

ANNEX A1

**GUIDES FOR ESTIMATING EACH HAZARD SCENARIO SAFETY
PROBABILITY INDEX**

ANNEX A1: Guide for Estimating each Hazard Scenario Safety Index

Component	Installations Deposits Works	Code	Safety Hazard Scenarios	Cause	PI Estimation Guide		
MINE	Underground workings	SHS 1	Development of major cracks, dolines or sink holes that could affect people, the environment or economic activities.	Seismic movements, underground mine structural instability, or water entry.	GUIDE 1		
		SHS 3	Asphyxiation of people entering the mine due to the presence of toxic gases.	Open access to abandoned mine.	GUIDE 7		
		SHS 4	Drowning in underground pools.	Open access to abandoned mine.	GUIDE 7		
		SHS 12	Falling into underground workings (people, stock, game animals).	Open access to abandoned mine.	GUIDE 7		
		SHS 13	Rocks, unsafe remnant structures or elements falling on people.	Open access to abandoned mine.	GUIDE 7		
		SHS 2	Collapse of the pit or surface works that could affect people, the environment and/or economic activities.	Seismic movements, water erosion, or surface faults.	GUIDE 2		
	Processing Plants	Open pits, trenches and other surface workings	SHS 4	Drowning in pool at bottom of pit.	Open access to abandoned mine.	GUIDE 7	
			SHS 12	Falling into open pit or trench (people, stock, game animals).	Open access to abandoned mine.	GUIDE 7	
			SHS 4	Drowning in tanks and ponds.	Open access to abandoned plant site.	GUIDE 7	
		PLANTS	Processing Plants	SHS 12	Risk of falling from elevated unsafe structures.	Open access to abandoned plant buildings.	GUIDE 7
				SHS 13	Rocks, unsafe remnant structures or other elements falling on people.	Open access to abandoned plant buildings.	GUIDE 7

Component	Installations Deposits Works	Code	Safety Hazard Scenarios	Cause	PI Estimation Guide
LARGE SCALE MINING WASTE	Tailings Dams	SHS 5	Dam failure that could cause a sudden release of tailings slurry that could affect people, the environment and/or economic activities.	Poor construction, seismic movements, rise in water table, overflow of dam, erosion of side walls.	GUIDE 3
		SHS 12	Risk of falling into tailings pond or from dam walls.	Open access to abandoned tailings dam.	GUIDE 7
		SHS 4	Drowning in tailings pond.	Open access to abandoned tailings dam.	GUIDE 7
	Tailings deposits dry-stacked or in other form	SHS 7	Failure of slopes of dry stacked or other tailings deposit that could affect people, the environment and/or economic activities.	Seismic movements, water erosion, poor construction, undermining of toe	GUIDE 5
		SHS 12	Risk of falling down steep slopes.	Open access to tailings impoundment.	GUIDE 7
	Heap leach waste dump	SHS 8	Failure of heap leach waste dumps that could affect people, the environment and/or economic activities.	Seismic movements, water erosion, poor construction.	GUIDE 5
		SHS 12	Risk of falling down steep slopes.	Open access to abandoned heap leach facility.	GUIDE 7
	Dumps for waste rock, low grade ore	SHS 9	Failure of slopes of dumps containing waste rock or low grade ore that could impact people, the environment or economic activities.	Seismic movements, water erosion, undermining of toe	GUIDE 6

Component	Installations Deposits Works	Code	Safety Hazard Scenarios	Cause	PI Estimation Guide
LARGE SCALE MINING WASTE	Dumps for waste rock, low grade ore	SHS 12	Risk of falling down steep slopes.	Open access to abandoned mine site.	GUIDE 7
	Slag heap	SHS 12	Risk of falling down steep slopes.	Open access to abandoned mine site.	GUIDE 7
SMALL SCALE INDUSTRIAL WASTE	Industrial waste deposits	SHS 14	Physical contact with unsafe remnant structures or other elements that may cause injury or damage.	Open access to abandoned mine site.	GUIDE 7
	Explosives magazine	SHS 10	Incorrect and/or unprotected storage of explosives which could result in an explosion causing injury.	Open access to explosives magazine.	GUIDE 7
ASSOCIATED INFRASTRUCTURE	Offices, camps, workshops and storage areas	SHS 12	Risk of falling in unsafe areas.	Open access to abandoned mine site.	GUIDE 7
		SHS 13	Falling of unsafe remnant structures or other elements onto people.	Open access to abandoned mine site.	GUIDE 7
	SHS 14	Physical contact with unsafe remnant structures or other elements that may cause injury or damage.	Open access to abandoned mine site.	GUIDE 7	
	Water systems and tanks	SHS 4	Drowning in tanks.	Open access to abandoned mine site.	GUIDE 7

Component	Installations Deposits Works	Code	Safety Hazard Scenarios	Cause	PI Estimation Guide
ASSOCIATED INFRASTRUCTURE	Water systems and tanks	SHS 12	Risk of falling from elevated unsafe structures.	Open access to abandoned mine site.	GUIDE 7
		SHS 13	Falling of unsafe remnant structures and other elements onto people.	Open access to abandoned mine site.	GUIDE 7
	Power lines and substations	SHS 12	Risk of falling from elevated, unsafe structures.	Open access to abandoned mine site.	GUIDE 7
		SHS 14	Physical contact with high voltage cables and other electrical installations that may cause injury or electrocution.	Open access to abandoned mine site.	GUIDE 7
	Roads and bridges	SHS 11	Vehicle accidents due to roads and/or infrastructure (e.g. bridges) in poor condition.	Open access to abandoned mine site.	GUIDE 7
		SHS 12	Risk of falling from elevated unsafe structures.	Open access to abandoned mine site.	GUIDE 7

Note: there is no Guide 4 in the Namibian version of the Manual as this addresses Safety Hazard Scenario 6, which does not exist in the Namibia situation.

POTENTIAL SAFETY HAZARD :

- SHS 3. Presence of toxic gases in the mine which could cause asphyxiation.
- SHS 4. Drowning in ponds, dams, tanks, pools.
- SHS 10. Unprotected explosive devices.
- SHS 11. Vehicle accidents on old roads and tracks.
- SHS 12. Risk of falling into underground workings or surface workings, down steep slopes, from unsafe elevated structures and due to uneven/unsafe surfaces.
- SHS 13. Risk of falling rocks or parts of remnant structures onto people.
- SHS 14. Physical contact with unsafe remnant structures and waste materials.

Can you access mine workings, facilities, structures or dumps which could pose a Potential Safety Hazard?

Yes

No

NEGLIGIBLE

Do conditions or circumstances facilitate the possibility of occurrence, such as:

- SHS 3** Lack of oxygen in long tunnels without ventilation. Unprotected entrances to mine workings.
- SHS 4** Depth of accumulated water >1 m. No means of escape.
- SHS 10** Unprotected explosive substances and devices.
- SHS 11** Severe erosion of access roads and tracks, or poor bridge conditions, which could cause vehicle accidents.
- SHS 12** Open and unprotected infrastructure, stockpiles or operations with uneven surface (over 1,5 m high) from which people may fall.
- SHS 13** Presence of rock falls at plant or other facilities, falling equipment, structures, ceiling, beams or other building debris at high elevation.
- SHS 14** Broken glass, scrap metal, sharp objects, metal spikes and other dangerous waste materials lying on the ground, and/or the presence of live cables and electrical installations in poor condition?

Yes

No

Frequency of Access

Frequency of Access

Very
Frequently

Frequently

Occasionally

Very
Frequently

Frequently or
Occasionally

HIGH

MEDIUM

LOW

LOW

NEGLIGIBLE

Notes:
 Very Frequently: Site is visited on a daily basis (or at least 5 days every week)
 Frequently: Site is visited on a few days per month (e.g. on weekends)
 Occasionally: Site is visited once or twice a year.

Comments
 Add comments on assumptions, data and criteria used to apply the guide.

Guide to estimate Hazard Scenario Probability Index	General site safety	GUIDE 7
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