



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF ENGINEERING AND BUILT ENVIRONMENT

DEPARTMENT OF CIVIL, MINING AND PROCESS ENGINEERING

QUALIFICATION: BACHELOR OF ENGINEERING: MINING ENGINEERING	
QUALIFICATION CODE: 08BMEG	LEVEL: 8
COURSE CODE: MPD811S	COURSE NAME: MINE PLANNING AND DESIGN 415
SESSION: JUNE 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY QUESTION PAPER	
EXAMINER(S)	Prof. H. Mischo
MODERATOR:	Dr. T. Tholana

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer all questions.2. Read all the questions carefully before answering.3. Marks for each question are indicated at the end of each question.4. Please ensure that your writing is legible, neat and presentable.

PERMISSIBLE MATERIALS

1. Examination paper.
2. Calculator and appropriate stationery

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

You are the mine manager of a local fluorspar mine. You are currently operating 4 different orebodies on your mine site as surface mining operations. Orebody D is the only high-grade orebody and thus the ore coming from this orebody is required as a “sweetener” in order to guarantee a continuous feed to the processing plant.

The surface mining operation on orebody D had to be stopped due to an extremely unfavourable ore-to-waste-ratio. Now the company CEO asks you to investigate the possibility to transform the surface mine on orebody D into an underground operation. Please answer the following 10 Questions. More information is given at the attached papers, you can use this papers to visualize your answer with sketches.

Given information about the deposit:

- Total ROM from all four orebodies is 120.000 t/a.
- Orebody D has to contribute 40.000 t/a from the future underground operation.
- For the future underground mine you have access to all existing mining services from the ongoing surface mines (e.g. workshops, labs, electricians, mechanics, grade controller, mine surveyor...)
- Until now: extraction in surface mining.
- Surrounding rock Fenite (uniaxial strength 200 - 250 MPa), host rock highly altered in a 2 m wide contact zone to the orebody
- Hydrothermal vein deposit, orebody D splits into numerous parallel ore veins (uniaxial strength 20 - 50 MPa)
- Orebody thickness 1 - 20 m, dip 60 - 90 gon, CaF₂-content 37 %
- Underground mine will be operated as one-shift operation with 10h/shift
- 250 Working days / year

Question 1 [10 marks]

Describe your development plan for the underground mine, indicate the placement and lineage of the surface openings in the attached drawings

Question 2 [10 marks]

Select an appropriate mining method und substantiate your decision

Question 3 [10 marks]

Name type and number of additionally required mobile mining equipment for the underground operation Please give a payload range for your haulage machines

Question 4 [10 marks]

Compare diesel and battery driven mobile equipment. Substantiate your choice for the new mine

Question 5 [10marks]

Discuss the Pros and Cons for a backfill operation for this underground mine. Where is the backfill material coming from. Do you need cemented backfill?

Question 6 [10marks]

Describe your ventilation concept and indicate in the drawing. Where do place the main mine fan? Please describe and show in the drawing

Question 7 [10marks]

Describe your concept for the supply/disposal of the underground mine with utilities and water and indicate in the drawing

Question 8 [10marks]

Name all new staff positions you have to fill for the underground mine. Describe the necessary competence levels for each position. Describe you staff recruitment strategy. What is the minimum number of staff required to operate the underground mine

Question 9 [10marks]

Describe your Safety and Rescue Concept for the underground mine

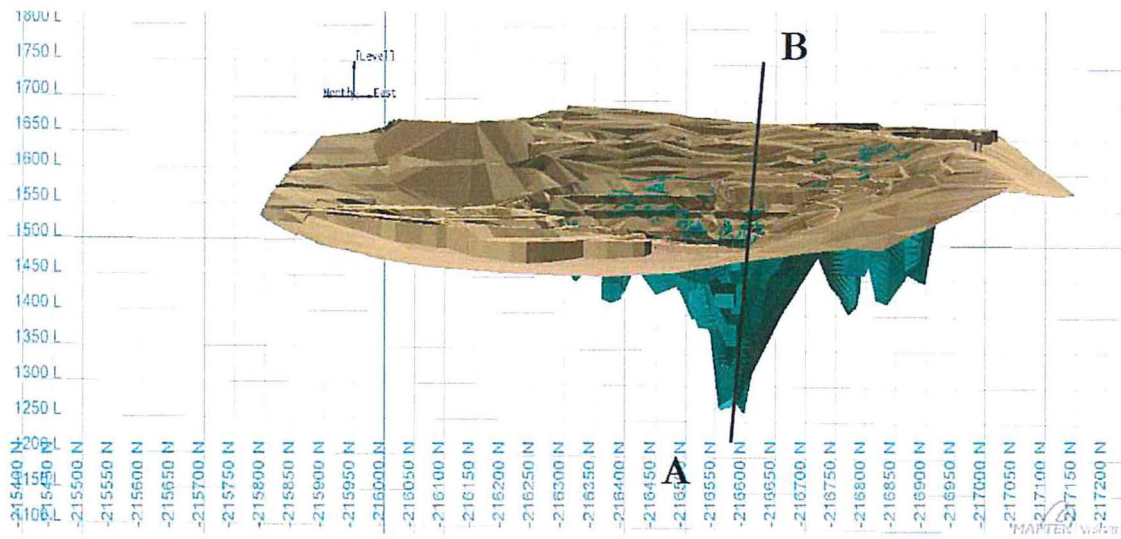
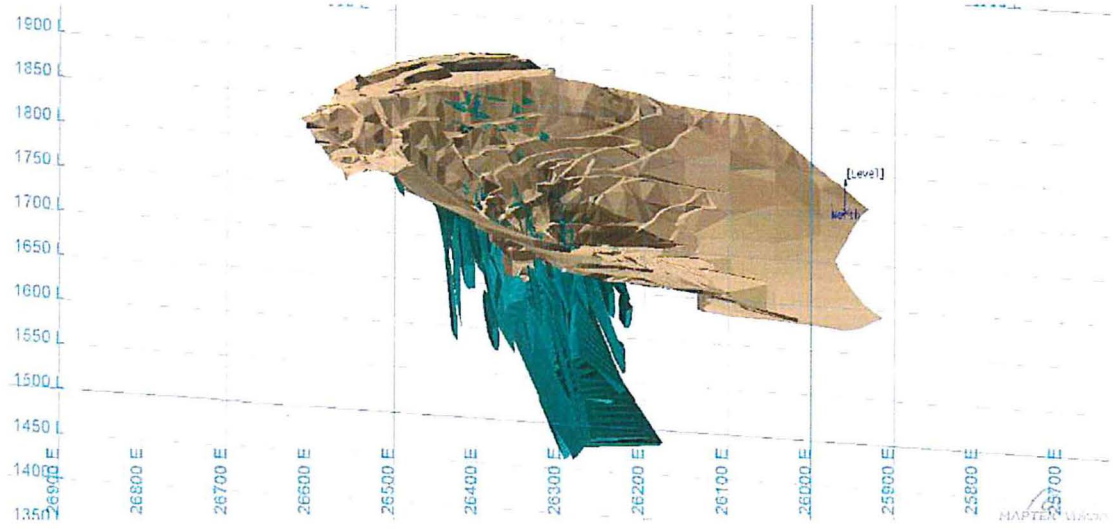
Question 10 [10marks]

Summarize your suggestion to the company CEO if the mine should go/not go into an underground operation for orebody A within three sentences

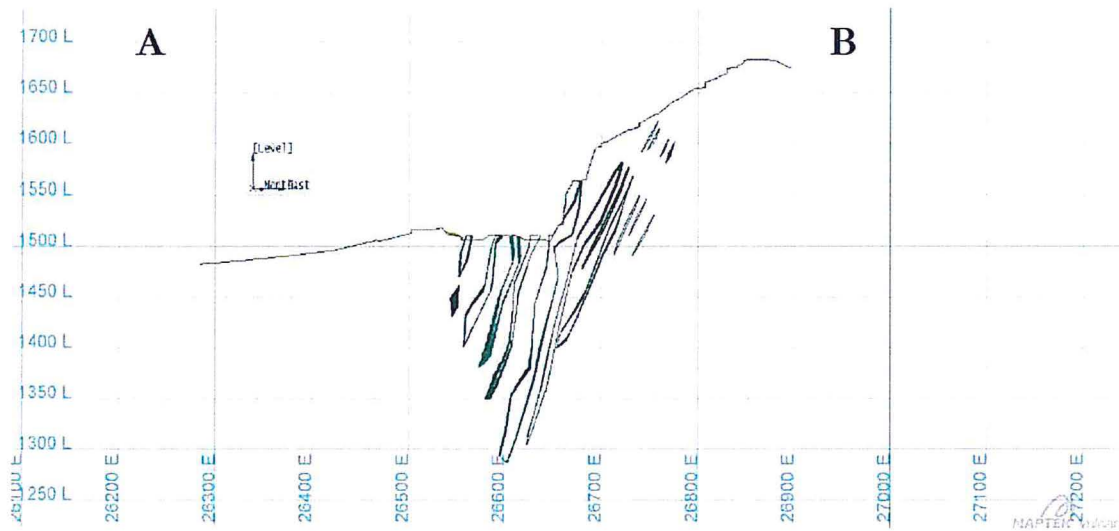
Additional Notes

DEPOSIT: FLUORSPAR ORE A

3D-View (grid 50 m)



Section view (grid 50 m)



Given information about the deposit:

- Until now: extraction in surface mining.
- Surrounding rock Fenite (strength 200 - 250 MPa)
- Hydrothermal vein deposit, orebody D splits into three parallel ore veins (strength 20 - 50 MPa)
- Thickness 1 - 20 m, dip 40 - 60 gon, CaF₂-content 55 %