

July 13, 1989

MEMORANDUM

LARA 92B/13
827419

ATTN : ALEX DAVIDSON
FROM : JOHN VILLAMERE
REF. : HANDLING OF THE LARA PROPERTY ORE AND WASTE ROCK

WATER QUALITY ANALYSIS PROGRAM

Points to be noted:

1. There is no degradation of Solly Creek downstream of the work area to date. However, the increasing SO₄ levels downstream of the work area in the last two samplings are a concern.
2. Increasing sulfate and zine levels in the monitoring pond will be a concern to the government environmental agencies.

OPTIONS FOR HANDLING OF WASTE ROCK/ORE AT THE LARA SITE

There are approximately 13,000 tonnes of material on the impermeable pad at the present time. Approximately 500 tonnes of this material is considered to be "ore", the remainder is "waste rock". The options being considered at this stage include the following:

1. Haul "ore" to Westmin for processing.
2. Ocean dumping of "ore".
3. Return "ore" underground.
4. Covering of the "ore" and "waste rock" at its present location with acid consuming material.
5. Burial of the "ore" in a nearby trench and covering with acid consuming material.

Regards,

John Villamere

TABLE 1: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES, PORTAL SITE.

PARAMETER (mg/L)	1988								1989		
	JULY 21	AUG. 11	SEPT. 8	OCT. 11	NOV. 8	NOV. 14	DEC. 14	DEC. 29	JAN. 20	MAY 15	JUNE 1
pH	7.20	7.00	6.61	7.56	7.74	8.09	7.74	7.44	-	7.11	7.20
Alkalinity CaCO ₃	119.0	85.0	72.0	102.0	95.4	530.0	58.7	56.7	-	17.0	43.5
Sulphate SO ₄	18.0	19.0	40.3	57.5	39.8	12.8	8.2	13.8	-	2.6	4.4
Total Metals											
Aluminum	68.6	12.3	5.92	0.63	0.039	-	p	0.022	-	0.041	0.022
Arsenic	2.14	0.098	0.048	0.016	0.0093	-	0.0022	0.0036	-	0.0005	0.0002
Copper	7.00	0.15	0.26	0.009	0.002	-	0.001	L0.001	-	0.002	0.001
Iron	191.00	9.93	6.54	0.66	L0.03	-	L0.015	L0.015	-	0.044	0.12
Lead	11.6	0.33	0.66	0.63	0.004	-	0.001	0.001	-	0.001	L0.001
Zinc	56.6	1.00	2.01	0.15	0.11	-	0.028	0.033	-	0.21	0.65
Dissolved Metals											
Aluminum	0.21	0.12	0.074	0.021	0.024	-	p	0.007	-	0.007	0.005
Arsenic	0.029	0.0060	0.0035	0.0052	0.0089	-	0.0018	0.0032	-	0.0003	L0.0001
Copper	L0.005	L0.005	L0.005	0.002	0.002	-	L0.001	L0.001	-	0.002	0.001
Iron	L0.03	L0.03	L0.03	L0.03	L0.03	-	L0.015	L0.015	-	L0.015	L0.015
Lead	0.001	0.004	0.008	0.031	0.001	-	0.001	L0.001	-	L0.001	L0.001
Zinc	L0.005	L0.005	0.027	0.10	0.11	-	0.028	0.032	-	0.16	0.58

L = Less than
 Results are expressed in mg/L except for pH.

TABLE 2: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES, SOLLY CREEK ABOVE EXPLORATION SITE.

PARAMETER (mg/L)	1988								1989			
	JULY 21	AUG. 11	SEPT. 8	OCT. 11	NOV. 8	NOV. 14	DEC. 14	DEC. 29	JAN. 20	MAR. 14	MAY 15	JUNE 1
pH	6.39	6.81	6.53	6.77	6.95	-	6.78	6.48	-	7.13	6.72	6.78
Alkalinity CaCO ₃	6.8	9.0	12.0	12.0	12.0	-	5.1	6.2	-	7.4	6.0	4.1
Sulphate SO ₄	1.6	L1.0	L1.0	L1.0	L1.0	-	L1.0	L1.0	-	L1.0	L1.0	L1.0
Total Metals												
Aluminum	0.05	0.075	0.092	0.15	0.029	-	p	0.056	-	0.068	0.083	0.15
Arsenic	L0.0001	L0.0001	L0.0001	0.0002	L0.0001	-	L0.0001	L0.0001	-	L0.0001	0.0002	0.0004
Copper	L0.005	0.005	L0.010	L0.001	0.001	-	0.003	L0.001	-	L0.001	0.002	0.002
Iron	L0.03	L0.03	0.03	0.04	0.03	-	L0.015	L0.015	-	0.031	L0.015	0.017
Lead	L0.001	L0.001	0.003	L0.001	L0.001	-	L0.001	L0.001	-	L0.001	L0.001	L0.001
Zinc	L0.005	L0.005	L0.005	0.007	L0.005	-	L0.005	0.008	-	0.007	L0.005	0.008
Dissolved Metals												
Aluminum	0.05	0.069	0.083	0.029	0.029	-	p	0.031	-	0.056	0.070	0.12
Arsenic	L0.0001	L0.0001	L0.0001	0.0002	L0.0001	-	L0.0001	L0.0001	-	L0.0001	L0.0001	0.0003
Copper	L0.005	L0.005	L0.005	L0.001	L0.001	-	0.001	L0.001	-	L0.001	0.002	0.001
Iron	L0.03	L0.03	L0.03	L0.03	L0.03	-	L0.015	L0.015	-	L0.015	L0.015	L0.015
Lead	L0.001	L0.001	L0.001	L0.001	L0.001	-	L0.001	L0.001	-	L0.001	L0.001	L0.001
Zinc	L0.005	L0.005	L0.005	L0.005	L0.005	-	L0.005	0.008	-	0.007	L0.005	0.008

L = Less than
 Results are expressed in mg/L except for pH.

TABLE 3: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES, SOLLY CREEK BELOW EXPLORATION SITE.

PARAMETER (mg/L)	1988							1989			
	JULY 21	AUG. 11	SEPT. 8	OCT. 11	NOV. 8	NOV. 14	DEC. 14	DEC. 29	JAN. 20	MAY 15	JUNE 1
pH	6.53	6.50	dry	-	-	-	6.70	6.38	-	6.35	6.56
Alkalinity CaCO ₃	6.8	13.0	creek	-	-	-	8.2	6.2	-	7.0	11.6
Sulphate SO ₄	1.1	11.0	-	-	-	-	11.0	11.0	-	4.3	9.5
Total Metals											
Aluminum	0.07	0.074	dry	-	-	-	p	0.062	-	0.026	0.016
Arsenic	0.0003	LO.0001	creek	-	-	-	LO.0001	LO.0001	-	0.0002	0.0001
Copper	LO.005	0.007	-	-	-	-	LO.001	LO.001	-	0.001	0.001
Iron	LO.03	LO.03	-	-	-	-	LO.015	LO.015	-	0.019	LO.015
Lead	LO.001	LO.001	-	-	-	-	LO.001	LO.001	-	LO.001	LO.001
Zinc	LO.005	LO.005	-	-	-	-	0.014	LO.005	-	LO.005	LO.005
Dissolved Metals											
Aluminum	0.06	0.065	dry	-	-	-	p	0.038	-	0.022	0.011
Arsenic	0.0003	LO.0001	creek	-	-	-	LO.0001	LO.0001	-	0.0001	LO.0001
Copper	LO.005	LO.005	-	-	-	-	LO.001	LO.001	-	0.001	0.001
Iron	LO.03	LO.03	-	-	-	-	LO.015	LO.015	-	LO.015	LO.015
Lead	LO.001	LO.001	-	-	-	-	LO.001	LO.001	-	LO.001	LO.001
Zinc	LO.005	LO.005	-	-	-	-	0.011	LO.005	-	LO.005	LO.005

L = Less than
 Results are expressed in mg/L except for pH.

TABLE 4: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES, MONITORING POND.

PARAMETER (mg/L)	1988								1989			
	JULY 21	AUG. 11	SEPT. 8	OCT. 11	NOV. 8	NOV. 14	DEC. 14	DEC. 29	JAN. 20	MAR. 14	MAY 15	JUNE 1
pH	6.98	7.48	4.74	7.58	7.47	7.76	7.24	7.25	7.31	7.34	7.38	7.33
Alkalinity CaCO ₃	73.1	88.0	4.0	80.0	49.0	61.0	51.5	55.6	61.8	59.9	51.0	38.9
Sulphate SO ₄	260.0	29.0	37.5	79.6	303.0	6.2	638.0	391.0	579.0	504.0	689.0	1,080.0
Total Metals												
Aluminum	2.22	0.48	1.15	0.14	0.029	-	p	0.009	0.11	0.028	LO.005	LO.005
Arsenic	0.020	0.022	0.015	0.010	0.0033	-	0.0020	0.0014	0.0022	0.0013	0.0010	0.0035
Copper	LO.005	0.008	0.032	0.003	0.002	-	0.004	0.002	0.007	0.008	0.005	0.007
Iron	0.40	0.37	0.89	0.20	0.04	-	0.021	LO.015	0.033	0.018	0.015	LO.015
Lead	0.015	0.009	0.052	0.026	0.002	-	0.010	0.001	0.011	0.010	0.008	LO.001
Zinc	0.085	0.059	0.21	0.14	2.04	-	8.69	10.7	8.23	6.50	9.25	8.30
Dissolved Metals												
Aluminum	1.32	0.24	0.15	0.015	0.005	-	p	LO.005	0.014	LO.005	LO.005	LO.005
Arsenic	0.013	0.015	0.0038	0.0049	0.0024	-	0.0017	0.0012	0.0016	0.0013	0.0007	0.0029
Copper	LO.005	LO.005	LO.005	LO.001	0.002	-	0.004	0.002	0.005	0.007	0.004	0.003
Iron	LO.03	LO.03	LO.03	LO.03	LO.03	-	LO.015	LO.015	LO.015	LO.015	LO.015	LO.015
Lead	0.002	LO.001	0.003	0.002	LO.001	-	0.016	0.001	0.010	0.008	0.006	LO.001
Zinc	0.067	0.018	0.033	0.012	2.03	-	8.34	10.0	8.20	6.46	8.78	7.66

L = Less than
Results are expressed in mg/L except for pH.

TABLE 5: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES,
BULK ORE SAMPLE LEACHATE.

PARAMETERS (mg/L)	1988				1989			
	OCT. 1	NOV. 8	DEC. 14	DEC. 29	JAN. 20	MAR. 14	MAY 15	JUNE 1
pH	5.31	3.91	7.42	7.52	7.40	7.38	7.66	6.77
Alkalinity CaCO ₃	8.0	L1.0	119.0	98.9	84.5	78.8	106.0	88.2
Sulphate SO ₄	1,880.0	2,160.0	1,680.0	1,730.0	1,050.0	810.0	1,620.0	1,710.0
Total Metals								
Aluminum	0.18	0.016	p	0.013	0.060	0.024	0.009	0.022
Arsenic	0.0077	0.0022	0.0032	0.0028	0.0021	0.0017	0.0017	0.0040
Copper	0.067	0.011	0.008	0.008	0.010	0.011	0.034	0.007
Iron	0.84	0.33	L0.015	0.39	L0.015	L0.015	0.13	0.021
Lead	0.25	0.18	0.016	0.011	0.016	0.016	0.021	0.017
Zinc	15.8	24.4	17.2	12.9	14.7	13.0	21.4	8.58
Dissolved Metals								
Aluminum	0.021	0.016	p	L0.005	0.020	0.005	0.006	0.005
Arsenic	0.0069	0.0018	0.0029	0.0023	0.0016	0.0017	0.0011	0.0037
Copper	0.049	0.011	0.006	0.008	0.010	0.010	0.029	0.007
Iron	L0.03	0.04	L0.015	L0.015	L0.015	L0.015	L0.015	L0.015
Lead	0.20	0.18	0.044	0.006	0.014	0.016	0.015	0.010
Zinc	11.4	23.9	16.7	12.9	12.6	12.8	19.9	8.58

L = Less than

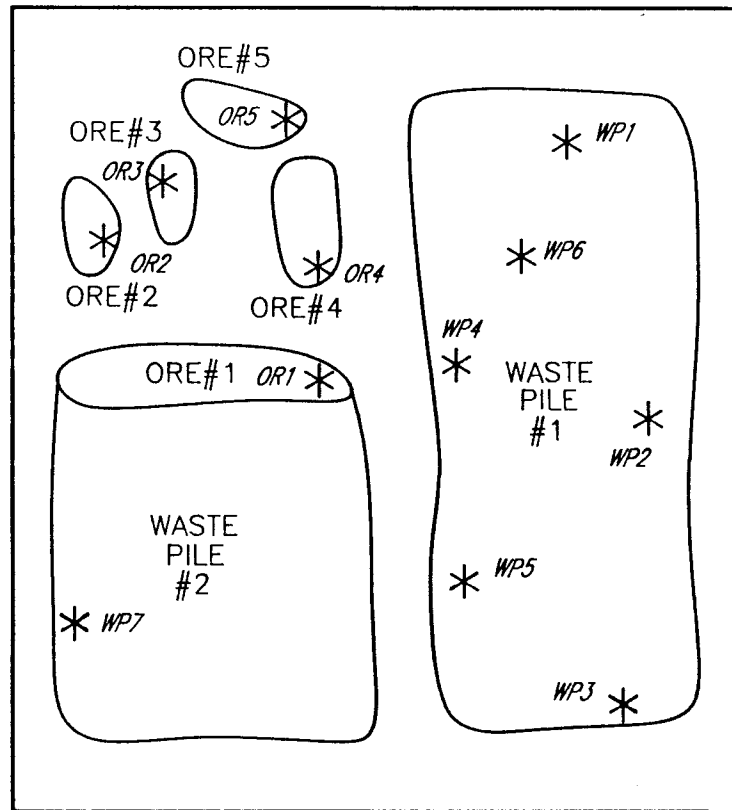
Results are expressed in mg/L except for pH.

TABLE 6: LARAMIDE RESOURCES LIMITED, LARA PROJECT, UNDERGROUND EXPLORATION WATER QUALITY ANALYSES FOR WATER FROM SELECTED SITES.

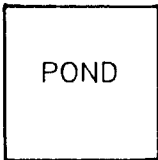
<u>PARAMETERS (mg/L)</u>	<u>EAST DRIFT SEPT. 8, 1988</u>	<u>WEST DRIFT SEPT. 8, 1988</u>	<u>POND INLET JULY 21, 1988</u>	<u>MINE TUNNEL NOV. 14, 1988</u>
pH	7.73	7.75	7.09	8.92
Alkalinity CaCO ₃	138.0	90.0	119.0	121.0
Sulphate SO ₄	65.7	12.5	12.5	16.8
Total Metals				
Aluminum	0.35	0.071	50.3	-
Arsenic	0.022	0.0031	1.88	-
Copper	0.023	LO.010	5.03	-
Iron	0.32	0.03	192.0	-
Lead	0.011	0.005	9.60	-
Zinc	0.78	0.020	44.7	-
Dissolved Metals				
Aluminum	0.10	0.070	0.20	-
Arsenic	0.014	0.0031	0.021	-
Copper	LO.005	LO.005	LO.005	-
Iron	LO.03	LO.03	LO.03	-
Lead	0.002	0.002	LO.001	-
Zinc	0.51	0.016	LO.005	-

L = Less than
Results are expressed in mg/L except for pH.

SKETCH OF LARA U/G STOCKPILE - PLAN VIEW



* WP7 Location of Sample for Acid Generation Potential Tests



ROCK PILE	tonnes	Cu%	Pb%	Zn%	Ag oz/T	Au oz/T	
WASTE#1	9145	}	0.11	0.15	0.16	0.41	0.022
WASTE#2	2351		0.32	0.46	2.17	1.11	0.051
Sub Total	11496						
ORE#1	55	}	0.61	0.73	4.56	2.02	0.068
ORE#2	119		1.14	1.83	9.90	4.30	0.131
ORE#3	157		0.28	0.52	1.18	1.23	0.066
ORE#4	72		0.50	0.58	4.01	2.10	0.049
ORE#5	126		0.40	0.45	2.16	1.27	0.050
Sub Total	529						