



ASM PIT SIDE CHAT BOOK
A Gateway to Best Practices
A Guide to Sustainable ASM in Zambia

ABBREVIATIONS

AMR	Artisanal Mining Rights
ASM	Artisanal and Small –scale Mining
ESG	Environment, Social and Governance
EPB	Environmental Project Brief
LSML	Large scale Mining Licence
MMMD	Ministry of Mines & Minerals Development
MPL	Mineral Processing Licence
MSD	Mines Safety Department
NGO	Non – Governmental Organizations
NRC	National Registration Card
SSML	Small –Scale Mining licence
EU	European Union
UNDP	United Nations Development Programme
OACPS	Organization of African, Caribbean and Pacific Group of States
ZEMA	Zambia Environmental Management Agency
ZRA	Zambia Revenue Authority

FOREWORD

Zambia is a country endowed with a variety of mineral resources, which include copper, gold, manganese, cobalt, emerald, fluoride, tin, amethyst and many more. These minerals have been exploited at both large- and small-scale operations. In the recent times, there has been an increase in Artisanal and Small-Scale Mining (ASM) across the country. This is attributed mainly to more discoveries of minerals in many areas across the country. There is also a sharp increase in the number of citizens conducting mining either as individuals or as cooperatives. The Government of Zambia views this sector to have immense potential to contribute to both job creation and economic development of the country.

The Government of Zambia has since the early 2000s incorporated national development plans and programmes to develop the country's ASM sector. However, to date this potential has not been realised primarily due to the inability of ASM players to operate in a sustainable manner in terms of Safety, Health and Environmental Protection and also as proper business entities which are able to plan its works, execute programmes in accordance with the programs of operations and generate profit. The discovery of minerals has seen the rapid increase of 'informal miners' across the country who don't have basic knowledge and training on sustainable mining operations. Furthermore, lack of proper geological and mining information has also inhibited the development of the ASM sector.

In the 8th National Development Plan for 2022 to 2026, the government has prioritized the development of Artisanal and Small-Scale mining (ASM) as one of the strategies for job creation and economic diversification. Ways of Developing the Artisanal and Small Scale Mining includes; converting informal miners into legalized entities by way of them registering cooperatives that can be issued with licenses; provide technical extension services to in order to build capacity; promote the conservation of mineral resources of the Republic through appropriate mining methods and mineral processing technology in order to prevent wasteful mining and environmental degradation, ; interface with the ministries responsible for finance, environment and other cooperating partners on matters supporting the growth of the artisanal and small-scale mining subsector; promote value addition to optimise mineral exploitation; and to provide access to funding for the ASM sector players.

The increase in participation in ASM mining by formal and 'informal' Zambian miners has resulted into an increase in a number of accidents and deaths, an increase in environmental degradation where the miners are working from, increase in the use of dangerous chemicals such as silver mercury and influx of some foreign individuals whose intention is to buy minerals at an exploitative price.

In order to combat the negative vices observed in the ASM Sector, the Ministry of Mines and Minerals Development working with various stakeholders such as Zambia Environmental Management Agency, Ministry of Labour and Social Security, University of Zambia, United Nations Development Programme, ESMAZ, Women in Mining and many other stakeholders decided to develop an ASM training manual known as the "Pit Side Chat Book" tailor made for Artisanal and Small-Scale Miners

The “Pit Side Chat Book” ASM training manual gives guidance on basic identification and exploration of minerals, mining and mineral processing methods; value addition in the Development Minerals; occupational health, safety and environmental issues of ASM operations; business planning for ASM operations; Access to finance and Marketing and environmental and Social mineral resource governance in Zambia

I am confident that this “Pit Side Chat Book” training manual has come at the right time and I believe it will serve as a valuable guide and resource book to all ASM Miners and its sector players. I sincerely urge all ASM miners and its sector players to make use of this training manual and make sure that it is kept at the operational sites for ease of reference and guidance. The Ministry of Mines and Minerals Development will ensure that the “Pit Side Chat Book” is relevant at all times by updating it with new technologies and processes applicable to the sector. It is my hope that the “Pit Side Chat Book” will serve as a very useful tool to the ASM sector in Zambia.



Hon. Paul C Kabuswe, MP

MINISTER OF MINES AND MINERALS DEVELOPMENT

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EXECUTIVE SUMMARY

The ASM Pit Side Chat Book is a Gateway to best practices in Artisanal and Small-Scale Mining (ASM) in Zambia. This guide takes the Miner through the various stages of mining. The first stage of the journey begins with a walk through the formalization path. This path shows the challenges to formalization and the benefits of formalization to the Artisanal and Small-Scale Miners. The next stage of the journey is through the mine planning phase which takes us through efficient mine design layouts, basic ASM infrastructure and rehabilitation planning.

The third stage of the guide focuses on building sustainable communities, obtaining a social licence to operate and grievance and conflict prevention mechanisms. The next stage of the journey is the Mining stage. This stage describes different mining and processing methods. Drilling and blasting risks are explored and mitigation measures are presented.

The Fourth stage of the journey is the safety aspect of mining in ASM. This journey takes us through the different potential hazards the ASM miners may encounter during mining operations.

The next stage of the journey takes us through the rehabilitation phase of the mining operations and the circular economy which stresses the need to recycle, reuse, repurpose and utilization of renewable resources in operations.

To ensure that the ASM thrive in their mining operations this ASM Pit Side Chat Book discusses access to finance. It presents a Five step guide as the ASM Miners Finance Navigator. It also explores the different available options for financing sources in Zambia. The access to market stage of the journey focusses on the various mineral specific strategies to obtain fair and legal markets for ASM Miners in Zambia.

The recommendations given in this ASM Pit Side Chat Book include the following

1. The formation of mining cooperatives with good governance systems.
2. Community engagement and obtaining of social licence to operate in the area where mining is taking place.
3. Incorporating Environmental, Social and Governance (ESG) in ASM operations.
4. Utilising of Government and NGO initiatives such as Citizen Economic Empowerment Funds, the ASM Fund, and Constituency Development Funds as access to finance options.
5. Building trust profiles to boost credit worthiness from banks
6. Pooling of production with fellow ASM miners to expand market access
7. Embedding a circular economy in all stages of ASM mining operations.

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The Stone at the Doorstep: A Zambian Miner's Parable

Copperbelt Province, 1978

Old Man Kito's calloused hands had dug earth since the days of Northern Rhodesia. Each dawn, he'd trek to his pit near Chingola – a serpentine tunnel bored into ochre soil, shored up with termite-eaten mopane wood. "Gold waits deeper," he'd mutter, though his yield barely bought mealie meal.

One rain-swollen July, his tunnel coughed. From its gullet, Kito pried a stone – cold, heavy, streaked with veins like frozen lightning. Too weary to carry it far, he dragged it home to Nkana West. For 17 years, it lay at his doorway, trodden by grandchildren's bare feet, washed by monsoons, unnoticed.

On June 12, 1995, Kito returned to his abandoned tunnel. Winter winds howled. Above ground, his grandson Musa begged: "*Mbuya, the beams sing!*" Kito waved him off. "Tradition demands depth!" At 3:17 PM, the earth groaned. The tunnel swallowed Kito whole.

The Mourning

Villagers unearthed his body after three days. At the funeral, winter bit hard. Kito's widow, Nyambe, ordered: "*Cook nshima – warm their bones.*" Three stones steadied the iron pot over acacia wood fire. One – smooth from years of footsteps – was *that* stone from the tunnel.

The Revelation

As elders chanted dirges, the fire roared. Suddenly – *CRACK!* The steppingstone split. Boiling nshima flooded the flames.

Through the hissing steam, young Musa saw it:

Molten gold bled from the stone's heart

Pooling in the ashes like liquid sun

They recovered 5.3kg of 22K gold – enough to build a school. Enough to save Kito's tunnel-bound sons.

The Cruel Truth

Kito died digging for what had *always* been at his threshold. Gold was literally underfoot for 17 years. Ignorance, not instability, killed him. That stone had whispered its worth:

Its weight (density > 19 g/cm³); the quartz veins (gold's cradle); even its location (near oxidized ore zones)

He never knew to listen.

DEDICATION

"To Kito and thousands unknown –

Who perished in darkness

While gold lay at their feet.

This manual is your grandson's cry:

TEST THE STONE AT YOUR DOOR.

IGNORANCE KILLS, NOT ACCIDENT.

For every Zambian miner –

May knowledge be your lamp,

Safety your shield,

And the earth's riches seen not just with eyes,

But with wisdom."

It is our wish that this story will haunt – and empower. Because in mining, accident and treasure sleep side by side. Only wisdom parts them.

– Ministry of Mines and Minerals Development, Zambia



INTRODUCTION

A FRAMEWORK FOR SUSTAINABLE AND PROSPEROUS ASM IN ZAMBIA

Artisanal and Small-Scale Mining (ASM) is the lifeblood of countless communities across Zambia. It is more than an economic activity; it is a vital source of livelihood, a catalyst for local development, and a testament to the resilience and entrepreneurial spirit of the Zambian people. The sector possesses immense potential to drive sustainable development, reduce poverty, and contribute significantly to our national economy, particularly in realizing the ambition of producing three million tonnes of copper by 2031.

However, this potential remains locked behind significant challenges. Unregulated practices have too often led to preventable tragedies, environmental degradation, and cycles of informality that limit growth and innovation. The prevalence of dangerous working conditions, the harmful use of chemicals, and limited access to finance and markets have constrained the sector's ability to thrive responsibly.

This **Pit-Side Chat Book** directly addresses these challenges. It marks a pivotal shift in how we support and empower our ASM sector. Developed by the Ministry of Mines and Minerals Development in collaboration with miners, experts, and stakeholders, this manual is not a set of distant rules but a practical, field-tested toolkit. It is designed *for* miners, by those who understand the realities of the pit.

Our Vision and Objectives

This manual is built on a clear vision: to transform Zambia's ASM sector into a global benchmark for safety, environmental stewardship, and economic prosperity. Its core objectives are to:

- **Empower with Knowledge:** Provide clear, actionable guidance on mineral identification, safe mining methods, and environmental management, turning practical skills into a competitive advantage.
- **Bridge the Formalization Gap:** Demystify the path to licensing and compliance, unlocking access to formal finance, fair markets, and government support.
- **Champion Safety and Health:** Equip every miner with the knowledge to identify hazards, prevent accidents, and protect their health, ensuring that every worker returns home safely.
- **Promote Sustainable Stewardship:** Integrate environmental and social governance (ESG) into the heart of ASM operations, from rehabilitating land to fostering inclusive community development.

A New Approach: Your Journey Through This Manual

This manual is your comprehensive guide, structured to take you from foundational knowledge to advanced, sustainable management of your mining enterprise. Here is what to expect:

- **FOUNDATIONS (Lessons 1-2):** We begin with the basics. **Know What You See** teaches you to correctly identify minerals and estimate resources. **Follow The Law** provides a clear roadmap to obtaining licenses and understanding compliance, ensuring your operation is legal and recognized.

- **STRATEGY & PLANNING (Lessons 2-A to 3):** Before you dig, you must plan. This section guides you in defining your mining vision, forming and governing effective cooperatives, and navigating the pathways to formalization. It culminates in practical **Mine Planning** and setting up the basic infrastructure needed for efficient and safe operations.
- **OPERATIONAL EXCELLENCE (Lessons 4-5):** Learn how to secure your **Social License to Operate** by building strong community relations. Then, dive into the core of your work: improving how you **Mine and Process** minerals, leveraging field-tested methods and optimizing your sites for better recovery and efficiency.
- **SAFETY & SUSTAINABILITY (Lessons 6-8):** This is the heart of responsible mining. A comprehensive module on **Health and Safety** provides you with a risk management plan, emergency drills, and codes to prevent collapses and manage your site. It extends to **Rehabilitation** and the **Circular Economy**, showing you how to care for your people and environment by minimizing waste and maximizing resource use.
- **GROWTH & PROSPERITY (Lesson 9):** Turn your operation into a thriving business. This section covers **Financial Strategies**, identifies sources of financing, and provides a step-by-step guide to accessing better markets through production pooling and strategic sales.

Where Promise meets expectations

By the end of this training, you will be equipped to transform your mining operation from an informal activity into a recognized, profitable, and safe business. You will gain the practical knowledge to correctly identify minerals, secure the necessary licenses, and implement planned mining practices that significantly reduce risks and environmental impact.

This manual will provide you with strategies to access new financing opportunities, negotiate better market prices, and build sustainable community relations. Ultimately, you will graduate from being seen as an informal laborer to becoming a respected entrepreneur and a steward of Zambia's natural resources, fully prepared to contribute to and benefit from the sector's formal economy.

The manual concludes with a powerful call to action, outlining **A New Path for Zambia's Mining Heartbeat**—a future where ASM is safe, formalized, and a proud contributor to national development.

This manual is more than a book; it is a commitment to a brighter future for every Zambian miner. It is a call to action to embrace better practices, to formalize your operations, and to become stewards of a sector that is safe, productive, and sustainable. Let this be the first step on your journey to transforming your work and your community.

The future of Zambian mining is in your hands. Let's build it together.

The Avatars' page

As the manual is envisioned to be interactive, this page will present 5 avatars, each representing a stakeholder group in the ASM sector. These are characters that will play a certain role throughout the document, and their personality will be equally crafted here to fit the role they are going to play throughout.

Avatar 1: The reckless ASM Miner (A man)

Avatar 2: The good ASM Miner (A woman)

Avatar 3: The Officer from ASM Department (A man)

Avatar 4: The Officer from the Mine Safety Department

Avatar 5: The buyer

Avatar 5: The community elder

LESSON 1: KNOW WHAT YOU SEE: MINERAL IDENTIFICATION & RESOURCE ESTIMATION

Last season, a miner in Kitwe discarded "worthless green rocks" – later identified as high-grade malachite worth ZMW 80,000/ton. Mineral misidentification isn't just a mistake; it is income lost or buried in your pit. This lesson trains your eyes to spot Zambia's hidden treasures, from Copperbelt cobalt to Lufwanyama emeralds among others. With correct minerals identification, you can seek help from a professional to support in further estimating the quantity of minerals.

This module includes 2 lessons. Lesson 2-A is on how to identify a mineral: visual cues while Lesson 2-B focuses on how to know how much mineral you have got in your license area?

LESSON 1-A—HOW TO IDENTIFY A MINERAL: VISUAL CUES

1. Objectives:

Identify 10+ Zambian minerals using visual cues, scratch tests, and UV light
Distinguish high-value ore from waste using vinegar fizz tests and density checks

2. Expected Outcomes:

By the end of this lesson, you should be able to name minerals on sight, calculate deposit values, and negotiate better price – turning rocks into reliable income.

3. Questions for a Miner

Icebreakers (Connect to Experience)

- Show a rock that fooled you—how did you learn it was worthless?
- How did you find the mineral you are mining?
- How do you find other minerals available in your area?
- Share some more tips on how to find minerals?

Share your feedback on the above questions

--

We asked 100 ASM miners about how they identify minerals. Below is their feedback:

- Some rocks appear to have gold, and yet there is nothing. We spend time mining the same.
- We follow a male vein. This vein leads us to the female vein
- Through interaction with some explorers
- They follow the veins and some yellowish materials (clay minerals associated with gold)
- By following small veins on the surface which lead to large and mineralized veins
- There is a tree called *Naketenge* that grows where gold is found.

Most have no method to quantify their minerals, meaning they do not know how much mineral is sitting in the ground. However, they just use instinct.

4. Learning from Peers: Field wisdom

There are several indigenous techniques in use by ASM miners. These include:

- Vein tracking ("male / female veins").
- Indicator plants (e.g., *Naketenge* tree at Keleshi).

- "If termite mounds are reddish, dig deeper." Gold (Petauke).
- "Green stains on rocks = gem zone." Emeralds (Lufwanyama).

There are other possibilities for low-cost testing. These include:

- Panning + blowing crushed rock to isolate gold (heavy material remains).
- Rubber tires/plates for gravity separation).

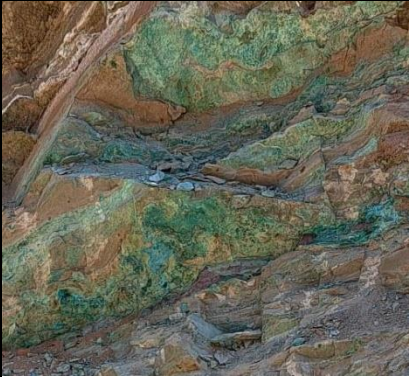


Despite decades of experience and knowledge acquired, challenges persist such as frequent misjudgment of ore value leading to wasted costs on waste removal.

Some ASM miners engaged geologists for professional advice on vein orientation and rock identification. Cases in point are Keleshi, Kakumbwa and Mukwenge cooperatives.

Innovations

- Mercury-free separation using tires, plates, and air blowing (Keleshi).
- Paper-sheet blowing technique to retain gold (Kakumbwa).

Table 1: Identification of rocks and minerals

Critical minerals	Copper Minerals		
			
	Name: Malachite From: Kitwe (Mopani mine) Main Use: Electronic product	Name: Azurite From: Chingola (Nchanga Mine) Main Use: Electronics Battery	Name: Chalcopyrite From: Kitwe (Mopani Mine) Main Use: Electronics
	Lithium Minerals		
			
	Name: Surgilite From: Mansa Main Use: Make Jewelry	Name: Spodumene From: Zimba (Mapatizya area) Also found: Luano	Name: Lepidolite From: Mapatizya Also found: Luona

		Main Use: Lithium Batteries	Main Uses: Lithium Batteries
			
<p>Name: Maganese</p> <p>From: Chipili District (Musamu Resources Mine)</p> <p>Also found in: Mansa, Mkushi, Serenje etc.</p> <p>Main uses: Battery manufacturing</p>	<p>Name: Cobalt</p> <p>From: Kitwe (Mopani mine)</p> <p>Also found in: Chingola, Chililabombwe and Mufilira etc.</p> <p>Main uses: Battery manufacturing</p>	<p>Name: Nickel</p> <p>From: Mazabuka District (Munali Nickel Mine)</p> <p>Also found in: Kalumbila etc.</p> <p>Main uses: Battery manufacturing</p>	
High value minerals (Metals and Gems)			
			
<p>Name: Emerald</p> <p>From: Lufwanyama (Chumwe mine)</p> <p>Also found in: Lundazi, Lusangazi etc.</p> <p>Main uses: Jewelry</p>	<p>Name: Aquamarine</p> <p>From: Itezhi itezhi(Kaingu Gem Mine)</p> <p>Also found in: Mapatizya, Lumezi</p> <p>Main uses: Jewelry</p>	<p>Name: Black tourmaline</p> <p>From: Itezhi itezhi (Kaingu Gem Mining)</p> <p>Also found: Siavonga</p> <p>Main use: Jewelry</p>	

Precious
metals and
stones



Name: Gold bearing rocks

From: Mansa??

Main uses: Jewelry



Name: Amethyst

From: Itezhi itezhi(Kaingu Gem Mine)

Also found in: Mapatizya, Mumbwa, Lumezi

Main uses: Jewelry



Name: Amazonite

From: Chama










Also found in: Patueke, Lumezi





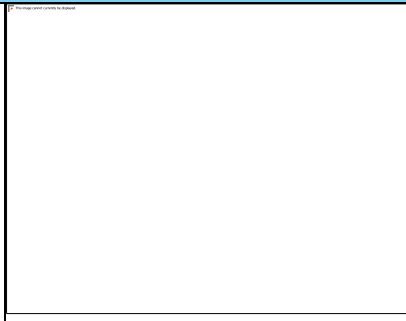




Main use: Jewelry




Name: Turquoise

Industrial Minerals

Development Minerals			
	Name: Fluorite From: Siavonga Aso found in Main use: Toothpaste, Ceramics industry	Name: Tin From: Kalomo Aso found in Choma, Zimba Main Use: Alloy component	Name: Clay (kaolin and bentonite) From: Main Use: ceramics, paper, pharmaceuticals, paints
			
	Name: Mica From: Mapatizya Main use: Cosmetics, Insulation	Name: Calcite From: Mumbwa Main use: Cement manufacturing	Name: Limestone Uses: cement, lime, steelmaking, water purification, paints, plastics.
			
	Name: Clay From/ Found in: Main uses: Ceramics, pottery, tiles	Name: Graphite Uses: the "lead" in pencils, a key component in lithium-ion batteries, a lubricant, used in nuclear reactors, steelmaking	Name: Gypsum Uses: a soil amendment (land plaster), a fertilizer, in cement production and dental applications

Development Minerals	Construction materials		
			
	Name: Sand Uses: construction and agriculture to recreation and industrial processes, concrete, mortar, and grout	Name: Clay Uses: construction, bricks, tiles, and plasters, composite materials like adobe and rammed earth,	Name: Limestone Uses: construction, building material, aggregate in concrete and asphalt, decorative elements.
	Semi-precious stones		
			
Name: Garnet From: Also found in: Main uses: Jewelry	Name: Sapphire From: Also found in: Main uses: Jewelry	Name: Tourmaline From: Also found in: Main uses: Jewelry	
Dimension stones			
			
Granite Main uses: Known for its durability and aesthetic appeal, is used extensively in construction for countertops, flooring, wall cladding, monuments, and paving, both indoors and outdoors.	Name: Limestone From: Ndola Main uses: used as a dimension stone, meaning it's quarried and shaped into blocks or slabs for various applications like building	Name: Slate From: Siavonga Main uses: Good flooring, walls, Pavers, Cladding	

Development Minerals	materials, paving stones, and decorative elements	
	 <p>From left to right: Cream Marble; Green Marble; White Marble; Pink Marble; Red Marble; and free Intricate Marble Texture</p> <p>Uses: building facades, sculptures, countertops, flooring, and even as a filler in paints and pharmaceuticals.</p>	

Peer Fire Chat Corner: Challenge Questions

- How would you test if a rock contains gold?
- Describe a time you misjudged mineral value. What cost did you bear?
- What low cost tool did you invert to estimate ore quality without labs?
- How did you engage a professional to help and what difference did it make?

Being able to identify a particular type of mineral or a wide range of minerals is an important step, but that is not enough for you to start mining. You still need to know the quantity and quality of the mineral as well as where it is located to avoid random digging as you may miss the location and break your business with wasteful digging. If you still have some doubts about what you see, contact the Minerals Regulation Commission or a geologist.

In the next lesson, we will be learning professional tips from a geologist and low costs technics, as well as why working with a geologist is unavoidable.

LESSON 1-B: RESOURCE ESTIMATION: HOW MUCH MINERAL IS THERE IN YOUR AREA?

After the mineral has been clearly identified—by yourself or with help from a geologist—it is essential to estimate the quantity and quality. This will help you mine the right way and avoid unnecessary digging, thereby reducing the negative environmental impact of your activities. Estimating mineral resources is also necessary for good financial planning and for obtaining credit against it as collateral.

1. Objectives : Estimate reserves with high accuracy using grid pitting and bulk sampling
Know where to mine to improve ASM output qualitatively and quantitatively

2. Expected outcomes : Geological information is essential for efficient mining and the lack of it can lead to wasteful practices. In this module, participants will learn cost-effective methods to estimate mineral reserves with reasonable accuracy, even in financially constrained settings. While drilling, sampling, and lab analysis remain the most reliable approaches, this module offers geologists practical, low-budget alternatives to support artisanal and small-scale miners (ASMs) in making informed decisions.

Involve a geologist

Several reserve estimation technics can be financially feasible for ASM miners and can yield good results

o Target Minerals

For Development Minerals (industrial minerals, dimension stones, construction materials) estimation can be done using practical technics from pitting to digging to area calculation etc. However, for other minerals types some drilling is required including sample analysis. These include Gold, Gemstones (emeralds, amethyst), Critical Minerals (cobalt, copper).

o Gold (Alluvial & Hard Rock)

Methods:

- **Grid Pitting:** Dig 2m x 2m pits every 20m. Sample each 0.5m layer.
- **Pan Testing:** Pan 5kg samples per pit. Weigh gold flakes with kitchen scale
- **Density:** Use 1.8 t/m³ (weathered) or 2.7 t/m³ (quartz veins).

Equipment required: shovel, scale, bags.

To boost accuracy it is advised to cross-check results with other ASM miners in the area based on their experience and historical data.

o Gemstones (Emeralds, Amethyst)

Methods:

- **Bulk Sampling:** Collect 100kg from each 5m² zone. Hand-sort gems.
- **Grade:** % gems per tonne (e.g., 0.1% = 1kg gems/tonne).
- **Density:** 2.6 t/m³ (pegmatite).

Equipment required: hammer, chisel.

Accuracy Boost: UV light for detecting emerald fluorescence.

○ Critical Minerals (Cobalt, Copper)

Methods:

- **Channel Sampling:** Cut 10cm x 10cm channels in outcrops. Sample every meter.
- **Field Tests:**
 - Copper: Vinegar + hydrogen peroxide turns green (indicative of malachite).
 - Cobalt: Borax bead test, blue = cobalt,

Equipment required: chisel, test kits

To boost accuracy compare with nearby industrial mine grades or nearest Mines Regional Office data.

○ Dimension Stones (Granite, Marble)

Methods:

- **Block Measurement:** Use rope to mark 2m³ blocks. Count fractures/joints.
- **Recovery Estimate:** 50% for fractured rock, 80% for solid.

Equipment required rope, paint.

To boost accuracy Accuracy Boost: Sell one test block to measure actual yield.

○ Construction Materials (Sand, Gravel)

Methods:

- Pit Volumetrics: Dig 1m³ pit. Screen material
- Density: Sand = 1.5 t/m³, Gravel = 1.8 t/m³.

Equipment required: Screen and shovel

Accuracy Boost: Track truckload sales for 1 week to validate

○ Industrial Minerals (Limestone, Talc)

Methods:

- Outcrop Sampling: Chip 10 samples per 100m². Test with vinegar (fizzes = limestone).
- Density: Limestone = 2.4 t/m³, Talc = 2.7 t/m³.

Equipment/input required vinegar, hammer.

Accuracy Boost: Check and compare with nearest Mines Regional Office data.

Knowledge Consolidation

○ Peer Fire Chat Corner:

Debate: "You have been mining copper for a while and one day you stumbled upon something different on your site. How can you prove which minerals it is?"

Scenario: After several days of digging for gold, you took two dozen bags to the hammer mill and after processing, the yield was poor, and you felt cheated. What should you do to ensure that next time gold yield increases?

○ **Challenge Yourself:**

- **Photo Quiz:** Identify 5 Zambian minerals from field photos (malachite vs. chrysocolla)
- **Field Calculation:** Estimate gold in 20x20m plot using shovel, pan, and kitchen scale
- **Spot the Fake:** Test pyrite vs. gold using vinegar fizz and density

Carry This With You:

It is obvious that minerals can be elusive as there is no good shortcut to finding what you are looking for in a particular place and being able to know the exact quantity. Reflecting from the above, mining requires technical knowledge and those who seek support from geologists.

Don't go at it alone, seek support from professionals, know how much minerals you have got and know where to dig, and win big! No more blind digging!

Mineral Identification Kit: Magnet, vinegar dropper, UV light

Pocket Guide: local mineral traits (e.g., "Kafubu emeralds: hexagonal crystals, UV red glow")

LESSON 2- FOLLOW THE LAW BEFORE YOU MINE: LICENSING AND COMPLIANCE

Though minerals can be found in your backyard, your farmland where you grow crops every season or in the river where you fish, you still cannot mine it straight away without a license. Though the land might be yours, you still require a license to mine. There are different types of licenses depending on the size of your operation. This section takes you to the heart of the compliance by the government to regulate and ensure proper sector governance. It introduces the different types of licenses and compliance levels required. Licenses aren't bureaucracy – they're your shield against exploitation as licensed miners can access finance and survive regulatory crackdowns. Master Zambia's licensing system to operate securely and profitably.

LESSON 2-A: YOU WANT TO MINE, WHAT IS YOUR VISION?

In mining, like in any other business, it is important to have a vision. Simply put, your vision is where you want to be in the future, where you want to see yourself or your business within a certain period of time. You found minerals and you want to mine, what is your vision for your undertaking?

1. Objectives

In this module, you will learn what Vision is, why it is important, and how you can formulate your own vision to guide your quest for better mining.

2. Expected Outcomes:

Miners—cooperative or small-scale enterprise-will be able to carve out their vision to inspire commitment and growth.

3. Immersion into miners' world

Given ASM miners are already in mining business, it is important to hear from them directly. We asked 100 ASM miners in Chisamba and Mumbua Districts to get their stories:

a) What brought you into mining and why are you still mining?

- We are mining as another source of income and livelihood
- For us, it is a means of survival
- To better our lives
- To earn a living

b) Where do you see yourself in the future?

Develop the mine by acquiring more equipment

c) How far do you want to grow your mining business?

- Buy more equipment; increase employment levels; diversify activities
- Diversify into other business such as agriculture
- Want to acquire equipment to increase productivity
- Create local job opportunities

d) Do you see yourself as a lead Miner?

"Yes, we want to set the trend and others will follow". Debra Chitalla, Chairperson, Tweleshe ASM Cooperative

As simple as the question may seem to be, the answers are as diverse as the stories behind each AMS cooperative. The same can be said for the motivation & goals :

- o **Drivers for mining:** Income generation ("earn a living," "money," "hunger").
- o **Future aspirations:** Business growth (equipment acquisition, scaling operations), diversification (agriculture/poultry), job creation.
- o **Self-perception:** All cooperatives see themselves as lead miners, citing improved safety standards (Keleshi) and growth ambitions.

4. Questions for a Miner

o **Share your own story**

- o How did you become a miner?
- o Why are you mining and do you like mining?

o **As a cooperative or an enterprise, carve up a vision for your business**

- o Where do you see yourself in the future?
- o How far do you want to grow your mining business?
- o Do you see yourself as a lead miner in the years to come?

• **Write down your Vision Statement**

Congratulations on your Vision Statement! Though you may have stumbled into mining without one, keep it to your chest and don't lose focus, just follow through as it can take you far in your journey to better mining.

Carry this with you

- *Write down your vision statement, print it and display it visibly*
- *Every member of your business entity should know it by heart.*
- *Refer to it during meetings, believe in it even when everything seems lost. It's your spark!*

Your next step is to go through a formalization process: create a cooperative with your team

LESSON 2.B. FORMATION ORGANIZATION AND GOVERNANCE OF COOPERATIVES

A mining cooperative is your collective power. It turns scattered miners into a unified force—negotiating better prices, accessing finance, and demanding fair treatment. But without strong organization and governance, even the best-intentioned group can collapse. This module shows how to build a cooperative that lasts.

1. Objectives

- **Structure** your cooperative with clear roles.
- **Govern** transparently to prevent conflicts.
- **Mobilize** members for collective action.

2. Expected Outcomes: By mastering this module, you will be able to draft a cooperative constitution that balances power, hold leaders accountable without paralyzing progress and turn group savings into shared assets (e.g., processing plants).

3. Learn from a Miner

Ms Kaingu, AZWIM (Women's Mining Collective Leader)

"We started with 33 women digging gems. Now we run a whole association. Our secret?

- Rule 1: Weekly public cash counts.
 - Rule 2: No leader's relative gets paid more.
 - Rule 3: Every member learns bookkeeping.
- Fights? We settle them under the tree—no further noise, just truth."

5. Learn from a Professional

Mr. Victor Kalesha, President of AZEM sharing his wisdom

Golden Governance Framework:

A. Structure

- **General Assembly:** All members vote on big decisions (e.g., loans > ZMW 50k).
- **Board:** 5-7 elected members (gender-balanced). Term: 2 years max or depending on terms agreed in internal rules.
- **Management:** Hired experts (e.g., accountant) *never* on the board.

B. Transparency Tools

- **Open Books Policy:** Display income/expenses monthly on a chalkboard.
- **3-Signature Rule:** Cheques need Treasurer + Chairperson + 1 rotating member.
- **Whistleblower Protection:** Anonymous complaint box checked by all.

C. Conflict Navigation

"When disputes erupt:

- Pause operations for 48 hours.
- Bring neutral elder (not a member!).
- Vote: 75% majority required to eject a member."

Carry This With You

Your Cooperative Survival Checklist

Key constitution clauses: "No leader serves >2 terms. Profits: 30% shared, 30% reinvested in production equipment and others, 30% savings and 10% in environmental rehabilitation."

Monthly Must-Dos:

Public cash count + chalkboard update.

Skill swap (e.g., gem cutter trains bookkeeper).

When Conflict Hits: Freeze funds → Call mediator → Vote in 72 hours.

ESG Shield: "Formalize or perish. Register with PACRA + ZCCM-IH."

Final Wisdom:

A cooperative is a living thing. Feed it with transparency, prune it with accountability, and harvest resilience. Attribute this quote to a cooperative member

TOPIC 1: HOW TO IMPLEMENT COOPERATIVE GOVERNANCE: A MINER'S ACTION GUIDE

A. Structure Your Cooperative for Power

Step 1: Launch the General Assembly

- Action: Gather all members under a tree. Elect a temporary chair by hand vote.
- Script: "Raise hands for Kaseba as chair? [Count]... Approved!"
- Critical Move: Draft a **one-page constitution** with three non-negotiable rules:
 1. "All loans > ZMW 50k require 75% member vote."
 2. "No family members on the same board."
 3. "Women hold $\geq 40\%$ leadership roles."

Step 2: Form the Board

- Action: Nominate 5-7 members (mix of youth/elders, gender-balanced).
- Election Hack: Use maize kernels for voting—one kernel = one vote in a bowl.
- Key: Board members **must** step down after 2 years. No exceptions.

Step 3: Hire Independent Management

- Action: Recruit a non-member bookkeeper. Pay them with cooperative dues.
- Smart Contract: "Bookkeeper gets 5% of recovered debt or saved fines."

B. Lock in Transparency

Tool 1: The Chalkboard Economy

- Action: Paint a 2m x 1m chalkboard at the mine entrance.
- Update Weekly:
 - Income: "July 12: Gold sold = ZMW 8,400"
 - Expenses: Explosives = ZMW 1,200; Safety gear = ZMW 600
 - Savings: "Co-op fund = ZMW 2,300"
- Rule: Three members verify numbers before posting.

Tool 2: Three-Signature Money Control

- Action: Buy a metal cash box with three padlocks.
- Key Holders: Chairperson + Treasurer + Rotating member (changed monthly).
- Spending Process:
 - Propose expense: Need ZMW 500 for water pump repair.
 - Three signatures on a dated voucher.
 - Open box together, pay and post receipt on chalkboard.

Tool 3: Anonymous Complaint System

- Action: Mount a locked "Truth Box" on a tree.
- Key Rule: Open box monthly with all members present.
- Response Protocol:
 - Minor issue? Mediate at next meeting.
 - Theft? Freeze funds → Hire village elder investigator.

C. Navigate Conflicts : When Tensions Rise:

- **Pause Operations Immediately**
 - Shout: Mine freeze! 48-hour cooling time!
 - Why: Prevents sabotage during fights.
- **Call a Neutral Elder**
 - Criteria: Respected non-miner (e.g., retired teacher).
 - Their Role:
 - Hear both sides separately.
 - Propose solution: Kaseba returns ZMW 200; David apologizes publicly.
- **Vote to Expel (Last Resort):** Ballot Process:
 - Write accused name on paper → Fold → Drop in helmet.
 - Expel only if $\geq 75\%$ agree.
 - Aftermath: Return expelled member's shares in cash.

Box 1: First 30 Days: Your Start-Up Checklist

Week 1:

- Hold founding meeting and hand-vote temporary chair.
- Draft one-page constitution for all members to sign or thumbprint.
- Paint chalkboard + install Truth Box.

Week 2:

- Elect board via maize-kernel vote.
- Designate or hire a bookkeeper to start collecting first dues (e.g. ZMW 20/member)

Week 3:

- Buy a three-lock cash box and assign key holders.
- Post first income/expense report on chalkboard.

Week 4:

- Run conflict drill: "Simulate theft accusation and practice elder mediation."

This turns governance theory into field actions—ensuring your cooperative survives and outlives its founders to become a local economic development engine.

LESSON 2-C : PATHWAYS TO FORMALIZATION

Now that you have set up your cooperative, you need to take deliberate steps to navigate the formalization process. Zambia Mines and Minerals Development Act sets out several pathways to mining. From individuals to cooperatives, to associations and small to medium scale enterprises, you can choose your way to formalizing your mining business. In that regard, a number of legal options are available for you to choose.

Objectives

This will help you in underrating your formalization process. You will learn to:

- Organize your cooperation and set up a robust governance system
- Compare AMR, SEL, and SML licenses by cost, size, and compliance needs.
- Navigate the existing formalization process with ease
- Prepare ZEMA EPBs

Expected Outcomes: You will be able to choose the right license and transform legal compliance into market leverage.

○ Questions for a Miner: Ice-Breakers

- What are the common excuses you've heard for avoiding licenses?
- Share your story about formalization (How did you get your license)?
- Has a license ever helped you negotiate better prices?
- Do you know how to renew your license?

Learn from Peers: Field wisdom

We asked 100 miners about their side of the story and below are their insights

○ *"What are the common excuses you've heard for avoiding licenses?"*

- *Bureaucracy at the MMMD.*
- *Getting a license is a very difficult process.*
- *Large-scale exploration holders deny consent to the ASM Cooperatives.*

○ *"Has a license ever helped you negotiate better prices?"*

- *"YES. We are not afraid to make any transactions. Besides, we are now able to hire CDF equipment from the Council at relatively lower rates."*
- *"It has also minimized accidents/incidents as the miners mine freely without rushing".*
- *"Easy to lobby for incentives and partnering. Improved security"*

○ *Share your story about formalization.*

- *Before we got the license, we went through a difficult process of obtaining consent from the holder of a large-scale exploration license.*
- *Most of us were approached and sensitized by the ministry of mines concerning legalizing activities.*
- *Few don't know about formalization.*

Key Feedback

- **Struggles:**
 - Bureaucracy at MMMD (Mines Ministry) and delays in obtaining consent from large-scale license holders (all cooperatives).
 - High fees (ZEMA) and centralized processes.
- **Benefits of formalization:**
 - Better market prices (Twelesha, Kakumbwa).
 - Access to council equipment (Twelesha, Mother Gold).
 - Access to market and ability to negotiate the price.
- **Renewal challenges:**
 - Kakumbwa explicitly requested guidance on renewal steps.
- **Conflict-free minerals:**
 - Limited traceability; cooperatives unaware of downstream buyer chains.

Mineral Output Statistical Evaluation System (MOSES) Process Flow Chart

This is an Online System mainly used for Mineral Production Reporting and Mineral Export Permit Application. The diagram (Figure 1) below shows the Stages one has to go through in using the system for Mineral Production reporting and Mineral Export Permit Application.

○ License

To register on MOSES one needs to have one of the following licenses

- Mining License (AMR and SML)
- Mineral Trading Permit
- Mineral Processing Permit

Figure 1: MOSES System

○ Registration

- Fill registration forms

○ System Access

○ Upon filling relevant forms, a Unique username and Password being are generated to enable the user log in to the system

○ Information Input

- The user will now be able to submit the required information in the MOSES

Table 2: License Requirements¹

Types of licenses	Requirements	Fees (ZMW)	Compliance	Validity period (Years)
Artisanal Mining Right (AMR)	Coordinates of area of interest conforming to the cadastre units Minimum size for application; one (1) cadastre unit = 3.34 hectares Maximum size for application; two (2) cadastre units = 6.68 hectares Environmental commitment plan Programme of mining operation Copies of NRCs Certificate of Registration of Cooperative Copy of a Valid Tax Clearance certificate Board resolution deciding to engage in mining ZEMA FEES for EPB _17,333.20	1,200	Copy of Pegging certificate Payment of Area Charges Monthly Mineral Production Returns Annual Mining Reports Future Programme of operation Audited Financial Reports	2 years valid and renewable
Small Scale Exploration License (SEL)	Coordinates of area of interest conforming to the Cadastre units Minimum Size for application; three (3) cadastre units = 10.02 hectares Maximum Size for application; three hundred (300) cadastre units = 1002 hectares Proposal for employment and training of Citizens Proposal for Local Business Development Environmental commitment plan Programme of exploration operation Copies of NRCs Certificate of incorporation Certificate of Share Capital Copy of a Valid Tax Clearance certificate Articles of Association	1,200	Copy of Pegging certificate Payment of Area Charges Quarterly Exploration Reports Annual Exploration Reports	4 years valid and Non - renewable
Small Scale Mining License (SML)	Coordinates of area of interest conforming to the Cadastre units Minimum size for application; three (3) cadastre units = 10.02 hectares Maximum size for application; one hundred and twenty (120) cadastre units = 400.8 hectares Proposal for employment and training of Citizens Proposal for Local Business Development Approved ZEMA Decision Letter for Mining (ZEMA FEES for EPB _17,333.20) Programme of mining operation Copy of Certificate of incorporation Copy of Certificate of Share Capital Copy of a valid Tax Clearance certificate Articles of Association	6,000	Copy of Pegging certificate Payment of Area Charges Monthly Mineral Production Returns Annual Mining Reports Future Programme of operation reports Audited Financial Reports	10 years valid and renewable

¹ All applications are online for speedy processing, transparency and tracking. ZEMA fees are dependent on unit cost as per government determination

Knowledge Consolidation

○ Peer Fire Chat Corner:

- **License Match-Up:** Pair minerals (gemstones/gold/limestone) with optimal licenses

Challenge Yourself:

- MOSES Drill: Report 50kg gold production using mock forms
- You are an informal miner, and you have been mining for half a decade now without any license. The Ministry has announced an upcoming crackdown on illegal mining. Sketch out the process that you are going to follow to formalize before it is too late.
- Your license expires in 3 months. List steps to renew it without stopping work.

Congratulations on your ASM license, you can now mine in confidence. ≠Dig and run no more!

Carry This With You

Compliance Calendar: Laminated renewal schedule (MOSES: 5th monthly, ZEMA: annual)

Document Pack: Onsite folder with NRC, peg certificate, tax clearance

Community MOU Template: Blank agreement for land access

The only way to mine profitably and safely is to secure a license before you mine. License not only protects your operation but transforms your business into a formal entity that can benefit from many funding and support opportunities.

LESSON 3. MINE PLANNING: MUST DO MINING OPERATIONS BEST PRACTICES

Mine planning is a very important step in your business. Now that you are an ASM license holder, you need to know how to mine better. Unplanned pits are flood-prone and a source of accidents. Smart design saves lives. Transform your site into a safe, efficient operation – whether digging gold in Mumbwa or limestone in Ndola. Organized sites reduce hazards and boost productivity. Smart mine planning builds the foundation for mining in a socially and environmentally responsible manner.

1. Objectives

- Map mine layouts using Google Earth/hand-drawn grids
- Build gender-responsive infrastructure (childcare corners, restrooms)
- Develop phased plans for critical minerals (cobalt) vs. construction materials (sand)
- Repurpose waste

2. Expected Outcomes: Through this module, you'll create safer pits and turn waste into income – slashing costs and accidents.

3. Questions for a Miner:

- What's the deadliest "shortcut" you've seen? What happened?
- How do women miners handle childcare while working?
- Would you convert exhausted pits to fishponds or water reservoirs? Why?

Learning from a Peer: Field wisdom + quotes.

What is mine planning? Before one can start mining, it is important to establish first the layout of a mine. This is necessary for carrying out mining operations in an efficient, safe and responsible manner and minimizing the negative impact on the environment.

TOPIC 1: PRACTICAL GUIDE TO EXECUTING MINE PLANNING FOR ASM OPERATIONS

1. Survey Site & Risks

Method: Walk the entire claim with local elders and workers. Sketch boundaries using natural landmarks (rivers, large trees) or a basic compass. Mark sensitive areas (water sources, homes, burial grounds) with biodegradable tape. Identify unstable ground by testing soil cohesion with a shovel; slopes >30 degrees are high-risk. Document hazards on your map using red ink.

2. Design Efficient Layout

Method: Plot access routes along existing animal trails or ridges to minimize erosion. Place waste rock dumps *downhill* and *downwind* of work zones and water sources (minimum 50m buffer). Design settling ponds at natural drainage points using compacted clay liners. Position water intake upstream from all mining activity. Sketch layouts directly onto your site map.

3. Integrate Rehabilitation

Method: Before digging, strip topsoil and stockpile under tarps. Sequence excavation to backfill exhausted pits immediately with non-toxic overburden. Allocate 10% of work area for a native plant nursery; propagate fast-growing species like vetiver grass. Replant slopes within 48 hours of backfilling.

4. Plan Social Infrastructure

Method: Designate level ground near entry points for worker rest shelters (three-walled structures with benches). Site first-aid posts within 200m of active dig faces. Reserve communal space near access roads for community meetings (clear flat area with log seating). Mark all locations on your operational map.

5. Create Clear Maps

Method: Use graph paper or a free app (e.g., *QGIS*). Draw to scale: 1cm = 10m works for most ASM sites. Trace boundaries from GPS coordinates or paced measurements. Color-code zones: blue for water, green for rehab areas, red for hazards. Laminate the final map for field use.

6. Engage Stakeholders Early

Method: Host a site walk with community leaders before breaking ground. Display your draft map on cardboard. Explain waste locations, water protection, and rehab plans in local language. Record concerns in a notebook; adjust plans if >70% agree on changes. Have attendees sign the revised map as proof of consultation.

Execution Essentials

- **Tools Needed:** Compass, measuring tape, graph paper, colored pens, shovels (for soil tests).
- **Critical ASM Adaptation:** Use local materials (clay for ponds, logs for seating) and traditional land knowledge.
- **Avoid:** Delaying rehab, sitting waste uphill, or skipping community signatures on maps.

7. Mine site planning and design

Table 3: Five site mapping tips for Artisanal and Small-Scale Mining (ASM):

Standard approach	Budget approach
Use High-Resolution Satellite Imagery and GIS Tools: Leverage satellite images and Geographic Information Systems (GIS) to create accurate, detailed maps of the mining site. This helps identify terrain, resources, and potential hazards.	Use Free or Low-Cost Mapping Tools: Utilize free platforms like Google Earth, OpenStreetMap, or QGIS (open-source GIS software) to create basic maps. These tools are accessible and require minimal technical expertise. Hand-Drawn Maps: Collaborate with local miners to create hand-drawn maps based on their knowledge of the area. These can be digitized later if needed.
Conduct Ground Surveys and Sampling: Complement remote mapping with on-the-ground surveys to verify data, assess mineral deposits, and identify access routes, water sources, and waste disposal areas.	Community-Based Mapping: Train local miners and community members to conduct basic ground surveys using simple tools like measuring tapes, compasses, and GPS-enabled smartphones. Visual Inspections: Rely on visual inspections and local knowledge to identify mineral-rich zones, access routes, and potential hazards.
Map Environmental and Social Features: Include critical environmental features (e.g., rivers, forests) and social infrastructure (e.g., nearby communities, roads) to minimize environmental impact and ensure compliance with regulations.	Local Knowledge Integration: Engage with community elders and local miners to identify environmental features (e.g., rivers, forests) and social infrastructure (e.g., villages, roads) through participatory mapping. Low-Tech Mapping: Use paper maps or chalkboards to mark key features during community meetings.
Identify Hazard Zones: Clearly mark unstable ground, flood-prone areas, and other hazards to ensure safety and proper planning for mining operations.	Local Experience and Observation: Rely on the experience of local miners who are familiar with the area to identify unstable ground, flood zones, and other hazards. Simple Risk Assessment Tools: Use basic checklists or risk assessment templates to document hazards and share them with the mining team.
Engage Local Stakeholders: Involve local communities and miners in the mapping process to gather valuable insights, ensure accuracy, and foster cooperation for sustainable mining practices.	Community Meetings and Workshops: Organize low-cost community meetings to gather input and share mapping findings. This fosters collaboration without requiring expensive technology. Peer-to-Peer Knowledge Sharing: Encourage miners to share their knowledge and experiences to improve mapping accuracy and safety practices.

TOPIC 2. BASIC ASM INFRASTRUCTURE

Gender-Responsive ASM Mine Site Infrastructure Plan

This plan outlines the basic infrastructure for Artisanal and Small-Scale Mining (ASM) operations in Zambia, tailored to ensuring gender inclusivity, safety, and productivity.

1. Common Infrastructure for ASM

Here is a description of infrastructure that transforms ASM site into a life-friendly place, secure and gender sensitive.

a. Shelter/Camp

Separate safe spaces for women

- Private resting area for female miners.
- Secure storage for personal belongings.

b. Basic seating and shade (locally sourced materials).

c. Water Source

- Accessible water points
- Drinking water + washing stations for ore/mineral cleaning.
- Located near worksites and rest areas.

c. Storage

- Lockable storage boxes
- Secure storage for tools, PPE, and high-value minerals.
- Separate compartments for hazardous materials (mercury-free processing reagents).

d. Restrooms

- Separate for men and women (privacy and dignity).
- Handwashing stations with soap.
- Waste disposal system (pit latrines or portable toilets).

2. ASM Childcare Corner

The childcare corner is designed to make ASM inclusive space and facilitate involvement of women in childbearing age with children in mining activities and keep children safe from any entanglement with the workspace. Therefore, it is presented here as an exception as it is not supposed to be part of mine infrastructure. In addition, its implementation must strictly follow government regulations and good practices relating to zero child tolerance onsite.

○ Requirements and Design Principles

- Mobile and modular (easy to dismantle/relocate as sites shift).
- Hazard-agnostic (addresses risks common across all minerals: dust, debris, noise, hygiene).
- Low-cost and community-managed (rotating supervision, locally sourced materials).

- **Core Features**
 - **Shelter & Play Area**
 - **Modular shade structure** (e.g., foldable tent or tarp with UV/dust-resistant fabric).
 - **Removable flooring** (raised wooden platforms or washable mats) to isolate children from ground hazards (dust, sharp debris).
 - **Low-height fencing** (portable and lightweight) to mark safe boundaries.
 - **Health & Safety:**
 - Dust mitigation (damp cloths or mesh screens around the perimeter if needed).
 - **Play Materials**
 - Non-toxic, durable toys (fabric sacks, wooden blocks, or repurposed safe containers).
 - Storage bins (covered to protect belongings from dust/corrosion).
 - **Community Roles:**
 - Rotating supervision (trained mothers/guardians take turns overseeing the space).
 - Safety briefing (short daily reminders for caregivers, e.g., "Check children's hands after play").
 - **Adaptability:**
 - Anchor weights (sandbags or rocks) to stabilize structures in windy areas.
 - Collapsible design (fits on a cart or vehicle for transport).
 - **Optional Add-ons for Specific Risks:**
 - Dust-heavy sites? Add wet curtains.
 - Noisy zones? Relocate the corner farther from machinery or add extra ear protection.
 - Falling debris risk? position the shelter away from loose slopes.

Adaptations

- **Community Roles**
 - Train mothers via existing health networks (e.g., Safe Motherhood Action Groups).
 - **Funding:** Partner with cooperatives (e.g., ZCCM-IH) or NGOs).

Key Notes

- Childcare Corners are an important infrastructure to promote ASM inclusiveness and gender sensitiveness as their presence retain women miners onsite.
- Restrooms must be gender-segregated and hygienic to reduce health risks.
- Water access is critical for both mineral processing and worker welfare.

This plan ensures low-cost, scalable, and gender-responsive infrastructure for ASM.

Knowledge Consolidation

- **Peer Fire Chat Corner**
 - Debate: "Do childcare corners boost productivity or waste space?"
 - Scenario: Your teammates are asking you to involve a mining engineer. Your thought?
- **Challenge Yourself**
 - Sketch Challenge: Design gender-responsive layout on 6ha (Map every infrastructure)

LESSON 4. BUILDING SUSTAINABLE COMMUNITY RELATIONS IN ASM AND SECURING YOUR SOCIAL LICENSE TO OPERATE

Artisanal and Small-scale Mining (ASM) does not operate in a vacuum; it is deeply embedded in the social and environmental fabric of local communities. Sustainable operations depend not on avoiding these communities, but on building mutual trust and cooperation with them. This module provides a practical, low-cost, and actionable framework for ASM miners and operators to move from a relationship of conflict to one of partnership. The strategies are designed to be implemented with minimal resources, leveraging existing community structures and wisdom to create a stable foundation for long-term success.

1. Objectives

This module will provide you with the practical strategies to protect your investment and ensure long-term operational stability by transforming community relations from a source of risk into your greatest asset. Upon completion, you will be able to:

- **Prevent Costly Conflicts:** Proactively identify and address community grievances to avoid work-stopping blockades, protests, and disputes that threaten your livelihood.
- **Build Trust Through Action:** Implement a clear, low-cost process of dialogue and delivered commitments to earn community cooperation and secure your social license to operate.
- **Establish a Reliable Early Warning System:** Create a simple, community-rooted mechanism to resolve issues fairly and quickly, ensuring a stable and productive worksite

2. Expected Outcomes

Upon completion of this module, you will be able to establish a foundational community relations process and learn how to identify key stakeholders, facilitate inclusive dialogue, and co-create simple, actionable agreements that address community priorities. In addition, you will be able to implement a practical grievance and conflict prevention mechanism rooted in local traditions. The ultimate outcome is a shift from reactive firefighting to proactive relationship management, leading to reduced conflicts, enhanced social license to operate, and a more secure and productive mining environment.

3. Questions for a Miner: Testing Your Current Approach

To help improve your community engagement strategy, honestly reflect on these questions about your current or usual practices.

- **Before Starting:** Did you map out all community groups (including farmers, women, youth, and landowners) or do we only engage with the chief?
- **First Contact:** When you first engage, did you come with a ready-made plan to announce, or arrive with the primary goal of listening to concerns and aspirations?
- **Problem-Solving:** Who identifies the main problems? Who decides based on what we see, or did you facilitate a process for the community itself to prioritize the issues that affect them most?
- **Agreements:** Are community rules made by you and then told to the community, or are they written together with community representatives in simple, clear language?

- **Conflict:** Is your approach to grievances reactive (waiting for a problem to explode) or proactive? Do you have a known, simple, and trusted process for community members to raise concerns without fear?
- **Mindset:** Do you primarily view the community as a source of cheap labor and a potential obstacle, or as essential long-term partners whose well-being is directly tied to the success of our operation?

4. Wisdom from the field and years of practice

This is a critical challenge for the ASM sector. A successful approach must be low-cost, culturally grounded, and built on mutual respect. Here is a feasible, step-by-step process for sustainable ASM-community relations.

4.1. A How-To Guide to Building Sustainable ASM-Community Relations

This process assumes ASM miners are both from the local community and potentially from elsewhere, which is a common dynamic.

Guiding Principle: Move from a relationship of "Us vs. Them" to "We." The goal is not just to avoid conflict, but to build a shared future where both the community and the miners see benefit in the operation's sustainability.

Step 1: The Foundation – How to Identify and Map Stakeholders (Weeks 1-2)

- Before any meeting, understand who you need to talk to. Do not just talk to the village chief.
 - **Formal Leaders:** Chief, Community Elders, Council.
 - **Informal Leaders:** Youth group leaders, women's association leaders, religious leaders, respected farmers.
 - **Vulnerable Groups:** Identify landowners whose property is near the site, farmers, fishermen, women-led households (who are often most affected by water or land impacts).
 - **The Miners:** Include both local miners and migrant miners in this mapping. They are a key stakeholder group themselves.

Step 2: The Introduction - Informal "Listen First" Meetings (Weeks 3-4)

- **How-to** NOT arrive with a plan. Arrive to listen.
 - **Who:** A small, respectful delegation from the mining group (including a local community miner if possible).
 - **Where:** Under a tree, at the chief's house, in a community center. A neutral, comfortable place.
 - **Agenda:** Introduce yourselves. Clearly state: *"We are working here. We are also part of/neighbors to this community. We want to understand how our work affects you—the good and the bad—so we can find ways to work together and support each other."*
 - **Key Action:** Listen and take notes. Let them voice fears, complaints, and hopes. This builds trust and shows respect.

Step 3: Joint Problem Identification & Prioritization (Week 5)

- **How-to:** Organize a larger community meeting. Present what you heard in informal meetings.
 - **Use a Facilitator:** If possible, find a neutral local person (a teacher, a retired civil servant) to help facilitate to ensure fairness.
 - **List Everything:** Write down all concerns on a large piece of paper or board: e.g., "water pollution," "noise," "damage to paths," "youth not going to farm," "dust on crops," "security."
 - **Vote on Priorities:** Let the community members themselves vote (with stones or beans) on which 2-3 issues are most critical to address *first*. This ensures you're working on what *they* care about most.

Step 4: How-to Co-Create Simple, Actionable Agreements (Week 6)

- Form a small, joint committee (2-3 miners + 2-3 community representatives). Their task is to create simple, written rules based on the top priorities.
 - **Example 1 (Issue: Water):** "Agreement: The miners will not wash ore or dispose of waste in the main river. They will build a simple settlement pond to trap silt before any water leaves the site."
 - **Example 2 (Issue: Employment):** "Agreement: When possible, the mine will give priority for unskilled labor jobs to young men and women from this community."
 - **Example 3 (Issue: Dust):** "Agreement: Water bowsers will spray the main access road twice daily to reduce dust."
 - **Keep it Simple & Visible:** Write these agreements in simple language and post them in a public place.

Step 5: How-to Implement & Communicate Progress (Ongoing)

- Action is everything.
 - **Start Immediately:** Begin work on the first agreement. Even small, visible progress builds enormous goodwill.
 - **Communicate Constantly:** The joint committee should meet weekly at first. The miner liaison should walk through the community regularly and update people. "We've started digging the settlement pond." "We hired two people from the village this week."
 - **Be Transparent:** If you can't do something, explain why. Honesty is valued more than empty promises.

4.2. A How-To Guide to Grievance Handling & Conflict Prevention

This mechanism must be simple, accessible, and trusted. It should mirror how the community already solves problems.

Step 1. Establish a Clear and Accessible Pathway

Create a simple, three-phased process that everyone knows:

- **Phase 1: Direct Discussion (Informal Chat):** The person with the grievance (e.g., a farmer whose crops are dusty) is encouraged to first speak directly to the mine site supervisor. Many issues can be solved here immediately (e.g., "Okay, we will spray the road more often.").

- **Phase 2: Community Liaison Committee (CLC):** If not resolved, the issue is taken to the small Joint Committee formed in Step 4 above. This group hears both sides and tries to find a solution. **This is the most important step.** It uses community wisdom and peer pressure to find a fair outcome.
- **Phase 3: Traditional Authority / Elder Mediation:** If the CLC is deadlocked, the matter is referred to the traditional community leadership (Chief and Elders). Their ruling is usually final and respected by all. The miners must agree upfront to respect this traditional system.

Step 2. Make it Practical and Known

- **Identify a Grievance Officer:** Appoint one miner (e.g., the site manager or a respected elder miner) as the official person to receive complaints. Everyone should know his/her name and face.
- **Use a Simple Box:** For those who are shy or fear reprisal, set up a physical **Grievance Box** in a public place (e.g., the market, community water point) where people can drop anonymous notes. The CLC must check this box weekly.
- **Set Timeframes:** Promise to acknowledge a grievance within 48 hours and work towards a solution within 2 weeks. This prevents frustrations from festering.

Step 3. Root it in Existing Community Ways

- **Use Local Language:** All communication and meetings must be in the local language.
- **Respect Protocols:** Always inform and seek blessing from the Chief before rolling out any formal mechanism. His buy-in is crucial for legitimacy.
- **Incorporate Traditional Conflict Resolution:** Often, resolving a conflict ends with a small symbolic gesture (e.g., sharing a cola nut, a drink, or a communal meal) to restore harmony. The mining operation should be prepared to support this culturally important step.

By following this approach, you build a community-owned structure that is sustainable precisely because it is simple, practical, and rooted in local reality.

5. Actionability in the ASM Context and why it works for ASM:

1. **Low Financial Cost:** It requires minimal financial investment. The core resources are time, respect, and willingness to listen. The most significant costs are logistical (e.g., transportation to meetings, a notebook, a grievance box). The technical solutions proposed (settlement ponds, water spraying) are among the simplest and most affordable best practices.
2. **Leverages Existing Social Capital:** It doesn't try to invent new systems but builds upon the community's existing structures—traditional leadership, informal gatherings (*baraza*), and known conflict resolution methods. This makes it familiar, accessible, and legitimate in the eyes of the community.
3. **Focus on Process, Not Paper:** It avoids complex, written legal agreements that are hard to implement and enforce. Instead, it focuses on a transparent *process* of engagement that builds trust, which is the true currency of sustainable relations.

4. **Scalable and Incremental:** It doesn't try to solve every problem at once. By having the community prioritize 2-3 issues, it allows for small, quick wins. Demonstrating a commitment to fixing one problem (like dust) builds the goodwill needed to tackle more complex issues (like water quality) later.
5. **Acknowledges the Reality:** It directly addresses the fact that miners are also community members, which is a source of both tension and potential synergy. The approach is designed to navigate these complex internal dynamics.

It provides a clear, foundational pathway to dialogue and cooperation. It won't prevent every single problem, but it will provide a reliable and practical mechanism to handle them when they arise, preventing them from escalating into violence or work stoppages.

6. Knowledge consolidation

- **Trust is Your Most Valuable Asset:** You cannot buy a social license; you earn it through consistent, honest action. It is more important than any piece of machinery and harder to replace once broken.
- **Listen First, Talk Second:** You do not have all the answers. The community holds the key to understanding the problems and often has the best, most context-appropriate solutions. Your primary job at the beginning is to listen.
- **The Community is Not a Monolith:** Understand the different groups, leaders, and interests within the community. A deal with the chief is not enough. You must engage with women, youth, farmers, and other groups to have lasting stability.
- **Action Speaks Louder Than Words:** A small, promised action that you actually deliver on (like fixing a damaged path) is infinitely more powerful than a grand promise you can't keep (like building a hospital).
- **Prevention is Cheaper Than Cure:** Investing time in building relationships and a simple grievance mechanism is far less expensive than dealing with a community blockade, protests, or violent conflict that halts your operation for weeks or months.
- **You Are Part of the Community:** Whether you are from the village or not, your operation is now part of the social and environmental fabric of that place. Your success is tied to the well-being of the community. Acting like a responsible neighbor is not charity; it is smart, sustainable business.

Carry this with you

Your long-term success is not just about the minerals you extract, but the trust you build. True sustainability means shifting your mindset: stop seeing the community as an obstacle and start embracing them as your most essential partner. This begins not with grand promises, but by actively listening to all community voices—especially women, youth, and farmers—to understand their real needs. Remember, a single small action you deliver builds more trust than a hundred broken promises. Investing in these relationships and a simple process to handle concerns is the smartest investment you can make. It is far cheaper than a conflict that shuts down your mine. Start today: be the neighbor who listens, acts, and proves that your operation's future is a shared future.

LESSON 5. MINING: HOW DO ASM MINE AND PROCESS? HOW CAN THEY IMPROVE IT?

Not all mineral types are found on the surface of the ground surface. Unlike alluvial minerals that can be easily collected right on the ground surface and depending on the depth of location of the minerals, miners use different methods such as open pit and tunneling. In any case, miners knowing how to mine better is key to sustainable mining. This includes field wisdom based on years of practice and advice from professionals. It is therefore important to consolidate this knowledge to improve your daily work as a miner regardless of the minerals you are mining.

1. Objectives

This lesson is designed to help you merge your hands-on experience with professional techniques to enhance your mining operation. By the end, you will be able to:

- Identify the most effective mining method (e.g., open pit, tunneling, alluvial) for different mineral types and deposit depths.
- Integrate practical field wisdom with fundamental professional advice to improve safety and efficiency.
- Apply one key improvement to your current mining practice to increase sustainability and productivity.

2. Expected Outcomes

You will leave this session with a practical plan to mine more effectively and safely. Specifically, you will:

- Understand how to choose and adapt your mining approach based on what you are digging for and where it is located.
- Have a clear idea of how to blend your own valuable experience with new, proven techniques.
- Identify one immediate change you can make on your site to mine better.

3. Questions for a Miner

- What mining method do you use on your site?
- Why did you choose that particular method and not any other one?
- What is the one piece of "field wisdom" or old advice passed down to you that you find most valuable in your work?
- For the mineral you mine, what is the biggest challenge related to the depth or hardness of the deposit?
- Besides the mineral itself, what is the most important thing you've learned to "read" in the ground to keep you safe? (e.g., soil color, rock cracks, water seepage).
- Think of the most experienced miner you know. What do they do differently that makes them so successful?
- What is one problem on your site that you've solved through trial and error that you are proud of?
- What is a question you have always wanted to ask a mining engineer or geologist about your specific site?

Feedback from the field

We asked 100 miners about how they mine and below is their feedback from the field.

- **Mining methods**
 - Open pit with little to no benching done. Those sites are characterized by sloppy benches and overhangs represent clear and present danger to human life.
 - Underground mining with vertical shaft reaching several dozen meters depth with further horizontal tunneling in the pursuit of the quartz vein.
 - Burrowing/ tunneling or "*funco*" in nyangia language. It is a frequent practice consisting of systematic horizontal addit digging over several meters with high risk of pit collapse at the very entrance.
 - Alluvial mining: scratching and digging in the riverbank. It is common on rivers or water bodies in areas of high mineralization. Alluvial mining is done during low tides when the riverbank is accessible. Indiscriminate digging poses high risk for biodiversity and riverbank integrity through silting.
- **Common practices and traits on ASM mining sites (formal or informal)**

Most sites are characterized by the following:

 - Lack of signage to clearly guide and or inform people on the site
 - Indiscriminate land clearing and digging
 - Indiscriminate disposal of tailings and waist
 - Widespread "dig-and-go" culture with rehabilitation left to wait for the end of operations in the best case.

Based on current realities from the field, the need for improving mining technics in ASM is real and below is a step-by-step process inspired by ASM miners.

LESSON 5.A. MINING METHODS FOR ASM FROM FIELD WISDOM AND YEARS OF PRACTICE

1. Improving existing know how

1.1. Alluvial Mining

Minerals: Gold, cassiterite (tin), gemstones (e.g., sapphire).

Process:

- **Land Clearing:** Manual removal of riverine vegetation (avoid bulldozers).
- **Earthmoving:** Excavate sediment using shovels/hoes; sluice boxes separate minerals from gravel.
- **Extraction:** Panning or gravity separation (no chemicals).
- **Tailings:** Directly discharged into rivers (common) or stored in settling ponds (best practice).
- **Rehabilitation:** Backfill pits; replant banks with native species (e.g., reeds).

ASM Excellence:

- **Do:** Use mercury-free gold traps (e.g., borax); divert tailings to vegetated ponds.
- **Avoid:** In-river dumping; deforestation.

Legal vs. Practice:

- **Legal:** EIA required for >5ha operations; river pollution prohibited.
- **Practice:** Often unlicensed; river damage prevalent.

1.2. Open-Pit Mining

Minerals: Gold, copper, limestone, clay, dimension stones (granite), industrial minerals.

Process:

- **Land Clearing:** Strip topsoil; store for rehabilitation
- **Earthmoving:** Create terraced benches (max 45° slope); excavate ore with picks/jackhammers.
- **Extraction:**
 - Soft minerals (clay, limestone): Direct hauling.
 - Hard rock (gold, copper): Drill/blast → Crush → Process (e.g., leaching).
- **Tailings:** Stored in lined ponds (ideal) or dumped (common).
- **Rehabilitation:** Backfill with waste rock; restore topsoil; replant drought-resistant grasses.

ASM Excellence:

- **Do:** Bench slopes for stability; use wet dust suppression; repurpose pits as fish farms.
- **Avoid:** Uncontrolled blasting; pit-wall undercutting.

Legal vs. Practice:

- **Legal:** Blast permits is mandatory; 10% revenue bond for rehabilitation.
- **Practice:** Rarely bonded; blasting is often unpermitted.

1.3. Underground Mining

High-Risk Disclaimer: Underground mining is strongly discouraged in Zambian ASM. Collapses, gas, and flooding cause 60% of mining deaths. Only viable for high-value, vein-hosted minerals (e.g., emeralds) under professional oversight.

Minerals: Emeralds, copper (malachite), gold (quartz veins).

Process:

- **Land Clearing:** Minimal (around adit entrance).
- **Earthmoving:** Dig vertical shafts/horizontal adits using hand tools.
- **Extraction:** Manual drilling → Blasting → Ore haulage.
- **Tailings:** Dumped near entrances, triggering erosion.
- **Rehabilitation:** Seal adits; replant slopes

ASM Excellence (if unavoidable):

- **Do:** Install timber supports; ventilate with fans; test for CO₂; ban solo work.
- **Avoid:** Unsupported tunnels; child labor; deep shafts (>10m).

Legal vs. Practice:

- **Legal:** Prohibited without ventilation maps and escape routes.
- **Practice:** Illegal adits are common with safety ignored.

2. Mineral-Method Alignment

When ready to mine, the depth of the minerals often indicate which method works best. However, each mining technic comes with safety and financial risks that you need to know before you start.

Table 4: Optimal mining methods

Mineral	Optimal Method	Safety	Profitability	Critical Tools	Comments
Gold/Cassiterite	Alluvial	Medium risk	Variable returns	Sluice box, borax kit	Viable for beginners
Gold or any other minerals	Underground	Extreme danger	High cost/risk	Mechanized tools and sophisticated engineering	Avoid
Copper/ Limestone	Open-Pit (surface pods—emerald)	Safest	High scalability	Jackhammer, crusher	Best for ASM
Emeralds				Sieves, UV light	
Clay/Dimension Stone				Wire saw, polisher	

Source: Field engagement

Note: Underground mining is restricted to high-value veins under engineering oversight.

Why Open-Pit Dominates:

- **No tunnel collapses** with visible hazards.
- **Lower costs**
- **Higher volumes** of ore extracted daily.

3. Transitioning from Underground to Open-Pit: Professional Protocol

Step 1: Mineral Redirection

Identify surface deposits with the help of a geologist (halt underground operations—if you have already started and willing to change)

- **Step 2: Phased Equipment Shift**

Begin with manual tools (picks/sieves); rent excavators (\$50/day) via cooperatives. *Always* bench slopes at 45° using MMMD's visual stability guides.

- **Step 3: Legal Leverage**

Join or form a cooperative to access CEEC grants.

- **Step 4: Rehabilitation-Driven Profit**

Seal abandoned tunnels; sell reclaimed timber or other equipment to fund open-pit startups. Convert limestone tailings into bricks or clay pits into rainwater reservoirs.

4. Drilling and blasting

As stated earlier, open pit and underground mining can require drilling and blasting. Particularly hard-rock deposits e.g., copper, gold quartz, granite and some gemstones. Though this is a critical operation, it is not without risks to health and safety.

4.1. Key Risks

- a. Fly rock & Debris: Uncontrolled explosions can hurl stones up to 300m, risking fatalities.
- b. Toxic Fumes: Ammonium nitrate-based explosives release NO₂/CO, causing respiratory harm.
- c. Ground Vibrations: Can destabilize nearby structures or mine walls.
- d. Noise & Dust: Permanent hearing damage and silicosis risks.

4.2. Mitigation Measures

- Engage a certified Blasters: the *Zambia Explosives Act* requires a licensed professional to design blasts, ensuring safe charge ratios and timing
- Exclusion Zones: Clear all personnel (including children) to 500m+ before blasting; use sirens/flags
- Post-Blast Venting: Wait 30+ minutes for fumes to disperse; use gas detectors
- PPE: Helmets, earplugs, and masks for workers

4.3. Community Protections

- Schedule blasts during low-activity hours (e.g., midday when children are at school).
- Publicize blast timings via SMS/community radios.
- **Critical Rule:** No exception, evacuate everyone including all children and non-essential personnel before every blast.

LESSON 5.B. TYPICAL ASM PROCESSING SITES BASED ON FIELD OBSERVATION

5.1. Typical ASM Gold Processing Method & Site

The hallmark of typical ASM processing is a reliance on manual labor, simple tools, and mercury amalgamation, with little planning for safety or environmental protection.

5.1.1 ASM Gold Processing Method and Sites

Gold is one of the most processed minerals by ASM, and its methods are illustrative of the broader challenges and opportunities.

- **Crushing:** Ore is first broken up by hand with hammers on a large flat rock or in a steel drum. This is inefficient, exposes workers to harmful dust (silica), and risks injury from flying rock fragments.
- **Milling:** The crushed ore is then fed into a diesel-powered grinding mill, often a simple ball mill or "Chilean mill." This produces fine powder.
- **Sluicing/Concentration:** The powdered ore is mixed with water and washed over a carpeted sluice box or a copper plate coated with mercury. The dense gold particles are captured while lighter waste material (tailings) is washed away.

- **Amalgamation:** The concentrated material, which now contains gold, is mixed with liquid mercury by hand in a bucket or basin. The mercury binds to the gold, forming a silvery putty-like amalgam.
- **Burning:** The amalgam is heated in a pan or open pot over a fire, often with a blowtorch. This vaporizes the mercury, leaving behind a crude gold nugget. The mercury vapor is highly toxic and is inhaled by the miners and released into the environment.
- **The Typical Site:** The processing site is usually located near the mine or a water source.

It is characterized by:

- **No Containment:** Tailings (waste sludge) are directly discharged into the environment—rivers, soil, or large, unlined ponds. This contaminates water with mercury, heavy metals, and silt.
- **No Safety Measures:** Miners, often including women and children, work without personal protective equipment (PPE), inhaling dust and mercury vapor directly.
- **Inefficiency:** Significant amounts of gold are lost to the environment in the tailings due to inefficient crushing, grinding, and concentration.

5.1.2. Good Practice Processing Method & Site—The Goal

Good practice focuses on maximizing recovery, eliminating the most dangerous practices, and minimizing environmental impact through better technology and planning.

- **Improved Comminution (Crushing & Milling)**
 - **Practice:** Use of a small, mechanized jaw crusher *before* the ball mill. This creates a more uniform feed size for the mill, making grinding more efficient and increasing overall throughput.
 - **Benefit:** Higher efficiency, less energy consumed, and less generation of harmful dust.
- **Mercury-free Concentration**
 - **Practice:** Use of shaking tables or centrifugal concentrators (like the Falcon or Knelson concentrator) to separate gold from the ore. These devices use gravity and centrifugal force and are far more efficient than simple sluices.
 - **Benefit:** Dramatically increases gold recovery (from maybe 30-40% to over 90%), making the operation more profitable. It eliminates the *need* for mercury in the concentration stage.
- **Mercury-Free Final Extraction**
 - **Practice:** For ores that are difficult to concentrate, the responsible use of cyanidation in a controlled, contained leach pad or tank can be an alternative, but it requires significant skill and control. A simpler, excellent practice is to direct the concentrate from a shaking table to a smelting furnace.
 - **Benefit:** Completely eliminates the deadly health risks of mercury vaporization and environmental pollution.

5.1.3. The Good Practice Site: An "ESG" Mine

A good practice site is planned, contained, and managed as described below.

- **Contained Tailings:** Tailings are discharged into a single, **lined tailings storage facility (TSF)** or settlement pond. This prevents toxic waste from seeping into groundwater and allows sediments to settle so water can be recycled.
- **Water Recycling:** Water from the settlement pond is pumped back to the mill for reuse, drastically reducing freshwater consumption and eliminating contaminated effluent.
- **PPE and Safety Protocols:** Workers are equipped with and trained to use basic PPE: respirators for dust, gloves, and safety glasses. The burning of amalgams is banned and done in a completely isolated, ventilated area if it *must* occur.
- **Efficiency:** The combination of better crushing, efficient concentration, and contained processing means more gold is captured from the same amount of ore, increasing income while reducing the environmental footprint.

Table 5: Summary of Typical vs. Good Practice

Aspect/Operation	Typical ASM Practice	Good Practice
Crushing	Hand hammers	Mechanized jaw crusher
Concentration	Carpets/sluices + Mercury	Shaking tables / Centrifugal concentrators
Gold Extraction	Open-air mercury burning	Smelting furnace or controlled cyanidation
Waste Management	Direct disposal to environment	Lined tailings dam & settlement ponds
Water Use	Once-through, high consumption	Water recycling from ponds
Health & Safety	No PPE, exposure to toxins	PPE enforced, toxic processes isolated
Efficiency	Low recovery (30-40%)	High recovery (>90%)

Source: Field engagement

5.2. Typical ASM Copper Processing Method & Site

5.2.1. Copper Ore Processing (Typical Practice)

Copper mining in Zambian ASM often targets oxide ore (like malachite and azurite) or secondary sulphides, as they are easier to process than deep primary sulphides.

- **Mining & Sorting:**

Ore is dug from shallow pits or old tailings dumps. High-grade chunks are hand-sorted directly at the face.

- **Crushing and Grinding:**

The sorted ore is crushed by hand with hammers or with a diesel-powered jaw crusher. It is then ground into a fine powder using a ball mill ("chakachaka" or "mutoshi").

- **Leaching:**

The ground ore is placed in a makeshift vat, drum, or even a pit in the ground. It is then drenched with a diluted acid solution (often sulphuric acid, sometimes obtained by draining old car batteries). This acidic solution dissolves the copper from the ore.

- **Precipitation (The "Cement Copper" Process):**

The copper-rich solution is drained into another container. To extract the copper, miners add scrap iron (old nails, torn-up roofing sheets, mesh). The iron forces the copper out of the solution, causing it to precipitate as a fine, dark brown sludge known as "**cement copper**." This sludge is collected, dried, and sold.

- **The Typical Site:** Characterized by:

- **Uncontrolled Acid Use:** Handling of acid without protective gear (gloves, goggles, boots), leading to severe chemical burns.
- **Direct Effluent Discharge:** The highly acidic and metal-laden wastewater (from leaching and precipitation) is often allowed to flow directly into the soil and nearby waterways, causing severe pollution and acidification.
- **Inefficiency:** Significant copper loss due to inefficient grinding and incomplete leaching.

5.2.2. Copper Ore Processing (Good Practice)

Good practice focuses on increasing recovery, ensuring safety, and eliminating environmental pollution.

- **Improved Leaching:**

Practice: Use of robust, **lined leach pads** or containers (e.g., HDPE-lined ponds or large plastic drums) to contain the acid solution and prevent soil and water contamination.

Benefit: Prevents devastating environmental damage and allows for the collection and re-use of the leaching solution, reducing acid consumption.

- **Safe Acid Handling:**

Practice: Mandatory use of **Basic PPE** for handling acids: nitrile or rubber gloves, PVC aprons, goggles, and rubber boots. Access to clean water for emergency rinsing is essential.

Benefit: Prevents debilitating chemical burns and long-term health issues.

- **Efficient Precipitation:**

Practice: Using a controlled tank for precipitation and ensuring the effluent is neutralized (e.g., with limestone) before safe discharge.

Benefit: Prevents acid mine drainage and allows for safer handling of copper product.

Table 6: Summary for Copper Processing (Zambian ASM Context)

Aspect	Typical ASM Practice (Zambia)	Good Practice (Zambia)
Mining Method	Shallow pits, hand-sorting high-grade ore.	Systematic pits, bulk sampling for average grade.
Crushing & Grinding	Hand hammers or basic jaw crusher; inefficient ball mill.	Jaw crusher followed by a well-maintained ball mill with a controlled feed.
Leaching	In unlined pits or drums; direct discharge of acid.	In lined leach pads or tanks; solution contained and recirculated.
Precipitation	Using scrap iron in open containers; acidic runoff.	In controlled tanks; effluent neutralized (e.g., with lime) before disposal.
Health & Safety	No PPE for acid handling; high risk of burns.	Full PPE mandatory: acid-resistant gloves, goggles, boots, aprons.
Environmental	Severe contamination of soil and water with acid and metals.	Contained pollution; zero or minimal discharge to the environment.
Estimated Recovery Rate	30-50% (Inefficient liberation and solution loss).	>75% (Improved liberation, contained solutions, and complete leaching).

Source: Field engagement

5.3. ASM Gemstone Processing and Sites (Typical Practice)

Zambia is famous for emeralds and amethysts. Gemstone processing is less chemical but requires great skill and care to avoid breaking crystals. Processing includes:

- **Washing and Sorting:** The weathered ore (gravel and clay) is washed in a simple screen or sieve to break down the clay and reveal the rough gemstones.
- **Manual Extraction:** Gemstones are carefully picked out by hand. For hard rock mining, ore is carefully broken with hammers and chisels to avoid damaging the crystals.
- **Cleaning and Grading:** Stones are washed and visually sorted by size, color, and clarity.

5.3.1. The Typical Site

The main issues are not chemical but related to:

- **Value Loss:** The use of hammers can easily fracture or "bruise" gems, drastically reducing their value.
- **Theft and Safety:** Insecure sites lead to high risks of theft. Poor pit stability is a major safety concern.
- **Inefficient Recovery:** Basic washing techniques can miss smaller or embedded stones.

5.3.2. Gemstone Processing (Good Practice)

- **Improved Liberation:**
 - **Practice:** Using mechanical **rotary scrubbers** (like a large, motorized drum) to gently break down clay without damaging the stones, replacing aggressive hammering.
 - **Benefit:** Significantly reduces breakage and increases the recovery of high-value, undamaged gems.
- **Improved Concentration:**

- **Practice:** Using **density separation** methods like jigging tables. These separate heavier gemstones from lighter waste rock based on their specific gravity in water.
- **Benefit:** Dramatically improves recovery rates of smaller stones that are missed by hand sorting, boosting profitability.
- **Security and Valuation:**
 - **Practice:** Establishing a secure, centralized washing and sorting facility. Providing basic training on gemstone valuation (the "4 Cs": color, clarity, cut, carat).
 - **Benefit:** Reduces theft and empowers miners to negotiate better prices based on a clearer understanding of their product's true value.

Table 7: Summary for Gemstone Processing (Zambian ASM Context)

Aspect	Typical ASM Practice (Zambia)	Good Practice (Zambia)
Mining Method	Selective digging for visible crystals; high risk of damage.	Careful bulk extraction to protect the host rock and crystals.
Washing & Liberation	Aggressive washing and breaking of ore with hammers.	Rotary scrubbers to gently break down clay without damaging stones.
Concentration	Visual hand-sorting only; highly dependent on skill and eyesight	Gravity separation using jigging tables or panning to recover smaller stones.
Sorting & Valuation	Basic sorting by size/color; vulnerable to underpricing.	Use of simple tools (loupe, light); basic training in gemology for better valuation.
Health & Safety	Dust inhalation; poor pit stability; risk of theft.	Dust control (water spray); safe work practices; secure storage for gems.
Environmental	Soil erosion from washing; siltation of waterways.	Settling ponds to recycle water and prevent siltation .
Estimated Recovery Rate	40-60% (Many smaller and embedded stones are lost).	>85% (Mechanical concentration ensures near-total recovery of all saleable material).

Source: Field engagement

LESSON 6: KNOW WHAT CAN GO WRONG AND BE SAFE: HEALTH AND SAFETY IN MINING

"The collapse in Kafue that buried 3 miners was a tragic reminder of the dangers beneath our feet. But the threats in mining aren't just from geohazards. They are also in the air we breathe, the chemicals we touch, and the tools we use every day. True safety means being aware of *all* risks—from unstable slopes and dusty air to mercury exposure and unsafe tools. Protecting your health is just as important as preventing a collapse. This training combines 'field wisdom' with safe practices to ensure you can work not only without accident, but without long-term illness. Your well-being is your most valuable resource."

1. Objectives

- **Geotechnical Safety:** Identify and mitigate hazards related to ground instability. Demonstrate how to create stable slopes through benching and monitor for warning signs of collapse.
- **Chemical Hazard Management:** Recognize the health risks of common ASM chemicals (e.g., mercury, cyanide, diesel fuel, silica dust). Learn and apply safer handling, storage, and disposal practices to minimize exposure.
- **Safe Use of Tools and Machinery:** Identify hazards associated with manual tools (e.g., pickaxes, hammers) and mechanized equipment (e.g., crushers, generators, winches). Demonstrate safe operating procedures and basic maintenance checks.
- **Hazard Awareness and Control:** Conduct daily hazard checks that include geotechnical, chemical, physical, and ergonomic risks. Promote a culture of reporting and correcting unsafe conditions.
- **Community and Personal Protection:** Advocate for key safety actions, including the use of Personal Protective Equipment (PPE), keeping children and non-essential personnel off-site, and knowing basic emergency response.

2. Expected Outcomes:

Through this lesson will equip you with knowledge to deal with the below events successfully:

- **Prevent Collapses:** Significantly reduce the risk of pit and adit collapses by applying basic slope management techniques.
- **Conduct Effective Checks:** Perform and document simple daily hazard assessments (using a checklist if available) to identify and address risks before work begins.
- **Respond to Emergencies:** Know the first steps to take in case of a collapse or other emergency to improve the chances of a successful rescue and your own survival.
- **Protect Your Community:** Implement practical strategies to improve overall site safety, protect your fellow miners, and prevent accidents involving children and visitors.
- **Sustain Your Livelihood:** Maintain a safer worksite that is less likely to be shut down by inspectors and more likely to be productive and profitable in the long term.

3. Questions for a Miner

- **On Geotechnical Hazards (Pit Collapse & Slope Stability)**
 - "What are the signs you look for to tell if a pit wall or tunnel is becoming unstable?"
 - "Describe the method you use to dig. How could you adapt it to make the slopes more stable?"
- **On Chemical Hazards (Mercury, Dust, Fuels)**
 - "When you process ore or use chemicals, what do you do to avoid breathing in dust or fumes?"
 - "How do you handle, store, and dispose of chemicals like mercury or diesel fuel? What are the biggest challenges in doing this safely?"
 - "What do you do if you spill a chemical or fuel on your skin or on the ground?"
- **On Physical & Mechanized Hazards (Tools, Equipment, Noise)**
 - "What are the most dangerous tools or machines on your site? What safety steps do you take before using them?"
 - "How do you maintain your tools to prevent accidents from broken handles or faulty equipment?"
 - "How do you protect your hearing from constant loud noise from generators or crushers?"
- **On General Safety Culture & Community**
 - "What is the one piece of safety gear (PPE) you find most useful? Which one is hardest to use consistently, and why?"
 - "Beyond just telling them to leave, what are some practical ways we can keep children and animals safe and away from the processing and excavation areas?"
 - "If you saw a fellow miner using mercury without protection or working under an unstable roof, how would you talk to them about it?"

Share your own experience relevant to the questions above. Share to save lives.

4. Learning from Peers: Voices from the Pit

These are not just stories. This is our experience.

4.1. On Geotechnical Hazards:

- **What Happened:** "We were pulling an emerald from the side of a 50-meter pit. The boss said we didn't have time to bench or step the sides. We all knew the wall was leaning, but the money was good that day. Samuel was at the bottom. We heard a deep crack, like thunder from the ground. By the time the dust settled, he was gone. We dug for two days with our hands to find him."
- **The Missed Warning:** "The wall had a huge crack at the top that we packed with mud to hide it from the rain. We thought it would hold. We were wrong. The rain from the night before made the soil heavy."
- **The Lesson:** "A leaning wall is a wall that has already decided to fall. Never trust it. Never hide a crack; it is the earth's warning cry."

4.2. On Chemical Hazards: The Shaking Sickness of Kwame (Ghana, 2020)

- **What Happened:** "For years, Kwame was the best gold concentrator. He could work a mercury-gold amalgam with his bare fingers better than anyone. He'd clean the gold with a blowtorch, breathing the sweet-smelling smoke. He started forgetting things. Then his hands began to shake uncontrollably. Now, at 35, his wife must feed him. He can no longer work."
- **The Missed Warning:** "We all felt headaches after burning the amalgam. We called it 'the gold fever' and thought it was normal. We used empty water sachets to store the mercury. We never connected the sickness to the shiny metal we held every day."
- **The Lesson:** "Mercury does not just help you catch gold; it catches you. It is a slow poison that steals your mind and body. Skin contact and smoke are a direct path to sickness."

4.3. On Dust Hazards:

- **What Happened:** "Old Joseph worked the diamond drill for 20 years. He was strong, a legend. But for the last five years, his cough was louder than the drill. A deep, wet, shaking cough that would bend him double. He couldn't walk 10 steps without gasping for air. He didn't die in a collapse; he drowned in the air of his own home."
- **The Missed Warning:** "He would blow his nose at the end of the day and black mud would come out. We joked that he had ore in his veins. We thought it was a sign of being a hard worker. We didn't know the rock dust was cutting his lungs to scars."
- **The Lesson:** "The dust you ignore today will be the air you cannot breathe tomorrow. The rock we break can break us from the inside."

4.4. On Physical & Mechanized Hazards:

- **What Happened:** "Amina was feeding ore into the crusher. The jam plate was weak and bent. The machine jammed, as it always did. Instead of turning it off to clear it, she used a metal bar to poke at the rock while it was still running. The jaws caught the bar, pulled her arm in, and crushed her hand to pulp. She now sells peanuts at the market."
- **The Missed Warning:** "That crusher jammed three times a day. We were always poking at it while it was running to save time. The guard that would have covered the jaws was removed years ago because it 'got in the way'."
- **The Lesson:** "A machine has no mind. It does not know the difference between rock and bone. Never feed a hungry machine with your hands. Always lock out the power first."

4.5. On Community Hazards: The Playground (Nigeria, 2019)

- **What Happened:** "After the rains, the abandoned pits filled with water. They looked like swimming holes. The children from the village would play there to cool off. One afternoon, three boys—all cousins—didn't come home. We found their bodies the next day in the deep, cold water of a pit we had dug and left behind."
- **The Missed Warning:** "We knew the kids played there. We even saw them sometimes and shouted at them to go away. But we never fenced the pits. We never posted a guard. We never took the time to properly collapse and backfill them. We thought a shout was enough."
- **The Lesson:** "A pit left open is dangerous humans and animals. Our responsibility does not end when the ore runs out. We must make the land safe when we leave it."

LESSON 6 A-: ASM HEALTH & SAFETY: RISKS MANAGEMENT PLAN

ASM-specific risk assessment and control plan for the top hazards, designed to be feasible, low-cost, and effective for sustainable artisanal mining.

Guiding Principle: The most effective control is to remove the hazard completely (Elimination). If that's not possible, try to replace it with something safer (Substitution). If the hazard remains, use physical barriers (Engineering) and clear rules (Administrative) to manage it.

Remember! Personal Protective Equipment (PPE) is the last line of defense, not the first.

6.1. Ground Instability (Pit Collapse, Rockfalls)

This hazard is caused by excavating soil and rock, which removes natural support and increases stress on the remaining walls. This stress leads to cracking, shearing, and eventual failure. Factors like vibration from equipment, water saturation from rain, and undercutting slopes drastically accelerate this process. A collapse occurs when the weight of the material exceeds its strength, resulting in a rapid, uncontrolled movement of earth that can bury anything in its path.

Table 8: Risk assessment and control measures for ground instability

Hazard	Risk Identification	Risk Assessment	Control Measures
Ground Instability (Pit Collapse, Rockfalls)	Undercut or overhanging walls.	HIGH RISK: High likelihood of major collapse, causing fatal crushing injuries.	1. Elimination/Engineering: Create benched slopes (steps). Never dig straight down. This is the single most effective control. 2. Administrative: Designate a "Crack Checker" at the start of each shift to inspect walls for new cracks, water seepage, or loose rocks.
Ground Instability (Pit Collapse, Rockfalls)	Loose rocks falling from above.	MEDIUM-HIGH RISK: Likely to cause serious head injuries or death.	1. Engineering: Use a long, strong pole to bar down loose rocks from a safe position ("scaling") before starting work. 2. Administrative: Keep the area at the top of the pit (the "berm") clear of people, equipment, and waste piles.
Ground Instability (Pit Collapse, Rockfalls)	Working under unsupported "adits" or "funcos" (tunnels).	EXTREME RISK: Very high likelihood of fatal entrapment.	1. Elimination/Substitution: Avoid tunneling if at all possible. Prefer open-pit methods. 2. Engineering: If you must tunnel, use strong, solid timber props (not rotten branches) every meter for support.
Ground Instability (Pit Collapse, Rockfalls)	Heavy rain saturating the soil.	HIGH RISK: Dramatically increases weight and risk of slope failure.	1. Administrative: STOP WORK during and after heavy rain. Wait for the ground to dry. This is a non-negotiable rule. 2. Engineering: Dig diversion trenches around the pit to channel rainwater away.

Source: Field engagement

6.2. Chemical Exposure (Mercury, Cyanide, Silica Dust)

This occurs when hazardous substances enter the body, primarily through inhalation of dust or fumes, or through skin contact. **Silica dust** from crushing rock is fine enough to lodge deep in the lungs, causing incurable scarring (silicosis). **Mercury vapour** released when heating amalgam is a potent neurotoxin that damages the brain and nerves. **Cyanide**, used to dissolve gold, can be absorbed through the skin or accidentally ingested, preventing the body's cells from using oxygen.

Table 9: Risk assessment and control measures for chemicals

Hazard	Risk Identification	Risk Assessment	Control Measures
Chemical Exposure (Mercury, Cyanide, Silica Dust)	Inhaling mercury vapor during amalgam burning.	HIGH RISK: Causes irreversible nerve and brain damage.	1. Substitution: Use a retort (sealed glass or metal pipe). Captures >95% of vapors and allows recovery/re-use of mercury. 2. Engineering/Administrative: Burn amalgam outdoors only, stand upwind, keep others far away.
Chemical Exposure (Mercury, Cyanide, Silica Dust)	Skin contact with liquid mercury or cyanide.	MEDIUM-HIGH RISK: Absorbed through skin, causing organ damage.	1. Administrative: Never handle chemicals with bare hands. Use heavy-duty plastic bags as gloves, plastic bottles for storage. 2. Hygiene: Wash hands and arms thoroughly with soap and water before eating, drinking, or smoking.
Chemical Exposure (Mercury, Cyanide, Silica Dust)	Ingesting chemicals from contaminated hands/food.	HIGH RISK: Direct poisoning.	1. Administrative: Never eat, drink, or smoke in the processing area. Designate a clean area away from chemicals for breaks. 2. Engineering: Store chemicals in clearly labeled, unbreakable containers (sealed plastic buckets) away from water sources.
Chemical Exposure (Mercury, Cyanide, Silica Dust)	Inhaling silica dust from crushing/grinding.	HIGH RISK: Causes incurable lung disease (silicosis).	1. Engineering: Wet methods. Spray a light mist of water on rocks before crushing and during grinding. Keeps dust down. 2. Administrative: Position yourself upwind of crushing activities.

Source: Field engagement

6.3. Fall of Person (Into Pits, From Height)

This is a gravity-related hazard where a person plunges to a lower level, often resulting in severe injury or death. The risk is determined by the height of the fall and the surface impacted. It is caused by the absence of physical barriers (unguarded edges), the use of unstable access methods (makeshift ladders), and slippery or unstable walking surfaces. A fall from just twice a person's height can be fatal if they land on hard ground or equipment.

Table 10: Risk assessment and control measures for fall of person

Hazard	Risk Identification	Risk Assessment	Control Measures
Unguarded edges of deep pits.	Unguarded edges of deep pits.	HIGH RISK: High potential for fatal falls.	1. Engineering: Create a perimeter barrier using stacked rocks, sturdy wooden posts, or bushes planted around the edge (at least 1 meter back). 2. Administrative: Mark the edge with brightly colored rags or stones as a visible warning.
Unstable or makeshift ladders/ropes.	Unstable or makeshift ladders/ropes.	MEDIUM-HIGH RISK: Falls can cause broken bones or death.	1. Substitution/Engineering: Use a strong, sturdy wooden ladder. Inspect it daily for cracks. Tie the top and bottom to secure it. 2. Elimination: For shallow pits, dig a sloped exit ramp instead of using a ladder.
Slippery or unstable ground near edges.	Slippery or unstable ground near edges.	MEDIUM RISK: Likely to cause a fall into the pit.	1. Administrative: Keep the area around the pit clear of tools, waste rock, and other tripping hazards. 2. Engineering: Ensure good drainage to prevent water from collecting and making the ground muddy.

Source: Field engagement

6.4. Water Risks (Drowning, Flooding)

This involves the dangerous interaction between mining excavations and surface or groundwater. **Flooding** happens when water accumulates in a pit faster than it can be removed, often due to intense rainfall, rapidly submerging equipment and trapping personnel. **Drowning** risk is high in steep-sided pits or pools where a person cannot climb out, especially if they are weighed down by boots or clothing. Water also severely weakens pit walls, increasing the risk of collapse.

Table 11: Risk assessment and control measures for water

Hazard	Risk Identification	Risk Assessment	Control Measures (Most Effective to Least)
Water Risks (Drowning, Flooding)	Working in a pit that could flood rapidly from rain.	HIGH RISK: Rapid entrapment and drowning.	1. Administrative: Always check the weather forecast. Have a clear evacuation plan and escape route everyone knows. 2. Engineering: Dig a sump pit (a deep hole) in a corner to collect water and pump it out or bail it slowly.
Water Risks (Drowning, Flooding)	Abandoned, water-filled pits attracting children.	EXTREME RISK: High likelihood of child drowning.	1. Elimination: Backfill abandoned pits immediately as a community responsibility. 2. Engineering/Administrative: As a minimum, fence with local materials (thorn bushes, wooden posts) and post warning signs with pictures.
Water Risks (Drowning, Flooding)	Unsafe crossing to mining islands in rivers.	HIGH RISK: Risk of being swept away.	1. Substitution/Engineering: Build a simple, stable footbridge with local wood instead of wading or swimming. 2. Administrative: Never cross alone or during high water flow. Use a safety rope tied to both banks.

Source: Field engagement

6.5. Tool & Equipment Dangers

This encompasses injuries caused by the failure of tools or uncontrolled energy release. **Flying fragments** are created when brittle materials like rock or metal are struck with force. **Equipment pinch points** can catch clothing or limbs, pulling the operator into the machinery. **Breakage** of worn or damaged tools (e.g., a cracked hammerhead or frayed cable) releases stored kinetic energy in an unpredictable and dangerous way, projecting sharp debris at high speed.

Table 12: Risk assessment and control measures for tools and equipment

Hazard	Risk Identification	Risk Assessment	Control Measures
Flying rock fragments from hammering.	High likelihood of eye injuries.	MEDIUM-HIGH RISK	1. Engineering: Use a "hit board" to direct fragments away. 2. PPE: Safety glasses are non-negotiable. Cheap, reusable goggles are a critical investment.
Using tools with cracked handles or damaged heads.	Can break during use, causing injury.	MEDIUM RISK	1. Administrative: Daily "Tool Talk" – inspect every tool before use. A cracked handle must be replaced or tightly wrapped with wire or cord as a temporary fix.
Frayed ropes or cables used for lifting.	Load can fall, crushing anyone below.	HIGH RISK	1. Administrative: Never stand directly under a load being lifted. 2. Engineering: Inspect ropes daily. If a rope is frayed, replace it. Do not take chances.
Unguarded moving parts on crushers/pumps.	Risk of amputation or entanglement.	HIGH RISK	1. Engineering: Never remove guards. If a guard is missing, make one from strong sheet metal or wood. 2. Administrative: Ensure long hair is tied back and loose clothing is secured before starting.

Source: Field engagement

LESSON 6.B: SNAP HEALTH & SAFETY PREPAREDNESS DRILL FOR MINE EMERGENCIES

In the event of an incident, a coordinated response can make a lot of difference and save lives. Below are a concise, methodical snap drills guidance to increase your preparedness to face critical incidents in an ASM context, designed to be remembered easily. However, this is for the purpose of capacity building and not intended to replace the intervention of professionals.

Golden Rule: Your safety first. Never become a second victim. Stop, Think, then Act.

1. Incident: Equipment Fire (e.g., Generator, Pump)

Golden Rule: Your safety first. Never become a second victim. Stop, Think, then Act.

The Best Tool: For most ASM sites, dry sand or dirt is your best and most reliable firefighter.

- **DOS:**
 1. **SHOUT:** Yell "FIRE!" to alert everyone.
 2. **Call firemen Services** if available in your area and apply the below protocol.
 3. **CUT:** Disconnect the fuel source or power if it is safe to do so.
 4. **SMOTHER:**
 - **Primary Method:** Throw **dry sand or dirt** directly onto the base of the flames to cut off the oxygen. Keep shoveling until the fire is completely out.
 - **If Available & Safe:** Use a **fire extinguisher**. Remember **PASS**:
 - Pull the pin.
 - Aim the nozzle at the base of the fire.
 - Squeeze the handle.
 - Sweep from side to side.
 5. **CONTAIN:** Move any other flammable materials (fuel cans, rags) away from the fire.
- **DON'TS:**
 - Do not inhale the toxic smoke. Approach from upwind.
 - **Do not use water on burning fuel or electrical equipment**—it will spread the fire or electrocute you.
 - Do not let the fire block your escape route. If it is spreading fast, get everyone out and let it burn.

Warning: Water is dangerously ineffective on these types of fires (it can cause a fuel fire to spread or electrocute the user). Sand and dirt are highly effective for these **Class B** (flammable liquids) and **Class C** (electrical) fires, as they smother the flames by cutting off oxygen.

Key Training Point: During the drill, physically demonstrate throwing sand from a safe distance. If an extinguisher is available, demonstrate the PASS technique. This clarifies why sand is the recommended first option while still providing crucial knowledge for those who might have an extinguisher.

2. Incident: Broken Arm or Leg

- **DOS:**
 1. **CALM:** Keep the injured person still and calm. Tell them help is coming.
 2. **LOOK:** Look for obvious deformity, bleeding, or an open wound. **Do not try to straighten the limb.**
 3. **SUPPORT:** Immobilize the limb exactly as you found it. Use anything available: a rolled-up shirt, a piece of wood, a mining sack. Tie it above and below the injury to splint it.
 4. **ICE:** Apply a cold compress (a cloth-wrapped water bottle) to reduce swelling and pain.
- **DON'TS:**
 1. Do not move the person unless they are in immediate danger (e.g., pit collapse).
 2. Do not give them food or water in case they need surgery later.
 3. Do not rub or massage the injured area.

3. Incident: Hit by a Falling/Flying Rock

- **DOS:**
 1. **SCENE SAFETY:** Ensure no more rocks are falling. **Do not run into the collapse zone.**
 2. **CALL:** Shout for help. Send one specific person to get medical assistance.
 3. **ABC:**
 - **Airway:** Gently tilt their head back to ensure nothing is blocking their throat.
 - **Breathing:** Look for chest movement. Listen for breath.
 - **Circulation:** Check for severe bleeding.
 4. **STOP BLEEDING:** If there is a wound, apply firm, direct pressure with a clean cloth. Do not remove the cloth if it soaks through; add another layer on top.
 5. **STILL:** Tell the person not to move. Support their head and neck.
- **DON'T:**
 1. Do not remove a large, embedded object. Stabilize it with padding.
 2. Do not move them unless absolutely necessary.
 3. Do not crowd around the victim; ensure they have fresh air.

4. Incident: Suffocation from Gas/Fumes in a Tunnel (After a Blast)

WARNING: This is extremely dangerous. The air itself is the enemy.

- **DOS:**
 1. **STOP: DO NOT ENTER THE TUNNEL.** Gases are often invisible and odorless and can be fatal to you in seconds.
 2. **VENTILATE:** If possible, without entering, use a fan or pump to push fresh air into the tunnel from the entrance.
 3. **CALL:** Send for professional help immediately. This is beyond first aid.
 4. **WAIT:** Wait for the tunnel to be declared safe by professionals with gas detectors. **This is the hardest but most important rule.**

- **DON'TS:**
 1. **ABSOLUTELY DO NOT** run in to try to save someone. You will likely become the next victim, doubling the tragedy.
 2. Do not rely on holding your breath; some gases can be absorbed through the skin.
 3. Do not use open flames (lighters, torches) to check the tunnel—this could cause an explosion.

5. Pit Collapse & Entrapment

- **DOS:**
 1. **ASSESS:** Quickly determine the scale of the collapse. Is the area still unstable?
 2. **CALL:** Designate one person to go for heavy machinery and alert Mines Regional Office for professional rescue teams immediately. This is not a job for hand shovels alone.
 3. **COMMUNICATE:** If you can hear the trapped person, shout to them that help is coming. Keep them calm.
 4. **SHORE: Before digging,** make the area safe. Use timber to support the walls around the collapse to prevent a second collapse onto the victim and rescuers.
- **DON'TS:**
 1. Do not let a large group of people rush to the spot and start digging frantically. This can destabilize the ground further and endanger everyone.
 2. Do not use heavy machinery carelessly near the collapse edge; it can trigger another slide.
 3. Do not give up on calling for professional help. This is the fastest way to get them out alive.

Knowledge Consolidation

Peer Fire Chat Corner

Sit in a circle. Discuss these questions honestly. There are no wrong answers, only shared experiences.

- **On Risk & Choice:** Your younger brother wants to start mining with you tomorrow. What are the **three most important safety rules** you would teach him on his first day, and why those?
- **On Culture & Pressure:** The site boss says, "Skip benching today, we need to hit this target." How do you, as a team, respond to balance safety with productivity?
- **On Children & Community:** You see a woman processing gold with mercury while her baby sleeps on a cloth nearby. How do you approach her to discuss the risk without causing offense?
- **On Prevention:** "The best rescue is the one you never have to perform." What does this saying mean to you after today's training?
- **On Legacy:** What is one unsafe practice you saw your elders do that you commit to changing for your generation of miners?

Challenge Yourself: Your First Week Back Home

It is not enough to just learn, but to act. This week, choose one challenge from each category and make it happen on your site.

- **Ground Instability Challenge:** Be the "Crack Checker." Before anyone descends, you will walk the perimeter of the main pit. Point out one potential risk (a crack, an overhang, loose material) and suggest what the team should do about it.
- **Chemical Challenge:** Demonstrate one safer practice. Show one person how to use a plastic bag as a glove when handling mercury, or how to wet the rocks before crushing to reduce dust.
- **Fall Hazard Challenge:** Identify the most dangerous entrance/exit at your site. Lead a 15-minute effort to make it safer—whether by securing a ladder, clearing a path, or marking the edge with painted rocks.
- **Tool & Equipment Challenge:** Organize a "Tool Talk." Gather the tools used at your site. Inspect one pickaxe, one hammer, and one rope together as a team. Decide if they are safe to use or need to be fixed/replaced.
- **Water Risk Challenge:** Map your emergency flood escape route. If it doesn't exist, define it with your team. Where will you go if the water starts rising rapidly?

Carry This With You: The Miner's Creed

This is your daily protocol to observe at the start of the day.

- *Never trust a vertical wall. Bench it, check for cracks, and listen to the ground.*
- *Don't poison your lungs or brain. Work upwind, and wet the dust, and treat chemicals with caution.*
- *Your tools can affect your health and safety. Inspect them before use.*
- *Your safety is not just about you. You should speak up when you see a risk and keep children away from the site and ensure everyone has a way out in a moment notice.*
- *You will go home in the same condition as you have arrived. Healthy, whole, and ready for your family.*

This is how we mine. This is how we live. This is our responsibility.

LESSON 6.C: PREVENTING MINE COLLAPSE

A collapse doesn't warn you. It buries you. Weak ground, water, and bad practices turn pits into graves. This lesson is about using your eyes and local materials to keep the ground over your head. Collapses bury dreams in seconds. In ASM, weak supports or overloaded tunnels turn pits into graves. Though this subject has been mentioned earlier, its importance requires that it is discussed in a standalone lesson.

1. Objectives

In this lesson you will learn quick takeaways for good practices at Artisanal and Small-Scale Mining (ASM) sites to enhance safety, stability, and productivity. You will learn:

- Five key causes of pit and tunnel collapses.
- How to build strong supports and benches with on-site materials.
- How to read the ground's warning signs before it fails.
- Emergency drill for a collapse.

2. Expected Outcomes

You will be able to:

- Spot collapse risks like cracks, water, and overhangs.
- Build safe slopes (benching) and timber supports.
- Lead a daily ground inspection.
- React instantly and correctly if a collapse happens.

3. Icebreaker Questions

To Gauge Experience & Risk Perception:

- "Point to the most unstable spot on this site. Why is it dangerous?"
- "What does a 'tired' or stressed pit wall look like? Describe the signs."
- "Have you ever refused to work a face? Why?"

To Test Practical Knowledge:

- "What's the first thing you check after a heavy rain? Why?" "What's the biggest mistake you see people make that weakens a pit wall?"
- How do you test if an overhead rock is solid?"

To Engage in Problem-Solving:

- Your team is under pressure to dig faster. How do you argue for taking time to bench properly?"
- You see a deep crack forming above the adit. What are your next three steps?"
- What local material here is strongest for building a support? How would you use it?"

Learn from a Miner:

Write down your answer to all the above and share it with your peers for learning purposes. Remember there are no wrong answers.

4. Collapse Prevention Cheat Sheet: Wisdom from the field and years of practice.

Causes to Avoid:

- “*Funco*” or undercutting, adits or vertical digging without support.
- Rainwater soaking pit walls.
- Vibrations from blasting or machinery.

4.1 Undercutting

In the context of slope stability in mining it refers to excavating the base of a slope, thereby reducing its support and potentially increasing the risk of instability or failure. This is important to prevent slope failure. The Holder who contravenes is fined or imprisoned

Figure 1 Undercutting or *Funco*

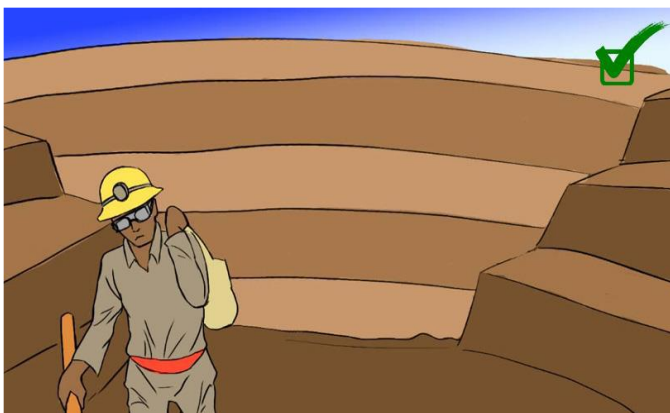


Source: ACP-EU Development Minerals Programme,

4.1.1. Prevention Technics

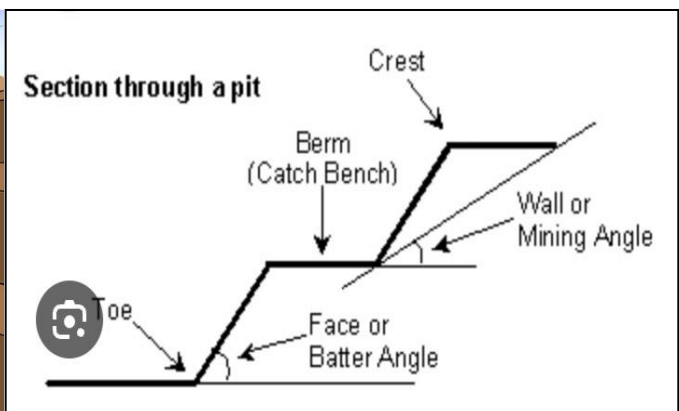
Angle Your Walls: Slope pit sides (4 5°+) to reduce pressure.

Figure 1: Benching technics



Source: ACP-EU Development Minerals Programme,
Uganda

Figure 2: Section through a Pit



Source: Datamine

Benching refers to the process of creating a series of horizontal steps or levels along the wall of the pit. This practice is critical for several reasons:

- Benches allow miners to extract ore or minerals from specific levels of the pit. Benches help in segregation of material as they can be used to target different ore zones or waste rock hence improving ore quality control.
- Provide stability by reducing the risk of rockfalls or landslides.
- Enable the use of machinery for drilling, blasting, and loading.

4.1.2. Benching basics and Daily Action:

Slope Angle: Keep bench angles $\leq 45^\circ$ (or as per local regulations) to prevent collapses.

Bench Height: Typically, 3–6 meters (10–20 ft) per bench, depending on equipment and ground stability.

Bench Width: Minimum 2–3 meters (6–10 ft) for safe access and machinery movement.

Despite the above, every day on very occasion, apply the "One Person Outside Rule": Always keep one miner above ground to watch for collapse signs and call for help.

4.2. Tunneling

Do not burrow tunnels in weathered ground or unconsolidated material e.g. waste dumps. Weak ground must be supported. Engage a mine planning engineer to design the tunnels and a rock engineer to design suitable support systems. Avoid making horizontal excavations without support.

4.2.1. Prevention tactics

- **Support with Timber:** Use logs as roof props or wall braces.

Figure 3: Protected vs unprotected tunnel entrance



Source: AI-generated image, Source: Class FM Online (2020); Chronicle (2019)

- **Monitor Daily:** Tap walls with a hammer—hollow sounds mean danger!

4.3. Drain Water

Dig trenches around pits to divert rain and avoid flood.

4.3.1. Prevention technics: Drain runoff water from mine working

This avoids weakening of slope via lubrication induced by water. Special care must be taken to ensure water does not ingress daylight cracks.

Figure 4 Drainage



Source: AI-generated image

4.4. Daylighting of cracks

The Holder, co-operative member or individual must inspect for cracks daylighting on the surface behind the slope. It is a sign of possible slope failure. Water being pumped from the pit must not be discharged into the cracks. Slope failure may result in fatalities.

Figure 5: Cracks Daylighting



Source: Sambad (2019)

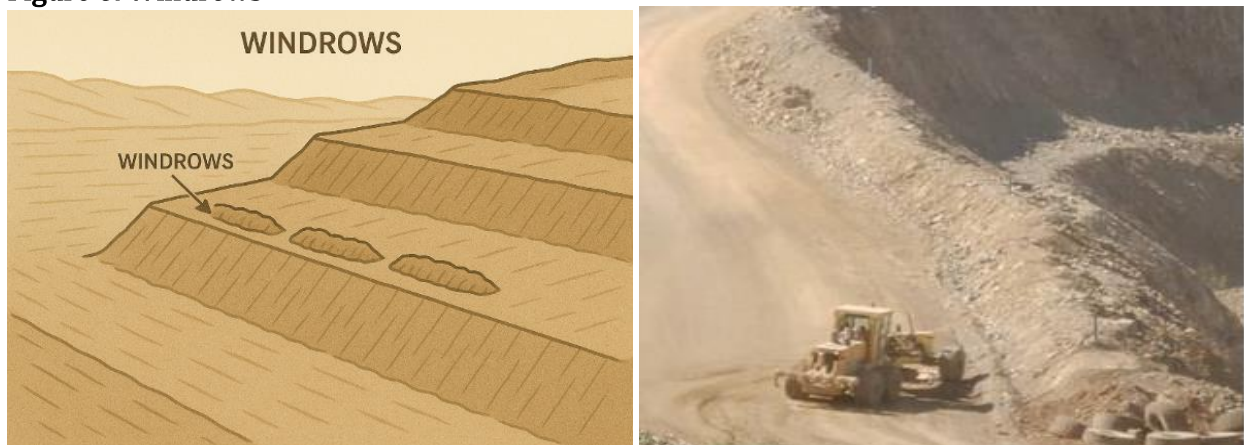
4.5. Safety Berms and Windrows

Safety windrows are important for mining operations and help to ensure a safer working environment. It is an arrangement of material, which is placed to serve as a barrier or buffer zone. Windrows are used to:

- Prevent soil or rock from sliding or eroding into pits or roads.
- Divert water: and prevent accumulation or flooding in mining areas.
- Act as a barrier to prevent vehicles or equipment from entering hazardous areas or to rolling over edges.

Engage a mine planning engineer for guidance on this.

Figure 6: Windrows



Source: AI-generated image

Tips: Miners should be trained in good mining techniques and only trained workers should be allowed to extract. Extra caution should be taken during the rainy seasons because water increases the risk of wall collapse. Always look out for fractures in pit walls and indications of movement or shift of the wall.

5. Knowledge Consolidation

5.1. Peer Fire Chat Corner: Test Your Understanding

- Sit in a circle. Answer these questions based on what we just learned.
- On Causes: "Besides rain, what are two other common causes of collapse we discussed? Why are they so dangerous?"
- On Warnings: "You see a trickle of muddy water coming out of a crack in the pit wall. What is this sign telling you? What is your immediate action?"
- On Solutions: "What is the main difference between benching and installing a support? When would you use one over the other?"
- On Culture: "Your friend says, 'Checking for cracks is a waste of time.' How do you convince them it's critical for everyone's safety?"
- On Emergency: "You hear a deep rumble and see dust rising from a tunnel. What are the first three things you MUST do? Shout? Run in? What?"

5.2. Challenge Yourself: Prove You Can Do It

- **Task 1: The Daily Inspector Challenge**
 - Tomorrow, before work begins, you will lead a 10-minute inspection of the main working face.
- **Action:**
 - Point out one potential hazard (a crack, an overhang, loose material) to your team. Propose one practical solution to fix it (e.g., "We need to bench this slope," or "We need to bar down that loose rock.").
- **Goal:**
 - Practice proactive monitoring and speaking up about safety.

- **Task 2: The Bench Builder Challenge**
 - Identify one slope in your pit that is too steep and unstable.
- **Action:**
 - With your team, spend one hour creating a single safe bench (step) in that slope. Use picks and shovels to carve it back.
- **Goal:**
 - Demonstrate the practical application of benching and feel the stability it creates.

- **Task 3: The Escape Drill Master Challenge**
 - Organize an emergency drill for your team.
- **Action:**
 - At the start of a shift, shout a clear warning signal (e.g., "COLLAPSE DRILL!").
 - Ensure every person knows the designated escape route and gathers at the pre-defined safe assembly point. Time how long it takes.
- **Goal:**
 - Make the emergency response an automatic reaction, not a moment of panic.

Carry This With You:

***Crack Monitor:** Nail + string ground-movement detector*

***Stability & Safety: Terracing:** Create stepped benches to reduce erosion and landslides.*

***Drainage:** Install ditches or berms to divert water and prevent saturation (a major collapse risk).*

***Berms/Safety Barriers:** Leave 1-meter spoil piles at bench edges to stop falling rocks.*

Excavation & Blasting (if applicable)

***Controlled Blasting:** Use small, staggered charges to minimize vibration damage to benches.*

***Overburden Removal:** Clear loose material from bench tops before drilling/blasting.*

Monitoring & Maintenance

***Daily Inspections:** Check for cracks, loose rocks, or water pooling.*

***Scaling:** Remove unstable rocks/hangs manually or with tools.*

***Avoid Overloading:** Do not stack waste/material near bench edges.*

Worker Training & PPE

***Safety Protocols:** Train workers on benching hazards (e.g., collapses, roll-aways).*

***PPE:** Helmets, harnesses (for steep slopes), and high-visibility vests.*

***Regulatory Compliance** Follow national guidelines*

LESSON 6.D. SAFETY AND SITE MANAGEMENT CODE

This mine is more than a pit; it is our workplace, our livelihood, and our community. The rules we set here are not to restrict you, but to protect you. They are written from the hard lessons of accidents and losses. This code is our promise to each other—a promise that every one of us will do everything in our power to ensure we all go home to our families, safe and whole, at the end of every day. Your life is worth more than the gold we dig.

1. Objectives

This lesson will help you in the following ways:

- Understand the life-saving reasons behind each rule in the Safety and Site Management Code.
- Know how to correctly use and maintain your Personal Protective Equipment (PPE).
- Be able to identify your role in enforcing these codes on your site.
- Develop the confidence to speak up when you see a violation.

2. Expected Outcomes

You will become your own “*site inspector*” and be able to:

- Explain *why* each safety rule exists, not just what it is.
- Inspect your PPE before each use and wear it correctly without being told.
- Take immediate action in an emergency, following the drill to the assembly point.
- Hold yourself and your peers accountable for a safer site.

3. Questions for a Miner

- What is the one safety rule you think is the hardest to follow? Why?
- Have you ever witnessed an incident where PPE saved from injury? What happened?
- If you see a good friend breaking a safety rule, how would you talk to them about it?
- What is the biggest safety risk you see every day that we haven't fixed yet?

Provide your answers here. Remember there are no wrong answers, write down your take on each of the questions and share your wisdom from the field with a miner. Sharing saves lives.

4. TOPIC 1: SAFETY CODE: USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)



Mine is more than a pit; it is our workplace, our livelihood, and our community. The rules we set here are not to restrict you, but to protect you. They are written from the hard lessons of accidents and losses. Your code is a promise to each other—a promise that every one of us will do everything in our power to ensure we all go home to our families, safe and whole, at the end of every day. Your life is worth more than the minerals we dig.

4.1. Body-PPE-Importance

Below is the ultimate PPE Board, it charts every PPE to a specific body part to help you understand the uses and take appropriate measures whenever something is missing.

Table 13: The Ultimate PPE Board

Body Part	Personal Protective Equipment		Use / Importance
Head/Eyes / Face 	Hard hat (with chin strap if needed)		Protects against falling objects and impacts.
	Safety goggles or face shield		Shields against flying debris, sparks, and chemical splashes.
 Ears	Earplugs or earmuffs		Reduces noise exposure in high-decibel environments.
Respiratory 	N95 mask (dust) or respirator (fumes/vapors)		Filters harmful particulates and gases.
Hands 	Leather gloves (cuts/burns) or nitrile gloves (chemicals)		Prevents abrasions, heat, and chemical contact.
Body 	Flame-resistant (FR) coverall or high-vis vest		Protects against heat, sparks, and enhances visibility.

 <p>Legs/ Feet</p>	 <p>Steel-toe boots (with metatarsal guards if needed)</p>	<p>Shields feet from crushing hazards and punctures.</p>
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Source: [Free3D.com](https://www.freepik.com/) & <https://www.freepik.com/>

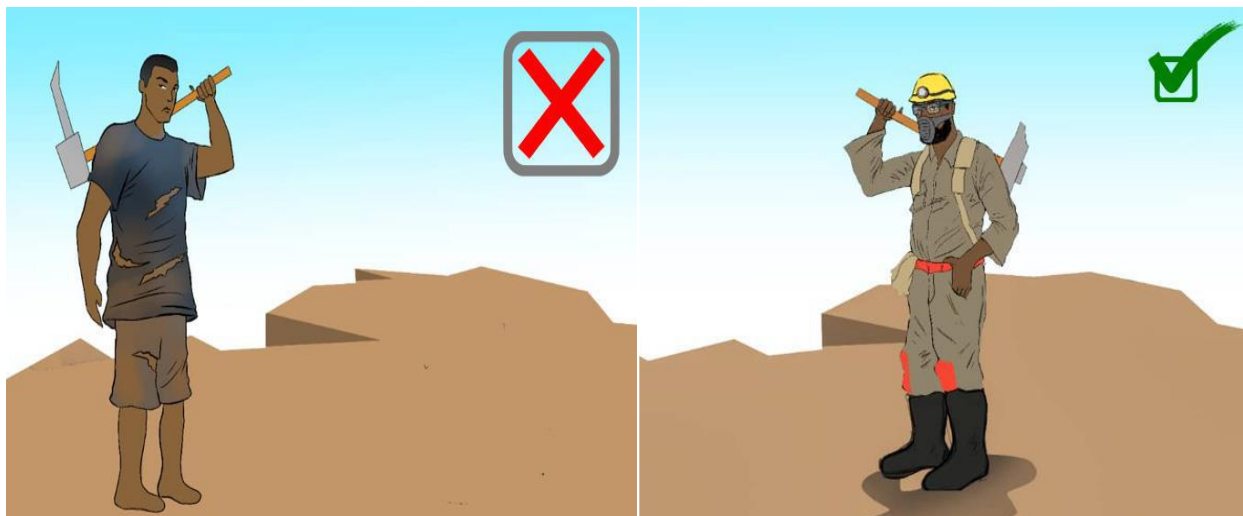
4.2. Your PPE is your personal shield. Without it, you are defenseless

- **The Rule: No PPE, No Work.** This is non-negotiable.
- **The Action:**
 - **Hard Hat:** Must be worn at all times in the mining area. It protects your head from falling rocks and knocks against low supports. **Check for cracks daily.**
 - **Safety Boots:** Must be sturdy, closed-toe, and with a thick sole. They protect your feet from crushing weights, sharp rocks, and punctures. **Check the soles for wear.**
 - **High-Visibility Vest:** Must be worn always. It ensures you are seen by machine operators and others, especially in low light or dusty conditions.
 - **Goggles:** **Must be worn** during hammering, chiseling, crushing, or any activity that could create flying fragments. **Your eyes cannot be replaced.**
 - **Dust Mask:** **Must be worn** during drilling, crushing, or processing. It stops invisible rock and chemical dust from entering your lungs and causing incurable disease.

4.2.1. Illustration of PPE Actions

- **Full body PPE**

Figure 7: illustration below shows a miner in a full PPE kit.



Source: ACP-EU Development Minerals Programme Uganda

- **Protection against Excessive Dust**

Dust can cause chest pains, asthma, persistent cough, chronic bronchitis, lung fibrosis, silicosis or even lung cancer in the long run. Dust is raised along the production value chain and miners must take caution in preventing excessive inhalation by using PPE such as nose masks to protect themselves as illustrated below.

Figure 8: Dust mask demo



Source: ACP-EU Development Minerals Programme Uganda

- **First Aid**

First Aid is the immediate and temporary care given to an injured or ill person at a work site using available equipment, supplies, facilities, or services, including treatment to sustain life, to prevent a condition from becoming worse, or to promote recovery. Miners quite often use locally created first aid means some of which may be unsafe and cause the situation to deteriorate further.

Figure 9: First Aid Kit demo



Your body is your most important tool. Personal Protective Equipment (PPE) is the armor that shields it. Each piece is a direct defense for a specific body part: the hard hat for your head against falling rocks, goggles for your eyes against flying chips, the mask for your lungs against deadly dust, and boots for your feet against crushing weight. Using PPE isn't a suggestion—it is the critical link between going home to your family and becoming a victim of a preventable tragedy.

Source: ACP-EU Development Minerals Programme, Uganda

5. TOPIC 2: SITE MANAGEMENT CODE

This code is our collective pledge to safety. These rules are written in memory of those we have lost and are enforced to protect those who remain. Violating these rules endangers everyone and will result in immediate removal from the site and termination of partnership.

1. Hazard Communication & Signage

- **Rule:** All hazard zones (open pits, processing areas, chemical storage) must be clearly marked for universal understanding.
- **Action:**
 - Use symbols: skull for extreme danger, falling rock for collapse zones, flame for fire hazards.
 - Use colour-coded flags: **Red** for *DANGER – KEEP OUT*, **Yellow** for *CAUTION*, **Green** for *SAFE ACCESS ROUTES*.
 - A central notice board must display daily tasks, known hazards, and this code.

2. Assembly Point & Emergency Preparedness

- **Rule:** Everyone must know where to go and what to do in an emergency.
- **Action:**
 - A designated **Emergency Assembly Point** must be established in a safe, open area upwind/uphill and marked with a highly visible flag.
 - An emergency signal (e.g., three long whistle blasts) means immediate evacuation to this point.
 - **Monthly emergency drills are mandatory** for all personnel.

3. First Aid Readiness

- **Rule:** Immediate medical response must be accessible to all.
- **Action:**
 - Well-stocked **First Aid kits** must be displayed visibly at the site entrance and processing area.
 - Everyone must know the location of the kits.
 - Kits are for emergencies only and must be restocked immediately after use.

5. Access, Traffic, tools storage & Suspended Loads

- **Rule:** Safe movement of personnel and equipment must be maintained.
- **Action:**
 - Designate separate routes for people and machinery where possible.
 - Keep access and exit routes clear of tools, waste, and debris.
 - Never walk under a suspended load.
 - Keep all tools and equipment in safety store

6. Children On-Site & Child Labour

- **Rule:** **ABSOLUTELY FORBIDDEN.**
- **Action:**
 - No one under 18 may perform any work.
 - No children on-site. The only exception is a designated **Mother & Infant Corner** for breastfeeding, located far from all hazards. Weaned children are not permitted.

7. Substances, Weapons & Prohibited Items

- **Rule: ZERO TOLERANCE.**
- **Action:**
 - No alcohol, narcotics, or mind-altering substances. Violators will be removed immediately.
 - No firearms, weapons (except work tools), or explosives.
 - No smoking except in designated safe areas away from fuels/chemicals.
 - No open flames near fuel or chemical storage.

8. Visitor Access

- **Rule:** All visitors are our responsibility.
- **Action:**
 - All visitors must report to the site supervisor, receive a safety briefing, be accompanied at all times, and wear required PPE.

9. Harassment, Exploitation & Violence

- **Rule: ZERO TOLERANCE for GBV, prostitution, sexual harassment, or discrimination.**
- **Action:**
 - This is a professional workplace built on mutual respect.
 - Any reported case will be investigated immediately by an elected safety committee.
 - Perpetrators will be removed immediately and face legal action.

10. Authority & Reporting

- **Rule:** Safety instructions are mandatory and final.
- **Action:**
 - All personnel must immediately adhere to instructions from designated **Site Guardians** or safety officers.
 - **Report all hazards, losses of life near-misses, or unsafe acts immediately.** You are your brother's and sister's keeper.

11. General Safety Protocols

- **Rule:** Use common sense and prioritize safety.
- **Action:**
 - No working alone. Use the buddy system.
 - Stay alert and aware of your surroundings.

This code is our shield. Compliance is mandatory. Let's ensure everyone returns home safely, every day.

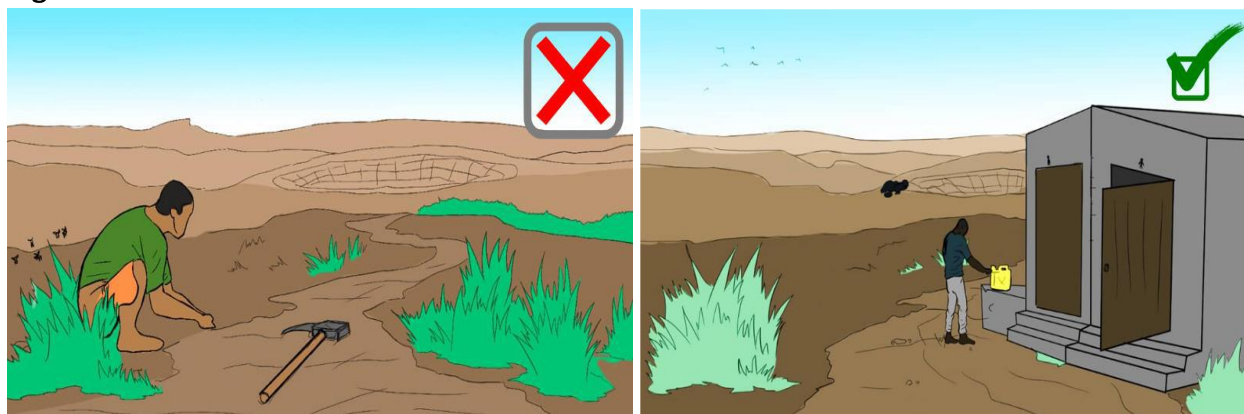
6. TOPIC 3: HYGENE AND SANITATION

A mine site must have toilet facilities to minimize the risk of diseases such as diarrhea, dysentery and typhoid. Using nearby bushes as toilets not only exposes the miners at the sites to diseases but also the surrounding population associated with the miners.

6.1. How to ensure basic sanitation:

- **Step 1. Build Latrines:** Dig proper pit latrines at a safe distance (at least 30 meters) from any water source. Ensure they are clearly marked as male and female toilets to differentiate them and have a cover to prevent flies.
- **Step 2: Promote Handwashing:** Install simple, low-cost handwashing stations near latrines and eating areas. Ensure they are always stocked with water and soap or ash.
- **Step 3. Manage Wastewater:** Dig shallow soakaways for grey water (from washing) to prevent stagnant, dirty pools that attract mosquitoes and cause diseases.

Figure 10: Good sanitation



Source: ACP-EU Development Minerals Programme, Uganda

Site owners should construct pit latrines for men and women in close proximity to mining sites. The facility should have hand washing water. This also prevents diseases associated with poor fecal waste disposal.

6.2. Maintain Good Hygiene

Miners should be guided to dump waste into big piles in a good convenient location around the mine site away from the central mining areas. Garbage lying around the mine site causes pollution and creates a smelly working environment and breeding ground for disease-carrying parasites.

7. Knowledge Consolidation

7.1. Peer Fire Chat Corner: Test Your Understanding

- Why is a 'Mother & Infant Corner' the *only* exception for a child on site? Why not older children?
- A visitor refuses to wear a hard hat because 'they are just looking.' What do you do?
- You see a pool of diesel fuel near the chemical storage area. According to the code, what are your immediate steps?

- What does 'Zero Tolerance' for GBV mean for how we talk to and treat each other every day?

7.2. Challenge Yourself: Prove You Can Do It

- **The PPE Patrol:** This week, your crew will appoint a daily "PPE Champion." Their job is to do a quick visual check of every person entering the site before work begins. They are not a police officer, but a reminder of our collective promise.
- **Map Your Escape:** In groups of three, walk the site together. Point out the fastest and safest route from your usual work area to the Emergency Assembly Point. Time how long it takes to get there. Now do it blindfolded (guided by your partners) to simulate a dust cloud or panic.
- **Build Your Code:** As a full team, gather. Using the provided code as a base, contextualize by writing few additional rules that reflect the reality of your mine. For example: *"At this site, we will always [specific action] to prevent [specific hazard]."* Everyone must agree to it and sign their name at the bottom then print, distribute copies to every team member and display one visibly in the meeting room or place of your choice.

Carry This With You: The Miner's Motto

- *I will wear my PPE without complaint. It is my shield.*
- *I will keep my children at home. This pit is no place for them.*
- *I will respect every person on this site, every day.*
- *I will speak up against danger, no matter who it comes from.*
- *I will never let a paycheck blind me to a deadly risk.*

*This code is my promise. To myself. To my family. To my crew.
I will not break it.*

LESSON 7: REHABILITATION AS WAY OF CARING FOR THE PEOPLE AND THE ENVIRONMENT

Mining creates scars on the land. But a responsible miner is also a healer. Progressive rehabilitation means healing the land *while* you mine, not years after you leave. True mining isn't just extraction; it's stewardship. It means working with the understanding that we are temporary users of land. Our responsibility is to leave it healthy, productive, and safe for future generations. This lesson moves beyond just filling holes. It is about integrated waste management, rebuilding ecosystems through afforestation, and ensuring that our work today doesn't become a burden in the future.

1. Objectives

By the end of this lesson, you will understand:

- The full scope of rehabilitation: from backfilling and waste management to soil restoration and afforestation.
- How to manage different types of mining waste responsibly.
- The importance of using native species for revegetation and how to source them.
- How to create a simple, phased rehabilitation plan that integrates with the mining cycle.

2. Expected Outcomes

You will be able to:

- Identify and separate different types of waste on your site (organic, inert, hazardous).
- Implement a waste management hierarchy: Reduce, Reuse, Recycle, Dispose.
- Source and plant appropriate native trees and grasses to restore ecosystem functions.
- Develop a culture of continuous rehabilitation that happens alongside mining, not after.

3. Questions for a Miner

- Beyond the pits, what other damage does your activities leave behind? (Think about packaging, domestic waste, etc.)
- What trees in this area grow well in poor soil? Where could we get their seeds or seedlings?
- How could we reduce the amount of waste we create in the first place? (e.g., reusing sacks, refilling water containers)
- What part of our site is the most damaged? Name a few steps to start healing it?

4. An Integrated Step-by-Step Guide to Rehabilitation & Waste Management

4.1. Phase 1: Waste Management (The Foundation)

- **Step 1: Segregate Waste:** Set up three separate collection points:
 1. **Organic Waste:** (Food scraps, grass). Can be composted to make fertilizer for revegetation.
 2. **Inert Waste:** (Plastic bottles, glass, scrap metal). Clean and sell to recyclers or store for safe disposal. *This is a potential income source.*
 3. **Hazardous Waste:** (Used engine oil, chemical containers, batteries). Store in a labelled, secure container away from water sources for proper disposal.

- **Step 2: Reduce and Reuse:** Use durable, reusable containers for water and fuel. Choose supplies with less packaging.

Figure 11: Illustration of good waste management



Source: ACP-EU Development Minerals Programme, Uganda

4.2. Phase 2: Earthworks and Stabilization

- **Step 3: Topsoil Management:** Carefully strip and stockpile topsoil separately. This is the lifeblood of future vegetation.
- **Step 4: Backfilling and Contouring:** Use waste rock to backfill exhausted pits. Shape the land into stable, gentle slopes that mimic the natural surroundings to prevent erosion.

4.3. Phase 3: Ecosystem Restoration (Afforestation & Revegetation)

- **Step 5: Soil Amendment:** Mix compost from your organic waste into the stored topsoil before resspreading it. This returns nutrients to the soil.
- **Step 6: Planting Pioneer Species:** Plant hardy, fast-growing native grasses and shrubs first. Their roots will stabilize the soil and create conditions for other plants to grow. **Consult local farmers or agricultural officers for the best species.**
- **Step 7: Afforestation:** Plant native trees on stabilized areas, around water sources, and on-site boundaries. Trees prevent erosion, restore habitats, and improve water cycles. **Involve the community in tree-planting days.**

Figure 12: Afforestation illustration with nursery bed



Source: ACP-EU Development Minerals Programme, Uganda

Start by maintaining a nursery bed where you can pick trees at little cost for planting around the mine site and replace threes cut during mining works. For every tree cut, five should be planted as a way of good practice.

Table 14: Progressive rehabilitation Dos and Don'ts

Do	Don't
DO separate waste into organic, inert, and hazardous.	DON'T burn plastic or dump waste in pits or rivers.
DO compost organic waste to create natural fertilizer.	DON'T let food waste attract animals and create unsanitary conditions.
DO partner with local communities for tree-planting initiatives.	DON'T plant invasive or water-thirsty foreign tree species.
DO use vetiver grass on slopes to control erosion effectively.	DON'T leave steep slopes bare, as they will wash away in the rain.
DO collect and store hazardous waste for professional disposal.	DON'T rinse chemical containers into the environment.

5. Knowledge Consolidation

5.1. Peer Fire Chat Corner: Test Your Understanding

- A colleague says planting trees is a waste of time because we won't be here to see them grow. How do you respond?
- What are the dangerous wastes on your site, and what is the safest way to handle it?
- Why is involving the community in tree planting a smart strategy?
- How can poor sanitation (open defecation, dirty water) on our site lead to sickness that stops our work and costs us money?

5.2. Challenge Yourself: Prove You Can Do It

- Your team will set up three labelled collection sacks for waste. Monitor for one week how much waste you generate in each category. Present the findings and brainstorm one way to reduce the biggest waste stream.
- As a group, build a simple protective fence around a small area. Source seeds or cuttings of a local, hardy tree species (e.g., Acacia). Plant and nurture them. Your goal is to grow 2500 seedlings for planting next season.
- Identify one eroding slope on your site (e.g., near a waste pile). Plant vetiver grass or another recommended grass in lines across the slope to hold the soil in place.
- As a team, build and install at least one simple handwashing station ("tippy-tap") near the eating area or latrine. Use a jerrycan, string, and sticks. Ensure it is always filled with water and has soap or ash available.
- If your site has no latrine, hold a community meeting to agree on a location and plan to dig a proper pit latrine. If one exists, assign a rotating weekly cleaning duty to ensure it is kept usable and hygienic.

Carry This With You

- *Rehabilitation is not an expense; it is an investment in our community's forgiveness and our future.*
- *The best waste is the waste we never create.*
- *A tree planted today is a promise to the future.*
- *We are not just miners; we are temporary guardians of this land. Our duty is to return it healthy.*

LESSON 8: CIRCULAR ECONOMY IN ASM – USING RESOURCES BETTER

A Circular Economy is a system where nothing is wasted. Instead of the old way of take, use, dispose, we aim to reduce, reuse, and recycle materials for as long as possible. In mining, this means seeing waste not as garbage, but as a potential resource.

For ASM miners in Zambia, this approach is crucial. It turns environmental liabilities—like piles of waste rock or abandoned pits—into economic assets. By integrating circular practices, we can lower costs, generate new income streams, reduce our environmental footprint, and build stronger relationships with our communities. This isn't just about being "green"; it's about working smarter, more efficiently, and more sustainably to ensure our livelihoods last for generations.

1. Objectives

By the end of this lesson, you will:

- Understand the principles of a circular economy in the ASM context.
- Identify opportunities to reuse, recycle, and repurpose mining waste.
- Learn how to transform pits and trenches into productive community resources.
- Appreciate the role of community partnerships in sustaining circular practices.

2. Expected Outcomes

This lesson will help you to :

- Convert mining waste (e.g., tailings, low-grade ore) into useful products.
- Implement simple water recycling techniques.
- Identify at least two repurposing options for exhausted pits on your site.
- Engage communities in recycling initiatives to create shared value.

3. Questions for a Miner

- What mining waste do you see around your site that could be turned into something useful?
- How do you currently manage water used in processing? Could it be reused?
- What community needs (e.g., water, energy, farming space) could your mining site help address after excavation?
- Have you ever tried selling or reusing waste materials like rocks or sand?

4. Circular Economy Strategies for ASM

1. Reuse Waste Material

- **How:** Convert tailings, waste rock, or low-grade minerals into construction materials (bricks, blocks), crafts, or soil conditioners for farming.
- **Example:** Mix tailings with cement to make paving stones or use crushed waste rock for road fill.

2. Recycle Water

- **How:** Channel water from washing and processing into settling ponds. Reuse clarified water for irrigation, dust suppression, or non-potable purposes.
- **Example:** Use recycled water to grow vegetables or feed livestock.

3. Repurpose Exhausted Pits and Trenches

- **Water Harvesting:** Line pits to store rainwater for irrigation or livestock.
- **Aquaculture:** Stock water-filled pits with fish like tilapia for food and income.
- **Renewable Energy:** Install solar panels around pit edges to power equipment or communities.
- **Agriculture:** Backfill with organic waste and soil to create fertile land for crops.
- **Community Use:** Develop pits into sports fields, playgrounds, or drainage channels.

4. Engage Communities

- **How:** Partner with local groups to lead recycling initiatives (e.g., making bricks from tailings, crafting jewelry from mineral scraps).
- **Benefit:** Creates jobs, strengthens relationships, and ensures sustainability.

5. Use Renewable Resources

- **How:** Replace diesel pumps with solar-powered pumps
- **Benefit:** Cuts costs and reduces pollution.

Table 15: Dos and Don'ts in a circular economy

Do	Don't
Separate waste for reuse (e.g., plastics, metals, minerals).	Dump tailings or chemicals into rivers or farmland.
Involve communities in repurposing projects.	Abandon pits without a rehabilitation plan.
Explore markets for recycled products (e.g., bricks, fish).	Waste water – reuse it wherever possible.
Use renewable energy like solar power.	Burn plastics or hazardous waste.

Source: Field engagement

4. Knowledge Consolidation

4.1. Peer Fire Chat Corner

- What is one waste product on your site that you could start reusing tomorrow?
- How could repurposing a pit benefit your community directly?
- Why is water recycling especially important in mining regions like Zambia?
- What challenges might you face trying to sell products made from mining waste?

4.2. Challenge Yourself

- **Waste Audit:** Identify three types of waste. Propose one reuse option for each.
- **Repurpose One Pit:** Pick an exhausted pit and design a simple repurposing plan (e.g., water pond, fish farm, tree nursery).
- **Community Meeting:** Organize a discussion with local leaders to explore interest in a recycling project (e.g., making bricks from tailings).

Carry This With You

- *Waste is only waste if we waste it.*
- *Every pit is a potential resource – for water, food, energy, or community use.*
- *Circular practices save money, protect the environment, and build stronger communities.*
- *Your goal: Leave the land as valuable as possible.*

LESSON 9: ACCESS TO FINANCE AND MARKET

When a Lusaka buyer underpaid Grace for emeralds by 70%, she had no records to protest. Financial illiteracy steals your minerals. Master funding streams and market tricks to claim your worth. This lesson is an invitation to explore that terrain, move beyond complaints about the market and inaccessible loans.

1. Objectives

In this lesson you will learn how ASM can effectively access finance and market by improving their understanding and mastering of the challenges they face and how to solve them. Specifically, they will learn to:

- Tap 3 funding streams: CEE Grants, CDF loans, mineral-backed bank finance
- Mineral-specific market access strategy
- Improve ASM business development

2. Expected Outcomes

At the end of this lesson, you'll be able to know:

- How to secure capital, command fair prices
- Master funding streams and grow your market
- Develop mineral-specific market access strategy

3. Questions for a Miner

1. When you need money quickly for an emergency or a new tool, who is the *first* person you turn to? What is the real cost of that choice?
2. Walk me through the journey of your minerals from pit to market. How much do you spend to get it out of the ground, and how much do you finally keep?
3. When was the last time you applied for a loan and failed? What happened?
4. If you were to approach a local SACCO or bank for a small loan, what is the one thing you could show them *tomorrow* to prove you are trustworthy and capable of repaying?
5. The next time a buyer gives you a price, what two simple questions could you ask to test if that price is fair, without seeming confrontational? (e.g., "Can you help me understand how this price is set?" or "Is this price based on today's rate?").
6. If a grant like the CEE fund gave you money not just for today, but for your children's future, what would you invest in that would still be valuable five years from now?
7. What is one thing you could achieve by pooling resources with five other miners that you could never accomplish alone? (e.g., bulk buying, owning a processing machine, negotiating as a bloc).
8. What is the *very first, smallest step* you can take this week to start tracking your money? (e.g., buying a notebook, naming a WhatsApp group "Mine Accounts," appointing a treasurer).

Learning from a Peer: Field wisdom

Write down your answers and remember there are no wrong answers!

LESSON 9.A. ASM FINANCIAL STRATEGIES AND MANAGEMENT

Strong financial management turns mining from a daily struggle into a reliable business as it put ASM on the right path to unlocking finance for business development. This lesson provides simple, actionable steps to manage your finances and make your cooperative a reliable and bankable. Financial planning and management is the first step to bankability.

1. Financial Planning: Your Map to Profit

1.1. Revenue Forecasting: Look Ahead to Earn More

- **How to do it:** At the start of each month, sit with your team. Based on last month's work, make a realistic estimate of how much mineral you will sell and how much money you will earn. Don't forget to include other sources of income, like renting out equipment or selling salvaged materials.
- **Why it matters:** This helps you see if your goals are realistic and stops you from overspending.

1.2. Expense Tracking: Know Where Every Kwacha Goes

- **How to do it:** Use a simple notebook or a free phone app. Every day, write down every single expense—tools, food for the crew, transport, fees. Use categories like "Equipment," "Labour," "Fuel."
- **Why it matters:** You cannot manage what you do not measure. This will show you where you can cut costs and save money.

1.3. Budgeting: Give Every Kwacha a Job

- **How to do it:** Based on your revenue forecast and expense tracking, create a simple plan for the month's money. Allocate specific amounts for what you need: so much for fuel, so much for new tools, so much for savings.
- **Why it matters:** A budget ensures you have money for what's important and prevents you from running out of cash before the next sale.

2. Financial Record-Keeping: Your Proof of Success

2.1. Simple Accounting: Your Business Diary

- **How to do it:** Your "accounting system" can be two columns in a notebook: "Money In" and "Money Out." Update it daily. This is your business diary that tells the story of your mine.
- **Why it matters:** This is the most important proof for lenders and partners. It shows you are serious and organized.

2.2. Profit & Loss Analysis: Did You Really Make Money?

- **How to do it:** At the end of each month, subtract your total "Money Out" from your total "Money In." The result is your profit (or loss). Do this every month without fail.
- **Why it matters:** It tells you clearly if your business is actually working. Are you making money or just being busy?

2.3. Organize Your Documents: Build Your Trust File

- **How to do it:** Keep a simple folder (even a cardboard box) for all your receipts, buyer invoices, and bank slips. Write the date and purpose on each one.
- **Why it matters:** This "Trust File" is your evidence. It protects you in disputes and is required for loans and formal partnerships.

3. Cash Flow Management: Don't Run Dry

3.1. Cash Flow Forecasting: See Trouble Before It Comes

- **How to do it:** Each week, list all the money you expect to receive and all the money you know you must spend. Will you have enough to cover your costs?
- **Why it matters:** It helps you avoid a crisis. You'll see a cash shortage weeks in advance and can plan for it, instead of being forced to take a bad loan.

3.2. Manage Your Cash Reserve: Your Safety Net

- **How to do it:** From every sale, try to put a small percentage (e.g., 5%) into a separate savings pot. This is your "Safety Net" for emergencies and opportunities.
- **Why it matters:** Cash on hand gives you options and power. It means you can say "no" to a bad price or "yes" to a good tool without begging for a loan.

4. Risk Management: Protect Your Livelihood

4.1. Market Risk: Don't Be Surprised by Price Drops

- **How to do it:** Talk to other miners! Use WhatsApp groups to share price information. If you hear prices are falling, you might decide to sell quickly or hold onto your product.
- **Why it matters:** Knowing the market trends helps you sell smart, not just sell fast.

4.2. Operational Risk: Plan for the Unexpected

- **How to do it:** Have a simple conversation with your team: "What could go wrong?" (e.g., tool breaks, pit floods). "What will we do if it happens?" (e.g., know where to get a quick repair, have a pump ready).
- **Why it matters:** A small problem doesn't have to become a disaster that bankrupts you.

4.3. Regulatory Risk: Stay on the Right Side of the Law

- **How to do it:** Make it your business to know the basic rules. Is your mining license up to date? Are you using chemicals legally? A quick visit to the local Mines Office can keep you out of trouble.
- **Why it matters:** Fines or work stoppages can destroy your business. Compliance is cheaper than conflict.

5. Co-operative Financial Management: Strength in Numbers

5.1. Clear Governance: Who Decides on the Money?

- **How to do it:** As a group, write down simple rules. How are spending decisions made? (e.g., small purchases by the treasurer, big purchases by a full vote). Who keeps the records?
- **Why it matters:** Clear rules prevent conflicts and build trust within the group.

5.2. Informed Decision-Making: Choose What's Best for the Group

- **How to do it:** Before making a big financial decision (e.g., buying a new crusher), use your financial records! Show everyone the projected cost, the expected increase in income, and how long it will take to pay back.
- **Why it matters:** Decisions based on data are better than decisions based on arguments or emotions.

5.3. Transparency and Accountability: Trust But Verify

- **How to do it:** Hold a short monthly meeting where the treasurer shares the notebook ("Money In/Out") and the cash box balance. Let every member ask questions.
- **Why it matters:** Total transparency is the glue that holds a co-operative together. It proves that everyone's money is being handled honestly.

Based on the above rigorous financial management, you are now ready to explore and navigate the financial market with confidence.

6. The ASM Miner's Finance Navigator: A 5-Step Guide

Your Goal is to move from expensive, risky loans to fair financing that helps your business grow. This happens by building proof that you are trustworthy.

Step 1: Change Your Question

Stop asking: "Where can I find money?"

Start asking: "What proof do I need to show that I am trustworthy?"

This shift puts you in control. Your mission is to gather that proof.

Step 2: Start a Savings Group (Your First Bank)

1. Gather 5-10 miners you trust completely.
2. Agree on rules: How much will everyone contribute each week? (e.g., 50 ZMW). Where will the money be kept safe? (e.g., a locked box with 3 keys).
3. Lend to each other for emergencies or small equipment needs. Charge a small interest rate (e.g., 5%) to make the group's savings grow.
4. This is your first proof: You can now say, "We successfully manage our own fund with a 100% repayment rate."

Step 3: Explore Government & NGO Programs

1. Find one key contact: Who is the Development Officer at your local Ward Office? What is one NGO that helps miners? (Find this at the Ministry of Mines or a local library).
2. Make the call/visit: Say: *"Hello. We are a miner group from [Your Area]. We want to improve our business. Are there programs for [specific need: e.g., a crusher]? What is the very first step to apply?"*
3. Listen carefully: Their questions will tell you what proof you need next (e.g., a business registration certificate, a simple plan).

Step 4: Use Your Mineral Sales as Proof

1. Sell to one formal buyer (a licensed company) for 3 months straight. Get an official receipt every time.
2. You now have proof of income: A stack of receipts showing you are reliable.

3. Propose a deal: Go to the buyer or a bank and say: *"See these receipts? We sell to you regularly. Could you give us an advance payment against our next shipment? We will repay it with that delivery."* This is a business deal, not a loan.

Step 5: Negotiate Directly with Equipment Sellers

1. Find a supplier for the tool you need (e.g., a pump).
2. Ask them: *"I need this pump to grow, but I can't pay full price now. Do you have a payment plan? I can pay a deposit now and the rest over 3 months."*
3. Many sellers prefer a sale on terms to no sale at all.

Box 2: Your 3 Proofs of Trust

Always build these to unlock every door:

1. *The Notebook: A simple ledger of money in/out. Proof you understand your business.*
2. *The Receipts: Official buyer receipts. Proof you have income.*
3. *The Group: A registered cooperative. Proof you are organized and low-risk.*

Prove you can do it: Take one step this week.

Choose one step above. Make one call. Have one conversation. Your goal is not to get money yet. Your goal is to get information. That is how you start.

LESSON 9.B: IDENTIFYING FINANCING SOURCES AND ACCESS READINESS

There are number of alternative financing models that exist for ASM, and these may include the following. Here you will need to take deliberate action to navigate the finance landscape, identify and assess each opportunity. For the purpose of this lesson, we are going to focus on the following including Village SACCOS, cooperatives associations funds, NGOs grants, government funding, collaboration with investors and banking institutions.

1. Miner Cooperatives and Associations

Pooling Money: Members contribute regular shares or dues into a common fund. This fund can then be used to give members loans for equipment at fair rates or to make large collective purchases that no one could afford alone.

2. Community Savings and Credit Cooperatives (SACCOs)

Community-based financial groups, like Village Savings and Loan Associations (VSLAs) or Rotating Savings and Credit Associations (ROSCAs), provide entry-level financing options. These groups help miners build financial literacy and savings, potentially leading to access to formal financing.

2. Artisanal and Small-Scale Mining Fund

What it is: A dedicated fund established by the Zambian government through the *Geological and Minerals Development Act No. 2 of 2025*. It is managed by the Ministry of Mines and Minerals Development specifically to support the ASM sector.

How it can help you: This fund is designed to provide financial products tailored to miners, such as:

- **Low-interest loans** for equipment and operational costs.
- **Grants** for formalization, safety improvements, and environmental management.
- **Guarantees** to help cooperatives secure loans from banks.

How to access it: Watch for official announcements from the Ministry of Mines on the application process, eligibility criteria, and required documentation (which will likely include formal registration and a simple business plan).

3. Collaboration with investors and holders of Licenses with financial capacity

What it is: Partnering with a larger company or individual investor who has the financial capacity to fund your operation.

How it solves finance problems: The investor provides the capital for equipment, exploration, and operational costs. In return, they receive a share of the production or profits.

Things to AVOID:

- **Vague Agreements:** Never agree on just a handshake. Every partnership must have a clear, written contract reviewed by a lawyer.
- **Losing Control:** Avoid deals where the investor takes majority ownership or control, leaving you with no say in decisions.
- **Unfair Terms:** Be wary of deals where the investor's share of the profits is too large or where you bear all the risk. The terms must be fair and transparent.

1. Citizen Economic Empowerment (CEE) Funds

What it is: A government initiative designed to provide financing and support to Zambian-owned businesses, helping them grow and participate meaningfully in the economy.

How it can help you: It offers access to:

- **Affordable loans** with better interest rates than informal lenders.
- **Business development services** like training and mentorship.
- **Grants** for specific projects that improve your business.

Focus: It aims to empower citizen-owned enterprises, making it a potential source of capital for registered miner cooperatives.

Step 1: Check Eligibility

- Visit your provincial CEE office or Zambia Development Agency (ZDA) website.
- Confirm if your miner's cooperative/group qualifies (e.g., youth/women-led, registered business).

Step 2: Prepare Documents

- Business registration certificate.
- Bank account details.
- Simple business plan (show how funds will improve mining/output).

Step 3: Submit & Follow Up

- Apply in person or online (ask for help if needed).
- Track your application—politely follow up every 2 weeks.

Tip: Partner with NGOs or Regional Mines Offices (RMO) to strengthen your application.

Box 3: ASM Miner's Finance Access Checklist

1. Citizen Economic Empowerment (CEE) Funds

Eligibility: Registered group? Women/youth-led?

Documents Needed:

- *Business certificate*
- *Bank details*
- *1-page plan (e.g., "Buy mercury-free equipment")*
Apply: Visit ZDA office or apply online → Follow up!

Tip: Visit nearest MRO for coaching

2. Constituency Development Fund (CDF)

What it is: Funds allocated by the government to each parliamentary constituency for local community development projects.

How it can help you: Miner groups can propose a project that benefits the entire community and the mining sector. For example:

- Applying for funds to build a **shared processing center**.
- Seeking support for **training programs** on safety or value-addition.
- Requesting funds for **community infrastructure** like water sources that also support mining operations.

Process: This requires engaging with your local Ward Development Committee and councilors to include your project in the constituency's development plan.

Step 1: Identify CDF Projects

- Attend community meetings or contact your local Ward Development Committee.
- Propose mining-related needs (e.g., "fund a shared processing plant").

Step 2: Lobby & Submit Proposal

- Draft a 1-page letter (signed by your mining group) explaining the project's community impact.
- Submit to your Constituency Office with support from local leaders.

Step 3: Monitor Implementation

- If approved, join the oversight committee to ensure funds are used properly.

Tip: CDF is competitive, rally other miners to unite behind 1-2 priority projects.

Box: 4 Constituency Development Fund (CDF)

Propose a Project:

- *Attend ward meetings*
- *Pitch needs (e.g., "Shared crushing machine")*
Submit: 1-page letter + miner signatures → Local CDF Committee
Track: Join oversight to ensure funds deliver!

Tip: Rally 10+ miners to support your proposal.

3. Using Certified Minerals as Collateral

What it is: Using your mineral production as proof of value to secure a loan from a bank.

How it works:

1. **Formalize:** Get a mining license and operate legally.
2. **Sell Formally:** Sell your minerals to a certified buyer (e.g., ZCCM-IH, accredited exporters) and get official receipts and documentation proving your production.
3. **Secure a Loan:** Take these documents to a bank. They show you have a reliable source of income. The bank can then offer you a loan based on the value of your future production, using the minerals themselves as the guarantee (collateral).

Key Benefit: It turns your physical minerals into financial power, allowing you to access capital based on what you already produce.

Step 1: Formalize & Certify

- Register with the Ministry of Mines and get a mining license.
- Sell through certified buyers (e.g., ZCCM-IH, accredited gold dealers) to get traceable receipts.

Step 2: Approach Banks

Bring certification documents + proof of consistent production to banks like Indo Zambia Bank (offers mineral-backed loans).

Start small—ask for a loan against your *next* shipment.

Box 5: Certified Minerals As Collateral

Get Certified:

- *Register with Ministry of Mines*
- *Sell to approved buyers (e.g., ZCCM-IH)*

Loan Steps:

- *Show bank your receipts + license*
- *Start small (e.g., loan against next shipment)*

Tip: Zambia Geological Survey can help with resource estimation.

LESSON 9C. ACCESS TO MARKETS

Different minerals have different buyers, value chains, and market rules. This lesson provides a specific roadmap for each major mineral category, focusing on practical steps to increase your profit and reduce dependence on middlemen.

Before we dive deep into the topic it is important to know the issues faced by artisanal and Small-scale Miners (ASM) for their products.

1. KEY CHALLENGES FACED BY ASM IN ACCESSING MARKETS

Below are the key issues that affect their ability to connect with local, regional, and international markets:

- **Informality:** Lack of legal recognition prevents access to formal markets.
- **Price Exploitation:** Middlemen offer low prices due to information asymmetry.
- **Low Volume:** Small, scattered production is unattractive to large buyers.
- **Poor Quality:** Inconsistent or unprocessed materials fetch lower prices.
- **Lack of Traceability:** No proof of ethical or legal sourcing.
- **Weak Negotiation Power:** Individual miners cannot influence prices

Minerals are different in their uses, so are their markets and diversity of market issues calls for a mineral specific approach that tailors specific solutions to specific minerals.

2. A STEP-BY-STEP GUIDE TO ACCESS BETTER MARKETS

For each mineral, follow the "What to Do" (your goal) and "How to Do It" (your action plan) to build a professional, profitable operation.

a) For GOLD: The System of Verifiable Trust

What to Do:

Bypass informal buyers by selling directly to licensed exporters for a transparent, international price. Pursue ethical certification to earn premiums.

How to Do It:

- Formalize Your Operation:**
 - Register your mining group as a cooperative with the Ministry of Mines.
 - Obtain a mining license to operate legally.
- Implement Robust Traceability:**
 - Use a tamper-proof notebook or simple mobile app.
 - Assign a unique number to every gram of gold (e.g., GOLD-001).
 - Record: Date, Unique ID, Weight, Origin (Pit/Team), and Buyer's Receipt Number.
- Target Licensed Buyers:**
 - Sell only to licensed entities (e.g., ZCCM-IH affiliates, Fidelity Printers).
 - Use your traceability records to negotiate based on the London Bullion Market price.
- Pursue Ethical Certification:**

- Contact NGOs (e.g., Pact, ARM) to understand Fairmined/Fairtrade requirements.
- Use your traceability system to demonstrate compliance.

v. **Aggregate with Purpose:**

- Join a marketing cooperative to pool gold volumes.
- Use communal, secure storage (e.g., certified safe) to prevent individual sales.
- Negotiate collectively with buyers.

Key to Excluding Middlemen:

- Transparency (records) and volume (aggregation) make you a direct partner to formal buyers.
- Certification opens doors to premium markets where middlemen cannot operate.

2. For GEMSTONES: The System of Expert Grading

What to Do:

Move from selling rough stones to selling sorted, graded, and value-added parcels to specialist buyers.

How to Do It:

i. **Sort and Grade:**

- Use sieves to sort stones by size.
- Learn grading (colour, clarity) from NGOs or lapidaries.
- Apply the "Three-Bowl Method": Sort stones into Premium, Commercial, and Low-grade categories.

ii. **Add Value through Processing:**

- Learn "windowing" (lapping) using sandpaper or coarse stones to reveal interior quality.
- Photograph windowed stones on a dark cloth for digital marketing.

iii. **Target Specialist Buyers:**

- Approach lapidaries, exporters, or ethical jewellery brands (via NGOs).
- Use WhatsApp Business to showcase sorted/windowed stones with prices.

iv. **Build a Brand Story:**

- Document the origin of stones (e.g., "Kafubu Emeralds").
- Use traceability records to prove ethical sourcing.

Key to Excluding Middlemen:

- Your expertise in grading and value addition captures the middleman's profit margin.
- Direct digital marketing to specialists bypasses local traders.

3. For Critical Minerals (e.g., Cobalt, Copper) The System of Bulk Consistency

What to Do:

Become a reliable supplier of consistent, high-volume concentrate to industrial buyers.

How to Do It:

- i. **Ensure Basic ESG Compliance:**
 - Document practices: No child labour, PPE use, environmental controls (e.g., siltation dams).
 - Photograph/video evidence of compliant operations.
- ii. **Standardize Quality and Volume:**
 - Use washing/gravity separation for uniform concentrate.
 - Create a "Master Sample" as a quality benchmark for all shipments.
 - Label samples with date, pit, and grade.
- iii. **Aggregate Reliably:**
 - Form a producer organization to guarantee large, steady supply.
 - Use secure, centralized storage for pooled concentrate.
- iv. **Target Industrial Buyers:**
 - Approach mining companies, mineral traders, or government agencies (e.g., ZCCM-IH).
 - Share your "Supplier Profile" (production data, ESG proof, Master Sample photo).
- v. **Lead with Data:**
 - Maintain production records (volume, grade) and share with buyers.

Key to Excluding Middlemen:

- Industrial buyers require large, consistent, ethically sourced volumes—something middlemen cannot guarantee.
- Your data-driven approach positions you as a direct supplier.

4. For Construction Materials (Sand, Aggregate, Dimension Stone): The System of Reliable Logistics

What to Do:

Become the preferred local supplier for construction projects through quality consistency and reliable delivery.

How to Do It:

- i. **Identify Local Demand:**
 - Visit construction sites; ask for procurement managers.
 - Provide samples and emphasize your local advantage.
- ii. **Ensure Consistent Quality:**
 - Use sieves/moisture meters to test materials against industry specs.
 - Provide quality assurance slips with each delivery.
- iii. **Master Logistics:**
 - Pool resources for a shared truck or reliable driver.
 - Offer same-day delivery for orders placed before 10 AM.
- iv. **Build Relationships:**

- Focus on reliability over price.
- Offer bundled services (e.g., delivery, on-site crushing).

Key to Excluding Middlemen:

- Your local presence, quality control, and reliability offer more value than a middleman's discounted price.
- Direct relationships with construction managers make intermediaries unnecessary.

Overarching Principles for All Minerals

- **Formalize:** Register your operation to access formal markets.
- **Document:** Keep records of production, sales, and compliance.
- **Upgrade:** Add value through sorting, processing, or quality control.
- **Unite:** Pool resources with other miners to increase volume and bargaining power.
- **Target Direct Buyers:** Build relationships with entities that value your offering (e.g., ethics, consistency, locality).

By following these steps, you transform from a price-taker to a market player who sets terms, commands fair prices, and excludes middlemen through professionalism and volume.

3. PRODUCTION POOLING

Production Pooling is the practice where multiple Artisanal and Small-Scale Mining (ASM) cooperatives or individual miners combine their mineral output into a single, large-volume lot for sale. Instead of each miner or small group selling independently, they aggregate their resources to create a unified supply chain. This transforms scattered, small-scale production into a consolidated volume that meets the demands of larger, formal buyers.

3.1. How Production Pooling Facilitates ASM Market Access

- i. **Creates Volume Attractiveness**
 - Large-scale buyers (e.g., exporters, refiners, industrial plants) require consistent, high-volume shipments. Pooling allows ASM groups to meet these volume thresholds, making them viable partners for buyers who would otherwise ignore small-scale suppliers.
- ii. **Enables Quality Standardization**
 - Pooling requires cooperatives to agree on basic quality standards (e.g., grading gemstones, washing minerals, achieving concentrate purity). This consistency makes the aggregated product more reliable and marketable.
- iii. **Strengthens Negotiation Power**
 - A single large lot gives miners leverage to negotiate better prices, payment terms, and contracts. Buyers cannot easily dismiss a group representing tons of material versus kilograms.
- iv. **Reduces Transaction Costs**
 - Selling one large lot is more efficient than arranging dozens of small sales. This saves time, transportation costs, and administrative burdens for both miners and buyers.

v. **Opens Doors to Formal Markets**

- Formal buyers often require traceability, certifications, and compliance with ESG (Environmental, Social, Governance) standards. Pooling allows miners to collectively invest in meeting these requirements (e.g., ethical certification, export documentation).

vi. **Circumvents Middlemen**

- By offering bulk volumes directly to buyers, miners eliminate the need for intermediaries who typically fragment supply and capture profits through markups.

Table 16: Comparing pooling and not pooling

The Difference It Makes	Without Pooling	With Pooling
Sales Volume	Sell small, inconsistent quantities.	Sell large, standardized volumes.
Bargaining Power	Accept low prices due to weak bargaining power.	Negotiate prices aligned with market rates.
Transaction Costs	Face high per-unit transaction costs (transport, paperwork).	Achieve economies of scale, reducing costs.
Buyer Access	Struggle to access formal buyers requiring large volumes.	Attract exporters, refiners, and industrial users.
Middlemen/Buyer Relationships	Depend on middlemen who exploit information asymmetries.	Build direct relationships with buyers.
Value Addition	Inability to invest in value addition (e.g., sorting, processing).	Pool resources to upgrade quality and meet buyer specifications.

Source: Field engagement

3.2. How to Make Production Pooling Work: A Step-by-Step Guide

i. **Build Trust and Governance**

- **Action:** Form a coalition of cooperatives/miners with shared goals.
- **How:**
 - Draft a clear agreement covering roles, profit-sharing, and decision-making.
 - Use transparent governance (e.g., elected representatives from each group).
- **Precaution:** Start with a pilot project to test collaboration before scaling.

ii. **Standardize Quality and Measurement**

- **Action:** Agree on quality grades and measurement systems.
- **How:**
 - Use calibrated scales, sieves, or assay kits.
 - Train members on basic grading (e.g., gemstone clarity, mineral purity).
 - Create a "master sample" as a quality benchmark.
- **Precaution:** Reject non-compliant batches to maintain standards.

iii. Establish Logistics and Storage

- **Action:** Set up a secure, centralized aggregation point.
- **How:**
 - Use tamper-proof bags/containers with unique IDs.
 - Implement a ledger (digital or physical) to track each group's contribution.
 - Invest in secure storage (e.g., locked warehouses, guarded containers).
- **Precaution:** Rotate oversight responsibilities among members to prevent theft/fraud.

iv. Develop a Sales Strategy

- **Action:**
 - **How:**
 - Appoint a sales committee to negotiate with buyers.
 - Use pooled volume to demand better terms (e.g., upfront payments, higher prices).
 - Target buyers valuing bulk/ethical sourcing (e.g., industrial plants, certified exporters).
- **Precaution:** Use written contracts reviewed by a lawyer.

v. Ensure Transparent Profit-Sharing

- **Action:** Distribute revenue based on contributed volume/quality.
- **How:**
 - Use the aggregation ledger to calculate each group's share.
 - Hold public meetings to review sales and disbursements.
- **Precaution:** Hire a neutral third party (e.g., NGO) to audit records if trust is low.

vi. Leverage Technology for Efficiency

- **Action:** Use low-tech tools to streamline pooling.
- **How:**
 - WhatsApp groups for coordination.
 - Simple spreadsheets or ledger apps for tracking.
 - Mobile money for transparent payments.

Table 17: Dos and Don'ts for Successful Pooling

Do's	Don'ts
Start with a small group of trusted partners.	Rush into pooling without clear rules.
Invest in secure storage and transport.	Allow informal or verbal agreements.
Standardize quality before aggregation.	Mix low-quality with high-quality materials.
Use transparent record-keeping systems.	Exclude members from financial records.
Target buyers directly with volume offers.	Rely on middlemen to manage sales.

Source: Field engagement

Key Takeaway

Production pooling turns fragmentation into strength. By combining resources, ASM miners achieve the scale, quality, and professionalism needed to access formal markets and command fair prices. The ultimate goal is to **create a supply chain that buyers compete for**—not one that depends on exploitative intermediaries.

Additional precautions

Step 1: Build Trust Among Cooperatives

- Hold joint meetings to agree on shared goals, quality standards, and profit-sharing.
- Start with a small pilot project to test collaboration.

Step 2: Standardize Quality & Measurement

- Agree on basic quality grades (e.g., Grade A, B, C for gems; concentrate purity for metals).
- Use calibrated scales and sieves to ensure consistent measurement.

Step 3: Establish a Central Collection & Storage Point

- Choose a secure, neutral location for aggregation.
- Implement transparent logging of each cooperative's contribution (weight, grade, date).

Step 4: Implement Robust Record-Keeping

- Use a shared ledger (digital or physical) accessible to all partners.
- Record inputs, sales, and payments transparently.

Step 5: Negotiate collectively

- Appoint a small negotiation team with clear mandates.
- Use your pooled volume to demand better prices and terms.

Step 6: Distribute Proceeds Fairly

- Use the records to allocate payments based on each group's contribution.
- Hold regular meetings to review and adjust the process.

Knowledge Consolidation

Peer Fire Chat Corner:

- What is the biggest advantage of selling as a group instead of alone?
- How would you respond if a buyer refuses to pay a fair price?
- What is one thing you can do this week to make your minerals more valuable?

Challenge Yourself

1. **The Buyer Test:** Role-play negotiating with a buyer who offers a low price. Use your records and pooled volume as leverage.
2. **The Quality Upgrade:** Take a batch of your mineral. Sort, wash, or grade it. Then get a new price quote and compare.
3. **The Partnership Pitch:** Draft a one-page letter to another local cooperative proposing to pool your resources for the next sale.

Carry This With You

- *Your best leverage is your combined volume and your story.*
- *Transparency builds trust—with your partners and your buyers.*
- *The first step to a better price is a better product.*
- *You are not just a miner. You are a business owner.*

CONCLUSION: A NEW PATH FOR ZAMBIA'S MINING HEARTBEAT

This Pit-Side Chat Book is more than a manual; it is a covenant. It represents a fundamental shift—from viewing Artisanal and Small-Scale Mining as a problem to be managed, to recognizing it as a national strength to be empowered. For the first time, Zambia's miners hold in their hands a resource forged not in distant offices, but in the very pits and rivers where they labor. It speaks your language, respects your wisdom, and equips you with proven, practical knowledge to secure a safer, more prosperous, and dignified future.

This book provides the essential tools to transform your work and your legacy:

- **From Hazard to Safety:** You now possess the keys to turn danger into security—by mastering stable pit slopes, replacing toxic mercury with borax, and building a culture of collective responsibility where every miner returns home unharmed.
- **From Uncertainty to Prosperity:** The days of being cheated by buyers are over. With guides to mineral identification, fair market prices, and access to CDF and CEEC grants, you are equipped to build real wealth, invest in machinery, and transform your operations into sustainable enterprises.
- **From Informality to Recognition:** This is your roadmap to legitimacy. By formalizing your work, adhering to environmental guidelines, and adopting traceable practices, you elevate your status from informal laborers to respected partners in Zambia's economic development, crucial to both the clean energy transition and the national infrastructure boom.
- **From Extraction to Stewardship:** We have shown that mining and responsibility are not opposites. By rehabilitating pits into fish farms, repurposing tailings into bricks, and planting trees for every one cut, you become the primary guardians of Zambia's natural heritage, ensuring it thrives for generations to come.

The call to action is now yours to answer.

Carry this knowledge to your site. Let it stain with the earth of your hands. Share its pages with every member of your cooperative. Debate its lessons under the shade of a tree. Implement its strategies, one step at a time.

Let this manual be the foundation upon which we collectively build a transformed ASM sector—a sector where safety is non-negotiable, prosperity is shared, and the environment is protected. This is not the end of a process; it is the beginning of a movement. Let's move forward together to mine a future that all Zambians can be proud of.

The next chapter of Zambian mining starts with you.

ANNEXE 1: ASM CRAFT CODE IMPLEMENTATION GUIDE

INTRODUCTION

The ASM CRAFT Code is a **voluntary framework** for artisanal and small-scale miners committed to **responsible, profitable, and sustainable operations**. Unlike rigid standards, it adapts to your site's realities while prioritizing **environmental protection, community trust, fair labor, and market access**. Implementing this Code positions your mine for premium buyers, reduces operational risks, and fosters long-term social license to operate. Start where you can—progress, not perfection, drives impact.

EXPECTED OUTCOMES

By adopting the CRAFT Code, your mine will achieve:

- **Market Advantage:** Access ethical buyers paying 5–15% price premiums for traceable minerals.
- **Lower Costs:** Reduced fines, conflicts, and resource waste (e.g., water recycling cuts expenses by 20–40%).
- **Community Support:** Trust-driven partnerships that minimize operational disruptions.
- **Safer Operations:** Fewer accidents, healthier workers, and zero child labor liabilities.
- **Asset Resilience:** Rehabilitated land retains future value; formal status attracts investors.
- **Certification Readiness:** Builds foundations for Fairmined/RA certification.

QUESTIONS FOR MINERS: BEFORE YOU BEGIN

Answer these honestly to tailor your CRAFT Code journey:

1. **Commitment Check:**
 - What environmental or social risks keep you awake at night? (e.g., mercury use, community complaints).
 - *Are you and your team ready to dedicate 2–4 hours/week to implement changes?*
2. **Resource Assessment:**
 - What low-cost resources can you leverage? (e.g., community volunteers, unused land for settling ponds, local NGOs for training).
 - What technical skills does your team lack? (e.g., water testing, mercury-free processing).
3. **Priority Setting:**
 - Which module would bring the quickest win for your mine? (e.g., Safety Gear → immediate accident reduction; Mercury Phaseout → health/buyer appeal).

- Who in your community/organization can champion this work? (Identify allies early).
4. **Barriers:**
- What's your biggest fear about adopting this Code? (e.g., costs, complexity, team resistance).
 - What 1 change can you make in the next 30 days? (e.g., install 1 silt fence, start a grievance box).

MODULE 1: COMMUNITY ENGAGEMENT & DEVELOPMENT

Requirement: Proactively collaborate with local communities to ensure mutual benefit.

Implementation:

- **Establish Community Dialogue Forums:** Organize monthly meetings with community leaders and residents. Discuss mining impacts, job opportunities, and community needs. Document agreements in written memoranda.
- **Invest in Local Projects:** Allocate 5–10% of net profits to fund community-chosen initiatives (e.g., clean water systems, schools). Create a transparent fund managed jointly by miners and community representatives.
- **Prioritize Local Hiring:** Reserve 70% of non-specialized jobs for community members. Provide training for roles like equipment operation or safety monitoring.

MODULE 2: ENVIRONMENTAL STEWARDSHIP

Requirement: Minimize ecological disruption and restore mined land.

Implementation:

- **Prevent Water Contamination:** Install silt fences and settling ponds around mining sites to trap sediment. Test downstream water quarterly for heavy metals; remediate immediately if contamination is detected.
- **Rehabilitate Post-Mining:** Backfill excavated pits with non-toxic overburden. Plant native, fast-growing vegetation (e.g., grasses, shrubs) to stabilize soil. Partner with local agroforestry groups for saplings.
- **Phase Out Mercury:** Replace mercury amalgamation with gravity concentration (shaking tables, centrifuges). Train miners in borax processing for gold extraction.

MODULE 3: LABOR RIGHTS & SAFETY

Requirement: Guarantee safe, equitable working conditions.

Implementation:

- **Safety Gear Protocol:** Provide helmets, dust masks, gloves, and steel-toed boots to all workers. Enforce mandatory usage through daily checks. Install first-aid kits at every worksite.
- **Zero Child Labor Enforcement:** Verify worker ages via government IDs. Collaborate with NGOs to establish childcare/education programs for miners' children.
- **Fair Wages & Grievances:** Pay wages weekly at or above regional minimums. Create an anonymous grievance box reviewed biweekly by elected worker representatives.

MODULE 4: LEGAL COMPLIANCE & TRANSPARENCY

Requirement: Operate within legal frameworks and ensure traceability.

Implementation:

- **Formalize Operations:** Register with national mining authorities and obtain permits. Maintain a public ledger of licenses, fees paid, and inspection reports.
- **Mineral Traceability:** Tag mineral batches with origin (mine name, coordinates, extraction date). Use tamper-proof bags and digital tracking apps (e.g., *Fairmined* tools).
- **Conflict-Free Sourcing:** Vet all buyers through the OECD Due Diligence Checklist. Refuse dealings with entities linked to armed groups.

MODULE 5: RESOURCE EFFICIENCY

Requirement: Optimize resource use and reduce waste.

Implementation:

- **Water Recycling:** Capture processing water in sealed tanks. Treat with simple filtration (sand, charcoal) and reuse in extraction circuits.
- **Tailings Management:** Reprocess tailings with cyanide-free methods (e.g., flotation) to recover residual minerals. Store sterile tailings in geotextile-lined pits.
- **Energy Conservation:** Use solar panels for lighting/pumping. Schedule machinery operations during off-peak utility hours to cut costs.

MODULE 6: CONTINUOUS IMPROVEMENT

Requirement: Commit to ongoing learning and innovation.

Implementation:

- **Skills Upgrading:** Partner with mining cooperatives for quarterly technical training (e.g., efficient ore processing, financial literacy).
- **Impact Audits:** Conduct biannual self-assessments using the *CRAFT Code Checklist*. Share results with communities and regulators; implement corrective actions within 60 days.
- **Technology Adoption:** Pilot affordable tech (e.g., portable XRF analyzers for ore grading). Share successful tools via ASM networks.

EXECUTION PRINCIPLES

- **Start Small:** Focus on 1–2 modules initially (e.g., Safety + Environment). Scale as capacity builds.
- **Document Everything:** Use photo logs, meeting minutes, and expense trackers to demonstrate compliance.
- **Seek Partnerships:** Engage NGOs for technical support (e.g., *Pact*, *ARM*) and lenders for green financing.

BENCHMARK SUCCESS

- **Short-Term (3–6 mo):** Zero mercury use, 100% safety gear compliance, community fund operational.
- **Long-Term (1–2 yr):** Full site rehabilitation, 50% cost savings from resource efficiency, ISO 14001 alignment.

S/N	ACTIVITY	BRIEF DESCRIPTION	COMMENT	REPERCUSSIONS
1.	Commencement of Operations	Notice to be given to Director of Mines Safety when commencing, recommencing or abandoning operations at the mine	Very important so the that the Ministry is aware the physical status of the mine	The holder is fined for not giving notice
2.	Appointments	The Holder , co-operative member or individual with general managerial responsibilities must be appointed as mine manager who shall enforce the requirements of the laws	This is import for smooth running of operations at the mine	The Holder who contravenes is fined or imprisoned
3.	Mining Operations	Mine operators using simple tools must excavate small excavations/pits and bench the sidewalls of such excavations/pit at intervals of 1.5 meters to minimize the risk of sloughing (sliding /collapse).	Benching of the pit is very important because it prevents sliding and collapse of ground	The Holder who contravenes is fined or imprisoned
4.	Personal Protective Equipment (PPE)	Hard hats Safety glasses/goggles Earplugs/earmuffs Dust masks/respirators Steel-toed boots/shoes Gloves (mechanical, heat-resistant, or chemical-resistant) High-visibility vests	All employees working in the mining right or non-mining right areas must be provided with approved Proper Personal Protective Equipment	The Holder who contravenes is fined or imprisoned
5.	First aid	1 Triangular Bandages 18 2 Large F/ A Dressings 04 3 Medium F/ A Dressings 08 4 Finger F / A Dressings 12 5 Plaster Strips (Fabric) Box of 30 6 Splints (Inter lockable) 18 7 Rubber Tourniquets 02 8 Cetrimide Solution 1 % 01 Bottle 9 Liquid Medicinal Paraffin 01 Bottle 10 Twisting Sticks 9" & 6" Ing 02 11 Splint Padding 500g	All mine supervisors must be trained in first aid and must have valid first aid certificates from a reputation institution A trained first aider must administer first aid and also must inspect the first aid canister at least once every fortnight ensuring that	The Holder who contravenes is fined or imprisoned

		12 Cotton Wool 400g 13 CPR Mouth Piece 02 14 Crepe Bandages 04 15 Assorted Safety Pins 12 16 Surgical Gloves 04(minimum) 17 Cervical Collar 01 18 Pair of Scissors 01 ~ gauze Swabs 01 Pack ool Down Burn Gel 04 21 White Lint 04 22 rookes Airway 01 23Ambulance Bag 01	missing items are replenished	
6.	Fire fighting	<ul style="list-style-type: none"> • Fire Extinguishers • Area with sand and Bucket • Drums of water 	fire-fighting equipment provided are important as they help fight the fire outbreak and burning of equipment. They should be inspected by a competent person.	The Holder who contravenes can be sensitised or fined or imprisoned
7.	Ventilation systems (Mostly applicable to underground operations)	<ul style="list-style-type: none"> • adequate ventilation must be supplied to places where persons are travelling or working 	There must be proper ventilation in order to prevent gassing, heat exhaustion, explosions	The Holder who contravenes can be sensitized or fined or imprisoned
9.	Emergency preparedness		There is need to be prepared all the time in	The Holder who contravenes can be sensitized
10.	EXPLOSIVES Transportations Storage Usage Destruction	<ul style="list-style-type: none"> • Transportation of explosives must be done using standard approved vehicles and supervised by a competent person • The holder can have a MOU with Manufacturer of explosives 	Explosives are very dangerous and should be handled with care as they can cause fires, explosions, damage to equipment and property and injury to people	The Holder who contravenes can be sensitized or fined or imprisoned

		<ul style="list-style-type: none"> Storage magazines must be licensed, sanctioned and authorized Usage must be under supervision of a Blasting License Holder 		
11.	<p>MACHINERY (Applicable to Small Scale Mines)</p> <p>Pressure Vessels (Air receivers and Boilers)</p>	<ul style="list-style-type: none"> Standards of Construction, Installation, and Maintenance Inspection and Testing Safety Valves: Pressure Gauge Feed Wat Blowdown Valves: Drain Valves: Prohibitions Record Keeping Exceptions 	It's always important to test the vessels in case of faults or malfunction this helps to prevent Explosion, leaks and waves	The Holder who contravenes can be sensitised or fined or imprisoned
12.	Lifting Equipment (applicable to Small Scale Mines)	<ul style="list-style-type: none"> Lifting appliance Lifting gear Suitability and Design Safe Working Load Inspection and Testing Operation Brakes Controls Suspended Loads Hooks 	It's always important to test the lifting equipment in case of faults or malfunction in order to prevent load falling and causing accidents or injuries	The Holder who contravenes can be sensitised or fined or imprisoned
13.	Electrical Safety (applicable to Small Scale Mines)	<ul style="list-style-type: none"> Earthing Substations 	Earthing of electrical appliance/equipment and maintenance of substations very important as it prevents burns, electrical fire and explosions	The Holder who contravenes can be sensitised or fined or imprisoned

14.	Conveyor belts	<ul style="list-style-type: none"> •Guarding •Emergency Pull-Wire Switches 	Guards and emergency pull wire switches prevents crushing accidents and fall of objects	The Holder who contravenes can be sensitised or fined or imprisoned
15.	Vehicles	<ul style="list-style-type: none"> •Vehicle Operations & Requirements •Responsibilities of a Driver 	It's very important to have qualified and responsible drivers in order to prevent damage to the equipment and injury to person and people around	
16.	ENVIRONMENTAL MANAGEMENT	<ul style="list-style-type: none"> • Air quality monitoring • (Silica dust and fumes) • Water pollution control • Soil pollution control • Management of Hazardous materials • Management of Chemicals • Protection of flora and fauna • Progressive rehabilitation • Documenting/Reporting Environmental incidents • Environmental Management Plan • Environmental Protection Fund • Closure Plan 	Failure to manage the environment can lead to pollution of the air, water and soil. This pollution can cause damage to the environment and death to animals and people	The Holder who contravenes can be sensitized or fined or imprisoned
17.	GENERALS	<ul style="list-style-type: none"> • Training and Documentation • Signage • Accidents (reporting) • Sanitation 	Proper sanitation is key in preventing diseases such as diarrhea, dysentery, typhoid and many others	The Holder who contravenes can be sensitised or fined or imprisoned