

## Characterization of Waste Material

Wastes from the project would include topsoil, glacial till, sandstone, saprolite and low and high sulfur waste rock. All of these materials were subjected to laboratory analysis to ascertain their chemical characteristics. Analyses included bulk chemical analyses, acid production potential and neutralization testing, and leachate characterization.

The concentrations of major elements in the overburden materials are shown in Table 2-1. The major constituent of these materials was silicon, with lesser amounts of aluminum and iron. Tin, titanium, calcium, magnesium and copper were found in most samples in minor amounts.

TABLE 2-1  
Concentrations of Major Elements in the  
Topsoil, Till, Sandstone, and Saprolite Samples<sup>1</sup>

Parameters	Topsoil (Range)	Till (Range)	Sandstone (Range)	Saprolite
Al	28,000 - 32,600	38,900 - 52,600	5,440 - 6,140	34,800
Si	259,000 - 295,000	318,000 - 344,000	376,000 - 437,000	347,000
Ca	800 - 1,200	1,700 - 2,600	110 - 560	2,100
K	110 - 260	170 - 310	16 - 69	130
Mg	620 - 840	1,400 - 3,000	46 - 190	1,000
Na	16 - 22	6 - 14	6 - 7	6
Cr	6.0 - 9.5	9.1 - 11	1.6 - 2.3	9.2
Cu	2.7 - 4.0	13 - 83	3 - 34	160
Fe	4,400 - 10,000	5,700 - 10,000	430 - 1,100	12,000
Mn	280 - 610	160 - 460	10 - 200	310
Pb	5.0 - 10	2.3 - 3.5	0.4 - 1.3	29
Sn	<200 - 233	620 - 1,900	570 - 960	560
Ti	3,100 - 3,190	1,800 - 4,100	180 - 630	1,300
Zn	17 - 19	18 - 22	3 - 10	110
S %	0.20 - 0.21	<0.10	<0.10	<0.10

<sup>1</sup>Values in (ug/l) - error. Should be mg/Kg per Larry Lynch (See CD 125-98)

The composition of waste rock is similar to the overburden material (Table 2-2). Silicon and aluminum are the primary constituents with lesser amounts of aluminum and iron. Complete results of the bulk chemical analyses are provided in Appendix 3-5-O of the EIR.

TABLE 2-2

Concentrations of Major Elements in  
the Waste Rock Samples<sup>1</sup>

	WASTE ROCK SAMPLE				
	WR-1	WR-2	WR-3	WR-4	WR-5
Al	109,000	122,000	124,000	108,000	109,000
Si	357,000	330,000	336,000	349,000	269,000
Ca	5,200	1,500	2,300	1,800	252
K	700	590	360	870	118
Mg	9,400	6,400	7,100	8,900	345
Na	45	62	43	38	22
Co	18	28	60	35	23
Cr	24	29	25	17	2.3
Cu	540	2,700	3,900	5,000	6,400
Fe	33,000	38,000	42,000	45,000	38,000
Pb	9	16	60	24	7
Mn	310	160	130	180	19
Ni	7.1	14	31	11	6.1
Sn	2,600	<300	680	<300	460
Ti	2,600	3,000	2,900	2,600	2,000
Zn	1,200	98	7,900	830	41
S %	<0.10	0.49	0.70	2.0	4.8

<sup>1</sup>Values in (ug/l) — Error — Should be mg/kg per Larry Lynch (see CD 125-98)

Acid production studies were conducted on powdered waste rock to determine the materials' capability of producing acid. These tests indicated that waste rock with sulfur content of 2% or less would not be expected to produce acid.

Two different leaching tests on waste materials were performed. A wet/dry leach test simulated the natural precipitation cycle which the materials would be exposed to while stored on the surface. The second test evaluated leachate produced by continued saturation of the materials, simulating the backfilled pit after flooding with groundwater. Results from the leach testing are provided in Section 3.5.6.3.3 of the Mining Permit Application.

## TOPOGRAPHY

The entire region has been glaciated and most of the land forms in central Rusk County are of glacial or water-worked origin. The surface elevations at the mine site range from 1,090 feet at the Flambeau River to 1,160 feet in the uplands. Figure 2-3 illustrates the range and location of the various topographic elevations and geologic surfaces. The proposed rail spur, all of the ancillary facilities and most of the stockpiles will be located on upland areas ranging in elevation from 1,140 feet to 1,160 feet. The uplands are underlain by a layer of loamy till 30 to 40 feet thick.