



**A TECHNICAL REPORT ON STUDENT INDUSTRIAL  
WORK EXPERIENCE SCHEME  
(SIWES)**

**HELD AT**

**IYA-OKUN SOLID MINERALS AND PROCESSING, ARAROMI LOCAL  
GOVERNMENT, ILORIN KWARA STATE**

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## **DEDICATION**

This work is dedicated to God and to all who has made a positive contribution to my life; spiritually, morally, academically, financially, emotionally and otherwise.

## **ACKNOWLEDGEMENT**

My appreciation goes to God Almighty for His grace and guidance throughout my industrial training program. I also appreciate all the staff at IYA-OKUN SOLID MINERALS AND PROCESSING, ARAROMI LOCAL GOVERNMENT, ILORIN, KWARA STATE may God shower his blessings on you all. Also special thanks to the staff in Geology department. My thanks also goes to my lecturer's and my fellow students of this great citadel of learning. Lastly I thank my family for their support. God bless us all.

## **REPORT OVERVIEW**

Through the course of my SIWES program, I have come to learn the various roles a Geologist play in the betterment of our environment.

The primary objective of this program is to provide an avenue for students in higher institutions acquire skills and experience in their course of study, and I hope the information on the pages of this report will enlighten us on the wide range of things I learnt during the course of my training.

It is my hope that this report will provide a broad overview of the importance of the SIWES program, as well as the challenges the intern students' face during the program

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## **CHAPTER ONE**

### **1.0 INTRODUCTION**

This technical report is a concise document of my experience during my industrial training work experience scheme at IYA-OKUN SOLID MINERALS AND PROCESSING, ARAROMI LOCAL GOVERNMENT, ILORIN KWARA STATE. The program commenced on April and ended in September, in partial fulfillment of the award of Bachelor of Science (B.Sc.) in Applied Geoscience.

### **1.1 HISTORICAL DEVELOPMENT OF SIWES**

The students work experience scheme (SIWES) was established by the industrial training fund (ITF) in 1971, in a bid to boost indigenous capacity for the nation's industrial need. The fund was initiated in 1973.

SIWES therefore, is a skill training program designed to expose and prepare students of universities, polytechnics and college of education to real life work situation.

### **1.2 AIMS AND OBJECTIVES OF SIWES**

1. To expose students to work methods and techniques in handling equipment that may not be available in some educational institutions.
2. To provide students with an opportunity to apply their theoretical knowledge in real work Situation thereby bridging the gap between theories and practical.
3. To enhance and strengthen employers involvement in the education process.
4. To provide avenue for students in higher institutions to acquire industrial skills and experience in their course while in school.

## CHAPTER TWO

### 2.0 DESCRIPTION OF THE ESTABLISHMENT

IYA-OKUN SOLID MINERALS AND PROCESSING is a company that as both Quarry and a Marble Milling Factory. Quarry is a place where all the rocks are being blasted and broken into pieces through the help of a drilling machine and an explosives before being transported to the marble milling factory. The Quarry is located at IDOFIAN in Kwara State while the Marble Milling Factory is where the marbles are grinded into calcium carbonate through the help of several milling machine such as jaw crusher, bucket elevator blower etc., the factory is located at Araromi local government in Ilorin Kwara State.

### 2.1 LOCATION AND BRIEF HISTORY OF THE ESTABLISHMENT

IYA-OKUN SOLID MINERALS AND PROCESSING is located at ARAROMI LOCAL GOVERNMENT, OPPOSITE ARAROMI AND OLORUNDA NURSERY ND PRIMARY SCHOOL, ILORIN, KWARA STATE. IYA-OKUN was once called INTERNATIONAL MILLING COMPANY not until 2016 that the new chairman Captain Raji bought it from the previous owner and then the company started functioning again.

### 2.2 VARIOUS DEPARTMENT AND THEIR FUNCTIONS

There are various department in the organization, they are;

- Security post
  - Milling Factory
  - Administration
- i. **SECURITY POST:** They are responsible for guiding the production both day and night and to record every marbles that are being brought into the factory and when calcium carbonate is taken out of the factory.
  - ii. **MILLING FACTORY:** This is where the production of calcium carbonate takes places through the help of milling machine such as jaw crusher, bucket elevator, blower, cyclone collector etc.
  - iii. **ADMINISTRATION:** This part of the company is divided into three group. They are;

**Stall:** The stall is responsible for everything that happens at the factory and made sure the right amount of calcium carbonate are produced and then give record of the production to the Accountant.

**Accountant:** The accountant is responsible for the payment of daily wages production and also make sure right amount of calcium carbonate are produced by the factory.

**Manager:** The manager is the head of the admin and his responsible for every activities that are carried out at the company and also responsible for the salary of the workers.



## **CHAPTER THREE**

### **3.0 ACTIVITIES CARRIED OUT AT THE ESTABLISHMENT**

I was assigned to the jaw crusher and milling unit and the processing unit in the administration office and from time to time we were taken to the site for drilling and blasting.

### **3.1 DRILLING OF MARBLE**

Drilling is the process of making or creating a round hole on a rock body. Since drilling is a critical part of the quarry production process, the best planning, figuring, calculations and explosives are worthless if the area to be blasted is not drilled properly and responsibly. Basically, if the drilling goes bad and is off pattern, the entire blasting operation will fail. Drilling in any surface mining or quarrying environment invariably follows a pattern that has been designed to take into account natural parameters of the rock including hardness and strength, the presence of planes of weakness such as faults or fracturing, and the degree of fragmentation needed in the blasted product. The drill pattern will be designed according to hole spacing (along the bench) and burden (distance from the front free face) for a given hole diameter, and thus stipulate the amount of explosives needed for each charged hole.

Generally, a less powerful drill rig that produces small diameter holes will have to drill on a closer pattern than a machine driving a larger-diameter bit. Drilling is normally done using heavy-duty Down-The-Hole (DTH) and top hammer drill rigs.

If the drill rig operator is instructed to remain on a specific pattern, he must do so and not alter it unless authorized. The operator must also keep the blaster-in-charge informed of any changes in the rock while drilled, or indeed any mistakes, so that the blaster can make any necessary adjustments to the charge. The drill rig operator should tell the blaster about fractures or other abnormalities in the rock, changes in the strata and sand or mud seams in the rock, so that explosives can be loaded in the hole with these factors taken into consideration. The operator must also inform the blaster-in-charge of any 'short' holes – holes that are not drilled to the expected or planned depth. In other words, the driller is the blaster's eyes on the ground and, as such, can make or break a blasting operation

### **TYPES OF DRILLING MACHINE**

- **Pneumatic Crawler Drilling Machine:** It is powered by compressed air with the help of a compressor. It discharges the dust on the surface and it's cheaper and affordable.



Pneumatic driller

- Hydraulic Drilling Machine: It is controlled by the hydraulic but it's also contains a compressor which is used to blow out the cutting while drilling. It has a dust collector and it's very expensive.

### **TYPES OF DRILLING EFFICIENCY**

- Rotary Drilling: It is the type of drilling that rotates only to make a hole.
- Percussive Drilling: It is a type of drilling that only hammering or hitting occur.
- Rotary Percussive Drilling: This is the combination of both the rotary and the percussive types of drilling i.e. it's rotates and it's also hammers the rock body.

### **3.2 BLASTING OF MARBLE:**

Blasting is the process of breaking a rock body into a small particles using an explosives. Rock blasting is the process of drilling holes in a rock mass at depths, and spacing to allow an explosive to fracture the rock. In this process, the rock must fracture enough to be broken down to the size intended.

***The Blasting accessories include;***

High explosives, Ammonium Nitrate, Detonating cord, Electric detonator, Connecting wire, Exploder and Non electric detonator.



**PICTURE SHOWING HOW THE DRILLED HOLE IS CHARGED WITH AN EXPLOSIVES**

### **BLASTING OPERATIONS**

- 1-Setting up a drill
- 2-Drilling blast holes
- 3-Placing the explosives in the blast holes
- 4-Detonating the explosives
- 5-Getting rid of the fragmented material
- 6-Secondary blasting if there is overburden

### **KEY FACTORS AFFECTING BLASTING DESIGN**

- 1-Explosives and energy factors
- 2-Types and quantity of explosives used
- 3-Diameter of blast holes
- 4-Orientation of the ore body

5-Dynamic rock or ore properties.

### **3.3. MARBLE**

Marble is a metamorphic rock composed of recrystallized carbonate minerals, most commonly calcite or dolomite. Marble is refers to metamorphosed limestone, it is commonly used for sculpture and as a building material.

At our quarries, dolomites, limestone's undergone geothermal metamorphism that lead to their subjection for the great heat and pressure over a period of geological year (Millions of years).

These geological changes in association with pore field pressure, solvent and variation in chemical composition bring about concentration of marble.

Pure calcium carbonate can be produced from marble, or it can be prepared by passing carbon dioxide into a solution of carbon hydroxide.

#### **FORMATION OF MARBLE**

1. Marble is formed when limestone is exposed to high temperatures and pressures.
2. During metamorphism the calcite limestone recrystallizes, forming the interlocking calcite crystals that make up the marble.
3. Marbles formed from pure calcite lime stones are white, with a sugary texture, and they effervesce when tested with dilute (~10%) hydrochloric acid.
4. Impurities in the limestone may lead to the formation of new minerals, giving the marble a variety of colors.



Marble stones persevered at the processing site



### **MARBLE MILLING:**

It is the process of grinding marbles and turning it to a calcium carbonate powder through the help of a milling machine. The marbles are carried and then sent to the jaw crusher to be made into pebbles and then carried by the bucket elevator to be stored by the storage hopper which

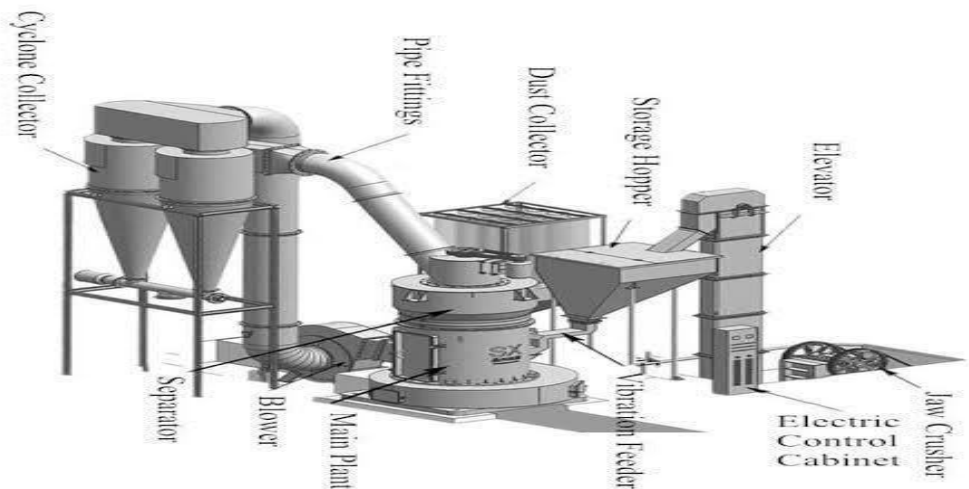
then release the pebbles to the main plant and then separated by the separator and then blower helps to blow the dust away from the product and then pass it to the cyclone collector and the dust then move to the dust collector by a pipe fittings.

### 3.4 STAGES OF MARBLE MILLING

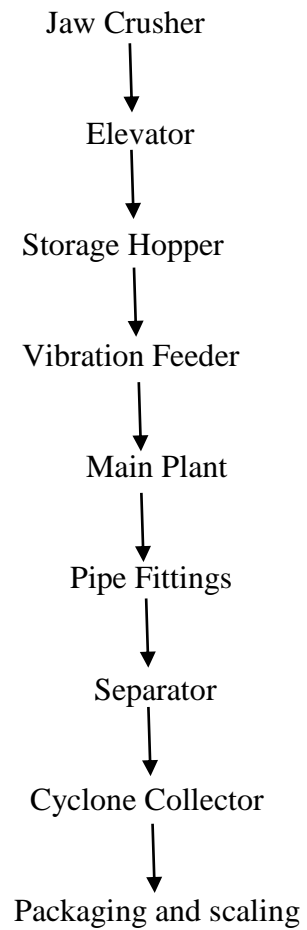
*There are four stages of marble milling and they include;*

- 1st stage: The crushed large pieces of marbles are transported by special vehicles to the raw materials warehouse, and then the materials are sent to the jaw crusher for crushing and crushed to be smaller than they feed size of the mill.
- 2nd stage: The marble after the feed is crushed by the crusher is lifted by the elevator to the storage hopper and the storage hopper is discharge and then fed to the host by the feeder evenly.
- 3rd stage: The qualified products in the grinding and grinding process are screened by the screening system and then enter the collector through the pipeline.
- After being collected, they are discharged through the powder pipe to become the finished product, and the unqualified products fall into the main machine and regrind.
- 4th stage: The purified airflow of the finished product flow into the blower through the residual air pipe above the dust collector. The air path is circular, except for the positive pressure from the blower to the grinding chamber, the air flow in the other pipe flow under negative pressure and the indoor sanitary conditions are good.

## DIAGRAM OF A JAW CRUSHER PLANT



## PRODUCTION LINE OF MARBLE TO FINISHED CALCIUM CARBONATE



### **3.5 USES OF MARBLE**

- It is used for the production of toothpaste
- It is used for building and pharmaceutical purpose
- It is used for plant and terrazzo flooring production
- It is used for the production of plastic such as chair, tables.
- It is used for the production of fertilizer
- It is used for the production of asbestos



## CHAPTER FOUR

### 4.0 EQUIPMENT USED AND THEIR USES

**WHEEL BARROW:** This is used for the easy movement of the marbles to the jaw crusher.



**JAW CRUSHER:** A jaw crusher reduces large rocks by compressing it between a fixed surface and a movable surface. The compression is created by forcing the rock against the stationary plate. The opening at the bottom of the jaw plate is the crusher undersize gap.

The size of marble that can enter the jaw crusher is 9cm (90 mm) for the milling machine jaw crusher, while for the trowel jaw crusher, the size of 6cm (60mm) can enter.



**BUCKET ELEVATOR:** Bucket elevator carries the pebbles that are crushed by the jaw crusher and delivers it to the storage hopper.



**HAND GLOVES:** It is used for the protection of hands.



**STORAGE HOPPER:** It is responsible for the storage of the pebbles before they enter through the funnel to the main plant.



**BLOWER:** It helps to separate the dust from the original calcium carbonate



**CYCLONE COLLECTOR:** It is responsible for the receiving of the product using the sack bag.



**SAG BACK:** This is used to collect the product directly from the cyclone collector.



**JAIN WEIGN SCALE:** It is used to scale the product taken using the sack into the desired kilogram e.g. 50kg.





**BAG SEWING MACHINE:** This is used in sewing the sack bag that is filled with the calcium carbonate.



**CONTROL BOX:** This is also called a panel and it is used to control the milling machine. It's as both on and off button of each machine which uses an electric motor.



**PICTURES SHOWING THE LOADING OF CALCIUM CARBONATE**







## **CHAPTER FIVE**

### **5.1 SUMMARY AND RECOMMENDATIONS**

Mining as the bedrock of modern civilization Government should be actively involved in mining industry. If mining of iron could enhance the economy of china and make it to compete with the five best economy in the world, this tells us how much mining activities can boost and enhance economy of our contemporary Nigeria. So a valuable industrial mineral like marble has what it takes to influence the economy of this nation of ours. I hereby recommended as follows;

- 1- Government should revive the mining sector in Nigeria and equip tertiary institution of Nigeria so as to be able to train students in mining and related discipline.
- 2- Government should try and make life easier and more comfortable for local settlers and miners in these communities.
- 3- Government should improve mine safety & health.

### **CONCLUSION**

During my Program I was exposed to marble production with the aid of adding value to marble. I also learnt some operations outside engineering discipline due to the fact that engineering work in a multidisciplinary environment and acquire knowledge and skill through work experience that may allow them to practice in associated areas of sciences, engineering, sales, marketing or management. I enjoyed all the beautiful moments that I spent at IYA-OKUN SOLID MINERALS AND PROCESSING under the supervision of Mr. Ibiwoye. Which makes me enjoy almost all the areas and aspect of mining activities.

### **PROBLEM ENCOUNTERED**

The challenges I encountered during my training are as follows;

- 1.High cost of transportation.
2. Very heavy traffic.
3. No payment.
4. Bad attitude of clients in some cases.
5. Short duration of program
6. Lack of placement opportunities as a result of which some companies already have IT student they want to take.