FEASIBILITY STUDY

FOR

TANEN VENTURE MINERALS CO LIMITED

ON

ESTABLISHING A MINERAL PROCESSING PROJECT (GRAPHITE)

PREPARED BY

MS. TANEN VENTURE MINERALS CO LIMITED

Dar es Salaam

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1.0 INTRODUCTION

1.1 Foreword

The Tanzania Government is emphasing p on its long – term industrial plan of strengthening the metal and engineering sub- sector in the country.

The private sector has also been paying a vital role in the development of this basic industry, mainly by establishing service- oriented engineering workshops which provide maintenance and repair services.

The National demand was established to be more than 400,000 tons per annum .Indications that the demand is increasing fast and is now closed to 700,000 tons per annum

One of the basic necessities for the establishment of this basic industry is the availability of an adequate local market for its output. It is rational for local Governments, therefore , to encourage and promote the growth of the local engineering sub- sector which will ultimately consume the local MINERAL products for building and construction materials etc. A recently established local firm, **MS. TANEN VENTURE MINERALS CO LIMITED** has realized the potential this country has in terms of construction and decide to establish a mineral processing plant in Mbeya Region.

1.2 Objective of Study

The purpose of this feasibility study is to work out the technical and commercial details and financial viability for the establishment of Graphite plant for manufacturing of materials for construction, materials for building materials and materials for other constructions sites.

1.3 Project Promoters

The proposed mineral facility is being promoted by a locally registered company namely **MS. TANEN VENTURE MINERALS CO LIMITED** of P.O Box 46182, Dar es Salaam

Name of Director	Share	Nationality
GAO DEGUO	64	CHINESE
SONG SHIYANG	26	CHINESE
LAN XIAOQING	10	CHINESE

2.0 EXECUTIVE SUMMARY

2.1 Introduction

This study examines the possibility for the establishing a mineral processing facility that led to production of stones to be used in building construction sites, road construction and other building construction. Also will produce other materials such as limestone to be supplied in cements factories and other manufacturers of building materials.

2.2 Market and Marketing Aspect

The market survey carried out revels that he demand for Graphite products raising rapidly.

The survey concludes that the proposed production of about 4,800 tons of building materials per annum will not face any market problems.

2.3 Project capacity

The proposed project will be able to produce between 8,000 -12,000 tons per day and will be using modern machines which will be imported from China and Japan. Project promoters have already identify the suppliers of the machines and plants.

2.4 Process and Technology

Vertical openings: shafts and raises

The principal means of access to an underground ore body is a vertical opening called a shaft. The shaft is excavated, or sunk, from the surface downward to a depth somewhat below the deepest planned mining horizon. At regular intervals along the shaft, horizontal openings called drifts are driven toward the ore body. Each of these major working horizons is called a level. The shaft is equipped with elevators (called cages)

by which workers, machines, and material enter the mine. Ore is transported to the surface in special conveyances called skips.

Shafts generally have compartments in which the media lines (e.g., compressed air, electric power, or water) are contained. They also serve as one component in the overall system of ventilating the mine. Fresh air may enter the mine through the production shaft and leave through another shaft, or vice versa.

Another way of gaining access to the underground is through a ramp—that is, a tunnel driven downward from the surface. Internal ramps going from one level to another are also quite common. If the topography is mountainous, it may be possible to reach the rock or ore body by driving horizontal or near-horizontal openings from the side of the mountain; in metal mining these openings are called adits.

Stones aggregates that is mined on the different levels is dumped into vertical or near-vertical openings called stone passes, through which it falls by gravity to the lowest level in the mine. There it is crushed, stored in bin, and charged into skips at a skip-filling station. In the head frame on the surface, the skips dump their loads and then return to repeat the cycle. Some common alternative techniques for ore transport are conveyor belts and truck haulage. Vertical or near-vertical openings are also sometimes driven for the transport of waste rock, although most mines try to leave waste rock underground.

Vertical or subvertical connections between levels generally are driven from a lower level upward through a process called raising. Raises with diameters of 2 to 5 metres (7 to 16 feet) and lengths up to several hundred metres are often drilled by powerful raise-boring machines. The openings so created may be used as ore passes, waste passes, or ventilation openings. An underground vertical opening driven from an upper level downward is called a winze; this is an internal shaft.

Horizontal openings: drifts

All horizontal or subhorizontal development openings made in a mine have the generic name of drift. These are simply tunnels made in the rock, with a size and shape depending on their use—for example, haulage, ventilation, or exploration. A drift running parallel to the ore body and lying in the footwall is called a footwall drift, and drifts driven from the footwall across the ore body are called crosscuts. A ramp is also a type of drift.

2.5 Production Inputs

The most critical inputs in to the plant are electric power in the magnitude of 2000 KVA will be required and this amount will be required and this amount will be supplied by Tanzania Electric Supply Company Limited

A considerable amount of water will be required for cooling .However, it will be recycles. Other production inputs include fuel oil, alloying elements and graphite powder

2.6 Location

The plant will be located at Tanga region in Tanzania.

2.7 Manpower Requirements

The plant Management will comprise 3 people out of a total workforce of 65 people. There will be 18 operators, 4 expatriates and the rest in direct workforce. The plant will operate on a3- shift per day basis. The plant will be organized into three departments, namely production, , finance and Administration and technical services(repair , maintenance and quality control).

2.8 Implementation

The Major activities include registration and approval by the Tanzania Investment Centre and mobilization of funds from sponsors and banking instutions. Civil works design, tendering and construction will be carried

out immediately after project is approved and would take about six months.

Technology

Machinery will be ordered from China and Japan after funds are committed. These will be fabricated shipped for activities related to machinery up to their receipt at site .

Training machinery installation and commissioning will be undertaken within another two months.

Activities related to civil works and machinery will take place simultaneously.

2.9 Project Economics

2.9.1 Capital Investment Requirements

DESCRIPTION	TOTAL
Land and Building	130,000
Plant & Machinery	2,250,000
Furniture & Fitting	20,000
Vehicle	130,000
Pre- Operational Expenses	40,000
Working Capital	100,000
TOTAL INVESTMENT	**2,670,000**

2.9.2 Financing Scheme

i) Fixed Assets and Pre- Operational Costs

	US$
Equity	2,670,000
Total	2,670,000

2.10 Recommendations

The study shows that mineral production is both technically and financially feasible. Furthermore, it will cut down on imports of this

important product. In view of the findings the project is recommended for implementation

3.0 MARKET AND MARKETING

3.1 Product

The product which this mineral is going to produce for sale is various construction companies and building materials producers.

3.2 Demand

Demand for the proposed product has been derived on the basis of the end use method. The products are used in various ways from buildings and other civil work constructions, in manufacturing of security grills and fences and as raw materials for manufacture of industrial products and machinery parts to industries.

There is high demand for mineral products as Raw materials for manufacture of building materials and contractors. The demand for these products as raw material for analysis has revealed there is an increase which is caused by shortage of raw materials, old machineries and import of manufactured goods.

Given the current improvements in the national economy, it is expected that the average capacity utilization of the past 5 years to at least 70%. It is also expected that the average growth rate of usage of mineral raw materials will equal to the growth rate of GDP for the industrial sector, currently at 3.4 %.

3.3 Supply

There exist numerous factors which supply of mineral products is huge. The quantity has been declining over the years. The declining trend is as a result of increasing number of construction companies being opened in the country.

3.4 Promotion

Experience of selling this product prescribes that they can be easily sold through personal selling (personal solicitations of orders) to potential big customers and advertisement with emphasis on product availability quality and persuasion.

4.0 PRODUCTION PROCESS AND TECHNOLOGY

4.1 Production Processes for Steel

The method of removal of stones from their natural bed by using different operations is called mineral processing called as:

- a) Digging – This method is used when the mineral consists of small & soft pieces of stones.
- b) Heating – This method is used when the natural rock bed is horizontal and small in thickness.
- c) Wedging –This method is used when the hard rock consists of natural fissure. When natural fissures are absent then artificial fissures are prepared by drilling holes.
- d) Blasting – It is the process of removal of stones with the help of controlled explosives is filled in the holes of the stones. Line of least resistance plays very important role in the blasting process.

Following steps are used in the blasting process;

- 1) Drilling holes – Blast holes are drilled by using drilling machines.
- 2) Charging – Explosive powders are fed into the cleaned & dried blast holes.
- 3) Tamping – The remaining portion of the blast holes are filled by clay, ash, fuse & wirings.
- 4) Firing –The fuses of blasting holes are fired by using electrical power supply or match sticks.

4.2 Power Utilization

In the operation of electrical facilities, the most favorable installation for power costs is attained at preferably high utilization with preferably low power peak.

This is achieved in modern medium- frequency melting by provision of constant power supply in the converters and through selective switching of power feed units.

4.3 Environment Protection

During the process of melting steel scrap there will the emission of dust and gaseous furnes.Furnes especially are toxic and of complex composition. The most common are sulphur and nitrogen oxides (S0x, NOX) In the developed world where there are many steel works this is of concern, Therefore, it is recommended to arrest this problem right from the beginning in countries entering the steel industry. In the recommended technology i.e induction furnace, the amount of hazardous gases emitted will be very small especially because only cleaned raw materials will be used. There is therefore no environment hazardous waste expected from this project

5.0 Plant Location and Civil Works

The plant will be located in Tanzania. Production Building Required which is an open shed roofed with GCI sheets, and constructed from reinforces concrete slab in site is ideal for both the furnace and rolling mill facilities.The scrap and finished products would both be stored in the open

6.0 Utility Services

a) Water

The site has already been supplied with water. A 3 inch diameter pipeline connects the plot to the main pipeline.The plant water requirement is basically for cooling purposes and water will be recycled. About 10,000 litres of water will be required per day. Therefore a water reservoir of capacity 30,000 litres is recommended to be constructed.

b) Electricity

The site will tap its power from substation nearby. A number of machines will be premedical operated .There will therefore be a need to have a central compressor station which will generate the compressed air requirements .A central compressor station will be provided to provide compressed air for some of the production units.

As said elsewhere in this report, the source of energy for meeting the scrap will be electric power. Power is consumed in very large quantities and it is among the biggest cost element in this type of steel production. The demand for this plan is estimated at around 2000Kva

c) Material Handling Equipment

The plant will require the services of an overhead crane which will be employed for lifting the scrap containers for feeding the furnace as well as move the ladles with liquid steel into the casting area.

e) Workshop Facility

In order to enable the company to handle small repairs to its aassets we recommend the acquisition of a minimum number of metal working machines such as one lathe, a milling/drilling machine power hacksaw and tool kits.

7.0 MANPOWER AND ORGANISATION

The proposed copper and metal plant complex will have three Independent departments, namely administration and finance production and technical staff.

Organisation

The top people in the day- to day running of the company will be General Manager .Under the General Manager's office will e three department, namely finance/ administration production and technical services. Each department will be under a Manager and will comprise a number of sections each headed by section head such as Finance/ Personnel Department Production Department.

Each section will be manned by a number of personnel with varying education levels and work experiences. The management team will comprise the General Manager, Chief Accountant and the four expatriates who will head the different production and service department.

He will also be responsible for repair and maintenance for company assets and research and development activities.

The technical department will comprise three sections, namely:

a) The repair and maintenance section which would be responsible for all repair works. An expatriate will be employed to train the local technician in the machinery repair works.
b) Laboratory section which will be responsible for quality control of both the raw materials and finished goods.
c) Research and development section.

7.1Production Department

The production department will comprise two sections, namely steel mill and rolling mill.

Finance and Administration Department

An Administration and Finance Manager will head the department. He will be responsible for the administration of the company as well as overseeing the financial aspect of the company

7.2 Manpower Requirement

The manpower requirement for running the proposed steel and rolling mill is 65 people .The administration staff will work on one shift per Day. The production and technical departments will work on 3 shifts per
Day basis.

8.0 INVESTMENT AND FINANCING

8.1 Assumptions

The financial projections to determine the viability of the Copper and metal Project is based on the following key assumptions:

- The project will operate at 50% capacity in year 1 , 60% in year 2, 70% in year 4 and thereafter
- Plant will operate on three shifts per day for 250 days per year.
- The whole project output will be sold locally

8.2 Summary of Capital Costs

The total initial investment required for undertaking the project is estimated at US$ 2,85 million. Spread over a year as shown. The breakdown of the capital investments is presented in table below:

DESCRIPTION	**Total**
Land and Building	130,000
Plant & Machinery	2,250,000
Furniture & Fitting	20,000
Vehicle	130,000
Pre- Operational Expenses	40,000
Working Capital	100,000
TOTAL INVESTMENT	**2,670,000**

8.3 Building and Civil Works Costs

The premises will be renovated e for constructions for plant installation only. These are Estimated and given under cost of machinery

8.4 Plant Machinery and Equipment Costs

The main machinery for the envisaged project will be electric furnace, steaming ladles and moulds reheating various tools, accessories etc.

8.5 Furniture and Fittings

The items to be purchased will comprise office furniture and computers for office and factory.

8.6 Vehicles

A 15 toner truck and a 5 toner truck that will be used for transportation of raw Materials and finished products and other office activities are recommended. A Bus of 45 seats will be provided for workers' transport and two saloon cars for the top management

8.7 Pre- Production Capital Expenditures

These include project development cost for feasibility study and start-expenses

Including interest on loan taken for capital investment in the pre-production Period

8.8 Initial Working Capital

Initial Working capital requirements for the proposed project works Out at about US$ 0.67 Million

8.9 COST OF OPERATION

The anticipated costs for operating the project are detailed in the following Sections the capacity utilization has been assumed to grow at a rate of 50% in year 1, 60% in year 2, 70% in year 3 while stabilized production is envisaged From the fourth year at 80% of rated capacity. 80% will be the sustainable Production level.

8.10 Repair and Maintenance

Annual repairs and maintenance of the machinery and equipment have been Worked out to cover all costs including spare parts.

8.11 Vehicle Running Expenses

Vehicle running expenses include fuel, lubricants, tear and wear, road licence Insurance etc, This cost item has been estimated at 35% of the original cost of the vehicle annually

8.12 Salaries and Wages

The total wage package is estimated at US$ 0,070 million for the first two years

8.13 Administrative Overheads.

The main item in the administrative cost is insurance of fixed assets. The administrative costs are estimated at US$0,010 million/ annum
Dividends for the first 5 years during which are company will have to meet other
Commitments like loan repayment, costs for technology training etc.

9.0 FINANCIAL ANALYSIS

9.1 Income and Expenditure

9.1.1 Income

The proposed steel and copper mill project expects to earn its income through the sale of reinforcement copper and steel products mainly at sustainable level of production, the total sales are expected to stand at US$ 1,632 million from the Fourth year of production onwards by selling a total of 4800t of final products.

9.1.2 Cash Flow Statement

The project's cash flow is impressive as the need for external assistance arises Only in the initial stages of the project investment.

10.0 Economic Benefits

The successful operation of this processing plant will contribute significant Economic benefit to Kilimanjaro region people and Tanzania as whole . In summary the benefits which will be realized are as follows:

- The execution of this project will bring about employment opportunities
- Provision of income to other services providers, thus contributing to the reduction of poverty. The income to be earned will help in improving standard of living of the workers and other people residing in the region
- The direct income for the workers combined with help in overall efforts of alleviation of poverty in the Region
- This project will facilitate opportunities to increase foreign exchange earnings through export of some of its value products
- Project will create Government Revenue through Taxation

11.0 Conclusion

The investment and development of these products processing undertaking is in Line with the Government objective of encouraging proper development of Industries in the country. It will have a positive impact on the development of the region as, it would Generate a number of benefits and more positive impact on the economy of the region

This document has provided a full analysis on the financial , Techno-economic viability and have established that the proposed project is technically sound financially viable , and economically/ socially beneficial.

MS. TANEN VENTURE MINERALS CO LIMITED

INVESTMENT COST

DESCRIPTION	TOTAL
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MS. TANEN VENTURE MINERALS CO LIMITED

PROJECT FINANCING

US$

DESCRIPTION	**FOREIGN**	**TOTAL**
Equity	2,670,000	2,670,000
TOTAL INVESTMENT	**2,670,000**	**2,670,000**

FIXED ASSETS SCHEDULE

NAME OF ASSETS			**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
Land and Buildings			130,000	123,500	117,000	110,500	104,000
Plant & Machines			2,250,000	1,800,000	1,350,000	900,000	450,000
Motor Vehicle			130,000	125,000	120,000	115,000	110,000
Furniture & Fixtures			20,000	17,500	40,000	35,000	30,000
Total			**2,530,000**	**2,066,000**	**1,627,000**	**1,160,500**	**694,000**
Depreciation			**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
Land and Buildings			6,500	6,500	6,500	6,500	6,500
Plant & Machines			450,000	450,000	450,000	450,000	450,000
Motor Vehicles			5,000	5,000	5,000	5,000	5,000
Furniture &Fixtures			2,500	2,500	2,500	2,500	2,500
ANNUAL DEPRECIATION			**464,000**	**464,000**	**464,000**	**464,000**	**464,000**
CLOSING FIXED ASSETS			**2,066,000**	**1,602,000**	**1,163,000**	**696,500**	**230,000**

OTHER OPERATIONG COST

Other Operations Cost			**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
Motor Vehicle running expens			30,000	30,400	30,800	31,200	31,600
Salaries and Wages			28,000	30,800	33,880	37,268	40,995
Adminitrative Overhead Costs			10,000	11,000	12,100	13,310	14,641
Utility Costs			12,000	13,200	14,520	15,972	17,569
Interest on Loan			10,000	11,000	12,100	13,310	14,641
Communication Exepnses			10,000	11,000	12,100	13,310	14,641
Total Costs			**100,000**	**107,400**	**115,500**	**124,370**	**134,087**

PROJECT BALANCE SHEET

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Fixed Assets		2,530,000	2,066,000	1,627,000	1,160,500	694,000
Long term Assets						
Depreciation		464,000	464,000	464,000	464,000	464,000
Total long termassets		**2,066,000**	**1,602,000**	**1,163,000**	**696,500**	**230,000**
Current Assets						
Cash		406,100	684,700	979,050	1,292,735	1,625,723
Account Receivable		105,000	110,250	216,535	421,763	527,628
Inventory		214,710	376,383	438,469	402,292	467,493
Total Current Assets		**140,000**	**140,000**	**140,000**	**140,000**	**140,000**
Total Assets		**2,206,000**	**1,742,000**	**1,303,000**	**836,500**	**370,000**
Curent Liabilities						
Accounts Payable		84,000	88,200	92,610	97,241	102,103
Other Current Liablit		70,000	73,500	77,175	81,034	85,085
Subtotal Current Liabi		**154,000**	**1,616,700**	**169,785**	**178,274**	**187,188**
Long term Liabilties						
Long term Liabilitie		1,820,000	1,820,000	1,820,000	1,820,000	1,820.00
Total Liabiities		**2,066,000**	**1,602,000**	**1,163,000**	**696,500**	**230,000**
Net Assets		**820,810**	**877,633**	**951,268**	**1,044,516**	**1,157,656**
Captil and Reserves						
Owners Contribution		780,000	780,000	780,000	780,000	780,000
Retained Earning		**40,810**	**97,633**	**171,268**	**264,516**	**377,656**
Total Capital		**2,206,000**	**1,742,000**	**1,303,000**	**836,500**	**370,000**

PROJECTED INCOME STATEMENT

			YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR5
Sales Revenue			630,000	756,000	907,200	1,088,640	1,306,368
Cost of Sales			126,000	126,000	126,000	126,000	126,000
Gross Profit			**504,000**	**630,000**	**781,200**	**962,640**	**1,180,368**
Operating Expenses							
Administrative Overhead							
Costs			105,000	106,050	107,111	108,182	109,263
Motor Vehicle running			5000	5,050	5,101	5,152	5,203
Expenses			8,000	8,080	8,161	8,242	8,325
Salaries and Wages			78,000	78,780	79,568	80,363	81,167
Depreciation			81,000	81,810	82,628	83,454	84,289
Marketing Costs			6,500	6,565	6,631	6,697	6,764
Utility Costs			10,500	10,605	10,711	10,818	10,926
Insurance			10,000	10,100	10,201	10,303	10,406
Interest on Loan			12,200	12,322	12,445	12,570	12,695
Communication			1,750	1,768	1,785	1,803	1,821
Total Expenses			**207,950**	**210,030**	**212,130**	**214,251**	**216,394**
Profit before Tax			**296,050**	**419,971**	**569,070**	**748,389**	**963,974**
Tax (30%)			207,235	293,979	398,349	523,872	674,782
Profit After Tax			**88,815**	**125,991**	**170,721**	**224,517**	**289,192**