



**A TECHNICAL REPORT ON STUDENT INDUSTRIAL WORK
EXPERIENCE SCHEME**

(SIWES)

HELD AT

**MOUNT OLIVE QUARRY NIG. LTD., K14
EIYEKORINBALLAH RD, ESEKE**

WRITTEN BY

POPOOLA DEBORAH OPEYEMI

ND/23/MPE/PT/0029

SUBMITTED TO

**DEPARTMENT OF MINERALS AND PETROLEUM RESOURCES
ENGINEERING, INSTITUTE OF TECHNOLOGY (IOT), KWARA STATE
POLYTECHNIC, P.M.B 1375, ILORIN, KWARA STATE, NIGERIA**

**IN PARTIAL FULFILLMENT FOR THE AWARD OF NATIONAL
DIPLOMA (ND) IN MINERALS AND PETROLEUM RESOURCES
ENGINEERING**

HELD BETWEEN AUGUST – DECEMBER, 2024

DEDICATION

This report is dedicated to Almighty God who is the beginning and the end of my existence, the reason I breathe, but for his grace and mercies I would not be writing this report this day. Also to my lovely and wonderful parents **Mr. and Mrs. Popoola** for your labor of love and support through these years, to my brothers, sisters and friends a big thank you for your support.

ACKNOWLEDGEMENTS

I would like to express my gratitude to God for his grace throughout my industrial training and to members of Mount Olive Quarry Nig. Ltd., as well as my industry-based supervisor for their kind cooperation and encouragement which helped me in completion of this SIWES. Special gratitude to the Imam family for their support in my educational pursuit.

ABSTRACT

This report is a summary of experienced gained during my student industrial work experience scheme (SIWES) training program at **MOUNT OLIVE QUARRY NIG. LTD., K14 EIYEKORINBALLAH RD, ESEKE.**

It is carefully arranged in chapters, written according to the aspect of mining activities professional practical experienced. The knowledge I acquired was based on the exploitation of granite.

TABLE OF CONTENTS

Tittles Page	i
Dedication	ii
Acknowledgement	iii
Abstract	iv
Tables of Contents	v
CHAPTER ONE	
1.1 Introduction	1
1.2 Aims and Objectives	1
1.3 Organization Flow Chart	3
CHAPTER TWO	
2.0 About Mount Olive Quarry Nig. Ltd.	4
2.1 Drilling and Blasting	7
2.1.1 Drilling	7
2.1.2 Types of Drilling	8
2.2 Explosives	11
2.3 Blasting	11
CHAPTER THREE	
3.1 Quarry Operations	13
3.2 Equipment Used in Quarry Operations	14
3.3 Crushing	16
3.4 Safety	18
CHAPTER FOUR	
4.1 Recommendations for Future Development	19
4.2 Conclusion	20

CHAPTER ONE

1.1 INTRODUCTION

Training is a key factor in enhancing the efficiency and enterprise in a work force. The Student Industrial Work Experience Scheme (SIWES) is a skill development program initiated by the Industrial Training Fund (ITF) in 1973 to bridge the gap between theory and practical among students of Engineering and Technology in institution of higher learning in Nigeria. It provides for on-the-job practical experience for students as they are exposed to work methods and techniques in handling equipment and machinery that may not be available in their institutions.

At inception in 1974, the scheme started with 784 students from 11 institutions with 104 eligible courses. By 2008, 210, 310 students from 219 institutions participated in the scheme with over 112 eligible courses. However, the rapid growth and expansion of SIWES, has occur against the backdrop of successive economic crisis which have affected the smooth operation and administration of the scheme.

1.2 AIMS AND OBJECTIVES

Aims

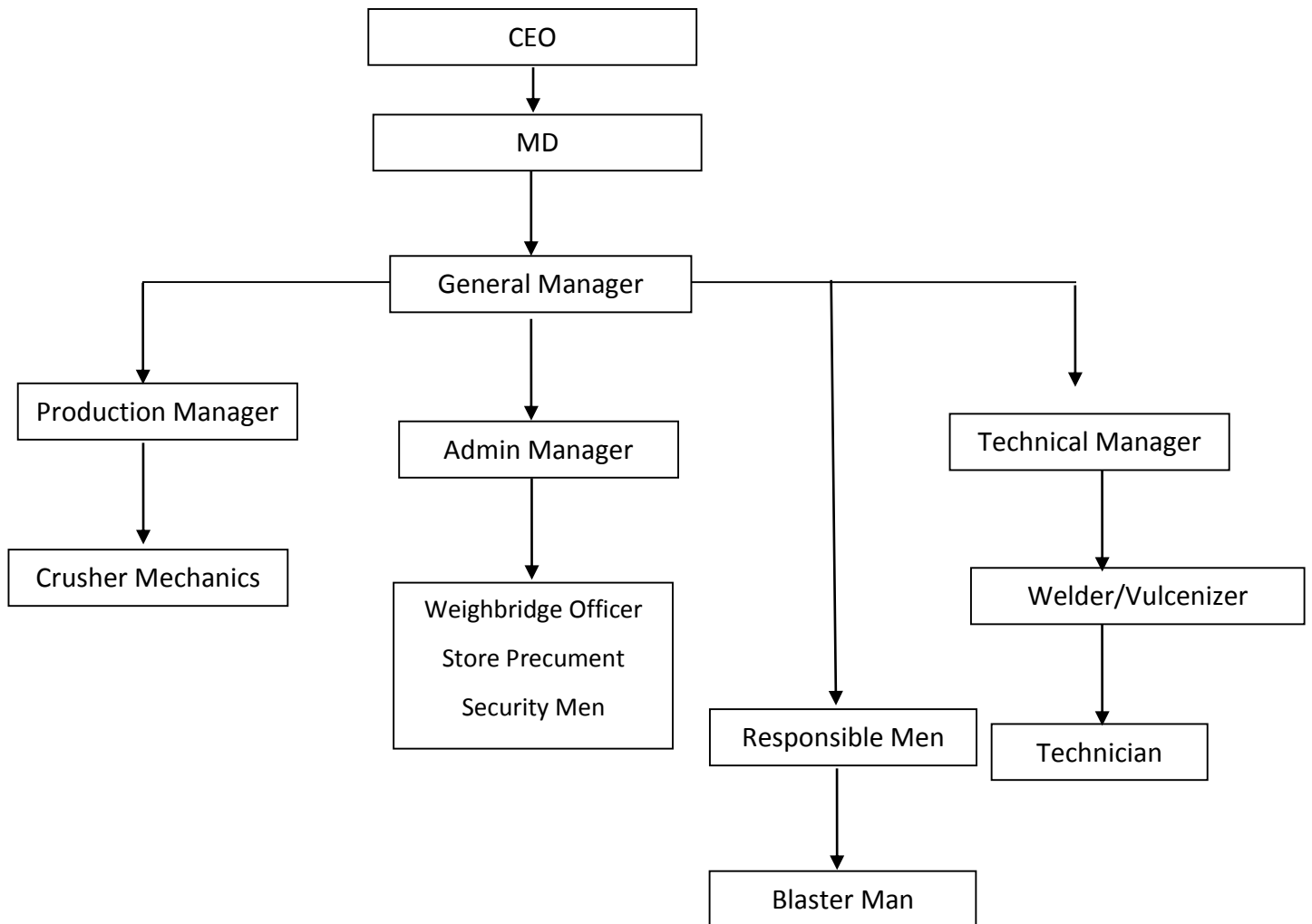
- i. To develop the intellectual skills of the students as we are often allowed to take decision and provide appropriate solution to problems we may encounter.

- ii. To afford student the opportunity to interact with a large spectrum of people in the industrial set up; and
- iii. To show how relevant the importance of the course is to the students.

Objectives

- i. It provides an avenue for students in the Nigerian institutions to acquire industrial skills and experience on their course of study
- ii. It prepares students for the work situation they are likely to face after graduation and;
- iii. It expose students to an opportunity to apply their theoretical knowledge in real work situation.

1.3 ORGANIZATION FLOW CHART



CHAPTER TWO

2.0 ABOUT MOUNT OLIVE QUARRY NIG. LTD., K14 EIYEKORIN, BALLAH RD, ESEKE

Mount Olive Quarry Nigeria Limited, located in Eiyekorin, Ilorin, Kwara State, is a prominent mining company specializing in the extraction and processing of granite and other solid minerals for the construction and infrastructure industries. Established with a vision to meet the growing demand for quality aggregates in Nigeria's construction sector, Mount Olive Quarry has grown into a key player in the Nigerian quarrying industry.

Founding and Early Development

Mount Olive Quarry Nigeria Limited was established in the early 2000s with the goal of providing high-quality crushed granite and other construction materials to meet the expanding needs of the construction and road-building industries in Nigeria. The company's founders, recognizing the potential of granite deposits in the Ilorin region, chose Eiyekorin as the location for the quarry due to its rich geological resources.

The decision to start operations in this area was influenced by the availability of abundant granite reserves and its strategic location, which provides easy access to both local and regional markets. Over time, the quarry has expanded its operations

to cater to the growing demand for building materials, particularly for large-scale construction projects, roads, and infrastructure development.

Growth and Expansion

In the years following its establishment, Mount Olive Quarry Nigeria Limited experienced significant growth in both production capacity and market reach. The company initially focused on providing crushed granite and aggregates for local construction projects within Ilorin and the surrounding areas. As demand grew, the quarry expanded its production facilities to include a range of products, including granite chippings, gravel, sand, and stone dust, allowing it to serve a broader market. With the Nigerian construction industry experiencing a boom, particularly with the rise of infrastructure projects and urbanization, Mount Olive Quarry capitalized on the opportunity to scale up its operations. The company invested in modern equipment, such as crushers, screening plants, and transportation vehicles, to increase production efficiency and meet the demands of large construction projects across Kwara State and neighboring regions.

Innovation and Modernization

As the quarry industry evolved, Mount Olive Quarry Nigeria Limited adopted new mining technologies and practices to enhance operational efficiency and reduce environmental impact. The company invested in automated machinery for crushing, sorting, and packaging, which allowed it to increase output while maintaining

product quality. Additionally, the quarry implemented modern techniques for waste management and environmental sustainability, including dust control, noise reduction, and land rehabilitation programs.

The quarry has also made strides in safety and health management by implementing strict safety protocols, ensuring a safe working environment for its staff and minimizing risks associated with quarrying operations.

Commitment to Quality and Environmental Sustainability

From its inception, Mount Olive Quarry Nigeria Limited has remained committed to producing high-quality aggregates that meet the stringent requirements of the construction and road-building sectors. The quarry's granite products have been widely used in the construction of roads, bridges, housing estates, and commercial buildings across Kwara State and beyond.

At the same time, the company has been proactive in managing its environmental footprint. It has continuously invested in sustainable quarrying practices, such as water conservation, dust suppression, and land restoration, to minimize the environmental impact of its operations. The quarry's commitment to environmental stewardship is further demonstrated by its regular environmental audits and compliance with both local and national regulations.

Current Operations and Future Outlook

Today, Mount Olive Quarry Nigeria Limited is recognized as one of the leading quarries in the region, with a strong reputation for producing high-quality aggregates and providing reliable supply to its clients. The company is well-positioned to continue its growth in the face of Nigeria's ongoing infrastructure development. As the demand for construction materials continues to rise, particularly in urban centers and major transportation networks, Mount Olive Quarry aims to expand its operations further and explore new markets.

The future of the company looks promising, with plans to increase production capacity, introduce more sustainable practices, and further modernize its equipment and technology. With a focus on innovation, safety, and environmental responsibility, Mount Olive Quarry Nigeria Limited is set to remain a key player in the Nigerian quarrying industry for years to come.

2.1 DRILLING AND BLASTING

2.1.1 Drilling

Drilling is the process of making a hole into a hard surface where the length of the hole is very large compared to the diameter. In the context of mining engineering drilling refers to making holes into a rock mass. Surface mining requires drilling for different purposes that include;

1. Production drilling i.e for making holes for placement of explosives for blasting. The objective of drilling and blasting is to prepare well – fragmented loose rock amenable to excavation with better productivity from the excavation machinery. The holes drilled for this purpose are defined as blast hole.
2. Exploration drilling for sample collections to estimate the quality and quantity of a mineral reserve. The samples are collected as core and the drilling for such purposes are referred as Core drilling. As diamond bits are used for such drilling, core drilling is often called diamond drilling.
3. Technical drilling during development of a mine for drainage slope stability and foundation testing purposes.

There are several equipment needed in proper fragmentation of rocks, they are; the drilling rig, drilling bit, air compressor, jaw hammer, wagon drill.

2.1.2 TYPES OF DRILLING

Primary Drilling

It involves the use of wagon drill machine in boring hole on parent rock for initial disintegration of the deposit.

Secondary Drilling

It is carried out on boulders which are produced after primary blasting for further breakdown for ease processing in the crushing plant. Drilling is usually done by using jack hammer.

Problems of Drilling

The Problems that may occur during drilling include

- Bit stuck
- Broken bit (tungsten carbide)
- Rods stuck that won't separate
- Rods broken

Other problems associated are;

- Excessive noise
- Excessive dust generation
- Excessive bit wear rate
- Poor penetration rate
- Problem of flushing
- Wall collapse during drilling
- Water in the hole (Pathak, K. (1989))

Safety at Drilling Operations

The hazards and risks are involved in drilling mainly due to the following

- **Noise (hearing):** the drilling operations normally produce higher level of noise. The operation and helper must use personnel protective equipment as prescribed by the manufacturer of the drill or the mine management.
- **Explosive Material:** Drilling is followed by blasting and the drilling personnel must be aware of explosive risks.
- **Burst Hoses:** The machine comprises of hydraulic and pneumatic hose pipes. They must be properly maintained and replaced after prescribed use. Accidental bursting may cause accident.
- **Air and Hose:** The drilling personnel must be aware of the high pressure lines and the risks to work with them.
- **Couplings:** The couplings at drill rods are not supposed to break, however, poor workmanship may lead to improper coupling that get dislodged while operation may create series injury to men or machine.
- **Compressed Air:** All the precautions to work with compressed
- **Dust:** Dusts can cause lung disease as well as inconvenience in working. Dust collector facilities in the drill must be well maintained.
- **Loose Clothing:** No person with loose garment should be allowed to work with the drill.

2.2 EXPLOSIVES

Explosives are said to be chemical or combination of chemical compound of solids or liquid which could be subjected to rapid decomposition under the effect of external forces such as heat, fire etc.

Types of Explosive

A low explosive burns, but a high explosive detonates a very different phenomenon. An initial shock compresses a high-explosive material, heating it and causing chemical decomposition.

Explosives can be grouped into two types which are mentioned below.

Low Explosive

A very good example of this is gun power. Gun power does not expose, but burns rapidly forming a high pressure gas. Another example is fireworks.

High Explosive

This has greater power and less sensitivity than other types of explosives. They are the perfect explosives for blasting and excavating e.g dynamite, Aluminum Nitrate Fuel Oil (ONFO), glycerin etc

2.3 BLASTING

The process by which drilling holes are being charged with explosives to break the rock into different sizes and shapes is called blasting.

Types of Blasting

There are two types of blasting namely; primary and secondary blasting.

Primary Blasting

This is blasting operation in which the original rock formation is dislodged from its natural location.

Secondary Blasting

Blasting conducted to reduce the size of boulders resulting from a primary blast which can then be handled by the loading, hauling and crushing system.

Blasting Accessories

The explosive accessories include:

- i. High Explosive (dynamite)
- ii. Low Explosive
- iii. Detonating Cord
- iv. Detonators

Initiator is a term that is used in the explosive industry to describe any device that may be used to start a detonation or deflagration.

CHAPTER THREE

MACHINES APPLICABLE IN QUARRY

3.1 QUARRY OPERATIONS

A quarry is a place from which dimension stone, rock, construction aggregate, riprap, sand, gravel, or slate has been excavated from the ground. A quarry is distinctly different from an open-pit mine from which minerals are extracted. An example of this difference between quarrying and mining would be that limestone is quarried whereas the mineral lime is mined (Wikipedia, 2013). Quarrying stone is one of the world's oldest professions.

For hard-rock workings, there are four principal stages in the extraction process:

- Soil and overburden removal;
- Primary (and secondary) fragmentation of the rock mass;
- Excavation and loading; and
- Haulage to the processing plant

Each should be considered as a continuation of the other in the process. Changes in proposals for one element may have consequences for the others. Many of the options will be dictated by site circumstances (e.g site layout, topography, strength of the overburden and rock mass, plant selection etc) and as such there may

be little flexibility in accommodating changes. Where practicable however the quarry designer will need to optimize the activities to arrive at an economically and environmentally acceptable solution.

3.2 EQUIPMENT USED IN QUARRY OPERATIONS

Air Compressor

This is a device that converts power (usually from an electric motor, diesel engine or a gasoline engine) into Kinetic energy by compressing and pressurizing air, which on command, can be released in quick burst, it basically powers by the crawler drilling machine, jack hammer and blow up of tyre tubes



WAGON DRILL MACHINE

This is powered by air from the air compressor drilling machine, it possess series of drilling pipes with attached bit for the drilling. It employs rotary – percussive drilling method. It is used for drilling of holes.

DUMP TRUCK

The machine is a four wheeled drive; it consists of a diesel engine, an automatic transmission system, hydraulic system for steering and implements operation. It is used for transportation of overburden and mineral ore.



JACK HAMMER

This is hand held powered by air compressor used in drilling of small holes diameter of several inches required in secondary drilling operations.



EXCAVATOR

An excavator is a construction vehicle used to dig or move large objects. It is made of two parts: a driving base and a powerful boom arm with an attachment designed for digging. It is also used for removing overburdens.

3.3 CRUSHING



Crushing is the process of reducing the size of solid bodies by breaking them with the aid of external forces, as results of which internal adhesional forces joining the separate particles of the solid body are overcome and new surface are exposed.

There are two major types of crushing which are: Primary Crushing and Secondary Crushing.

- **Primary Crusher:** these are heavy-duty machines used to reduce the run-off mine down to a size suitable for transport and for feeding the secondary crushers. These are two main types of primary crushers in metalliferous operated in open circuit, with or without heavy-duty screens. They include; Jaw and gyratory crushers.
- Secondary crusher are cone, roll crushers etc

Crushing is the disintegration of rock while a crusher is a machine used for the disintegration of rocks. Jaw crusher is a primary crusher whose distinctive feature is the two plates which open and close like that of an animal jaw. The jaws are set at an acute angle to each other, and one jaw is pivoted so that it swings relatively to the other fixed jaw.

The important features of the machine are:

- i. since the jaw is pivoted from the top, it moves a minimum distance at the feed entry point and a maximum distance at the discharge (the throw).
- ii. The horizontal displacement of the swing jaw is greater at the bottom of the pitman cycle and diminishes steadily through the rising half of the cycle as the angle between the pitman and back toggle plate become less acute.
- iii. The crushing force is least at the start of the cycle, when the angle between the toggles is most acute, and is strong at the top, when full power is delivered over a reduced travel of the jaw.

Advantages of Jaw Crushers Include

- (a) Light weight
- (b) Compactness
- (c) Low cost
- (d) Simplicity of construction

The Disadvantages are:

- (a) Low Capacity
- (b) Vibration
- (c) High Energy Construction
- (d) Vibration

3.4 SAFETY

Quarry safety affects many people, not just owners but inspectors, foreman, employees, neighbour's, and the client who will purchase the finished product. Accident prevention and health program includes the following.

- i. Providing safety education for employees
- ii. Supervision of employees and equipment; first aid, fire prevention, and sanitation facilities.
- iii. Investigation of accident and health problems.
- iv. Emergency action planning
- v. Inspection of operating units with the aim of correcting unsafe acts or conditions.
- vi. Assuring compliance with company and government health and safety regulations.
- vii. Securing maintaining and using personal protective equipment
- viii. Application of approved prevention and corrective disciplinary procedure

CHAPTER FOUR

RECOMMENDATION AND CONCLUSION

4.1 RECOMMENDATIONS FOR FUTURE DEVELOPMENT

- **Investment in Automation:** The company could benefit from further investment in automated systems for crushing, sorting, and transportation, to improve efficiency and reduce labor costs.
- **Sustainability Initiatives:** Further steps could be taken to enhance the quarry's sustainability, such as exploring alternative energy sources and increasing the use of recycled materials in its operations.
- Since Nigeria is blessed with numerous mineral, over some have not been discovers till this moment, so government should ensure that mining course are accredited in all the polytechnic (both the HND and ND) and university in the country, to make mining course easily available for the student that have interest. Also government should try and cooperate with private miner section by provide to them some equipment which lead to the improvement in their production.
- There should be a good commencement of on the importance mineral available; these will motivate people to apply for mining course, since this will be job opportunity for them.

- The student industrial work experience scheme (SIWES) is a must for all science and technology student to undergo and it must be taken with full seriousness, since it is done once at the national diploma programme.

4.2 CONCLUSION

Mount Olive Quarry Nigeria Limited is a key player in the extraction and processing of granite in Ilorin, Kwara State. With its modern mining practices, robust safety measures, and commitment to environmental sustainability, the quarry is well-positioned to continue its operations while minimizing its impact on the surrounding environment. The company's compliance with national regulations and its focus on quality products make it a reliable partner for the construction and road-building industries in Nigeria.

The Student Industrial Work Experience Scheme (SIWES) is an importance programme that brings about importance programme that brings about improvement to student in the field of work (SIWES), also made student to be self-confidence and to withstand industrial work.