

**FEASIBILITY STUDY**

**FOR**

**MS. NAHDI CRUSHER COMPANY LIMITED**

**QUARRY PROCESSING PROJECT**

**PREPARED BY**

**MS. NAHDI CRUSHER COMPANY LIMITED**

**Dar es Salaam**

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## 1.0 INTRODUCTION

### 1.1 Foreword

The Tanzania Government is emphasizing 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 based QUARRY & iron and steel industry's output. A recently established local firm, **MS. NAHDI CRUSHER COMPANY LIMITED** has realized the potential this country has in terms of steel scrap, QUARRY and steel products markets. It is now contemplating putting up a complex that will refine steel and QUARRY to produce various types of goods.

### 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 Melting / refinery facilities for QUARRY processing for various and users such as civil work construction and engineering works.

### 1.3 Project Promoters

The proposed QUARRY processing plant is being promoted by a locally registered company namely **MS. NAHDI CRUSHER COMPANY LIMITED** of P.O Box 1186, Dar es Salaam

## **2.0 EXECUTIVE SUMMARY**

### **2.1 Introduction**

This study examines the possibility for the establishing a processing facilities for QUARRY and Various metal products by using induction furnace and hot rolling technologies and locally available metal products. A techno- economic evaluation has been carried out to determine the viability of the project idea.

### **2.2 Market and Marketing Aspect**

The market survey carried out reveals that he demand for QUARRY products raising rapidly.

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

### **2.3 Process and Technology**

There are various methods for processing and refining QUARRY. The most widely used method is the basic process. The method for crushing and smelting is of two type's .This includes the converted and the heath methods. The electric methods fall under the heath method and employ electricity as the energy for melting the inputs.

Two methods are used, namely the arc furnace and induction furnace. The former uses electrodes for current circulation while the latter used frequency. The proposed project will employ the induction method, a method which is more economical for high quality steel.

The process involved sorting out the crucible of the furnace, heating and melting it and finally pouring the liquid steel into moulds where they solidify. Thereafter the ingots are reheated to even internal temperatures and then hot- rolled .The requisite machinery for the production include a 4 tone charge induction furnace, a reheating furnace and steel re- rolling induction accessories such as pouring and moulding equipment.

### **2.4 Production Inputs**

The most critical inputs in to the plant are crushers, 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 recycled. Other production inputs include fuel oil, alloying elements, graphite powder and limestone.

## **2.5 Location**

The plant will be located at Tanzania.

## **2.6 Manpower Requirements**

The plant Management will comprise 3 people out of a total workforce of 142 people. There will be 81 operators, 4 expatriates and the rest in direct workforce. The plant will operate on a 3- 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).

## **2.7 Implementation**

The Major activities include registration and approval by the Tanzania Investment Centre and mobilization of funds from sponsors and banking institutions. Civil works design, tendering and construction will be carried out immediately after project is approved and would take about six months.

Machinery will be ordered 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.

## 2.8 Project Economics

### 2.8.1 Capital Investment Requirements

DESCRIPTION	TOTAL
Land and Building	900,000
Plant & Machinery	1,200,000
Furniture & Fitting	90,000
Vehicle	400,000
Pre- Operational Expenses	40,000
Working Capital	300,000
<b>TOTAL INVESTMENT</b>	<b>2,030,000</b>

### 2.8.2 Financing Scheme

i) Fixed Assets and Pre- Operational Costs

US\$

Equity 2,030,000

Total 2,030,000

## 2.9 Recommendations

The study shows that steel & QUARRY 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 QUARRY processing plant is going to produce for sale is various QUARRY and other related products.

### 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.

QUARRY also is one of the basic elements. In its nearly pure state, QUARRY is known for its high thermal conductivity. It is commonly used to produce a wide variety of products. QUARRY is also used as a pigment and preservative for paper, paints, textiles and wood. It is combined with zinc to produce brass and with tin to produce bronze.

There is high demand for steel & QUARRY products as raw materials for manufacture of industrial products and machinery parts. The demand for these products as raw material for the manufacture of industrial products and machinery parts, 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 steel bars as 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 metal and QUARRY products. The quantity has been declining over the years. The declining trend is as a result of increasing number of steel companies being opened in the country.

#### **Distribution Channels**

Steel & QUARRY products are heavy and bulky products. Hence they can be easily distributed to find consumers either directly (one level channel)

to final consumers or by using only one intermediary who will resale to final consumers ( two level channel)

### **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.

#### **3.4.1 Raw Materials**

Pure QUARRY is rarely found in nature, but is usually combined with other chemicals in the form of QUARRY stones. There are about 15 QUARRY ores mined commercially in 40 countries around the world. The most common are known as sulfide ores in which the QUARRY is chemically bonded with sulfur. Others are known as oxide ores, carbonate areas or mixed ores depending on the chemicals present .Many QUARRY ores also contain significant quantities of commercially useless material ..The most common sulfide ore chalcopryite ,  $Cu, S$ , is another sulfide ore, Cuprite or red QUARRY ore,  $Cu, O$ , is an oxide are Malachite or green QUARRY ore ,  $Cu(OH)_2 CUCO_3$  , is an important carbonate ore , as is azurite or blue QUARRY carbonate,  $Cu (OH), 2CUCO_3$ . Other ores include tennantite boronite , chrysocolla, and atacamite .In addition to the ores themselves, several other chemicals are often used to process and refine QUARRY. These include sulfuric acid, oxygen , iron, silica and carious organic compounds , depending on the process used.

#### **4.3.2 THE MANUFACTURING PROCESS**

##### **Process**

The process of extracting QUARRY from QUARRY ore varies according to the type of ore and the desired purity of the final product .Each process consists of several steps in which unwanted

materials are physically or chemically removed, and the concentration of QUARRY is progressively increased. Some of these steps are conducted at the mine site itself, while others may be conducted at separate facilities

Here are the steps used to process the sulfide ores commonly found in the western United States.

**(a) Mining**

Most sulphide ores are taken from huge open pit mines by drilling and blasting with explosives. In this type of mining, the material located above the ore, called the overburden, is first removed to expose the buried ore deposit. This produces an open pit that may grow to be a mile or more across. A road to allow access for equipment spirals down the interior slopes of the pit.

1) The exposed ore is scooped up by large power shovels capable of loading 500- 900 cubic feet (15-25 cubic meters) in a single bite. The ore is loaded into giant dump trucks, called haul trucks, and is transported up and out of the pit.

1) The QUARRY concentrate is fed into a furnace along with a silica material called a flux. Most QUARRY smelters utilize oxygen Enriched air is forced into the furnace to combust with fuel oil. The QUARRY concentrate and flux melt, and collect in the bottom of the furnace. Much of the iron in the concentrate chemically combines with the flux to form a slag, which in the concentrate combines with the oxygen to form sulphur dioxide which is exhausted from the furnace as a gas and is further treated in an acid plant to produce sulphuric acid. The remaining molten mixture in the bottom of the furnace is called the matte. It is a mixture of QUARRY sulphide and iron sulphides and contains about 60% QUARRY by weight.

2) The molten matter is drawn from the furnace and poured into a second furnace called a converter. Additional silica flux is added and oxygen is blown through the molten material. The chemical

reactions in the converter are similar to those in the flash furnace. The silica flux reacts with the remaining sulphur to form sulphur dioxide. The slag may be fed back into the flash furnace to act as a flux, and the sulphur dioxide is processed through the acid plant. After the slag is removed, a final injection of oxygen removes all but a trace of sulphur. The resulting molten material is called the blister and contains about 99% QUARRY by weight.

Because electrical applications require a very low level of impurities, QUARRY is one of the few common metals that are refined to almost 100% purity. To ensure this purity, samples are analyzed at various steps to determine whether any adjustment to the process is required.

#### 4.3.2 PRODUCTS/ WASTE

The recovery of sulfuric acid from the QUARRY smelting process only provides a profitable byproduct, but also significantly reduces the air pollution caused by the furnace exhaust. Gold, silver and other precious metals are also important byproducts. Waste products include the overburden from the mining operation, the tailing from the concentrating operation, and the slag from the smelting operation. This waste may contain significant concentrations of arsenic, lead, and other chemicals, which pose a potential health hazard to the surrounding area.

#### The Future

Demand for QUARRY is expected to remain high, especially in the electrical and electronics industries. The current trends in QUARRY processing are towards methods and equipment that use less energy and produce less air pollution and solid waste.

One encouraging trend is the increased use of recycled QUARRY. Currently over half the QUARRY being produced in the world comes from QUARRY machining operations, such as screw forming and

45% comes from the recovery of used QUARRY products, such as electrical wire.

#### **4.4 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.

#### **4.5 Environment Protection**

During the process of melting steel scrap there will be the emission of dust and gaseous fumes. Fumes especially are toxic and of complex composition. The most common are sulphur and nitrogen oxides (SO<sub>x</sub>, NO<sub>x</sub>) 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 reinforced concrete slab in site is ideal for both the crushing facilities. The scrap and finished products would both be stored in the open

## **7.0 MANPOWER AND ORGANISATION**

The proposed QUARRY 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.

### **7.1 Production 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 142 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 QUARRY 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:

<b>DESCRIPTION</b>	<b>Total</b>
Land and Building	900,000
Plant & Machinery	1,200,000
Furniture & Fitting	90,000
Vehicle	400,000
Pre- Operational Expenses	40,000
Working Capital	300,000
<b>TOTAL INVESTMENT</b>	<b>2,030,000</b>

### **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 steel mill project works Out at about US\$0,20 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 QUARRY mill project expects to earn its income through the sale of reinforcement QUARRY 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. GOLDEN STARINTERNATIONAL MINERAL HOLDING LIMITED**

**INVESTMENT COST**

<b>DESCRIPTION</b>	<b>TOTAL</b>
Land and Building	900,000
Plant & Machinery	1,200,000
Furniture & Fitting	90,000
Vehicle	400,000
Pre- Operational Expenses	40,000
Working Capital	300,000
<b>TOTAL INVESTMENT</b>	<b>2,030,000</b>

**MS. GOLDEN STARINTERNATIONAL MINERAL HOLDING LIMITED**

**PROJECT FINANCING**

**US\$**

<b>DESCRIPTION</b>	<b>FOREIGN</b>	<b>TOTAL</b>
Equity	2,030,000	2,030,000
<b>TOTAL INVESTMENT</b>	<b>2,030,000</b>	<b>2,030,000</b>

**MS. NAHDI CRUSHER COMPANY LIMITED**

**DEPRECIATION SCHEDULE**

	Rate	1	2	3	4	5	6	7	8	10-Sep
Land & Building	4%	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000
Plant & Machinery	12.50%	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Furniture & Fitting	12.50%	11,250	11,250	11,250	11,250	11,250	11,250	11,250	11,250	11,250
Vehicles	25%	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Pre Operational Expenses	20%	8,000	8,000	8,000	8,000	8,000	8,000	-	-	-
<b>TOTAL</b>		<b>405,250</b>	<b>405,250</b>	<b>405,250</b>	<b>405,250</b>	<b>405,250</b>	<b>405,250</b>	<b>397,250</b>	<b>397,250</b>	<b>397,250</b>

**MS. NAHDI CRUSHER COMPANY LIMITED**

**PROFIT & LOSS FORECAST**

	1	2	3	4	5	6	7	8	9
	60%	80%	90%						
PNOVER	979000	1,305,600	1632000	1632000	1632000	1632000	1632000	1632000	1632000
Sale of Steel & QUARRY Products									
	979000	1,305,600	1632000	1632000	1632000	1632000	1632000	1632000	1632000
RECT COSTS	242000	322000	403000	403000	403000	403000	403000	403000	403000
Total Direct Cost	242000	322000	363000	403000	403000	403000	403000	403000	403000
LOSS PROFIT	737000	939600	1229000	1229000	1229000	1229000	1229000	1229000	1229000
OTHER COSTS	200750	200750	200750	200750	200750	200750	196750	196750	200750
Depreciation									
Profit before tax	536250	738850	1,028,250	1,028,250	1,028,250	1,028,250	1,032,250	1,032,250	1,032,250
ERATING PROFIT	536250	738850	1,028,250	1,028,250	1,028,250	1,028,250	1,032,250	1,032,250	1,032,250
Taxation 30%	160875	221655	308475	308475	308475	308475	309675	309675	309675
GROSS PROFIT	375375	517195	719775	719775	719775	719775	722575	722575	722575
MULATIVE	375375	892570	1,612,345	2,332,120	3,051,895	3,771,670	4,494,245	5,939,395	6,661,970

**MS. NAHDI CRUSHER COMPANY LIMITED**

**PROJECTED CASH FLOW**

	0	1	2	3	4	5	6	7	8
Source									
Profit before interest and Depreciation		737000	939600	1229000	1229000	1229000	1229000	1229000	1229000
Equity	2,030,000								
Total Sources	2,030,000	737000	939600	1229000	1229000	1229000	1229000	1229000	1229000
Duplications Capital Expenditure	2,030,000								
Tax		536250	738850	1,028,250	1,028,250	1,028,250	1,028,250	1,032,250	1,032,250
Sub Total	2,030,000	536250	738850	1,028,250	1,028,250	1,028,250	1,028,250	1,032,250	1,032,250
Capita Duplications	2,030,000	536250	738850	1,028,250	1,028,250	1,028,250	1,028,250	1,032,250	1,032,250
Net working capital		200750	200750	200,750	200,750	200,750	200,750	196,750	196,750
Acumulated Cash		200758	401500	602,250	803,000	1,003,750	1,204,500	1,401,250	1,598,000
									1,794,750