

**2012 Predicted water quantity and quality compared to the measured water quantity and quality**

**MINING YEAR 3**

**Water Quantity Year 3^**

Pits	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	931 800	1 026 000	10
Bay Goose	1 235 100	499 000	-60

^Predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project

**Third Portage Open Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.80	7.77	24	28	23	27	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	39	42	92	56	136	119	44	33	--	--	--
Ammonia (unionized)	mg NH3/L	0.00057	0.0006	0.2081	0.1000	36 413	34 588	17 444	16 567	0.016	--	--
Ammonia nitrogen	mg N/L	2.3	4	3.9	0.2	69	0	-90	-94	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.057	0.0031	0.0025	29	-95	4	-96	0.005	0.5	0.3
Chloride	mg/L	630	630	20	7	-97	-97	-99	-99	120	--	1000
Dissolved Copper	mg/L	0.0014	0.013	0.0046	0.0025	230	-64	79	-81	0.002	0.3	0.1
Fluoride	mg/L	0.19	0.23	0.62	0.34	228	171	80	49	0.12	--	--
Hardness	mg CaCO3/L	300	310	100	78	-67	-68	-74	-75	--	--	--
Dissolved Lead	mg/L	0.0016	0.0063	0.0036	0.0025	123	-43	56	-60	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.073	0.0051	0.0025	75	-93	-14	-97	0.025	0.5	0.2
Dissolved Barium	mg/L	0.040	0.057	0.0651	0.0088	63	14	-78	-85	--	--	--
Dissolved Cadmium	mg/L	0.000074	0.00023	0.0025	0.0025	3 278	987	3 278	987	0.00004	--	0.002
Dissolved Iron	mg/L	0.36	3.7	0.0328	0.0250	-91	-99	-93	-99	0.3	--	--
Dissolved Mercury	mg/L	0.0000057	0.000044	0.00025	0.00025	4 286	468	4 286	468	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.55	0.0553	0.0335	-71	-90	-82	-94	0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0238	0.0193	83	83	48	48	0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0011	0.0025	0.0025	762	127	762	127	0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.0001	0.0044	0.0050	14 692	4 338	16 567	4 900	0.0008	--	--
Nitrate	mgN/L	2.60	4.4	7.74	2.96	198	76	14	-33	2.94	--	20
Sulphate	mg/L	31	42	40	19	28	-6	-39	-55	128	--	--
Total dissolved solids	mg/L	960	990	240	168	-75	-76	-83	-83	--	--	--
Dissolved Zinc	mg/L	0.0074	0.068	0.0179	0.0025	142	-74	-66	-96	0.013	0.5	0.4

**Goose Island Open Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.75	7.56	27	27	24	24	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	27	27	85	55	216	216	103	103	--	--	--
Ammonia (unionized)	mg NH3/L	0.00056	0.00056	0.2358	0.0250	42 013	42 013	4 364	4 364	0.016	--	--
Ammonia nitrogen	mg N/L	3.6	3.6	5.0	0.6	40	40	-83	-83	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0158	0.0073	884	884	353	353	0.005	0.5	0.3
Chloride	mg/L	440	440	16	6	-96	-96	-99	-99	120	--	1000
Dissolved Copper	mg/L	0.00010	0.001	0.0150	0.0088	15 689	1 479	9 111	821	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.43	0.24	231	231	83	83	0.12	--	--
Hardness	mg CaCO3/L	210	210	130	60	-38	-38	-72	-72	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0144	0.0044	1 207	1 207	298	298	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0194	0.0194	869	869	869	869	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0618	0.0305	129	129	13	13	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0250	0.0250	48 920	48 920	48 920	48 920	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0250	0.0250	-90	-90	-90	-90	0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.0000039	0.00644	0.00025	164 964	164 964	6 310	6 310	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.1479	0.1109	14	14	-15	-15	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0240	0.0240	179	179	179	179	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0138	0.0025	6 775	6 775	1 150	1 150	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0050	0.0050	24 900	24 900	24 900	24 900	0.0008	--	--
Nitrate	mgN/L	4.00	4.00	6.28	0.92	57	57	-77	-77	2.94	--	20
Sulphate	mg/L	21	21	27	17	30	30	-20	-20	128	--	--
Total dissolved solids	mg/L	670	670	258	167	-61	-61	-75	-75	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0170	0.0025	233	233	-51	-51	0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 3 predictions for Portage and year 3 for Goose presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.

**2013 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 4**

**Water Quantity Year 3<sup>^</sup>**

Pits**	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	931 800	676 706	-27
Bay Goose	1 235 100	344 994	-72

<sup>^</sup>predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project

\*\*There is no year 4 in the predicted model so take year 3 for Portage and Vault and year 3 for Goose.

**Third Portage Open Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile +	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.49	7.17	19	23	14	18	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	40	43	72	52	81	68	30	21	--	--	--
Ammonia (unionized)	mg N/L	0.00052	0.00055	0.2000	0.0250	38 362	36 264	4 708	4 445	0.016	--	--
Ammonia nitrogen	mg N/L	2.1	3.5	3.6	0.2	70	2	-91	-95	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.068	0.0180	-	650	-74			0.005	0.5	0.3
Chloride	mg/L	620	630	2	-	-100	-100			120	--	1000
Dissolved Copper	mg/L	0.0014	0.016	0.0124	-	788	-22			0.002	0.3	0.1
Fluoride	mg/L	0.19	0.24	0.13	-	-32	-46			0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	300	310	48	-	-84	-85			--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0010	-	-36	-87			0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.093	0.0047	-	62	-95			0.025	0.5	0.2
Dissolved Barium	mg/L	0.041	0.063	0.0076	-	-82	-88			--	--	--
Dissolved Cadmium	mg/L	0.000076	0.00027	0.0000	-	-87	-96			0.00004	--	0.002
Dissolved Iron	mg/L	0.37	4.6	0.0125	-	-97	-100			0.3	--	--
Dissolved Mercury	mg/L	0.0000059	0.000054	0.00005	-	747	-7			0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.66	0.0123	-	-94	-98			0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0016	-	-88	-88			0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0012	0.0005	-	72	-58			0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.00012	0.0025	-	7 965	1 983			0.0008	--	--
Nitrate	mgN/L	2.30	4.0	1.35	-	-41	-66			2.94	--	20
Sulphate	mg/L	31	46	83	-	167	80			128	--	--
Total dissolved solids	mg/L	960	990	127	57	-87	-87	-94	-94	--	--	--
Dissolved Zinc	mg/L	0.0076	0.085	0.0028	-	-64	-97			0.013	0.5	0.4

**Goose Island Open Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile +	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.68	7.49	26	26	23	23	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	27	27	130	109	380	380	304	304	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.2961	0.1400	52 777	52 777	24 900	24 900	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	7.9	4.0	46	46	-26	-26	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0046	-	188	188			0.005	0.5	0.3
Chloride	mg/L	440	440	62	-	-86	-86			120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0712	-	7 389	7 389			0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.72	-	454	454			0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	210	210	214	-	2	2			--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	-	-86	-86			0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0599	-	2 893	2 893			0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.1328	-	392	392			--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0000	-	-12	-12			0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.1025	-	-59	-59			0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.0000039	0.00008	-	1 823	1 823			0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.2192	-	69	69			0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0207	-	140	140			0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0015	-	650	650			0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0025	-	12 400	12 400			0.0008	--	--
Nitrate	mgN/L	4.00	4.00	20.80	-	420	420			2.94	--	20
Sulphate	mg/L	21	21	66	-	216	216			128	--	--
Total dissolved solids	mg/L	670	670	314	218	-53	-53	-68	-68	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0075	-	47	47			0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 4 predictions for Portage and year 3 for Goose presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 2 or 1 samples were monitored in 2013

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.

**2014 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 5**

**Water Quantity Year 5<sup>^</sup>**

Pits**	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	715 200	165 877	-77
Bay Goose	1 235 100	307 769	-75
Vault Pit	46 100	101 617	120

<sup>^</sup>predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.1 and Figures 12.7  
<sup>\*\*</sup>There is no year 5 in the predicted model for Bay Goose so take year 3 for Goose.

**Vault Pit Sumps Water Quality Year 5**

Parameters	Units	Probable Scenario Year 5*	Possible Poor end Scenario Year 5*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.13	-	-11	-11	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	0.091	9.7	89	-	97 153	812	-	-	--	--	--
Ammonia (unionized)	mg N/L	0.78	1.30	0.1800	-	-77	-86	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	64	110	14.4	-	-78	-87	-	-	1.83	--	20
Dissolved Arsenic	mg/L	0.000063	0.052	0.0127	-	20 059	-76	-	-	0.005	0.5	0.1
Chloride	mg/L	0.0031	0.033	31	-	996 674	93 536	-	-	120	--	500
Dissolved Copper	mg/L	0.000063	0.00075	0.0116	-	184 027	1 447	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.000063	0.013	0.26	-	4 126 884	1 900	-	-	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	0.11	19	378	-	343 536	1 889	-	-	--	--	--
Dissolved Lead	mg/L	0.0000081	0.000011	0.0002	-	18 419	1 264	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000012	0.00011	0.0254	-	211 567	22 991	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000210	0.012	0.0588	-	27 900	390	-	-	--	--	--
Dissolved Cadmium	mg/L	0.00000081	0.000011	0.0003	-	370 270	2 627	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.000063	0.002	0.2200	-	349 106	10 900	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.00000081	0.000011	0.00010	-	123 357	809	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000018	0.00230	0.1328	-	737 678	5 674	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.000160	0.03100	0.1089	-	67 963	251	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.000041	0.00055	0.0070	-	170 632	1 173	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.000021	0.000023	0.0025	-	118 948	10 770	-	-	0.0008	--	--
Nitrate	mgN/L	71	120	46.40	-	-35	-61	-	-	2.94	--	50
Sulphate	mg/L	0.01	10	148	-	1 479 900	1 380	-	-	128	--	--
Total dissolved solids	mg/L	150	300	456	-	204	52	-	-	--	--	--
Dissolved Zinc	mg/L	0.000041	0.00052	0.0020	-	4 778	285	-	-	0.013	0.5	0.2

**Goose Island Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile <sup>+</sup>		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.97	7.52	31	31	23	23	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	27	27	90	86	233	233	217	217	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.0600	0.0100	10 614	10 614	1 686	1 686	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	1.8	0.2	-66	-66	-96	-96	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0040	-	150	150	-	-	0.005	0.5	0.3
Chloride	mg/L	440	440	53	-	-88	-88	-	-	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0010	-	5	5	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.94	-	623	623	-	-	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	210	210	131	-	-38	-38	-	-	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	-	-82	-82	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0150	-	650	650	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0280	-	4	4	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0000	-	-80	-80	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0050	-	-98	-98	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.0000039	0.00010	-	2 464	2 464	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.0590	-	-55	-55	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0180	-	109	109	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0010	-	400	400	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0030	-	14 900	14 900	-	-	0.0008	--	--
Nitrate	mgN/L	4.00	4.00	10.90	-	173	173	-	-	2.94	--	20
Sulphate	mg/L	21	21	61	-	190	190	-	-	128	--	--
Total dissolved solids	mg/L	670	670	530	232	-21	-21	-65	-65	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0010	-	-80	-80	-	-	0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 5 predictions for Vault and year 3 for Goose presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 2 or 1 samples were monitored in 2014

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.



**2015 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 6**

**Water Quantity - Year 5<sup>A</sup>**

Pits**	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	715 200	136 627	-81
Bay Goose	1 086 400	383 800	-65
Vault Pit	46 100	111 336	142

<sup>A</sup>predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.1 and Figures 12.7

\*\*There is no year 6 in the predicted model so take year 5 for Portage and Vault. For Goose, pit reflooding started in 2015, use year 5 reflooding values minus evaporation for Goose.

**Vault Pit Sumps Water Quality Year 6**

Parameters	Units	Probable Scenario Year 6*	Possible Poor end Scenario Year 6*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.11	-	-11	-11	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	0.160	17	126	-	78 650	641	-	-	--	--	--
Ammonia (unionized)	mg N/L	0.55	0.92	0.3200	-	-42	-65	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	45	76	22.6	-	-50	-70	-	-	1.83	--	20
Dissolved Arsenic	mg/L	0.00011	0.089	0.0003	-	127	-100	-	-	0.005	0.5	0.1
Chloride	mg/L	0.0054	0.057	33	-	614 715	58 146	-	-	120	--	500
Dissolved Copper	mg/L	0.0000110	0.00130	0.0010	-	8 991	-23	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.0000110	0.022	0.25	-	2 272 627	1 036	-	-	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	0.20	32	340	-	169 900	963	-	-	--	--	--
Dissolved Lead	mg/L	0.00000140	0.000019	0.0002	-	10 614	689	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000021	0.00019	0.0218	-	103 710	11 374	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000039	0.020	0.0703	-	180 156	252	-	-	--	--	--
Dissolved Cadmium	mg/L	0.0000014	0.000019	0.0000	-	614	-47	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.0000110	0.004	0.5900	-	536 264	16 757	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.000000140	0.000019	0.00001	-	3 471	-74	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000030	0.00390	0.0863	-	287 567	2 113	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.0000280	0.05300	0.1111	-	39 579	110	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0000069	0.00094	0.0040	-	57 871	326	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.0000036	0.000039	0.0025	-	69 344	6 310	-	-	0.0008	--	--
Nitrate	mgN/L	50	86	45.90	-	-8	-47	-	-	2.94	--	50
Sulphate	mg/L	0.02	17	124	-	729 312	629	-	-	128	--	--
Total dissolved solids	mg/L	100	240	568	-	468	137	-	-	--	--	--
Dissolved Zinc	mg/L	0.000069	0.00089	0.0005	-	625	-44	-	-	0.013	0.5	0.2

**Goose Island Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile <sup>+</sup>		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.37	7.06	21	21	16	16	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	27	27	57	52	109	109	91	91	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.0138	0.0088	2 355	2 355	1 463	1 463	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	1.1	0.8	-79	-79	-84	-84	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0003	0.0003	-84	-84	-84	-84	0.005	0.5	0.3
Chloride	mg/L	440	440	22	16	-95	-95	-96	-96	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0013	0.0006	35	35	-34	-34	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.40	0.36	205	205	173	173	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	210	210	134	116	-36	-36	-45	-45	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	0.0002	-82	-82	-86	-86	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0326	0.0232	1 532	1 532	1 060	1 060	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0173	0.0151	-36	-36	-44	-44	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0000	0.0000	-74	-74	-80	-80	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0050	0.0050	-98	-98	-98	-98	0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.000039	0.00001	0.00001	156	156	28	28	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.1776	0.1642	37	37	26	26	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0099	0.0089	16	16	3	3	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0015	0.0013	650	650	525	525	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0025	0.0025	12 400	12 400	12 400	12 400	0.0008	--	--
Nitrate	mgN/L	4.00	4.00	2.96	2.50	-26	-26	-38	-38	2.94	--	20
Sulphate	mg/L	21	21	79	60	276	276	185	185	128	--	--
Total dissolved solids	mg/L	670	670	180	114	-73	-73	-83	-83	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0005	0.0005	-90	-90	-90	-90	0.013	0.5	0.4

**Third Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile <sup>+</sup>		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	6.66	6.36	6	9	1	4	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	40	43	64	60	59	48	49	38	--	--	--
Ammonia (unionized)	mg N/L	0.00052	0.00055	0.0467	0.0250	8 874	8 385	4 708	4 445	0.016	--	--
Ammonia nitrogen	mg N/L	2.1	4	2.8	2.2	31	-21	5	-37	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.0680	0.0160	-	567	-76	-	-	0.005	0.5	0.3
Chloride	mg/L	620	630	15	-	-98	-98	-	-	120	--	1000
Dissolved Copper	mg/L	0.0014	0.016	0.0003	-	-82	-98	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.19	0.24	0.27	-	39	10	-	-	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	300	310	196	-	-35	-37	-	-	--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0002	-	-91	-98	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.093	0.0323	-	1 012	-65	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.041	0.0630	0.0111	-	-73	-82	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000076	0.00027	0.0000	-	-87	-96	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.37	4.60	0.0050	-	-99	-100	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000059	0.0000540	0.00001	-	112	-77	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.66	0.0921	-	-52	-86	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0628	-	383	383	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0012	0.0015	-	417	25	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.00012	0.0025	-	7 965	1 983	-	-	0.0008	--	--
Nitrate	mgN/L	2.30	4.00	10.47	-	355	162	-	-	2.94	--	20
Sulphate	mg/L	31	46	136	-	337	195	-	-	128	--	--
Total dissolved solids	mg/L	960	990	498	363	-48	-50	-62	-63	--	--	--
Dissolved Zinc	mg/L	0.0076	0.0850	0.0005	-	-93	-99	-	-	0.013	0.5	0.4

**North Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.87	7.45	25	29	18	22	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.05	2.4	77	68	153 614	3 102	134 900	2 713	--	--	--
Ammonia (unionized)	mg N/L	0.003	0.0014	0.0557	0.0350	1 757	3 880	1 067	2 400	0.016	--	--
Ammonia nitrogen	mg N/L	12	8.9	2.9	1.8	-76	-67	-85	-80	1.83	--	16
Dissolved Arsenic	mg/L	0.00005	0.056	0.0205	-	45 344	-63	-	-	0.005	0.5	0.3
Chloride	mg/L	0.0010	0.25	17	12	1 757 553	6 790	1 247 349	4 790	120	--	1000
Dissolved Copper	mg/L	0.00001	0.007	0.0007	-	6 036	-90	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.000008	0.031	0.31	0.29	3 812 400	884	3 656 150	844	0.12	--	--
Hardness	mg CaCO3/L	0.05	8	239	191	530 456	2 884	423 789	2 284	--	--	--
Dissolved Lead	mg/L	0.000002	0.0029	0.0002	-	10 127	-92	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.00003	0.043	0.0071	-	20 782	-83	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.00002	0.013	0.0092	-	48 058	-30	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000006	0.000099	0.0000	-	1 567	-90	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.000097	2.1	0.0075	-	7 632	-100	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.00000056	0.000029	0.00001	-	8 829	-83	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.22	0.0706	-	46 967	-68	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.000004	0.00081	0.0182	-	454 900	2 147	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.000003	0.00058	0.0010	-	33 233	72	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.0000014	0.000057	0.0038	-	267 757	6 479	-	-	0.0008	--	--
Nitrate	mgN/L	13	10.00	11.90	9.72	-8	19	-25	-3	2.94	--	20
Sulphate	mg/L	0.011	8.8	179	135	1 630 809	1 939	1 226 264	1 433	128	--	--
Total dissolved solids	mg/L	28	41	399	309	1 326	874	1 004	654	--	--	--
Dissolved Zinc	mg/L	0.000032	0.037	0.0008	-	2 244	-98	-	-	0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 6 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2015.

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.

**2016 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 7**

**Water Quantity - Year 7<sup>A</sup>**

Pits**	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	715 200	132 359	-81
Bay Goose	800 100	375 300	-53
Vault Pit	55 600	54 964	-1

<sup>A</sup>predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.1 and Figures 12.8

\*\*For year 7, in the predicted model, there is no value for the volume of water transferred from Portage Pit to the Reclaim Pond, so take year 5 values for Portage. For Goose, use year 7 reflooding values minus evaporation for Goose.

**Vault Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.76	7.56	-3	-3	-6	-6	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	0.220	23	95	87	42 968	312	39 445	278	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.113	0.110	-72	-83	-73	-84	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	5.0	3.7	-85	-91	-89	-93	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0023	0.0003	1 400	-98	67	-100	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	29	17	390 900	37 020	223 567	21 134	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0023	0.0005	15 483	30	3 317	-72	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.19	0.19	1 266 567	513	1 233 233	497	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	0.27	45	332	258	122 956	638	95 270	472	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0002	0.0002	7 795	456	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0065	0.0024	21 692	2 321	7 858	784	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0306	0.0193	56 474	9	35 641	-31	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.0001	0.0001	6 742	381	3 979	187	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0350	0.0250	23 233	629	16 567	421	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00018	0.0001	9 111	-35	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.1398	0.0952	332 757	2 489	226 567	1 663	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0659	0.0533	16 785	-10	13 560	-27	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0039	0.0024	39 848	198	24 385	83	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.000054	0.0006	0.0004	10 900	919	7 900	641	0.0008	--	--
Nitrate	mg/L	36	62	19.85	9.83	-45	-68	-73	-84	2.94	--	50
Sulphate	mg/L	0.02	24	144	143	599 796	500	595 629	496	128	--	--
Total dissolved solids	mg/L	76	210	529	441	596	152	480	110	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0008	0.0005	673	-38	415	-58	0.013	0.5	0.2

**Goose Island Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.73	7.63	27	27	25	25	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	27	27	47	45	74	74	66	66	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.0050	0.0050	793	793	793	793	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	0.1	0.0	-98	-98	-99	-99	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0003	0.0003	-84	-84	-84	-84	0.005	0.5	0.3
Chloride	mg/L	440	440	13	12	-97	-97	-97	-97	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0009	0.0004	-7	-7	-54	-54	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.34	0.33	163	163	154	154	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	210	210	127	113	-40	-40	-46	-46	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	0.0002	-86	-86	-86	-86	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0352	0.0260	1 660	1 660	1 201	1 201	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0162	0.0142	-40	-40	-48	-48	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0000	0.0000	-75	-75	-80	-80	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0050	0.0050	-98	-98	-98	-98	0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.000039	0.00001	0.00001	60	60	28	28	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.0480	0.0244	-63	-63	-81	-81	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0064	0.0060	-25	-25	-30	-30	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0008	0.0005	275	275	150	150	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0006	0.0004	2 650	2 650	1 900	1 900	0.0008	--	--
Nitrate	mg/L	4.00	4.00	3.72	3.55	-7	-7	-11	-11	2.94	--	20
Sulphate	mg/L	21	21	84	80	301	301	279	279	128	--	--
Total dissolved solids	mg/L	670	670	238	229	-64	-64	-66	-66	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0005	0.0005	-90	-90	-90	-90	0.013	0.5	0.4

**Third Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.70	-	22	26	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	40	43	64	54	59	48	34	24	--	--	--
Ammonia (unionized)	mg N/L	0.00052	0.00055	0.0833	0.0300	15 926	15 052	5 669	5 355	0.016	--	--
Ammonia nitrogen	mg N/L	2.1	4	5.3	4.4	153	52	108	25	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.0680	0.0003	-	-90	-100	-	-	0.005	0.5	0.3
Chloride	mg/L	620	630	31	29	-95	-95	-95	-95	120	--	1000
Dissolved Copper	mg/L	0.0014	0.016	0.0010	-	-29	-94	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.19	0.24	0.51	0.42	167	111	118	73	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	300	310	273	199	-9	-12	-34	-36	--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0002	-	-91	-98	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.093	0.0072	-	148	-92	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.041	0.0630	0.0173	-	-58	-73	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000076	0.00027	0.0002	-	216	-11	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.37	4.60	0.0200	-	-95	-100	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000059	0.0000540	0.00005	-	747	-7	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.66	0.5854	-	208	-11	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0867	-	567	567	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0012	0.0020	-	590	67	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.00012	0.0004	-	1 190	233	-	-	0.0008	--	--
Nitrate	mg/L	2.30	4.00	4.34	1.62	89	9	-30	-60	2.94	--	20
Sulphate	mg/L	31	46	245	153	691	433	394	233	128	--	--
Total dissolved solids	mg/L	960	990	562	470	-41	-43	-51	-53	--	--	--
Dissolved Zinc	mg/L	0.0076	0.0850	0.0040	-	-47	-95	-	-	0.013	0.5	0.4



**North Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.91	7.92	26	30	26	30	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.05	2.4	97	79	194 186	3 948	157 900	3 192	--	--	--
Ammonia (unionized)	mg N/L	0.003	0.0014	0.0914	0.0600	2 948	6 431	1 900	4 186	0.016	--	--
Ammonia nitrogen	mg N/L	12	8.9	3.7	2.8	-69	-58	-77	-69	1.83	--	16
Dissolved Arsenic	mg/L	0.00005	0.056	0.0140	0.0061	30 928	-75	13 372	-89	0.005	0.5	0.3
Chloride	mg/L	0.0010	0.25	24	19	2 415 352	9 369	1 918 267	7 420	120	--	1000
Dissolved Copper	mg/L	0.00001	0.007	0.0013	0.0007	11 264	-82	6 036	-90	0.002	0.3	0.1
Fluoride	mg/L	0.000008	0.031	0.43	0.35	5 357 043	1 282	4 312 400	1 013	0.12	--	--
Hardness	mg CaCO3/L	0.05	8	306	236	679 583	3 723	524 344	2 850	--	--	--
Dissolved Lead	mg/L	0.00002	0.0029	0.0002	0.0002	6 718	-95	6 718	-95	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.00003	0.043	0.0325	0.0253	95 488	-24	74 165	-41	0.025	0.5	0.2
Dissolved Barium	mg/L	0.00002	0.013	0.0207	0.0150	108 979	59	78 847	15	--	--	--
Dissolved Cadmium	mg/L	0.000006	0.000099	0.0004	0.0002	61 150	271	32 400	97	0.00004	--	0.002
Dissolved Iron	mg/L	0.000097	2.1	0.0063	0.0050	6 343	-100	5 055	-100	0.3	--	--
Dissolved Mercury	mg/L	0.00000056	0.000029	0.00002	0.00001	33 382	-35	8 829	-83	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.22	0.1373	0.1225	91 433	-38	81 533	-44	0.23	--	--
Dissolved Molybdenum	mg/L	0.000004	0.00081	0.1319	0.1192	3 296 775	16 181	2 979 275	14 613	0.073	--	--
Dissolved Selenium	mg/L	0.000003	0.00058	0.0020	0.0010	66 567	245	33 233	72	0.001	--	--
Dissolved Thallium	mg/L	0.0000014	0.000057	0.0004	0.0004	28 471	602	28 471	602	0.0008	--	--
Nitrate	mgN/L	13	10.00	12.68	12.60	-2	27	-3	26	2.94	--	20
Sulphate	mg/L	0.011	8.8	232	195	2 107 692	2 535	1 772 627	2 116	128	--	--
Total dissolved solids	mg/L	28	41	518	455	1 752	1 164	1 523	1 009	--	--	--
Dissolved Zinc	mg/L	0.000032	0.037	0.0021	0.0009	6 541	-94	2 634	-98	0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 7 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2016.

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.

**2017 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 8**

**Water Quantity - Year 8^**

Pits**	Predicted (m³)	Measured (m³)	% Difference between predicted vs measured
Portage	715 200	341 192	-52
Bay Goose	635 200	464 019	-27
Vault Pit	53 900	249 513	363

^predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.1 and Figures 12.9

\*\*For year 8, in the predicted model, there is no value for the volume of water transferred from Portage Pit to the Reclaim Pond, so take year 5 values for Portage. For Goose, use year 8 reflowing values minus evaporation for Goose.

**Vault Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile*	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.72	7.44	-4	-4	-7	-7	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.220	23	120	110	54 218	420	50 014	379	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.083	0.070	-79	-88	-83	-90	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	3.8	3.5	-88	-93	-89	-94	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0046	0.0003	2 950	-96	67	-100	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	36	26	474 344	44 942	344 900	32 653	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0013	0.0003	8 400	-29	1 567	-86	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.19	0.17	1 244 344	502	1 099 900	432	0.12	--	--
Hardness	mg CaCO3/L	0.27	45	290	249	107 246	544	91 937	452	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0005	0.0002	24 900	1 659	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0077	0.0033	25 428	2 736	10 733	1 104	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0271	0.0213	50 162	-3	39 391	-24	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.0000	0.0000	1 918	42	426	-63	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.6200	0.0113	413 233	12 817	7 400	134	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00002	0.00001	7 795	-44	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.2675	0.1847	636 805	4 854	439 662	3 320	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0283	0.0144	7 159	-61	3 579	-80	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0016	0.0013	16 223	22	12 787	-4	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.000054	0.0004	0.0004	7 900	641	7 900	641	0.0008	--	--
Nitrate	mg/L	36	62	4.23	1.28	-88	-93	-96	-98	2.94	--	50
Sulphate	mg/L	0.02	24	146	76	609 761	510	315 004	215	128	--	--
Total dissolved solids	mg/L	76	210	464	411	511	121	441	96	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0008	0.0005	759	-31	415	-58	0.013	0.5	0.2

**Goose Island Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.92	7.81	30	30	28	28	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	27	27	86	83	217	217	207	207	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.0183	0.0125	3 174	3 174	2 132	2 132	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	1.2	1.0	-79	-79	-82	-82	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0003	0.0003	-84	-84	-84	-84	0.005	0.5	0.3
Chloride	mg/L	440	440	13	12	-97	-97	-97	-97	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0009	0.0007	-9	-9	-26	-26	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.18	0.17	41	41	27	27	0.12	--	--
Hardness	mg CaCO3/L	210	210	226	208	8	8	-1	-1	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	0.0002	-86	-86	-86	-86	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.0702	0.0638	3 410	3 410	3 088	3 088	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0378	0.0341	40	40	26	26	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0000	0.0000	-80	-80	-80	-80	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0050	0.0050	-98	-98	-98	-98	0.3	--	--
Dissolved Mercury	mg/L	0.000039	0.000039	0.00002	0.00001	285	285	92	92	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.0842	0.0788	-35	-35	-39	-39	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0070	0.0065	-19	-19	-24	-24	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0015	0.0013	650	650	525	525	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0004	0.0004	1 900	1 900	1 900	1 900	0.0008	--	--
Nitrate	mg/L	4.00	4.00	13.22	9.68	230	230	142	142	2.94	--	20
Sulphate	mg/L	21	21	147	134	602	602	538	538	128	--	--
Total dissolved solids	mg/L	670	670	423	406	-37	-37	-39	-39	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0018	0.0008	-64	-64	-85	-85	0.013	0.5	0.4

**Third Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	8.14	8.05	29	33	28	32	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	40	43	77	74	92	78	85	72	--	--	--
Ammonia (unionized)	mg N/L	0.00052	0.00055	0.0617	0.0425	11 759	11 112	8 073	7 627	0.016	--	--
Ammonia nitrogen	mg N/L	2.1	4	4.2	3.7	100	20	76	6	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.0680	0.0003	0.0003	-90	-100	-90	-100	0.005	0.5	0.3
Chloride	mg/L	620	630	29	28	-95	-95	-95	-96	120	--	1000
Dissolved Copper	mg/L	0.0014	0.016	0.0004	0.0003	-74	-98	-82	-98	0.002	0.3	0.1
Fluoride	mg/L	0.19	0.24	0.39	0.38	104	61	97	56	0.12	--	--
Hardness	mg CaCO3/L	300	310	192	179	-36	-38	-40	-42	--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0002	0.0002	-91	-98	-91	-98	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.093	0.0175	0.0137	503	-81	372	-85	0.025	0.5	0.2
Dissolved Barium	mg/L	0.041	0.0630	0.0101	0.0090	-75	-84	-78	-86	--	--	--
Dissolved Cadmium	mg/L	0.000076	0.00027	0.0000	0.0000	-61	-89	-87	-96	0.00004	--	0.002
Dissolved Iron	mg/L	0.37	4.60	0.0050	0.0050	-99	-100	-99	-100	0.3	--	--
Dissolved Mercury	mg/L	0.000059	0.0000540	0.00004	0.00004	634	-20	493	-35	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.66	0.0735	0.0577	-61	-70	-70	-91	0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0279	0.0271	115	115	108	108	0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0012	0.0017	0.0010	475	39	245	-17	0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.00012	0.0004	0.0004	1 190	233	1 190	233	0.0008	--	--
Nitrate	mg/L	2.30	4.00	7.56	5.50	229	89	139	37	2.94	--	20
Sulphate	mg/L	31	46	129	124	316	180	298	168	128	--	--
Total dissolved solids	mg/L	960	990	388	376	-60	-61	-61	-62	--	--	--
Dissolved Zinc	mg/L	0.0076	0.0850	0.0005	0.0005	-93	-99	-93	-99	0.013	0.5	0.4



**North Portage Pit Sumps Water Quality Year 4**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.85	7.61	25	29	21	25	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.05	2.4	98	81	196 700	4 000	161 900	3 275	--	--	--
Ammonia (unionized)	mg N/L	0.003	0.0014	0.0717	0.0100	2 289	5 019	233	614	0.016	--	--
Ammonia nitrogen	mg N/L	12	8.9	2.6	0.7	-78	-71	-94	-92	1.83	--	16
Dissolved Arsenic	mg/L	0.00005	0.056	0.0203	0.0118	44 937	-64	26 011	-79	0.005	0.5	0.3
Chloride	mg/L	0.0010	0.25	25	16	2 553 641	9 911	1 601 941	6 180	120	--	1000
Dissolved Copper	mg/L	0.00001	0.007	0.0016	0.0003	14 021	-78	2 173	-96	0.002	0.3	0.1
Fluoride	mg/L	0.000008	0.031	0.42	0.38	5 250 733	1 255	4 749 900	1 126	0.12	--	--
Hardness	mg CaCO3/L	0.05	8	214	201	476 048	2 578	446 567	2 413	--	--	--
Dissolved Lead	mg/L	0.000002	0.0029	0.0009	0.0002	40 506	-69	6 718	-95	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.00003	0.043	0.0290	0.0251	85 214	-33	73 724	-42	0.025	0.5	0.2
Dissolved Barium	mg/L	0.00002	0.013	0.0159	0.0130	83 689	22	68 058	0	--	--	--
Dissolved Cadmium	mg/L	0.000006	0.000099	0.0001	0.0000	13 178	-20	1 567	-90	0.00004	--	0.002
Dissolved Iron	mg/L	0.000097	2.1	0.0200	0.0050	20 519	-99	5 055	-100	0.3	--	--
Dissolved Mercury	mg/L	0.00000056	0.000029	0.00002	0.00001	37 995	-26	8 829	-83	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.22	0.1255	0.1112	83 589	-43	74 000	-49	0.23	--	--
Dissolved Molybdenum	mg/L	0.000004	0.00081	0.0592	0.0405	1 479 567	7 207	1 011 150	4 894	0.073	--	--
Dissolved Selenium	mg/L	0.000003	0.00058	0.0009	0.0005	30 567	59	16 567	-14	0.001	--	--
Dissolved Thallium	mg/L	0.0000014	0.000057	0.0004	0.0004	28 471	602	28 471	602	0.0008	--	--
Nitrate	mgN/L	13	10.00	8.81	6.19	-32	-12	-52	-38	2.94	--	20
Sulphate	mg/L	0.011	8.8	186	159	1 690 809	2 014	1 445 355	1 707	128	--	--
Total dissolved solids	mg/L	28	41	463	396	1 555	1 030	1 314	866	--	--	--
Dissolved Zinc	mg/L	0.000032	0.037	0.0006	0.0005	1 619	-99	1 463	-99	0.013	0.5	0.4

**Footnotes:**

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 7 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2016.

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.

**2018 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 9**

**Water Quantity - Year 9<sup>A</sup>**

Pits**	Predicted (m <sup>3</sup> )	Measured (m <sup>3</sup> )	% Difference between predicted vs measured
Portage	715 200	117 803	-84
Bay Goose	635 200	327 114	-49
Vault Pit	53 900	88 469	64

<sup>A</sup>predicted volumes from Golder 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.1 and Figures 12.4 and 12-6

\*\*For year 9, in the predicted model, there is no value for the volume of water transferred from Portage Pit to the Reclaim Pond, so take year 5 values for Portage. For Goose, use year 8 reflooding values minus evaporation for Goose. For Vault, use

**Vault Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.52	7.34	-6	-6	-8	-8	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	0.220	23	107	100	48 536	365	45 355	335	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.0700	0.0600	-83	-90	-85	-91	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	3.1	2.6	-91	-94	-92	-95	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0022	0.0003	1 393	-98	67	-100	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	25	19	336 967	31 900	258 567	24 457	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0014	0.0005	9 367	-21	3 233	-72	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.20	0.20	1 349 900	553	1 316 567	537	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	0.27	45	287	176	106 122	537	65 085	291	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0002	0.0002	9 374	567	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0055	0.0044	18 300	1 944	14 567	1 530	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0252	0.0184	46 567	-10	33 974	-34	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.0002	0.0000	8 426	500	1 479	11	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0130	0.0100	8 567	171	6 567	108	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00001	0.00001	2 532	-81	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.1330	0.0722	316 471	2 362	171 805	1 237	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0602	0.0480	15 331	-18	12 208	-34	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0009	0.0005	9 488	-28	5 055	-62	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.000054	0.0002	0.0001	4 300	307	1 900	85	0.0008	--	--
Nitrate	mgN/L	36	62	4.95	4.29	-86	-92	-88	-93	2.94	--	50
Sulphate	mg/L	0.02	24	183	101	764 400	665	420 733	321	128	--	--
Total dissolved solids	mg/L	76	210	370	283	387	76	272	35	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0008	0.0005	725	-33	415	-58	0.013	0.5	0.2

**Phaser Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.76	7.67	-3	-3	-4	-4	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	0.220	23	97	84	44 067	322	37 855	263	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.1433	0.0400	-64	-79	-90	-94	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	8.0	2.9	-76	-86	-91	-95	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0014	0.0003	817	-99	67	-100	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	8	6	105 011	9 879	75 567	7 084	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0088	0.0055	58 678	390	36 733	207	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.18	0.16	1 177 678	470	1 066 567	416	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	0.27	45	250	197	92 369	455	72 956	338	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0003	0.0002	14 374	919	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0097	0.0057	32 344	3 505	18 900	2 011	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0811	0.0595	149 993	189	110 085	113	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.0001	0.0000	2 707	98	558	-54	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0433	0.0050	28 789	803	3 233	4	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00001	0.00001	2 532	-81	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.1932	0.0833	459 781	3 477	198 174	1 442	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0178	0.0089	4 464	-76	2 169	-88	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0006	0.0003	5 742	-56	3 122	-76	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.000054	0.0001	0.0001	1 900	85	1 900	85	0.0008	--	--
Nitrate	mgN/L	36	62	15.83	6.44	-56	-74	-82	-90	2.94	--	50
Sulphate	mg/L	0.02	24	131	84	545 733	446	348 442	249	128	--	--
Total dissolved solids	mg/L	76	210	344	276	352	64	263	31	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0037	0.0014	3 680	206	1 318	15	0.013	0.5	0.2

**Goose Island Pit Sumps Water Quality Year 3**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile <sup>+</sup>		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile <sup>+</sup>	Probable	Possible Poor	Probable	Possible Poor			
pH		6.10	6.10	7.42	-	22	22	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO <sub>3</sub> /L	27	27	49	-	81	81	-	-	--	--	--
Ammonia (unionized)	mg N/L	0.00056	0.00056	0.0050	-	793	793	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	5.4	5	0.1	-	-98	-98	-	-	1.83	--	16
Dissolved Arsenic	mg/L	0.0016	0.0016	0.0005	-	-67	-67	-	-	0.005	0.5	0.3
Chloride	mg/L	440	440	9	-	-98	-98	-	-	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.0015	-	53	53	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.13	0.13	0.23	-	77	77	-	-	0.12	--	--
Hardness	mg CaCO <sub>3</sub> /L	210	210	172	-	-18	-18	-	-	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0007	-	-39	-39	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.1100	-	5 398	5 398	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.0270	0.0295	-	9	9	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000051	0.000051	0.0001	-	18	18	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.25	0.25	0.0050	-	-98	-98	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000039	0.000039	0.00001	-	28	28	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.13	0.13	0.1245	-	-4	-4	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.0062	-	-28	-28	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0025	-	1 150	1 150	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.00002	0.00002	0.0001	-	400	400	-	-	0.0008	--	--
Nitrate	mgN/L	4.00	4.00	6.82	-	70	70	-	-	2.94	--	20
Sulphate	mg/L	21	21	142	-	574	574	-	-	128	--	--
Total dissolved solids	mg/L	670	670	273	-	-59	-59	-	-	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0005	-	-90	-90	-	-	0.013	0.5	0.4

Third Portage Pit Sumps Water Quality Year 4

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	7.67	-	22	26	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	40	43	55	-	38	28	-	-	--	--	--
Ammonia (unionized)	mg N/L	0.00052	0.00055	0.0400	-	7 592	7 173	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	2.1	4	2.1	-	-1	-41	-	-	1.83	--	16
Dissolved Arsenic	mg/L	0.0024	0.0680	0.0015	-	-38	-98	-	-	0.005	0.5	0.3
Chloride	mg/L	620	630	17	-	-97	-97	-	-	120	--	1000
Dissolved Copper	mg/L	0.0014	0.016	0.0007	-	-50	-96	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.19	0.24	0.29	-	53	21	-	-	0.12	--	--
Hardness	mg CaCO3/L	300	310	193	-	-36	-38	-	-	--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0002	-	-91	-98	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.003	0.093	0.0187	-	545	-80	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.041	0.0630	0.0107	-	-74	-83	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000076	0.00027	0.0001	-	-21	-78	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.37	4.60	0.0050	-	-99	-100	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000059	0.0000540	0.00001	-	-15	-91	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.19	0.66	0.1187	-	-38	-82	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.013	0.013	0.0202	-	55	55	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0003	0.0012	0.0010	-	245	-17	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.00003	0.00012	0.0004	-	1 190	233	-	-	0.0008	--	--
Nitrate	mgN/L	2.30	4.00	6.88	-	199	72	-	-	2.94	--	20
Sulphate	mg/L	31	46	133	-	329	189	-	-	128	--	--
Total dissolved solids	mg/L	960	990	318	-	-67	-68	-	-	--	--	--
Dissolved Zinc	mg/L	0.0076	0.0850	0.0005	-	-93	-99	-	-	0.013	0.5	0.4

North Portage Pit Sumps Water Quality Year 4

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile +		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
				Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor			
pH		6.30	6.10	-	-	-	-	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.05	2.4	61	-	121 900	2 442	-	-	--	--	--
Ammonia (unionized)	mg N/L	0.003	0.0014	0.0300	-	900	2 043	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	12	8.9	1.8	-	-85	-80	-	-	1.83	--	16
Dissolved Arsenic	mg/L	0.00005	0.056	0.0003	-	456	-100	-	-	0.005	0.5	0.3
Chloride	mg/L	0.0010	0.25	17	-	1 683 573	6 500	-	-	120	--	1000
Dissolved Copper	mg/L	0.00001	0.007	0.0014	-	12 627	-80	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.000008	0.031	0.25	-	3 124 900	706	-	-	0.12	--	--
Hardness	mg CaCO3/L	0.05	8	166	-	368 789	1 975	-	-	--	--	--
Dissolved Lead	mg/L	0.000002	0.0029	0.0002	-	6 718	-95	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.00003	0.043	0.0222	-	65 194	-48	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.00002	0.013	0.0093	-	48 847	-28	-	-	--	--	--
Dissolved Cadmium	mg/L	0.0000006	0.000099	0.0001	-	8 233	-49	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.000097	2.1	0.0100	-	10 209	-100	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.000000056	0.000029	0.00001	-	8 829	-83	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.22	0.1250	-	83 233	-43	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.000004	0.00081	0.0230	-	574 900	2 740	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.000003	0.00058	0.0010	-	33 233	72	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.0000014	0.000057	0.0008	-	57 043	1 304	-	-	0.0008	--	--
Nitrate	mgN/L	13	10.00	6.03	-	-54	-40	-	-	2.94	--	20
Sulphate	mg/L	0.011	8.8	130	-	1 181 718	1 377	-	-	128	--	--
Total dissolved solids	mg/L	28	41	303	-	982	639	-	-	--	--	--
Dissolved Zinc	mg/L	0.000032	0.037	0.0010	-	3 025	-97	-	-	0.013	0.5	0.4

Footnotes:

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.

\* Used year 7 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0

+ Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2018.

\*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).

Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.



**2019 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 10**

**Water Quantity - Year 10\* (SURFACE RUNOFF & INFILTRATION)**

Pits**	Predicted (m³)	Measured (m³)	% Difference between predicted vs measured
Portage	167 478	289 269	73
Bay Goose	343 567	327 114	-5
Vault Pit*	350 800	326 350	-7

\*Predicted volumes from August 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.2, Year 7 and include runoff to Vault Pit and other drainage area. In Year 10, the pits in Vault area are naturally reflooding.  
 \*\*For Year 10, for Vault, use the runoff estimated in Figure 12-9. For Portage and Bay Goose, values include surface runoff and infiltration into the pit based on the water balance considered in the ICRP update 2019.

**Vault Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile*	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	8.00	7.97	0	0	0	0	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.220	23	63	57	28 536	174	25 809	148	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.0300	0.0200	-93	-96	-95	-97	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	1.18	0.81	-96	-98	-98	-99	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0039	0.0037	2 522	-97	2 333	-97	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	11	9	145 233	13 697	114 567	10 786	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0023	0.0020	15 456	30	12 900	8	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.17	0.16	1 155 456	459	1 066 567	416	0.12	--	--
Hardness	mg CaCO3/L	0.27	45	197	158	72 986	339	58 233	250	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0002	0.0002	7 795	456	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0036	0.0033	11 900	1 233	10 900	1 122	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0250	0.0232	46 258	-11	42 863	-17	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.00001	0.00001	-426	-63	-426	-63	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0050	0.0050	3 233	4	3 233	4	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00001	0.00001	2 532	-81	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.0545	0.0491	129 662	909	116 805	809	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0467	0.0359	11 874	-36	9 105	-51	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0003	0.0003	2 477	-81	2 477	-81	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.00054	0.0001	0.0001	1 900	85	1 900	85	0.0008	--	--
Nitrate	mg/L	36	62	7.45	5.63	-79	-88	-84	-91	2.94	--	50
Sulphate	mg/L	0.02	24	134	104	556 289	456	432 400	333	128	--	--
Total dissolved solids	mg/L	76	210	312	273	311	49	259	30	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0012	0.0008	1 103	-3	673	-38	0.013	0.5	0.2

**Phaser Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile*	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.48	7.10	-6	-6	-11	-11	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.220	23	46	43	20 991	102	19 445	87	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.0280	0.0200	-93	-96	-95	-97	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	1.8	2.0	-95	-97	-94	-96	1.83	--	20
Dissolved Arsenic	mg/L	0.00015	0.120	0.0021	0.0018	1 327	-98	1 100	-99	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	3	3	40 700	3 773	37 233	3 444	120	--	500
Dissolved Copper	mg/L	0.000150	0.00180	0.0045	0.0039	30 033	151	25 900	117	0.002	0.3	0.1
Fluoride	mg/L	0.000150	0.031	0.13	0.11	839 900	306	733 233	255	0.12	--	--
Hardness	mg CaCO3/L	0.27	45	100	91	37 011	123	33 604	102	--	--	--
Dissolved Lead	mg/L	0.0000190	0.000027	0.0002	0.0002	7 795	456	7 795	456	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0053	0.0050	17 433	1 848	16 567	1 752	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0203	0.0174	37 456	-28	32 122	-38	--	--	--
Dissolved Cadmium	mg/L	0.000019	0.000027	0.00001	0.00001	532	-56	426	-63	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0150	0.0050	9 900	213	3 233	4	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.000027	0.00001	0.00001	2 532	-81	2 532	-81	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.0726	0.0726	199 567	1 453	172 757	1 244	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0107	0.0078	2 633	-85	1 900	-89	0.073	--	--
Dissolved Selenium	mg/L	0.000097	0.00130	0.0004	0.0004	4 436	-66	2 477	-81	0.001	--	--
Dissolved Thallium	mg/L	0.000050	0.00054	0.0001	0.0001	1 900	85	1 900	85	0.0008	--	--
Nitrate	mg/L	36	62	3.3	2.1	-91	-95	-94	-97	2.94	--	50
Sulphate	mg/L	0.02	24	59	61	243 900	144	252 817	153	128	--	--
Total dissolved solids	mg/L	76	210	174	172	129	-17	126	-18	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0005	0.0005	415	-58	415	-58	0.013	0.5	0.2

**Goose Island Pit Lake Water Quality Year 10**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Annual Average Water Quality Forecast Value***	Lower 25th Centile Water Quality Forecast Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average	Lower 25th centile			
pH		6.1	6.1													6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	27	27	73	71	61	-	126	126	-	-	-16	-15	-	-	--	--	--
Ammonia (unionized)	mg N/L	0	0			0.3200	-	57 043	57 043	-	-	-	-	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	5	5	28	27	10.5	-	94	94	-	-	-63	-61	-	-	1.83	--	16
Dissolved Arsenic	mg/L	0.002	0.002	0.011	0.011	0.0146	-	813	813	-	-	28	32	-	-	0.005	0.5	0.3
Chloride	mg/L	440	440	153	148	80	-	-82	-82	-	-	-48	-46	-	-	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.851	0.820	0.3543	-	37 195	37 195	-	-	-58	-57	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.130	0.130	0.630	0.613	0.54	-	315	315	-	-	-14	-12	-	-	0.12	--	--
Hardness	mg CaCO3/L	210	210	561	543	405	-	93	93	-	-	-28	-25	-	-	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0003	0.0003	0.0002	-	-86	-86	-	-	-54	-53	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.015	0.015	0.0150	-	650	650	-	-	-2	0	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.027	0.050	0.048	0.0303	-	12	12	-	-	-39	-37	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000	0.000	0.000	0.000	0.0000	-	-80	-80	-	-	-95	-94	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.250	0.250	0.384	0.371	0.0050	-	-98	-98	-	-	-99	-99	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000	0.0000	0.0000	0.0000	0.00001	-	28	28	-	-	-78	-77	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.1300	0.1300	0.1026	0.0905	0.0309	-	-76	-76	-	-	-70	-66	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.2881	0.2780	0.1025	-	1 092	1 092	-	-	-64	-63	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0535	0.0516	0.0015	-	650	650	-	-	-97	-97	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.0000	0.0000	0.0012	0.0011	0.0001	-	400	400	-	-	-92	-91	-	-	0.0008	--	--
Nitrate	mg/L	4.0	4.0	4.8	4.6	1.90	-	-53	-53	-	-	-60	-59	-	-	2.94	--	20
Sulphate	mg/L	21	21	1979	1909	469	-	2 133	2 133	-	-	-76	-75	-	-	128	--	--
Total dissolved solids	mg/L	670	670	1996	1932	803	-	20	20	-	-	-60	-58	-	-	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0038	0.0035	0.0005	-	-90	-90	-	-	-87	-86	-	-	0.013	0.5	0.4

**Third Portage Pit Sumps Water Quality Year 10 (Pit E)**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Annual Average Water Quality Forecast Value***	Lower 25th Centile Water Quality Forecast Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average	Lower 25th centile			
pH		6.3	6.1													6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	40	43	158	125	7.69	7.62	22	28	21	25	-62	-52	-71	-63	--	--	--
Ammonia (unionized)	mg N/L	0	0			0.11	0.06	21 246	20 082	11 438	10 809	-	-	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	2	4	14	5	5.44	2.44	159	56	16	-30	-60	20	-82	-46	1.83	--	16
Dissolved Arsenic	mg/L	0.002	0.068	0.654	0.024	0.0024	0.0020	1	-96	-17	-97	-100	-90	-100	-92	0.005	0.5	0.3
Chloride	mg/L	620	630	74	31	30.14	26.60	-95	-95	-96	-96	-59	-3	-64	-14	120	--	1000
Dissolved Copper	mg/L	0.001	0.016	0.574	0.002	0.0019	0.0008	33	-88	-43	-95	-100	-22	-100	-66	0.002	0.3	0.1
Fluoride	mg/L	0.190	0.240	0.577	0.540	0.39	0.40	104	62	111	67	-33	-28	-31	-26	0.12	--	--
Hardness	mg CaCO3/L	300	310	1023	393	280	280	-7	-10	-7	-10	-73	-29	-73	-29	--	--	--
Dissolved Lead	mg/L	0.0016	0.0076	0.0013	0.0003	0.00015	0.00015	-91	-98	-91	-98	-88	-50	-88	-50	0.		

North Portage Pit Sumps Water Quality Year 10 (Pit A)

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Annual Average Water Quality Forecast Value***	Lower 25% Centile Water Quality Forecasted Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 2012**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average	Lower 25th centile			
pH		6.3	6.1			7.84	-	24	28	-	-	-	-	-	-	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0	2	49	41	70	-	139 900	2 817	-	-	44	73	-	-	-	-	-
Ammonia (unionized)	mg N/L	0.0	0.0			0.1050	-	3 400	7 400	-	-	-	-	-	-	0.016	--	--
Ammonia nitrogen	mg N/L	12	9	19	17	6.7	-	-44	-24	-	-	-65	-60	-	-	1.83	--	16
Dissolved Arsenic	mg/L	0.000	0.056	0.008	0.007	0.2721	-	604 567	386	-	-	3 318	3 731	-	-	0.005	0.5	0.3
Chloride	mg/L	0	0	106	96	162	-	16 479 492	64 500	-	-	53	68	-	-	120	--	1000
Dissolved Copper	mg/L	0.000	0.007	0.530	0.434	0.0249	-	225 809	255	-	-	-95	-94	-	-	0.002	0.3	0.1
Fluoride	mg/L	0.000	0.031	0.404	0.326	0.38	-	4 687 400	1 110	-	-	-7	15	-	-	0.12	--	--
Hardness	mg CaCO3/L	0	8	351	285	631	-	1 401 011	7 781	-	-	80	121	-	-	--	--	--
Dissolved Lead	mg/L	0.0000	0.0029	0.0002	0.0002	0.0002	-	6 718	-95	-	-	-37	-28	-	-	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000	0.043	0.010	0.009	0.0640	-	188 135	49	-	-	513	627	-	-	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000	0.013	0.032	0.026	0.0273	-	143 584	110	-	-	-14	4	-	-	--	--	--
Dissolved Cadmium	mg/L	0.000	0.000	0.000	0.000	0.0001	-	18 233	11	-	-	4	41	-	-	0.00004	--	0.002
Dissolved Iron	mg/L	0.000	2.100	0.245	0.199	0.0625	-	64 333	-97	-	-	-74	-69	-	-	0.3	--	--
Dissolved Mercury	mg/L	0.0000	0.0000	0.0000	0.0000	0.00001	-	8 829	-83	-	-	-71	-68	-	-	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.2200	0.0627	0.0450	0.8817	-	587 667	301	-	-	1 306	1 861	-	-	0.23	--	--
Dissolved Molybdenum	mg/L	0.0000	0.0008	0.1792	0.1464	0.1533	-	3 831 150	18 820	-	-	-14	5	-	-	0.073	--	--
Dissolved Selenium	mg/L	0.0000	0.0006	0.0328	0.0264	0.0075	-	249 900	1 193	-	-	-77	-72	-	-	0.001	--	--
Dissolved Thallium	mg/L	0.0000	0.0001	0.0007	0.0004	0.0001	-	7 043	75	-	-	-85	-75	-	-	0.0008	--	--
Nitrate	mgN/L	13.0	10.0	3.5	3.2	4.59	-	-65	-54	-	-	31	43	-	-	2.94	--	20
Sulphate	mg/L	0	9	1342	1199	916	-	8 322 627	10 303	-	-	-32	-24	-	-	128	--	--
Total dissolved solids	mg/L	28	41	1374	1240	1391	-	4 866	3 291	-	-	1	12	-	-	--	--	--
Dissolved Zinc	mg/L	0.0000	0.0370	0.0035	0.0033	0.0005	-	1 463	-99	-	-	-86	-85	-	-	0.013	0.5	0.4

Footnotes:

Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.  
 \* Used year 7 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0  
 \*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).  
 \*\*\* Annual average water quality and 25% centile values shown in this table are based on the water quality forecast considered in the Meadowbank Interim Closure and Reclamation Plan - Update 2019, Doc. No. 662987-5000-4EER-0001, rev. 00.  
 + Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2019.  
 Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.



**2020 Comparison of predicted pit water quantity and quality to the measured water quantity and quality**  
**MINING YEAR 11**

**Water Quantity - Year 11^ (SURFACE RUNOFF & INFILTRATION)**

Pits**	Predicted (m³)	Measured (m³)	% Difference between predicted vs measured
Portage	167 616	302 500	80
Bay Goose	344 535	389 350	13
Vault Pit^	350 800	326 350	-7

^predicted volumes from August 2007 - Waste and Water Management Plan - Meadowbank Gold Project, Table 12.2, Year 7 and include runoff to Vault Pit and other drainage area. In Year 11, the pits in Vault area are naturally re-flooding.  
 \*\*For Year 11, for Vault, use the runoff estimated in Table 12.2. For Portage and Bay Goose, values include surface runoff and infiltration into the pit based on the water balance considered in the ICRP update 2019.

**Vault Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile*	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.97	7.92	0	0	-1	-1	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.220	23	55	46	24 900	139	20 809	100	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.0100	0.0100	-98	-99	-98	-99	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	0.15	0.12	-100	-100	-100	-100	1.83	--	20
Dissolved Arsenic	mg/L	0.000150	0.120	0.0034	0.0030	2 153	-97	1 900	-98	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	8	8	110 300	10 381	110 567	10 406	120	--	500
Dissolved Copper	mg/L	0.0000150	0.00180	0.0014	0.0005	8 967	-24	3 233	-72	0.002	0.3	0.1
Fluoride	mg/L	0.0000150	0.031	0.10	0.09	693 233	235	599 900	190	0.12	--	--
Hardness	mg CaCO3/L	0.27	45	119	111	43 900	164	41 011	147	--	--	--
Dissolved Lead	mg/L	0.0000190	0.00027	0.0002	0.0002	11 584	722	8 847	530	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0015	0.0014	5 033	470	4 567	419	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0110	0.0098	20 233	-61	18 048	-65	--	--	--
Dissolved Cadmium	mg/L	0.0000019	0.00027	0.00002	0.00002	953	-26	953	-26	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0100	0.0100	6 567	108	6 567	108	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.00027	0.00001	0.00001	5 163	-63	5 163	-63	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.0112	0.0026	26 471	107	6 090	-52	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0188	0.0128	4 726	-74	3 182	-82	0.073	--	--
Dissolved Selenium	mg/L	0.0000097	0.00130	0.0011	0.0010	11 034	-17	10 209	-23	0.001	--	--
Dissolved Thallium	mg/L	0.0000050	0.00054	0.0002	0.0002	3 900	270	3 900	270	0.0008	--	--
Nitrate	mg/L	36	62	2.23	1.80	-94	-96	-95	-97	2.94	--	50
Sulphate	mg/L	0.02	24	62	45	257 233	157	187 400	88	128	--	--
Total dissolved solids	mg/L	76	210	125	101	64	-40	33	-52	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0010	0.0010	931	-17	931	-17	0.013	0.5	0.2

**Phaser Pit Sumps Water Quality Year 7**

Parameters	Units	Probable Scenario Year 7*	Possible Poor end Scenario Year 7*	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to Wally Lake**
				Mean	Lower 25th centile*	Probable	Possible Poor	Probable	Possible Poor			
pH		8.00	8.00	7.75	7.56	-3	-3	-6	-6	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.220	23	40	28	17 880	72	12 627	22	--	--	--
Ammonia (unionized)	mg N/L	0.40	0.67	0.0100	0.0100	-98	-99	-98	-99	0.016	--	--
Ammonia nitrogen	mg N/L	33	55	0.1	0.0	-100	-100	-100	-100	1.83	--	20
Dissolved Arsenic	mg/L	0.000150	0.120	0.0010	0.0007	589	-99	367	-99	0.005	0.5	0.1
Chloride	mg/L	0.0075	0.079	2	1	24 048	2 193	17 233	1 546	120	--	500
Dissolved Copper	mg/L	0.0000150	0.00180	0.0018	0.0009	11 826	-1	5 900	-50	0.002	0.3	0.1
Fluoride	mg/L	0.0000150	0.031	0.08	0.06	518 419	151	399 900	94	0.12	--	--
Hardness	mg CaCO3/L	0.27	45	77	66	28 501	72	24 344	47	--	--	--
Dissolved Lead	mg/L	0.0000190	0.00027	0.0002	0.0002	11 888	744	8 847	530	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000030	0.00027	0.0034	0.0023	11 122	1 147	7 567	752	0.025	0.5	0.2
Dissolved Barium	mg/L	0.000054	0.028	0.0095	0.0057	17 410	-66	10 456	-80	--	--	--
Dissolved Cadmium	mg/L	0.0000019	0.00027	0.00002	0.00002	953	-26	953	-26	0.00004	--	0.002
Dissolved Iron	mg/L	0.000150	0.005	0.0111	0.0100	7 307	131	6 567	108	0.3	--	--
Dissolved Mercury	mg/L	0.00000190	0.00027	0.00001	0.00001	5 163	-63	5 163	-63	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.000042	0.00540	0.0213	0.0005	50 561	294	1 090	-91	0.23	--	--
Dissolved Molybdenum	mg/L	0.000390	0.07300	0.0035	0.0018	792	-95	362	-98	0.073	--	--
Dissolved Selenium	mg/L	0.0000097	0.00130	0.0009	0.0010	9 637	-27	10 209	-23	0.001	--	--
Dissolved Thallium	mg/L	0.0000050	0.00054	0.0002	0.0002	3 900	270	3 900	270	0.0008	--	--
Nitrate	mg/L	36	62	1.4	0.8	-98	-98	-98	-99	2.94	--	50
Sulphate	mg/L	0.02	24	32	26	135 270	35	109 483	10	128	--	--
Total dissolved solids	mg/L	76	210	83	59	10	-60	-22	-72	--	--	--
Dissolved Zinc	mg/L	0.000097	0.00120	0.0010	0.0010	931	-17	931	-17	0.013	0.5	0.2

**Goose Island Pit Lake Water Quality Year 11**

Parameters	Units	Probable Scenario Year 3*	Possible Poor end Scenario Year 3*	Annual Average Water Quality Forecast Value***	Lower 25% Centile Water Quality Forecasted Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile*		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile*		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average	Lower 25th centile			
pH		6.1	6.1			7.99	7.93									6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	27	27	43	23	81	63	201	201	133	133	90	249	47	171	--	--	--
Ammonia (unionized)	mg N/L	0	0			0.5914	0.2550	105 512	105 512	45 436	45 436					0.016	--	--
Ammonia nitrogen	mg N/L	5	5	11	4	19.2	10.7	256	256	97	97	69	387	-7	169	1.83	--	16
Dissolved Arsenic	mg/L	0.002	0.002	0.005	0.002	0.6715	0.4305	41 868	41 868	26 806	26 806	13 333	32 437	8 512	20 760	0.005	0.5	0.3
Chloride	mg/L	440	440	63	23	193	109	-56	-56	-75	-75	203	749	72	382	120	--	1000
Dissolved Copper	mg/L	0.001	0.001	0.345	0.119	0.5868	0.1176	61 671	61 671	12 274	12 274	70	392	-66	-2	0.002	0.3	0.1
Fluoride	mg/L	0.130	0.130	0.326	0.171	0.25	0.26	95	95	96	96	-22	48	-22	49	0.12	--	--
Hardness	mg CaCO3/L	210	210	247	96	817	834	289	289	297	297	231	749	238	766	--	--	--
Dissolved Lead	mg/L	0.0011	0.0011	0.0002	0.0001	0.0001	0.0001	-89	-89	-92	-92	-49	-7	-65	-35	0.001	0.2	0.1
Dissolved Nickel	mg/L	0.002	0.002	0.007	0.003	0.1343	0.0997	6 616	6 616	4 885	4 885	1 713	4 181	1 246	3 077	0.025	0.5	0.2
Dissolved Barium	mg/L	0.027	0.027	0.025	0.012	0.0501	0.0292	86	86	8	8	104	336	19	153	--	--	--
Dissolved Cadmium	mg/L	0.000	0.000	0.000	0.000	0.0000	0.0000	-80	-80	-80	-80	-94	-90	-94	-90	0.00004	--	0.002
Dissolved Iron	mg/L	0.250	0.250	0.167	0.063	0.0050	0.0050	-98	-98	-98	-98	-97	-92	-97	-92	0.3	--	--
Dissolved Mercury	mg/L	0.0000	0.0000	0.0000	0.0000	0.00001	0.00001	120	120	28	28	-58	-28	-58	-28	0.000026	--	0.0004
Dissolved Manganese	mg/L	0.1300	0.1300	0.1145	0.0648	0.0245	0.0168	-81	-81	-87	-87	-79	-62	-85	-74	0.23	--	--
Dissolved Molybdenum	mg/L	0.0086	0.0086	0.1195	0.0421	0.0808	0.0552	839	839	541	541	-32	92	-54	31	0.073	--	--
Dissolved Selenium	mg/L	0.0002	0.0002	0.0217	0.0075	0.0326	0.0205	16 221	16 221	10 150	10 150	50	333	-6	172	0.001	--	--
Dissolved Thallium	mg/L	0.0000	0.0000	0.0015	0.0009	0.0001	-	400	400	-	-	-93	-88	-	-	0.0008	--	--
Nitrate	mg/L	4.0	4.0	2.0	0.7	3.96	2.66	-1	-1	-34	-34	102	464	35	278	2.94	--	20
Sulphate	mg/L	21	21	819	290	824	561	3 822	3 822	2 571	2 571	1	184	-32	93	128	--	--
Total dissolved solids	mg/L	670	670	884	335	1316	1006	96	96	50	50	49	293	14	200	--	--	--
Dissolved Zinc	mg/L	0.0051	0.0051	0.0040	0.0025	0.0005	0.0005	-90	-90	-90	-90	-88	-80	-88	-80	0.013	0.5	0.4

**Third Portage Pit Sumps Water Quality Year 11 (Pit E)**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Annual Average Water Quality Forecast Value***	Lower 25% Centile Water Quality Forecasted Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile*		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile*		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average				



**North Portage Pit Sumps Water Quality Year 11 (Pit A)**

Parameters	Units	Probable Scenario Year 4*	Possible Poor end Scenario Year 4*	Annual Average Water Quality Forecast Value***	Lower 25% Centile Water Quality Forecasted Value***	Measured		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		% Difference between predicted vs measured- mean		% Difference between predicted vs measured- Lower 25th percentile *		CCME Guidelines**	MMER Schedule 4**	Water License Discharge to 3PL**
						Mean	Lower 25th centile	Probable	Possible Poor	Probable	Possible Poor	Annual Average	Lower 25th centile	Annual Average	Lower 25th centile			
pH		6.3	6.1			8.29	7.90	32	36	25	30			#DIV/0!	#DIV/0!	6.5 to 9.0	6.0 to 9.5	6.0 to 9.0
Alkalinity	mg CaCO3/L	0.05	2.40	67	58	91	63	182 233	3 699	125 900	2 525							
Ammonia (unionized)	mg N/L	0.003	0.001			0.3085	0.2625	10 183	21 936	8 650	18 650							
Ammonia nitrogen	mg N/L	12	9	20	18	13.1	12.9	9	47	8	45					0.016	--	--
Dissolved Arsenic	mg/L	0.000	0.056	0.180	0.009	0.3454	0.3348	767 419	517	743 956	498					0.005	0.5	0.3
Chloride	mg/L	0	0	108	96	124	131	12 698 880	49 680	13 400 410	52 430					1.83	--	16
Dissolved Copper	mg/L	0.000	0.007	0.657	0.629	0.3274	0.1324	2 976 112	4 577	1 203 309	1 791					0.002	0.3	0.1
Fluoride	mg/L	0.000	0.031	0.437	0.400	0.25	0.17	3 124 900	706	2 156 150	456					0.12	--	--
Hardness	mg CaCO3/L	0	8	542	423	610	608	1 354 344	7 519	1 350 456	7 497							
Dissolved Lead	mg/L	0.0000	0.0029	0.0005	0.0003	0.0004	0.0001	17 741	-86	3 764	-97					0.001	0.2	0.1
Dissolved Nickel	mg/L	0.000	0.043	0.015	0.012	0.0919	0.0755	270 047	114	221 885	76					0.025	0.5	0.2
Dissolved Barium	mg/L	0.000	0.013	0.065	0.038	0.0483	0.0431	254 023	271	226 874	232							
Dissolved Cadmium	mg/L	0.000	0.000	0.000	0.000	0.0000	0.0000	1 567	-90	1 567	-90					0.00004	--	0.002
Dissolved Iron	mg/L	0.000	2.100	0.571	0.294	0.0167	0.0050	17 082	-99	5 055	-100					0.3	--	--
Dissolved Mercury	mg/L	0.0000	0.0000	0.0000	0.0000	0.00001	0.00001	8 829	-83	8 829	-83					0.000026	--	0.0004
Dissolved Manganese	mg/L	0.0002	0.2200	0.0924	0.0827	0.2039	0.1035	135 811	-7	68 917	-53					2.3	--	--
Dissolved Molybdenum	mg/L	0.0000	0.0008	0.1863	0.1639	0.0898	0.0714	2 243 650	10 980	1 785 525	8 718					0.073	--	--
Dissolved Selenium	mg/L	0.0000	0.0006	0.0320	0.0248	0.0188	0.0140	626 289	3 140	466 567	2 314					0.001	--	--
Dissolved Thallium	mg/L	0.0000	0.0001	0.0009	0.0008	0.0003	0.0001	18 948	368	7 043	75					0.0008	--	--
Nitrate	mg/L	13.0	10.0	3.6	3.3	2.82	2.71	-78	-72	-79	-73					2.94	--	20
Sulphate	mg/L	0	9	1583	1505	720	592	6 544 597	8 081	5 377 173	6 622					128	--	--
Total dissolved solids	mg/L	28	41	1710	1542	1120	1093	3 898	2 630	3 802	2 565							
Dissolved Zinc	mg/L	0.0000	0.0370	0.0039	0.0037	0.0005	0.0005	1 463	-99	1 463	-99					0.013	0.5	0.4

**Footnotes:**  
 Highlighted values represent exceedences of greater than 20% relative percent difference between predicted vs measured values.  
 \* Used year 7 predictions for Vault, year 3 for Goose and year 4 for Portage as presented in Golder, 2007 - Water Quality Predictions Meadowbank Gold Project Doc No 516. Ver 0  
 \*\* Discharge criteria and guidelines based on total metal concentrations. Sulphate guideline based on threshold value from BC Environment guideline for the protection of aquatic life for very soft water (0-30 mg/L) (April 2013).  
 \*\*\* Annual average water quality and 25% centile values shown in this table are based on the water quality forecast considered in the Meadowbank Interim Closure and Reclamation Plan - Update 2019, Doc. No. 662987-5000-4EER-0001, rev. 00.  
 + Some have no lower 25th percentile data as only 1 or 2 samples were taken in 2019.  
 Highlighted values in yellow indicate a mean measured value greater than the discharge criteria or guidelines.