

CHEMICAL ANALYSIS REPORT

Date: July 21, 1993
ASL File No. D2446
Report On: Water Analysis (Goose Lake)
Report To: Noracol, Dames & Moore Ltd.
Suite 250
13571 Commerce Parkway
Richmond, BC
V6V 2R2
Attention: Mr. Bruce Ott
Received: June 30, 1993

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Brent A. Makelki, B.Sc.
Project Chemist

Eda Parrero, B.Sc.
Project Chemist

		Goose L. 1	Goose L. 2	Cocac L. 3	Goose L. 4	Goose L. 5
Physical Tests						
Colour	CU	30.1	13.5	14.8	23.5	37.9
Conductivity	umhos/cm	12.1	10.8	11.0	13.2	10.5
Total Dissolved Solids		9	7	7	10	7
Hardness	CaCO ₃	4.47	3.69	3.63	5.07	4.24
pH		5.60	5.75	5.92	6.00	5.95
Total Suspended Solids		2	<1	<1	<1	<1
Turbidity	NTU	0.51	0.52	0.70	0.50	0.50
Dissolved Anions						
Alkalinity - Total	CaCO ₃	3.1	2.7	2.3	3.2	2.0
Chloride	Cl	<0.5	0.5	0.5	0.5	0.6
Sulphate	SO ₄	2.0	<1.0	<1.0	2.3	<1.0
Nutrients						
Ammonia Nitrogen	N	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate Nitrogen	N	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrite Nitrogen	N	0.001	0.002	0.001	0.001	<0.001
ortho-Phosphate	P	0.002	0.004	0.004	0.003	0.002
Total Phosphorus	P	0.005	0.008	0.006	0.007	0.005
Total Metals						
Mercury	T-Hg	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

< - Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH, Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).

		Goose L. 1	Goose L. 2	Goose L. 3	Goose L. 4	Goose L. 5
Dissolved Metals						
Aluminum	D-Al	0.033	0.017	0.024	0.029	0.093
Antimony	D-Sb	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	D-As	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Barium	D-Ba	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium	D-Be	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth	D-Bi	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	D-Ca	0.954	0.784	0.774	1.09	0.888
Chromium	D-Cr	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	D-Co	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	D-Cu	0.003	0.001	0.001	0.002	0.006
Iron	D-Fe	0.075	0.031	<0.030	0.054	0.068
Lead	D-Pb	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	D-Li	<0.015	<0.015	<0.015	<0.015	<0.015
Magnesium	D-Mg	0.507	0.422	0.412	0.574	0.400
Manganese	D-Mn	<0.005	<0.005	0.007	<0.005	<0.005
Molybdenum	D-Mo	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	D-Ni	0.002	0.002	0.002	0.002	0.002
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	D-K	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium	D-Se	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silver	D-Ag	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	D-Na	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium	D-Sr	0.004	0.003	0.003	0.006	0.006
Thallium	D-Tl	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	D-Sn	<0.30	<0.30	<0.30	<0.30	<0.30
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010
Tungsten	D-W	<0.10	<0.10	<0.10	<0.10	<0.10
Vanadium	D-V	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	D-Zn	<0.005	<0.005	<0.005	<0.005	<0.005

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH, Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).

Goose L.
6Goose L.
7**Physical Tests**

Colour	CU	13.5	-
Conductivity	umhos/cm	12.4	-
Total Dissolved Solids		10	-
Hardness	CaCO ₃	4.61	-
pH		6.20	-
Total Suspended Solids		<1	-
Turbidity	NTU	0.50	-

Dissolved Anions

Alkalinity - Total	CaCO ₃	3.0	-
Chloride	Cl	0.6	-
Sulphate	SO ₄	2.0	-

Nutrients

Ammonia Nitrogen	N	<0.005	-
Nitrate Nitrogen	N	<0.005	-
Nitrite Nitrogen	N	<0.001	-
ortho-Phosphate	P	0.002	-
Total Phosphorus	P	0.005	-

Total Metals

Mercury	T-Hg	<0.00005	<0.00005
---------	------	----------	----------

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH, Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).

Goose L.
6Goose L.
7Dissolved Metals

Aluminum	D-Al	0.029	<0.005
Antimony	D-Sb	<0.0001	<0.0001
Arsenic	D-As	<0.0001	<0.0001
Barium	D-Ba	<0.010	<0.010
Beryllium	D-Be	<0.005	<0.005
Bismuth	D-Bi	<0.10	<0.10
Cadmium	D-Cd	<0.0002	<0.0002
Calcium	D-Ca	0.941	<0.050
Chromium	D-Cr	<0.001	<0.001
Cobalt	D-Co	<0.001	<0.001
Copper	D-Cu	0.001	<0.001
Iron	D-Fe	<0.030	<0.030
Lead	D-Pb	<0.001	<0.001
Lithium	D-Li	<0.015	<0.015
Magnesium	D-Mg	0.548	0.011
Manganese	D-Mn	<0.005	<0.005
Molybdenum	D-Mo	<0.001	<0.001
Nickel	D-Ni	0.002	<0.001
Phosphorus	D-P	<0.30	<0.30
Potassium	D-K	<2.0	<2.0
Selenium	D-Se	<0.0005	<0.0005
Silver	D-Ag	<0.0001	<0.0001
Sodium	D-Na	<2.0	<2.0
Strontium	D-Sr	0.003	<0.001
Thallium	D-Tl	<0.10	<0.10
Tin	D-Sn	<0.30	<0.30
Titanium	D-Ti	<0.010	<0.010
Tungsten	D-W	<0.10	<0.10
Vanadium	D-V	<0.030	<0.030
Zinc	D-Zn	<0.005	<0.005

< = less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH,
Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

Metals in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Edition published by the American Public Health Association, 1992. The procedures involve a variety of instrumental analyses including atomic emission spectrophotometry (ICP) and atomic absorption spectrophotometry (AA) to obtain the required detection limit for each element. Specific details are available on request.

End of Report

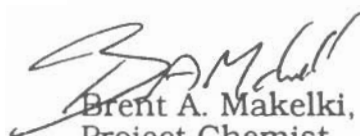


CHEMICAL ANALYSIS REPORT

Date: October 5, 1993
ASL File No. D3907
Report On: Water Analysis (Goose Lake)
Report To: **Homestake Canada Ltd.**
1000 - 700 West Pender Street
Vancouver, BC
V6C 1G8
Attention: **Mr. John Dadds**
Received: September 7, 1993

ASL ANALYTICAL SERVICE LABORATORIES LTD.

per:


Brent A. Makelki, B.Sc.
Project Chemist


Katherine Thomas, B.Sc.
Project Chemist

cc: Norecol, Dames & Moore - Richmond

Att'n: Mr. John Jemmett

&

✓ Mr. Purcy Pacor - Homestake





RESULTS OF ANALYSIS - Water

File No. D3907

	WQ1	WQ2	WQ3	WQ4	WQ5
	93 08 30 14:00	93 08 30 14:10	93 08 30 14:15	93 08 30 14:30	93 08 30 14:35
<u>Physical Tests</u>					
Colour CU	9.3	<5.0	5.4	23.1	37.0
Conductivity umhos/cm	17.4	23.7	15.0	22.7	17.9
Total Dissolved Solids	10	12	8	12	10
Hardness CaCO ₃	5.49	7.93	4.08	9.23	6.97
pH	6.11	6.25	4.81	6.20	6.24
Total Suspended Solids	2	3	3	6	1
Turbidity NTU	0.85	0.52	0.60	2.33	0.56
<u>Dissolved Anions</u>					
Alkalinity - Total CaCO ₃	5.6	5.1	6.4	7.1	5.8
Chloride Cl	1.3	3.0	0.8	1.1	0.8
Sulphate SO ₄	1.6	<1.0	<1.0	<1.0	2.6
<u>Nutrients</u>					
Ammonia Nitrogen N	0.007	<0.005	0.008	0.018	<0.005
Nitrate Nitrogen N	<0.005	0.019	<0.005	<0.005	<0.005
Nitrite Nitrogen N	0.004	0.004	0.003	0.005	0.004
ortho-Phosphate P	0.003	0.002	0.004	0.003	0.002
Total Phosphorus P	0.005	0.005	0.004	0.007	0.004
<u>Total Metals</u>					
Mercury T-Hg	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH,
Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).



RESULTS OF ANALYSIS - Water

File No. D3907

		WQ1	WQ2	WQ3	WQ4	WQ5
		93 08 30 14:00	93 08 30 14:10	93 08 30 14:15	93 08 30 14:30	93 08 30 14:35
Dissolved Metals						
Aluminum	D-Al	0.009	0.007	0.008	0.019	0.073
Antimony	D-Sb	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Arsenic	D-As	<0.0001	<0.0001	0.0001	0.0001	<0.0001
Barium	D-Ba	<0.010	<0.010	<0.010	<0.010	<0.010
Beryllium	D-Be	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth	D-Bi	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Calcium	D-Ca	1.24	2.01	0.825	1.97	1.45
Chromium	D-Cr	0.003	0.002	<0.001	<0.001	0.004
Cobalt	D-Co	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	D-Cu	0.003	0.002	0.002	0.003	0.003
Iron	D-Fe	<0.030	<0.030	<0.030	0.230	0.062
Lead	D-Pb	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	D-Li	<0.015	<0.015	<0.015	<0.015	<0.015
Magnesium	D-Mg	0.581	0.704	0.489	1.05	0.812
Manganese	D-Mn	<0.005	<0.005	<0.005	0.006	<0.005
Molybdenum	D-Mo	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	D-Ni	0.002	0.002	0.002	0.003	0.004
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	D-K	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium	D-Se	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Silver	D-Ag	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Sodium	D-Na	<2.0	<2.0	<2.0	<2.0	<2.0
Strontium	D-Sr	<0.001	0.010	<0.001	<0.001	<0.001
Thallium	D-Tl	<0.10	<0.10	<0.10	<0.10	<0.10
Tin	D-Sn	<0.30	<0.30	<0.30	<0.30	<0.30
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010
Tungsten	D-W	<0.10	<0.10	<0.10	<0.10	<0.10
Vanadium	D-V	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	D-Zn	0.015	0.008	<0.005	0.006	0.006

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH,
Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).



RESULTS OF ANALYSIS - Water

File No. D3907

		WQ6	WQ7	WQ8
		93 08 30 14:40	93 08 30 14:50	93 08 30 15:00
<u>Physical Tests</u>				
Colour	CU	5.1	5.0	<5.0
Conductivity	umhos/cm	29.3	12.6	1.5
Total Dissolved Solids		17	7	<1
Hardness	CaCO ₃	9.00	3.78	0.42
pH		6.23	6.33	5.96
Total Suspended Solids		1	1	<1
Turbidity	NTU	0.70	0.57	<0.10
<u>Dissolved Anions</u>				
Alkalinity - Total	CaCO ₃	6.1	4.4	<1.0
Chloride	Cl	1.3	0.8	<0.5
Sulphate	SO ₄	4.8	<1.0	<1.0
<u>Nutrients</u>				
Ammonia Nitrogen	N	<0.005	0.010	<0.005
Nitrate Nitrogen	N	0.038	<0.005	<0.005
Nitrite Nitrogen	N	0.004	0.005	<0.001
ortho-Phosphate	P	0.001	0.002	<0.001
Total Phosphorus	P	0.002	0.004	<0.001
<u>Total Metals</u>				
Mercury	T-Hg	<0.00005	<0.00005	<0.00005

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH, Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).



RESULTS OF ANALYSIS - Water

File No. D3907

		WQ6	WQ7	WQ8
		93 08 30 14:40	93 08 30 14:50	93 08 30 15:00
Dissolved Metals				
Aluminum	D-Al	0.015	<0.005	<0.005
Antimony	D-Sb	<0.0001	<0.0001	<0.0001
Arsenic	D-As	0.0001	<0.0001	<0.0001
Barium	D-Ba	<0.010	<0.010	<0.010
Beryllium	D-Be	<0.005	<0.005	<0.005
Bismuth	D-Bi	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.0002	<0.0002	<0.0002
Calcium	D-Ca	1.86	0.758	0.167
Chromium	D-Cr	0.003	0.002	<0.001
Cobalt	D-Co	<0.001	<0.001	<0.001
Copper	D-Cu	0.002	0.001	<0.001
Iron	D-Fe	<0.030	<0.030	<0.030
Lead	D-Pb	<0.001	<0.001	<0.001
Lithium	D-Li	<0.015	<0.015	<0.015
Magnesium	D-Mg	1.06	0.457	<0.010
Manganese	D-Mn	<0.005	<0.005	<0.005
Molybdenum	D-Mo	<0.001	<0.001	<0.001
Nickel	D-Ni	0.002	0.001	<0.001
Phosphorus	D-P	<0.30	<0.30	<0.30
Potassium	D-K	<2.0	<2.0	<2.0
Selenium	D-Se	<0.0005	<0.0005	<0.0005
Silver	D-Ag	<0.0001	<0.0001	<0.0001
Sodium	D-Na	<2.0	<2.0	<2.0
Strontium	D-Sr	<0.001	<0.001	<0.001
Thallium	D-Tl	<0.10	<0.10	<0.10
Tin	D-Sn	<0.30	<0.30	<0.30
Titanium	D-Ti	<0.010	<0.010	<0.010
Tungsten	D-W	<0.10	<0.10	<0.10
Vanadium	D-V	<0.030	<0.030	<0.030
Zinc	D-Zn	0.007	<0.005	<0.005

< = Less than the detection limit indicated.

Results are expressed as milligrams per litre except for pH,
Conductivity (umhos/cm), Turbidity (NTU), and Colour (CU).



METHODOLOGY

File No. D3907

Samples were analyzed by methods acceptable to the appropriate regulatory agency. Outlines of the methodologies utilized are as follows:

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Ed. published by the American Public Health Association, 1992. Further details are available on request.

Metals in Water

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 18th Edition published by the American Public Health Association, 1992. The procedures involve a variety of instrumental analyses including atomic emission spectrophotometry (ICP) and atomic absorption spectrophotometry (AA) to obtain the required detection limit for each element. Specific details are available on request.

End of Report