NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

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PROPOSED OCCUPATIONAL STANDARDS

OCCUPATION: METAL MINING TECHNICIAN

LEVEL: NTA 5

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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 excavation implementation

d) Blasting analysis, design and organisation management

e) Surface mining construction

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 5

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ORGANISATION OF SHAFT AND DRIFT CONSTRUCTION	**DUTY NO.**	501
TASK TITLE	ORGANISATION OF HORIZONTAL DRIFT CONSTRUCTION	**TASK NO.**	5011
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to complete the organisation of horizontal drift construction according to the design.		
RANGE STATEMENT	The task can be performed within the construction area under the organisation and leadership of senior technicians or 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. Make a drift cross-section drawing; 3. Determine the type and size of drift cross-sections; 4. Prepare forms of work amount and material consumption; 5. Organise and design the horizontal drift excavation 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 horizontal drift design drawings. 1.3 Organise the horizontal drift construction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Specifications for the design of shaft and drift; 2.2 Principles of planimetry calculation; 2.3 Basic principles of engineering drawing. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of selecting horizontal drift cross-sections; 3.2 Calculation of horizontal drift cross-section size; 3.3 Equipment matching requirements for mechanised operating lines of horizontal drift excavation;

	3.4 Method of organising and managing horizontal drift construction. **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	Horizontal drift cross-section drawings are read and interpreted, forms of work amount and material consumption are prepared, and construction is organised according to operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ORGANISATION OF SHAFT AND DRIFT CONSTRUCTION	**DUTY NO.**	501
TASK TITLE	PATIO CONSTRUCTION ORGANISATION	**TASK NO.**	5012
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to design the patio cross-section and organise the construction accordingly.		
RANGE STATEMENT	The task can be performed within the construction area under the organisation and leadership of senior technicians or 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 patio design; 3. Prepare forms of work amount and material consumption; 4. Prepare the organisation and design for the construction of the patio excavation; 5. Carry out the construction organisation of the patio excavation.	**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 patio design; 1.3 Select the method of patio excavation; 1.4 Organise the construction of patios. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Specifications for the design of shaft and drift; 2.2 Basic principles of engineering drawing. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Principles of selecting patio cross-sections; 3.2 Method of patio excavation and its advantages and disadvantages. **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	Work amount and material consumption are prepared, and construction is organised according to operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	ORGANISATION OF SHAFT AND DRIFT CONSTRUCTION	**DUTY NO.**	501
TASK TITLE	INCLINED SHAFT CONSTRUCTION ORGANISATION	**TASK NO.**	5013
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to organise and implement construction work in accordance with the design of the inclined shaft.		
RANGE STATEMENT	The task can be performed within the construction area under the organisation and leadership of senior technicians or 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 inclined shaft design; 3. Prepare forms of work amount and material consumption; 4. Prepare the organisational design for the construction of the inclined shaft excavation; 5. Carry out construction work on the inclined shaft excavation.	**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 inclined shaft design; 1.3. Organise the construction of the inclined shaft cross-section. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Specifications for the design of shaft and drift; 2.2 Basic principles of engineering drawing; 2.3 Principles of supporting. **3.0 Theories** The person performing this task must be able to explain the following: 3.1. Principles of the cross-section selection and layout of inclined shafts; 3.2. Methods for determining the cross-section size of inclined shafts. **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	Work amount and material consumption are prepared, and construction is organised according to operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	502
TASK TITLE	DRILLING AND BLASTING CONSTRUCTION ORGANISATION	**TASK NO.**	5021
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to complete safe construction operations of drilling and blasting in accordance with the design.		
RANGE STATEMENT	The task can be performed on the construction area under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

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. Determine the parameters of the blasting hole net for deep hole blasting and adjacent slopes for normal mining in surface mine; 5. Prepare drawings of the drilling and blasting process; 6. Organise and participate in safe construction operations for drilling and blasting.	**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 Combine with surface mine design specification and safety and technical regulations; 1.3 Read and interpret drawings of drilling and blasting processes; 1.4 Lay out the site hole net; 1.5 Perform medium-deep hole blasting construction for surface mines; 1.6 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 principle of safety and system optimisation; 2.3 Principle of matching equipment type, set and capacity; 2.4 Principles of loss reduction and dilution; 2.5 Principle of safety first and prevention crucial; 2.6 Working principles of the DTH drill and roller-bit rotary rig.

	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 DTH drill and troller-bit rotary rig, and calculation method for the equipment coordination; 3.3 Methods of reading and drawing mineral maps. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Deep hole drilling and blasting and drilling and blasting on adjacent slopes during normal mining in surface mines are carried out in accordance with operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	502
TASK TITLE	MINE ROCK BUCKETING AND TRANSPORTATION CONSTRUCTION ORGANISATION	**TASK NO.**	5022
PERFORMANCE CRITERIA	The person performing this task in Mining Technology Department must be able to determine the bucketing and transportation equipment, organise or 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 on the construction area under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Understand and apply 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. Organise and participate in safe construction operations for bucketing and transportation.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Combine with surface mine design specification and safety and technical regulations; 1.2 Determine the type of bucketing and transportation equipment; 1.3 Determine the number of bucketing and transportation equipment; 1.4 Prepare drawings of the mining and stripping process; 1.5 Carry out replacement of transportation equipment at the working surface; 1.6 Perform safety management of bucketing and transportation equipment. **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 principle of safety and system optimisation; 2.3 Principle of matching equipment type, set and capacity; 2.4 Principles of loss reduction and dilution;

	2.5 Principle of safety first and prevention crucial. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Requirements for 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. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The safe implementation of the work of determining extractive elements and bucketing and transportation in surface mines is carried out in accordance with the operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	SURFACE MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	502
TASK TITLE	CONSTRUCTION ORGANISATION FOR SURFACE MINE DUMPING	**TASK NO.**	5023
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 on the construction area under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

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. Organise and 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; 1.4 Combine with surface mine design specification and safety and technical regulations and production; **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principle of safety and system optimisation; 2.2 Principle of matching equipment type, set and capacity; 2.3 Basic principle of selecting a soil dumping site; 2.4 Principle 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. **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 the operation specifications and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	UNDERGROUND MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	503
TASK TITLE	MINING PREPARATION AND CUTTING ENGINEERING CONSTRUCTION ORGANISATION	**TASK NO.**	5031
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 organisation in accordance with the different mining methods.		
RANGE STATEMENT	The task can be performed on the construction field under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following operations: 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 Determine the excavation method of mining preparation and cutting project for the mining method; 6. Determine the type and number of labourers required for excavation mining preparation and cutting engineering; 7. Determine the type and number of equipment required for excavation mining preparation mining preparation and cutting engineering; 8. Determine the type and consumption of materials required for excavation	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the type and number of mining preparation and cutting engineering equipment for various mining methods during excavation; 1.2 Determine the type and number of labourers required for excavation mining preparation and cutting engineering; 1.3 Determine the type and consumption of materials required for excavation mining preparation and cutting engineering; 1.4 Calculate the total amount of work involved in mining preparation and cutting; 1.5 Calculate the excavation time for mining preparation and cutting engineering; 1.6 Prepare a construction schedule for mining preparation and cutting engineering construction; 1.7 Undertake mining preparation and cutting engineering for various mining method during excavation. **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

mining preparation mining preparation and cutting engineering; 9. Organise and implement the excavation of mining preparation and cutting engineering; 10. Calculate the total work amount of the mining preparation and cutting project for an ore block; 11. Calculate the excavation time for a block of mining preparation and cutting engineering; 12. Prepare the construction schedule of mining preparation and cutting project for an ore block;	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 Minimum cutting-mining ratio; 2.4 Loss reduction and dilution; 2.5 Prospecting in the arrangement of mining preparation and cutting engineering. **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 standards 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 Drawing skills; 4.4 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Mining preparation and cutting engineering are carried out in accordance with the operation specification and the occupational requirement.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	UNDERGROUND MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	503
TASK TITLE	CONSTRUCTION ORGANISATION OF STOPING OPERATION	**TASK NO.**	5032
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to design the construction organisation for the corresponding stoping operation according to the different mining methods.		
RANGE STATEMENT	The task can be performed on the construction area under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

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 understand the three-views of mining methods; 4. Read and interpret design information and drawings for stoping operations in mining methods; 5. Determine the model and quantity of rock drilling equipment and the type and quantity of blasting equipment in a stoping cycle; 6. Determine the type and quantity of ore handling equipment in a stoping cycle; 7. Determine the model and quantity of equipment and type and quantity of materials to be consumed for the goaf ground pressure management in a stoping cycle; 8. Determine the type and quantity of workers required for a stoping cycle; 9. Organise and perform stoping in the	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the model and quantity of rock drilling equipment and the type and quantity of blasting equipment; 1.2 Determine the model and quantity of ore handling equipment; 1.3 Determine the model and quantity of equipment and type and quantity of materials to be consumed for the goaf ground pressure management; 1.4 Determine the type and number of labourers required for the stoping operation; 1.5 Perform rock drilling and blasting, ore handling, and goaf pressure management in mining areas for various mining method projects; 1.6 Make a stoping in mining room. 1.7 Calculate the time required for a stoping cycle; 1.8 Calculate the amount of ore extracted in a stoping cycle. **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;

stoping room; 10. Calculate the time required for a stoping cycle; 11. Calculate the amount of ore extracted in a stoping cycle.	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 Requirements of selecting stoping processes and mining machines for various mining methods. **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 implementation of stoping operations is carried out in accordance with the operation specification and occupational requirement.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	UNDERGROUND MINING CONSTRUCTION ORGANISATION	**DUTY NO.**	503
TASK TITLE	CONSTRUCTION ORGANISATION FOR PILLAR STOPING AND TREATMENT OF GOAF	**TASK NO.**	5033
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to carry out the corresponding ore pillar and handling of goaf construction organisation in accordance with the different mining methods.		
RANGE STATEMENT	The task can be performed on the construction area under the organisation and direction of the chief mine engineers or senior technicians. The equipment and tools to be used include: 1. Office software; 2. AutoCAD software; 3. Computer.		

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 for ore pillar stoping and goaf treatment in the mining method; 5 Determine the type and quantity of equipment, materials to be consumed, and workers required for top pillar stoping; 6. Determine the type and quantity of equipment, materials to be consumed, and workers required for sill pillar stoping; 7. Determine the type and quantity of equipment, materials to be consumed, and workers required for rib pillar stoping; 8. Determine the type and quantity of equipment, materials to be	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Carry out the stoping of the crown pillar; 1.2 Carry out the stoping of the rib pillar; 1.3 Carry out the stoping of the sill pillar; 1.4 Carry out the stoping of the other pillars; 1.5 Deal with the goaf. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of safe and efficient ore pillar stoping and goaf treatment; 2.2 Principles of loss reduction and dilution; 2.3 Principles of rapid ore pillar stoping and goaf treatment; 2.4 Principles of using advanced rock drilling, loading, and ore removal equipment; 2.5 Principles of increasing labour productivity; **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Pillar stoping requirements of the open stoping method;

consumed, and workers required for the stoping of other pillars; 9. Determine the type and quantity of equipment, materials to be consumed, and workers required for goaf treatment; 10. Organise and implement the stoping of crown pillar, sill pillar and rib pillar as well as other pillars; 11. Organise and implement goaf treatment.	3.2 Pillar stoping requirements of the stowing method; 3.3 Requirements for ground pressure treatment in goaf; 3.4 Processes for the treatment of goaf. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Skills in using computer. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Pillar stoping and goaf treatment is carried out in accordance with the operation specification and the occupational requirement.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT AND MAINTENANCE OF MINE VENTILATION	**DUTY NO.**	504
TASK TITLE	MEASUREMENT OF WIND SPEED AND AIRFLOW	**TASK NO.**	5041
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to accurately determine the actual wind speed and airflow at the designated location.		
RANGE STATEMENT	The task can be performed within the construction area under the organisation and leadership of senior technicians or chief engineers. The tools and equipment to be used include: 1. Anemometer; 2. Stopwatch; 3. Tape measure; 4. Telemeter rods; 5. Record tables; 6. Calculator.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Measure the average wind speed in shafts and drifts; 2. Measure the cross-section area of shaft and drift ventilation; 3. Calculate a correction factor for personnel obstruction.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Apply the lattice points method to determine the average wind speed; 1.2 Apply the parabolic method to determine the shaft and drift ventilation cross-section area; 1.3 Calculate the correction factor and true wind speed based on the obstruction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principle of wind speed measurement; 2.2 Principle of airflow measurement. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Method of selecting a wind gauge before measurement; 3.2 Technical and safety precautions during measurement;

	3.3 Method for controlling errors in measurements; 3.4 Method for determining average wind speed in shaft and drift; 3.5 Method for determining shaft and drift ventilation cross-section area; 3.6 Method of calculating the personnel obstruction factor. **4.0 Essential Skills** 4.1 Teamwork skills; 4.2 Calculation and analysis skills; 4.3 Error control skills; 4.4 Report preparation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Measurement of wind speed and airflow is carried out in accordance with the operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT AND MAINTENANCE OF MINE VENTILATION	**DUTY NO.**	504
TASK TITLE	AIRFLOW DISTRIBUTION CONTROL IN THE MINING AREA AND WIND FLOW CONVEYANCE IN THE EXCAVATION FACE	**TASK NO.**	5042
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to fulfil the requirements for airflow distribution control in the mining area and wind flow transportation in the face of the excavation.		
RANGE STATEMENT	The task can be performed in the construction area under the organisation and leadership of the senior technicians or chief engineers. The tools and equipment to be used include: 1. Calculator.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Calculate the air demand of the excavation face; 2. Design the airflow transmission system for the excavation face; 3. Calculate the air demand and air supply in the mining area; 4. Design the control system for ventilation and airflow distribution in the mining area.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Calculate the air demand of the excavation face; 1.2 Select the method of conveying the wind flow in the excavation face; 1.3 Choose the airduct for conveying the wind flow in the excavation face; 1.4 Calculate the ventilation resistance of the airduct at the face of the excavation; 1.5 Choose the local fan that conveys the wind flow from the excavation face; 1.6 Estimate the investment in ventilation of the excavation face and the cost of electricity; 1.7 Calculate the actual air demand in the mining area; 1.8 Determine the reasonable air supply for the mining area; 1.9 Select the way to control the airflow distribution in the mining area; 1.10 Calculate ventilation investment and electricity fee in mining area. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Mechanism of dust and smoke exhaust and ventilation in excavation face;

	2.2 Balance of efficiency and economy; 2.3 Principles of dynamic regulation and real-time monitoring. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Calculation method of air demand for excavation work; 3.2 Method of selecting ventilation methods for excavation face; 3.3 Method of selecting the airduct for the excavation face; 3.4 Calculation method for ventilation resistance of the airduct; 3.5 Method of selecting the specification and model of the local fan; 3.6 Method of calculating investment and electricity fee for excavation ventilation; 3.7 Method of calculating the actual air demand in the mining area; 3.8 Method of determining reasonable air supply in mining areas; 3.9 Design method of controlling the added resistance of windshield in the mining area; 3.10 Design method of controlling drag-reduction brushing in mining area; 3.11 Design method of auxiliary fan pressurisation and control in mining area; 3.12 Method of selecting the airflow regulation method in the mining area; 3.13 Method of calculating investment and electricity fee for ventilation in mining areas; 3.14 Methods of designing ventilation systems for excavation face; 3.15 Advantages and disadvantages of the three methods of airflow distribution regulation in the mining area; 3.16 Design method of airflow distribution and control system in mining area. **4.0 Essential Skills** 4.1 Teamwork skills; 4.2 Calculation and analysis skills; 4.3 Error control skills; 4.4 Report preparation skills. **5.0 Math Skills**

	5.1 Basic arithmetic skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Design of wind flow conveyance schemes for excavation face and implementation and management of airflow distribution regulation and control in the mining area is carried out in accordance with the operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT, SAFETY INSPECTION AND SUPERVISION OF THE MINE	**DUTY NO.**	505
TASK TITLE	CONSTRUCTION SAFETY TECHNICAL DISCLOSURE AND TECHNICAL GUIDANCE	**TASK NO.**	5051
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to complete construction safety and technical instructions and prepare construction and acceptance notices according to the different construction projects.		
RANGE STATEMENT	The task can be performed in the construction area under the organisation and leadership of the senior technicians or the 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 s of greater danger during construction; 2. Prepare the engineering construction plans of the mine projects; 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 Prepare a construction schedule; 1.2 Prepare notices and engineering requirements; 1.3 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 Quality acceptance specification for mine shaft and drift engineering; 2.2 Specifications for the mine shaft and drift engineering construction. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Preparation theory for quality acceptance of mine shaft and drift engineering; 3.2 Construction schedule requirements.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Learning skills; 4.4 Article writing skills. **5.0 Math Skills** 5.1 Calculation skills in commonly-used functions.
DESCRIPTION OF THE END PRODUCT / SERVICE	The preparation of notification forms for construction notices, acceptance status, etc., are carried out in accordance with operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	DAILY MANAGEMENT, SAFETY INSPECTION AND SUPERVISION OF THE MINE	**DUTY NO.**	505
TASK TITLE	PROFESSIONAL COMMUNICATION	**TASK NO.**	5052
PERFORMANCE CRITERIA	The person performing this task in the Mining Technology Department must be able to keep communication with the Department of surveying, geological and ore dressing depending on different projects, ensuring that production is carried out properly.		
RANGE STATEMENT	The task can be performed in the construction area under the organisation and leadership of the senior technicians or the chief mine engineers or registered safety engineers. The tools and equipment to be used include: 1. Computer; 2. Office software.		

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. Carry out work safety management; 3. Organise the process and perform the achievement acceptance.	**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 Work safety guideline; 2.2 Principles of work safety; **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. **5.0 Math Skills** 5.1 Calculation skills in commonly-used functions.
DESCRIPTION OF THE END PRODUCT / SERVICE	The monthly, quarterly and annually work safety plans are prepared in accordance with the operation specification and occupational requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MANAGEMENT AND MAINTENANCE OF MINING EQUIPMENT	**DUTY NO.**	506
TASK TITLE	DAILY MANAGEMENT OF MINING EQUIPMENT	**TASK NO.**	5061
PERFORMANCE CRITERIA	The person performing this task must implement the selection of equipment rationally in accordance with the principles of metal mining equipment selection and meet the relevant safety regulations.		
RANGE STATEMENT	The task can be performed in metal mines under the supervision of senior technicians or electrical and mechanical engineers. The tools and equipment to be used include: 1. Relevant safety specification; 2. Computer; 3. Calculator; 4. CAD software; 5. Printer.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Read and understand relevant safety regulations; 2. Prepare for the reference books and tools necessary for selection and design; 3. Collect raw data on metal mining equipment selection and design; 4. Correctly select and calibrate the models, specifications and quantities of transportation equipment for metal mines in accordance with the production conditions and relevant procedures and specifications; 5. Prepare protocols for the use management.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Implement relevant safety regulations; 1.2 Determine the applicable place for metal mining equipment ; 1.3 Select device model. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Working principles of equipment; 2.2 Principles for equipment selection **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Components of the equipment and the role of each part; 3.2 Calculation methods and steps for equipment selection; 3.3 Application methods of office software. **4.0 Essential Skills**

	4.1 Communication skills; 4.2 Teamwork skills; 4.3 Transportation equipment operation and selection skills; 4.4 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The models, specifications and quantities of mine transportation equipment are correctly selected and calibrated and the design instructions are prepared in accordance with the production conditions and relevant procedures and specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety; 2. Laws and regulations of work safety.

OCCUPATION	METAL MINING TECHNICIAN	**OCCUPATION CODE**	
DUTY TITLE	MANAGEMENT AND MAINTENANCE OF MINING EQUIPMENT	**DUTY NO.**	506
TASK TITLE	DAILY MANAGEMENT OF MINING EQUIPMENT	**TASK NO.**	5062
PERFORMANCE CRITERIA	The person performing this task must be able to repair and maintain equipment in accordance with the technical requirements for repair and maintenance of equipment.		
RANGE STATEMENT	The task can be performed in repair workshops under the supervision of senior technicians or electrical and mechanical engineers. The tools and equipment to be used include: 1. Metal mining equipment; 2. Crane; 3. Equipment maintenance tool kit; 4. Personal protective equipment; 5. Lathe, milling machine, electric welding machine, etc.; 6. Mechanical fitter's tool.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Comply with the relevant standards for the integrity of electromechanical equipment, and the requirements for the content and maintenance of overhaul, medium repair, minor repair of metal mining equipment; 2. Analyse faults of transportation equipment and their causes; 3. Develop a maintenance scheme; 4. Prepare for tools for maintenance; 5. Repair fault parts; 6. Maintain equipment; 7. Debug equipment.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Troubleshoot common faults with major equipment components; 1.2 Repair the main components of the equipment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Equipment maintenance and overhaul system; 2.2 Equipment maintenance system. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Common faults of major components of transportation equipment and their causes; 3.2 Processes and methods for repairing major components of transportation equipment. **4.0 Essential Skills** 4.1 Communication skills;

	4.2 Teamwork skills; 4.3 Learning skills. **5.0 Math Skills** 5.1 Geometric and trigonometric function calculation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The repair of faulty parts and maintenance and debugging of equipment are conducted in accordance with production conditions and relevant regulations and specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Laws and regulations of work safety; 2. Occupational health and safety

TABLE 1: DACUM CHARTS FOR METAL MINING TECHNICIAN - NTA 5

DUTIES	TASKS	ENABLERS
1.0 Organisation of shaft and drift construction	1.1 Organisation of horizontal drift construction 1.2 Patio construction organisation. 1.3 Inclined shaft construction organisation.	**General skills and knowledge** · Mining geological data reading · Selection and size calculation of horizontal drift cross-section · Support design and calculation · Basic knowledge of engineering drawing · Basic knowledge of mathematics · Communication skills · Teamwork skills · Engineering drawing operation skills · Learning skills **Tools and equipment** · Computers · Safety marks and warning signs · Construction site facilities and temporary appliances · Transportation and transportation equipment **Materials** · List of mechanical equipment and tools. · On-site monitoring and charting **Requirements for employees** · Safety consciousness · Professional dedication
2.0 Surface mining construction organisation	2.1 Drilling and blasting construction organisation. 2.2 Mine rock bucketing and transportation construction organisation. 2.3 Construction organisation for surface mine dumping.	**General skills and knowledge** · Engineering drawing and basic knowledge of drawing reading · Basic knowledge of mathematics · Knowledge of safety operation of mechanical equipment, blasting equipment · Communication skills · Teamwork skills · Engineering drawing operation skills · Learning skills **Tools and equipment** · Computers

DUTIES	TASKS	ENABLERS
		· Teaching prototype of drilling equipment · Emergency rescue plans and equipment **Materials** · On-site monitoring and charting **Requirements for employees** · Safety consciousness · Professional dedication
3.0 Underground mining construction organisation	3.1 Mining preparation and cutting engineering construction organisation. 3.2 Construction organisation of stoping operation. 3.3 Construction organisation for pillar stoping and treatment of goaf.	**General skills and knowledge** · Basic computing skills · Use of AutoCAD and Office software. · Basic knowledge of engineering drawing · Basic knowledge of mathematics · Communication skills · Teamwork skills · Engineering drawing operation skills · Learning skills **Tools and equipment** · Computers · Emergency rescue equipment **Materials** · On-site monitoring and charting **Requirements for employees** · Safety consciousness · Professional dedication
4.0 Daily management and maintenance of mine ventilation	4.1 Measurement of wind speed and airflow. 4.2 Control and management of wind flow in mining areas and excavation faces.	**General skills and knowledge** · Drawing and basic knowledge of drawing reading · Basic knowledge of mathematics · Operation skills for anemometers, stopwatches, tape measures and telemeter rod · Operation skills for air gauge · Teamwork skills · Calculation and analysis skills · Learning skills

DUTIES	TASKS	ENABLERS
		Tools and equipment · Computers · Anemometer · Stopwatch · Tape measure · Telemeter rod · Record chart · Calculator · Ventilation equipment testing instrument **Materials** · Ventilation equipment maintenance record form **Requirements for employees** · Safety consciousness · Professional dedication
5.0 Daily management, safety inspection and supervision of the mine	5.1 Construction safety technical disclosure and technical guidance. 5.2 Professional communication.	**General skills and knowledge** · Basic knowledge of engineering drawing · Construction technique knowledge · Knowledge of design techniques · Basic knowledge of construction engineering · Knowledge of construction management · Safety management knowledge **Tools and equipment** · Computers · Mapping software **Materials** · List of safety equipment and appliances · Safety signs and marks **Requirements for employees** · Hard-working · Solidarity and cooperation · Honesty and responsibility · Down-to-earth and dedicated
6.0 Management and	6.1 Daily management of mining equipment.	**General skills and knowledge**

DUTIES	TASKS	ENABLERS
maintenance of mining equipment	6.2 Daily maintenance of mining equipment	· Communication skills · Skills and knowledge of mining equipment selection · Technical drawing interpretation skills · Equipment management skills · Statistical skills **Tools and equipment** · Computers · Personal protective equipment · Office software · Safety signs and marks · Mining equipment · Cranes · Equipment maintenance tools; · Lathe, milling machine, electric welding machine, etc. · Mechanical fitter's tool **Materials** · List of safety equipment and appliances **Requirements for employees** · Hard-working · Solidarity and cooperation · Honesty and responsibility · Down-to-earth and dedicated