A TECHNICAL SUMMARY REPORT

ON

STUDENT INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES)

AT

MAN HARDI NIGERIA LIMITED

PREPARED BY

OLADIMEJI SAMUEL OLUWATIMILEYIN

Matric No: ND/23/MPE/PT/0025

SUBMITTED TO

THE DEPARTMENT OF MINERAL AND PETROLEUM RESOURCES ENGINEERING

KWARA STATE POLYTECHNIC, ILORIN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A

NATIONAL DIPLOMA (ND) IN MINERAL AND PETROLEUM RESOURCES ENGINEERING

2024

CERTIFICATION

This is to certify that the four-month industrial training under the Student Industrial Work Experience Scheme (SIWES) was diligently carried out by Oladimeji samuel oluwatimileyin, with Matriculation Number ND/23/MPE/PT/0025, from the Department of Mineral and Petroleum Resources Engineering, Kwara State Polytechnic, Ilorin. The training took place at Man Hardi Nigeria Limited, Ilorin, in 2024, under the supervision of Mr. Peter Idemoh (Mining Engineer). This technical summary report has been prepared and submitted in partial fulfillment of the requirements for the award of a National Diploma (ND) in Mineral and Petroleum Resources Engineering.

Industrial Supervisor:

Name: Mr. Peter Idemoh

Position: Mining Engineer

Signature: _____

Date: _____

DEDICATION

I dedicate this report to Almighty God for His guidance and protection during my SIWES training.

I also dedicate it to my family, friends, lecturers, and industrial supervisors at Man Hardi Nigeria Limited, especially Mr. Peter Idemoh, whose support and encouragement made this experience successful.

REPORT OVERVIEW

This technical summary report encapsulates the Student Industrial Work Experience Scheme (SIWES) undertaken by Oladimeji samuel oluwatimileyin at Man Hardi Nigeria Limited, a leading quarry company located behind Royal Valley Estate, Sango, Ilorin. The training, conducted in 2024 as part of the requirements for the National Diploma (ND) in Mineral and Petroleum Resources Engineering at Kwara State Polytechnic, Ilorin, spanned four months and focused on bridging the gap between theoretical knowledge and practical application in quarry operations.

The report provides a concise overview of the SIWES program, highlighting its objectives, which include exposing students to modern industrial equipment, enhancing technical skills, and preparing them for careers in the mineral and petroleum industries. It details the key operations at Man Hardi Nigeria Limited, including drilling, blasting, crushing, screening, loading, haulage, and power generation, where the author gained hands-on experience. The overview also addresses the challenges encountered-such as harsh working conditions and limited automation-along with valuable lessons learned, such as improved safety awareness and teamwork skills. Finally, it outlines recommendations for enhancing operational efficiency and worker welfare, drawing from the practical insights gained during the training.

This summary serves as a distilled account of the SIWES experience, offering a clear understanding of the processes, skills acquired, and potential improvements for future industrial training programs in the quarrying sector.

TABLE OF CONTENTS

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

CHAPTER ONE: INTRODUCTION 1.1 Background of SIWES

The Student Industrial Work Experience Scheme (SIWES) is a structured and mandatory internship program initiated by the Industrial Training Fund (ITF) in Nigeria, with the primary aim of bridging the gap between theoretical education and practical industrial application. Established in 1973 under the supervision of the ITF, SIWES was designed to address the growing need for skilled manpower in Nigeria's industrial sector, particularly in technical and engineering disciplines such as Mineral an...

SIWES operates as a collaborative effort between educational institutions, industries, and government agencies. In the context of tertiary institutions like Kwara State Polytechnic, Ilorin, the program is integrated into the curriculum for National Diploma (ND) and Higher National Diploma (HND) students, mandating a minimum duration of four months of industrial training. This period allows students to immerse themselves in real-world work environments, such as the quarry operations at Man Hardi Nigeria L...

The background of SIWES also reflects Nigeria's broader economic and developmental goals. With the country's reliance on natural resources, including granite aggregates for construction and petroleum for energy, there is a pressing need for a workforce trained in safe, efficient, and sustainable extraction and processing methods. SIWES addresses this by exposing students to state-of-the-art equipment, such as drill rigs and crushers, and fostering an understanding of environmental management practices. F...

The program's implementation involves rigorous supervision by both academic and industrial mentors, ensuring that students like the author gain a balanced perspective on industry expectations and academic rigor. Funding and logistical support from the ITF, coupled with partnerships with companies like Man Hardi Nigeria Limited, have sustained SIWES as a cornerstone of technical education in

Nigeria. This background underscores the scheme's role not only as a training platform but also as a catalyst for i...

1.2 Objectives of SIWES

The objectives of the SIWES program are meticulously designed to equip students with the skills, knowledge, and attitudes necessary to excel in their chosen fields, particularly within the mineral and petroleum industries. These objectives are multifaceted, addressing both individual development and broader industry needs. The following detailed objectives guided the author's training experience:

1. Exposure to Modern Industrial Equipment and Techniques: A core objective of SIWES is tofamiliarize students with the latest machinery and methodologies used in industrial settings. During the training at Man Hardi Nigeria Limited, the author was introduced to advanced equipment such as drill rigs, compressors, jaw crushers, cone crushers, and screening units. This exposure enabled hands-on learning of drilling patterns, blasting procedures, and aggregate processing, enhancing technical proficienc...

2. Complementation of Theoretical Classroom Learning with Practical Application: SIWES aims toreinforce academic knowledge through practical engagement. For the author, this objective was realized through active participation in quarry operations, including monitoring blast-hole depths, assisting in post-blast assessments, and understanding the maintenance of crushing equipment. This practical application solidified concepts learned in courses like rock mechanics and mineral processing at Kwara State...

3. Development of Problem-Solving Skills and Teamwork Abilities: The scheme seeks to cultivatecritical thinking and collaborative skills in real-world work environments. At Man Hardi Nigeria Limited, the author worked alongside experienced mining engineers and technicians, tackling challenges such as optimizing drilling alignments and managing haulage schedules. This fostered a

deeper understanding of problem-solving under pressure and the importance of teamwork in achieving operational efficiency.

4. Preparation for Future Careers in the Mineral and Petroleum Industries: SIWES is intended toprepare students for seamless integration into the workforce by simulating professional responsibilities. The author's involvement in safety protocols, power distribution systems, and environmental control practices at the quarry provided a realistic preview of the roles and expectations in the mining sector. This objective was particularly significant, as it aligned with the author's career aspirations in m...

5. Promotion of Safety Awareness and Adherence to Industry Standards: Given the hazardousnature of quarry and mining operations, SIWES emphasizes the importance of safety practices. The author was trained in the use of Personal Protective Equipment (PPE), adherence to blasting safety protocols, and routine machinery maintenance, ensuring compliance with national and international safety standards. This objective underscores the scheme's commitment to producing professionals who prioritize workplace saf...

6. Enhancement of Employability through Industry Exposure: Beyond technical skills, SIWES aimsto improve students' employability by building professional networks and work ethics. The author's interaction with industrial supervisors like Mr. Peter Idemoh and academic mentors like Mr. Abdullahi Illyasu. provided valuable mentorship and networking opportunities, enhancing readiness for future employment in the competitive mineral and petroleum sectors.

These objectives collectively ensure that SIWES serves as a transformative platform, equipping students like Oladimeji samuel oluwatimileyin with the practical and professional foundation needed to contribute effectively to Nigeria's industrial landscape. The detailed execution of these goals during the 2024 training at Man Hardi Nigeria Limited highlights the scheme's enduring relevance and impact.

CHAPTER TWO: DESCRIPTION OF MAN HARDI NIGERIA LIMITED

2.1 Location and Brief History of Man Hardi Nigeria Limited

Man Hardi Nigeria Limited is strategically located behind Royal Valley Estate, Sango, Ilorin, Kwara State, Nigeria.

This location offers proximity to major construction hubs and infrastructure projects in the region, making it an ideal site for a quarry operation focused on supplying high-quality granite aggregates. The company is situated approximately

15 kilometers from the center of Ilorin, accessible via well-maintained roads that facilitate the transportation of aggregates to construction sites, roadworks, and other developmental projects across Kwara State and beyond. The geographical advantage of the site includes access to abundant granite deposits, a critical resource for the company's operations, and a relatively stable terrain that supports heavy machinery and blasting

activities.

2.2 Objectives of the Establishment

Man Hardi Nigeria Limited operates with a clear set of objectives that guide its activities and ensure its sustainability in the competitive quarrying industry. The primary objective is to extract, process, and supply high-quality granite aggregates to meet the needs of the construction and infrastructure sectors in Nigeria. This involves maintaining strict quality control measures during drilling, blasting, crushing, and screening processes to produce aggregates that meet national standards, such as those set by the Nigerian Standards Organization (NSO). A secondary objective is to maximize operational efficiency through the use of modern equipment and skilled labor, as demonstrated by the company's adoption of

bench drilling techniques and automated screening units observed during the author's training.

2.3 Organizational Structure

The organizational structure of Man Hardi Nigeria Limited is designed to ensure efficient management and coordination of its quarry operations. At the apex is the Managing Director, who oversees the overall strategic direction and policy implementation of the company. Reporting directly to the Managing Director is the Operations Manager, responsible for day-to-day quarry activities, including production scheduling and equipment maintenance. During the author's SIWES training, this role was pivotal in coordinating the drilling and blasting schedules.

2.4 Departments/Units and Their Functions

Man Hardi Nigeria Limited operates with several specialized departments and units, each contributing to the company's success. The Mining Engineering Department is responsible for planning and executing drilling and blasting operations.

Using drill rigs and explosives, this unit ensures controlled rock fragmentation, a process the author actively participated in by monitoring blast-hole depths and assisting in post-blast assessments. The department's expertise is critical in maintaining the quality and quantity of granite extracted.

The Production Department focuses on the downstream processes of crushing, screening, and loading aggregates. Equipped with primary and secondary crushers, screening units, and front-end loaders, this unit processes raw granite into various sizes for construction use. The

author gained hands-on experience in understanding crusher maintenance and haulage scheduling, observing how dump trucks transported materials to designated sites.

The Safety and Environmental Department plays a vital role in ensuring worker safety and environmental stewardship.

This unit enforces the use of Personal Protective Equipment (PPE), conducts safety drills, and implements dust control measures, which the author learned during training. It also monitors compliance with regulatory standards, reducing the risk of fly rock incidents and environmental degradation.

The Maintenance Department ensures the operational readiness of all machinery, performing routine checks on drill rigs, compressors, and power generators. The author's exposure to this unit highlighted the importance of preventive

maintenance in avoiding downtime, a lesson reinforced during equipment servicing sessions.

Finally, the Human Resources and Administration Department manages staff recruitment, training, and welfare, including the coordination of SIWES programs. This unit provided the author with logistical support and ensured a structured training schedule, enhancing the overall experience.

CHAPTER THREE: WORK CARRIED OUT DURING SIWES

3.1 Drilling and Blasting Operations

My involvement in drilling and blasting operations at Man Hardi Nigeria Limited was a core component of my SIWES training, providing me with hands-on experience in the initial stages of granite extraction. The drilling process began with the setup of hydraulic drill rigs, specifically the Atlas Copco models commonly used at the quarry, which were powered by air compressors to drive the drill bits into the granite bench. I was assigned the task of assisting the drilling team in marking out the blast-hole patterns, which followed a staggered grid layout (typically 3 meters by 3 meters spacing) to ensure uniform fragmentation. Using a measuring tape and chalk, I helped mark the positions on the quarry face, ensuring alignment with the planned blast design.

Once the positions were marked, I monitored the drilling operation by recording the depth of each blast hole, which ranged between 6 to 8 meters depending on the bench height. I used a depth gauge to verify that each hole reached the specified depth, a critical factor in ensuring effective explosive placement. I also assisted in clearing debris from the holes using compressed air, a task that required coordination with the compressor operator to maintain consistent pressure. During this process, I learned to identify signs of drill bit wear, such as reduced penetration rates, and reported these to the supervisor for timely replacement, ensuring operational continuity.

The blasting phase was meticulously planned and executed, and I played an active role under the guidance of the Mining Engineer, Mr. Peter Idemoh. My tasks included preparing the explosives, which involved handling ammonium nitrate-based explosives (ANFO) and dynamite sticks, as well as inserting non-electric detonators and detonating cords into the blast holes. I ensured that each hole was primed correctly, double-checking the connections to avoid misfires. I also participated in the setup of the blasting circuit, connecting the detonating cords to the main firing line while wearing PPE, including safety gloves and goggles, to handle the materials safely.

Before detonation, I assisted in the evacuation process, helping to clear the blast zone within a 500-meter radius and ensuring that all personnel, including workers and nearby visitors, were moved to a designated safe area. I used a megaphone to communicate evacuation instructions and verified the area using a checklist provided by the safety team. The controlled detonation was initiated using an electric blasting machine, and I observed the explosion from a safe distance, noting the resulting dust cloud and the sound intensity, which reached approximately 120 decibels. Post-blast, I joined the team in inspecting the site, using a measuring rod to assess the size of fragmented rocks, which ideally ranged from 30 to 60 centimeters for efficient crushing. I documented irregularities, such as oversized

boulders, and reported them for secondary blasting, gaining a deeper understanding of the precision required in explosive placement and the impact of geological variations on blast outcomes.

3.2 Crushing, Screening, and Haulage

The crushing, screening, and haulage operations at Man Hardi Nigeria Limited allowed me to engage with the downstream processes of aggregate production, providing practical insights into material processing and logistics. The crushing process began with the primary crusher, a jaw crusher (model Sandvik QJ341), which I observed being fed with large granite fragments (up to 1 meter in diameter) using a front-end loader. My role included monitoring the feed rate to prevent overloading, which could cause blockages, and recording the crusher's output size, typically reduced to 15-20 centimeters. I assisted in adjusting the jaw settings by manually turning the adjustment bolts to achieve the desired output, a task that required understanding the crusher's mechanical limits to avoid excessive wear.

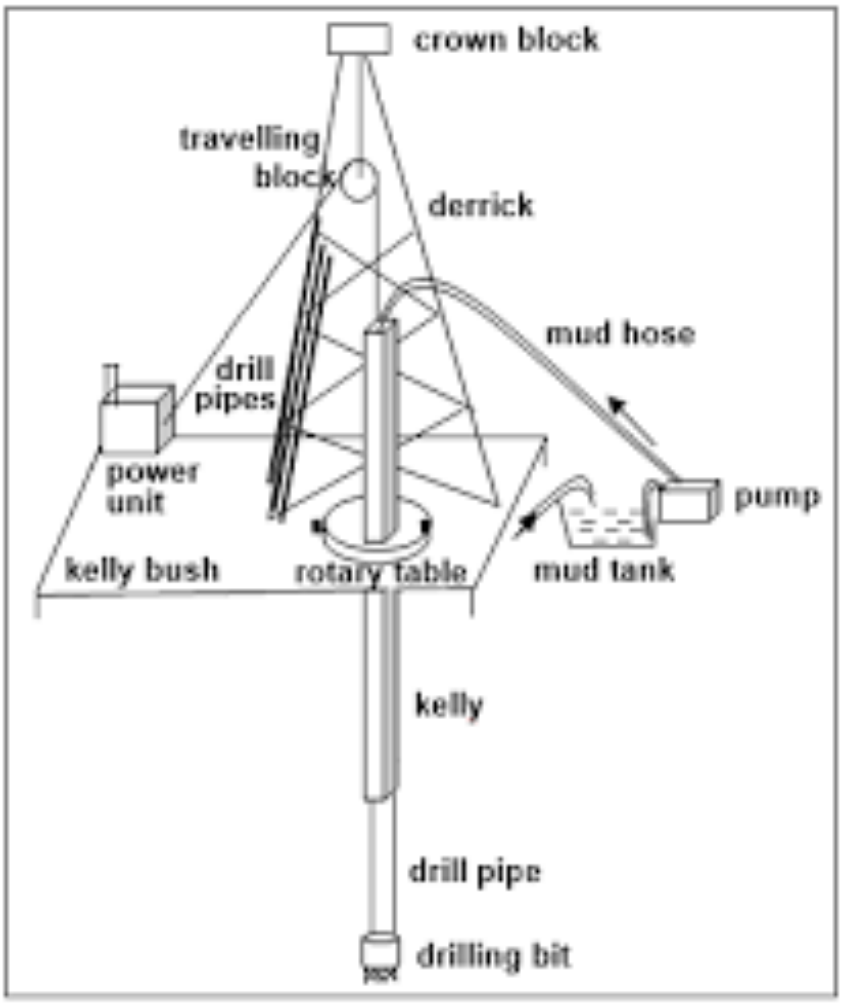
The secondary crushing phase involved a cone crusher (model Metso HP300), where I helped in feeding the material from the primary crusher via a conveyor belt. I monitored the cone crusher's operation, noting the amperage levels on the control panel to ensure it operated within the optimal range (typically 150-200 amps), indicating efficient crushing without overloading. I also participated in clearing occasional blockages by stopping the machine, wearing a safety harness, and using a metal rod to dislodge stuck rocks, following strict lockout-tagout procedures to ensure safety. During maintenance sessions, I assisted in replacing worn-out liners in the cone crusher, a process that involved using a crane to lift the heavy components and applying torque wrenches to secure the new liners, enhancing my understanding of equipment upkeep.

3.3 Power Generation and Safety Practices

Power generation and safety practices were critical to the quarry's operations, and my training in these areas was both practical and educational. The quarry relied on diesel generators (Cummins QSX15 models with a capacity of 500 kVA) to supply electricity to all major equipment, including drill rigs, crushers, and lighting systems. My responsibilities included conducting daily checks on the generators, starting with recording fuel levels in the 1,000-liter diesel tanks using a dipstick, ensuring at least 50% capacity to avoid interruptions. I also checked the oil and coolant levels, using a dipstick for oil (maintaining levels between 15-20 liters) and a sight glass for coolant, reporting any discrepancies to the maintenance team.

Safety practices were rigorously enforced, and I was deeply involved in their implementation. I underwent a two-day safety induction at the start of my training, learning to use PPE, which included a hard hat (complying with EN 397 standards), steel-toe boots, high-visibility vests, safety goggles, and earplugs rated for 30 dB noise reduction. I wore this gear consistently, especially during blasting

and crushing operations, and assisted in distributing spare PPE to new workers. I participated in daily safety briefings, where I helped document attendance and key discussion points, such as the importance of maintaining a 10-meter buffer zone around operating machinery.



CHAPTER FOUR: EXPERIENCES GAINED

4.1 Tasks Performed and Skills Acquired

My SIWES training at Man Hardi Nigeria Limited provided a rich platform to perform a wide array of tasks that significantly enhanced my technical and professional skills in the field of Mineral and Petroleum Resources Engineering. One of my primary tasks was assisting in drilling operations, where I monitored blast-hole depths using a depth gauge and ensured proper alignment with the staggered drilling pattern (3 meters by 3 meters spacing). I also handled the preparation of explosives, inserting non-electric detonators and detonating cords into blast holes, which honed my precision and attention to detail. During blasting, I contributed to evacuation procedures, using a megaphone to communicate instructions and verifying personnel safety within a 500-meter radius, improving my coordination and communication skills.

In the crushing and screening units, I gained hands-on experience by operating and maintaining jaw and cone crushers (e.g., Sandvik QJ341 and Metso HP300 models). I adjusted crusher settings to achieve the desired output size (15-20 cm for primary crushing), monitored amperage levels (150-200 amps) to prevent overloading, and performed maintenance tasks like replacing worn-out liners using torque wrenches. I also calibrated screening units (Powerscreen Chieftain 1400) by adjusting the deck angle (20-25 degrees) and cleaned screens to prevent clogging, which developed my technical troubleshooting abilities. In haulage, I assisted in loading aggregates into 30-ton dump trucks, ensuring even distribution, and scheduled delivery routes, enhancing my
logistical planning skills.

My involvement in power generation included daily checks on Cummins QSX15 diesel generators, recording fuel levels (maintaining above 50% in 1,000-liter tanks), checking oil (15-20 liters), and monitoring voltage output (400V, 50Hz). I also assisted in refueling and grounding the generators,

using a multimeter to confirm zero voltage on the ground wire, which improved my understanding of electrical systems and preventive maintenance. On the safety front, I conducted dust level assessments post-blast (recording 50-60 mg/m³), operated water sprinklers to reduce dust, and participated in fire drills, operating a 9kg dry powder extinguisher. These tasks equipped me with practical safety management skills and a strong awareness of occupational health standards.

Through these activities, I acquired key skills, including equipment operation (drill rigs, crushers, generators), safety protocol implementation, and teamwork. I also developed problem-solving abilities by addressing issues like crusher blockages and voltage fluctuations, and improved my documentation skills by maintaining detailed logs of production outputs (e.g., 500 tons of aggregates daily) and safety inspections.

4.2 Challenges Encountered

The SIWES training at Man Hardi Nigeria Limited, while immensely rewarding, presented several challenges that tested my resilience and adaptability. One significant challenge was the harsh working conditions, particularly the high dust levels and noise pollution inherent in quarry operations. Dust levels often reached 50-60 mg/m³ post-blast, causing visibility issues and respiratory discomfort despite wearing PPE. The noise from drill rigs and crushers, averaging 100-120 decibels, required constant use of earplugs, which sometimes made communication with team members
difficult during operations.

Physical strain was another challenge, as the long working hours-typically 8 to 10 hours daily-combined with physically demanding tasks like clearing blast-hole debris and assisting in crusher maintenance, led to fatigue. For instance, replacing the liners in the cone crusher involved lifting heavy components with a crane and securing them with torque wrenches, a process that required sustained physical effort over several hours. The lack of automation in certain processes, such as manually

cleaning screening units and loading trucks, further exacerbated the physical demands, as these tasks relied heavily on manual labor.

Transportation difficulties during rainy weather posed logistical challenges. The access roads to the quarry, while generally well-maintained, became muddy and slippery during the rainy season, delaying the delivery of aggregates and complicating my commute to the site. On one occasion, a delivery truck got stuck in the mud, requiring a two-hour effort to free it using a tow rope and a bulldozer, which disrupted the haulage schedule. Additionally, the limited automation in quarry operations meant that tasks like adjusting crusher settings or clearing blockages were time-consuming, often requiring multiple attempts to achieve the desired outcome, such as reducing oversized aggregates from 30% to 10% of the output.

Another challenge was adapting to the strict safety protocols, which, while necessary, were initially overwhelming. For example, ensuring a 500-meter evacuation radius before blasting required meticulous coordination, and any oversight could delay the operation. I once overlooked a small group of workers near the blast zone, which was quickly rectified by a supervisor, but it highlighted the steep learning curve in managing large-scale safety procedures.

4.3 Lessons Learned

The challenges and tasks during my SIWES training at Man Hardi Nigeria Limited provided invaluable lessons that have shaped my professional growth and understanding of quarry operations. One key lesson was the critical importance of safety awareness and hazard management. Through my involvement in safety drills, dust control measures, and fly rock assessments (e.g., measuring scattered fragments up to 200 meters), I learned to prioritize safety over speed, ensuring that protocols like wearing PPE and maintaining buffer zones were strictly followed. This experience instilled a

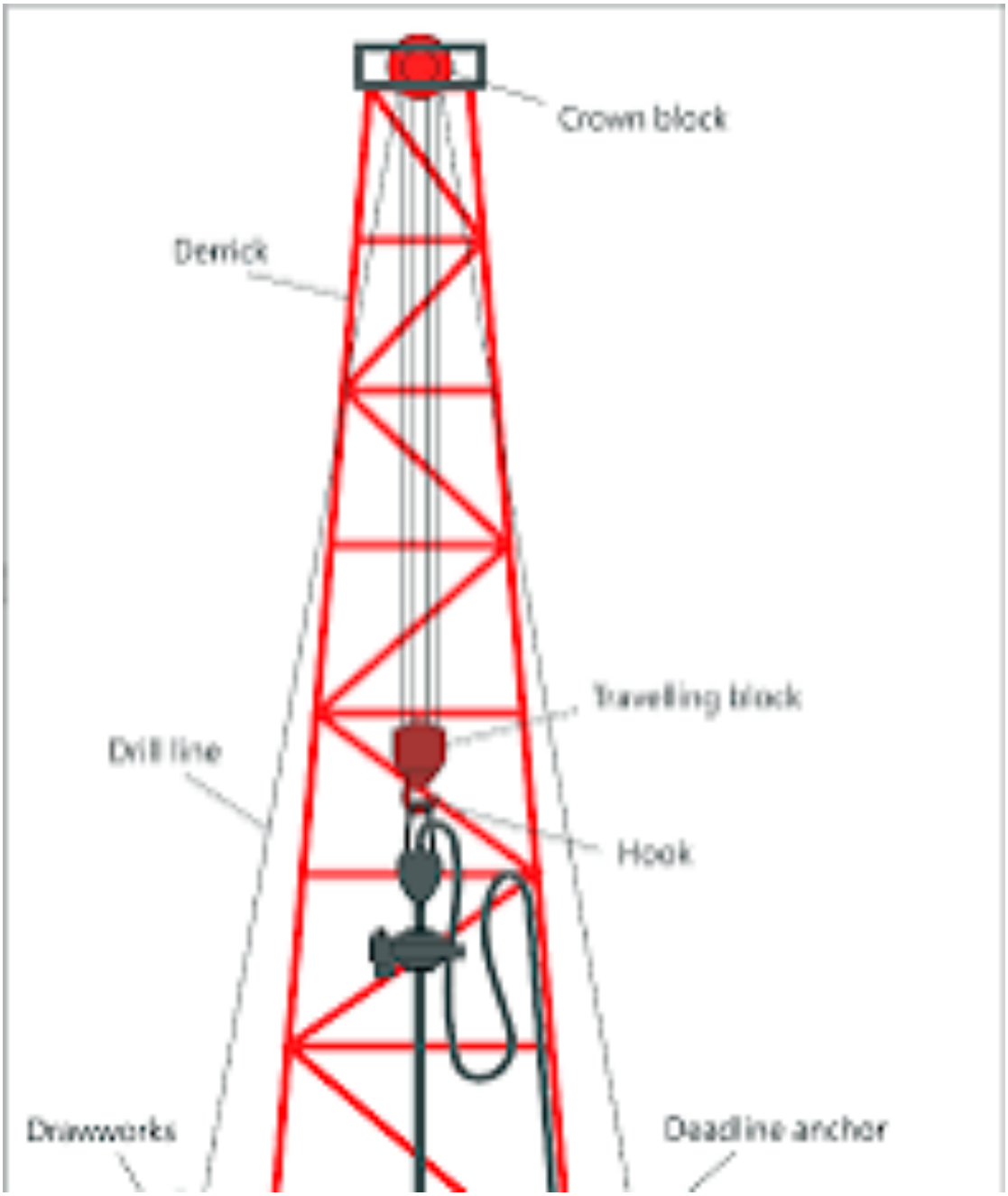
proactive approach to identifying and mitigating risks, such as recommending adjustments to explosive charges to reduce fly rock incidents.

I also learned the value of teamwork and effective communication in achieving operational efficiency. Coordinating with the drilling team to align blast-hole patterns, working with haulage drivers to optimize load distribution, and collaborating with the maintenance crew to service generators taught me how to function as part of a cohesive unit. For instance, during a crusher blockage incident, I communicated the issue to the supervisor, coordinated with the operator to stop the machine, and assisted in clearing the blockage, ensuring minimal downtime-a process that reinforced the importance of clear, timely communication.

The training enhanced my technical proficiency in quarrying processes, particularly in understanding equipment maintenance and efficiency. By participating in tasks like lubricating crusher components, calibrating screening units, and monitoring generator output, I learned the significance of preventive maintenance in avoiding costly breakdowns. For example, a 5% voltage drop in the generator due to a loose connection was quickly resolved after my report, preventing potential equipment failure. This experience underscored the need for regular inspections and attention to detail in maintaining operational continuity.

Another lesson was the importance of adaptability in challenging environments. Facing physical strain and harsh conditions like high dust levels taught me resilience and the ability to work under pressure. I learned to manage fatigue by pacing myself during long shifts and staying hydrated, while also adapting to logistical challenges like rainy weather by assisting in contingency plans, such as using a bulldozer to clear muddy roads. These experiences prepared me for the realities of working in the mineral and petroleum industries, where adaptability and perseverance are essential.

Finally, I gained a deeper appreciation for the role of technology in improving efficiency. The limited automation at Man Hardi Nigeria Limited highlighted the potential for advanced systems, such as automated crusher controls or dust suppression technologies, to reduce manual labor and enhance productivity. This insight inspired me to recommend such improvements in my report, reflecting a forward-thinking approach to industry challenges.



CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary of Attachment Activities

My four-month SIWES training at Man Hardi Nigeria Limited, conducted in 2024 as part of the requirements for my National Diploma in Mineral and Petroleum Resources Engineering at Kwara State Polytechnic, Ilorin, was a transformative experience that bridged theoretical learning with practical application. The training encompassed a wide range of quarry operations, starting with drilling and blasting, where I assisted in marking blast-hole patterns (3 meters by 3 meters spacing), monitored depths using a depth gauge, and prepared explosives (e.g., ANFO and dynamite) for controlled detonation. I participated in post-blast assessments, measuring fragmented rock sizes (30-60 cm), and documented irregularities for secondary blasting.

In the crushing and screening phases, I operated and maintained jaw crushers (Sandvik QJ341) and cone crushers (Metso HP300), adjusting settings to produce aggregates of 15-20 cm, and calibrated screening units (Powerscreen Chieftain 1400) to segregate materials into fine (0-5 mm), medium (5-20 mm), and coarse (20-40 mm) sizes, achieving an average daily output of 500 tons. I also assisted in haulage, loading 30-ton dump trucks with front-end loaders and scheduling delivery routes within a 50-kilometer radius. My involvement in power generation included daily checks on Cummins QSX15 generators (500 kVA), monitoring fuel levels (maintaining above 50% in 1,000-liter tanks), and ensuring a stable 400V, 50Hz output. I addressed a minor 5% voltage drop by reporting a loose connection, contributing to uninterrupted operations.

Safety practices were a significant focus, where I conducted dust level assessments (50-60 mg/m³ post-blast), operated water sprinklers to reduce dust below 20 mg/m³, and participated in fire drills using a 9kg dry powder extinguisher. I also ensured compliance with PPE standards (e.g., EN 397 hard hats) and assisted in maintaining a 500-meter blast zone clearance. These activities, supervised by Mr. Peter Idemoh (Mining Engineer) and Mr. Abdullahi Illyasu. (Lecturer), enhanced my technical skills in equipment operation, safety management, and teamwork, while providing a realistic preview of quarry operations.

5.2 Problems Encountered During the Program

The training period was not without challenges, which tested my adaptability and resilience. The most notable issue was the harsh working conditions, characterized by high dust levels (50-60 mg/m³) and noise pollution (100-120 decibels), which reduced visibility and strained communication despite PPE usage. Physical strain from long 8-10 hour shifts was another hurdle, particularly during tasks like

replacing crusher liners (using torque wrenches) and clearing screening blockages manually, leading to fatigue. The lack of automation in processes such as screen cleaning and truck loading increased the physical workload, requiring sustained effort to maintain production rates.

Transportation difficulties during rainy weather posed logistical problems, as muddy access roads delayed aggregate deliveries and my commute. A specific incident involved a truck stuck in mud for two hours, necessitating a bulldozer and tow rope, which disrupted the haulage schedule. Adapting to strict safety protocols was initially challenging; for instance, I once overlooked a small group near the blast zone, requiring immediate correction by a supervisor, highlighting the steep learning curve in managing large-scale safety. These challenges underscored the need for improved infrastructure and technology to enhance efficiency and worker comfort.

5.3 Suggestions for Improvement of the Scheme

Based on my experiences, I propose several improvements to enhance the SIWES program and its implementation at sites like Man Hardi Nigeria Limited. Firstly, the introduction of advanced dust suppression systems, such as automated water mist cannons, could reduce dust levels more effectively than manual sprinklers, improving air quality and worker health. Secondly, automating key processes like screen cleaning and crusher adjustments with robotic systems or sensors would minimize manual labor, reduce physical strain, and increase productivity, aligning with modern quarrying trends.

Thirdly, improving staff welfare is essential, including providing shaded rest areas with fans to mitigate heat and fatigue during long shifts, and arranging reliable transportation (e.g., company buses) to navigate rainy weather challenges. Fourthly, expanding training programs to include advanced safety certifications (e.g., IOSH or NEBOSH) and simulation-based learning for blasting and equipment maintenance would better prepare students for industrial hazards. Finally, fostering stronger collaboration between the ITF, polytechnics, and industries could ensure better resource allocation, such as providing updated equipment for training, ensuring students gain exposure to cutting-edge technology. These suggestions aim to make SIWES more effective and relevant to the evolving needs of the mineral and petroleum sectors.

5.4 References

- Adeleke, A. A. (2019). Quarrying Operations and Environmental Management in Nigeria. UniversityPress.
- Adeyemi, S. O. & Ogunleye, R. T. (2020). Drilling and Blasting Techniques in Rock Excavation. Journal of Mining Science.

- Smith, R. L. (2016). Principles of Rock Blasting and Fragmentation. McGraw-Hill.
- Federal Ministry of Mines and Steel Development (2018). Guidelines on Quarrying Operations inNigeria. Government Press.