

COMINCO ENGINEERING SERVICES LIMITED

PRELIMINARY MINE PROJECT EVALUATION PROGRAMME
(this programme is intended for preliminary evaluations only)

COMPANY: MINNOVA INC. EVALUATED BY: KJD
 PROPERTY: Tulsequah Chief DATE: 15-Aug-91
 MINING METHOD: Sub-level blasthole (1' to 2' dia.) at rate of 2,000 tons/day
 MILLING METHOD: Mixed sulphides, diff.flotn., separate concs. at rate of 2,000 tons/day
 PRODUCTION RATE: 700,000 tons/year
 CAPITAL COST: 142,180,000 1991 \$Can. OPERATING COST: 78.91 1991 \$Can. per ton

	TONS OF OVERALL		CONTAINED OZ.		NET SMELTER	NSR PER TON	METAL PRICES USED		MILL HEAD GRADES		
	CONC.	HILL	CONC.	(thousands)							
	PER YEAR RECOVERY		GRADE	Ag Au	CONC. (1991 \$US)	OF ORE (1991 \$US)					
Cu	30,570	85.26%	25.0%	1,158	31	812.90	35.50	Pb	0.30	\$US/lb.	1.07 %
Pb	11,650	73.68%	45.0%	511	8	407.88	6.79	Zn	0.50	\$US/lb.	5.92 %
Zn	63,010	80.00%	50.0%	34		219.98	19.80	Cu	1.00	\$US/lb.	1.35 %
Au		80.00%						MoS2		\$US/lb.	%
Ag		88.00%						Au	380.00	\$US/oz.	0.070 oz/ton
TOTAL NSR per ton of ore						62.09 1991 \$US		Ag	4.80	\$US/oz.	2.765 oz/ton
						or	71.40 1991 \$Can.				
OPERATING MARGIN OF						-7.51 1991 \$Can. per ton of ore					

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PERCENTAGE MILL RECOVERIES

		Zn	Pb	Cu	Au	Ag
Cu conc.	Cu conc.	1.6	1.5	81.0	64.0	59.8
Pb conc.	Pb conc.	2.4	70.0	1.7	16.0	26.4
Zn conc.	Zn conc.	76.0	2.2	2.6		1.8
Overall	Overall	80.0	73.7	85.3	80.0	88.0

PERCENTAGE DISTRIBUTION OF RECOVERED METAL(S)

Conc.	Conc.	Zn	Pb	Cu	Au	Ag
Cu	Cu	2	2	95	80	68
Pb	Pb	3	95	2	20	30
Zn	Zn	95	3	3		2

CONCENTRATE GRADES - % and oz/ton

Conc.	Conc.	Zn	Pb	Cu	Au	Ag
Cu	Cu	2.2	0.4	25.0	1.0	37.9
Pb	Pb	8.5	45.0	1.4	0.7	43.9
Zn	Zn	50.0	0.3	0.4		0.5

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CAPITAL COST ESTIMATE

MINE		MILL AND SURFACE PLANT	
Site clearing, portal, level rehab. & facilities	4,020,000	Local site access roads	18,000,000
Shaft headworks & development	1,350,000	Mill site clearing, excavation, etc.	490,000
Shaft sinking	10,800,000	Concrete foundations	2,740,000
Mine development	4,886,000	Tailings disposal & storage	6,980,000
Initial stope preparation	1,830,000	Water supply	3,420,000
		Diesel-electric plant & surface power distribution	12,000,000
Hoist	5,740,000	Other surface & camp facilities	4,630,000
Hoist installation	1,100,000		
Bins and skips	290,000	Fine crushing, conveyors	8,420,000
Mining equipment	6,020,000	Mill buildings	6,060,000
Ventilation system	1,610,000	Grinding, ore bins	7,810,000
Drainage, water supply	1,300,000	Processing plant	4,020,000
Primary jaw crusher	360,000	Mine backfill plant	1,880,000
Maintenance shop	620,000		=====
Compressor plant	810,000	TOTAL MILL & SURFACE PLANT	76,450,000
Air and water piping	620,000		=====
Fill distribution system	2,030,000	PROJECT OVERHEAD (excluding working capital)	20,560,000
Electrical distribution	1,790,000		=====
	=====	ESTIMATED TOTAL PROJECT COST (1991 \$Can.)	142,180,000
TOTAL MINE	45,170,000		=====
	=====		

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OPERATING COST ESTIMATE

	COST/TON -----		COST/TON -----
MINE		MILL	
Stoping	9.27	Secondary crushing and conveying	1.05
Backfilling	2.14	Ore storage and grinding	1.87
Stope preparation	3.97	Processing	6.07
Primary crushing	0.76	Tailings disposal	0.35
Hoisting	1.80	Assaying	0.49
Mine services	19.10	Supervision, maintenance, and general	3.41
Supervision	2.14		=====
	=====	TOTAL MILL	13.24
TOTAL MINE	39.19		=====
	=====		
		OPERATING MANPOWER	
GENERAL		Mine	153
Power (mine and mill)	12.55	Mill	55
Maintenance, services	9.17	Services	78
Administration and technical	4.76	Administration and technical	34
	=====		=====
TOTAL GENERAL	26.48	TOTAL MANPOWER	320
	=====		=====
ESTIMATED TOTAL PROPERTY COST PER TON	78.91		
(1991 \$Can.)	=====		