dam			< 50	< 2.0	<0.100	9.8	7.03	<0.0001	< 0.50	<0.0050	<0.100	0.58	1.01	4.28	0.017	4.55	< 5.0	< 0.03	0.017	<0.0005	8.9	<0.0200	
Soudan Monument culvert	9.13.2022	VLA				327.0	860.0			0.4	4.52										105.0		
E2 River, Tower Harbor		water level				32.1	19.9			< 0.01	0.50										1.8		
E2 River, YBC dock		1357.31'				32.0	15.1			< 0.01	0.43										1.9		
E2 River, entrance to Pike Bay						19.0	12.9			< 0.01	0.93										9.2		
Pike River, below dam under Hwy 77 bridge											3.14										17.1		
Pike River, entrance to Pike Bay											2.50										15.4		
Stuntz Bay						12.0																	
Cable Bay						12.0																	
Soudan Monument culvert	5.8.2023	VLA	0.50			80.4	126.0			0.66	1.79										70.7		
Junction Rd power substation culvert		water level				48.4	35.2				0.17											14.2	
E2 River, Tower Harbor		1359.04'				16.8	8.7				0.35											2.8	
E2 River, YBC dock		(ice out-Daisy B)	0.08			16.6	5.2				0.32											2.7	
W2 River, near Hwy 169 bridge						9.0	2.0				0.63											1.8	
Pike River, below dam under Hwy 77 bridge						8.2	8.4				0.77											16.1	
Daisy Bay, sw, reading station	6.18.2023	water level																					

LAKE VERMILION METAL and ANION ANALYSES in Surface Water

METAL/ANION →		Alkalinity	Chl-a	Coliform	DO	pH	Secchi	TDS	TSS	PFOS	Temp°F	GPS Location
		mg/L	µg/L	cfu	mg/L	pH	feet	mg/L	mg/L	ng/L		
Ideal		> 5 (20-200 typical)	< 20 >10 bloom	0 drink	> 5.5 fish	6.5 - 8.5	varies	< 500	< 1,200 drink	≤ 4 drink		
LOCATION	Date											
Soudan monument culvert,draining Soudan mine	5.11.22					8.9						
E2 River, Mesabi Tr west of Junction Rd						8.1						
E2 River, Tower harbor						7.7						
E2 River, YBC dock						7.7						
Pike River dam, under Hwy 77 bridge												
Big Bay, near Spider Island, WQ-1?	6.14.22	36	6.69			7.65		112				
Trout Lake portage, WQ-2?		28	18.60			7.58		108				
Frazer Bay, near 36 island, WQ-3?		34	8.61			7.68		112				
Niles Bay, near Zups point, WQ04?		33	20.80			8.22		112				
Wakemup Bay, near Comet island, WQ-5?		24	19.30			7.73		64				
Tower waste water pond #3	6.29.22	167	NA			7.6	x	344	< 2.0			47°48'50"N, 92°15'25"W
Soudan monument culvert,draining Soudan mine & local storm ru		74	NA			7.6	NA	1110	12.2			47.48.49N, 92.14.26W
E2 River, Mesabi Tr west of Junction Rd		x	x	x	x	x	x	x	x			x
E2 River, Tower Harbor		81	< 1.67			7.5	7.5	118	< 1.4			47.48.14 N, 92.16.52W
E2 River, YBC dock		10	< 1.25			7.4	B	120	< 1.4			47.48.19 N, 92.17.18W
E2 River, entrance to Pike Bay		68	6.01			6.6	4.5	108	2.6			47.48.28 N, 92.17.42W
W2 River, near Hwy 169 bridge		56	NA			6.4	NA	132	2.2			47.47.30 N, 92.22.05W
Pike River, below dam under Hwy 77 bridge		74	NA			7.5	NA	210	2.8			47.47.30N, 92.22.06W
Stuntz Bay		43	10.7			7.5	5.0	96	2.8			47.49.51N, 92.14.32W
Cable Bay		43	7.68			7.4	6.0	98	1.9			47.50.45N, 92.12.03W
Big Bay, near Spider Island "hole"		37	6.69			7.4	7.5	94	< 1.4			47.52.00N, 92.17.28W
Trout River, as it empties into Ver.		31	7.34			6.8	13.0	50	< 2.0			47.54.51N, 92.19.34W
Frazer Bay, nw Breezy Pt		56	8.01			7.6	9.0	82	< 2.0			? N, 92.27.24W
Niles Bay, mid bay		43	7.48			7.4	8.5	66	< 2.0			47.53.32N, 92.30.32W
Wakemup Bay, nw of Center Island		31	3.34			6.8	12.0	50	< 1.4			47.55.23N, 92.36.49W
Black Bay, mid bay		25	6.94			6.2	2.0	68	< 1.4			47.57.30N, 92.28.28W
Wolf Bay, near Vermilion dam		37	7.48			7.2	8.0	76	2.0			47.57.23N, 92.28.28W
Soudan Monument culvert	9.13.2022	86.8				7.9		1820				47.48.49N, 92.14.26W
E2 River, Tower Harbor		105.0				7.7		164				
E2 River, YBC dock		105.0				7.6		162				47.48.18N, 92.17.16W
E2 River, entrance to Pike Bay		86.8				7.5		166				47.48.47N, 92.17.69W
Pike River, below dam under Hwy 77 bridge		x				7.5						x
Pike River, entrance to Pike Bay						7.5						x
Stuntz Bay						x						47.49.77N, 92.14.35W
Cable Bay						x						47.50.72N, 97.12.01W
Soudan Monument culvert	5.8.2023					8.1						
Junction Rd power substation culvert						7.9						
E2 River, Tower Harbor		u				7.9						
E2 River, YBC dock		(ic)				7.7						
W2 River, near Hwy 169 bridge						7.4						
Pike River, below dam under Hwy 77 bridge						7.5						
Daisy Bay, sw, reading station	6.18.2023											

LAKE VERMILION METAL and ANION ANALYSES in Surface Water

METAL/ANION →			Al	As*	B	Ca	Chloride	Cd*	Co	Cu*	Fe	Hg*	K	Mg	Mn	Na	Ni*	Nitrates	P (TP)	Pb*	Sulphate	Zn*
			ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	ng/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L
Ideal			<200	<340	< 0.5	< 20	<120	< 0.72	<1.8	< 1.3	< 1.0	< 144	< 164	< 1,000	< 0.05	< 250	< 52	< 10	< 0.0305	<0.065	< 600	< 0.12
				<10 drink					drink								continuous	drink		<0.015 drink	< 10 rice	
LOCATION	Date	Collector																				

