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

HELD AT

MAN HARDI NIGERIA LIMITED

KANGILE AREA, ILORIN KWARA STATE

PRESENTED BY

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SUBMITTED TO

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IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF NATIONAL DIPLOMA (ND) IN MINERALS AND PETROLEUM RESOURCES ENGINEERING DEPARTMENT KWARA STATE, POLYTECHNICS ILORIN, NIGERIA.

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DEDICATION

This SIWES report is dedicated to Almighty **Allah** who made my industrial training a successful one despite the situation so far and also to my wonderful Parent.

ACKNOWLEDGEMENT

First and foremost, I give thanks to almighty God, the creator of the universe for greatest protection and love been given to me as a privilege to start and complete my SIWES programme.

I extend my special thanks to my parent **Mr. & Mrs. ISMAIL** for their morally, spiritually and financially, word of encouragement and prayer given to me, who make my SIWES programme successful.

I express my profound gratitude to my department Lecturers and my SIWES supervisor for the support towards the successful of the time used in SIWES. I also give thanks to my Brothers and Sister in the name of **ISMAIL ABDULQUDUS,** and entire family of **ELERINMOSA** for their advice to me during my SIWES programmed. May almighty Allah bless you all (Amen).

I also appreciate the effort of the entire staff of **MAN HARDI NIGERIA LIMITED** for the tremendous moral assistance throughout the period of my attachment and also my grateful lovely friends HASSAN AHMED and **Others** for their contribution in one way of other. May almighty God bless them all and provide for their needs.

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CHAPTER ONE

1.0 INTRODUCTION

The Student Industrial Work Experience Scheme (SIWES) constitutes a vital component of both Degree and National Diploma programs across all higher institutions in Nigeria. This initiative aims to familiarize students in the fields of science and environmental studies with the real-world challenges they'll encounter in their future careers. While SIWES primarily serves as professional training, it also empowers students to apply theoretical knowledge in practical settings.

1.1 AIMS

The aim of SIWES is to provide students with hands-on experience in their academic fields and equip them for the forthcoming demands of the job m

CHAPTER TWO

2.0 BRIEF HISTORY OF THE ORGANIZATION

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 quang design or will need to optimize the activides to prive anar economically environmentally acceptable solution.

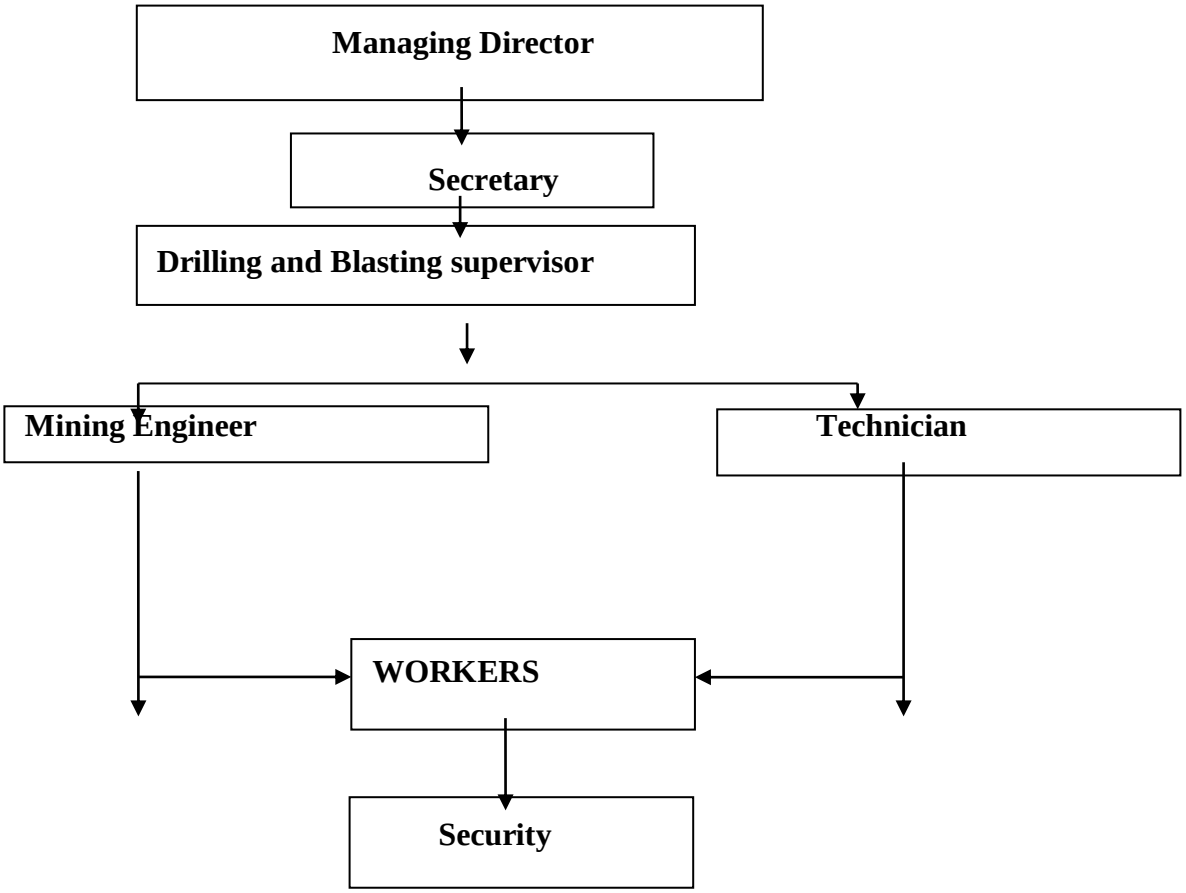
At MAN HARDI NIGERIA LIMITED I specializes in the production and marketing of granite aggregate for construction and other uses. It makes use of conveyor belt as transport system MAN HARDI NIGERIA LIMITED I produce aggregates of four distinctive sizes which are 1", ¼, ½, and stone dust.

Construction materials that make up the material world around us come into this unconscious, "invisible" category, buildings, roads, footpaths and bridges every day. The vast bulk of our built environment is formed from raw materials won from the earth by the extractive

industries. Without the raw materials with which to build houses, hospitals, schools, factories, roads, etc life would certainly be more basic and less comfortable than we presently experience.

Stone quarrying is the multistage process by which rock is extracted from the ground and crushed to produce aggregate, which is then screened into the sizes required for immediate use, or for further processing, such as coating with bitumen to make bituminous macadam (bitmac) or asphalt.

2.1 ORGANIZATION CHART



CHAPTER THREE

3.0 EXPERIENCE DURING STUDY

3.1 QUARRYING

This branch of mining focuses on excavating, exploring, extracting, and processing blasted rocks for various purposes, whether industrial or domestic. Its operational cycle includes stripping overburden, mineral excavation, drilling, blasting, loading, and milling. These processes are carried out at MBS Multi-Venture, a company specializing in excavation, drilling, blasting, processing, and marketing of dolomite marble. Being a mine-based company, the presence of marble aggregate makes it particularly advantageous for commercial industries and an ideal location for industrial training for students.

3.2 QUARRYING OPERATION

These activities are conducted on-site where solid minerals or rocks are dug out and fragmented into chunks and pebbles. The subsequent operations commonly take place in a quarry to optimize its efficiency and efficacy.

3.2.1 LAND CLEARING (SITE PREPARATION)

This is the clearing of land or a quarry site in order to ease the quarry operation of necessary

This involves clearing land or a quarry site to facilitate the necessary quarry operations. It can be accomplished manually using basic tools such as diggers, shovels, headpans, hoes, etc., or mechanically with the use of sophisticated machinery like bulldozers, draglines, etc.

3.3 MINES EQUIPMENT AND MACHINE

The equipment and machinery utilized in mining are crucial for the extraction and excavation of rock materials, often regarded as the core of the production process. While some of these machines serve multiple functions, each one's unique capabilities are indispensable, hence the need for a diverse range. At Man-hardi Nigeria Limited, rock materials are processed using

both basic tools and occasionally rented machinery to streamline daily production activities. These machines include:

1. Air compressor
2. Dumper
3. Trailer
4. Excavator
5. Crusher

Air compressor: This apparatus is an air-generating facility engineered to transform atmospheric air into pressurized air. It comprises a power system, either a diesel-driven engine or an electric motor. It can be either mobile or stationary, with various models available. Its primary applications include powering jackhammers and blowing out dust generated during pre-blasting drilling activities, a process known as flushing.

Fig. 1: Compressor

DUMPER: This is commonly known as a four-wheel drive vehicle, constructed from robust metals and equipped with a diesel engine. It features automatic transmission and a hydraulic system for executing various operations. Additionally, it includes a loading bucket at the rear end, used for transporting lumps from the quarry to the milling plant (hammer mill).

Fig 2: Dumper

TRAILER: This is a non-motorized wheeled vehicle, distinct from caravans or campers, towed behind another vehicle, and utilized for transporting equipment, materials, and finished products from one location to another.

Fig. 3: Trailer

3.4. 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.

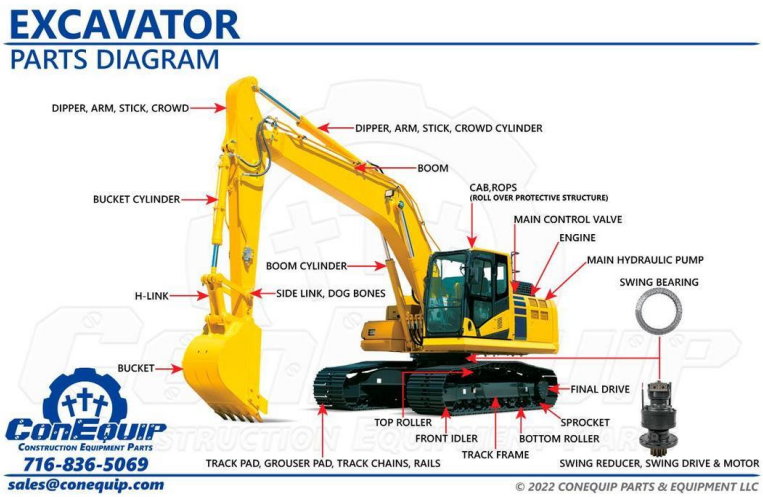


Fig. 4: EXCAVATOR

3.5. JAW CRUSHER

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.

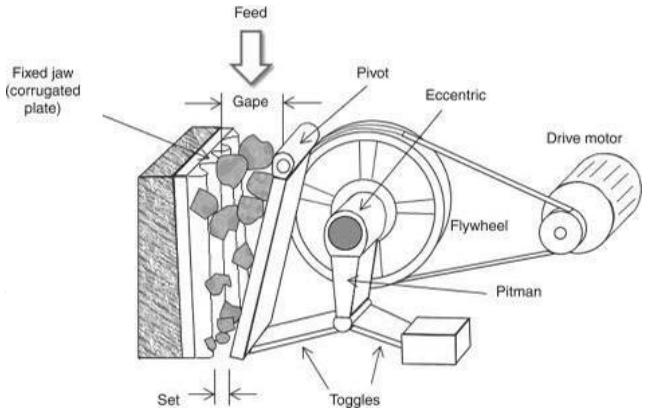


Fig. 5: JAW

3.4 DRILLING

Drilling involves the boring of holes using specialized equipment known as a Jacked Hammer and Compressor. It serves as the initial phase of mineral extraction operations. The Jack Hammer is a machine that creates holes in the ground by utilizing a milling bit attached to a drilling rod, which is then connected to the Jack Hammer.

3.4.1 TYPES OF DRILLING METHOD

1. ROTARY DRILLING

During rotary drilling, the drilling tools rotate at the same angle as the energy supplied to the bit.

2. PERCUSSIVE DRILLING

In this drilling method, the tool strikes the rock directly at the specified point, breaking it using a percussive action.

3. ROTARY-PERCUSSIVE

The primary method employed here is rotary drilling. It's important to note that this type of drilling consists of 75% rotary action and 25% percussion.

4. PERCUSSIVE-ROTARY

This type of drilling is predominantly percussive, with 75% of the action being percussive and the remaining 25% rotary.

3.4.1 DRILLING EQUIPMENT

1. Air Compressor
2. Drilling Rod
3. Drilling Bit
4. Jack Hammer
5. Drilling Rig
6. Man Power

DRILLING ROD :-This is a tool steel round bar with a precise diameter tolerance, typically ranging from 30mm to 40mm, utilized in drilling operations.

Fig. 5: Drilling Rod

DRILLING BIT:-DRILLING BIT: Drilling bits are cutting tools employed to produce cylindrical holes, typically circular in cross-section. They come in various sizes and serve multiple purposes. These bits are held within a tool known as a drill, which rotates them and applies torque and axial force to create the holes.

Fig. 6: Drilling Bit

3.5 SAFETY PRECAUTION TO BE TAKING IN DRILLING

- Take into account variations in hole depth
- Maintain consistent spacing between holes
- Use the same drilling bit throughout
- Prevent misalignment of holes
- Prevent hole blockages
- Avoid using dull drill bits

3.6 NECESSARY PROCESS IN BLASTING

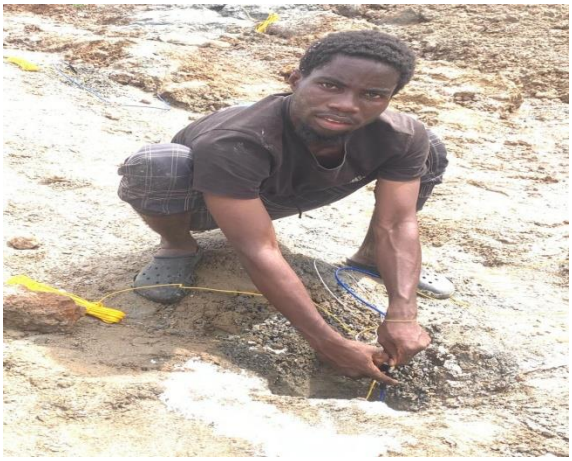
- Drawing of blasting plan
- Selection of blasting materials
- Preparing the mixture {Ammonium nitrate + diesel acid}
- Arrangement of blasting materials
- Priming
- Charging
- Stemming
- Connection
- Testing of the cabin current (in electrical mode)
- Extension of blasting wire and exploration which must place against the face direction.

3.7 CHARGING A DRILL HOLE

Charging the drill hole involves sequentially dropping detonating cord, explosive material (ammonium), and mud or chips into the drilled hole. This process is essential for introducing a

handful of ammonium nitrate mixed with fuel oil, commonly known as AMFO, into a 2.5ft drilled hole.

Initially, the detonating cord must be carefully lowered into the hole, ensuring it reaches the bottom. Subsequently, the explosive and ammonium nitrate are dropped on top of the detonating cord. A stemming stick is then used to firmly press or tamp down the materials to ensure a tight fit, preventing them from being dislodged when withdrawn. Gradually covering with sand or chips, additional stemming stick pressure is applied. It's crucial to exercise caution during stemming to prevent inadvertent cutting of the detonating cord, as this could lead to misfiring.



3.8 CHARGING OFWATERLODGED HOLES

Charging with explosives, which may include options beyond ANFO, is contingent upon the depth and quantity of holes employed.

Blasting Accessories

Detonating

Ammonium nitrate

Diesel

Safety fuse

Detonator (plain cap)

Explosives

Detonating Cord, also known as cortex, is a flexible cord containing a central core of high explosive material used to detonate other explosives. It has the ability to burn and is manufactured to resist water absorption, making it water-resistant.

The detonating cord must extend to the bottom of the hole and have a sufficient length outside for proper connection.

3.9 EXPLOSIVES

Explosives are chemical compounds or mechanical mixtures of solid or liquid minerals capable of rapid and violent decomposition when exposed to external impulses such as heat or fire, resulting in a significant release of energy.

TYPES OF EXPLOSIVE

Explosive can be grouped into two types which are mentioned below:

- High explosive: e.glycerine, dynamite, gelatin, rock booster etc
- Low explosive: e.g ammonium nitrate (AN) in addition to full oil (FO)
  Blasting agent (ANFO) at an aggregate proportion in ratio 96:4 i.e 25kg of ammonium nitrate require 1.8 liter of diesel oil.

USES

Explosive are used for the following operation:

- For blasting and demolition
- Also as propellant
  Therefore, generally explosive are used in the following area:

A. In open pit mines
B. Exploration for oil and gas deposit
C. Used for war purpose
D. For construction of electric dams and irrigation dams

EFFECT

During blasting the energy released by the detonation of explosive fire basic effect:

i. Rock fragmentation
ii. Rock displacement
iii. Ground vibration
iv. Air blast
v. Dust/fumes/nauseous gas

Safety Fuse:

This is a flexible cord containing an internal burning medium that conveys fire or flame at a continuous and relatively uniform rate from the point of ignition to the point of use.

Detonator:

The detonator is responsible for initiating the detonation of the cord immediately after the safety fuse has been ignited. It triggers the detonating cord and the explosive material rapidly.

Stemming:

This process involves filling the holes with mud or chips and compacting them with a stemming stick after the detonating cord and explosive material have been inserted to ensure a firm and tight seal. Stemming is performed to facilitate the movement of pressure from high to low pressure.

3.10 CONNECTION AND BLASTING

Following the charging of the hole, a long detonating cord will be securely connected to transmit fire to all the holes. The detonator and safety fuse, both dipped into the plain cap and joined together, will be wired to the detonating cord at an appropriate location.

Types of Connection

- Parallel connection
- Series connection

- Parallel in series connection
- Series in parallel connection

Precaution

Precaution to be taking for life safety during connection and the blasting operation are:

1. Confirm the rate of time at which the safety fuse burns compare with the distance before firing.
2. Proper connection to avoid misfired
3. Do away with any hot material during connection
4. The burden and spacing must be properly positioned to the strength of the explosive which must be proportional to the resistance power or rock.
5. Primary blasting must carried out before producing to secondary blasting.
6. Proper announcement is compulsory before blasting.
7. Follow the blasting distance to avoid been reach by the fly blasted rock i.e 100m-150m away from pit or area were blasting operation is going on.
8. After blasting, allow the dust (poisonous gases) to diffuse or dissipate before moving close to the area.
9. Low explosive is required for secondary blasting.

Forms of Blasting

- **Primary Blasting:** this is the type of blasting that firstly takes place on the parent marble rock or any other parent rocks.
- **Secondary Blasting**: this is the type of blasting that is performs on huge boulders that are too big for haulage.

Types of blasting

i. Electrical blasting

ii. Fire blasting

3.11 GRANITE ROCK

Granite rocks are igneous rocks formed from the slow crystallization of magma deep within the Earth's crust. They are composed primarily of quartz, feldspar, and mica, giving them a distinctive speckled appearance. Granite is known for its durability, strength, and resistance to weathering, making it a popular choice for construction materials, monuments, countertops, and sculptures. It comes in a variety of colors and textures, ranging from light to dark shades. Due to its hardness and resistance to abrasion, granite is also used as a dimension stone in buildings and infrastructure projects. Overall, granite rocks are valued for their aesthetic appeal, longevity, and versatility in various applications.

Granite rocks are abundant in various regions of Nigeria, particularly in the following states:

1. Plateau State: Plateau State is known as the "Home of Peace and Tourism" and is one of the major granite-producing areas in Nigeria. The Jos Plateau region is rich in granite deposits and has numerous quarries.

2. Kaduna State: Kaduna State, located in the north-central part of Nigeria, also has significant granite reserves. Areas such as Kafanchan and Birnin Gwari are known for their granite deposits.

3. Ekiti State: Ekiti State, situated in southwestern Nigeria, is another region with notable granite deposits. Areas around Ikere-Ekiti and Igbara-Odo have active granite quarries.

4. Ondo State: Ondo State, located in the southwestern part of Nigeria, is home to granite rocks, particularly in areas like Akure and Owo.

5. Cross River State: Cross River State, in the southeastern part of Nigeria, has granite deposits in locations such as Akamkpa and Calabar.

These are just a few examples of the many regions in Nigeria where granite rocks are found, highlighting the widespread distribution of this valuable natural resource across the country.

Granite rock is a versatile material with various uses across different industries and applications. Some common uses of granite rock include:

1. Construction: Granite is widely used as a building material for constructing structures such as bridges, buildings, monuments, and roads due to its durability, strength, and aesthetic appeal.

2. Countertops: Granite countertops are popular in kitchens and bathrooms due to their durability, heat resistance, and natural beauty.

3. Flooring: Granite tiles and slabs are used for flooring in both residential and commercial buildings because of their durability and easy maintenance.

4. Sculpture and Monuments: Granite's ability to hold intricate details and withstand weathering makes it a preferred material for sculptures and monuments.

5. Landscaping: Granite rocks are used in landscaping projects for pathways, retaining walls, decorative features, and garden borders.

6. Tombstones and Memorials: Granite is commonly used for tombstones and memorials due to its durability and ability to hold inscriptions for long periods without fading.

7. Kitchenware: Granite is sometimes used to make kitchenware such as mortar and pestle sets due to its hardness and resistance to staining.

8. Ballast: Crushed granite is used as railroad ballast to provide stability and support for railway tracks.

9. Aquariums: Polished granite stones are used as decorative elements in aquariums and fish tanks.

10. Abrasive: Crushed granite is used as an abrasive material in sandblasting, polishing, and grinding applications.

These are just a few examples of the many uses of granite rock, highlighting its versatility and importance in various industries and everyday applications.

CHAPTER FOUR

4.0 RELEVANCE OF THE EXPERIENCE GAINED AT STUDENTS FIELD OF STUDY

In summary , this program has provided me with valuable hands-on experience relevant to my field of study, mining engineering, and I have gained significant benefits from it. The knowledge I acquired at different sites includes:

- Conducting geophysical surveys and borehole drilling

- Performing drilling and blasting operations on rocks

- Identifying various types of mining equipment.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The SIWES program provided me with valuable exposure to the practical aspects of mining engineering. It enabled me to compare the knowledge acquired in the classroom with real-world industrial experience, fostering the development of a critical and pragmatic approach to problem-solving within the quarrying /mining industry.

5.2 RECOMMENDATION

It is essential for polytechnics to mandate participation in the SIWES program for all students, as it greatly enhances both practical and theoretical knowledge. The SIWES program serves as a gateway to understanding the practical applications of theoretical concepts taught in school. Additionally, there should be an established body responsible for imposing penalties on students who decline to participate in the SIWES program.