Konkola Mineral Resources Ltd

KONKOLA MINE

MMGR/011/80
14th July, 2023

The Director-General,
Zambia Environmental Management Agency,
Corner Church and Suez Road,
P O Box 35131,
LUSAKA.

Attention: **The Client Manager-- Pollution Control**

Dear Sir/Madam,

RE: BI-ANNUAL STATUTORY REPORT FOR KMRL KONKOLA MINE

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, 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/00667/Z16/2014/2**
   - Storage of Pesticides and Toxic Substances – Concentrator, Analytical Services & Public Health
   - Importation of Pesticides and Toxic Substances – Concentrator
   - Fumigation of Pesticides and Toxic Substances – Public Health
   - Blending of Pesticides and Toxic Substances – Public Health

2. **Emission Licence – NDL/EMM/00667/Z16/2014/2**
   - Discharge of Effluent – Combined Discharge Point No. 209
   - Discharge of Effluent – Lubengele Tailings Dam Overflow Discharge Point No. 208
   - Discharge of Effluent – Engineering Workshops Discharge Point No. 225
   - Emission of Air Pollutants at Incinerator – Mine Hospital
   - Emission of Air Pollutants at Diesel Generator Set No. 1, 2 and 3 – Power Plant

3. **Hazardous Waste Licence – NDL/LHWM/00667/Z10/2014/2**
   - Generation of Used Oil, Fluorescent Tubes and Batteries – Engineering Services, Shaft 1 & 3
   - Storage of Used Oil, Fluorescent Tubes and Batteries – Engineering Services, Shaft 1 and 3
   - Generation and Storage of Healthcare Waste – Health Centre No. 1, 4, 5 and Mine Hospital
   - Transportation of Healthcare Waste
   - Generation, Transportation and Handling of Expired Chemicals

4. **Waste Management Licence – NDL/WM/00667/Z10/2014/2**
    - Own and operate Lubengele Tailings Dam – Concentrator
    - Own and operate Waste Rock Dump A and B – Shaft 1 and 3 Respectively
    - Transportation of Tailings by Pipeline – Concentrator
    - Transportation of Overburden Material/Waste Rock by road – Shaft 1 & 3

5. **Ozone Depleting Substances Licence – NDL/ODS/00667/Z10/2014/2**
    - Handling of ozone depleting substances (ODS) – Engineering Services

We thank you for your continued support.

Yours faithfully,

JOHN LUKAKI
MANAGER/HOLDER

CC Manager ZEMA – Northern Region

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

BI-ANNUAL REPORT TO THE ZAMBIA ENVIRONDENTAL MANAGEMENT AGENCY (ZEMA) FOR THE PERIOD JANUARY TO JUNE 2023

PART 1: The Environmental Management (Licensing) Regulations, 2013

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

1.1 Reagents – Processing

The main reagents at Konkola Mine are used in the concentrator and they include Xanthate, Sodium hydrosulphide and Frother. The reagents are used in the processing of copper ore to produce copper concentrates. In order to prevent pollution and other health hazards associated with these substances, Konkola 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 1 below.

Fig.1: Concentrator Plant

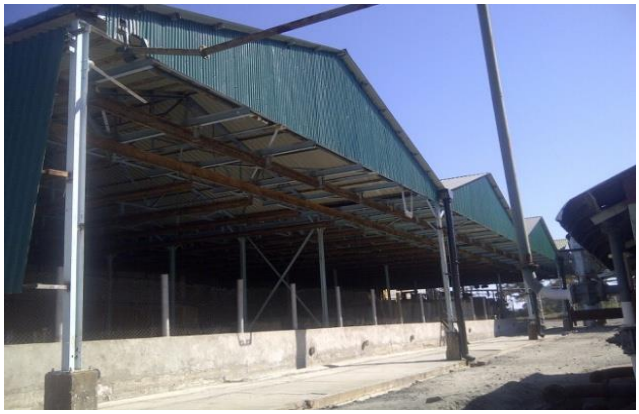


Fig.2: Reagents Storage Shed

Table 1: Process Reagents

S/n	Name	Closing Stock	Opening Stock	From Sister Units	Imported	Stored	Used	Closing Stock	Source	Transporter
		31-Dec 22	1-Jan 23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun		
1	Sodium Hydrosulphide, solid (NaHS)	18,650	18,650	-	106,700		57,550	67,800	Tianjin Forever International Ltd– China	C Steinweg – Durban
2	Sodium Isopropyl Xanthate (SIPX)	-	-	-	35,500		10,000	25,500	TC China (Charles Tennant Mining Chemical)- China	C Steinweg - Durban
3	Betafroth FZK 245, liquid (Frother)	24,000	24,000	-	30,000		41,000	13,000	Betachem Pty Ltd – South Africa	C Steinweg - Durban
4	Flex 1	3,600	3,600	-	72,000		34,950	40,650	Betachem Pty Ltd – South Africa	C Steinweg - Durban

Table 1 Cont.

S/n	Chemical Name	Source	Transporter	Description Of Storage Facility	Emergency Equipment Available
1	Sodium Hydrosulphide, solid (NaHS)	Tianjin Forever International Ltd– China	C Steinweg – Durban	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	Sodium Isopropyl Xanthate (SIPX)	TC China (Charles Tennant Mining Chemical)- China	C Steinweg – Durban	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

3	Betafroth FZK 245, liquid (Frother)	Betachem Pty Ltd – South Africa	C Steinweg – Durban	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
4	Flexs 1	Betachem Pty Ltd – South Africa	C Steinweg – Durban	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

NOTE

- Unit of measure is tons
- 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.

1.1.2 Importation – All process reagents are imported. Importation of the reagents only takes place once in a year for reagent 1 and 2 while reagent 3 is imported twice. Table 2 below provides a summary of the imported reagents, the source and the transporter (C Steinweg Bridge (Pty) Ltd – 151 South Coast Road, Rossburgh Durban) for the reporting period.

Table 2: Imported Reagents

S/n	Name	Closing Stock	Opening Stock	From Sister Units	Imported	Stored	Used	Closing Stock	Source	Transporter
		31-Dec 22	1-Jan 23	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun		
1	Sodium Hydrosulphide, solid (NaHS)	18,650	18,650		106,700		57,550	67,800	Tianjin Forever International Ltd– China	C Steinweg – Durban
2	Sodium Isopropyl Xanthate (SIPX)	-	-		35,500		10,000	25,500	TC China (Charles Tennant Mining Chemical)- China	C Steinweg - Durban
3	Betafroth FZK 245, liquid (Frother)	24,000	24,000		30,000		41,000	13,000	Betachem Pty Ltd – South Africa	C Steinweg - Durban
4	Flex 1	3,600	3,600	-	72,000		34,950	40,650	Betachem Pty Ltd – South Africa	C Steinweg - Durban

NOTE

- Unit of measure is tons

1.2 Reagents - Analytical

The analytical facilities at the mine include an assay laboratory, facilities for the analysis of selected water samples and the hospital laboratory. Table 3 below provides a summary of the chemical reagents that were stored and used in the period under review:

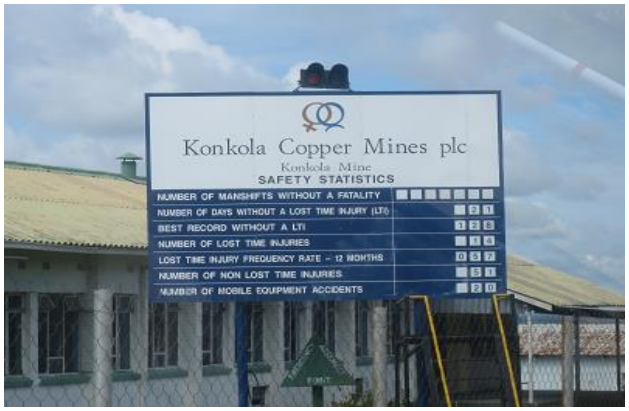


Fig.3: Analytical Services Laboratory

Fig.4: Reagent Storage Facility

Table 3: Analytical Reagents

S/n	Name	UoM	Closing Stock	Opening Stock	To Sister Units	From Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source
			Dec-22	Jan-23	Jan - June 2023	Jan - June 2023	Jan - June 2023	Jan - June 2023	Jan - June 2023	Jun-23	
1	CHEMICAL,AMMONIUM CHLORIDE,PROCESS	KG	202	202	0	0	0	0	0	202	**NCHANGA MINE**
2	CHEMICAL,AMMONIUM ACETATE	GM	18000	18000	0	0	0	0	0	18000	**MICIL INVESTMENTS LTD**
3	CHEMICAL,AMMONIUM NITRATE,500 GM	GM	1	1	0	0	0	0	0	1	**PHISHAGEN CHEM & SCI SUPPL LTD**
4	CHEMICAL,DIETHYL-P-PHENYLENE DIAMINE	EA	5	5	0	0	0	0	0	5	**Old Stock (No record)**
5	CHEMICAL,HYDROXYAMMONIUM CHLORIDE,500 G	GM	7000	7000	0	0	0	0	0	7000	**Old Stock (No record)**
6	CHEMICAL,ORTHOPHOSPHORIC ACID,REAGENT	EA	25	25	0	0	0	0	0	25	**NCHANGA MINE**

7	chemical, perchloric acid,process,2.5 ltr	L	50	50	0	0	0	50	50	0	MICIL INVESTMENTS LTD
8	chemical, potassium chloride, 500 g	KG	0	0	0	0	100	100	100	0	**Old Stock (No record)**
9	chemical, potassium iodide,reagent,500 g	GM	0	0	0	0	15000	15000	15000	0	OCTAHEDRON ENTERPRISES LTD
10	chemical, sodium sulphite,anhydrous	GM	0	0	0	0	10000	10000	10000	0	PHISHA GEN CHEM & SCI SUPPL LTD
11	chemical, zinc,laboratory,500 g	KG	1	1	0	0	0	1	0	1	OCTAHEDRON ENTERPRISES LTD

NOTE

- 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 consists of PVC Apron, gloves, gas mask, broom, container of absorbent (sawdust/sand), dust pan/spade, empty container for collecting cleaned material.

1.3 Pesticides – Health and Sanitation

KMRL-Konkola 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 4 below provides a summary of the pesticides usage and quantities in stock. No pesticides and toxic substances were stored at Konkola storage facility in the reporting period as the facility was temporarily suspended for use and rehabilitation works have just been completed. During the period under review, all substances used were collected from Nchanga Public Health Centre and used upon demand.

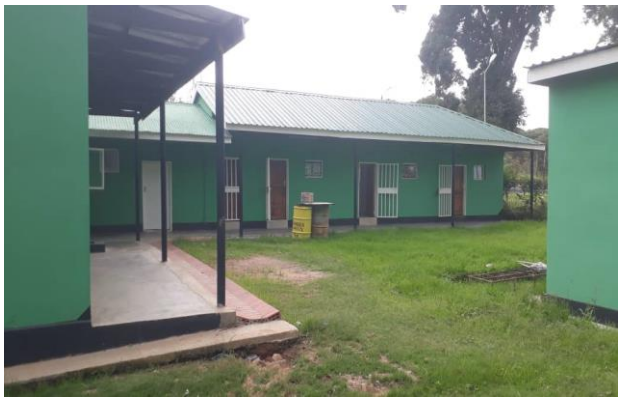


Fig.5: Public Health Centre

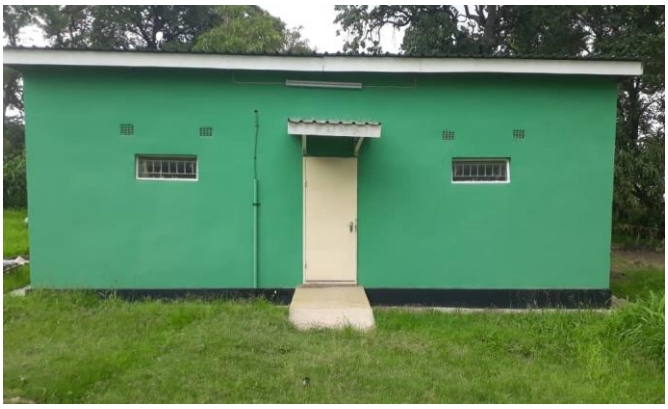


Fig.6: Pesticides Storage Facility

Table 4: Pesticides and Toxic Substances

S/n	Chemical Name	Closing Stock	Opening Stock	To/from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source
		31-Dec	31-Jan	31-Jan	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	
1	Reskol (Litres)	0	0	0	0	0	0	0	Afrizet Zambia Ltd
2	Pynol (Litres)	0	160	160	0	160	100	60	Afrizet Zambia Ltd

NOTE

- 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.

1.3.1 **Fumigation** –A summary of the quantities of the pesticides and toxic substances used in the reporting period is provided in Table 5, and the medical records of personnel involved in the handling of these substances is provided are Table 6 below.

Table 5: Pesticides and Toxic Substances used in fumigation

S/n	Name	Closing Stock	Opening Stock	To/from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source
		31-Dec	31-Jan	31-Jan	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	
1	Reskol (Litres)	0	0	0	0	0	0	0	Afrizet Zambia Ltd
2	Pynol (Litres)	0	160	160	0	160	100	60	Afrizet Zambia Ltd

Table 6: Personnel involved in fumigation of Pesticides and Toxic Substances

S/n	Name	Mine No.	Date Tested	Medical Centre
1	Bangwa Jonathan	22000706	22.03.2023	Konkola Mine Hospital – Occupational Health
2	Simpungwe Michael	22001429	02.02.2023	Konkola Mine Hospital – Occupational Health

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

Blending –A summary of the quantities of the pesticides and toxic substances used in blending for the reporting period is provided in Table 7, and the medical records of personnel involved in the handling of these substances are provided in Table 8 below.

Table 7: Pesticides and Toxic Substances used in blending

S/n	Name	Closing Stock	Opening Stock	To/from Sister Units	Quantity Procured	Quantity Stored	Quantity Used	Closing Stock	Source
		31-Dec	31-Jan	31-Jan	Jan-Jun	Jan-Jun	Jan-Jun	Jan-Jun	
1	Reskol (Litres)	0	0	0	0	0	0	0	Afrizet Zambia Ltd
2	Pynol (Litres)	0	160	160	0	160	100	60	Afrizet Zambia Ltd

Table 8: Personnel involved in blending of Pesticides and Toxic Substances

S/n	Name	Mine No.	Date Tested	Medical Centre
1	Bangwa Jonathan	22000706	22.03.2023	Konkola Mine Hospital – Occupational Health
2	Simpungwe Michael	22001429	02.02.2023	Konkola Mine Hospital – Occupational Health

NB: 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

PART 2: The Environmental Management (Licensing) Regulations, 2013

2. EMISSION LICENCE (EFFLUENT DISCHARGE, Regulation 4)

In order to prevent effluent through our three licenced discharge points from polluting the environment, Konkola mine uses various management and engineering controls. At Konkola, the most significant environmental actions aim at reducing and controlling spillage and leaks from a process control basis. Operational controls are continually improved through internal and external audits; containment areas are constructed and maintained; ponds, containment areas and drains are regularly cleaned out to remove accumulated debris; worn and leaky pipelines are replaced; 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, includes actions required to prevent pollutants from entering discharges from the mine and hence the environment. Clean-up actions are also addressed. KCM is committed to not only meeting the limits set by Zambian Regulations but 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 licenced drains as monitored in the reporting period.

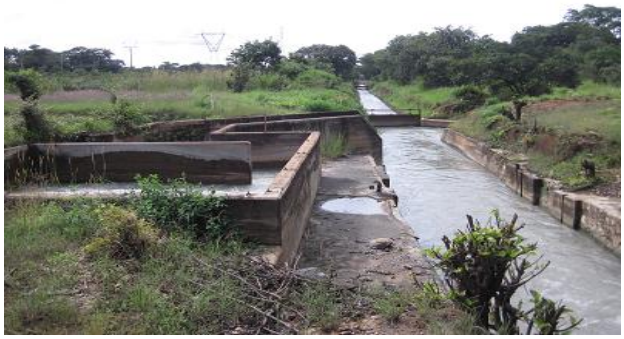


Fig.7: Combined Drain

Fig.8: Pipe Columns from Underground

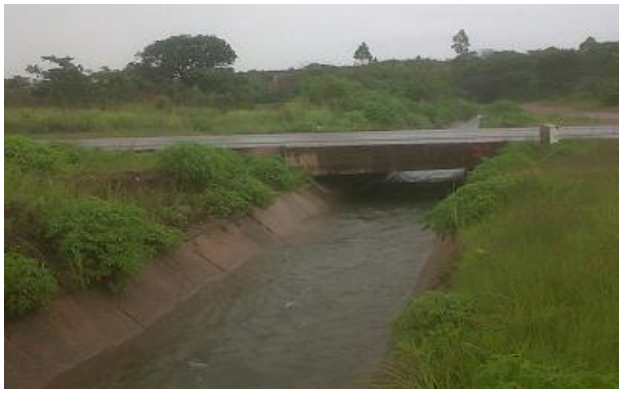


Fig.9: Lubengele Tailings Dam Overflow

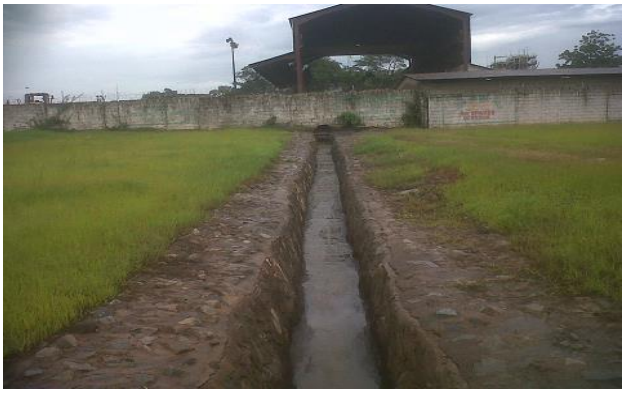


Fig.10: Engineering Workshops Drain

2.1. UNDERGROUND AND PLANT OVERFLOW INTO KAKOSA STREAM – COMBINED DISCHARGE POINT No. 209.

Konkola Mine is one of the wettest mining operations in the world, and for the safe operation of the underground workings, it is necessary to pump approximately 350, 000m³/day of groundwater from the mine. This amounts to a continuous flow of approximately 4.1m³/s, which is ultimately discharged into the Kafue River.

In order to dewater the Konkola underground mining operations, water is pumped from underground via the following multiple pipes:

- Two 500 mm (16") diameter pipes (new and old) and one 600 mm (20") diameter pipe which provide the process water for the concentrator plant
- One 1200 mm (48") diameter pipe, which discharges directly to the environment
- One 200 mm (8") diameter pipe, which discharges directly to the environment
- One 600 mm (20") diameter pipe, which is treated in sedimentation ponds for domestic water use
- One 200 mm (8") diameter pipe, which is treated in sedimentation ponds before discharge to the environment
- One 200 mm (8") diameter pipe, which is treated in a 250ft thickener before discharge to the environment
- Four 500 mm (16") diameter pipes, which discharges directly to the environment

Konkola mine has a total of 20 settlers underground, 5 Settlers on 1850ft level at Shaft 3, 5 Settlers on 2212ft level at Shaft 1, 4 Settlers on 1150ft level at Shaft 1 and 6 Settlers on 3150ft level at Shaft 1. The settlers are 20m deep and 12m wide. On surface, there are 5 Settlers in which part of the water from underground and concentrator dewatering activities is further treated prior to discharge. Table 9 below provides a summary of the monitoring results for the combined drain in the reporting period. Details of related incidents and causes are provided in table 14.

Table 9: Underground and Plant combined effluent monitoring results (Monthly averages)

MONTH	FLOW RATE (m^3/day)	pH	Cond	TSS	TDS	TCu	TFe	TMn	TCo	TPb
January	337274.00	7.39	NR	30.25	NR	0.39	0.27	0.04	0.07	0.08
February	365935.00	7.28	NR	32.25	NR	0.99	0.84	<0.01	0.05	0.03
March	335771.00	7.26	453.00	42.75	226.00	0.61	0.88	0.15	0.03	0.25
April	330723.25	7.33	873.50	47.00	436.00	1.04	0.59	0.52	0.03	<0.01
May	345378.00	7.35	457.75	20.50	228.50	0.52	0.44	0.06	0.04	<0.01
June	NR	7.34	411.50	18.50	233.75	0.41	0.81	0.03	0.14	<0.01
Average	**343016.30**	**7.33**	**548.94**	**31.88**	**281.06**	**0.66**	**0.64**	**0.16**	**0.06**	**0.12**
Statutory Limit	***ND***	***6.0 - 9.0***	***4300***	***100***	***3000***	***1.50***	***2.00***	***1.00***	***1.00***	***0.50***

Table 9 Cont.

MONTH	TCd	Hg	TAs	TCa	TMg	DSO_4	BOD	COD	DO_2	NO_4
January	<0.01	<0.01	<0.01	37.94	10.71	NR	6.40	13.20	5.80	<0.01
February	<0.01	<0.01	<0.01	44.48	17.67	69.56	5.20	11.20	7.20	2.31
March	<0.01	<0.01	<0.01	36.39	16.45	158.97	12.00	9.80	6.00	2.31
April	<0.01	<0.01	<0.01	38.46	15.15	22.64	3.80	<0.01	7.80	<0.01
May	<0.01	<0.01	<0.01	43.91	16.66	NR	10.20	23.20	7.60	<0.01
June	<0.01	<0.01	<0.01	41.23	17.11	NR	16	0.7	3.7	<0.01
Average	**<0.01**	**<0.01**	**<0.01**	**40.40**	**15.63**	**83.72**	**8.93**	**11.62**	**6.35**	**2.31**
Statutory Limit	***0.500***	***0.002***	***0.05***	***100***	***500***	***1500***	***50***	***90.0***	***5.00***	***50.0***

Table 9 Cont.

MONTH	NO_3	NH_4	PO_4	Cl	Ur	Temp	Turb	Color	Oil	TC
January	0.48	40.00	0.06	22.64	0.03	23.25	5.15	0.72	<0.01	<0.01
February	<0.01	<0.01	0.05	28.64	<0.01	24.45	13.76	1.08	<0.01	<0.01
March	0.44	<0.01	0.04	26.20	<0.01	23.28	13.06	0.94	0.02	0.01
April	0.36	<0.01	0.04	31.36	<0.01	22.50	24.26	4.28	<0.01	<0.01
May	0.36	<0.01	0.04	31.36	<0.01	21.78	7.74	1.28	<0.01	<0.01
June	0.68	<0.01	0.04	28.26	<0.01	20.70	5.60	1.22	<0.01	<0.01
Average	**0.46**	**40.00**	**0.05**	**28.08**	**0.03**	**22.66**	**11.59**	**1.59**	**0.02**	**0.01**
Statutory Limit	***2.00***	***50.00***	***6.00***	***800***	***0.03***	***40.0***	***15.0***	***20.0***	***5.00***	***10.00***

NOTE

- Analyses are in mg/l except pH, Conductivity (µS/cm), Temperature (ºC), Turbidity and Colour.
- ND means not defined
- NR mean not analysed due to faulty/unavailable equipment

2.2. LUBENGELE TAILINGS DAM OVERFLOW INTO LUBENGELE STREAM – DISCHARGE POINT No. 208.

The tailings from the existing concentrator are presently pumped to the Lubengele Tailings Disposal Facility. Overflow from the tailings dam is conveyed to the discharge point through the spillway. Accordingly, samples of discharge water are collected from the concrete channel downstream of the tailings facility (Discharge point 208). Table 10 below provides a summary of the monitoring results for the tailings dam overflow in the reporting period. Details of related incidents and causes are provided in table 14.

Table 10: Tailings Dam Overflow monitoring results (Monthly averages)

MONTH	FLOW RATE (m^3/day)	pH	Cond	TSS	TDS	TCu	TFe	TMn	TCo	TPb
January	338428.00	7.25	NR	7.00	NR	<0.01	0.14	<0.01	<0.01	<0.01
February	128431.00	7.31	NR	6.00	NR	<0.01	0.38	<0.01	<0.01	<0.01
March	235201.00	7.27	232.00	7.50	117.00	<0.01	0.89	0.07	<0.01	0.03
April	174706.00	7.32	431.00	9.00	214.50	<0.01	0.38	0.11	<0.01	<0.01
May	49775.00	7.53	232.25	15.75	115.75	0.05	0.38	0.03	0.01	<0.01
June	19654.00	7.48	241.25	14	120.25	0.09	1.63	0.01	0.09	<0.01
Average	**157699.17**	**7.36**	**284.13**	**9.88**	**141.88**	**0.05**	**0.63**	**0.05**	**0.05**	**0.03**
Statutory Limit	***ND***	***6.0 - 9.0***	***4300***	***100***	***3000***	***1.50***	***2.00***	***1.00***	***1.00***	***0.50***

Table 10: Cont.

MONTH	TCd	Hg	TAs	TCa	TMg	DSO_4	BOD	COD	DO_2	NO_4
January	<0.01	<0.01	<0.01	27.09	7.93	NR	7.20	10.40	6.20	<0.01
February	<0.01	<0.01	<0.01	14.59	8.66	101.25	8.80	18.60	6.70	0.24
March	<0.01	<0.01	<0.01	14.04	4.48	102.17	11.00	8.20	7.30	0.24
April	<0.01	<0.01	<0.01	30.03	5.98	23.56	4.20	10.40	7.60	<0.01
May	<0.01	<0.01	<0.01	35.97	4.84	NR	8.00	22.50	7.80	<0.01
June	<0.01	<0.01	<0.01	8.65	7.19	NR	15.00	1.70	4.00	<0.01
Average	**0.01**	**0.01**	**0.01**	**21.73**	**6.51**	**75.66**	**9.03**	**11.97**	**6.6**	**0.24**
Statutory Limit	***0.50***	***0.002***	***0.05***	***100***	***500***	***1500***	***50***	***90.0***	***5.00***	***50.00***

Table 10: Cont.

MONTH	NO_3	NH_4	PO_4	Cl	Ur	Temp	Turb	Color	Oil	TC
January	0.23	11.00	0.03	26.00	0.02	24.90	10.90	0.22	<0.01	<0.01
February	<0.01	<0.01	0.03	13.24	<0.01	24.40	10.50	64.00	<0.01	<0.01
March	0.42	<0.01	0.04	8.61	<0.01	23.08	9.79	1.10	0.02	0.01
April	0.11	<0.01	0.02	7.56	<0.01	22.63	7.13	0.86	<0.01	<0.01
May	0.11	<0.01	0.02	7.56	<0.01	21.73	7.25	1.24	<0.01	<0.01
June	0.09	<0.01	0.02	6.52	<0.01	20.58	7.56	1.28	<0.01	<0.01
Average	**0.19**	**11.00**	**0.03**	**11.58**	**0.02**	**22.89**	**8.85**	**11.45**	**0.02**	**0.01**
Statutory Limit	***2.00***	***50.00***	***6.00***	***800***	***0.03***	***40.0***	***15.0***	***20.0***	***5.00***	***10.00***

NOTE

- Analyses are in mg/l except pH, Conductivity (µS/cm), Temperature (°C), Turbidity and Colour.
- ND mean not defined/minimal flow
- NF mean no flow
- MF mean Minimal flow
- NR mean not analysed due to faulty/unavailable equipment

2.3. ENGINEERING WORKSHOP OVERFLOW INTO LUBENGELE STREAM – DISCHARGE POINT No. 225.

Routine service, repair and overhauls of equipment as well as cleaning of fuelling facilities require the use of water to a limited extent. Accordingly, samples of discharge water are collected from the concrete channel downstream of the central workshops on surface workshops at Engineering Services (Discharge point 225). Table 11 below provides a summary of the monitoring results for the engineering workshops overflow in the reporting period. Details of related incidents and causes are provided in table 14.

Table 11: Engineering Workshops Overflow monitoring results (Monthly averages)

MONTH	FLOW RATE (m^3/day)	pH	Cond	TSS	TDS	TCu	TFe	TMn	TCo	TPb
January	320.00	6.89	NR	12.25	NR	0.08	0.20	0.13	0.00	0.14
February	290.00	6.77	NR	22.25	NR	0.19	0.83	0.22	<0.01	0.05
March	287.00	6.84	193.50	17.25	97.00	0.13	1.05	0.15	<0.01	0.01
April	285.00	6.47	514.00	37.25	258.00	0.21	0.85	0.37	<0.01	<0.01
May	225.00	6.69	329.50	41.50	165.50	0.11	0.81	0.24	0.04	<0.01
June	220.00	6.58	541.50	24.25	272.25	0.4175	1.885	0.2	0.1275	<0.01
Average	**271.17**	**6.71**	**394.63**	**25.79**	**198.19**	**0.19**	**0.94**	**0.22**	**0.06**	**0.07**
Statutory Limit	***ND***	***6.0 - 9.0***	***4300***	***100***	***3000***	***1.50***	***2.00***	***1.00***	***1.00***	***0.50***

Table 11 Cont.

MONTH	TCd	Hg	TAs	TCa	TMg	DSO_4	BOD	COD	DO_2	NO_4
January	<0.01	<0.01	<0.01	27.46	9.28	NR	41.20	76.00	2.60	<0.01
February	<0.01	<0.01	<0.01	28.66	9.64	45.68	38.00	64.30	2.20	2.78
March	<0.01	<0.01	<0.01	46.23	9.71	267.42	13.80	21.80	5.60	2.78
April	<0.01	<0.01	<0.01	30.78	6.60	17.39	4.10	8.42	7.50	<0.01
May	<0.01	<0.01	<0.01	69.15	17.23	NR	14.60	25.00	7.50	<0.01
June	<0.01	<0.01	<0.01	39.55	17.86	NR	14.6	1.70	4.20	<0.01
Average	**<0.01**	**<0.01**	**<0.01**	**40.31**	**11.72**	**110.16**	**21.05**	**32.87**	**4.93**	**2.78**
Statutory Limit	***0.50***	***0.002***	***0.05***	***100***	***500***	***1500***	***50***	***90.0***	***5.0***	***50.00***

Table 11 Cont.

MONTH	NO_3	NH_4	PO_4	Cl	Ur	Tem	Turb	Color	Oil	TC
January	0.54	31.00	0.21	39.40	0.02	23.28	3.37	1.50	<0.01	<0.01
February	<0.01	<0.01	0.04	14.62	<0.01	24.43	20.12	1.47	<0.01	<0.01
March	0.54	<0.01	0.13	33.45	<0.01	23.23	13.56	0.41	<0.01	0.02
April	0.21	<0.01	0.06	18.63	<0.01	22.60	7.80	2.03	<0.01	<0.01
May	0.21	<0.01	0.06	18.63	<0.01	21.80	12.49	2.03	<0.01	<0.01
June	0.42	<0.01	0.06	16.52	<0.01	20.45	51.30	1.87	<0.01	<0.01
Average	**0.38**	**31**	**0.09**	**23.54**	**0.02**	**22.63**	**18.12**	**1.55**	**<0.01**	**0.02**
Statutory Limit	***2.00***	***50.0***	***6.00***	***800***	***0.03***	***40.0***	***15.0***	***20.0***	***5.00***	***10.00***

NOTE

- Analyses are in mg/l except pH, Conductivity (µS/cm), Temperature (°C), Turbidity and Colour.
- ND mean not defined/minimal flow

PART 3: The Environmental Management (Licensing) Regulations, 2013

3. EMISSION LICENCE (EMISSION TO AIR, Regulation 4)

The permits to emit air pollutants at Konkola Mine relates to the operations of the incinerator at Konkola Mine Hospital and the Emergency Diesel Generators at KDMP (4 Shaft). In order to comply with the general requirements of The Environmental Management (Licensing) Regulations, 2013, Konkola mine has engaged Tibon Environmental Solutions to monitor emissions from the stacks.

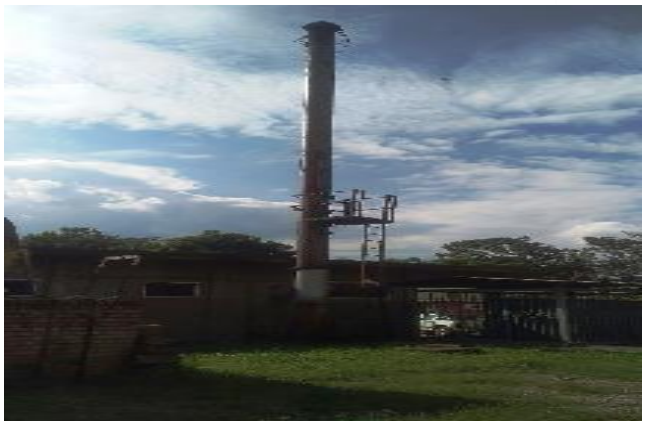


Fig.11: Hospital Incinerator Stack

Fig.12: Diesel Generator Stacks

3.1 Emissions To Air – Hospital Incinerator Stack

- Solid waste from the mine hospital, 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.

Month	Rate (Nm3/Hr)	Dust	CO	SO_2	NO_x	Hg	Cu	Cd	Pb
January	1153.87	47.62	99.56	15.24	19.19	0.000047	0.2943	0.0043	0.1719
February	1115.27	44.18	77.48	23.82	31.68	0.000088	0.2730	0.0046	0.1101
March	1262.10	39.74	87.48	5.72	24.54	0.000079	0.3089	0.0029	0.1268
April	1259.15	46.19	83.31	6.67	28.56	0.000092	0.4259	0.0041	0.1335
May	1140.09	38.99	51.24	16.20	17.40	0.000078	0.4082	0.0045	0.0952
June	1130.98	43.38	34.57	8.57	21.87	0.000086	0.6271	0.0041	0.1816
Average	**1176.91**	**43.35**	**72.27**	**12.70**	**23.87**	**0.000078**	**0.39**	**0.004**	**0.1365**
Statutory Limit	***ND***	***50***	***100***	***850***	***460***	***0.05***	***1***	***0.05***	***0.2***

3.2 Emissions To Air – Diesel Generator Stacks

The diesel generators were installed to provide power required for ventilation, man riding and pumping in an emergency. Table 13 below provides a summary of the monitoring results for the stacks. Details of related incidents and causes are provided in table 14.

Table 13: DG Set stack monitoring results

MONTH	Stack 1				Stack 2				Stack 3			
	Rate (Nm3/H)	Dust	CO	SO_2	Rate (Nm3/H)	Dust	CO	SO_2	Rate (Nm3/H)	Dust	CO	SO_2
January	26054.95	44.31	98.31	69.55	27776.06	46.07	108.72	29.53	NS			
February	28835.28	41.81	98.73	51.45	30498.23	47.71	99.56	46.68	30930.26	42.02	91.64	75.26
March	28494.05	39.36	84.98	67.64	29910.51	46.33	101.64	66.69	29276.58	44.85	98.31	68.60
April	32206.8	41.04	89.56	34.47	28275.66	43.64	97.06	68.60	30936.45	44.29	97.89	74.31
May	32206.81	38.19	89.56	67.64	28325.24	40.88	87.06	55.26	28937.98	42.39	89.14	35.25
June	32225.03	37.76	75.40	45.73	30097.40	42.25	98.31	49.54	30706.13	39.91	87.89	30.49
Average	**30003.82**	**40.41**	**89.42**	**56.08**	**29147.18**	**44.48**	**98.73**	**52.72**	**29388.62**	**42.69**	**92.97**	**56.78**
Stat Limit	***ND***	***50***	***100***	***850***	***ND***	***50***	***100***	***850***	***ND***	***50***	***100***	***850***

NOTE

- Unit of measure is mg/Nm3.
- NS mean not sampled due to equipment being offline during the reporting period.

INCIDENTS RECORDED:

Table 14: Emission related incidents

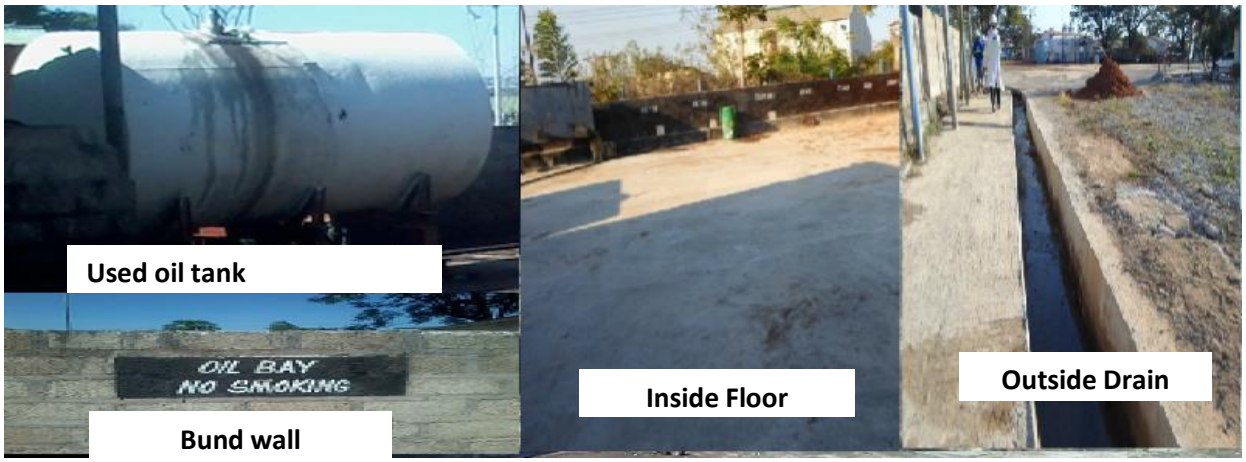
Date	Purpose of Operation	Details of Noncompliance	Cause	Corrective/Preventive Measures	Current Status
January-May 2023	Waste disposal/ Tailings Dam Station (208)	Dissolved Oxygen (DO) was above the statutory limit at the Tailings dam overflow- 208: January(6.20mg/l), February (6.0mg/l), March (7.3mg/l), April (7.6mg/l), May (7.8mg/l) against 5.00mg/l)	Natural Occurrence	N/A	Effective implementation of water pollution controls is ongoing

February-May 2023	Underground Dewatering (209)	Dissolved Oxygen (DO) was above the statutory limit at the Combined Drain 209: February (7.20mg/l), March (6.0mg/l) and April (7.8mg/l), May (7.6) against 5.00mg/l)	Natural Occurrence	N/A	Effective implementation of water pollution controls is ongoing
April and May	Equipment maintenance and repair (225)	Dissolved Oxygen (DO) was above the statutory limit at the Engineering Drain 225: April (7.5mg/l) and May (7.5mg/l) against (5.00mg/l)	Natural Occurrence	N/A	Effective implementation of water pollution controls is ongoing
April	Underground Dewatering (209)	Turbidity was above the statutory limit at Combined Drain-209: in April (24.26) against (15)	Contaminated material from the immediate surroundings was washed/carried over into the drain.	Effective implementation of water pollution control procedure (KMRL-EP-01).	On-going
January and June	Equipment maintenance and repair (225)	Turbidity was above the statutory limit at Engineering Drain-225, (20.12) in January, (51.3) in June against (15).	Contaminated material from the immediate surroundings was washed/carried over into the drain.	Effective implementation of water pollution control procedure (KMRL-EP-01).	On-going

PART 4: The Environmental Management (Licensing) Regulations, 2013

4. HAZARDOUS WASTE LICENCE (GENERATION AND STORAGE, Regulation 19)

The plant generates hazardous waste namely; waste oil, used fluorescent tubes and used batteries. Waste oil is stored on constructed bays with impervious floors and bund walls and eventually reused at Nchanga Smelter as fuel. Spent fluorescent tubes are stored within the plant premises in fabricated storage drums while batteries are stored in the hazardous materials store before it is disposed of through recycling/reuse contractors. The quantities generated are presented in table 15 below.



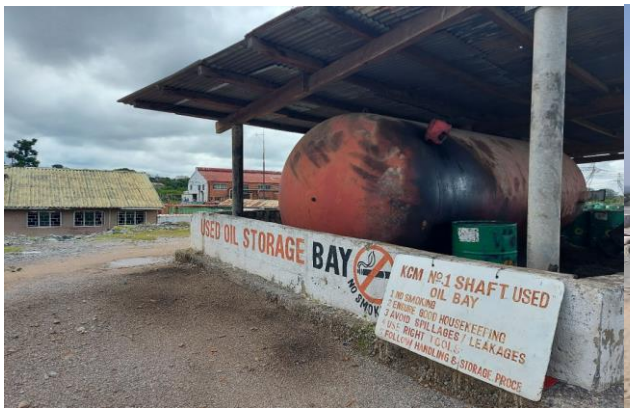


Fig.14: Used Oil Store – Shaft 1

Fig.15: Used Batteries and Fluorescent Tubes Store – Salvage Yard

4.1 HAZARDOUS WASTE GENERATED, STORED AND DISPOSED

Table 15 (a): Hazardous waste

Month	Opening Stock	Used Oil Generated				Used Oil Stored			Used Oil Disposed	Closing Stock
		Eng.	Shaft 1	Shaft 3	Total	Shaft 1	Shaft 3	Total	Konkola	
Dec-22	484.609	0	6.3	12.51	18.81	6.3	12.51	503.419	11.43	491.989
Jan-23	491.991	0	7.98	5.88	13.86	7.98	5.88	505.851	12.12	493.731
Feb-23	411.381	0	18.96	4.83	23.79	18.96	4.83	435.171	9.86	425.311
Mar-23	433.181	0	8.7	5.46	14.16	8.7	5.46	447.341	14.45	432.891
Apr-23	440.961	0	12.03	6.3	18.33	12.03	6.3	459.291	13.07	446.221
May-23	463.881	0	11.4	5.88	17.28	11.4	5.88	481.161	9.69	471.471
Jun-23	484.609	0	4.2	5.46	9.66	4.2	5.46	494.269	10.71	483.559
TOTAL	**3210.613**	**0**	**69.57**	**46.32**	**115.89**	**69.57**	**46.32**	**3326.503**	**81.33**	**3245.173**

NOTE

Unit of measure is tons.

Table 15 (b): Hazardous waste

Month	Opening Stock	Used Batteries Generated				Used Batteries Stored			Used Batteries Disposed	Closing Stock
		Eng.	Shaft 1	Shaft 3	Total	Shaft 1	Shaft 3	Total	Konkola	
Dec-22	10.16	0	0	0	0	0	0.00	10.16	0.00	10.16
Jan-23	10.16	0	0	0.00	0.00	0	0.00	10.16	0.00	10.16
Feb-23	10.16	0	0	0.00	0.00	0	0.00	10.16	0.00	10.16
Mar-23	10.16	0	0	0.00	0.00	0	0.00	10.16	0.00	10.16
Apr-23	10.16	0	0	0.60	0.60	0	0.06	10.22	0.06	10.16
May-23	10.16	0	0	0.60	0.60	0	0.06	10.28	0.06	10.16
Jun-23	10.16	0	0	0.06	0.06	0	0.06	10.34	0.06	10.16
TOTAL	**71.12**	**0**	**0**	**1.26**	**1.26**	**0**	**0.18**	**71.48**	**0.18**	**71.12**

NOTE

Unit of measure is tons.

Table 15 (c): Hazardous waste

Month	Opening Stock	Used Fluorescent Tubes Generated				Used Fluorescent Tubes Stored			Used Fluorescent Tubes Disposed	Closing Stock
		Eng.	Shaft 1	Shaft 3	Total	Shaft 1	Shaft 3	Total	Konkola	
Dec-22	1.211	0	0	0	0	0	0	1.211	0	1.211
Jan-23	1.211	0	0	0	0	0	0	1.211	0	1.211
Feb-23	1.211	0	0	0.004	0.004	0	0.004	1.215	0.004	1.211
Mar-23	1.211	0	0	0.002	0.002	0	0.002	1.213	0.002	1.211
Apr-23	1.211	0	0	0.003	0.003	0	0.003	1.214	0.003	1.211
May-23	1.211	0	0	0.003	0.003	0	0.003	1.214	0.003	1.211
Jun-23	1.211	0	0	0	0	0	0		0	1.211
TOTAL	**8.477**	**0**	**0**	**0.012**	**0.012**	**0**	**0.012**	**7.278**	**0.012**	**8.477**

NOTE

Unit of measure is tons.

4.2 PERSONNEL INVOLVED IN MANAGEMENT OF HAZARDOUS WASTE

32 employees involved in management of hazardous waste underwent tetanus vaccinations in the period under review.

S/N.	EMPLOYEE NAME	Medical Centre
1.	CHABU DORRIAN	Konkola Mine Hospital – Occupational Health
2.	NAWEJI MICHEAL	Konkola Mine Hospital – Occupational Health
3.	MOGHA TOWARD	Konkola Mine Hospital – Occupational Health
4.	SIMUTOWE JAMES	Konkola Mine Hospital – Occupational Health
5.	CHIBEKA JOSEPH	Konkola Mine Hospital – Occupational Health
6.	FISANGA EMMANUEL	Konkola Mine Hospital – Occupational Health
7.	MUSANKABALA FLOYD	Konkola Mine Hospital – Occupational Health
8.	MUGALA JACK	Konkola Mine Hospital – Occupational Health
9.	KAPEMBWA PROSPER	Konkola Mine Hospital – Occupational Health
10.	KATEBE GILLAN	Konkola Mine Hospital – Occupational Health
11.	KAKUNGU KABANDA	Konkola Mine Hospital – Occupational Health
12.	MUWOWO MARTIN	Konkola Mine Hospital – Occupational Health
13.	KALENGE JOHN	Konkola Mine Hospital – Occupational Health
14.	MULUNDU HONEST	Konkola Mine Hospital – Occupational Health
15.	KAUNDA GERSHOM	Konkola Mine Hospital – Occupational Health
16.	MUSONDA THOMAS	Konkola Mine Hospital – Occupational Health
17.	MPASHILE KATAI	Konkola Mine Hospital – Occupational Health
18.	CHUNGU DAVID	Konkola Mine Hospital – Occupational Health
19.	LUNDA LYUBA	Konkola Mine Hospital – Occupational Health
20.	CHILUFYA ASTON	Konkola Mine Hospital – Occupational Health
21.	SAKALA PAUL	Konkola Mine Hospital – Occupational Health
22.	CHILWILA RICHARD	Konkola Mine Hospital – Occupational Health
23.	CHIBWE FLINT	Konkola Mine Hospital – Occupational Health
24.	KUMWENDA HAUDSON	Konkola Mine Hospital – Occupational Health
25.	TEMBO PETER	Konkola Mine Hospital – Occupational Health
26.	CHOLA KASEKE	Konkola Mine Hospital – Occupational Health
27.	FISANGA EMMANUEL	Konkola Mine Hospital – Occupational Health
28.	KASEVU HOSEA	Konkola Mine Hospital – Occupational Health
29.	MULENGA CHILESHE	Konkola Mine Hospital – Occupational Health
30.	BANDA ALEFA	Konkola Mine Hospital – Occupational Health
31.	KAPAIPI CHRISTOPHER	Konkola Mine Hospital – Occupational Health
32.	KABWE ISAAC	Konkola Mine Hospital – Occupational Health

4.3 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 17 below

Table 17: Healthcare waste generated

Month	Opening Stock	Clinical Waste Generated			Clinical Waste Stored		Clinical Waste Incinerated	Ash Generated Jan-Jun
		Clinics	Hospital	Total	Clinics	Hospital	Konkola Mine Hospital	
Dec-22	0	0.066	0.829	0.895	0.066	0.829	0.895	0
Jan-23	0	0.905	0.059	0.924	0.865	0.059	0.924	0.1305
Feb-23	0	0.939	0.041	0.980	0.939	0.041	0.98	0.1070
Mar-23	0	0.918	0.073	0.991	0.918	0.073	0.991	0.1099
Apr-23	0	0.855	0.053	0.908	0.855	0.053	0.908	0.0995
May-23	0	0.844	0.031	0.875	0.844	0.031	0.875	0.1005
Jun-23	0	0.835	0.094	0.929	0.835	0.094	0.929	0.0960
TOTAL	**0**	**5.296**	**0.351**	**5.647**	**5.256**	**0.351**	**5.607**	**0.6434**

NOTE

Unit of measure is Tons.

4.4 TRANSPORTATION OF HEALTHCARE WASTE

Healthcare waste generated from Konkola Mine Hospital & the satellite clinics was transported to Nchanga Mine hospital for incineration. 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 18 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 18: Healthcare waste transported

Month	Source	Quantity	Mode of Transport	Destination	Disposal
January	HC 1,4 and 5	0.924	Van with steel container	Nchanga Hospital	Incineration
February	HC 1,4 and 5	0.980	Van with steel container	Nchanga Hospital	Incineration
March	HC 1,4 and 5	0.991	Van with steel container	Nchanga Hospital	Incineration
April	HC 1,4 and 5	0.908	Van with steel container	Nchanga Hospital	Incineration
May	HC 1,4 and 5	0.875	Van with steel container	Nchanga Hospital	Incineration
June	HC 1,4 and 5	0.929	Van with steel container	Nchanga Hospital	Incineration
TOTAL	HC 1,4 and 5	**5.647**	Van with steel container	Nchanga Hospital	Incineration

NOTE

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

4.5 GENERATION, TRANSPORTATION AND HANDLING OF EXPIRED CHEMICALS

During the period under review (January – June, 2023) 15 tons of expired Magnafloc 1597 and 13,440 Liters of Magnafloc 10 that was stored at Commercial Department was disposed of by re-using/dosing into the conventional thickeners at the Concentrator.

PART 5: The Environmental Management (Licensing) Regulations, 2013

5. WASTE MANAGEMENT LICENCE

There are two waste rock dumps, adjacent to each of the shafts. The "A" Dump is situated adjacent to and to the South West of No. 1 Shaft. This dump was started in 1955, covers approximately 22.5ha. The "B" Dump, started in 1957, is situated adjacent and to the North West of the No. 3 Shaft, covers an area of approximately 11ha. Reclamation of waste rock from the dumps for aggregate production is ongoing in a controlled manner.

Tailings are pumped to the Lubengele Tailings Dam, which lies to the North of the plant site. The Lubengele Tailings Dam is a valley dam (started in 1964) with a 28.5m high wall formed with cycloned coarse tailings. The current maximum available capacity is 105Mt and about 100.535Mt has been deposited since it was started in 1964. Tailings material is transported from the concentrator through one of two steel pipelines, operated alternately, and is discharged primarily from the Eastern side of the impoundment. The Lubengele Dam is located in a large catchment area of 61km² and captures the drainage from four streams, namely the Lubengele, Kawiri, Michelo and the Ming'omba streams. Runoff from this area together with tailings water is decanted through the spillway into the Lubengele Stream and ultimately into the Kafue River.

5.1 LUBENGELE TAILINGS DAM

In order to ensure safe operating conditions of the tailings dam, Konkola mine has engaged an independent consultant [Knight Piesold] to conduct periodical assessments. Below is a summary of the status of the dam.

Fig.16: Lubengele Tailings Dam Wall

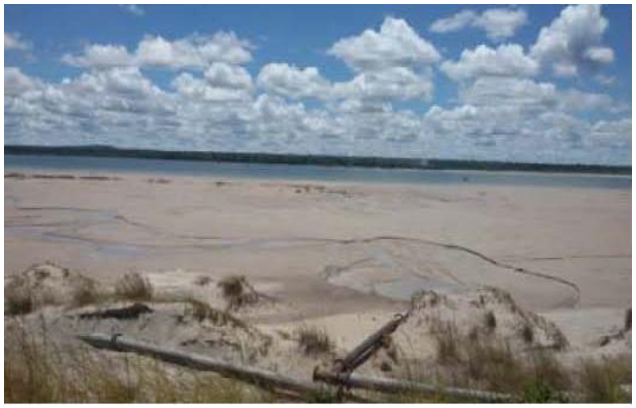


Fig.17: Lubengele Tailings Dam Beach

Fig.16: Lubengele Tailings Dam Wall

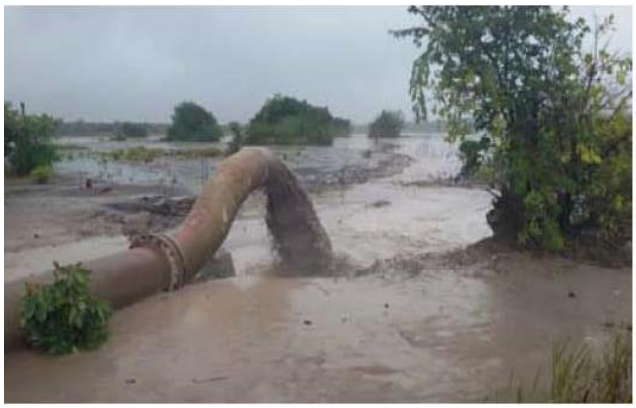


Fig.17: Tailings Discharge Column

5.1.1 Embankment Integrity

a) Stability

The embankment is generally maintained in good order with vegetation well established on most portions of the slope.

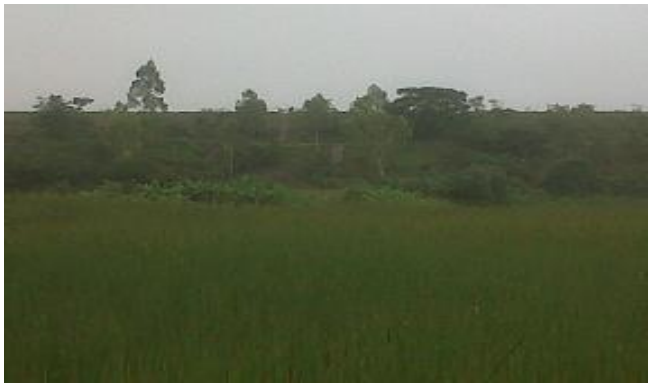


Fig.18: Lubengele Tailings Dam Wall

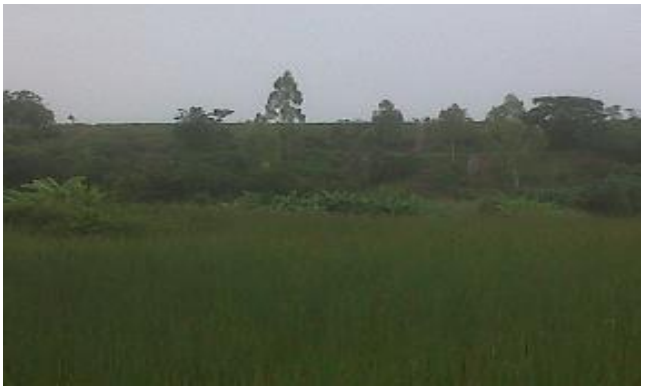


Fig.19: Lubengele Tailings Dam Wall

b) Vegetation

Work towards revegetation of areas of the tailings embankments to reduce on erosion is undertaken on an ongoing basis. The replanting involves a selection of tree and grass species and stock is obtained from local suppliers.

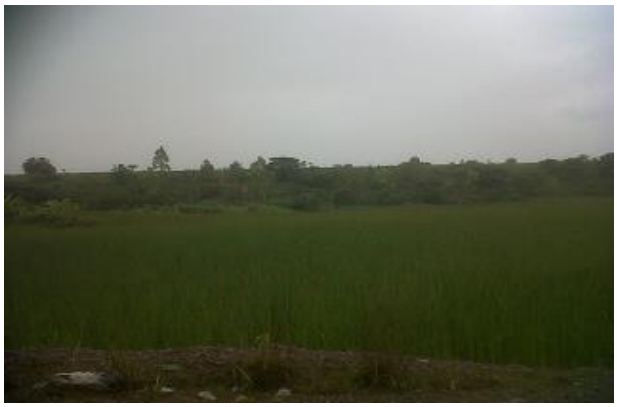


Fig.20: Lubengele Tailings Dam Surrounding

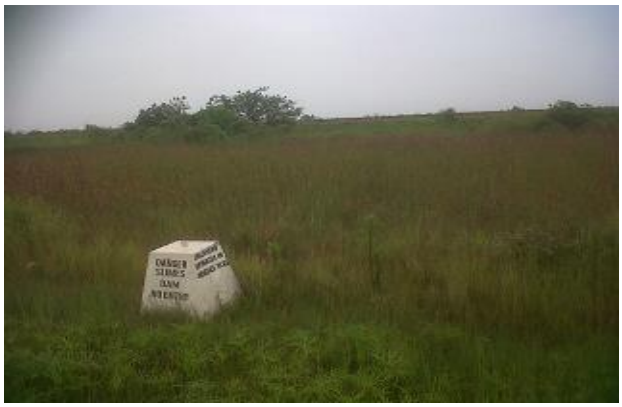


Fig.21: Lubengele Tailings Dam Surrounding

c) Seepage

There are a number of dug wells adjacent to and upstream of the dam. Table 15 below shows the quality of groundwater around the dam. SDH19 and SDS01 are controls.

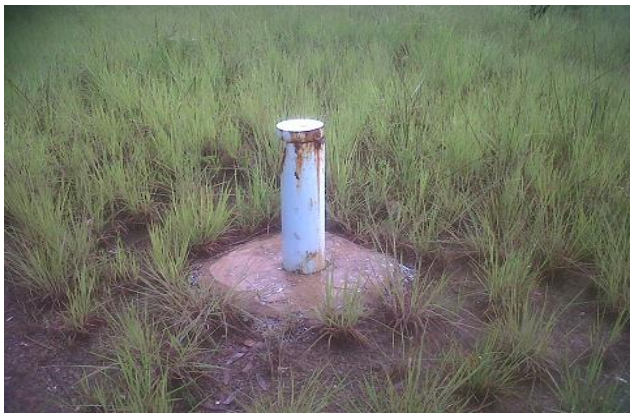


Fig.22: Lubengele Tailings Dam Borehole

Fig.23: Lubengele Tailings Dam Borehole

d) Access Restrictions to the Dam

The tailings dam is a vast area and therefore no fencing has been provided to restrict access. However, in order to prevent illegal entry by unauthorized persons, appropriate warning signage is displayed at various points around the dam. The perimeter is also under 24Hours surveillance by Mine Security Personnel. Despite all the effort, illegal fishing and washing of clothing is occasionally practiced. Due to the fact that unauthorised fishing from the dam could represent a health risk, fish and water quality from the dam is periodically tested. Sampling of fish and water from the Lubengele Tailings Dam was conducted in the review period.

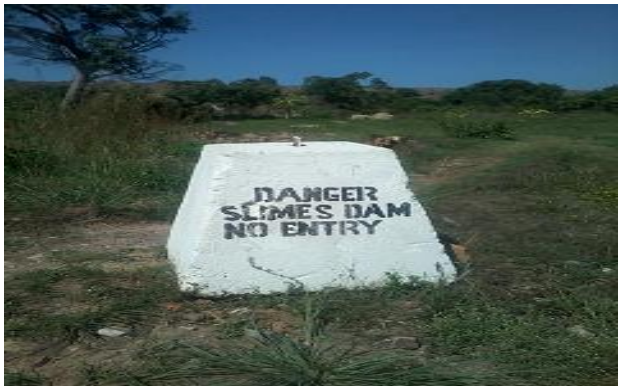


Fig.24: Lubengele Tailings Dam

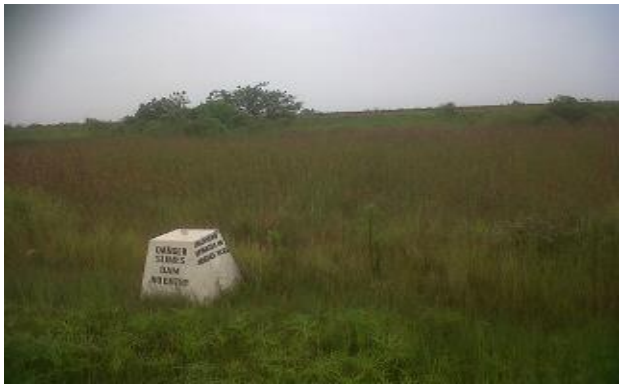


Fig.25: Lubengele Tailings Dam

5.1.2 Concentrator Plant Material Balances

Table 19: Concentrator plant material

Month	Input to Plant	Concentrates Produced	Tailings Disposed at Lubengele Dam (Dump C)	Tailings Used In Backfilling	Balance
January	63415	5267	58151	0	-3
February	72316	5819	66336	0	161
March	67830	5040	62287	0	503
April	95468	7736	86989	0	743
May	78464	5182	71467	0	1,815
June	44564	4099	40154	0	311
TOTAL	**358,642**	**27,876**	**327,233**	**0**	**1,303**

NOTE

1. Unit of measure is tons.
2. The difference in mass balance is mainly due to moisture content

Fig.26: West Backfill Plant

Fig.27: East Backfill Plant

5.1.3 Chemical Analysis of tailings to the Lubengele Tailings Dam

Table 20: Tailings composition

Month	%Cu	%ASCu	%Co	%Fe	%S	%SiO2
January	0.38	0.16	0.030	RF	RF	RF
February	0.57	0.37	0.035	RF	RF	RF
March	0.42	0.20	0.037	RF	RF	RF
April	0.64	0.28	0.041	RF	RF	RF
May	0.54	0.19	RF	RF	RF	RF
June	0.76	0.43	0.042	RF	RF	RF
Average	**0.55**	**0.27**	**0.037**	**RF**	**RF**	**RF**

NOTE

1. Assays done on monthly composite samples
2. RF Means Results to Follow

5.1.4 Quality of Groundwater As Monitored In Wells and Boreholes Around The Dam

Table 21: Groundwater quality (Monthly averages)

MONTH	Well/Bore hole	pH	Cond	TSS	TDS	TCu	TFe	TMn	TCo	TPb
January										
Lubengele Tailings Dam	SDH17	6.12	NR	7	NR	<0.01	0.29	0.14	<0.01	0.13
	SDH19	6.18	NR	14	NR	<0.01	0.26	0.21	<0.01	0.23
	KO6	6.20	NR	11	NR	<0.01	0.22	<0.01	<0.01	0.27
	SDS01	6.06	NR	12	NR	<0.01	0.39	0.28	<0.01	0.13
	PPZ	5.89	NR	7	NR	0.01	0.71	<0.01	<0.01	0.15
February										
Lubengele Tailings Dam	SDH17	4.94	NR	10	NR	<0.01	0.76	<0.01	<0.01	0.68
	SDH19	4.67	NR	22	NR	<0.01	0.78	<0.01	<0.01	<0.01
	KO6	5.94	NR	4	NR	<0.01	0.82	0.05	<0.01	12.16
	SDS01	6.14	NR	1	NR	<0.01	0.56	0.20	<0.01	11.61
	PPZ	5.24	NR	23	NR	0.25	2.95	<0.01	<0.01	8.02
March										
Lubengele Tailings Dam	SDH17	4.91	26	4	13	<0.01	1.60	0.02	<0.01	<0.01
	SDH19	4.68	20	1	10	<0.01	1.63	<0.01	<0.01	<0.01
	KO6	4.51	21	1	11	<0.01	2.30	0.01	<0.01	<0.01
	SDS01	6.43	269	12	148	<0.01	2.14	0.01	<0.01	10.53
	PPZ	4.96	435	11	219	<0.01	1.64	0.28	<0.01	6.64
April										
Lubengele Tailings Dam	SDH17	5.90	26	3	13	<0.01	<0.01	0.64	<0.01	<0.01
	SDH19	5.29	20	11	10	<0.01	0.07	0.68	<0.01	<0.01
	KO6	4.95	30	1	15	<0.01	<0.01	1.30	<0.01	<0.01

	SDS01	6.55	179	4	90	<0.01	<0.01	2.69	<0.01	9.62
	PPZ	5.02	437	6	219	<0.01	<0.01	1.81	<0.01	1.48
May										
Lubengele Tailings Dam	SDH17	6.03	42	4	21	0.06	<0.01	<0.01	<0.01	0.01
	SDH19	5.41	23	7	11	0.06	<0.01	<0.01	<0.01	0.01
	KO6	5.75	116	13	58	0.36	<0.01	<0.01	<0.01	0.01
	SDS01	6.41	412	2	205	<0.01	0.17	<0.01	<0.01	15.42
	PPZ	5.23	419	13	209	0.03	<0.01	<0.01	<0.01	3.56
June										
Lubengele Tailings Dam	SDH17	5.96	80	6	40	0.14	2.27	<0.01	<0.01	1.12
	SDH19	6.04	72	10	36	0.09	2.31	<0.01	<0.01	0.01
	KO6	5.16	374	24	189	0.64	2.78	0.10	<0.01	4.89
	SDS01	5.89	96	8	48	0.10	1.71	<0.01	<0.01	0.67
	PPZ	5.05	390	2	195	0.29	1.67	<0.01	<0.01	4.76
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

Table 21: Cont.

MONTH		TCd	Hg	TAs	TCa	TMg	DSO_4	BOD	COD	DO_2
January										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	55.81	5.02	NR	16.0	28.4	5.6
	SDH 17	<0.01	<0.01	<0.01	62.43	6.86	NR	5.6	12.2	6.2
	SDH 19	<0.01	<0.01	<0.01	63.74	5.08	NR	4.0	7.2	6.4
	KO 6	<0.01	<0.01	<0.01	61.02	4.39	NR	6.6	15.2	6.3
	PPZ	<0.01	<0.01	<0.01	44.51	<0.01	NR	6.40	12.6	6.0
February										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	9.57	11.61	73.67	6.0	4.2	11.3
	SDH 17	<0.01	<0.01	<0.01	<0.01	0.68	27.58	10.0	16.4	6.2
	SDH 19	<0.01	<0.01	<0.01	<0.01	<0.01	29.22	8.0	13.2	5.0
	KO 6	<0.01	<0.01	<0.01	3.66	12.16	104.95	12.0	14.3	5.4
	PPZ	<0.01	<0.01	<0.01	5.61	8.02	73.26	11.0	5.4	23.0
March										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	<0.01	10.53	105.36	3.6	2.43	6.8
	SDH 17	<0.01	<0.01	<0.01	<0.01	<0.01	81.08	7.3	11.2	6.8
	SDH 19	<0.01	<0.01	<0.01	<0.01	<0.01	74.49	7.6	12.8	6.9
	KO 6	<0.01	<0.01	<0.01	<0.01	<0.01	32.51	4.5	7.5	7.2
	PPZ	<0.01	<0.01	<0.01	<0.01	6.64	48.15	2.0	5.3	7.4
April										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	38.90	9.62	NR	4.00	8.8	7.8
	SDH 17	<0.01	<0.01	<0.01	25.15	<0.01	NR	4.30	9.36	7.0
	SDH 19	<0.01	<0.01	<0.01	24.85	<0.01	NR	5.00	10.02	7.1
	KO 6	<0.01	<0.01	<0.01	25.76	<0.01	NR	4.20	11.3	7.8

	PPZ	<0.01	<0.01	<0.01	29.29	1.48	NR	18.00	33.21	3.3
May										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	40.92	15.42	NR	9.2	27.1	7.1
	SDH 17	<0.01	<0.01	<0.01	14.38	0.01	NR	8.30	27.2	7.4
	SDH 19	<0.01	<0.01	<0.01	14.34	0.01	NR	8.10	27.3	7.6
	KO 6	<0.01	<0.01	<0.01	34.99	0.01	NR	9.40	23.6	7.2
	PPZ	<0.01	<0.01	<0.01	17.12	3.56	NR	9.20	26.9	7.1
June										
Lubengele Tailings Dam	SDS 1	<0.01	<0.01	<0.01	0.01	0.67	NR	8.3	3.2	5.2
	SDH 17	<0.01	<0.01	<0.01	0.01	1.12	NR	8.2	2.9	5.6
	SDH 19	<0.01	<0.01	<0.01	0.01	0.01	NR	7.3	2.3	5.1
	KO 6	<0.01	<0.01	<0.01	0.01	4.89	NR	7.4	3.0	2.9
	PPZ	<0.01	<0.01	<0.01	0.01	4.76	NR	12.4	2.7	5.2
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

Table 21: Cont.

MONTH		NO_4	NO_3	NH_4	PO_4	Cl	Ur	Tem	Turb	Color
January										
Lubengele Tailings Dam	SDH17	<0.01	0.33	<0.01	<0.01	27.36	<0.01	21.5	1.80	0.53
	SDH19	<0.01	0.21	<0.01	<0.01	4.58	<0.01	21.5	2.11	0.78
	KO6	<0.01	<0.01	<0.01	<0.01	3.11	<0.01	21.6	1.77	0.50
	SDS01	<0.01	<0.01	<0.01	<0.01	4.87	<0.01	21.5	5.68	0.51
	PPZ	<0.01	0.46	<0.01	<0.01	11.06	<0.01	21.5	7.83	0.22
February										
Lubengele Tailings Dam	SDH17	<0.01	<0.01	<0.34	<0.01	27.06	<0.01	26.5	1.74	0.77
	SDH19	<0.01	<0.01	<0.01	<0.01	2.23	<0.01	26.4	1.26	0.53
	KO6	<0.01	<0.01	<0.01	<0.01	2.21	<0.01	26.4	1.47	0.59
	SDS01	<0.01	<0.01	0.23	<0.01	28.43	<0.01	26.7	1.39	0.56
	PPZ	<0.01	<0.039	<0.01	<0.01	15.04	<0.01	26.6	3.89	0.13
March										
Lubengele Tailings Dam	SDH17	<0.01	0.36	<0.01	<0.01	26.3	<0.01	22.2	7.48	0.84
	SDH19	<0.01	0.33	<0.01	<0.01	2.61	<0.01	22.2	5.78	0.44
	KO6	<0.01	0.29	<0.01	<0.01	2.48	<0.01	22.2	6.13	0.36
	SDS01	<0.01	0.27	<0.01	<0.01	5.53	<0.01	22.2	5.88	0.33
	PPZ	<0.01	2.33	<0.01	<0.01	12.26	<0.01	22.3	6.46	1.1
April										
Lubengele Tailings Dam	SDH17	<0.01	<0.01	<0.01	<0.01	4.33	<0.01	21.4	2.23	0.48
	SDH19	<0.01	<0.01	<0.01	<0.01	3.64	<0.01	21.4	3.21	0.73
	KO6	<0.01	<0.01	<0.01	<0.01	6.38	<0.01	21.5	2.51	1368
	SDS01	<0.01	<0.01	<0.01	<0.01	27.1	<0.01	21.3	13.8	1.51
	PPZ	<0.01	<0.01	<0.01	<0.01	15.03	<0.01	21.6	4.13	0.89

May										
Lubengele Tailings Dam	SDH17	<0.01	<0.01	<0.01	<0.01	4.36	<0.01	22.6	1.28	1.00
	SDH19	<0.01	<0.01	<0.01	<0.01	3.69	<0.01	22.5	0.23	1.13
	KO6	<0.01	<0.01	<0.01	<0.01	6.68	<0.01	22.4	0.26	1.21
	SDS01	<0.01	<0.01	<0.01	<0.01	32.1	<0.01	22.6	0.22	1.11
	PPZ	<0.01	<0.01	<0.01	<0.01	13.67	<0.01	22.9	0.28	1.13
June	1.07	1.18	1.27	1.31						
Lubengele Tailings Dam	SDH17	<0.01	0.11	<0.01	<0.01	4.56	<0.01	22.4	2.88	1.07
	SDH19	<0.01	0.06	<0.01	<0.01	3.49	<0.01	22.2	2.56	1.18
	KO6	<0.01	1.87	<0.01	<0.01	6.88	<0.01	23.2	1.61	1.27
	SDS01	<0.01	0.06	<0.01	<0.01	30.2	<0.01	22.4	3.29	1.31
	PPZ	<0.01	1.85	<0.01	<0.01	12.62	<0.01	22.3	2.08	1.33
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

NOTE

- ND means not defined

Lubengele Tailings Dam fish toxicological tests

- Fish and water from the tailings dam was sampled on 20th June 2022. Awaiting analysis and results from university of Zambia School of Agriculture Laboratory. Results to be submitted to ZEMA on or before 31st July 2023.

5.2 LUBENGELE TAILINGS PIPELINE

5.2.1 Physical State

- The tailings pipeline is a 300 mm diameter, 8.4 km long rubber lined steel pipeline which delivers tailings from the process plant for disposal in the tailings facility. The pipeline was newly installed with a 25 year guarantee. A second tailings pipeline is available for use during maintenance of the main pipeline.

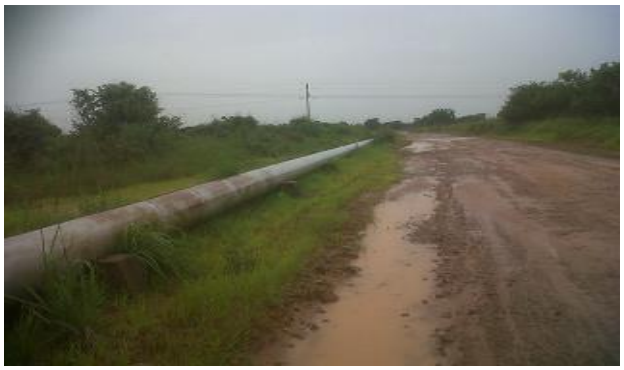


Fig.28: Lubengele Tailings Pipeline

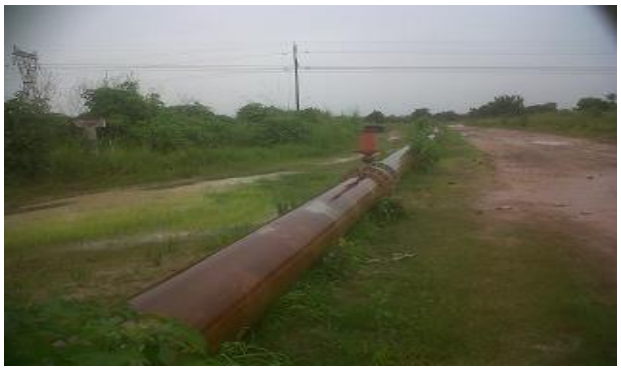


Fig.29: Lubengele Tailings Pipeline

5.2.2 Accidental Spillage/Leakage

Daily monitoring of the pipeline is undertaken to ensure that any spillages are identified and dealt with quickly. Visual inspections of the entire length of the tailings delivery line are undertaken by the Dam Operator of the Concentrator Department. Any spillages detected are immediately reported to the Plant Manager who ensures that the following actions are undertaken:

- 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
- A clean-up team is dispatched immediately once the spillage has been reported. Spilled tailings are returned to the tailings facility
- 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.

5.3 WASTE ROCK DUMPS

Monitoring of the waste rock dumps is undertaken on an ongoing basis regarding volumes of waste rock disposed on the dumps and visual inspection for sign of instability and/or erosion.

Fig.30: Waste Rock Dump A

Fig.31: Waste Rock Dump B

5.3.1 Dump Integrity

a) Stability

The dumps are generally well maintained. Both dumps are currently being reclaimed for building/construction material. Slopes are stable and top surfaces well maintained. Tension cracks are filled as they appear.

Fig.32: Waste Rock Dump A

Fig.33: Waste Rock Dump B

b) Vegetation

There is no vegetation on the dump. The surrounding areas are however well vegetated with no evidence of negative effects arising from erosion.

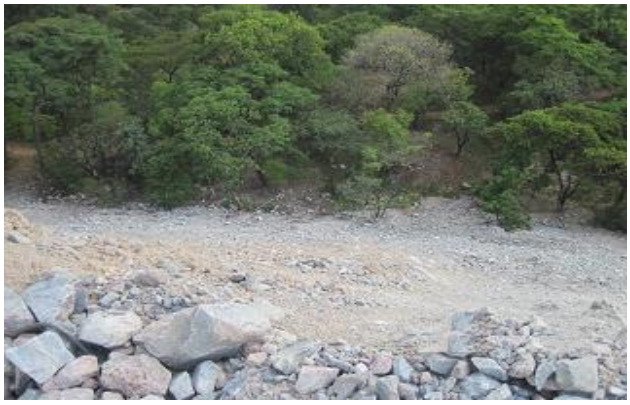


Fig.34: Waste Rock Dump A

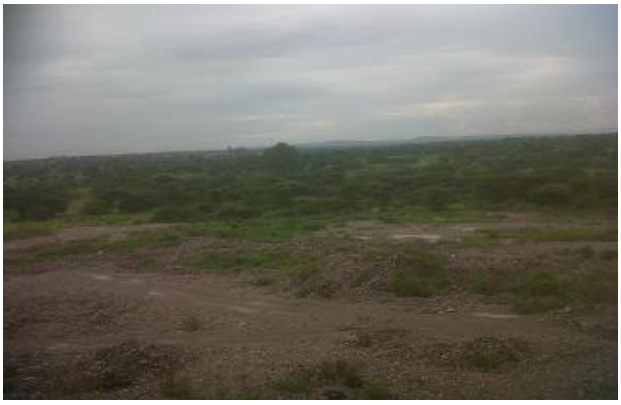


Fig.35: Waste Rock Dump B

c) Seepage

There are two monitoring boreholes on each waste rock dump to monitor the quality of groundwater to ascertain whether our operations are impacting on the groundwater resources. Monitoring results are presented in Table 20 above. WDA 1 and WDB 1 are controls.

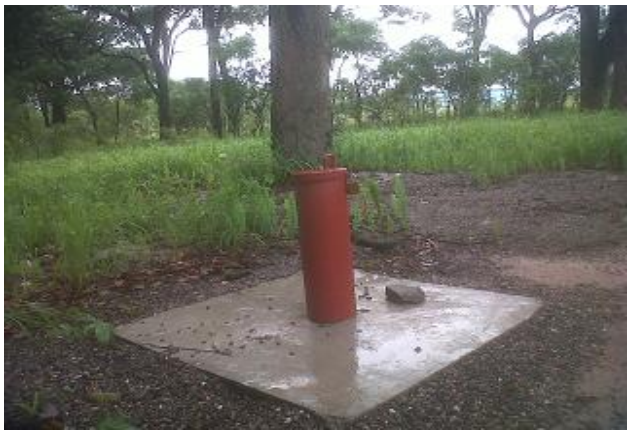


Fig.36: Waste Rock Dump A Borehole

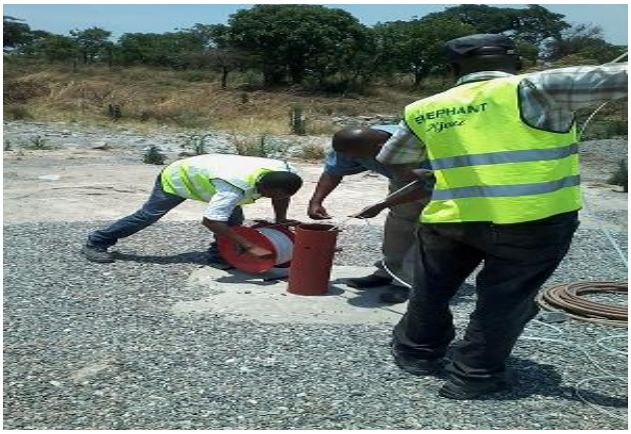


Fig.37: Waste Rock Dump B Borehole

Table 23: Groundwater quality – Waste Rock Dump A and B

MONTH	Well/Bore hole	pH	Cond	TSS	TDS	TCu	TFe	TMn	TCo	TPb
January										
Waste Rock Dump A	WDA01	5.58	"	19	"	0.14	0.36	0.16	<0.01	0.06
	WDA02	6.03	"	6	"	<0.01	0.44	<0.01	<0.01	<0.01
Waste Rock Dump B	WDB01	5.44	"	5	"	0.01	0.40	<0.01	<0.01	<0.01
	WDB02	5.76	"	10	"	<0.01	0.40	<0.01	<0.01	0.13
February										
Waste Rock Dump A	WDA01	6.75	"	3	"	<0.01	0.58	<0.01	<0.01	<0.01
	WDA02	6.62	"	6	"	<0.01	0.62	<0.01	<0.01	<0.01
Waste Rock Dump B	WDB01	5.56	"	11	"	<0.01	1.34	<0.01	<0.01	<0.01
	WDB02	5.45	"	3	"	<0.01	1.10	<0.01	<0.01	<0.01
March										
Waste Rock Dump A	WDA01	5.39	437	10	219	0.16	3.72	0.15	<0.01	0.18
	WDA02	6.39	364	2	182	0.23	4.31	0.19	<0.01	0.24
Waste Rock Dump B	WDB01	6.29	242	2	121	<0.01	3.16	0.16	<0.01	0.18
	WDB02	6.26	243	13	122	<0.01	2.43	<0.01	<0.01	0.18
April										
Waste Rock Dump A	WDA01	6.72	277	20	137	<0.01	<0.01	1.91	<0.01	<0.01
	WDA02	6.59	143	19	71	<0.01	<0.01	0.82	<0.01	<0.01
Waste Rock Dump B	WDB01	6.57	184	17	92	<0.01	0.86	1.81	<0.01	<0.01
	WDB02	6.56	217	15	109	<0.01	<0.01	0.94	<0.01	<0.01
May										
Waste Rock Dump A	WDA01	6.06	416	7	206	<0.01	<0.01	<0.01	0.01	<0.01
	WDA02	6.23	407	9	203	<0.01	0.04	<0.01	<0.01	<0.01
Waste Rock Dump B	WDB01	6.47	340	5	170	<0.01	0.22	<0.01	<0.01	<0.01
	WDB02	6.54	336	3	169	0.14	<0.01	<0.01	<0.01	<0.01

June										
Waste Rock Dump A	WDA01	6.55	235	2	117	<0.01	1.18	<0.01	0.05	<0.01
	WDA02	6.57	81	8	41	<0.01	1.67	<0.01	0.01	<0.01
Waste Rock Dump B	WDB01	5.51	374	2	189	0.06	1.08	<0.01	0.01	<0.01
	WDB02	5.36	390	3	195	0.07	1.07	<0.01	0.01	<0.01
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

Table 23: Cont.

MONTH		TCd	Hg	TAs	TCa	TMg	DSO_4	BOD	COD	DO_2
January										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	27.31	<0.01	NR	8.4	12.8	6.4
	WDA02	<0.01	<0.01	<0.01	27.29	<0.01	NR	8.8	14.7	6.0
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	33.38	1.96	NR	44.2	82.1	2.8
	WDB02	<0.01	<0.01	<0.01	36.89	<0.01	NR	8.0	13.7	6.3
February										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	6.59	9.82	74.91	4.0	7.8	7.2
	WDA02	<0.01	<0.01	<0.01	<0.01	10.33	46.92	7.6	12.3	6.6
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	<0.01	8.28	54.33	6.0	10.37	6.6
	WDB02	<0.01	<0.01	<0.01	<0.01	7.83	21.40	10.0	12.4	6.8
March										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	0.22	9.78	86.43	8.0	5.40	7.5
	WDA02	<0.01	<0.01	<0.01	28.55	12.65	153.5	4.30	5.6	7.6
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	5.50	6.75	112.3	5.60	9.0	6.6
	WDB02	<0.01	<0.01	<0.01	<0.01	2.82	86.43	4.40	15.0	7.4
April										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	38.34	7.69	NR	4.2	12.2	7.3
	WDA02	<0.01	<0.01	<0.01	39.96	9.07	NR	6.2	24.4	6.6
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	38.19	7.91	NR	4.8	14.4	7.2
	WDB02	<0.01	<0.01	<0.01	35.45	7.68	NR	4.01	28	7.7
May										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	17.95	7.47	NR	8.9	24.2	7.8
	WDA02	<0.01	<0.01	<0.01	40.28	15.35	NR	9.4	25.3	7.2
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	33.58	10.43	NR	9.8	24.9	7.8
	WDB02	<0.01	<0.01	<0.01	32.18	10.01	NR	9.6	26.1	7.7
June										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	0.01	2.46	NR	6.3	2.5	3.6
	WDA02	<0.01	<0.01	<0.01	0.01	0.04	NR	7.6	2.7	5.8
Waste Rock Dump B	WDB01	<0.01	<0.01	<0.01	0.01	3.89	NR	12.3	3.3	3.9
	WDB02	<0.01	<0.01	<0.01	0.01	4.35	NR	14.6	1.6	3.5
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

Table 23: Cont.

MONTH		NO_4	NO_3	NH_4	PO_4	Cl	Ur	Temp	Turb	Color
January										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	<0.01	13.4	<0.01	21.5	7.96	1.27
	WDA02	<0.01	<0.01	<0.01	<0.01	30.12	<0.01	21.6	7.58	0.78
Waste Rock Dump B	WDB01	<0.01	0.03	<0.01	<0.01	36.22	<0.01	21.6	7.41	0.54
	WDB02	<0.01	0.02	<0.01	<0.01	37.26	<0.01	21.6	3.16	0.52
February										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	<0.01	13.22	<0.01	26.6	2.55	0.94
	WDA02	<0.01	<0.01	<0.01	<0.01	12.87	<0.01	26.4	2.47	1.06
Waste Rock Dump B	WDB01	<0.01	0.01	<0.01	<0.01	14.63	<0.01	26.7	1.49	0.68
	WDB02	<0.01	0.02	<0.01	<0.01	14.02	<0.01	26.6	2.05	1.11
March										
Waste Rock Dump A	WDA01	<0.01	<0.01	0.2	<0.01	5.42	<0.01	22.1	6.16	0.74
	WDA02	<0.01	<0.01	0.18	<0.01	3.82	<0.01	22.2	7.62	1.0
Waste Rock Dump B	WDB01	<0.01	0.03	0.23	<0.01	6.74	<0.01	22.2	7.37	1.01
	WDB02	<0.01	0.02	0.23	<0.01	6.92	<0.01	22.2	0.00	0.84
April										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	<0.01	13.3	<0.01	21.4	11.5	1.42
	WDA02	<0.01	<0.01	<0.01	<0.01	8.63	<0.01	21.5	10.2	1.17
Waste Rock Dump B	WDB01	<0.01	0.01	<0.01	<0.01	9.68	<0.01	21.5	11.0	2.12
	WDB02	<0.01	0.02	<0.01	<0.01	8.67	<0.01	21.5	3.0	0.84
May										
Waste Rock Dump A	WDA01	<0.01	<0.01	<0.01	<0.01	11.3	<0.01	26.70	1.17	1.42
	WDA02	<0.01	<0.01	<0.01	<0.01	8.67	<0.01	26.20	0.28	1.07
Waste Rock Dump B	WDB01	<0.01	0.01	<0.01	<0.01	9.63	<0.01	24.00	0.37	2.56
	WDB02	<0.01	0.02	<0.01	<0.01	9.71	<0.01	23.70	0.24	1.84
June										
Waste Rock Dump A	WDA01	<0.01	1.85	<0.01	<0.01	13.1	<0.01	18.70	2.42	1.48
	WDA02	<0.01	0.11	<0.01	<0.01	8.37	<0.01	18.70	3.21	1.17
Waste Rock Dump B	WDB01	<0.01	1.89	<0.01	<0.01	9.23	<0.01	18.70	1.97	2.36
	WDB02	<0.01	1.88	<0.01	<0.01	13.1	<0.01	18.80	2.34	1.64
Statutory Limit		***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***	***ND***

NOTE

- ND mean not defined.

d) Access Restrictions to the Dumps

In order to prevent illegal entry by unauthorized persons, appropriate warning signage is displayed at various points around the dumps. Table 16 below details the quantities of waste rock generated and disposed at licensed Dumps A and B.

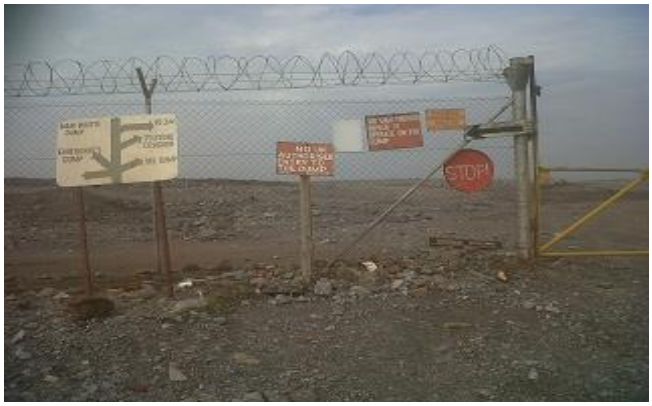


Fig.38: Waste Rock Dump A

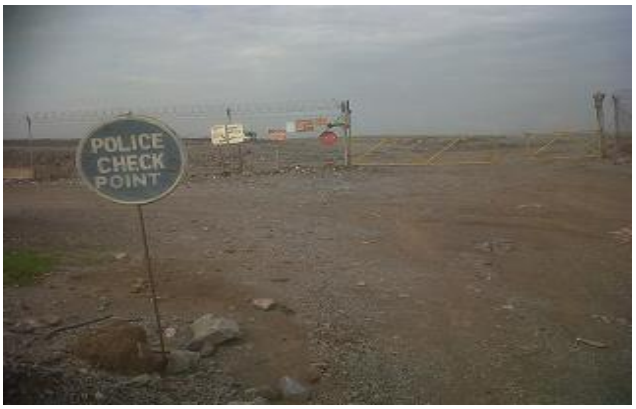


Fig.39: Waste Rock Dump B

5.3.2 Quantities Disposed and Reclaimed

Both A and B Dumps continue to be reclaimed for production of aggregate for construction. Currently A is being reclaimed by Crushteck and Sensele while B is not being reclaimed.

Table 24: Waste rock

Month	Dump A		Dump B	
	Dumped	Reclaimed	Dumped	Reclaimed
January	14370	13776	1242	0
February	17280	38864	4151	0
March	16680	54368	4206	0
April	13680	45096	957	20440
May	30780	37744	4842	7205
June	4470	49056	7317	7800
TOTAL	**97260**	**238904**	**22715**	**35445**

NOTE

- Unit of measure is tons.
- At 1 & 4 Shafts, all waste rock generated from the mining is taken to Waste Rock Dump A.
- At 3 Shaft, waste rock from Konkola Extension & Konkola Flats Mining Blocks is used for backfilling in the Post Pillar Cut and Fill method of mining whilst waste from Konkola East Mining Block is taken to the Waste Rock Dump B.

PART 6: The Environmental Management (Licensing) Regulations, 2013

6. OZONE DEPLETING SUBSTANCES LICENCE

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

6.1 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. Table 25 below provides a summary of the status and usage of ODS at Konkola Mine.

Table 25: Ozone depleting substances

Month	Ozone depleting substance	Quantity	Ozone Depleting Potential**	CFC Equivalent for the quarter	Sources of emission/area of usage
January	R-12	nil			Air Conditioners and Refrigeration
	R-22	1.2kg			Air Conditioners and Refrigeration
	R-134a	0.7kg			Air Conditioners and Refrigeration
	R404	nil			Air Conditioners and Refrigeration
	R410	4kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
February	R-12	nil			Air Conditioners and Refrigeration
	R-22	2kg			Air Conditioners and Refrigeration
	R-134a	nil			Air Conditioners and Refrigeration
	R404	nil			Air Conditioners and Refrigeration
	R410	1kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
March	R-12	nil			Air Conditioners and Refrigeration
	R-22	2.6kg			Air Conditioners and Refrigeration
	R-134a	0.9kg			Air Conditioners and Refrigeration

	R404	nil			Air Conditioners and Refrigeration
	R410	2.3kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
April	R-12	nil			Air Conditioners and Refrigeration
	R-22	1.3kg			Air Conditioners and Refrigeration
	R-134a	0.5kg			Air Conditioners and Refrigeration
	R404	nil			Air Conditioners and Refrigeration
	R410	1.1kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
May	R-12	nil			Air Conditioners and Refrigeration
	R-22	1.4kg			Air Conditioners and Refrigeration
	R-134a	nil			Air Conditioners and Refrigeration
	R404	nil			Air Conditioners and Refrigeration
	R410	1.2kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
June	R-12	nil			Air Conditioners and Refrigeration
	R-22	2kg			Air Conditioners and Refrigeration
	R-134a	nil			Air Conditioners and Refrigeration
	R404	nil			Air Conditioners and Refrigeration
	R410	1kg			Air Conditioners and Refrigeration
	R-407c	nil			Air Conditioners and Refrigeration
Total		**46.6kg**			

NOTE

- Unit of measure is in Kgs.

Katongo Kabwe
ENVIRONMENTAL COORDINATOR

Itamba Joseph
SHE MANAGER

14/07/2023