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DEVELOPMENTS AT THE SILBAK PREMIER/BIG MISSOURI PROPERTIES STEWART, B. C.

WESTMIN RESOURCES LIMITED

PART I - A. E. SOREGAROLI
HISTORY OF MINING AND RECENT EXPLORATION DEVELOPMENTS

PART II - H. D. MEADE
EXPLORATION, GEOLOGY AND RESERVES

PART III - B. K. MCKNIGHT
CONCEPTUAL MINE DEVELOPMENT PLAN
(CAPITAL AND OPERATING COSTS)

87-45

LOCATION AND ACCESS

1) Location Map - N.W. B.C. (hwy. Terrace-New Hazelton-Mezziadin-Stewart).

2) Overview of Stewart.

3) Property Location Map showing
   - Silbak Premier - 2 to 3 km apart
   - Big Missouri
   - Granduc Road
   - Mineralized zones

HISTORICAL

The first gold discovery in the area was on Big Missouri ridge in 1904 and Silbak Premier was not discovered until 1910.

SILBAK PREMIER

- Production of bonanza ore began in 1918 with 122,397 tons produced from 1918 to 1922 with a recovered grade of 1.35 oz/t Au and 45.75 oz/t Ag, in the near surface part of the Premier mine.
- the current Silbak Pemier property originally consisted of numerous properties with most of the early production from the Premier mine. In 1935 the B.C. Silver and Sebakwe mines properties merged to form British Silbak Premier Mines Ltd. Subsequently other properties were acquired.

GOLD-SILVER PRODUCTION AT SILBAK PREMIER

	TONNAGE (tons)	RECOVERED GRADE * (oz/t) Au	Ag
1918-1953	4,696,386	0.38	8.02
1953-1968	26,027	0.57	11.95
TOTAL	4,722,413	0.384	8.03

or 1,814,723 oz Au, 37,963,245 oz Ag

*base metal recovery 1923-1932; 1946-1953; 1959-1969

- the 1953-1968 production is from leasors and Bralorne Mines in the upper part of the Glory Hole area.
- production prior to mine closure in 1953 (due to low metal prices) was from the Northern Light area on the lowermost level in the mine.
- maximum production occurred from 1926 to 1932 at 250,000 t/year using gravity and flotation of a bulk sulphide concentrate.

LONGITUDINAL SECTION - SILBAK PREMIER

- review development over 6 levels.
- locate Glory Hole area, Northern Light, B.C. Silver (acquired in 1936).

HISTORIC PHOTOGRAPHS

BIG MISSOURI

- subsequent to the initial discovery in 1904, exploration continued until 1926 when Consolidated Mining and Smelting Co. (Cominco) became interested in the property; took an option and formed Buena Vista Mining Company.
- underground development began in 1927 and evaluation continued until 1936 when a production decision was made to build a 750 t/day underground mill.

Preproduction reserve estimates varied from:
3,650,000 tons grading 0.063 oz/t Au
to 1,317,750 tons grading 0.1437 oz/t Au

PRODUCTION (1938-1942)

822,011 tons grading 0.0775 oz/t Au and minor Ag and base metals.

UNDERGROUND DEVELOPMENT

- stope plan and section.

HISTORICAL

- underground mill (750 t/day - gravity, sulphide flotation and cyanide)
- hydroelectric facility, town site.
- construction of dam on Long Lake.

RECENT EXPLORATION DEVELOPMENTS

1973 - John Hembling of Tournigan Mining Explorations Ltd. began acquiring mineral claims in Big Missouri ridge area. In 1978? acquires the former mine property from Cominco consolidating the numerous old properties that together with staked claims comprise the current property.

1978 - Tournigan begins exploration of the property with trenching, rehabilitation of former workings, geochemical and geophysical surveys and diamond drilling.

Dec.
1978 - Western Mines Limited (Westmin) acquired an option on the property to earn a 70% interest in the property. Westmin may aquire an additional 7 1/2% interest by paying Tournigan $1,000,000 within 90 days of commencement of commercial production.

June
1979 - Westmin begins exploration at Big Missouri and to December 31, 1986 has completed the following exploration:
- geology, geochemical and geophysical surveys.
- extensive trenching, surface and underground sampling.
- 9,618 feet percussion drilling / 173 holes.
- 41,723 feet diamond drilling / 282 holes

1979 - Ben Ouelette of British Silbak Premier Mines Limited acquires the Silbak Premier mine property from British interests.

1980 - British Silbak Premier Mines Limited begins exploration on evaluation of surface zones and rehabilitation of 6 Level. A total of 23,354 feet of diamond drilling was completed to the end of 1981.

March
1983 - Westmin acquires an option to earn a minimum 50% interest in the Silbak Premier property in November 3, 1981 and completed the agreement in March 1983.

June
1983 - Westmin begins exploration and to December 31, 1986 has completed the following exploration:
- geology, geochemical and geophysical surveys.
- trenching and surface and underground sampling.
- 48,497 feet surface diamond drilling in 137 holes and 10,399 feet underground drilling in 46 holes, mainly to test the Glory Hole area.
- 2,950 feet rotary drilling in 102 holes to test grade of waste dump.

July
1986 - Westmin enters into an agreement with Canacord Resources Inc. wherein Canacord can earn an 18.75% interest in Westmin's interest in the Silbak Premier and Big Missouri properties.

Oct.
1986 - Westmin submits a prospectus for Stage I Socio-Economic Environmental Impact Study to B.C. Mine Development Steering Committee.

Dec.
1986 - EXPLORATION EXPENDITURES

Big Missouri	$3,000,000
Silbak Premier	$5,000,000
TOTAL	$8,000,000

PART II EXPLORATION, GEOLOGY AND GEOLOGICAL RESERVES

EXPLORATION BIG MISSOURI

- Exploration began at Big Missouri in 1979 with a systematic evaluation of the numerous surface mineral occurrences.

  i) work began by evaluating the size potential and grade distribution of the various zones and prioritizing the potential of each zone.
  ii) evaluation of the structural and stratigraphic relationships within the various mineralized zones.

AN EXPLORATION MODEL WAS DEVELOPED

  i) grade-size relationship indicated small tonnage potential at grades of greater than 0.2 oz/t Au; but obvious moderate to large tonnage potential at 0.07 to 0.10 oz/t Au. Exploration was focused at defining near surface open pittable mineralization with a 0.10 oz/t Au equivalent grade.

  ii) The mineralized zones were recognized to be conformable to stratigraphy and a stratigraphic model was developed to guide exploration.

PROPERTY GEOLOGY

Geology Plan and Cross Section - (locate X-sec) (Scale 1:1000)

- (property approximately 8 km long x 2 km wide).
- gentle to moderate west dipping sequence.
- mineralization hosted within andesite of the Early Jurassic Hazelton Group.

  Upper Sequence - green andesite flow & tuff breccia

  Lower Sequence - andesite to rhyodacite ash flow, tuff and volcaniclastic

- Mineralized zones located in 3 regionally extensive mineralized horizons - lower, middle and upper.
- locate previous Big Missouri underground mine.

MINERALIZED ZONES - Plan & Long Section

PLAN - scale; locate the main mineralized zones.
- Geological Reserves within 4 open pit zones:

	Mineable
Dago	3.35
S-1	1.27
Province	0.53
Martha Ellen	4.00

3,031,000 tons grading 0.075 oz/t Au and 0.95 oz/t Ag (2.23 g/t Au, 32.57 g/t Ag).

LONG SEC. - review 3 regionally extensive horizons and location of main mineralized zones.

DAGO ZONE (Plan & Section) - 250 m long x 125 m wide

- show grade distribution in plan, noting thicker higher grade core.
- conformable nature of the zone consisting of 3 mineralized zones; proposed open pit and apparent waste:ore ratio.
  1. Schematic cherty tuff band
  2. Semi massive sulphide band
  3. fragmental cherty tuff - brecciated

SECTION S-1 ZONE AND PROVINCE AND BIG MISSOURI UNDERGROUND

S-1 ZONE - Section (geometry of the zone - several bands)
- waste to ore ratio

1. Footwall breccia
2. silica breccia from Big Missouri underground

PROVINCE ZONE - Section (geometry of the zone - very low w:0 ratio

1. bleached sericitized andesite with disseminated sulphide patches and stringers - late quartz gash fillings
2. semi-massive sulphide material

EXPLORATION POTENTIAL BIG MISSOURI

i) expansion of the Martha Ellen zone and evaluation of other surface mineral zones.
ii) evaluation of underground reserve potential such as down dip extension of the S-1 zone where 8 holes in the high grade core of the zone have averaged approximately 65.0 feet grading 0.18 oz/t Au equivalent.

EXPLORATION SILBAK PREMIER

- the experience gained at Big Missouri was used to estimate the underground reserve potential of the Silbak Premier property during the acquisition evaluation, and latter to determine the low grade reserve potential in the Glory Hole area.
- Westmin began its exploration of the property by testing the open pit potential in the Glory Hole area.

REGIONAL GEOLOGY

- locate Big Missouri and Silbak Premier - approximately 6 km apart.
- Green are favourable andesites at Big Missouri host mineralization.
- Yellow is Premier Porphyry which is a subvolcanic Quartz-Plagioclase-Hornblende andesite porphyry characterized by large K-feldspar megacrysts. Premier Porphyry occurs as flows, sills and dykes and is coeval to Texas Creek granodiorite stock.
- A mineralized andesite fragmental unit thought to be an extrusive equivalent of Premier Porphyry may be followed from Big Missouri to Silbak Premier suggesting that the two areas of mineralization occur at a similar stratigraphic position.

PROPERTY GEOLOGY - SILBAK

PLAN - the geology is similar to that at Big Missouri but much more complex:

- numerous faults juxtapose the mineralized zones.
- locate the Main zone and West zone.

- Mineralization is hosted in both andesite and Premier Porphyry which is a subvolcanic sill-dyke-flow unit.
- several distinct types of mineralization are present varying from low sulphide to high sulphide types.
- the mineralized zones are both concordant and discordant to andesite stratigraphy.

LONGITUDINAL SECTION

- former mine working showing steeply plunging shoots or lenses from surface to 6 Level - 1,500 ft. vertical
  - 15,000 ft. strike
- locate proposed open pit area.
- Glory Hole a cave feature that developed in 1940-1942 period as a result of overmining in stopes below 2 Level.
- locate area of underground reserves.

Scenic shot of Silbak Premier - show proposed pit site.

GEOLOGICAL RESERVES	Tons	Au oz/t	Ag oz/t
GLORY HOLE AREA			
Main Zone	5,380,500	0.055	2.26
West Zone	517,300	0.129	1.85
Stope Fill	469,200	0.041	2.12
TOTAL	6,367,000	0.060	2.52

Waste:Ore Ratio 5.7:1 -> 4.5 mineable + Big Missouri -> 3.7:1

		Tons	Au oz/t	Ag oz/t
UNDERGROUND RESERVES	- 602 XC	127,000	0.13	0.90
	- Northern Light	225,000	0.118	1.15

	Length	Au	Ag	
86-102	162/279'	0.237	1.26	stope fill
86-94	32.00'	0.383	32.65	in situ
86-122	5.00'	22.66	18.38	in situ
86-U-148	31.5'	2.112	3.03	stope fill
86-U-160	31.6/105	1.497	34.09	stope fill

SCHEMATIC GEOLOGIC SECTION

- shows the mineralized zone from surface to 6 Level.
- proposed open pit zone.
- underground reserves on 6 Level.

LONGITUDINAL SECTION SHOWING METAL ZONING

- 2 Level as a reference is the focus of underground drilling.
- strong zoning of Au/Au ratio suggesting that ratio of Ag and Au will be variable during production.

EXAMPLES OF ORE TYPES

LOW SULPHIDE - stockworks typically high Ag;Au ratios (0.04 Au/3.0 Ag).

HIGH SULPHIDE - semi-massive sulphide.
eg. - 2 Level portal exposure approx. 77.1 feet grading 0.46 oz/t Au, 3.73 oz/t Ag, 2.4% Zn, 2.7% Pb, 0.18% Cu.

BONANZA ORES - mined in early production with grades of several oz/t gold and 100's of oz/t Ag.

EXPLORATION

i) drilling is continuing on 2 Level to better define reserves within the proposed open pit and test for possible expansion of the pit to depth.

ii) numerous othe surface zones of mineralization offer potential for open pit mineralization.

iii) Underground potential

a) discovery of new zones both within and adjacent the area of the former workings.
b) extensions of existing stoped areas such as 602 XC and Northern Light zone (drilling is currently in progress on 602 XC zone).
c) bulk mining of low grade mineralization flanking the previous stoped areas.

In conclusion - we will be exploring at Silbak Premier and Big Missouri for many years to come.

Reserve Inventory Slide

PART III CONCEPTUAL MINE DEVELOPMENT PLAN

(1) SITE PLAN

Map showing location of pits, mill, hydroelectric site, roads and major topographic features.

(2) DESCRIPTION

Ore Reserves

- Geological or in situ first done by Westmin in fall of 1985 using 25-30 metre cross sections compilation of surface and underground diamond drillholes, surface percussion drillholes and trenches and underground panel sampling.
- Kilborn audited this reserve calculation on 45 random block checks and found no errors.
- Kilborn recalculated using a bench-by-bench method to check the in situ reserves, determine dilution factor and to allow prediction of annual head grades.

Geological Reserves

	Tons	Grades (oz/ton)	
Premier	6,367,000	.060	2.52
Big Missouri	2,749,700	.075	.95
Total	9,116,700	.062	2.05

Mineable Reserves

Premier	6,316,000	.050	2.20
Big Missouri	1,714,000	.079	.89
Total	8,084,000	.056	1.905

Mining

- Conventional open pit operations (truck and shovel)
- Standard Drill, Blast, Load, Haul Dump
- Total 2,000 tons/day (1 814 tonnes)
- 730,000 tons/year (662,000 tonnes)
- Premier mining all year, initially two small pits then coalesce to one
- Existing underground workings - have surveys and will monitor adjacent areas and plan to cave or fill large openings as mining progresses.
- Big Missouri, summer only, and stockpile excess ore (production from 4 small pits: Province, S1, Martha Ellen and Dago)
  - 10 mile highway haul to mill by contractor
- Standard bench height 5 m, some double benches
  - 7.5 m safety berm every 25 metres
  - overall pit slope 50°
  - geotechnical work still going on and may significantly increase slope in certain regions
  - blastholes 4" x 20' on 12' pattern

Mining Equipment

- shovels, 5 cubic yards
- loaders, 7 cubic yards
- off-highway trucks, 35 ton capacity
- Big Missouri highway haul trucks - contracted

Milling

- site at Premier as shown
- metallurgy still going on
- recoveries assumed last year study based on historical data and Bacon, Donaldson study:

		Silbak Premier		Big Missouri	
		Au	Ag	Au	Ag
Flotation Recovery	(%)	93.0	85.5	96.2	89.8
Cyanidation Recovery	"	96.9	61.5	90.5	79.3
Soluble & Refining loss/charge	"	1.0	5.0	1.0	5.0
Total Payable	(%)	89.1	47.6	86.1	66.2

- most likely process and the one costed in the Kilborn study is described here

Crushing	2 stage jaw-cone - 5/8"
Grinding	65% - 200# rod and ball (looking into SAG)
Jigs	expected to get 20% of gold based on historical recoveries (current testing showed range of 2-28%)
Flotation	of sulphide concentrate
Thicken/Dewater	of concentrate
Cyanide Leach	48 hours
Filter	
Precipitation	Of gold/silver using Zn dust (Merrill-Crowe process). (No provision in this plan to recover base metals.)
Smelting	Dore bullion
Tailings	Originally examined twelve sites, and five methods of disposal. Currently examining two or three sites and two methods. (Conventional impoundment and sub-aerial stacking.)

Electric Power

- require estimated 4.0 MW (4.6 peak) subject to more grinding tests
- three possibilities:
  - i) onsite hydro - Long Lake - Silver Lakes - Hog Lake - Cascade Creek System (Westmin has water rights)
  - ii) diesel generators
  - iii) connection to B.C. Hydro Grid
- currently updating the Hydro studies of several years ago
- Kilborn study assumed onsite hydro and they used the M. A. Thomas study as a basis of their report.
- Hydro with standby diesel seems the most likely alternative

Ancillary Facilities (all at Premier site)

- administration buildings and change houses (modular trailer units with framed roof for snow loads)
- maintenance shops/warehouse complex (pre-engineered building)
- metallurgical and assay laboratory (pre-engineered building)
- water supply and distribution (process water taken from underground water and pit dewatering)
- sewage - centralized Rotating Biological Contact Sewage Treatment Plant (RBC) and ultimate disposal in tailings site

Employees

- estimated at 150
- will be housed in Stewart and commute to work by bus