

 BOTSWANA Qualifications Authority Classification: Internal	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.P01.GD02
		Issue No.	01
		Effective Date	01.08.2022

SECTION A: QUALIFICATION DETAILS														
QUALIFICATION DEVELOPER (S)		Orapa Technical College												
TITLE	Certificate V in Diamond Mining Process Plant Operations										NCQF LEVEL	5		
STRANDS (where applicable)	1. N/A 2. 3. 4.													
FIELD	Mining			SUB-FIELD			Mining Engineering			CREDIT VALUE	1 2 5			
New Qualification							√	Legacy Qualification						
SUB-FRAMEWORK		General Education			√	TVET			√	Higher Education				
QUALIFICATION TYPE	Certificate	I	II	III	IV	V	√	Diploma	Bachelor					
	Bachelor Honours			Post Graduate Certificate			Post Graduate Diploma							
	Masters					Doctorate/ PhD								
RATIONALE AND PURPOSE OF THE QUALIFICATION														
RATIONALE: <p>Mining is one of the key industries in Botswana and together with Tourism, constitute major foreign exchange earners for the country. Mining on its own is the backbone of the Botswana economy providing a greater part of the nation's foreign earnings. Diamond mining stands out as the main provider of resource for national development and it is essential to ensure that there is effectiveness and efficiency in the extraction and processing of the mineral.</p>														

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The Debswana Mining Company produces majority of the diamonds that are produced in Botswana and hence there is need to ensure that the operations of extracting the diamonds as well as processing the mineral are undertaken with great care and skill.

Providing training in mining process plant operation is therefore essential in getting persons trained in the efficient use of these machines in separating the precious metal from other rocks. Training mining process plant operators on the various mineral processing plants will enhance their competencies and equip them to maximise the performance of these plants and ensure higher productivity for the establishment.

This need within the mining industry is echoed by the HRDC Report on Priority Skills and Employment Trends, HRDC, 2019 which classifies Process Operators/Metallurgical Operators as one of the 'Top Occupations in Demand in Botswana'. The availability of such competent workforce ties in well with the Government drive for quality skills development as outlined in the Education and Training Sector Strategic Plan 2015 to 2020 which sets out the framework for improving education and training performance in Botswana over a 6-year period. The goal of the ETSSP, which is to 'provide an overall policy and strategic sector framework for the education sector that will play a pivotal role in the development of a modern, sustainable, knowledge-based economy that supports inclusiveness and diversity' serves as a key driver for development of such skills relevant to the economy. These ideals are supported by other Government initiatives and policy frameworks such as the Revised National Policy on Education of 1994 and the National Human Resource Development Strategy (2009 – 2022). Currently, there is a shortage of personnel who are competent in the usage of the various plants.

Orapa and Jwaneng Mines have been training school leavers employed by the organisations as process plant operators for years. These courses have equipped the new recruits in gaining relevant industry skills for operating the plants. In the case of Orapa Mine Training Centre in particular, these courses have been combined to form a certificate qualification which are awarded by the mine. However, over the years, it has been observed that holders of the mine qualification are unable to gain recognition in other organisations within the region and internationally as these are considered to be in-house awards of the mine in spite of the competencies demonstrated by the graduates of this qualification. With the establishment of the Botswana Qualifications Authority (BQA) and the ongoing transformation of the education and training system in Botswana to an outcomes-based credit bearing system, the organisation has found it necessary to develop this qualification as a credit-bearing outcomes-based award and have it registered on the National Credit and Qualifications Framework (NCQF) to facilitate recognition of the graduates within the region and internationally.

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PURPOSE:

The purpose of the qualification is to equip graduates with broad technical knowledge, skills, and competencies to:

- Apply knowledge of various machinery used in ore processing operations
- Work safely in the diamond mining environment
- Produce a range of diamond mineral products using a range of ore processing machinery
- Apply an understanding of laboratory standards in mineral ore processing functions.


MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Applicants will be admitted to this qualification after satisfying the admission requirements set out for this qualification. Thus, entry to the Certificate in Diamond Mining Process Plant Operations qualification is open to individuals who possess any of the following:

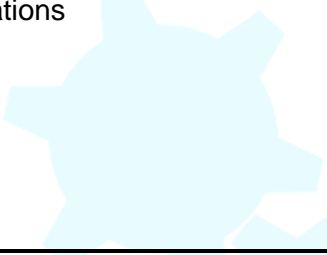

- a) NCQF Level IV in General Education or an equivalent, with a pass in Mathematics, English and Science
- b) Applicants with any relevant or related qualifications may be considered for access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) modes

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SECTION B		QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)		ASSESSMENT CRITERIA	
1. Demonstrate broad technical knowledge and application of occupational health and safety requirements to minimise or eliminate workplace hazards 		Apply current legislation on safety and health in the workplace <ul style="list-style-type: none"> Identify potential hazards in the workplace and take measures to minimize or eliminate them Implement procedures for recording accidents that could cause bodily harm in the workplace Identify safe work practices and health principles Apply workplace hazard identification systems Recognise the importance of clear and effective communication and establish modes of communication in relation to health and safety in the workplace Apply health and safety protocols in the workplace 	
2. Demonstrate ability to work as member of a team to achieve set targets		<ul style="list-style-type: none"> Maintain personal hygiene and acceptable appearance Show professionalism in the workplace Prioritize work activities using appropriate methods Perform work related tasks with others Review own performance of assigned group task 	
3. Identify and solve routine and non-routine technical workplace problems		<ul style="list-style-type: none"> Distinguish routine and non-routine workplace problems Apply set procedures for problem solving Solve routine and non-routine workplace problems Evaluate results of solving non-routine workplace problems 	
4. Develop ability to perform computer operations using Microsoft applications		<ul style="list-style-type: none"> Open a new word document and enter information Apply features and functions of word processing in simple word document Save and print the document Produce a simple spreadsheet document Check the spreadsheet for appropriate formatting, readability, legibility, presentation, accuracy and data integrity Use the Spreadsheet to solve a problem 	

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5. Demonstrate knowledge and skill in the use of various machinery and equipment in process plant operations 	<ul style="list-style-type: none"> ○ Apply safety precautions in operating the following machines or equipment: Crushing Plant, Screening Plant, Scrubbing Plant, Dense Medium Separation Plant, Water Reticulation Plant, Tailing Disposal Plant, and Recovery Plant ○ Identify the functions of the parts of each machine or equipment used in ore processing ○ Apply the operational principles of each machine and equipment used in ore processing operations
6. Develop knowledge and skill in the use of Crushing, Screening and Scrubbing Plants to produce a product as per plant specifications. 	<ul style="list-style-type: none"> ○ Explain the operations of the Crushing, Screening and Scrubbing Plants ○ Prepare to operate the Crushing, Screening and Scrubbing Plants ○ Carry out pre-start checks on the Plant having regard for safety and security issues ○ Start a Crushing, Screening and Scrubbing Plants following established safety procedures ○ Operate each of the Crushing, Screening and Scrubbing Plants, ○ Monitor the products from the Crushing, Screening and Scrubbing Plants and report any deviations ○ Comply with safety procedures required for operating the Crushing, Screening and Scrubbing Plants ○ Comply with the security procedures required for operating the Crushing, Screening and Scrubbing Plants ○ Shutdown the Plant following established procedures and observing safety
7. Demonstrate knowledge and technical ability to produce a product using a Dense Medium Separating Plant as per plant specifications.	<ul style="list-style-type: none"> ○ Explain the operations of the Dense Medium Separating Plant ○ Plan and prepare to operate the Dense Medium Separating Plant ○ Carry-out pre-start checks on the Dense Medium Separating Plant having regard for safety and security issues ○ Start the Dense Medium Separating Plant following established safety procedures ○ Operate the Dense Medium Separating Plant, ○ Monitor the product from the Dense Medium Separating Plant and report any deviations


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	<ul style="list-style-type: none"> ○ Comply with safety procedures required for operating the Dense Medium Separating Plant ○ Comply with security procedures required for operating the Dense Medium Separating Plant ○ Shutdown the Dense Medium Separating Plant following established procedures and observing safety
<p>8. Demonstrate knowledge and skill of using a Water Reticulation Plant to produce a product as per plant specifications</p> 	<ul style="list-style-type: none"> ○ Explain the operations of the Water Reticulation Plant ○ Plan and prepare to operate the Water Reticulation Plant ○ Carry-out pre-start checks on the Water Reticulation Plant having regard for safety and security issues ○ Start the Water Reticulation Plant following established safety procedures ○ Operate the Water Reticulation Plant, ○ Monitor the product from the Water Reticulation Plant and report any deviations ○ Comply with safety procedures required for operating the Water Reticulation Plant ○ Comply with security procedures required for operating the Water Reticulation Plant ○ Shutdown the Water Reticulation Plant following established procedures and observing safety
<p>9. Develop technical ability to dispose mineral residue using disposal facilities as per plant specifications.</p>	<ul style="list-style-type: none"> ○ Explain the operations of the Disposal Plant ○ Plan and prepare to operate the Tailings Disposal Plant ○ Carry-out pre-start checks on the Tailings Disposal Plant having regard for safety and security issues ○ Start the Tailings Disposal Plant following established safety procedures ○ Operate the Tailings Disposal Plant, ○ Monitor the product from the Tailing Disposal Plant and report any deviations ○ Comply with safety procedures required for operating the Tailing Disposal Plant ○ Comply with security procedures required for operating the Tailings Disposal Plant ○ Shutdown the Tailings Disposal Plant following established procedures and observing safety

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10. Develop knowledge and skill in the use of a Recovery Plant to produce a product as per plant specifications	<ul style="list-style-type: none"> ○ Explain the operations of the Recovery Plant ○ Plan and prepare to operate the Recovery Plant ○ Carry-out pre-start checks on the Recovery Plant having regard for safety and security issues ○ Start the Recovery Plant following established safety procedures ○ Operate the Recovery Plant, ○ Monitor the product from the Recovery Plant and report any deviations ○ Comply with safety procedures required for operating the Recovery Plant ○ Comply with security procedures required for operating the Recovery Plant ○ Shutdown the Recovery Plant following established procedures and observing safety
11. Apply knowledge and understanding of laboratory standards in a diamond processing plant as per plant specifications	<ul style="list-style-type: none"> ○ Demonstrate knowledge of the functions of various laboratory equipment ○ Demonstrate understanding of the purpose of samples and the impact of results on a business ○ Comply with safety procedures for obtaining samples ○ Take samples of mineral products for analysis ○ Process and analyse samples in accordance with established organisational laboratory procedures ○ Capture and report the results in accordance established organisational procedures


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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [3]	Level [4]	Level [5]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Basic Computer Operations		10		10
	Solving Workplace Problems			6	6
	Self-Management and Team Work		8		8
	Health and Safety in the Workplace		5		5
CORE COMPONENT Subjects/Courses/ Modules/Units	Machinery and equipment used in ore processing operations	20			20
	Engineering hand tools and Manual Lifting Equipment	6			6
	Crushing, Screening and Scrubbing Plants			20	20
	Dense Medium Separation Plant			20	20
	Water Reticulation Plant			12	12

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STRANDS/ SPECIALIZATION	<i>Subjects/ Courses/ Modules/Units</i>	Credits Per Relevant NCQF Level			Total Credits
		Level []	Level []	Level []	
1.	N/A				
2.					
Electives	Mineral Residue Disposal Facilities			10	10
	Recovery Plant			15	15

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	Laboratory Standards and Operations		10		
	Professionalism in the Workplace		4		4
	Customer Service		3		3
	Time Management			5	5



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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL		
TOTAL CREDITS PER NCQF LEVEL		
NCQF Level	Credit Value	
3	26	
4	40	
5	88	
TOTAL CREDITS	154	
Rules of Combination: (Please Indicate combinations for the different constituent components of the qualification)		
Candidates are required to pursue all the modules in the Fundamental Component which contributes a total of 29 credits to the award of the qualifications. In addition, candidates are required to complete all the outcomes in the Core Component of the qualification. This contributes a total of 78 credits making a total of 107 credits. Candidates are required to select a minimum of two outcomes from the electives to achieve the 125 credits required to attain the qualification and the rules of combination are shown below:		
Elective		
Guidance on the selection of options will be provided by the Centre management team and will be based on learner performance on previous outcomes as well as established need of the organisation.		
Option 1	Option 2	Option 3
Mineral Residue Disposal Facilities	Recovery Plant	Laboratory Standards and Operations
Option 4	Option 5	Option 6
Professionalism in the Workplace	Customer Service	Time Management

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ASSESSMENT ARRANGEMENTS

The learning outcomes of this qualification will form the basis for all assessments leading to the award of credits for this qualification. Thus, the standards-based assessment approach will be used to assess learners against the learning outcomes.

The weightings assessments will be:

- 80% Formative
- 20% Summative

Use of Qualified Assessors

All assessors assessing candidates against the outcomes must possess:

- a) Qualification in the subject area – subject matter experts at one level above the certificate level
- b) Successfully completed the Standards-Based Assessment Training
- c) Accredited with BQA as Assessors

MODERATION ARRANGEMENTS

MODERATION

Systems shall be put in place to moderate the assessment both internally and externally.

Assessment results will be declared only after moderation. Both Internal and External moderation shall be carried out in line with the BQA requirements and the organisation's Assessment and Moderation Policies

RECOGNITION OF PRIOR LEARNING

There Shall be provision for awarding the qualification through Recognition of Prior Learning (RPL).

CREDIT ACCUMULATION AND TRANSFER

There Shall be provision for awarding the qualification through Credit Accumulation and Transfer(CAT)

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

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There are a number of options open to the graduate of this qualification in terms of learning and employment. It is noted that the qualification will be registered on the National Credit and Qualifications Framework so it will be internationally recognised.

Learning Pathways:

Vertical Articulation

The candidate who successfully completes this Certificate V in Mining Process Plant Operations is eligible to enter into a Diploma in Mining Engineering Qualification at Level 6 of the NCQF both locally or internationally.

Horizontal Articulation

There shall be provision for awarding the qualification through the principles of Credit Accumulation and Transfer (CAT). The candidate can branch into:

- Certificate V in Gold Mining Process Plant Operations
- Certificate V in Copper Mining Process Plant Operations
- Certificate V in Coal Mining Process Plant Operations

Employment Pathways

The graduate of this qualification is eligible for employment as:

- Process Plant Operator in a Diamond Mining Operation
- Process Plant Supervisor in a Diamond Mining Operation

QUALIFICATION AWARD AND CERTIFICATION

The candidates who meets a minimum of 125 credits will be awarded Certificate V in Diamond Mining Process Plant Operations and shall be awarded a certificate

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

This qualification is not offered locally ,regionally and international however the modules offered by METSKILLS (PTY) Limited in South Africa in National Certificate in Mineral Processing Level 4 are similar to those offered in this qualification.

The results of the benchmarking are summarised below:

Institution/Body	Title of Qualification	Entry Requirements	Duration
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METSKILL (Pty) Ltd of South Africa	National Certificate in Mineral Processing L4	Matric	1 year

The qualification is designed such that it compares well with the qualifications mentioned above. The benchmarking reveals that the Certificate in Diamond Mining Process Plant Operations Qualification is intended to have a duration of one and half years whereas the benchmarked qualifications are for one-year duration. The envisaged trainee is the school leaver so provision has been made to provide background knowledge in machinery and equipment at the early stages of the qualification whereas for the BOTA qualification registered on the BNVQF the foundational knowledge is expected to be covered in the National Intermediate and National Foundation Certificates. The outcomes for the qualifications are comparable with the other qualifications however the sub-outcomes have been refined to ensure clarity when assessing learners. Generally, however, the qualifications all cover similar outcomes and the successful graduate from the different qualifications are comparable in terms of their capabilities and competencies.

In terms of International comparability, we could not find any qualification similar to this qualification

REVIEW PERIOD

This qualification is subject to review every five years. This notwithstanding, the qualification will be reviewed at any time when there is need, for example when there are changes in the needs of the key stakeholders. The intent is to make the qualification fit for purpose hence the need to monitor industry-wide development and technological changes that may impact on the role of the process plant operator.

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