NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

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PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: METAL MINING TECHNICIAN

LEVEL: NTA 4

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ABBREVIATIONS

CAD	Computer-Aided Design
CBET	Competency Based Education and Training
MCN	Mining-Area Control Network
MM	Mining Method
MOPP	Maintenance Operations Processes and Procedures
MT	Mining Technology
MVSD	Mine Ventilation System Diagram
MV	Mine Ventilation
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OPSMM	Open-Pit Slope Movement Monitoring
OS	Occupational Standards
SM	Surface Mining
SR	Stripping Ratio
TC	Transportation Capacity
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
UM	Underground Mining

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks - essentially the same tasks are performed by all employees having the same title.
Occupational Area:	This is a broad grouping of related jobs. (Examples: coal mining technician and cartographer).
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	A set of statements, which, if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task Analysis:	The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees

	performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., a coal mining engineer designs drift layout, ventilation system management, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to the demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational Standards are thus the starting point for developing competency-based training (CBET) programmes. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Metal Mining Technician Occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The *10-year National Skills Development Strategy (2016-2026)* was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes.

These sectors include: Transport and Logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The Occupational Standards were then developed. Experts in Occupational Analysis and the Development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the Occupational Standards. Engineers, supervisory technicians on the job, and experienced Coal Mining Technicians were key informants in the survey to discover occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation. A total of ... online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they also served to engage a wide cross-section of experts in the occupation. Apart from this, the stakeholders' forum was attended by ... participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR METAL MINING TECHNICIANS

These standards cover a broad range of duties and tasks that can be performed by a Metal Mining Technician. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the

technician in specific settings or positions. The Metal Mining Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Metal Mining Technicians shall organise and implement shaft and drift excavation, mining work, and ventilation safety management under the supervision of engineers. Technicians in metal mines complete various blasting analysis designs and organise and manage the implementation of underground mining, the implementation of surface mining, the daily management of mines and safety inspections, and the management and maintenance of mining equipment. Generally, the Metal Mining Technician performs the following responsibilities:

a) Shaft and drift construction

b) Organisation of shaft and drift construction

c) Shaft and drift implementation

d) Blasting analysis, design and organisation management

e) Surface mining

f) Surface mining construction organisation

g) Surface mining implementation

h) Underground mining construction

i) Underground mining construction organisation

j) Underground mining implementation

k) Daily management and maintenance of mine ventilation

l) Mine ventilation management and maintenance

m) Daily management, safety inspection and supervision of the mine

n) Management and maintenance of mining equipment

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA level 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR METAL MINING TECHNICIAN - NTA 4

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SHAFT AND DRIFT CONSTRUCTION	**DUTY NO.**	401
TASK TITLE	RECOGNITION OF SHAFT AND DRIFT SECTION DRAWING	**TASK NO.**	4011
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to read and interpret shaft and drift section drawings.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the senior metal mining technicians or the chief mine engineers. The tools and equipment to be used include: 1. Computer; 2. AutoCAD software; 3. Various types of horizontal drift construction and installation equipment.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and interpret the geological information of mines; 2. Read and interpret design information.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and interpret the geological information of mines; 1.2 Read and interpret horizontal drift design drawings. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Geological conditions, support techniques; 2.2 Ventilation, safety and water management; 2.3 Environmental protection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Horizontal drift section drawing; 3.2 Horizontal drift section support parameter. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 AutoCAD drawing skills;

	4.4 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The horizontal drift section drawings are read and interpreted and the construction work is organised.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SHAFT AND DRIFT CONSTRUCTION	**DUTY NO.**	401
TASK TITLE	DTH DRILLING CONSTRUCTION	**TASK NO.**	4012
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to carry out DTH drilling construction in accordance with the requirements of the shaft and drift design.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the senior metal mining technicians or the chief mine engineers. The tools and equipment to be used include: 1. Computer; 2. AutoCAD software; 3. Various types of patio construction and installation equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and interpret the geological information of mines; 2. Read and interpret the design drawings of shaft and drift. 3. Select the model of DTH drilling equipment and conduct the construction.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and interpret the geological information of mines; 1.2 Read and interpret the design drawings of shaft and drift. 1.3 Carry out DTH drilling construction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Geological conditions, support techniques; 2.2 Ventilation, safety and water management; 2.3 Environmental protection. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Operating procedure of DTH drilling; 3.2 Safety specification for DTH drill operation. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Drawing reading skills; 4.4 Learning skills.

	5.0 Math Skills 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The DTH drilling construction is carried out.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION	**DUTY NO.**	402
TASK TITLE	DRILLING AND BLASTING OPERATIONS	**TASK NO.**	4021
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to perform safe construction operations of drilling and blasting in accordance with the design.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the chief mine engineers or senior metal mining technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer; 4. Explosive tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand mine exploration reports and geological information; 2. Understand and apply proficiently the surface mine design specification and safety technical regulations; 3. Determine the models and sets of DTH drills and roller-bit rotary rigs; 4. Participate in drilling and blasting safety construction operations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and interpret the geological drawings of mines; 1.2 Read and interpret drawings of drilling and blasting processes; 1.3 Set up the hole net on site; 1.4 Perform medium-deep hole blasting construction for surface mines; 1.5 Perform safety management of drilling and blasting operations. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of engineering drawing; 2.2 Basic principles of safety and system optimisation; 2.3 Principles of matching equipment type, set and capacity; 2.4 Principles of loss reduction and dilution; 2.5 Working principles of the DTH drill and roller-bit rotary rig; 2.6 Principles of safety first and prevention crucial.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Basic requirements for drilling and blasting work in surface mine; 3.2 Selection of the DTH drill and troller-bit rotary rig, and calculation method for the equipment coordination; 3.3 Determination and calculation of parameters of blasting hole net for deep hole blasting and adjacent slopes in normal mining in surface mines; 3.4 Theory of safety and systems engineering. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in reading mining map; 4.4 Drawing skills; 4.5 Computer application skills; 4.6 Skills in using office software. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The drilling and blasting in deep holes in normal excavation of surface mines and drilling and blasting on adjacent slopes are completed.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION	**DUTY NO.**	402
TASK TITLE	MINE ROCK BUCKETING AND TRANSPORTATION	**TASK NO.**	4022
PERFORMANCE CRITERIA	The person performing this task in Mining Technology Department must be able to determine the bucketing and transportation equipment, participate in the completion of the safe construction operations of bucketing and transportation in accordance with the objectives of the mine's production tasks and the mining and stripping parameters of the working surface.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the chief mine engineers or senior metal mining technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer; 4. Transportation equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Understand and apply proficiently the surface mine design specification and safety technical regulations; 2. Determine the type and set of bucketing and transportation equipment; 3. Determine the mode of entry and exchange of transportation equipment at the working surface; 4. Determine the main technical parameters of transportation routes; 5. Prepare drawings of the mining and stripping process; 6. Participate in bucketing and transportation safe construction operations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the type of bucketing and transportation equipment in accordance with production needs; 1.2 Determine the number of bucketing and transportation equipment; 1.3 Carry out replacement of transportation equipment at the working surface; 1.4 Perform safety management of bucketing and transportation equipment; 1.5 Combine surface mine design specifications, safety and technical regulations with production. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of engineering drawing; 2.2 Basic principles of safety and system optimisation; 2.3 Principles of matching equipment type, set and capacity; 2.4 Principles of loss reduction and dilution; 2.5 Principles of safety first and prevention crucial.

	3.0 Theories The person performing this task must be able to explain the following: 3.1 Commonly-used bucketing and transportation equipment in surface mine; 3.2 Operation mode of loading machine shovels on the working surface; 3.3 Extractive elements of mechanical shovel work; 3.4 Ways to increase the productivity of excavators; 3.5 Mode of entry and exchange of transportation equipment at the working surface; 3.6 Technical requirements for transportation routes; 3.7 Theory of safety and systems engineering. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in reading and drawing mining drawings; 4.4 Skills in AutoCAD drafting and use of Office software; 4.5 Continuous learning skills. **5.0 Math Skills** The person performing this task must have the following math skills: 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The work of determining the elements of extraction in the working face of surface mines and the safe implementation of bucketing and transportation work is carried out in accordance with the requirements of construction.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Safety knowledge.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION	**DUTY NO.**	402
TASK TITLE	IMPLEMENTATION OF SOIL DUMPING OPERATIONS	**TASK NO.**	4023
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to fulfill the daily task of safely removing waste soil and rock from the dumping site in accordance with the mine's stripping ratio, the volume of waste soil and rock, and the mining and stripping schedule.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the chief mine engineers or senior metal mining technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer; 4. Soil dumping equipment.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and interpret topographical and geological drawings of the mine site and information on mining and stripping schedule; 2. Understand and apply proficiently the surface mine design specification and safety technical regulations; 3. Select the location of the dumping site; 4. Determine process and equipment of dumping; 5. Participate in the safe removal of waste soil and rock; 6. Handle, control and prevent diseases in the dumping site.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and interpret mine topographic and geological maps, mining and stripping schedules; 1.2 Choose a soil dumping site; 1.3 Carry out safety management of soil dumping site operations. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of safety and system optimisation; 2.2 Principles of matching equipment type, set and capacity; 2.3 Basic principle of selecting a soil dumping site; 2.4 Principles of safety first and prevention crucial. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Theory of safety and systems engineering; 3.2 Basic theory of rock mechanics;

	3.3 Theory of disaster prevention and control in dumping site. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in reading and drawing mining drawings; 4.4 Skills in drafting and use of Office software. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The siting and construction of the dumping site and safe discharge of waste soil and rock from surface mines are carried out in accordance with construction requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	UNDERGROUND MINING CONSTRUCTION	**DUTY NO.**	403
TASK TITLE	MINING PREPARATION AND CUTTING ENGINEERING CONSTRUCTION	**TASK NO.**	4031
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to carry out the corresponding mining preparation and cutting engineering construction in accordance with the different mining methods.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the chief mine engineers or senior metal mining technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer; 4. Relevant construction tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand mine exploration reports and geological information; 2. Understand and apply the underground mine design specification and safety technical regulations; 3. Read and interpret the three-views of the mining method; 4. Read and understand the design information and drawings of mining methods for mining preparation and cutting engineering; 5. Organise and implement the excavation of mining preparation and cutting engineering; 6. Calculate the total work amount of the mining preparation and cutting project for an ore block; 7. Calculate the excavation time for a block of mining preparation and cutting engineering; 8. Prepare the construction schedule of mining preparation and cutting	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Carry out the excavation and mining preparation project; 1.2 Carry out mining preparation and cutting engineering; 1.3 Calculate the total amount of work involved in mining preparation and cutting; 1.4 Calculate the excavation time for mining preparation and cutting engineering; 1.5 Prepare a construction schedule for mining preparation and cutting engineering construction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 The principle that the mining preparation, cutting project, and stoping process shall be well-matched; 2.2 The principle that mining preparation and cutting project shall meet the requirements of stoping; 2.3 Principles of minimising the cutting-mining ratio; 2.4 Principles of loss reduction and dilution; 2.5 The principle that the arrangement of mining preparation, cutting project, and prospecting shall

project for an ore block;	be well-matched. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Typical projects of various mining methods; 3.2 Adaptation theories of mining methods for mining preparation, cutting engineering design and stoping process and mining area bottom structure. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 AutoCAD drawing skills; 4.4 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The mining preparation and cutting engineering construction is carried out in accordance with the construction requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	UNDERGROUND MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	403
TASK TITLE	STOPING PROCESS CONSTRUCTION	**TASK NO.**	4032
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to organise the construction of the corresponding stoping process in accordance with the different mining methods.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the chief mine engineers or senior metal mining technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer; 4. Relevant construction tools.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand mine exploration reports and geological information; 2. Understand and apply the underground mine design specification and safety technical regulations; 3. Read and interpret the three-views of the mining method; 4. Read and interpret design information and drawings for stoping operations in mining methods; 5. Perform stoping in the stoping room; 6. Calculate the time required for a stoping cycle;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and interpret three-views drawings and drill-hole layouts of mining methods; 1.2 Conduct rock drilling and blasting; 1.3 Remove ore; 1.4 Conduct ground pressure management; 1.5 Prepare a stoping cycle time. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of "Forced Mining" and "Forced Excavation"; 2.2 Principles of using advanced rock drilling, loading, and ore removal equipment; 2.3 Principles of increasing labour productivity; 2.4 Principles of loss reduction and dilution; 2.5 Principles for keeping a safe operating environment. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Typical projects of various mining methods;

	3.2 The selecting of stoping processes and mining machines for various mining methods. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Drawing skills; 4.4 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Organise the corresponding mining operations in accordance with the different stoping methods.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT, SAFETY INSPECTION AND SUPERVISION OF THE MINE	**DUTY NO.**	404
TASK TITLE	MINING METHODS, IMPLEMENTATION OF MINING PREPARATION, CONSTRUCTION SCHEME AND TECHNICAL DISCLOSURE	**TASK NO.**	4041
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to complete the implementation of mining methods, mining preparation, construction scheme and technical disclosure in accordance with the different construction projects.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the senior metal mining technicians, chief mine engineers or registered safety engineers. The tools and equipment to be used include: 1. Computer; 2. Office software; 3. Various construction specifications.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Prepare safety measures for special construction scheme of greater danger during the construction process, based on the engineering construction project and construction drawings of the mine project; 2. Prepare the engineering construction plans of the mine project; 3. Prepare a list of materials for construction acceptance for metal mining; 4. Prepare construction notices; 5. Prepare specific requirements for the acceptance notice.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Clarify mine engineering construction projects; 1.2 Prepare a construction schedule; 1.3 Prepare notices and engineering requirements; 1.4 Observe the specification for quality acceptance of shaft and drift engineering. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Geological exploration and prediction; 2.2 Support design; 2.3 Selection of excavation methods; 2.4 Ventilation and dust prevention; 2.5 Safety measures; 2.6 Drainage system; 2.7 Regular inspection and monitoring. **3.0 Theories**

	The person performing this task must be able to explain the following: 3.1 Quality acceptance specification for mine shaft and drift engineering; 3.2 Construction schedule. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Office software; 4.4 Learning skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Notices for construction and acceptance status are prepared.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT, SAFETY INSPECTION AND SUPERVISION OF THE MINE	**DUTY NO.**	404
TASK TITLE	CONSTRUCTION QUALITY SUPERVISION AND SIMPLE ASSESSMENT OF ENGINEERING CONSTRUCTION QUALITY OF VARIOUS PROJECTS	**TASK NO.**	4042
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to complete construction quality supervision and simple assessment of the quality of engineering construction in accordance with the different projects.		
RANGE STATEMENT	The task can be performed at the construction site under the organisation and direction of the senior metal mining technicians, chief mine engineers or registered safety engineers. The tools and equipment to be used include: 1. Computer; 2. Office software; 3. Safety protection facilities		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Be familiar with the general objectives and requirements of work safety; 2. Be familiar with measures for work safety management; 3. Complete acceptance in accordance with the construction operation specifications and acceptance process.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Read and understand the general objectives of work safety; 1.2 Read and understand the general requirements for work safety; 1.3 Develop measures to manage work safety in production. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of compliance; 2.2 Technical principles; 2.3 Principles of design consistency; 2.4 Principles of material quality; 2.5 Principles of process control. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Work safety objectives of the project; 3.2 Measures for the work safety of the engineering. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Safety management knowledge and skills; 4.4 Learning skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The monthly, quarterly and annually work safety production plans are prepared.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Knowledge of structural engineering; 2. Knowledge of occupational safety.

TABLE 1: DACUM CHARTS FOR METAL MINING TECHNICIAN - NTA 4

DUTIES	TASKS	ENABLERS
1.0 Shaft and drift construction	1.1 Recognition of shaft and drift section drawing. 1.2 DTH drilling construction.	**General skills and knowledge** · Mining geological data reading skills · Basic knowledge of engineering drawing · Basic knowledge of mathematics · Communication skills · Teamwork skills · Engineering drawing operation skills · Learning skills **Tools and equipment** · Computers · Teaching prototype of drilling equipment **Materials** · Steel · Concrete · Timbering materials · Lubricating oil · Water **Requirements for employees** · Continuous learning · Safety consciousness · Professional dedication
2.0 Surface mining construction	2.1 Execution of drilling and blasting operations. 2.2 Mine rock bucketing and transportation. 2.3 Implementation of soil removal operations.	**General skills and knowledge** · Engineering drawing and basic knowledge of drawing reading · Basic knowledge of mathematics · Safety operation knowledge of blasting equipment · Safety operation knowledge of mechanical equipment · Communication skills · Teamwork skills · Engineering drawing operation skills · Learning skills **Tools and equipment** · Computers · Drilling equipment

DUTIES	TASKS	ENABLERS
		· Transportation equipment **Materials** · Steel · Concrete · Blasting material · Ore treatment equipment · Timbering materials · Lubricating oil · Water **Requirements for employees** · Safety consciousness · Professional dedication
3.0 Underground mining construction	3.1 Mining preparation and cutting engineering construction. 3.2 Stoping process construction.	**General skills and knowledge** · Basic knowledge of engineering drawing · Basic knowledge of mathematics · Communication skills · Teamwork skills · Learning skills **Tools and equipment** · Computers **Materials** · Steel · Concrete · Timbering materials · Lubricating oil · Water **Requirements for employees** · Safety consciousness · Professional dedication
4.0 Daily management, safety inspection and supervision of the mine	4.1 Mining methods, implementation of mining preparation, construction scheme and technical disclosure. 4.2 Construction quality supervision and simple assessment of engineering construction quality of	**General skills and knowledge** · Basic knowledge of engineering drawing · Knowledge of construction technique · Knowledge of design techniques · Knowledge of construction management

DUTIES	TASKS	ENABLERS
	various projects.	· Knowledge of safety management **Tools and equipment** · Computers · Mapping software · Safety equipment and appliances · Safety signs and marks · Emergency rescue equipment; · Testing instruments and equipment · CAD software **Materials** · Sheet **Requirements for employees** · Hard-working · Solidarity and cooperation · Integrity and responsibility · Organisation and coordination; · Down-to-earth and dedicated · Safety consciousness