Konkola Mineral Resources Ltd

NCHANGA MINE

Ref No. 0138/M4/L7/19A

July 14th, 2023

The Director-General,
Zambia Environmental Management Agency,
P O Box 35131,
LUSAKA.
Attention: **The Client Manager– Pollution Control**

Dear Sir/Madam,

RE: BI-ANNUAL STATUTORY REPORT FOR KMRL NCHANGA MINE

Please find enclosed a copy of the statutory report covering the licences listed below for the period January to June 2023:

1. **Pesticides and Toxic Substances Licence – NDL/PTS/00674/Z10/2014/2**
   - 1.1 Storage of Pesticides and Toxic Substances
   - 1.2 Importation of Pesticides and Toxic Substances
   - 1.3 Fumigation of Pesticides and Toxic Substances
   - 1.4 Blending of Pesticides and Toxic Substances
2. **Emission Licence – NDL/EMM/00674/Z10/2014/2**
   - 2.1 Discharge of Effluent – Pollution Control Dam Spillway Discharge Station No. 306
   - 2.2 Discharge of Effluent – Muntimpa Tailings Dam Spillway Discharge Station No. 308
   - 2.3 Discharge of Effluent – Combined Concentrator Drain Discharge Station No. 309
   - 2.4 Discharge of Effluent – Nchanga Open Pit RTV Workshop Drain Discharge Station 343
   - 2.5 Discharge of Effluent – TD3 Pond Overflow into Mushishima Stream
   - 2.6 Emission of Air Pollutants at Incinerator – Nchanga Mine Hospital
3. **Hazardous Waste Licence – NDL/LHWM/00674/Z10/2014/2**
   - 3.1 Hazardous waste generated, stored and disposed
   - 3.2 Personnel involved in management of hazardous waste
   - 3.3 Generation of Healthcare waste
   - 3.4 Transportation of Healthcare waste
   - 3.5 Generation, Transportation and Handling of Expired Chemicals
4. **Waste Management Licence – NDL/WM/002930/Z10/2014/2**
   - 4.1 Transportation of waste
   - 4.2 Management of waste dump sites
   - 4.3 Tailings dam status
   - 4.4 Overburden dump status
   - 4.5 Quality of groundwater
5. **Ozone Depleting Substances Licence – NDL/ODS/00674/Z10/2014/2**
   - 5.1 Handling and storage of Ozone depleting substances (ODS)
   - 5.2 Personnel involved in management of Ozone depleting substances (ODS)
   - 5.3 Ozone depleting substances (ODS) Consumptions

This is in fulfilment of the requirements under The Environmental Management Act 2011, Environmental Management (Licensing) Regulation 112 of 2013 which requires submission of bi-annual reports to the Zambia Environmental Management Agency Inspectorate.

Yours faithfully,

CHARLES LITIYA
MANAGER/HOLDER

Cc Manager ZEMA - Northern Region
Central Records – File L7/19A (3)

ZAMBIA ENVIRONMENTAL MANAGEMENT AGENCY
14 JUL 2023
REGIONAL OFFICE
P.O BOX 71302, NDOLA

A. EVALUATION OF COMPLIANCE TO ENVIRONMENTAL LICENCES/ PERMITS

There are five (5) Environmental Licenses for Konkola Mineral Resources Limited Chingola operations. From these five (5) licenses, there are 42 Sub licenses/facilities, which are under Nchanga Mine. During the period under review, three (3) licenses were compliant (Pesticide and Toxic Substances, Ozone Depleting Substances and Waste Management) and two (2) license is not compliant (Emission and Hazardous Waste Management License).

Table 1 below presents a summary of compliance levels for Nchanga Mine with respect to Environmental Licenses.

Table 1: Summary of Nchanga License Compliance

Total number of conditions	1006
Number of compliant conditions	997
Number of Non-compliant conditions	9
Total number of facilities	42
Number of compliant facilities	35
Number of non- compliant facilities	7
Total number of licenses	5
Number of compliant licenses	3
Number of non-compliant licenses	2
Overall Compliance (By Conditions)	**99.11%**
Overall Compliance (By Facility)	**83.33%**
Overall Compliance (By License)	**60.00%**

B. THE ENVIRONMENTAL MANAGEMENT (LICENSING) REGULATIONS, 2013

1 PESTICIDE AND TOXIC SUBSTANCE LICENCE (Regulations 25, 27 and 28)

1.1 Reagents – Processing

Pesticides and Toxic Substances (PTS) at Nchanga Mine are consumed in the Concentrator in copper concentrate production. Reagents are used for vector control at the Public health and as disinfectant at the Nchanga South Hospital and at the three (3) Mine Health Centers. In order to prevent pollution and other health hazards associated with these substances, the Mine ensures transportation, handling, storage and use of these chemicals is in line with good international industry practice by providing preventive and protective measures, training of workers and emergency prevention, preparedness and response arrangements

1.1.1 STORAGE

All process reagents are kept at the central storage shed and transported on demand to the reagent mixing shed, which is under a roof and adequately bunded. The store is sized to hold approximately twelve month's operating requirements. A summary of the storage and use of reagents in the reporting period is provided in **Table 2** below.

Table 2: Process Reagents

S/No	Chemical Name	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Imported	Quantity Stored	Quantity Used	Closing Stock	Source	Transporter	Point of Storage	Description Of Storage Facility	Emergency Equipment Available
		Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23					
1	Beta Froth	28,000	28,000	4,000	30,000	35,500	18,500	35,500	Betachem	Betachem	Concentrator Reagent Shed	The storage facility is properly constructed and surrounded by bund walls of sufficient strength capable of retaining one hundred and ten per cent of the amount of reagent contained in the container. Access is restricted by fencing and locking.	Emergency equipment/kit available consists of recirculation pumps, gloves, gas mask, broom, container of absorbent (sawdust/sand), dust pan/spade, empty container for collecting cleaned material.
2	Flex 31	4,950	4,950	0	0	450	4500	450	TC China	TC China			
3	Potassium Amyl Xanthate	0	0	0	0	0	0	0	Invochem	Invochem			
4	Sodium Isopropyl Xanthate	16,600	16,600	17,550	74,800	15,550	58,300	15,550	RGPM, Invochem & Yellow strip Resources Ltd	RGPM, Invochem & Yellow strip Resources Ltd			

NOTE
Unit of measure is tons

1.1.2 IMPORTATION

All process reagents are imported. Importation of the reagents only takes place as when need arises. **Table 3** below provides a summary of the imported reagents, the source and the transporter for the reporting period.

Table 3: Imported Reagents

S/n	Chemical Name	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Imported	Quantity Stored	Quantity Used	Closing Stock	Source	Transporter	Point of Storage	Description Of Storage Facility	Emergenc Equipmen Available
		Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23					
1	Beta Froth	28,000	28,000	4,000	30,000	35,500	18,500	35,500	Betachem	Betachem	Concentrator Reagent Shed	The storage facility is properly constructed and surrounded by bund walls of sufficient strength capable of retaining one hundred and ten per cent of the amount of reagent contained in the container. Access is restricted by fencing and locking.	Emergency equipment/k available consists of recirculation pumps, glove gas mask, broom, container of absorbent (sawdust/sa , dust pan/spade, empty container for collecting cleaned material.
2	Sodium Isopropyl Xanthate	16,600	16,600	17,550	74,800	15,550	58,300	15,550	RGPM, Invochem & Yellow strip Resources Ltd	RGPM, Invochem & Yellow strip Resources Ltd			
3	Sulphuric Acid	19,774	19,774	16,829	18,479	18,100	16,922	13,655	Kansanshi, Mopani & Chambishi Copper Mines	Gomes, Awet & Alliswell Ltd	500TPD Acid Storage Tanks		

NOTE
Unit of measure is tons

1.1.3 EXPORTATION

There was no exportation of Sulphuric Acid under the period under review.

1.2 Reagents - Analytical

The analytical facilities at the mine include an assay laboratory and facilities for the analysis of selected water samples. **Table 4** below provides a summary of the chemical reagents that were stored and used in the period under review:

Table 4: Analytical Reagents

S/n	Chemical Name	Units	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source	Description Of Storage Facility	Emergency Equipment Available
			Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23			
1	Acetone	Litres	612.5	612.5	0	0	575	37.5	575	Micil, Phisha and Octahedron	The storage room is properly constructed with concreted floor, surrounded by enclosed walls of sufficient strength with an iron roof and a steel door. Access to the facility is restricted.	Emergency equipment/kit available consis of PVC Apro gloves, gas mas broom, contain of absorbe (sawdust/sand) dust pan/spad empty contain for collecti cleaned materia
2	Ammonia Solution	Litres	125	125	0	0	125	0	125	Micil, Phisha and Octahedron		
3	Lanthanum III Chloride LaCl□	Kilograms	4	4	0	0	4	0	4	Micil, Phisha and Octahedron		
4	Hydrofluoric Acid, HF	Litres	85	85	0	0	85	10	75	Micil, Phisha and Octahedron		
5	Hydrochloric Acid, HCL	Litres	100	325	0	225	325	205	120	Micil, Phisha and Octahedron		
6	Methylated Spirit	Litres	520	400	0	0	400	180	220	Micil, Phisha and Octahedron		
7	Lead, Pb Std	Litres	5	5	0	0	5	0.5	4.5	Micil, Phisha and Octahedron		
8	Iodine Ampoule 0.1N	Litres	0.1	0.1	0	0	0.1	0	0.1	Micil, Phisha and Octahedron		
9	Magnesium Stock Solution	Litres	2	2	0	3	5	0.5	4.5	Micil, Phisha and Octahedron		
10	Urea	Kilograms	4.5	4.5	2	36.5	12	27	12	Micil, Phisha and Octahedron		
11	Potassium Iodide	Kilograms	20.5	20.5	0	0	20.5	4.5	16	Micil, Phisha and Octahedron		
12	Potassium Thiocyanate	Kilograms	9	8	0	20	28	2.5	25.5	Micil, Phisha and Octahedron		
13	Copper II Sulphate	Kilograms	0	0	0	11	11	1.5	9.5	Micil, Phisha and Octahedron		
14	Sodium Thiosulphate	Kilograms	47.5	17	0	36	53	16	37	Micil, Phisha and Octahedron		

S/n	Chemical Name	Units	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source	Description Of Storage Facility	Emergency Equipment Available
			Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23			
15	Perchloric Acid	Litres	50	50	2.5	32.5	7.5	77.5	7.5	Micil, Phisha and Octahedron	The storage room is properly constructed with concreted floor, surrounded by enclosed walls of sufficient strength with an iron roof and a steel door. Access to the facility is restricted.	Emergency equipment/kit available consis of PVC Apro gloves, gas mas broom, contain of absorbe (sawdust/sand) dust pan/spad empty contain for collecti cleaned materia
16	Methanol	Litres	315	315	0	0	315	0	315	Micil, Phisha and Octahedron		
17	Copper, Std Solution	Litres	1	2	0	0	2	1.5	0.5	Micil, Phisha and Octahedron		
18	Cobalt, Std Solution	Litres	24	24	0	4	28	0.5	27.5	Micil, Phisha and Octahedron		
19	Barium Chloride	Kilograms	13	12	0	17.5	29.5	17.5	12	Micil, Phisha and Octahedron		
20	Sulphuric Acid Ampoule 1N	Litres	16	16	0	0	16	15.3	0.7	Micil, Phisha and Octahedron		
21	Starch Soluble	Kilograms	5	5	0	48	53	5.5	47.5	Micil, Phisha and Octahedron		
22	Calcium Stock Solution	Litres	0	4.5	0	19	23.5	5	18.5	Micil, Phisha and Octahedron		
23	Sodium Carbonate	Kilograms	42.5	42	0	0	42	7	35	Micil, Phisha and Octahedron		
24	Silicon Std Solution	Litres	7.4	7.4	0	0	7.4	0	7.4	Micil, Phisha and Octahedron		
25	Nitric Acid HNO□	Litres	25	25	75	325	50	275	50	Micil, Phisha and Octahedron	**As Above**	Lime, fire extinguishers an eye washes

1.3 Pesticides – Health and Sanitation

KMRL- Nchanga Public Health Department uses a number of pesticides to control various pests that may pose a danger to the workforce and the general public within our area of operation. In order to prevent the risks associated with these substances including potential misuse, spills, and accidental human exposure, the department ensures safety guidelines for the storage, transport, and use of pesticides are applied into day-to-day activities. **Table 5** below provides a summary of the pesticide usage and quantities in stock.

Table 5: Pesticides and Toxic Substances

S/n	Chemical Name	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source	Description Of Storage Facility	Emergency Equipment Available
		Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23			
1	Reskol (Litres)	600	600	30	Nil	600	95	475	Afrivet Zambia Ltd	The storage area is constructed with concreted floor, walls, roof and a steel door. Access to the facility is restricted as the area is under lock	Emergency equipment/kit available consists of PVC Apron, gloves, gas mask, broom, container of absorbent (sawdust/sand), dust pan/spade, empty container for collecting cleaned material.
2	Pynol (Litres)	2680	2680	80	Nil	2320	280	2320	Coopers Investments		
3	K-Othrine	-	-	-	-	-	-	-	Afrivet Zambia Ltd		
4	Ficam (Sachet)	24	24	Nil	Nil	24	4	20 S	Afrivet Zambia Ltd		
5	San Clean Disinfectant (Litres)	725	725	Nil	Nil	725	Nil	725	Afrivet Zambia Ltd		
6	Agita Fly bait (Kilograms)	199	199	Nil	Nil	199	Nil	199	Afrivet Zambia Ltd		
7	Dy-fly (Kilograms)	198	198	Nil	Nil	198	6	192	RuthCo		
8	Cislin (Grams)	134	134	30	Nil	134	Nil	104	RuthCo		
9	Coopex (Litres)	200	200	50	Nil	200	50	150	RuthCo		
10	Viridis (20L)	1740	1740	Nil	Nil	1740	Nil	1740	Afrivet Zambia Ltd		
11	Viridis (500mls)	426	426	Nil	Nil	426	6	420	Afrivet Zambia Ltd		
12	Granula Chlorine (Kilograms)	100	100	Nil	Nil	100	Nil	100	Afrivet Zambia Ltd		

1.1.1 Fumigation

A summary of the quantities of the pesticides and toxic substances used in the reporting period is provided in **Table 6**, and the medical records of personnel involved in the handling of these substances is provided in **Table 7** below.

Table 6: Pesticides and Toxic Substances used in fumigation

S/n	Chemical Name	Closing Stock	Opening Stock	Quantity to/from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source	Description of Storage Facility	Emergency Equipment Available
		Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23			
1	Pynol (Litres)	2680	2680	80	Nil	2320	280	2320	Coopers Investments	The storage area is constructed with concreted floor, walls, roof and a steel door. Access to the facility is restricted as the area is under lock and key.	Emergency equipment/kit available consists of PVC Apron, gloves, gas mask, broom, container of absorbent (sawdust/sand), dust pan/spade, empty container for collecting cleaned material.

Table 7: Personnel involved in fumigation of Pesticides and Toxic Substances

S/n	Name	Mine No.	Date Scheduled	Medical Centre
1	Musonda Mwale	33000125	28/07/2023	Nchanga South Hospital

NB – medical tests are conducted once a year for public health officers

1.1.2 Blending

A summary of the quantities of the pesticides and toxic substances used in blending for the reporting period is provided in **Table 8**, and the medical records of personnel involved in the handling of these substances are provided in **Table 9** below.

Table 8: Pesticides and Toxic Substances used in blending

S/n	Chemical Name	Closing Stock	Opening Stock	Quantity to /from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source	Description Of Storage Facility	Emergency Equipment Available
		Dec-22	Jan-23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jun-23			
1	Reskol (Litres)	600	600	30	Nil	600	95	475	Afrivet Zambia Ltd	The storage area is constructed with concreted floor, walls, roof and a steel door. Access to the facility is restricted as the area is under lock and key.	Emergency equipment/kit available consists of PVC Apron, gloves, gas mask, broom, container of absorbent (sawdust/sand), dust pan/spade, empty container for collecting cleaned material.
2	K-Othrine	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Afrivet Zambia Ltd		
3	Ficam (Sachets)	24	24	Nil	Nil	24	4	20	Coopers Investments		
4	San Clean Disinfectant (Litres)	725	725	Nil	Nil	725	Nil	725	Afrivet Zambia Ltd		
5	Agita Fly bait (Kilograms)	199	199	Nil	Nil	199	Nil	199	Afrivet Zambia Ltd		
6	Dy-fly (Kilograms)	198	198	Nil	Nil	198	6	192	Afrivet Zambia Ltd		
7	Cislin (Grams)	134	134	30	Nil	134	Nil	104	Afrivet Zambia Ltd		
8	Coopex (Litres)	200	200	50	Nil	200	50	150	RuthCo		
9	Viridis (20L)	1740	1740	Nil	Nil	1740	Nil	1740	RuthCo		
10	Viridis (Litres)	426	426	Nil	Nil	426	6	420	RuthCo		
11	Granula Chlorine (Kilograms)	100	100	Nil	Nil	100	Nil	100	Afrivet Zambia Ltd		

Table 9: Personnel involved in blending of Pesticides and Toxic Substances

S/n	Name	Mine No.	Date Scheduled	Medical Centre
1	Musonda Mwale	33000125	28/07/2023	Nchanga South Hospital

Note: **The same personnel involved in blending are also involved in fumigation of the pesticides and toxic substances. Medical tests are conducted once a year for public health officers.**

2 EMISSION LICENCE

2.1 Effluent Discharge: Regulation 4

The permit to discharge effluents relates to the Pollution Control Dam (PCD) discharge into Mushishima stream, Muntimpa Tailings Dam (TD5) spillway overflow into Muntimpa stream, Concentrator combined drain discharge into Nchanga stream, Open Pit RTV workshop drain into Nchanga stream and TD3 ponds overflow into Mushishima stream.

In order to prevent discharge of pollutants to the environment through the six (6) licensed discharge points, Nchanga Mine uses various management and engineering controls. The most significant environmental actions aim at reducing and controlling spillages and leaks from a process control basis. Operational controls are continuously being improved through Internal and External audits; Containment areas are constructed and maintained; Systems have been put in place to return spillage to the process stream in order to reduce discharges to a minimum; Treatment systems are installed on site for effluents prior to being released to the environment. Our Environmental Management System, EMS, aims at not only meeting the limits set by Zambian Regulations but also achieving the World Bank and IFC guidelines as part of its sustainability program.

Below is a summary of the effluent quality and quantity through the licensed drains as monitored in during the period under review.

2.1.1 POLLUTION CONTROL DAM SPILLWAY DISCHARGE (STATION No.306)

The **Table 10** below shows the summary of effluent performance for the period under review.

Table 10: PCD Effluent Monitoring Results (Monthly averages)

Month	FLOW m3/day	pH	Cond.	Copper	Iron	Manganese	Cobalt	Calcium	Magnesium	Sulphate	Total Dissolved Solids	Total Suspended Solids
Jan-23	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD
Feb-23	5865.27	6.05	1672	4.83	19.54	6.56	0.42	ED	ED	146.67	1463.00	237.25
Mar-23	13755.53	6.55	4004	32.29	1.05	28.33	2.84	ED	ED	ED	2803.00	331.50
Apr-23	26886.32	7.90	2952	30.41	85.02	41.84	2.61	7.95	ED	1153.50	2066.50	208.16
May-23	17424.21	7.28	3647	28.41	64.98	18.42	2.22	28.31	ED	1556.25	2558.00	15626.25
Jun-23	23598.87	7.86	1090	0.66	83.33	25.11	3.07	20.81	12.10	1634.00	2998.33	17477.67
Statutory Limits		**6-9**	**4300**	**1.5**	**2**	**1**	**0.05**	**100**	**500**	**1500**	**100**	**3000**

Note:

Samples are cut at a temperature of 25°C.
All results except pH and Conductivity (µS/cm) are in mg/litre.
- Minimal Flows
- ED: Equipment down
Below Detectable levels
ZD: Zero Discharge

2.1.2 MUNTIMPA TAILINGS DAM SPILLWAY DISCHARGE (STATION No. 308)

The **Table 11** below shows the summary of effluent performance for the period under review.

Table 11: Muntimpa Tailings Dam (TD5) Effluent Monitoring Results (Monthly averages)

Month	FLOW m3/day	pH	Cond.	Copper	Iron	Manganese	Cobalt	Calcium	Magnesium	Sulphate	Total Dissolved Solids	Total Suspended Solids
Jan-23	69,905.95	7.58	4,471.00	0.83	1.05	47.20	2.57	ED	ED	2,092.00	3,566.00	153.00
Feb-23	82,144.93	7.37	4,597.00	0.58	3.60	3.60	1.52	ED	ED	1,268.57	3,229.43	199.14
Mar-23	73,364.50	7.16	4,693.00	0.22	1.05	24.26	0.96	ED	ED	ED	2,413.63	67.75
Apr-23	57,471.67	7.76	2,573.00	0.15	43.22	13.05	0.39	0.15	ED	1,490.75	2,552.60	311.48
May-23	27,674.76	7.63	2,472.33	0.34	0.81	7.90	0.60	2.41	3.84	1,730.67	1,730.67	46.00
Jun-23	23,598.87	7.53	1,090.33	0.24	3.07	11.61	0.92	1.43	0.98	1,268.57	1,552.57	44.00
Statutory Limits		**6-9**	**4300**	**1.5**	**2**	**1**	**0.05**	**100**	**500**	**1500**	**100**	**3000**

Note:
Samples are cut at a temperature of 25°C. All results except pH and Conductivity (µS/cm) are in mg/litre.

- Minimal Flows

ED: Equipment down
Below Detectable levels
ZD: Zero Discharge

2.1.3 NCHANGA OPEN PIT RTV WORKSHOP DRAIN INTO NCHANGA STREAM (STATION NO. 343)

The **Table 12** below shows the summary of effluent performance for the period under review.

Table 12: Nchanga Open Pit RTV Workshop Drain into Nchanga Stream Monitoring Results (Monthly Averages)

Month	FLOW m3/day	pH	Cond.	Copper	Iron	Manganese	Cobalt	Calcium	Magnesium	Sulphate	Total Dissolved Solids	Total Suspended Solids
Jan-23 to Apr - 23	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD	ZD
May-23	-	7.60	277.60	0.56	2.01	0.19	0.12	1.50	4.42	61.40	194.40	180.00
Jun-23	-	7.86	313.14	0.83	3.52	0.86	0.30	1.27	4.09	314.71	219.00	98.00
Statutory Limits		**6-9**	**4300**	**1.5**	**2**	**1**	**0.05**	**100**	**500**	**1500**	**100**	**3000**

Note:

Samples are cut at a temperature of 25°C. All results except pH and Conductivity (µS/cm) are in mg/litre.

- Minimal Flows

ED: Equipment down

\# Below Detectable levels

ZD: Zero Discharge

2.1.4 COMBINED CONCENTRATOR DRAIN INTO NCHANGA STREAM (STATION No.309)

The drain was on Zero Discharge during the period under review.

2.1.5 TD 3 POND OVERFLOW INTO MUSHISHIMA STREAM

The drain was on Zero Discharge during the period under review.

2.2 EMISSION TO AIR: Regulation 4

The permits to emit air pollutants at Nchanga mine relates to the operations of the incinerator at Nchanga Mine Hospital. In order to comply with the general requirements of The Environmental Management (Licensing) Regulations, 2013, Nchanga Mine has engaged Tibon to monitor emissions from the stacks.

2.2.1 EMISSIONS TO AIR – NCHANGA SOUTH HOSPITAL INCINERATOR STACK

Health care waste from the Mine hospital and Health Centres is collected and incinerated at the Nchanga South Hospital Incinerator and the waste ash disposed of at the designated incinerator ash disposal facility which is a concreted below ground pit. **Table 13** below provides a summary of the monitoring results.

Table 13: Hospital incinerator stack monitoring results

Pollutant	Dust mg/Nm³	CO mg/Nm³	SO_2 mg/Nm³	NOX mg/Nm³	Cd mg/Nm³	Cu mg/Nm³	Pb mg/Nm³	Hg mg/Nm³
Emission Limits	**100**	**100**	**850**	**460**	**0.05**	**1.0**	**0.5**	**0.05**
Jan-23	77.25	99.56	49.54	20.97	0.0076	0.5173	0.1610	0.000153
Feb-23	81.09	197.87	22.87	19.63	0.0097	0.7004	0.1250	0.000161
Mar-23	91.41	94.14	52.40	16.96	0.0077	0.8347	0.1905	0.000182
Apr-23	70.32	63.53	7.62	21.42	0.0078	0.5165	0.1291	0.000070
May-23	88.29	77.06	13.34	16.51	0.0105	0.7975	0.1928	0.000175
Jun-23	84.49	103.93	129.57	18.30	0.0098	0.6852	0.3689	0.000088

2.2.2 Environmental Incidents (Category 2 and above) Recorded in the Review Period

Find below details of incidents recorded for the period under review.

Table 14: Emission related incidents

Date	Department	Details of Noncompliance	Cause	Corrective/Preventive Measures	Current Status
17-Mar-23	Concentrator Dams	Rapture of Muntimpa Line 3 on one short pipe draining point at Chikola swampy area	Wear and tear	Sealed the raptured point by arc welding.	Closed
19-Mar-23	Nchanga Underground	Pipe failure leading to partial flooding of 2800 pump chamber	Pipe failure	Sealed the holed pipe.	Closed
14-Apr-23	Concentrator-dams	On 14Th April, 2023 at around 07:00hrs PCD team informed Environmental team about the presence of organic materials at Pollution Control Dam (PCD) from Smelter HFO storage tank.	Leaking HFO Valve from Smelter storage tank	Informed SmelterCo and the valve was closed Applied saw dusted and scooped the material	Closed
25-Apr-23	Concentrator-dams	On 25th April 2023 at around 08:00hrs, the entire Pollution Control Dam (PCD) was down due to pipe rupture on decant line and line 2 near the PCD junction from TD 2 pump station as well as pump failure at CM513 in the night shift. This resulted in middle paddock and Decant being full of water /effluent. Therefore, water from Decant started overflowing into Spillway paddock causing overflow at PCD Spillway.	Wear and tear	Repairing of the ruptured pipe and failing pumps and Monitoring of effluent quality at PCD Spillway, Mushishima stream, Hippo Pool and Kafue river at Mulonga pump station Procurement of new pipe and failing pumps	Closed
1-May-23	Concentrator Dams	On 30th April 2023, Muntimpa pump station struggled with delivery of tailings to TD5 throughout the whole day and night. Efforts were made on 30th April 2023 by dam's management to request for throttling of inputs into TLP due to the non-discharge of material at TD5 and depletion of cavities at PCD. However, this request to go down completely on inputs was over ruled and NEM and OEM continued to run with NEM only stopping at 01:45hrs and OEM	Pump failure	Repaired the washed away portions of the embankment at PCD7 & and at middle paddock & normalized incoming flows to PCD7.	Closed

Date	Department	Details of Noncompliance	Cause	Corrective/Preventive Measures	Current Status
		stopping at 08: 00hrs (1st May 2023), with no discharge at TD5."			
22-May-23	Concentrator Dams	On 22nd May 2023 at around 13:00hrs Pollution Control Dam (PCD) spillway started overflowing into Mushishima stream due to massive flows reporting to PCD from TLP Main plant. The decant paddocks were overwhelmed due to high flows from the plant. The pumps at the spillway were down as V - belt Snapped from 182 Pump. Monitoring of effluent at the spillway continued and below are the readings for pH and Turbidity	Power failure	Re-built washed away embankments. Repaired V-belt on pump 182	Closed
29-May-23	Concentrator Dams	On 29th May 2023, Power failure occurred at dams at 12:00hrs affecting PCD pumps and Muntimpa pump station had tripped out at 11:30hrs due to failure on the gland service water pumps. This resulted in high slurry flows to CM513 and PCD and eventually overflow at spillway."	Power failure	Restored power at PCD. Replaced and repaired the gland water pumps at Muntimpa pump station. Restoration of CM513.	Closed
1-Jun-23	Concentrator Dams	PCD was overwhelmed with flows coming from main plant. All the paddocks were full to the limits, with small sections in the hosed portions at PCD7 and Middle paddock, Decant and spillway were full. All the drains at main plant that feeds CM513 drain had considerable flows (High grade with Mulonga water, Leach drain with cloudy water, Muntimpa drain with cloudy water).	Pump failure	Restoration of Muntimpa pinch valves and pump sets to working order.	Closed

3 HAZARDOUS WASTE LICENCE (GENERATION AND STORAGE, Regulation 19)

The plant generates hazardous waste namely; used oil, used fluorescent tubes, used batteries, spent grease, used oil filters, oil sludge, hydrocarbon contaminated sawdust, lead dross and scrap lead. Used Oil is stored at the storage facilities at the point of generation that is at NOP's RTV Workshop, Mine Garage's Workshop and Underground Workshop, which ends up at Salvage Yard for final disposal through the Nchanga Smelter Anode Furnaces. Used Fluorescent Tubes are being centrally stored at Electrical Power Distribution Storage Facility. Used Batteries are centrally stored at the Salvage Yard. Spent Grease is stored at the plants of generation, that is, Concentrator, Mine Garage's Workshop and Underground Storage facilities. Used Oil filters is stored at the points of generation, that is, Concentrator, Open Pit and Underground Storage facilities. Oil sludge is stored at the points of generation, that is, Concentrator and Underground Storage facilities. Hydrocarbon contaminated sawdust is stored at the plants of generation, that is, Concentrator and Underground Storage facilities. The quantities generated are presented in tables below.

3.1 HAZARDOUS WASTE GENERATED, STORED AND DISPOSED

3.1.1 HAZARDOUS WASTE –USED OIL

Table 15: Hazardous waste –Used Oil

Month	Opening Stock	Used Oil Generated	Used Oil Stored	Used Oil Disposed	Closing Stock
Jan-23	00	5.450	5.450	5.450	00
Feb-23	00	6.878	6.878	00	6.878
Mar-23	6.878	7.600	14.478	00	14.478
Apr-23	14.478	8.018	22.496	00	22.496
May-23	22.496	8.880	31.376	00	31.376
Jun-23	31.376	5.821	37.197	00	37.197
TOTAL		**42.647**	**37.197**	**5.450**	**37.197**

NOTE
Unit of measure is tons.

3.1.2 HAZARDOUS WASTE –USED FLUORESCENT TUBES

Table 16: Hazardous waste - Used fluorescent tubes

Month	Opening Stock	Used fluorescent tubes Generated	Used fluorescent tubes Stored	Used fluorescent tubes Disposed	Closing Stock
Jan-23	2617	10	2627	0	2627
Feb-23	2627	14	2641	0	2641
Mar-23	2641	8	2649	0	2649
Apr-23	2649	10	2659	0	2659
May-23	2659	2012	4671	0	4671
Jun-23	4671	12	4683	0	4683
TOTAL		**2066**	**4683**	**0**	**4683**

NOTE
Unit of measure is tons.

3.1.3 HAZARDOUS WASTE –USED BATTERIES

Table 17: Hazardous waste - Used batteries

Month	Opening Stock	Used batteries Generated	Used batteries Stored	Used batteries Disposed	Closing Stock
Jan-23	67	10	10	0	77
Feb-23	77	8	85	0	85
Mar-23	85	4	89	0	89
Apr-23	89	7	96	0	96
May-23	96	7	103	0	103
Jun-23	103	4	107	0	107
TOTAL		**40**	**107**	**0**	**107**

NOTE
Unit of measure is each.

3.1.4 HAZARDOUS WASTE –SPENT GREASE

Table 18: Hazardous waste - Spent grease

Month	Opening Stock	Spent grease Generated	Spent grease Stored	Spent grease Disposed	Closing Stock
Jan-23	0.121	41	41.121	0	41.121
Feb-23	41.121	42	68.121	15	68.121
Mar-23	68.121	12	80.121	0	80.121
Apr-23	80.121	34	114.121	0	114.121
May-23	114.121	44	51.879	210	51.879
Jun-23	51.879	44	95.879	0	95.879
TOTAL		**217**	**95.879**	**225**	**95.879**

NOTE
Unit of measure is tons.

3.1.5 HAZARDOUS WASTE –USED OIL FILTERS

Table 19: Hazardous waste - Used oil filters

Month	Opening Stock	Used oil filters Generated	Used oil filters Stored	Used oil filters Disposed	Closing Stock
Jan-23	54	3	3	2	55
Feb-23	55	6	57	4	57
Mar-23	57	8	61	4	61
Apr-23	61	6	63	4	63
May-23	63	12	69	6	69
Jun-23	69	6	71	4	71
TOTAL		**41**	**71**	**24**	**71**

NOTE
Unit of measure is tons.

3.1.6 HAZARDOUS WASTE – OIL SLUDGE

Table 20: Hazardous waste - Oil sludge

Month	Opening Stock	Oil sludge Generated	Oil sludge Stored	Oil sludge Disposed	Closing Stock
Jan-23	0	22	22	22	0
Feb-23	0	16	16	0	16
Mar-23	16	15	15	0	31
Apr-23	31	14	30	15	30
May-23	30	6	21	15	21
Jun-23	21	6	12	15	12
TOTAL		**79**	**12**	**67**	**12**

NOTE
Unit of measure is tons.

3.1.7 HAZARDOUS WASTE – HYDROCARBON CONTAMINATED SAWDUST

Table 21: Hazardous waste - Hydrocarbon contaminated sawdust

Month	Opening Stock	Hydrocarbon contaminated sawdust Generated	Hydrocarbon contaminated sawdust Stored	Hydrocarbon contaminated sawdust Disposed	Closing Stock
Jan-23	0.443	0.28	0.513	0.210	0.513
Feb-23	0.513	0.17	0.683	0.0	0.683
Mar-23	0.683	0.13	0.813	0.0	0.813
Apr-23	0.813	0.18	0.993	0.0	0.993
May-23	0.993	0.19	0.973	0.210	0.973
Jun-23	0.973	0.28	1.253	0.0	1.253
TOTAL		**0.123**	**1.253**	**0.420**	**0.146**

NOTE
Unit of measure is tons.

3.2 PERSONNEL INVOLVED IN MANAGEMENT OF HAZARDOUS WASTE

Personnel involved in management of hazardous waste underwent medical tests in the review period. The names are presented in **Table 22** below.

Table 22: Personnel involved in the management of hazardous waste

S/N	Name	Mine No.	Department	Date Tested	Medical Centre
				First	
1	Henry Mutwale	33000214	Engineering	19/01/23	KCM – Occupational Health
2	Kafula Mwelwa	AMSL 125	Concentrator	10/01/23	KCM – Occupational Health
3	Mfula Lloyd	33001013	NOP	10/01/23	KCM – Occupational Health

3.3 GENERATION OF HEALTHCARE WASTE

Solid waste from the mine hospitals, including contaminated medical waste, is collected at the hospital, incinerated and the waste ash disposed of at the designated incinerator ash disposal facility which is a concreted below ground pit. The quantities generated are presented in **Table 23** below.

Table 23: Healthcare waste generated

Month	Opening Stock	Clinical Waste Generated			Clinical Waste Stored		Clinical Waste Incinerated	Closing Stock @ Hospital	Ash Opening Stock @ Disposal Site	Ash Generated Jan-Jun 23	Ash Closing Stock @ Disposal Site
		Clinics	Hospital	Total	Clinics	Hospital	Nchanga South Hospital				
Jan-23	-	201	420	621	201	420	621	-	-	55	55
Feb-23	-	180	390	570	180	390	570	-	55	52	107
Mar-23	-	197	468	665	197	468	665	-	107	71	178
Apr-23	-	218	600	818	218	600	818	-	178	66	244
May-23	-	188	576	764	188	576	764	-	244	63	307
Jun-23	-	258	541	799	258	541	799	-	307	74	381
TOTAL		**1,242**	**2,995**	**4,237**	**1,242**	**2,995**	**4,237**	**-**	**Total**	**381**	**381**

NOTE

Unit of measure is Kilograms (kg).

- No Stock

3.3.1 TRANSPORTATION OF HEALTHCARE WASTE

Healthcare waste generated from satellite clinics is transported to the hospital for incineration. There are 6 satellite clinics owned and operated by KCM Nchanga Mine and all were operational in the reporting period. Waste is put in a special container and transported on the back of a van. Hazard warning signage is placed on the container and van during transportation. **Table 24** below presents a summary of the healthcare waste transported. No incidences/accidental spillages relating to the transportation of healthcare waste were recorded in the reporting period.

Table 24: Healthcare waste transported

Month	Source	Quantity	Mode of Transport	Destination	Disposal
Jan-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	201	Waste van	Hospital	Incineration
Feb-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	180	Waste van	Hospital	Incineration
Mar-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	197	Waste van	Hospital	Incineration
Apr-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	218	Waste van	Hospital	Incineration
May-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	188	Waste van	Hospital	Incineration
Jun-23	HC 3, HC 10th street, Lulamba, TLP, NUG and NOP Clinics	258	Waste van	Hospital	Incineration

NOTE

- Unit of measure is tons.
- HC means Health Centre

3.4 GENERATION, TRANSPORTATION AND HANDLING OF EXPIRED CHEMICALS

During the period under review (January – June 2023) there was no generation, transportation and Handling of Expired Chemicals.

4 WASTE MANAGEMENT LICENCE

There are 15 (fifteen) overburden dumps, located around the Nchanga, Chingola, Mimbula and Fitwaola Open Pits.

There are 5 (five) Tailings Dams, two are active, Muntimpa (TD 5) and TD 7 (Emergency Dam); TD 3 is being reclaimed whilst TD 2 and TD 4 are inactive.

Tailings are pumped to the Muntimpa Tailings Dam, which consists of a cross-valley dam built downstream of the confluence of the Muntimpa and Kasompe Streams approximately 12 km south of the Nchanga Mine plant area.

Nchanga Mine has a Pollution Control Dam (PCD) that was built to intercept spillage and plant discharge from the plant area to avoid polluting the Mushishima stream discharging in the Kafue River with mine waste effluents.

4.1 TRANSPORTATION OF WASTE

The tails and overburden from the plant is transported to the dumpsite via pipelines and dump trucks respectively with the supervision of competent personnel. The personnel ensure that no waste other than tails and overburden material is dumped at the dams and dumps respectively. To ensure safety, dump truck operators are provided with appropriate personal protective equipment (PPE).

4.1.1 MUNTIMPA PIPE LINE

All three Muntimpa pipelines are fully upgraded from rubber lined mild steel pipes to HDPE pipes in steel casing.

Daily monitoring of the pipeline is undertaken to ensure that any spillages are identified and dealt with quickly. The Dams team of the Concentrator Department undertakes visual inspections of the entire length of the tailing delivery line. Any spillages detected are immediately reported to the Plant Manager who ensures that the following actions are undertaken:

a) The tailings delivery is switched into the second pipeline, and the damage to the main pipeline is repaired. Once the repairs are complete, use of the main pipeline resumes
b) A clean-up team is dispatched immediately once the spillage has been reported. Spilled tailings are returned to the Tailings Storage Facility (TSF).
c) Monthly inspections to check for deterioration of the pipeline (e.g. corrosion) are undertaken

No instances of spillages/leaks from the pipeline were recorded in the reporting period.

4.2 MANAGEMENT OF WASTE STORAGE FACILITIES

KCM Nchanga Mine has engaged an independent consultant, Knight Piesold, to conduct periodical assessments to ensure safe operating conditions of the Tailing dams and overburden dumps. The last assessment carried out by Knight Piesold was in 2021. Statutory Inspection is scheduled for this financial year and commercial process is in progress to engage competent vendor.

An Internal Dump and Dam Management System is in place that monitors the drainage systems, dump wall stability, timely detection of tension cracks, management of gullies and disposal activities.

In order to prevent illegal entry by unauthorized persons into the tailing dams and dump sites, signage has been erected and the areas are under patrol and surveillance by Mine Security Personnel with reinforcement from State Paramilitary Police, where need be.

4.2.1 TAILINGS DAM STATUS

Table 25 below shows the Tailings monthly disposal and general dam status.

Table 25: Monthly Tailings Disposal and Reclamation

	Tailings Dam	Area (m^2)	Tonnage	Status	Quantities disposed (in tons)					
					Jan-23	Feb-23	Mar-23	April-23	May-23	Jun-23
1	TD 4	887,250	23,531,232	Inactive	-	-	-	-	-	-
2	TD 5	16,780,980	530,417,455	Active	1,051,992	938,766	1,011,155	707,652	703,624	1,004,267
					Quantities reclaimed (in tons)					
3	TD 3	1,325,883	9,000,000	Being Reclaimed	0	0	0	0	0	0
4	PCD	350,000	1,546,299	Being Reclaimed	31,343	69,338	76,298	83,649	89,589	103,484

Note:

- No disposal done.

4.2.2 OVERBURDEN DUMP STATUS

Table 26 below shows the Open Pit monthly disposal and general dump status

Table 26: Monthly Overburden Dump Status

	Overburden Dumps	Area (m2)	Tonnage	Status	Quantities (in tons)					
					Jan-23	Feb-23	Mar-23	April-23	May-23	Jun-23
1	NOP: OB 1(excluding portion owned by Kronos Limited), 2, 16, 20, & 22)	10,017,745	502,771,508	Inactive	502,771,508	502,771,508	502,771,508	502,771,508	502,771,508	502,771,508
2	NOP OB 23	120,956	8,257,716	Inactive	8,257,716	8,257,716	8,257,716	8,257,716	8,257,716	8,257,716
3	COP AC Dumps (OB 27, 4 & 5)	2,188,348	115,481,670	Inactive	115,481,670	115,481,670	115,481,670	115,481,670	115,481,670	115,481,670
4	COP F&D OB 24	546,779	20,260,406	Inactive	20,260,406	20,260,406	20,260,406	20,260,406	20,260,406	20,260,406
5	COP F&D OB 25	455,617	88,633,060	Active	83,701,561	84,385,510	85,246,380	86,386,509	87,481,782	88,633,060
6	COP F&D OB 26	941,674	84,302,50	Inactive	84,302,50	84,302,50	84,302,50	84,302,50	84,302,50	84,302,50
7	Fitwaola North and North East OBs	507,149	35,293,500	Inactive	35,293,500	35,293,500	35,293,500	35,293,500	35,293,500	35,293,500

4.2.3 QUALITY OF GROUNDWATER AS MONITORED IN BOREHOLES AROUND NCHANGA MINE OPERATIONS

Table 27: Groundwater quality (Monthly averages)

Location	pH	Cond.	Copper	Iron	Manganese	Cobalt	Calcium	Magnesium	Sulphate	Total Dissolved Solids	Total Suspended Solids	Turbidity	Hydro - carbon
ENV-1 TD5 Apex	-	-	-	-	-	-	-	-	-	-	-	-	-
ENV-12 TD5 Break tank	6.9	248	1.34	5.95	0.29	0.15	2	3	50	174	81	0.24	-
ENV-21 TD5 BH2	7.2	431	0.35	2.07	0.16	0.14	3	4	17	302	141	1.34	-

Location	pH	Cond.	Copper	Iron	Manganese	Cobalt	Calcium	Magnesium	Sulphate	Total Dissolved Solids	Total Suspended Solids	Turbidity	Hydro - carbon
ENV-22 TD5 BH3	7.2	1041	0.16	0.74	0.04	0.17	2	1	81	729	95	0.94	-
ENV-23 TD5 BH4	7.8	3493.5	0.79	0.18	2.85	0.12	1	1	548	-	121	6.88	-
ENV-23 TD4 ENV-27	6.6	391	0.11	0.02	0.21	0.03	-	-	125	274	2	-	0
ENV-06 TD3/4	6.5	481	0.15	0.02	0.02	0.02	-	-	187	337	1	-	0
ENV-30 TD3 BH2	6.8	296	0.89	0.51	0.11	0.02	-	-	18	207	3	-	0
ENV-26 TD2	7.1	589	0.02	0.84	0.02	0.02	-	-	211	412	3	-	4
ENV7 PCD	6.8	187	0.02	0.43	0.15	0.02	-	-	41	131	2	-	2
ENV-29 PCD BH2	8	349	0.02	1.19	0.05	0.01	0.01	0.02	242	244	26	0.64	-
ENV-11 CRO	5.4	1104	0.26	0.02	0.41	0.02	-	-	670	773	2	-	0
ENV4 Loco Shop	7.8	586	2.13	2	0.04	0.11	1.18	1.43	91	410	99	-	3
ENV-20 Mine Garage	5.8	587.25	2.04	1.30	0.17	0.135	1.605	1.49	114	411	199	-	0.5
ENV-18 Heap Leach Plant	4.6	3173.5	32.19	11.06	9.85	2.14	2.95	1.44	1265	2222	45	6.89	-
ENV-19 Heap Leach Plant	5.4	1567	15.58	3.0725	5.73	1.425	3.09	1.185	805.75	1097	27	2.05	-
ENV-10 Acid offloading bay	3.7	4039	15.13	26.78	7.45	1.88	2.92	2.02	2014	2827	137	-	1.5
ENV-13 Old Tank House	-	-	-	-	-	-	-	-	-	-	-	-	-
ENV-14 Old Tank House	-	-	-	-	-		-	-	-	-	-	-	-
ENV-15 COP F&D	8.4	106	0.06	8.32	3.63	0.08	0.14	0.22	194	74	470	1.47	-
ENV-28 Coke Shade BH	5.1	1077	5.01	0.28	1.53	2.84	3.85	17.84	196	754	2	0.56	-
ENV-09 Concentrator BH	5.0	2423	2.42	0.05	2.07	1.22	4.56	30.64	287	1696	5	1.34	-
ENV-25 Public Health BH	-	-	-	-	-	-	-	-	-	-	-	-	-
ENV-24 Trust school BH	7.0	573	4.82	34.31	0.81	0.17	3.23	16.34	806	401	24	0.99	-
Statutory Limits	**6-9**	**4300**	**1.5**	**2**	**1**	**0.05**	**100**	**500**	**1500**	**100**	**3000**	**#**	**10**

Note:

No limits

- Not recorded due to defective sampling/analysis equipment

5 OZONE DEPLETING SUBSTANCES LICENCE

At Nchanga Mine, ozone depleting substances are used in refrigeration and air conditioning equipment in office buildings, vehicles and at the hospital mortuary.

5.1 HANDLING AND STORAGE OF OZONE DEPLETING SUBSTANCES

Whenever an ODS using unit is being decommissioned or serviced, refrigerants are recovered. During the recovery process, refrigerants are transferred into a cylinder that is empty or that contains the same type of refrigerant. This is always carried out in ways that ensure ODS do not leak into the atmosphere. Only competent personnel are responsible for handling, storage, transportation and disposal of contaminated refrigerants. Tools are available to identify potential leakage points of refrigeration and air conditioning equipment. Hazard and safe working practices for installation, commissioning and handling of refrigerants are also in place.

5.2 PERSONNEL INVOLVED IN MANAGEMENT OF OZONE DEPLETING SUBSTANCES

The following licensed personnel at Nchanga Mine handle and supervise the storage of Ozone Depleting Substances (ODS)

Table 28: Personnel involved in the management of Ozone depleting substances

S/N	Name	Mine No.	Department	Date Tested	Medical Centre
				First	
1	Henry Mutwale	33000214	ENGINEERING	19/01/2023	KCM – Occupational Health
2	Musa Chilufya	33000921	ENGINEERING	19/01/2023	KCM – Occupational Health

Note:
Personnel involved in management of Ozone depleting substances (ODS) underwent medical tests in the review period.

5.3 OZONE DEPLETING SUBSTANCES (ODS) CONSUMPTIONS

Table 29 below provides a summary of the status and usage of ODS at Nchanga Mine.

Table 29: Ozone depleting substances monthly consumption

Month	Ozone depleting substance	Quantity	Ozone Depleting Potential**	Sources of emission/area of usage
Jan	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0.003	0.003	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0.0045	0.0045	Air Conditioners and Refrigeration
	R407c	0	0.000	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration

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Month	Ozone depleting substance	Quantity	Ozone Depleting Potential**	Sources of emission/area of usage
Feb	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0.003	0.003	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0	0.000	Air Conditioners and Refrigeration
	R407c	0	0.000	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration
Mar	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0	0.000	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0.009	0.009	Air Conditioners and Refrigeration
	R407c	0	0.000	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration
April	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0.007	0.007	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0.003	0.003	Air Conditioners and Refrigeration
	R407c	0	0.000	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration
May	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0.007	0.007	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0.007	0.007	Air Conditioners and Refrigeration
	R407c	0.002	0.002	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration
Jun	R12	0	0.000	Air Conditioners and Refrigeration
	R22	0	0.000	Air Conditioners and Refrigeration
	R134a	0	0.000	Air Conditioners and Refrigeration
	R404a	0	0.000	Air Conditioners and Refrigeration
	R410a	0	0.000	Air Conditioners and Refrigeration
	R407c	0	0.000	Air Conditioners and Refrigeration
	R600a	0	0.000	Air Conditioners and Refrigeration
	R290	0	0.000	Air Conditioners and Refrigeration
	R717	0	0.000	Air Conditioners and Refrigeration
	CO2	0	0.000	Air Conditioners and Refrigeration
Total		**0.038**	**0.038**	

NOTE

- Unit of measure is tons.
- Hydrochlorofluorocarbons (HCFCs) are chemical compounds commonly used in the foam, refrigeration, and air conditioning sectors that destroy the protective ozone layer and contribute to climate change. It is essential to reduce and phase out the use of HCFCs in

industry practices. Examples of HCFC being used are R12 and R22 Refrigerant Gas. R12 has been phased out, hence no longer in use.

- There were no refrigerants and oils contamination incidents/accidents that occurred during the period under review.
- Routine inspections of potential leakage points of refrigeration and or air conditioning equipment is carried out by the appointed engineers and promptly repaired and or replaced. There were no potential leakage points of refrigeration and or air conditioning equipment that occurred during the period under review.
- R12 was neither recovered nor recycled during the period under review.

Compiled by:

VRC

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Environmental Coordinator- NSBU

Approved by:

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Environmental Manager- NSBU