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TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

PRE-FEASIBILITY REPORT
on the
MICA MULE PROPERTY
Sections 12 & 13, T.8N, R.1E;
Sections 5, 6, 7 & 8, T.8N, R.1 1/2E; and
Sections 17 & 18, T.8N, R.2E
YAVAPAI COUNTY
PHOENIX, ARIZONA STATE, U.S.A.

N. Lat. 34° 02' 32" W. Long. 112° 11' 45"

by

N. C. CROOME, P. Eng.

STRATO GEOLOGICAL ENGINEERING LTD.
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JANUARY 31, 1986

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1.0 INTRODUCTION

At the request of the Directors of Tropicana Resources Ltd. and United Liberty Resources Ltd., N. C. Croome, P. Eng. of Strato Geological Engineering Ltd., was engaged to provide professional engineering services for the preparation of a Preliminary Feasibility Study of the Mica Mule Property located at Yavapai County in the State of Arizona.

The scope of the study is to include geological and mineable ore reserves, mining methods and planning, general metallurgical facilities and ancillaries, capital and operating costs of such facilities for various production tonnages. Production rates are as follows, Case I, mica production at a rate of 20,000 tons in the first year, 36,000 tons in the second year, and 50,000 tons in the third and following years. Case II, mica production at a rate of 20,000 tons in the first year, 36,000 tons in the second year and 50,000 tons in the third and following years, in addition to feldspar production of 40,000 tons in the first year, 72,000 tons in the second year and 100,000 tons in the third and following years.

Throughout the study new equipment has been costed. It is understood that, should management wish to incorporate an amount of good used equipment in the operation, economies will result. Current prevailing labor and salary rates, equipment and material costs were used in capital and operating costs. All values are expressed in 1986 U.S. dollars.

Giving consideration to the depth of detail used in the study, it is reasonable to deduce that the capital and operating costs derived herein are well within the range of those normally found in the preliminary feasibility study, namely plus or minus thirty percent.

2.0 SUMMARY

2.1 Conclusions

Subject to sales contracts and environmental approvals by the State of Arizona, the studies summarized in this report indicate a viable operation for the Mica Mule project of United Liberty Resources Ltd. and Tropicana Resources Ltd.

Sales price for dry ground mica is estimated at $150.00, less $2.00 royalty, per short ton f.o.b. plant and feldspar $45.00, less $0.25 royalty, per short ton f.o.b. plantsite, near Phoenix, Arizona.

The proximity of the production facilities to the large markets of the Western United States will give the Mica Mule product a definite advantage in selling prices over production from North Carolina or the Eastern United States. Typical transportation costs to the Los Angeles area from North Carolina is 3.3 cents per ton mile by rail, or $82.89, whereas costs from Phoenix to Los Angeles by truck at 8.75 cents per ton mile, a distance of 425 miles, is $35.06 for a net advantage in selling price to Mica Mule of $47.83 per short ton.

Two specific production schedules are contemplated:

Case I, Production of dry ground mica only,

Case II, Production of dry ground mica and recovery of marketable feldspar.

The economics of both cases were examined by Net Present Value Calculations and Cash Flow Projections, which are shown in Section 12 of this report.

The Net Present Value analysis uses a 15% discount rate over the first ten years of production. Both cases show a positive Net Present Value of, Case I, $6,623,328 and Case II, $20,313,969.

Cash Flow Projections were calculated using a debt-equity ratio of 60:40 percent with a 10 percent rate of interest on the outstanding debt portion. Debt payback is made starting in year four through year eight with interest only being paid in the first three years of operation. No allowance is made for depreciation or pertinent local, State of Federal taxes.

2.2 Capital Cost Summary

	CASE I	CASE II
Annual Production Rates (short tons)		
Year 1 - Mica	20,000	20,000
Feldspar		40,000
Year 2 - Mica	36,000	36,000
Feldspar		72,000
Year 3 - Mica	50,000	50,000
Feldspar		100,000
Mine Equipment	$ Contractor	$ Contractor
Milling		
Mica Recovery Circuit	2,343,840	2,343,840
Mica Fine Grinding Circuit	1,566,865	1,566,865
Feldspar Recovery Circuit	--	838,000
General and Ancillaries	1,367,985	1,367,985
Total Capital Costs	5,287,690	6,116,690
Contingency 15%	791,805	917,505
Sub Total	6,079,495	7,034,195
Engineering, Design, Procurement and Construction 10%	607,950	703,420
Sub Total	6,687,445	7,737,615
Working Capital (4 months)	691,250	758,990
Total	$ 7,378,695	$ 8,496,605

Case I, a net income from operations in the first year $678,052, rising to $3,072,352 in the third year with a return on invested capital of 15 and 69 percent respectively.

Case II shows a net income from operations during the first year of $1,958,536, rising to $6,503,636 during the third year with a return on invested capital of 38% and 127% respectively.

Case II production program is the most advantageous from both economic and production considerations. The minimal capital costs incurred in installation of a feldspar production circuit is readily negated by the increase in cash flows inherent in the additional feldspar production, and is therefore recommended to the client.

Respectfully submitted,
Strato Geological Engineering Ltd.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

N. C. Croome, P. Eng.

2.3 Operating Cost Summary

2.3.1 Case I

	Year 1	Year 2	Year 3
Production (short tons)			
Mica	20,000	36,000	50,000
Production Costs (short tons)			
Mining (contractor)	$ 20.05	$ 19.88	$ 20.04
Milling			
Mica Production	25.86	22.15	21.64
Mica Fine Grinding	30.37	25.16	25.84
Administration Costs	23.06	17.27	13.13

2.3.2 Case II

	Year 1	Year 2	Year 3
Production (short tons)			
Mica	20,000	36,000	50,000
Feldspar	40,000	72,000	100,000
Production Costs (short tons)			
Mining (contractor)	$ 20.05	$ 19.88	$ 20.04
Milling			
Mica Production	25.86	22.15	21.64
Mica Fine Grinding	30.37	25.16	25.84
Feldspar Production	11.62	10.55	9.99
Administration Costs	23.06	17.27	13.13

2.4 Recommendations

The Preliminary Feasibility Study of the Mica Mule project indicates the economic viability of the project. A three stage program leading to production is recommended.

Stage I - Estimated cost $150,000

The First stage will include the following:

1. Marketing Study. A study will be made of the uses and consumption of mica in North America and offshore, however, the study should be primarily aimed at the eleven western United States and a portion of Texas, where definite selling price advantages are inherent due to the advantage of transportation costs. Competitive mica producers in the area must be evaluated. Transportation costs, both truck and rail to the major consumer areas, must be established. Determine specification requirements for various potential products. Potential consumers should be contacted to determine their purchasing policies and price ranges paid for their various requirements.

2. Test holes should be drilled below the various mineralized outcrops to prove the downward extension of the ore bodies and also obtain representative samples for metallurgical testing. This testing program would include sufficient data to determine the percent recovery, type and quality of the final products.

3. The required permitting program should be studied and State authorities contacted with regard to their requirements, the type and duration of the programs. The acquisition of water rights should be investigated. Arizona Power will be contacted to determine the cost of construction of a power line to the proposed plant site and the cost of power delivered.

Stage II - Estimated cost $800,000

Detailed Feasibility Study - This study will determine capital and operating costs of the Mica Mule project with an accuracy of plus or minus 15 percent. This study would include plant site soil tests, tailings dam soil tests, water supply tests, completion of water well tests and completion of all environmental studies and requirements for production permitting.

On completion of this Detailed Feasibility Study, the detailed engineering could be completed and minesite and plantsite construction commenced.

Stage III - Estimated Cost 6.1 to 7.1 millions.

This stage consists of mine preparation, and metallurgical facility construction and provision of the required ancillaries to commence production.

Stage IV - Estimated Cost .7 to .75 millions.

This stage consists of start up and testing for a period estimated for four months.

3.0 GENERAL INFORMATION

3.1 Location

The Mica Mule mining claims are located in Yavapai County, approximately 2 1/2 miles due east of Rock Springs-Black Canyon City, Arizona in the Tip Top Mining District. Specifically the claims are located in Sections 12 and 13, T.8N., R.1E; Sections 5, 6, 7 and 8, T.8N., R.1 1/2E.; and Sections 17 and 18, T.8N., R.2E.

The mine area is accessible by a good gravel road, with the possibility that during the rainy seasons some delays may be encountered at the Agua Fria River crossing. The Table Mesa interchange, 22 miles north of Phoenix on Interstate 17 is the present access road into the mine area. From the interchange it is 5.6 miles to the Agua Fria River ford at Gillette via county maintained road. The road continues approximately 3.5 miles to the Mica Mule property boundaries. (See Property Location Map)

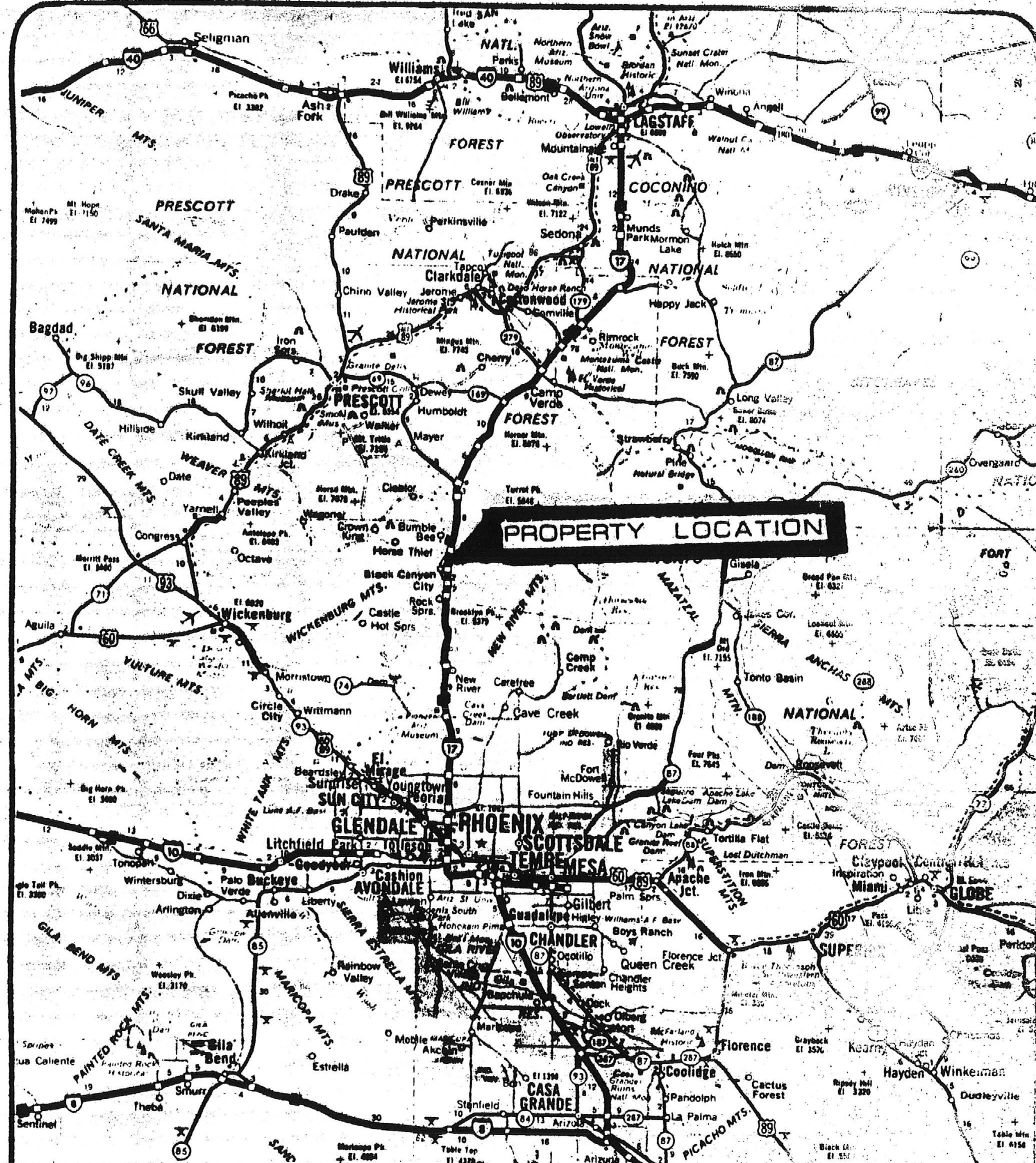
3.2 Topography - Climate

The claimed area is situated in the foothills of the Bradshaw Mountains in gently rolling terrain. Several sharply incised drainage channels present minor - and the only - topographic obstacles to easy development of the Mica Mule Mine. The elevation ranges from 2000 to 2500 feet A.S.L. in the main area of interest.

This portion of the Bradshaw range is semi-arid desert receiving an estimated 12 - 14 inches of rainfall per year. Vegetation is typical Upper Sonoran, consisting of various cacti, mesquite, palo verde, desert shrubs, with riparian vegetation along major drainages. The annual rainfall should be sufficient to charge a small strategically placed reservoir to provide water at the mine site. In addition, springs exist at or near the granite-schist contact that could be developed providing a steady water flow.

3.3 Property and Ownership

The property is owned by Harrison Mining and Exploration Company, Inc. The Harrison holdings include the Mica Mule Block of unpatented mining claims which consist of the Mica Mule claims



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Scale: One inch: approximately 25 miles

miles: 0 5 10 20 30 40 50
inches: 0 1 2

FIGURE

LOCATION MAP

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA

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1 through 4, 101 through 107 and 21 through 67 inclusive, totalling 58 claims. The Green Beauty claims consist of [illegible] through 54 inclusive. The Jolly Jugs claims number 1 through [illegible] inclusive, the Hill Top claims number 1 through 37 inclusive and the Rainbow claims number 1 through 18 inclusive. All claims are located in Yavapai County and Maricopa County, State of Arizona, which more particularly can be described as follows:

> Part of Section 12 and 13, Range 1 East, Township 8 North; and the East one-half of Section 6, the East one half of Section 7, part of Section 8, part of Section 18, Range 2 East, Township 8 North, Gila and Salt River Base and Meridian.

The Mica Mule Mill Site claim is located in Maricopa County more particularly described as follows:

> The Southwest Quarter of the Northwest Quarter of Section 27, Township 8 North, Range 2 East, Gila and Salt River Base and Meridian.

The total Harrison holdings of unpatented mining claims and mill site total approximately 2660 acres. (See Claim Map)

United Liberty Resources Ltd. was granted the sole and exclusive option to acquire 100% of Harrison's interest in the above named properties by agreement dated November 7, 1985. This option is effective until November 1, 1986. Under the terms of this agreement, United Liberty will pay Harrison $5,000,000 as follows:

- (i) $50,000 upon exercise of the option;
- (ii) the greater of $5,000 per quarter as a royalty or sliding scale royality payments from mine operations.

Tropicana Resources Ltd. was granted the sole and exclusive option to acquire 66 2/3% of United Liberty's interest in the properties by agreement dated November 15, 1985. Tropicana will earn its interest by conducting an exploration and development program on the properties before October 31, 1986.

3.4 History

Although the Tip Top Mining District is one of the oldest in Arizona - established in the 1870's - no significant mineral production has transpired since the closing of the Tip Top Mine near the turn of the century. No known mica production of any sort has been recorded.

The district has however undergone extensive prospecting as witnessed by the abundant abandoned claims. The claims were apparently staked for base metals, precious metals and/or uranium but abandoned when economic amounts of these minerals were not found.

During the late 1960's and early 1970's, the Mica Mule group of claims were staked by Herman Harrison and Associates of Phoenix, Arizona. In 1971, the Harrison Mining and Exploration Company, Inc., was incorporated under the laws of the State of Arizona. The 48 Mica Mule claims were then assigned to this corporation. Following assignment, an intensive program of sampling and trenching was undertaken by the company and an extensive road network was established to provided needed access. As a result of this exploratory effort, Harrison concluded that a large body of high quality muscovite mica of sufficient size to support a moderate mining and milling operation existed on the property.

The GMS/Tanner group of Phoenix, Arizona, became interested in the property in the late 1970's as the result of a favourable market survey prepared by Mineral Marketing, Hal McVey of San Francisco. In 1979 the group engaged Kilborn/NUS of Denver, Colorado, to prepare engineering drawings to commence the construction of beneficiation facilities. GMS/Tanner were interested in dry processing of the mica ores and metallurgical testing of that method was conducted. The plant, incorporating electrostatic separators, was completed in early 1980. An attempt was made to operate the plant for approximately six months. Minimum tonnages were treated but recoveries were minimal and the project was not successful. At that time it was agreed by the parties concerned that a flotation plant would be successful. The owners were not prepared to put forward the additional funds necessary to construct the new facility and abandoned the project. In the subsequent period, the Harrison Group was approached by a number of potential buyers but finally settled on an offer by United Liberty Resources Ltd. in 19[illegible].

4.0 GEOLOGY AND ORE RESERVES

4.1 Regional Geology

The mine area is situated along a major Pre-cambrian pegmatite belt extending from Cleator, Arizona in the north to the White Picacho District near Morristown, Arizona in the southwest. The belt is arcuate paralleling the contact between the Yavapai Group schists and a major granitic batholith, both of Pre-Cambrian age. Recent volcanic flows cover a large area south and east of the claims but are not present on the claims.

4.2 Property Geology

The deposit consists of a major pegmatite dike swarm trending North 10 degrees East to North 30 degrees East about 600 to 1000 feet east of the granite-schist contact. Exposures of the dikes are excellent as they stand out in bold relief forming ridges and walls up to 25 feet in height above the intruded schist.

The pegmatite dikes generally are conformable with the intruded Yavapai Group schists but in a few instances cut across the schist trend. The oldest rocks are the schists and the youngest the pegmatites, all of older Pre-Cambrian period.

The Yavapai Group schists form the country rock throughout the claimed area. The schists are sericite-staurolite schists with porphyoblasts of staurolite set in a fine-grained sericite groundmass. The schist is quite soft weathering and forms topographic lows. It appears to be deeply weathered and should be easily rippable.

In one part of the claimed area, a thin but persistent rhyolite tuff breccia unit occurs with adjacent quartz-tourmaline veining. Several small, isolated occurrences of base metals exist along the margins of the rhyolite. Argentiferous and gold-bearing galena was noted by previous exploration studies at one prospect pit and oxidized copper at several other small pits along the rhyolite-schist contact.

The granite intrudes the schist along the schistosity but with numerous parallel and transverse granite dikes. Several large pegmatites parallel and cut the contact. The contact is marked by an abundance of these pegmatites. An example of the complex nature of the contact may be seen in the southwest corner of the mapped area. Several granite dikes grade laterally into coarse grained pegmatites along strike of the dike. The granite-schist contact is highly sericitic, probably from assimilation and remobilization of the intruded sericite schist.

Several granite dikes are present east of the mapped area and are parallel to the pegmatite dike swarm. Often these sericitic granite dikes grade laterally into pegmatites, along strike.

In all instances, the granite is highly sericitic, coarse-grained, and consists essentially of quartz, potassic feldspar, and sericite. A common genesis between the granite and pegmatites is obvious.

The Pegmatite dike swarm consists of numerous NNE-trending dikes that pinch and swell and merge and separate. The pegmatite is simple granitic consisting of very coarse to medium grained, subhedral to euhedral, crystals of milky quartz, potassic feldspars, and muscovite mica. No pronounced zoning of the components was noted except for a tendency in the larger masses for large aggregates of each mineral to occur together in an almost random fashion. In general, the larger the dike the larger the grain in size.

Few accessory minerals were noted in the dikes. Noted were garnet, lithiophillite, and tourmaline. The tourmaline occurs in the schist along the dike margins in irregular and inconsistent masses. Garnet and the manganese-bearing lithiophillite occur only on the northern and southern extremes of the deposit.

The widths of the dikes vary, pinching and swelling along strike and probably with depth. In numerous instances several smaller dikes will merge along strike to form a single large dike and conversely. When visible along washes several dikes were seen to merge vertically forming a single unit. The Southern group of dikes is an excellent example of dikes merging along strike and with depth. Despite the pinching and swelling of the dikes, most are remarkably consistent along strike when an average width is considered. Most major dikes will maintain an average width for several hundred feet along strike. Along-strike characteristics of the dikes can be considered an excellent approximation of their depth characteristics.

Dips ranging from 45 degrees to vertical can be measured along the dikes. However, most of the dikes seems to represent an offshoot of a major dike and generally indicate merging of dikes with depth. The depth extent of the dike system is unknown but probably exceeds 500 feet. This is the amount of relief between the North and South ends of the dike swarm.

Numerous NW to WNW fault zones cut and offset the dike swarm yielding an apparent echelon series. The faults are probably normal faults with a small strike-slip component. A large portion of the dikes have undergone extensive shearing perpendicular to strike yielding a crumbly shattered rock. An estimated 50% of the dike rock visible has undergone shattering.

4.3 Mineralization

The primary ore minerals is muscovite mica, of exceptional quality and purity; both gangue minerals quartz and potassic feldspar are potential by-products. In most of the areas to be mined the rock will average 17 - 20% mica with considerable equal amounts of quartz and feldspar.

Muscovite mica occurs in the pegmatite as unusually clean subhedral books with very few visible impurities. Average sizes throughout the area are 1/4 in. to 1 in. diameter books. The average size of the mica in the main areas of interest is medium to coarse grained, or from 1/4 in. to 1 in. in diameter.

The average grade, as estimated by previous geological studies, throughout the area is 15 to 20% with areas ranging up to 70% mica. Coarse mica is found in several zones.

The muscovite is pale-green to yellow-green on fresh surface and occurs as aggregates of books. Often the aggregates constitute 80% of the rock in a pegmatite that averages 40% mica. The yield from these areas should be excellent as many aggregates are several feet in length and width. In the lower grade pegmatites the mica occurs as individual, non-oriented, discrete books.

The potential byproduct feldspar and quartz are of sufficient quality and quantity to be considered of economical interest. The feldspar and quartz occur as discrete subhedral crystals and aggregates of crystals throughout the deposit. In general, feldspar exceeds quartz but quartz often forms veins or veinlike masses of pure quartz within the pegmatite.

4.4 Ore Reserves

4.4.1 Geological Reserves

Surface outcrops of the dikes are mineralized throughout their exposure, however little or no exploration in depth by diamond drilling has been conducted, hence the ore reserves as presented in this report can be only considered as "probable ore" as defined by the U.S. Bureau of Mines and the U.S. Geological Society. Probable Ore is defined as an ore reserve for which sufficient continuity of dimensions and grade can be assumed for preliminary financial planning, but for which the risk of failure in continuity is greater than that for proven ore.

The Mica Mule geological ore reserves were calculated by measurement of each dike and dike segment. The surface area was converted to tons per vertical foot using a tonnage factor of 12.5 cubic feet per ton. Tonnages were calculated for vertical depths of 100 feet. For a total dike length of 22,700 feet covering an area of 150,370 square feet, the potential tonnage is 122,900 tons per vertical foot. Assuming various depths may be calculated.

Depth	Tonnage
50 feet	6,148,000 short tons
100 feet	12,296,000 short tons
150 feet	18,444,000 short tons

4.4.2 Mineable Reserves

A total of eight areas were selected as open-pit mine areas. It is obvious that additional areas are available for further exploration and could provide a considerable increase in tonnages mineable by open pit methods. Consideration was given to the areas selected for mining on the basis of the size of the outcropping, degree of mineralization, location, topographic relief, and accessibility. Several of the smaller pits selected were included because of the visible high mica content.

The preliminary mining targets are:

PIT	TONNAGE	ESTIMATED GRADE % MICA	WASTE ORE RATIO
North	450,000	20 - 30 %	1:1
North #2	14,000	30 - 35 %	2:1
Central	52,000	25 - 30 %	1.5:1
Central #2	90,000	18 - 23 %	1.5:1
North Central	18,200	25 - 30 %	2:1
North Central #1	7,200	30 - 35 %	2:1
North Central #2	5,000	35 - 40 %	2:1
South Pit Complex	680,000	18 - 25 %	4:1
Total Tonnage	1,316,000	20 - 25 %	1.5:1

From the visible observation and review of the Mica Mule property, it is a reasonable assumption that a mineable, by open pit methods, tonnage or ore exists which contains 20 to 25% mica, at an average waste ore stripping ratio of 1.5:1. For Pit sections see Appendix A.

5.0 MINING

5.1 Production Schedules

To co-ordinate with the sales program and market development for the various mica and feldspar products, mining would commence at the rate of 470 short tons ore per day in the first year increasing to 840 short tons ore per day in the second year and attaining a production rate of 1176 short tons ore per day in the third, and subsequent years, at an average head of 22.5 percent muscovite mica.

The mine will commence operations on a five day week, 240 days per year, one shift per day in the first year, 2 shifts per day in the second year and 3 shifts per day to achieve maximum production. Anticipated average waste-ore ratio will approximate 1.5 to 1.

Annual Mine Production Schedule (Short tons)

	Ore	Waste	Total
1st Year	112,800	169,200	282,000
2nd Year	201,600	302,400	504,000
3rd Year	282,240	423,360	705,600
Subsequent Years	282,240	423,360	705,600

A continuing exploration program will be conducted to upgrade the geological reserves to proven mineable reserves after commencement of commercial production.

Average Daily Mine Production (ore and waste, short tons)

1st year -	1175
2nd year -	2100
3rd year -	2940
Subsequent years -	2940

5.2 Open Pit Mining System

5.2.1 Design Details

A standard mining plan using conventional equipment is recommended. The stripping ratio will be low at start of operations, but will gradually increase until the average noted above is reached. Very little preproduction stripping is required to expose the ore on several benches. Haul roads from the various pit areas will be constructed with a width of 22 feet to allow haul trucks to pass throughout the length of the haul to the crusher station, coarse ore storage area or waste dump. Access roads to the pit benches will not exceed a ten percent gradient.

Pit benches will be 15 feet in height. Average pit with slopes will not exceed 50 degrees with vertical working faces in the ore zones. Access will be maintained to two adjacent benches. When drilling waste, the drill will operate from the upper bench and drill vertical holes to the sub grade elevation of the lower bench. When drilling ore, the drill will operate on the lower bench and drill horizontal holes along the strike of the ore body. Thus a clean separation of ore and waste should be achieved. Several benches would be opened in the pre-production period.

Equipment proposed for drilling is a standard Airtrac type machine drilling a 3 inch hole with a tungsten carbide bit to a depth of 16 feet, bench height plus 1 foot sub-grade. These machines can drill both horizontal and vertical holes. Compressed air will be provided by a diesel driven 900 cfm cubic feet air compressor, wheel mounted for mobility.

Blasted material will be picked up by rubber tired front-end loaders and loaded into 20-ton capacity end-dump trucks. The waste will be hauled to the waste dump and the ore to the primary crusher, or the coarse ore stock pile.

From preliminary experience in drilling and blasting in the area and the drilling method proposed, more than the normal large fragments of ore will be produced in the blasting. A mobile unit with a compressor and rock-pic or breaker mounted on rubber tires will be required for secondary breakage of the large fragments for ease of transportation and crushing.

A large crawler tractor will be required to strip overburden from pit areas, clean benches, build haul roads and clear the waste dump. A road grader is also necessary to maintain haul roads and pit floors.

5.2.2 Equipment Capital Requirements

The equipment listed below is indicative of the contractor's requirements to mine ore and waste as scheduled.

1. Mobile truck-type drill - 1 required
   Gardner Denver ATD-300 Air Trac with
   PR 123 4 1/2 inch drill
   Air required 600 cfm at sea level

2. Portable Diesel Powered Air Compressor - 1 required
   Rubber mounted, ready to operate Atlas
   Copco PT-900 Cd, Caterpillar Diesel
   engine, 900 cfm rating at sea level

3. Rubber tired front-end loader - 1 required
   4 cu yd bucket, Caterpillar 966C
   770 hp diesel

4. End dump trucks - 3 required
   30 ton capacity, 240 hp diesel

5. Crawler tractor - 1 required
   Caterpillar D8K 300 hp diesel
   complete with ripper.

6. Mobile Secondary Breaking Unit
   Mobile unit with 18 foot boom, hydraulic hammer capable of delivering 450 blows per minute at 1300 ft. lbs. impact energy and rubber tired carrier with 82 hp diesel engine.

7. Road Grader - 1 required
   Caterpillar Model 14G

8. Explosives truck - 1 required

9. Compressed Air Lines

10. Repair shop and storage is included in Auxiliary Buildings

5.2.3 Summary Mine Operating Costs

On review of a number of contracts for mining by open pit methods of relatively small tonnage deposits average cost per ton ore drilled blasted and hauled an average of 2000 feet is $1.60 per short ton. An average cost per ton of waste drilled, blasted and deposited in waste dumps adjacent to the mined areas is $1.30 per short ton.

The stripping ratio is 1.5 tons waste per ton ore.

Total mining cost per ton mill feed,	1 ton ore	$1.60
	1.5 tons waste	1.95
		$3.55

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6.0 METALLURGY

6.1 General

Flotation methods for the recovery of mica from pegmatites have been studied by the U.S. Bureau of Mines during the past several years. This work led to the development of the acid cationic and the alkaline anionic-cationic flotation methods for the recovery of mica from the various types of ore.

The cationic method has been applied to the recovery of mica from pegmatite ores. The ground ore pulp must be conditioned with sulphuric acid at 40 to 45 percent solids. Sulphuric acid is used for pH control and quartz depression. Optimum mica flotation is obtained in a pulp with a pH of 4.0. Cationic reagents such as long carbon chain acetates are the most effective collection agents for floating mica. The flotation product is further reduced to minus 40 micron size by micronization. The method consists of accelerating the mica particles to very high speeds in a confined space so that they collide and disintegrate. Particle size is controlled by adjusting the residence time in the mill and removing the oversize by air classification.

6.2 Preliminary Recovery Evaluation

The North Carolina State Minerals Research Laboratory was commissioned by Amex Inc. to make a preliminary evaluation of the economics of recovering mica and feldspar from pegmatites from the Mica Mule property. The Ore Dressing Test Data from the Amex Inc. recovery evaluations are prescented as Appendix B to this report. Unsuccessful attempts had been made in the past to beneficiate the mica by dry electrostatic methods. The as received ore was crushed to minus 9 mesh in a small laboratory size roll crusher. It was screened after each pass through the rolls and plus 9 mesh was then re-crushed until most of it passed this screen.

6.2.1 Mica Flotation

A 500 gram sample of minus 9 mesh head feed was further crushed in a 8" diameter by 9" long rod mill for 5 minutes at 40% solids in the presence of the equivalent of one pound per ton of caustic soda. It was determined by previous tests that this grinding time was sufficient to crush all of the feldspar and quartz to -28 mesh. The +28 mesh was 100% muscovite mica.

A rod charge of 13 kilos was used. These steel rods were 1 1/4" diameter.

The ground ore was transferred from the mill to a stainless steel 9 liter bucket for desliming. It was then diluted to a total of 5 liters in the bucket, after which it was thoroughly agitated and allowed to settle for 10 minutes. This was followed by decanting the water and screening the settled material on a 400 mesh Tyler sieve.

The concentrated partially deslimed material was scrubbed for 10 minutes at 1200 RPM in a 1/2 liter hexagonal pot. This was followed by desliming twice for 10 minutes following the procedure already described.

A one minute conditioning step followed desliming. This was accomplished in a 2 liter flotation cell at approximately 15% solids. The impeller speed was 1200 RPM. The following reagents were added to the condition: 1) 0.2 pound per ton of Armac T., 2) 1.5 lbs. per ton sulphuric acid, and 3) 1.0 pounds per ton of MIBC (Methyl Isobutyl Carbinol).

After conditioning, air was turned into the cell and flotation commenced. The concentrate produced by the initial flotation was given two more flotations. Reagents were not added in the last two steps.

6.2.2 Feldspar Flotation

The tailings produced from the first mica flotation were used for the feldspar, iron flotation procedure. These tailings were first scrubbed at 70% solids for 10 minutes in a hexagonal pot. The scrubbing speed used was 1000 RPM. Two pounds per ton of sulphuric acid was added in the scrub in order to dereagentize the material. A desliming step followed the scrub. This was accomplished by mixing and diluting the scrubbed material to 5 liters with water in a stainless steel bucket and then allowing it to settle for 10 minutes, after which the water laden slimes were screened through a 400 mesh Tyler sieve. The step was repeated once.

After being deslimed twice, the 400+ mesh material was prepared for iron flotation by conditioning for 5 minutes at 65% solids in a small laboratory size cylindrical conditioner. Two pounds per ton of sulphuric acid, 0.1 pound per ton of H-26 frother, and 0.6 pound per ton HM-70 petroleum sulphonate were added to the conditioner. The conditioner speed was 700 RPM and the pH was 1.9. The conditioned material was then transferred to a 2 liter Denver flotation cell where air was introduced into the pulp as the iron minerals were floated.

When the iron minerals had been removed, the air was turned off and 1.75 pounds per ton of H-P, 0.5 pounds per ton Armac-T amine, and 0.1 pound per ton of H-26 frother were added to the cell. The pulp was conditioned in the presence of these reagents for one minute at 1200 RPM. Following this step, air was re-introduced into the cell and feldspar was floated. The feldspar concentrate was given one cleaner flotation without the use of reagents.

6.3 Beneficiation Facilities

The production of marketable mica and feldspar products can be divided into distinct areas, crushing and milling, mica flotation circuit, mica grinding circuit and feldspar flotation circuit. (Figure 10).

6.3.1 Crushing and Milling

The ore is broken by blasting methods and reduced to minus 18" size by an in pit, mobile rock breaker. The broken ore is loaded by a front end loader into 35 ton off highway, end dump trucks. The ore is delivered to the mill area, either to a coarse ore stock pile or directly to the ore bin. The bin is covered by a grizzly with 18" spacing of the grizzly bar to eliminate oversize material being fed to a 500 ton capacity ore bin. The ore is discharged from the bin onto a 48" pan feeder over a grizzly with 4" spacing. The plus 4" material is fed to an 18 x 35 inch jaw crusher at a rate of 80 short tons per hour. The minus 4" material is fed to a conveyor which also picks up the minus 4" crusher discharge. The minus 4" material is screened to minus 1", the oversize is returned to the secondary crusher, a four foot gyratory for crushing to minus 3/4". The minus 3/4" material is transported to a covered fine ore storage pile. The fine ore is fed through feeders onto a conveyor and discharged into a 7 1/2 x 12 foot rod mill. Caustic soda is added at this point. The quartz and feldspar is ground to minus 28 mesh. The plus 28 mesh is mica. The rod mill discharge is screened and the plus 28 mesh is passed directly to the mica storage bin. The minus 28 mesh is deslimed by cyclones in series, the overflow to waste, the underflow or sands to a conditioner. Flotation reagents are added at this point, those being 1.5 pounds per ton sulphuric acid to lower the pH, 0.2 pound per ton Armac, 1.0 pounds per ton MIBC. The conditioned material is then treated by two stages of flotation, rougher and cleaner circuits. The mica flotation product is transferred to a thickener and the thickened product to a drum type filter. The filtered product is discharged in the coarse mica storage bin. The sands from the flotation process contain both the feldspar and quartz.

6.3.2 Mica Grinding Circuit

The beneficiated mica product is fed from the coarse mica storage bin through drawpoints into a screw feeder to a central drawpoint controlled by a rotary valve feeder. The mica is fed to a surge silo by blower, dust is sent to the dust collecting system. A screw conveyor transfers the coarse mica to a screw feeder and to the major jet pulverizer at the rate of 10 tons per hour. Air is supplied to the jet pulverizer by a 3000 cubic foot per minute compressor. Cooling water is required for this unit and is circulated through a cooling tower by a cooling water pump. The compressed air is heated in an air heater which has fuel oil supplied from a fuel tank. The ground mica is discharged from the jet pulverizer at a rate of 12.2 tons per hour and is carried in ducts to the product collector. The ground mica product is transferred from the product collector by screw conveyor through a rotary value feeder into two stage sifters. The undersize, or finished product, is transferred through a rotary value feeder into the product storage silos. The sifter oversize is returned to the jet pulverizer for size reduction. 2.2 tons per hour of this material is added to the coarse mica feed for the total of 12.2 tons per hour circulation. The finished product, at the rate of 10 tons per hour, is transferred either to the storage silos or to the bagging machine. From the storage silos it can be bulk loaded into trucks, or to the bagging machine for packaging and palletizing for shipment.

6.3.3 Feldspar Flotation

The tailings produced from the mica flotation are used to recover the feldspar. They are cleaned in a scrub tank at higher agitation and higher percentage of solids. Sulphuric acid is added at this stage. The material is then deslimed in two cyclones in series, the overflow is sent to waste and the underflow to a conditioner tank where the ore is conditioned with 2.00 pounds of sulphuric acid per ton, 0.1 pounds per ton of H-26 frother and 0.6 pounds per ton of HM-70 petroleum sulphonate. The conditioned material is pumped to the flotation cells and the iron is floated off. The sands are then conditioned with 1.75 pounds per ArmacT amine and 0.1 pounds per ton of H-26 frother. The conditioned material is transferred by pump to flotation cells and feldspar is floated off. The remaining sands, containing quartz, is sent to waste. The feldspar is then thickened and filtered. The filtered feldspar is then passed through a rotary dryer, elevated by a bucket elevator, and clinkers are screened and shipped to waste. The screened material or finished feldspar is stored in bins for bulk shipment by truck.

7.0 METALLURGICAL PLANT - CAPITAL COSTS

Costs are calculated on the basis of using all new equipment. Considerable savings can be affected by meticulous selection of available used equipment. The capital costs of major equipment items is calculated and other costs are factored on their relative requirements in metallurgical circuits to obtain the total capital cost of the plant.

7.1 Capital Costs - Mica Recovery Circuit

Annual production 50,000 short tons Mica and 100,000 short tons Feldspar.

<u>Item:</u>

1.	Ore bin, 500 tons capacity grizzly and truck dump		$ 160,000
2.	Pan feeder 48" wide z 10'	20 hp	7,280
3.	Jaw Crusher, 18" x 48"	100 hp	91,860
4.	Grizzly 4", bin and skirting		6,000
5.	Conveyor belt 24" capacity 100' long, complete with belt and steel support structure	10 hp	40,140
6.	Crusher, shorthead cone, diameter 4'	150 hp	101,270
7.	Screen, single deck 1" mesh vibrating, 3 x 10 feet	5 hp	17,230
8.	Skirting chute, etc.		4,000
9.	Conveyor 24", 50' long complete with belt, motor and steel support	10 hp	27,940
10.	Conveyor, 24", 75' long with belt, motor and support structure	10 hp	34,040
11.	3 vibrating feeders, 12" wide 5' long, includes motor drive and springs	9 hp	9,360
12.	Conveyor belt, 24", 150' long with belt motor and support structure, feed hoppers	15 hp	50,270
13.	Rod mill 7 1/2' x 12', 180 hp motor	25 hp	120,500

14. Feed pump for DSM screen, ASH BC-6-6		6,250
15. DSM screen, 4 foot type T		4,400
16. Skirting and chutes		6,500
17. 2 pump boxes and ASH BC-6-6 deslime pumps	50 hp	12,500
18. 2 cyclones, cast iron, rubber lined		10,000
19. Conditioner and tank 8' x 8'	40 hp	6,100
20. Compressor 200 cfm low pressure	45 hp	18,000
21. Flotation cells 1 bank 6 cells 100 cubic foot, complete and motors	75 hp	59,600
22. Flotation cells cleaner 1 bank 6 cells complete, 100 cubic foot complete plus motors	75 hp	59,600
23. 3 pump boxes and pumps ASH BC-6-6	75 hp	18,750
24. Mica concentrate 20' thickener complete, tank rakes and motor	10 hp	41,070
25. Filter feed pump	10 hp	6,000
26. Nash vacuum pump	75 hp	24,000
27. Eimco vacuum disc filter	5 hp	64,000
28. Tailing thickener, 20' diameter, complete tank, rakes and motor	10 hp	41,070
29. Tailings pump, rubberlined	25 hp	7,000
Delivered Equipment Cost	45%	$1,054,730
Electrical and switchgear	14%	328,140
Painting	1%	23,440
Instrumentation	4%	93,750
Structure	23%	539,085
Concrete	11%	257,820
Excavation	2%	46,875
Total Capital Cost of Mica Recovery Circuit	100%	$2,343,840

7.2 Capital Costs - Mica Fine Grinding Circuit

<u>Item:</u>

Item	Description	Power	Cost
1.	Mica storage bin, steel erected		$ 9,000
2.	2 feeders, 12" x 5'	1 hp	6,400
3.	Screw feeders 14 inch	3 hp	6,500
4.	Rotary valve feeder	3 hp	4,000
5.	Steel surge tank		11,500
6.	Screw feeder 12 inch	3 hp	6,500
7.	Screw feeder 12 inch	3 hp	6,500
8.	Majac Jet Pulverizer capacity 12.2 tons per hour		165,000
9.	Classifier blower	25 hp	18,500
10.	Product collection bin		27,500
11.	Rotary valve feeder	3 hp	4,000
12.	Fine mica sifter, double compartment		75,000
13.	Air heater	50 hp	16,250
14.	Combustion blower	5 hp	2,500
15.	3000 cfm air compressor to supply air to Jet Pulverizer	650 hp	132,000
16.	Cooling tower	20 hp	15,000
17.	Cooling water pump	5 hp	4,500
18.	Rotary valve feeder		4,000
19.	Pneumatic conveyor blower	20 hp	18,440
20.	6 mica product storage tanks		48,000
21.	Piping air slides and valves		35,000
22.	Mica product bagging bin		21,000
23.	Mica product bagging machine automatic bag placer, single spout 7 bags/minute		38,500
24.	Bucket elevator	20 hp	12,500
25.	Bulk loading chute and support steel		17,000
	Delivered Equipment Cost	45%	$ 705,090
	Electrical and Switchgear	16%	250,700
	Painting	1%	15,670
	Instrumentation	8%	125,350
	Structure	20%	313,375

Concrete	6%	94,010
Excavation	4%	62,670
Total Capital Cost of Mica Fine Grinding Circuit		$1,566,865

7.3 Capital Costs - Feldspar Recovery Circuit

Item:

1.	Pump box and ASH 6 Bc-6-6 pump	10 hp	$ 6,250
2.	Scrubber tank 6' x 6', motor and impeller	25 hp	6,000
3.	2 pump boxes and ASH 6 BC-6-6 pumps	20 hp	12,500
4.	2 cyclones, cast iron, rubber lined		10,000
5.	1 conditioner tank 6' x 6', motor and impeller	25 hp	6,000
6.	Iron flotation cells, 1 bank 6 cells, 100 cubic feet complete with motors	75 hp	59,600
7.	Conditioner tank 6' x 6', with motor and impeller	25 hp	6,000
8.	Feldspar flotation cells, 1 bank, 6 cells, 100 cubic foot complete with motors	75 hp	59,600
9.	Pump box and ASH 6 BC-6-6 pump	10 hp	6,250
10.	Feldspar thickener, complete tank rakes and motor	10 hp	41,070
11.	Filter feed pump and pump box	10 hp	6,250
12.	Nash vacuum pump	50 hp	22,000
13.	Eimco vacuum disc filter	5 hp	64,000
14.	Pump and pump box	10 hp	6,250
15.	Rotary dryer	15 hp	35,000
16.	Bucket elevator	10 hp	16,500
17.	Feldspar product screen, single deck vibrating	5 hp	17,230
18.	Feldspar product storage bins and bulk loadout		38,500
	Delivered Equipment Cost	50%	$ 419,000

Electrical and Switchgear	16%	134,080
Painting	1%	8,380
Instrumentation	8%	67,040
Structure	16%	134,080
Concrete	5%	41,900
Excavation	4%	33,520
Total Capital Cost Feldspar Recovery Circuit		$ 838,000

Metallurgical Facility Capital Cost Summary

Mica Recovery Circuit	$ 2,343,840
Mica Fine Grinding Circuit	1,566,865
Feldspar Recovery Circuit	838,000
Total	$ 4,748,705

8. CAPITAL COST - ANCILLARIES

8.1 Power Supply

The total power requirements for the metallurgical facilities, lighting, office and air conditioning, plant water circulation pump is estimated to be approximately 1700 KW at total loading. Four 500 KW diesel powered generator sets are required. Under 85 percent capacity loading, 3 generators would operate and 1 generator on standby.

4 x 72,600 =	$ 290,400
Installation, transformers and switch gear	40,000
Compressor building, cooling system, etc. 40' x 60' - 14' eave, cement floor, etc.	31,100
Diesel fuel storage, 10,000 gals capacity, day storage tanks and pumping facilities	12,920
Total Power facilities	$ 374,420

8.2 Mine Repair Shop and Garage

Repair facilities for trucks and heavy duty equipment is necessary, grease, wash, oil, and fueling systems are necessary. 60' x 80' - 18' eave, cement floor, pits, etc.	$ 93,565

8.3 Office and furnishings

Trailer office, double wide, complete with furniture, etc., plumbing, electrical, etc.	$ 35,000	
Office Equipment		
Computer, typewriters, etc.	20,000	
Total office and furnishings		$ 55,000

8.4	Assay office, complete for analysis and metallurgical testing	$ 45,000
8.5	Gate house, ambulance garage, and first aid room and ambulance equipped	34,000
8.6	Warehouse building complete with change room and lunch room, 40' x 60', cement floor	35,000
8.7	1 lot fencing, gates, etc., drainage	10,000
8.8	Vehicles and transportation	36,000
8.9	Tailings disposal facilities, including dam and water recovery systems for a maximum of 1,350,000 tons tailings per year, after 3rd year operation	325,000
8.10	Environmental studies, permitting and water licenses, estimated	250,000
8.11	Mill water supply, well drilling, pipe line and pumps, estimated	110,000
	Total General Capital Costs - Ancillaries	$1,367,985

9.0 CAPITAL COST SUMMARY

9.1 Capital Cost Summary (Case I)

Case I - Annual Production Rates (Short Tons)

	MICA
1st Year	20,000
2nd Year	36,000
3rd and Subsequent years	50,000

Mine Equipment	$ Contractor
Milling	
Mica Recovery Unit	2,343,840
Mica Fine Grinding Circuit	1,566,865
General and Ancillaries	1,367,985
Total Capital Costs	5,287,690
Contingency 15%	791,805
Sub Total	6,079,495
Engineering, Design, Procurement and Construction - 10%	607,950
Sub Total	6,687,445
Working Capital (4 months Year 1 operating costs)	691,250
Total Capital Requirements	$ 7,378,695

9.2 Capital Cost Summary (Case II)

Case II - Annual Production Rates (Short Tons)

	MICA	FELDSPAR
1st Year	20,000	40,000
2nd Year	36,000	72,000
3rd and subsequent years	50,000	100,000

Mine Equipment	**$ Contractor**
Milling	
Mica Recovery Circuit	**2,343,840**
Mica Fine Grinding Circuit	**1,566,865**
Feldspar Recovery Circuit	**838,000**
General Ancillaries	**1,367,985**
Total Capital Costs	**6,116,690**
Contingency 15%	**917,505**
Sub Total	**7,034,195**
Engineering, Design Procurement and Construction - 10%	**703,420**
Sub Total	**7,737,615**
Working Capital (4 months Year 1 operating costs)	**758,990**
Total Capital Requirements	**$ 8,496,605**

STRATO GEOLOGICAL ENGINEERING LTD.

10.0 OPERATING COSTS - MILLING FACILITIES

10.1 Year 1 - Annual Production 20,000 short tons Mica and 40,000 short tons Feldspar.

10.1.1 Mica Recovery Circuit

Labor:

Crusher Operator	1
Crusher Operator Helper	1
Grinding and Flotation Operator	3
Electrician	1
Mechanic	1
Labor	1
Total	8

Average hourly rate including 35% fringe benefits		\$ 15.60
Labor cost per day	8 x 8 x 15.60 = \$998.40	
Labor cost per ton mica produced	$\frac{998.40}{83}$ =	\$ 12.03

<u>Reagents</u>

Cost per ton same as Year 3	\$ 6.22

<u>Power Consumption</u>

Cost per ton same as Year 3	4.37

<u>Consumables and Supplies</u>

Cost per ton same as Year 3	3.25
Total Operating Costs per ton Mica Recovery Circuit	\$ 25.86

10.1.2 Mica Fine Grinding Circuit

Labor:

Mechanics	2
Electricians	2
Labor	2
Bagging Plant Operator	2
Palletizing	1
Total	9

Average hourly rate including 35% fringe benefits $15.60

Labor costs per day 9 x 8 x 15.60 = $1,123.20

Labor cost per ton mica produced $\frac{1,123.20}{83}$ = $ 13.53

Power Consumption

Cost per ton same as Year 3 4.19

Consumable Supplies

Cost per ton same as Year 3 12.65

Total Operating Cost per ton Mica Fine Grinding Circuit $ 30.37

10.1.3 Feldspar Recovery Circuit

Labor:

Flotation Operator	3
Flotation Operator Helper	2
Loadout Operator	1
Labor	1
Total	7

Average hourly rate including fringe benefits $15.60

Labor cost per day 7 x 8 x 15.60 = $873.60

Labor costs per ton feldspar produced $\frac{873.60}{167}$ = $ 5.23

<u>Reagents</u>

Cost per ton same as Year 3 3.16

<u>Power Consumption</u>

Cost per ton same as Year 3 0.98

<u>Consumable Supplies</u>

Cost per ton same as Year 3 2.25

Total Operating Cost per ton Feldspar Recovery Circuit $ 11.62

10.2 Year 2 - Annual Production 36,000 short tons Mica and 72,000 short tons Feldspar.

10.2.1 Mica Recovery Circuit

Labor:

Crusher Operator	2
Crusher Operator Helper	2
Grinding and Flotation Operator	3
Electrician	1
Mechanic	1
Labor	1
Total	10

Average hourly rate including 35% fringe benefits	\$ 15.60
Labor cost per day 10 x 8 x 15.60 = \$ 1,248.00	
Labor cost per ton mica produced $\frac{1,248}{150}$ =	\$ 8.32
<u>Reagents</u>	
Cost per ton same as Year 3	6.21
<u>Power Consumption</u>	
Cost per ton same as Year 3	4.37
<u>Consumables and Supplies</u>	
Cost per ton same as Year 3	3.25
Total Operating Costs per ton Mica Recovery Circuit	\$ 22.15

10.2.2 Mica Fine Grinding Circuit

Labor:

Mechanics	2
Electricians	2
Plant labor and cleanup	2
Bagging Plant Operator	2
Palletizing Operator	2
Total	10

Average hourly rate including 35% fringe benefits $15.60

Labor costs per day 10 x 8 x 15.60 = $1,248.00

Labor costs per ton mica produced $\frac{1,248.00}{150}$ = $ 8.32

<u>Power Consumption</u>

Cost per ton same as Year 3 4.19

<u>Consumable Supplies</u>

Cost per ton same as Year 3 12.65

Total Operating Cost per ton Mica Fine Grinding Circuit $ 25.16

10.2.3 Feldspar Recovery Circuit

Labor:

Flotation Operator	3
Flotation Operator Helper	3
Loadout Operator	2
Labor	2
Total	10

Average hourly rate including 35% fringe benefits $15.60

Labor cost per day 10 x 8 x 15.60 = $ 1,248

Cost per ton produced $\frac{1,248}{300}$ = $ 4.16

Reagents

Cost per ton same as Year 3 3.16

Power

Cost per ton same as Year 3 0.98

Consumable Supplies

Cost per ton same as Year 3 2.25

Total Operating Cost per ton Feldspar Recovery Circuit $ 10.55

STRATO GEOLOGICAL ENGINEERING LTD.

10.3 Year 3 - Annual Production 50,000 short tons Mica and 100,000 short tons Feldspar.

10.3.1 Mica Recovery Circuit

Labor:

Crusher Operator	2
Crusher Operator Helper	2
Grinding and Flotation Operator	3
Grinding and Flotation Helper	3
Electrician	1
Mechanic	1
Labor	1
Total	13

Average hourly rate including 35% fringe benefits $15.60

Labor cost per day 13 x 8 x $15.60 = $ 1,622.40

Labor cost per ton mica produced $\frac{1,622.40}{208}$ = $ 7.80

Reagents

Mica Flotation Reagent	Cost/lb	lbs/used/ton	Total Cost Per Ton
Armac-T amine	$ 0.97	0.2	$ 0.19
MIBC Frother	0.69	1.0	0.69
Sulphuric Acid	0.032	1.5	0.05
Caustic	0.085	2.0	0.17

Reagent cost per ton treated $ 1.10

Reagent cost/ton mica produced $\frac{1176 \times 1.10}{208}$ = $ 6.21

Power

Demand is based on mill operation using 100% availability

Circuit connected horsepower 846

Effective KW 846 x .746 = 631

Using an estimated cost $0.06 per Kwh generated

Cost per ton mica produced	$\frac{631 \times 0.06 \times 24}{208}$ =	4.37

Consumable Supplies

rods, mill liners, filter cloths, assay chemicals and miscellaneous supplies, estimated	3.25
Total Operating Costs per ton Mica Recovery Circuit	$ 21.64

10.3.2 Mica Fine Grinding Circuit

Labor:

Mechanics	3
Electricians	3
Plant Laborer & Cleanup	3
Bagging Plant Operator	3
Palletizing Operator	3
Total	15

Average hourly rate including 35% fringe benefits $ 15.60

Labor cost per day 15 x 8 x 15.60 = $ 1,872.00

Cost per ton mica produced $\frac{1,872.00}{208}$ = $ 9.00

Power

Demand is based on grinding plant operation using 100% availability

Circuit connected horsepower 811

Effective KW 811 x .746 = 605 KW

Using an estimated cost $0.06 per kwh generated

Cost per ton produced $\frac{605 \times 0.06 \times 24}{208}$ = 4.19

Consumable Supplies

Replacement parts, assay chemicals and miscellaneous supplies, bags, pallets, shinkwrap, etc., fuel oil for air heater, etc., estimated 12.65

Total Operating Costs per ton Mica Fine Grinding Circuit $ 25.84

10.3.3 Feldspar Recovery Circuit

Labor:

Flotation Operator	3
Flotation Operator Helper	3
Loadout Operator	3
Labor	3
Total	12

Average hourly rate including 35% fringe benefits $15.60

Labor cost per day 12 x 8 x 15.60 = $ 1,497.60

Cost per ton produced $\frac{1,497.60}{416}$ = $ 3.60

Reagents

Feldspar Flotation Reagent	Cost/lb	lbs/used/ton	Total Cost Per Ton
Sulphuric Acid	$ 0.032	4.0	$ 0.13
H-26 Frother	0.60	0.2	0.12
HM-70 Petroleum Sulfonate	0.505	0.5	0.25
Armac T	0.97	0.44	0.43
H.F.	0.43	1.3	0.56

Reagent cost per ton feed head 1.49/ton

Reagent cost per ton produced $\frac{1.49 \times 882}{416}$ = $ 3.16

Power

Demand based on feldspar flotation operation using 100 percent availability

Circuit connected horsepower 380

Effective KW 380 x .746 = 285 KW

Using an estimated cost $0.06/KW generated

Cost per ton produced $\frac{284 \times 0.06 \times 24}{416}$ =	0.98

Consumable Supplies

Filter cloths, assay chemicals and miscellaneous maintenance supplies per ton estimated	2.25
Total Operating Cost per ton Feldspar Recovery Circuit	$ 9.99

11.0 ADMINISTRATION AND SALES

11.1 Year 1 - Annual production 20,000 short tons Mica and 40,000 short tons Feldspar.

11.1.1 Administration

1 Mine Manager	$ 50,000 per year
1 Mine Accountant	36,000
1 Clerk Typist	24,000
1 Mine Superintendent	40,000
1 Mill Superintedent	36,000
1 Assayer Metallurgist	30,000
Total Annual Salaries	216,000
Fringe Benefits 38.5%	83,160
Total Administration	$ 299,160

Administration Cost per ton mica produced $ 14.96

11.1.2 Sales and Marketing

1 Manager	$ 45,000
1 Sales Representative	40,000
1 Clerk Accountant	32,000
Total Annual Salaries	117,000
Fringe Benefits 38.5%	45,045
Total Sales and Marketing Costs	$ 162,045

Sales and Marketing cost per ton mica marketed 8.10

Total Administration and Sales cost per ton mica marketed $ 23.06

11.2 Year 2 - Annual production 36,000 short tons Mica and 72,000 short tons Feldspar.

11.2.1 Administration

1 Mine Manager	$ 50,000 per year
1 Mine Accountant	36,000
1 Clerk Typist	24,000
1 Mine Engineer	36,000
1 Mine Superintendent	40,000
1 Mill Superintedent	36,000
1 Assayer Metallurgist	30,000
3 Security First Aid	60,000
Total Annual Salaries	312,000
Fringe Benefits 38.5%	120,120
Total Administration	$ 432,120

Administration Cost per ton mica produced $ 12.00

11.2.2 Sales and Marketing

1 Manager	$ 45,000
1 Sales Representative	40,000
1 Clerk Accountant	32,000
1 Typist	20,000
Total Annual Salaries	137,000
Fringe Benefits 38.5%	52,745
Total Sales and Marketing Costs	$ 189,745

Sales and Marketing costs per ton mica marketed 5.27

Total Administration and Sales cost per ton mica marketed $ 17.27

11.3 Year 3 - Annual Production 50,000 short tons Mica and 100,000 short tons Feldspar.

11.3.1 Administration

1 Mine Manager	$ 50,000	per year
1 Mine Accountant	36,000	
1 Clerk Typist	24,000	
1 Mine Engineer	36,000	
1 Mine Superintendent	40,000	
1 Mill Superintedent	36,000	
1 Assayer Metallurgist	30,000	
3 Security First Aid	60,000	
Total Annual Salaries	312,000	
Fringe Benefits 38.5%	120,120	
Total Administration	$ 432,120	
Administration Cost per ton mica produced		$ 8.64

11.2.2 Sales and Marketing

1 Manager	$ 45,000	
1 Sales Representative	40,000	
1 Clerk Accountant	32,000	
1 Typist	20,000	
Total Annual Salaries	137,000	
Fringe Benefits 38.5%	52,745	
Expenses, office rental, travel, telephone, etc.	35,000	
Total Sales and Marketing Costs	$ 224,745	
Sales and Marketing costs per ton mica marketed		4.49
Total Administration and Sales cost per ton mica marketed		$ 13.13

12.0 FINANCIAL

The projected operations of the Mica Mule Mine are examined through the following financial analyses:

(i) Annual Earnings

(ii) Net Present Values

(iii) Cash Flow Projections showing return on capital invested.

These Analyses are based on the following assumptions:

(i) Selling price of dry ground mica is $150.00, less $2.00 royalty per short ton f.o.b. plantsite.

(ii) Selling price of feldspar is $45.00, less $0.25 per short ton f.o.b. plantsite.

(iii) All costs and prices are stated in 1986 dollars U.S. currency.

(iv) No allowances are made for local taxes, State and Federal income taxes or depreciation on capital equipment.

(v) Full production will be attained by the third year and will remain constant over the life of the project.

(vi) All production will be marketed.

(vii) A debt-equity ration of 40:60 with interest on the debt portion at 10% per annum (Cash Flows).

12.1 Annual Earnings - Case I (Depreciation, depletion and State Federal taxes not included)

12.1.1 Year 1 - Annual Production 20,000 short tons Mica

Gross Value of Product per day (240 operating days per year)

Mica 83.3 x 148 =		$ 12,328	
Total			$ 12,328

Production Costs per day

Mining

Waste	706 x 1.30 =	$ 918	
Ore	470 x 1.60 =	752	
Total		$ 1,670	
Mica Recovery Circuit	83.3 x 25.86 =	2,154	
Mica Fine Grinding Circuit	83.3 x 30.37 =	2,530	
Administration & Sales	83.3 x 23.0 =	1,921	
Total			8,275
Gross Daily Earnings			4,053
Gross Annual Earnings 240 x $ 4,053 =			$ 972,720

12.1.2 Year 2 - Annual Production 36,000 short tons Mica

Gross Value of Product per day
(240 operating days per year)

Mica 150 x 148 =	$ 22,200	
Total		$ 22,200

Production Costs per day

Mining

Waste 1,260 x 1.30 =	$ 1,638	
Ore 840 x 1.60 =	1,344	
Total	$ 2,982	
Mica Recovery Circuit 150 x 22.15 =	3,323	
Mica Fine Grinding Circuit 150 x 25.16 =	3,774	
Administration & Sales 150 x 17.27 =	2,590	
Total		12,669
Gross Daily Earnings		9,531
Gross Annual Earnings 240 x $ 9,531 =		$ 2,287,440

12.1.3 Year 3 - Annual Production 50,000 short tons Mica

Gross Value of Product per day
(240 operating days per year)

Mica 298.3 x 148 =	$ 30,828	
Total		$ 30,828

Production Costs per day

Mining

Waste 1,764 x 1.30 =	$ 2,293	
Ore 1,176 x 1.60 =	1,882	
Total	$ 4,175	
Mica Recovery Circuit 208.3 x 21.64 =	4,508	
Mica Fine Grinding Circuit 208.3 x 25.84 =	5,382	
Administration & Sales 208.3 x 13.13 =	2,735	
Total		16,800
Gross Daily Earnings		14,028
Gross Annual Earnings 240 x $ 14,028 =		$ 3,366,720

12.2 Annual Earnings - Case II (Depreciation, depletion and State and Federal taxes not included)

12.2.1 Year 1 - Annual Production 20,000 short tons Mica and 40,000 short tons Feldspar.

<u>Gross Value of Product per day</u>
(240 operating days per year)

Mica 83.3 x 148 =	$ 12,328	
Feldspar 167 x 44.75	7,473	
Total		$ 19,801

<u>Production Costs per day</u>

Mining

Waste 706 x 1.30 =	$ 918	
Ore 470 x 1.60 =	752	
Total	$ 1,670	
Mica Recovery Circuit 83.3 x 25.86 =	2,154	
Mica Fine Grinding Circuit 83.3 x 30.37 =	2,530	
Feldspar Recovery Circuit 167 x 11.62 =	1,941	
Administration & Sales 83.3 x 23.06 =	1,921	
Total		10,216
Gross Daily Earnings		9,585
Gross Annual Earnings 240 x $ 9,585 =		$ 2,300,400

12.2.2 Year 2 - Annual Production 36,000 short tons Mica and 72,000 short tons Feldspar.

Gross Value of Product per day
(240 operating days per year).

Mica 150 x 148 =	$ 22,200	
Feldspar 300 x 44.75	13,425	
Total		$ 35,625

Production Costs per day

Mining

Waste 1,260 x 1.30 =	$ 1,638	
Ore 840 x 1.60 =	1,344	
Total	$ 2,982	
Mica Recovery Circuit 150 x 22.15 =	3,323	
Mica Fine Grinding Circuit 150 x 25.16 =	3,774	
Feldspar Recovery Circuit 300 x 10.55 =	3,165	
Administration & Sales 150 x 17.27 =	2,590	
Total Costs		15,834
Gross Daily Earnings		19,791
Gross Annual Earnings 240 x $ 19,791 =		$ 4,749,840

12.2.3 Year 3 - Annual Production 50,000 short tons Mica and 100,000 short tons Feldspar.

<u>Gross Value of Product per day</u>
(240 operating days per year)

Mica 208.3 x 148 =	$ 30,828	
Feldspar 416.7 x 44.75 =	18,647	
Total		$ 49,475

<u>Production Costs per day</u>

Mining

Waste 1,764 x 1.30 =	$ 2,293	
Ore 1,176 x 1.60 =	1,882	
Total	$ 4,175	
Mica Recovery Circuit 208.3 x 21.64 =	4,508	
Mica Fine Grinding Circuit 208.3 x 25.84 =	5,382	
Feldspar Recovery Circuit 416.7 x 9.99 =	4,163	
Administration & Sales 208.3 x 13.13 =	2,735	
Total Costs		20,963
Gross Daily Earnings		28,512
Gross Annual Earnings 240 x $ 28,512 =		$ 6,842,880

12.3 Net Present Value

NET PRESENT VALUE CALCULATION

Discount Rate of 15%

Period	Year	CASE I	CASE II
		** Net Cash	Flows **
Year 1986	1	$ 846,261	$1,998,609
Year 1987	2	1,729,633	3,591,561
Year 1988	3	2,214,186	4,499,712
Year 1989	4	1,925,379	3,912,793
Year 1990	5	1,674,243	3,402,429
Year 1991	6	1,455,863	2,958,634
Year 1992	7	1,265,968	2,572,725
Year 1993	8	1,100,842	2,237,152
Year 1994	9	957,254	1,945,350
Year 1995	10	832,394	1,691,609
Total Present Value		$14,002,023	$28,810,574
less Capital Costs		7,378,695	8,496,605
Net Present Value		$ 6,623,328	$20,313,969

SUMMARY OF DATA USED IN CALCULATION

*** COST PER TON OF CONCENTRATE ***

	Year 1	Year 2	Year 3
Mining Costs	$20.05	$19.88	$20.04
Mica Recovery Circuit	25.86	22.15	21.64
Mica Fine Grinding Circuit	30.37	25.16	25.84
Feldspar Recovery Circuit	11.62	10.55	9.99
Administration & Sales	23.06	17.27	13.13

*** ANNUAL PRODUCTION ***

	Year 1	Year 2	Year 3
Mica, short tons	20,000	36,000	50,000
Feldspar, short tons	40,000	72,000	100,000

*** SELLING PRICE PER TON ***

	CASE I	CASE II
Mica	$ 150.00	$ 150.00
less Royalty	2.00	2.00
Feldspar		45.00
less Royalty		0.25

12.4 Cash Flow

12.4.1 Case I - Cash Flow

PROJECTED CASH FLOW STATEMENT ON MICA MULE PROJECT
FOR THE FIRST EIGHT YEARS OF OPERATION

CASE I

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Revenue								
Mica	$3,000,000	$5,400,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000
less royalty	(40,000)	(72,000)	(100,000)	(100,000)	(100,000)	(100,000)	(100,000)	(100,000)
Total Revenue	$2,960,000	$5,328,000	$7,400,000	$7,400,000	$7,400,000	$7,400,000	$7,400,000	$7,400,000
Operating Costs								
Mining	$ 401,000	$ 715,680	$1,002,000	$1,002,000	$1,002,000	$1,002,000	$1,002,000	$1,002,000
Mica Recovery	517,200	797,400	1,082,000	1,082,000	1,082,000	1,082,000	1,082,000	1,082,000
Mica Grinding	607,400	905,760	1,292,000	1,292,000	1,292,000	1,292,000	1,292,000	1,292,000
Sub Total	$1,525,600	$2,418,840	$3,376,000	$3,376,000	$3,376,000	$3,376,000	$3,376,000	$3,376,000
Cost Of Admin & Sales	461,200	621,720	656,500	656,500	656,500	656,500	656,500	656,500
Interest Costs	295,148	295,148	295,148	236,118	177,089	118,059	59,030	0
Total Costs	$2,281,948	$3,335,708	$4,327,648	$4,268,618	$4,209,589	$4,150,559	$4,091,530	$4,032,500
Net Income	$ 678,052	$1,992,292	$3,072,352	$3,131,382	$3,190,411	$3,249,441	$3,308,470	$3,367,500
Return On Capital	15.32%	45.00%	69.40%	70.73%	72.06%	73.40%	74.73%	76.06%

*** SUMMARY OF DATA USED IN CALCULATIONS ***

*** EQUITY / DEBIT RATIO ***

Equity in Project	$4,427,217							
Debit in Project	$2,951,478	$2,951,478	$2,951,478	$2,361,182	$1,770,887	$1,180,591	$590,296	($0)
Total Investment	$7,378,695							
Equity / Debit	60%	40%						
Interest On Debit	10.00%							

****

	Year 1	Year 2	Year 3
*** SALES ***			
Mica Sales (tons)	20,000	36,000	50,000
*** COSTS (per ton) ***			
Mining Costs	$20.05	$19.88	$20.04
Mica Recovery	25.86	22.15	21.64
Mica Grinding & Packaging	30.37	25.16	25.84
Admin Costs	23.06	17.27	13.13

*** SELLING PRICE PER TON ***

Mica	$150.00
Royalty	$2.00

12.4.2 Case II - Cash Flow

PROJECTED CASH FLOW STATEMENT ON MICA MULE PROJECT
FOR THE FIRST EIGHT YEARS OF OPERATION

CASE II

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Revenue								
Mica	$3,000,000	$5,400,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000	$7,500,000
less royalty	(40,000)	(72,000)	(100,000)	(100,000)	(100,000)	(100,000)	(100,000)	(100,000)
Feldspar	1,800,000	3,240,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000
less royalty	(10,000)	(18,000)	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)	(25,000)
Total Revenue	$4,750,000	$8,550,000	$11,875,000	$11,875,000	$11,875,000	$11,875,000	$11,875,000	$11,875,000
Operating Costs								
Mining	$ 401,000	$ 715,680	$1,002,000	$1,002,000	$1,002,000	$1,002,000	$1,002,000	$1,002,000
Mica Production	517,200	797,400	1,082,000	1,082,000	1,082,000	1,082,000	1,082,000	1,082,000
Mica Grinding	607,400	905,760	1,292,000	1,292,000	1,292,000	1,292,000	1,292,000	1,292,000
Feldspar	464,800	759,600	999,000	999,000	999,000	999,000	999,000	999,000
Sub Total	$1,990,400	$3,178,440	$4,375,000	$4,375,000	$4,375,000	$4,375,000	$4,375,000	$4,375,000
Cost Of Admin & Sales	461,200	621,720	656,500	656,500	656,500	656,500	656,500	656,500
Interest Costs	339,864	339,864	339,864	271,891	203,919	135,946	67,973	0
Total Costs	$2,791,464	$4,140,024	$5,371,364	$5,303,391	$5,235,419	$5,167,446	$5,099,473	$5,031,500
Net Income	$1,958,536	$4,409,976	$6,503,636	$6,571,609	$6,639,581	$6,707,554	$6,775,527	$6,843,500
Return On Capital	38.42%	86.50%	127.57%	128.91%	130.24%	131.57%	132.91%	134.24%

*** SUMMARY OF DATA USED IN CALCULATIONS ***

*** EQUITY / DEBIT RATIO ***

Equity in Project	$5,097,963							
Debit in Project	$3,398,642	$3,398,642	$3,398,642	$2,718,914	$2,039,185	$1,359,457	$679,728	$0
Total Investment	$8,496,605							
Equity / Debit	60%	40%						
Interest On Debit	10.00%							

****

*** SALES ***	Year 1	Year 2	Year 3
Mica Sales (tons)	20,000	36,000	50,000
Feldspar Sales (tons)	40,000	72,000	100,000
*** COSTS (per ton) ***			
Mining Costs	$20.05	$19.88	$20.04
Mica Recovery	25.86	22.15	21.64
Mica Grinding & Packagin	30.37	25.16	25.84
Feldspar Recovery	11.62	10.55	9.99
Admin Costs	23.06	17.27	13.13

*** SELLING PRICE PER TON ***

Mica	$150.00
Royalty	$2.00
Feldspar	$45.00
Royalty	$0.25

13.0 CERTIFICATE

I, NORMAN C. CROOME, of the Municipality of Surrey, Province of British Columbia, hereby certify as follows:

1. I am a consulting engineer with an office located at 1681 Amble Green Blvd., Surrey, British Columbia, V4A 6B8.

2. I am a Professional Engineer (Mining) registered in the Province of British Columbia and Ontario, am a member of the American Institute of Mining, Metallurgical and Petroleum Engineers and the Canadian Institute of Mining and Metallurgy.

3. I have graduated with the degree of Bachelor of Science (Engineering) with additional Geology options from the University of Manitoba in the year 1960.

4. I have practiced my profession continuously for thirty-seven years and have been engaged in all phases of mineral exploration, mine development and mineral production in Canada, United States, Mexico, Peru and Bolivia.

5. I am the author of this report which is based on information obtained from Mica Mule personnel and on trips to the Mica Mule Project located in Yavapai County, Arizona.

6. I have no material interest, direct or indirect, in the properties discussed in this report or in the securities of either United Liberty Resources or Tropicana Resources.

7. I hereby consent to the publication of this report dated January 31, 1986, Preliminary Feasibility Study Mica Mule Property.

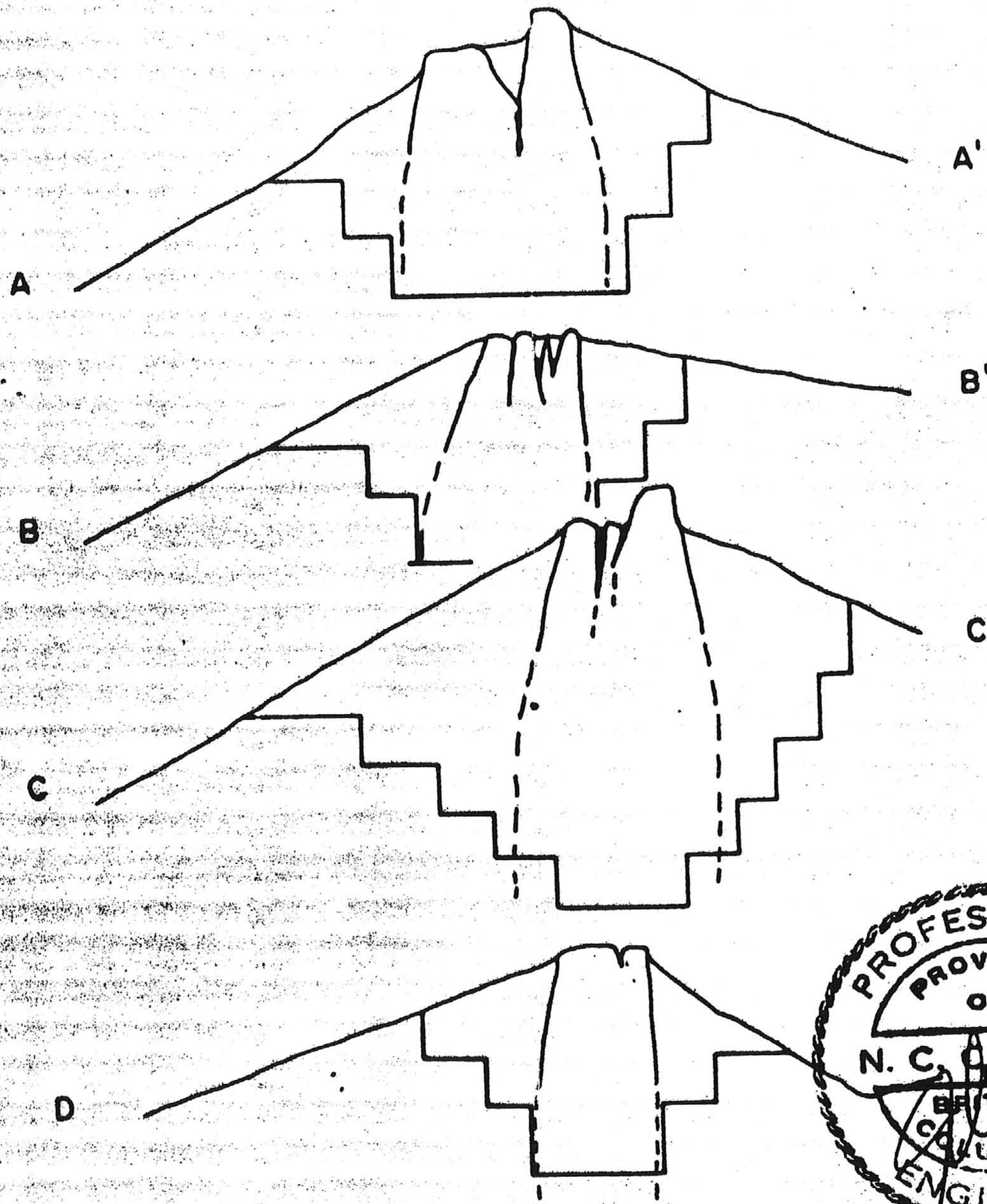
Dated at Surrey, British Columbia, this 31st day of January, 1986.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

N. C. Croome,
Consulting Engineer.

APPENDIX A

MICA MULE MINE



PROFESSIONAL PROVINCE OF N. C. CROOME BRITISH COLUMBIA ENGINEER

Tonnage: 450,000 Tons

Grade: Est. 20-30% Mica

Stripping ratio: 1:1

FIGURE 4

TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA, U.S.A.

NORTH PIT CROSS SECTION

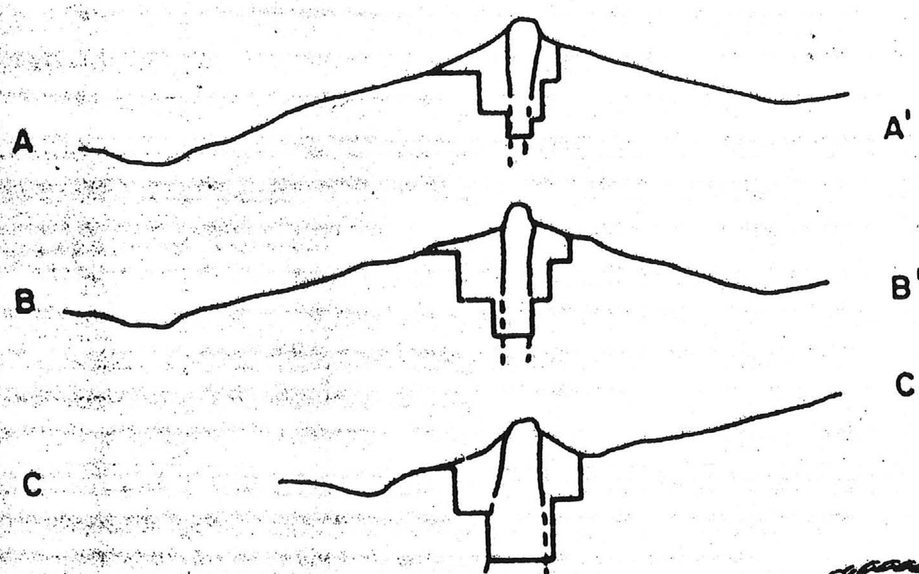
To accompany a report by N.C. Croome,
STRATO GEOLOGICAL ENGINEERING LTD.

DRAWN BY: BK

DATED: December, 1985

STRATO GEOLOGICAL ENGINEERING LTD.

MICA MULE MINE



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

Tonnage: 16,800

Grade: Est. 30-35% MICA

Stripping ratio: 2:1

FIGURE 5

TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA, U.S.A.

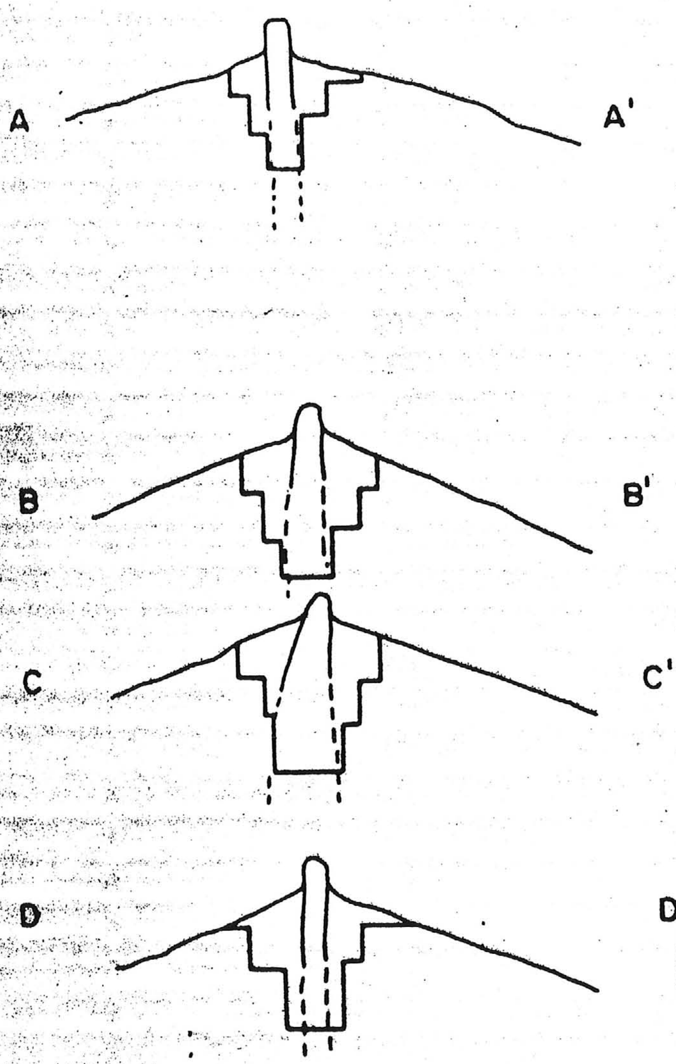
NORTH PIT 2
CROSS SECTION

To accompany a report by N. C. Croome,
STRATO GEOLOGICAL ENGINEERING LTD.

DRAWN BY: [illegible]
DATED: December, 1985

STRATO GEOLOGICAL ENGINEERING LTD.

MICA MULE MINE



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

Tonnage: 18,200 Tons

Grade: Est. 25-30 % MICA

Stripping ratio: 2:1

FIGURE 6

TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA, U.S.A.

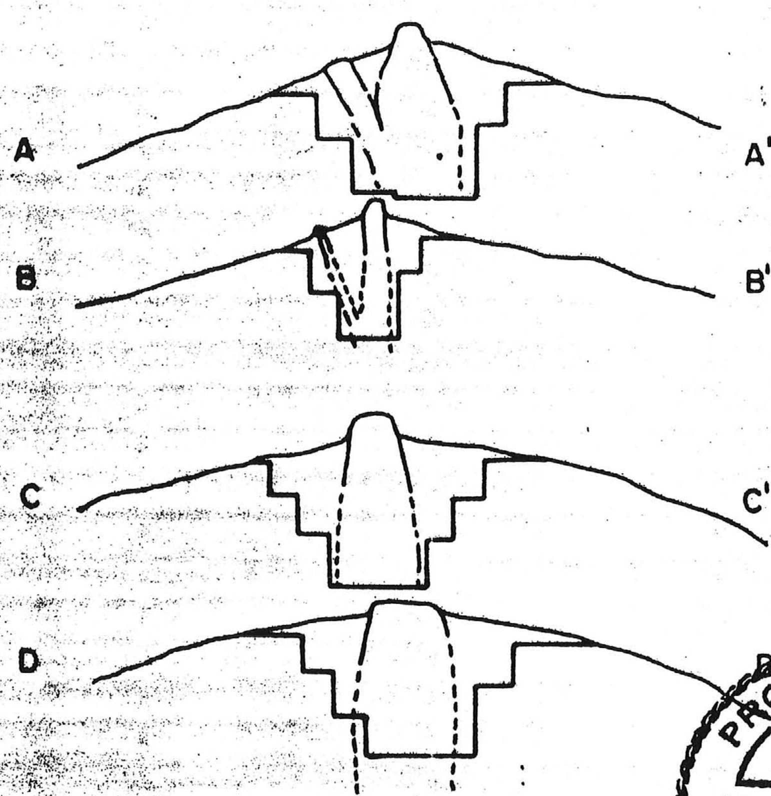
NORTH CENTRAL PIT CROSS SECTION

To accompany a report by N.C. Croome,
STRATO GEOLOGICAL ENGINEERING LTD.

DRAWN BY: DK
DATED: December, [illegible]

STRATO GEOLOGICAL ENGINEERING LTD.

MICA MULE MINE



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

Tonnage : 49,000 Tons

Grade : Est. 25-30 % MICA

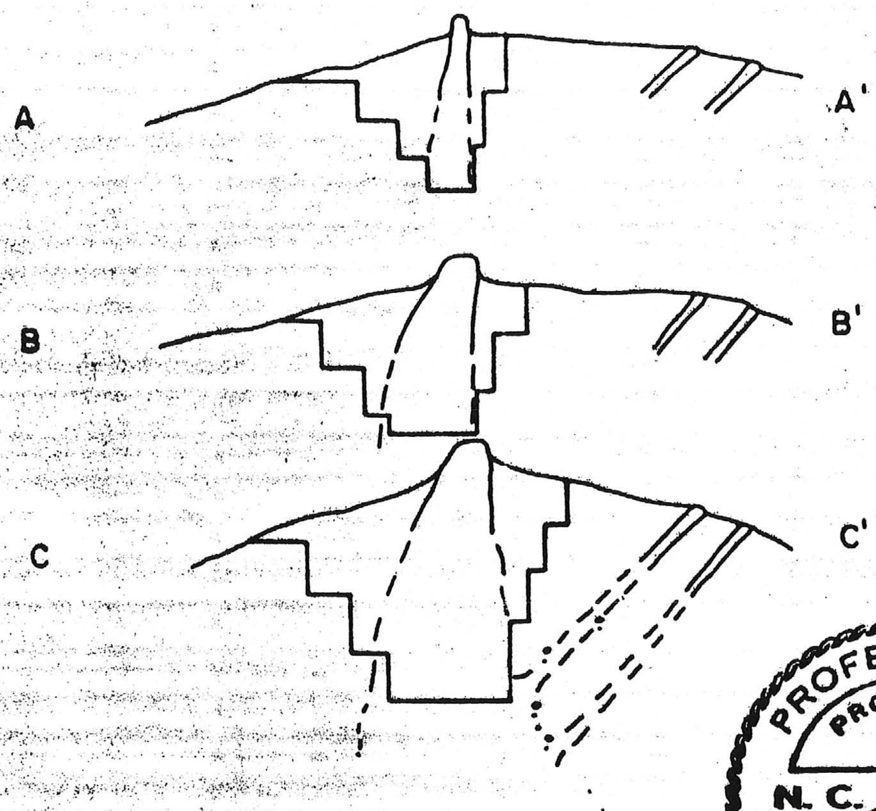
Stripping ratio : 1·5 : 1

FIGURE 7

TROPICANA RESOURCES LTD. UNITED LIBERTY RESOURCES LTD.
MICA MULE PROPERTY, YAVAPAI COUNTY PHOENIX, ARIZONA, U.S.A.
CENTRAL PIT CROSS SECTION
To accompany a report by N.C. Croome, STRATO GEOLOGICAL ENGINEERING LTD.
DRAWN BY: BK DATED: December, 1986

STRATO GEOLOGICAL ENGINEERING LTD.

MICA MULE MINE



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
N. C. CROOME

Tonnage : 90,000 Tons

Grade : Est. 17-20 % MICA

Stripping ratio : 1·5 : 1

FIGURE 8

TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA, U.S.A.

CENTRAL PIT 2 CROSS SECTION

To accompany a report by N.C. Croome,
STRATO GEOLOGICAL ENGINEERING LTD.

DRAWN BY : EK
DATED: December, 1983

STRATO GEOLOGICAL ENGINEERING LTD.

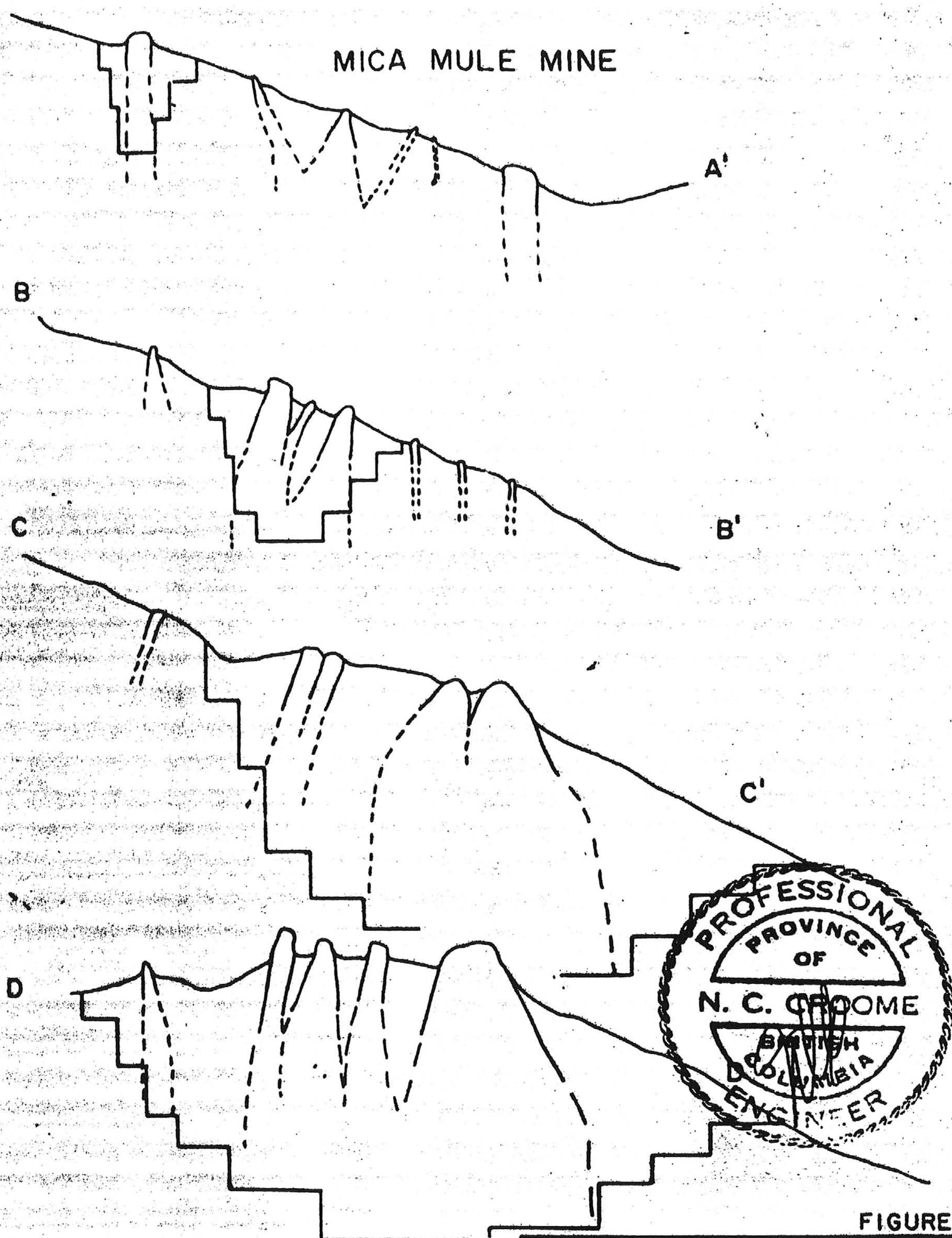


FIGURE 9

TROPICANA RESOURCES LTD.
UNITED LIBERTY RESOURCES LTD.

MICA MULE PROPERTY, YAVAPAI COUNTY
PHOENIX, ARIZONA, U.S.A.

SOUTH PIT COMPLEX CROSS SECTION

Tonnage : 680,000 Tons

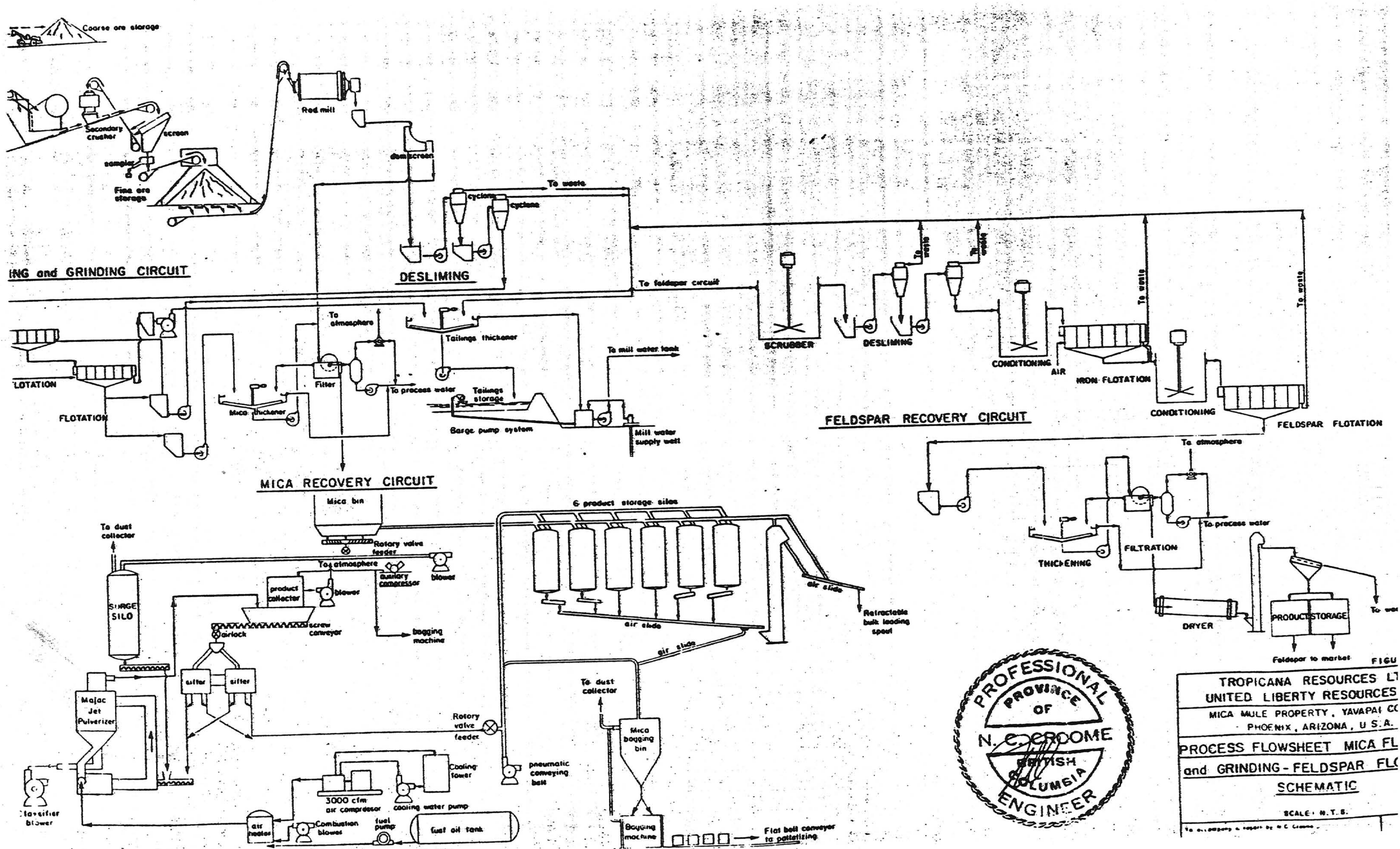
Grade : Est. 17 - 25 % MICA

Stripping ratio : 1 : 1

To accompany a report by N.C. Croome.
STRATO GEOLOGICAL ENGINEERING LTD.

DRAWN BY : BK
DATED : December, [illegible]

STRATO GEOLOGICAL ENGINEERING LTD.



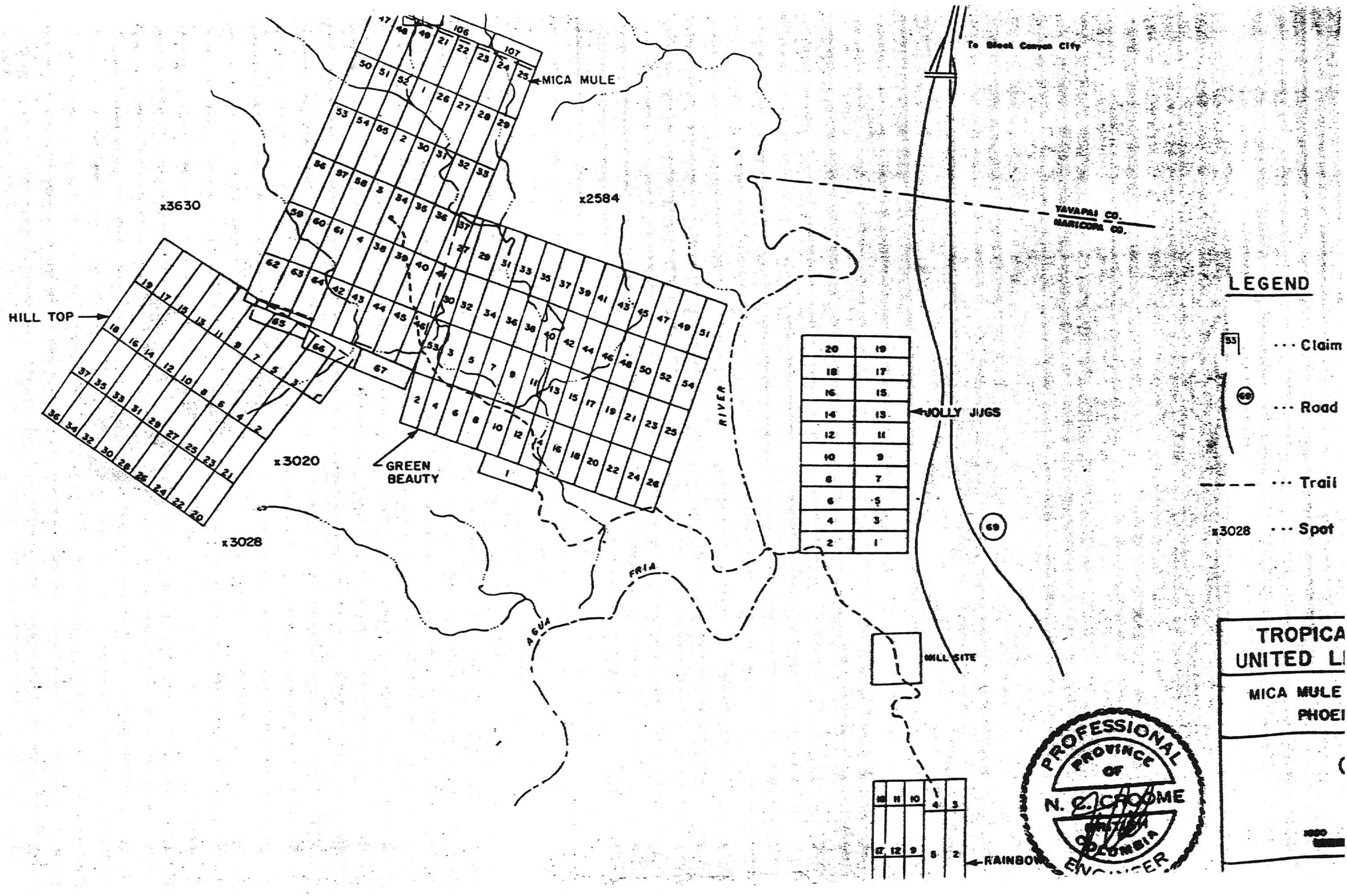
FIGU

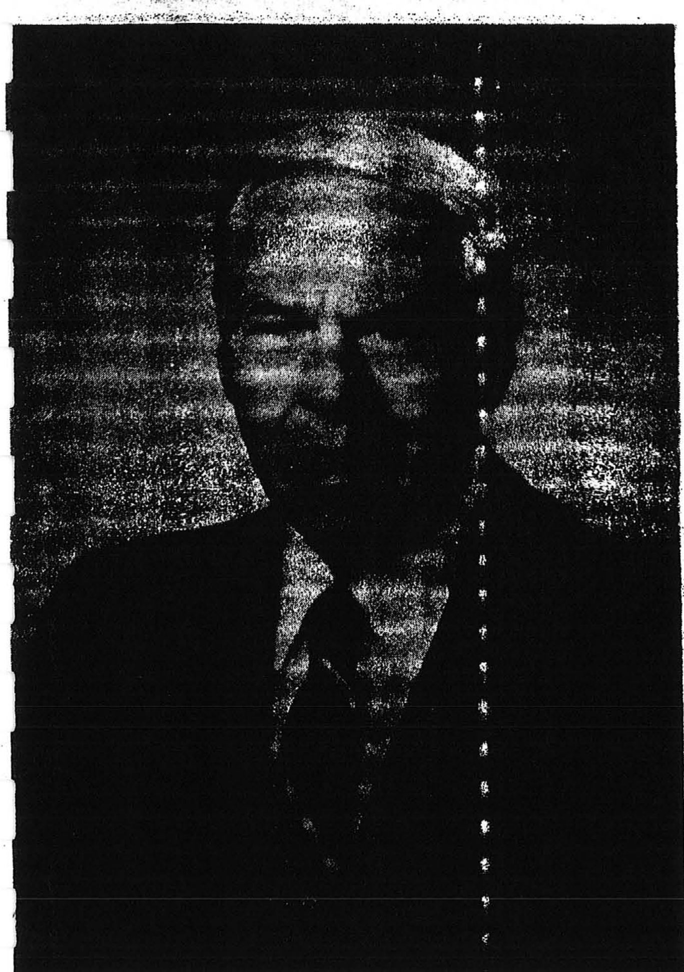
TROPICANA RESOURCES LT
UNITED LIBERTY RESOURCES
MICA MULE PROPERTY, YAVAPAI CO
PHOENIX, ARIZONA, U.S.A.

PROCESS FLOWSHEET MICA FL
and GRINDING - FELDSPAR FL
SCHEMATIC

SCALE: N.T.S.

To accompany a report by N.C. Croome


To Black Canyon City
MICA MULE
HILL TOP
GREEN BEAUTY
JOLLY JUGS
MILL SITE
RAINBOW
x3630
x2584
x3020
x3028
AGUA FRIA RIVER
YAVAPAI CO.
MARICOPA CO.
69
LEGEND
... Claim
... Road
... Trail
x3028 ... Spot
TROPICA
UNITED L
MICA MULE
PHOE
PROFESSIONAL
PROVINCE OF
N. C. CROOME
BRITISH COLUMBIA
ENGINEER

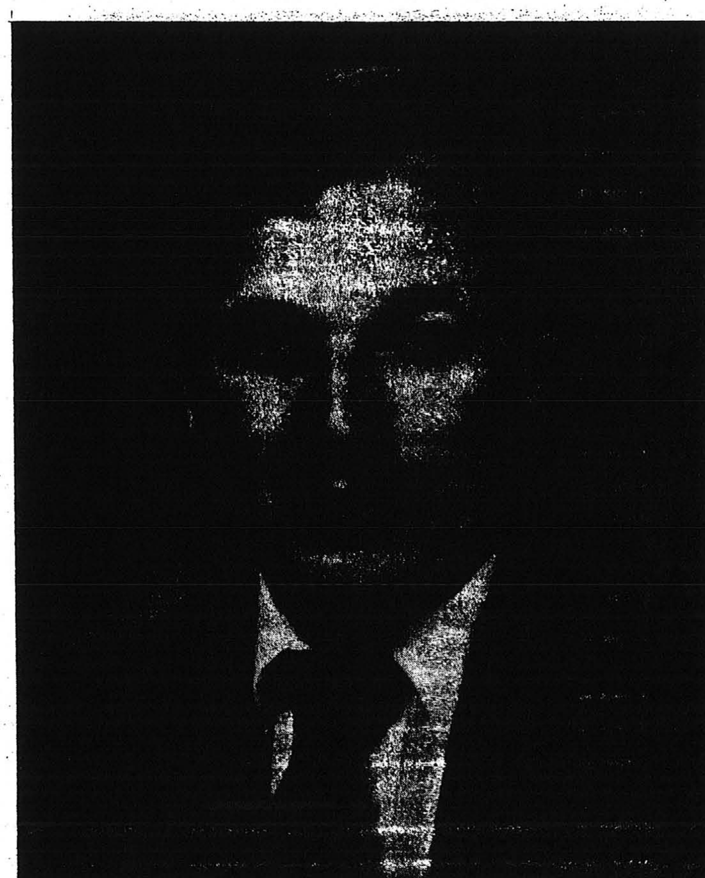


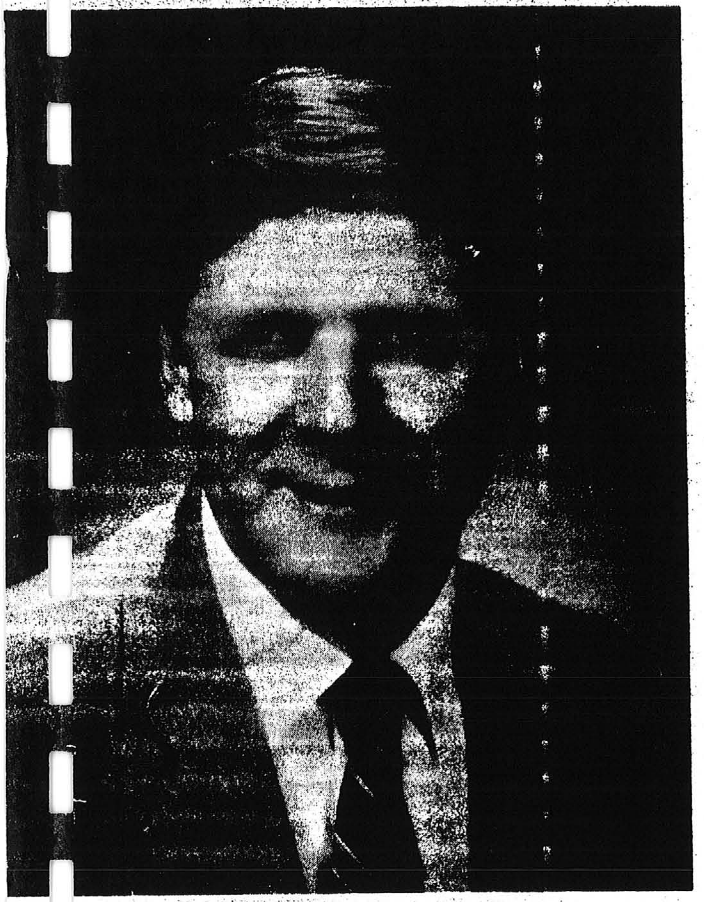
J. ROBERT BERG, **DIRECTOR**

Dr. Berg obtained his M.S. and Ph.D. at the State University of Iowa. As Professor and Dean at Wichita State University, Dr. Berg carried out extensive research, published and presented numerous papers in the field of Petroleum Geology. Dr. Berg is an internationally recognized expert in his field and serves some thirty organizations in an executive and advisory capacity. Dr. Berg brings to Strato his expertise in the Petroleum industry both in terms of his professionalism as a scientist and his recognition as a major contributor in the industry.

HANK LEIS, **CONSULTANT**

Mr. Leis has an educational background in Science and Business. Mr. Leis's early efforts were in the field of Enzymology. He entered the Mining Industry in 1964 as exploration manager, and later mine manager, in a Northern British Columbia operation. In 1967, he and several associates, started Strato. One year later, then as President of the company, he initiated what was termed the "Total Service Concept" in mineral exploration. His vigorous efforts resulted in expansion into the Yukon, Ontario and many areas of the United States. Presently he provides an essential link with the financial community, Strato's clientele and Strato's professional staff.





RALPH ENGLUND, **PRESIDENT**

Mr. Englund, a graduate of the University of British Columbia, has impressive credentials in both Electronics and Physics. Before joining Strato, he taught Geophysics at B.C.I.T. He has spent over ten years in the supervision and management of exploration programs in Canada and the United States. After taking over as President of Strato, Mr. Englund undertook the task of organizing and developing exploration programs and recruiting additional professional and technical staff. He is largely responsible for Strato extending its "Total Service Concept" into Wenatchee, Washington and Reno, Nevada. The new goals and objectives set by Mr. Englund are modernizing and facilitating information processing in the company network, resulting in a more professional and complete package to clientele.

.R. THOMPSON, **VICE PRESIDENT**

Since completing her education in Business Management, J.R. Th mpson has spent twelve years in administration and accounting. She ha been involved in computer in tallation and systems design. She has given seminars and carried out extensive negotiations in these ar as. In Strato, J.R. has de eloped formal reporting systems (financial and technical) which are nging the Company into the efront of procedural efficiency d effectiveness.