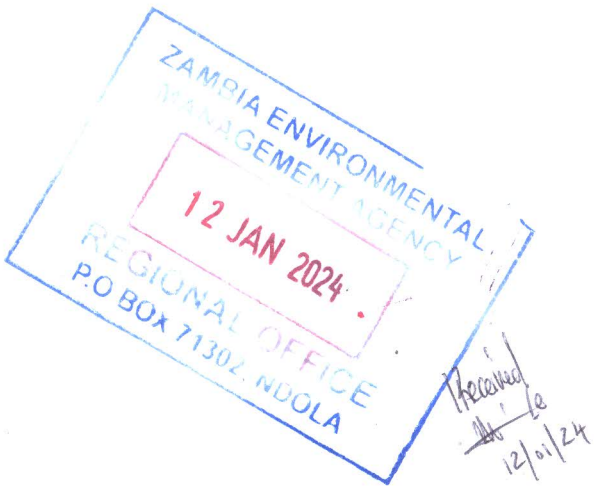
KCM (Smelterco) Ltd
Nkana Refinery

KCM-NK/003/2024



12th January, 2024.

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

Dear Sir/Madam,

RE: BI-ANNUAL STATUTORY REPORT FOR KCM (SMELTERCO) LIMITED – NKANA REFINERY

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 .July to December 2023:

1. **Pesticides and Toxic Substances Licence – NDL/PTS/00673/Z10/2014/3**
    - Storage of Pesticides and Toxic Substances – Nkana Anode Storage Casting room, Nkana Tankhouse, Nkana Acid Storage Tank No. 1, Nkana Acid Storage Tank No. 2 and Nkana Analytical Services Department.
    - Transportation of Pesticides and Toxic Substances – Nkana Refinery

2. **Emission Licence – NDL/EMM/00673/Z10/2014/3**
    - Discharge of Effluent – East Gate into North Uchi Stream
    - Discharge of Effluent – Nkana Refinery into South Uchi Stream
    - Emission of Air Pollutants at No. 4 Anode Furnace Stack – Anode Furnaces
    - Emission of Air Pollutants at No. 5 Anode Furnace Stack – Anode Furnaces
    - Emission of Air Pollutants at No. 6 Anode Furnace Stack – Anode Furnaces
    - Emission of Air Pollutants at Nkana HFO Boiler stack – Nkana HFO Boiler

Stand M/1408, Fern Avenue, Private Bag KCM © 2000, Chingola, Zambia
Tel: +260 212 350 604, Fax: +260 212 351 225
Incorporated in the Republic.of Zambia, Reg.120000044055

3. **Hazardous Waste Licence – NDL/LHWM/00673/Z10/2014/3**
    - Generation of Used Oil, Fluorescent Tubes and Batteries – Nkana Refinery
    - Storage of Used Oil, Fluorescent Tubes and Batteries – Nkana Refinery
    - Generation and Storage of Healthcare Waste – Nkana Clinic
    - Generation, Transportation and Handling of Expired Chemicals
    - Generation, storage of spent copper electrolyte

4. **Waste Management Licence – NDL/WM/00673/Z10/2014/3**
    - Own and operate Slag Dam No. 67

5. **Ozone Depleting Substances Licence – NDL/ODS/00673/Z10/2014/3**
    - Handling of ozone depleting substances (ODS)

We thank you for your continued support.

Yours faithfully,

BOAS SIMFUKWE

ACTING REFINERY MANAGER

CC Manager ZEMA – Northern Region

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

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

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

REAGENTS -REFINERY TANKHOUSE

The main reagents used for the metallurgical processing of copper at KCM SmelterCo ltd Nkana Refinery are Lignosulphate and glue. They are ordered through Commercial, drawn and stocked at the Refinery reagent storage shed.

STORAGE

The reagents are kept at the refinery storage shed and transported on demand to the processing section for mixing. The Refinery reagents warehouse is constructed of a concrete floor, concrete walls and iron roofing sheets. The storage shed is secured and well ventilated. Below are the quantities of glue and Lignosulphate that were consumed during the period under review:

Table 1: Reagents used at Refinery

Month	Glue Opening Stock (KG)	Glue Receipt (KG)	Consumed (KG)	Glue Closing Stock (KG)	Lignosulphate Opening Stock (KG)	Lignosulphate Receipt (KG)	Consumed (KG)	Lignosulphate Closing Stock (KG)
Jul-23	28,809.34	0	149.26	28,660.08	38,219.75	0	117.25	38,102.50
Aug -23	28,660.08	0	333.70	28,326.38	38,102.50	0	258.19	37,844.31
Sept-23	28,326.38	0	231.12	28,095.26	37,844.31	0	182.11	37,662.20
Oct-23	28,095.26	0	384.80	27,710.46	37,662.20	0	307.27	37,354.93
Nov-23	27,710.46	0	151.20	27,559.26	37,354.93	0	119.09	37,235.84
Dec-23	27,559.26	0	127.21	27,432.05	37,235.84	0	98.16	37,137.68
TOTAL			**1377.29**				**1088.07**	

Note: No new stock of both glue and Lignosulphate was ordered nor received at Commercial stores during the period under review.

ANODE CASTING STORAGE ROOM

No Barium Sulphate was used during the period under review.

SULPHURIC ACID

KCM SmelterCo Nkana refinery uses Sulphuric acid during the electrolytic refining of copper. It is used as an additive in electrolyte to refine copper anodes to copper cathodes. The transporter for Sulphuric acid from KCM SmelterCo Nchanga to KCM SmelterCo was;

AWET Investments Limited,
Plot No. 5559/6,
Kasuba Road,
Ndola.

STORAGE

The storage facility is surrounded by bund walls which are sufficient to mitigate exposure concerns in an event of a bulk material release. The floor of the storage area is made of impervious material and safety signs are displayed at appropriate places. Access to the area is highly restricted to deter unauthorised entry. Additionally, the area is equipped with emergency spill kits designed to contain, control and clean up spills. Below are the quantities of Sulphuric acid that was transported to KCM SmelterCo Nkana refinery during the period under review.

Table 2: Sulphuric acid received at KCM Nkana refinery

Month	Quantity received (MT)
Jul-23	32.82
Aug -23	91.14
Sept-23	62.72
Oct-23	64.06
Nov-23	92.00
Dec-23	31.64
TOTAL	**374.38**

WATER TREATMENT PLANT

Sodium chloride was used for the water treatment process at KCM SmelterCo Refinery. It is used for softening water that is used at the HFO fired boiler. The table below indicates the amount of sodium chloride that was used at water treatment.

Table 3: Sodium Chloride usage at water treatment

Month	Opening Stock (KG)	Receipt (KG)	Closing Stock (KG)	Consumed (KG)
Jul-23	900	450	900	0
Aug -23	1350	0	1050	300
Sept-23	1050	1000	1750	300
Oct-23	1750	0	1450	300
Nov-23	1450	400	1850	0
Dec-23	1850	0	1550	300
Total		**1850**		**1200**

REAGENTS – ANALYTICAL LABORATORY

KCM SmelterCo Nkana analytical laboratory uses reagents to process various elemental analysis. The analytical laboratory draws the reagents from commercial stores and stocks them in a reagent storage shed which is well ventilated; and has an impermeable concrete floor, concrete walls and secured roofing.

Table 4: Analytical laboratory reagents

No.	Reagent name	Opening stock (01.07.2023)		Receipts		Closing stock (31.12.2023)		Variance (consumed)	
		QTY	UOM	QTY	UOM	QTY	UOM	QTY	UOM
1	Acetic acid					7500	L		L
2	Ammonium hydrogen difluoride	16000	g	0	g	14500	g	1500	g
3	Cupric Sulphate						g		g
4	Nitric Acid	75	g	0	L	50	L	25	L
5	Potassium Thiocyanate	9000	g	0	g	6000	L	3000	L
6	Potassium Iodide	1050	g	0	g	4500	g	6000	g
7	Std Solution Gold 1000mg/l	250	ml	0	ml	125	ml	125	ml
8	Iron Standard solution	1000	ml	0	ml	500	ml	500	ml
9	Std Solution Manganese 1000mg/l	500.	ml	0	ml	250	ml	250	ml
10	Std Solution Silver 1001+/-2 mg/l	0	ml	0	ml	0	ml	0	ml

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

EMISSION LICENCE (EFFLUENT DISCHARGE, Regulation 4)

KCM SmelterCo Nkana refinery uses various management and engineering controls to prevent effluent from reporting to the environment. KCM SmelterCo Nkana refinery has employed Zero discharge to prevent effluent discharge to the environment. Effluent generated from the plant is captured in the ponds and recycled for re-use for other plant operations.

Our Environmental Management System includes actions required to prevent pollutants from entering discharges from the mine and hence the environment. 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.

Pollution Control Actions

The following pollution Control plans are in place;

- Regular cleaning of internal and Plant main drains.
- An effluent recycle pump that pumps effluent to the old power plant cooling water ponds to allow for settling of soluble compounds. A sand filter further treats the effluent to meet process quality requirements before being recycled back into the tank-house for re-use.
- Refinery surfaces are progressively rehabilitated to ease clean-up of any possible spills that may have a potential of ending up in the drains.
- Regular calibration of pH probes to ensure high reading efficiency.
- Programme of identifying water leaks and sealing off the same is ongoing.

EFFLUENT QUALITY IN LICENSED DRAINS

South Uchi

There was no effluent discharged to South Uchi during the period under review. KCM-SmelterCo Nkana is under Zero discharge. Effluent generated is captured, treated and recycled back into the system for re-use for other plant operations.

North Uchi

There was no effluent discharged to North Uchi during the period under review. Effluent discharged is pumped to the old power plant cooling water ponds and recycled back to the system for other plant operations. KCM SmelterCo-Nkana is under Zero discharge.

EMISSION LICENCE (EMISSION TO AIR, Regulation 4)

The permits to emit air pollutants at KCM SmelterCo Nkana refinery relates to the operations of the Anode furnaces No.4, No.5, No. 6 and HFO fired boiler. 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.

Emission Discharge at No.4, No.5 and No.6 Anode Furnaces

The operations at anode furnaces No 4, 5 and 6 were on cold standby during the period under review. No emissions were discharged to the environment.

Emission Discharge at HFO Boiler Stack

Table 5 HFO Boiler stack emissions

Month	Dust mg/Nm^3	CO mg/Nm^3	SO_2 mg/Nm^3	NO_x mg/Nm^3
	50	**100**	**850**	-
Jul-23	37	83	100	736
Aug -23	*	*	*	*
Sept-23	37	98	6	23
Oct-23	38	46	187	62
Nov-23	*	*	*	*
Dec-23	*	*	*	*

Note: * (the HFO boiler was on standby)

Incidents recorded

No emission incidents were recorded during the period under review.

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

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 in the used oil tank. The storage area has an impervious floor and sufficient concrete bund wall capable of containing massive bulk spills if the tank were to suffer a catastrophic leak of the liquid. Spent fluorescent tubes generated are stored and crushed in fabricated storage drums within the plant premises. Used batteries are stored in the hazardous material storage shed

which is secure and has restricted access. The used batteries are disposed of through recycling/reuse through contractors.

USED OIL INVENTORY

Table 6: Shows the amount of used oil that was generated and stored during the period under review

Month	Generated
Jul-23	20
Aug -23	840
Sept-23	86
Oct-23	0
Nov-23	0
Dec-23	0
TOTAL	**946**

NOTE: Unit of measure is liters

USED BATTERIES INVENTORY

Table 7: Indicates the amount of spent batteries that was generated and disposed/sold during the period under review

Month	Opening Stock	Generated	Stored	Sold	Closing Stock
Jul-23	109	0	112	0	109
Aug -23	109	0	112	0	109
Sept-23	109	2	111	0	111
Oct-23	111	0	111	0	111
Nov-23	111	1	112	0	112
Dec-23	112	0	112	0	112
TOTAL	109	**3**	**112**	**0**	**112**

Note: Unit of measure is each.

FLUORESCENT TUBES INVENTORY

Table 8: Shows the amount of spent fluorescent tubes that was generated and crushed during the period under review

Month	Generated	Crushed
Jul-23	1	1
Aug -23	10	10
Sept-23	0	0
Oct-23	1	1
Nov-23	3	3
Dec-23	2	2
TOTAL	17	17

Note: Unit of measure is each.

SCRAP LEAD INVENTORY

No scrap lead was generated nor stored during the period under review.

SPENT ELECTROLYTE INVENTORY

During the period under review, a total of 1,401.00 MT of spent electrolyte was generated at Refinery Tank house and transported to Tailings leach plant in Nchanga for re-use.

Table 9: Spent electrolyte

Month	Generated (MT)
Jul-23	86.70
Aug -23	229.08
Sept-23	293.28
Oct-23	50.14
Nov-23	25.22
Dec-23	716.58
TOTAL	**1401.00**

GENERATION OF HEALTH CARE WASTE

Clinical waste generated from the mine clinic and plant site clinic is collected and transported to Kitwe teaching hospital for incineration. The clinical waste is transported in specialized secured containers which have warning signs. No incidences/accidental spillages relating to the transportation of healthcare waste were recorded during the period under review. The quantities generated are presented in Table 10 below:

Table 10: Clinical waste generated during the period under review

Month	Generated (MT)	Disposed through incineration (MT)
Jul-23	0.078	0.078
Aug -23	0.075	0.075
Sept-23	0.065	0.065
Oct-23	0.072	0.072
Nov-23	0.100	0.100
Dec-23	0.180	0.180
TOTAL	**0.570**	**0.570**

GENERATION, TRANSPORTATION AND HANDLING OF EXPIRED CHEMICALS

During the period under review there was no generation, transportation and handling of expired chemicals.

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

WASTE MANAGEMENT LICENCE

KCM Nkana refinery has reclaimed the slag from the dump following its reclamation program which was initiated in May 2017 with the last reclamation being done in October, 2021. Dumping of slag on the dump ceased in February 2009. The entry to the slag dump is strictly by authorization from the security team which is re-enforced by the state paramilitary police. The statutory monitoring of the dump was conducted on 31st March 2020 by Knight Piesold. KCM Nkana refinery is in the process of engaging Misenge Technical and Engineering Services (METS) for the monitoring of radiation at the slag dump as per new licence conditions radioactive. The target date for commencement of radioactive monitoring is 31st March 2024.

Table 11: Slag dump No.67

Area (Hectares)	Slag reclaimed by KCM during the period under review (tons)	Slag as at 31.12.2023 (tons)
11.83	0	5,600

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

OZONE DEPLETING SUBSTANCES LICENCE

Ozone depleting substances are used in refrigeration and air conditioning equipment in office buildings.

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 to 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. R410a was used on the plant for servicing and repairing air conditioners and fridges. The gas is stored in cylinders and kept at the instrumentation workshop which is well secured. During the period under review 1.3 Kg of R410a was used for servicing air conditioners.

Actions to prevent contamination to the environment:

- Testing for leakage of refrigerants.
- Monitoring of monthly Ozone Depleting Substances (ODS) consumption.

The table below shows the amount of R410a that was used during the period under review.

Table 12: Ozone depleting substances

Month	Ozone depleting substance	Quantity	Ozone Depleting Potential**	CFC Equivalent for the quarter	Sources of emission/area of usage
Jul-23	R-410a	0.1	0.0	0.0	Air Conditioners and Refrigeration
Aug -23	R-410a	0.0	0.0	0.0	Air Conditioners and Refrigeration
Sept-23	R-410a	0.0	0.0	0.0	Air Conditioners and Refrigeration
Oct-23	R-410a	0.0	0.0	0.0	Air Conditioners and Refrigeration
Nov-23	R-410a	0.2	0.0	0.0	Air Conditioners and Refrigeration
Dec-23	R-410a	0.0	0.0	0.0	Air Conditioners and Refrigeration
Total		**0.3**	0.0	0.0	

NOTE: Unit of measure is Kg.

Ground Water Quality

There is historical contamination of ground water at KCM SmelterCo Nkana refinery which has been identified as a joint liability with Mopani Copper Mines. KCM SmelterCo Nkana engaged Golder Associates, an independent competent consultant who conducted a detailed study of contaminated ground water and flow movements. The tables below outlines monitoring results for ground water during the period under review.

Table 13 Borehole monitoring data

SAMPLE DATE	SAMPLE DESCRIPTION	BOREHOLE ID	pH	TCu (ppm)	TCo (ppm)	TFe (ppm)	TMn (ppm)	DCu (ppm)	DCo (ppm)	DFe (ppm)	DMn (ppm)	Sulphates
July -23	Settling ponds	NK-WM-01	4.3	1.9	0.5	0.6	1.9	1.1	0.5	0.3	1.9	313
	HFO Day Tanks	NK-WM-02	4.9	1.6	0.5	0.6	1.9	1.0	0.5	0.2	1.8	209
	Main HFO Tanks	NK-WM-03	3.4	2868.0	395.0	23.0	583.0	2722.0	358.0	0.5	558.8	5041
	Mining siding Acid L/bay	NK-WM-04	4.9	16.9	1.8	1.2	7.3	12.7	1.6	0.4	7.5	128
	Copper loading bay	NK-WM-05	5.0	92.0	4.0	1.0	13.6	92.0	4.0	0.2	13.5	84
	Refinery Northern boundary	NK-WM-06	5.1	1.7	0.5	0.7	2.0	1.4	0.5	0.0	1.9	101
	No. 4 Acid plant	NK-WM-07	4.3	1.9	0.5	0.6	2.0	1.1	0.5	0.3	1.9	313
	No. 3 Acid plant	NK-WM-08	4.9	1.6	0.5	0.6	1.9	1.0	0.5	0.2	1.8	209
WHO DRINKING WATER STANDARDS		-	**1.00**	**N/A**	**2.00**	**0.01**	-	-	-	-	-	

Note: Nkana refinery has been unable to analyze elementals (Cu, Co, Fe, Mg, Ca) in borehole samples since August 2023, due to break down of atomic absorption spectrometer (AAS). The new AAS has since being procured awaiting installation. The target date for closure is 10th February 2024

Table 15 Borehole monitoring data

SAMPLE DATE	SAMPLE DESCRIPTION	BOREHOLE ID	pH	TSS (ppm)	TDS (ppm)	Conductivity (µS/m)	Sulphates
Nov-23	Settling ponds	NKWMC 01	6.4	251	727	905	97
	HFO Day Tanks	NKWMC 02	6.2	342	724	909	88
	Main HFO Tanks	NKWMC 03	4.6	25	3125	3909	1040
	Mining siding Acid L/bay	NKWMC 04	5.0	218	2098	2628	302
	Copper loading bay	NKWMC 05	5.0	14	1840	2311	104
	No. 3 Acid plant	NKWMC 08	6.4	2	725	911	99
Dec-23	Settling ponds	NKWMC 01	6.3	7	495	710	97
	HFO Day Tanks	NKWMC 02	6.1	6	474	680	88
	Main HFO Tanks	NKWMC 03	4.8	30	2078	2980	1040
	Mining siding Acid L/bay	NKWMC 04	5.8	44	1433	2054	302
	Copper loading bay	NKWMC 05	6.0	220	1346	1930	104
	No. 3 Acid plant	NKWMC 08	6.4	11	464	666	99

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MATILDAH CHINYAMA

ACTING ENVIRONMENTAL COORDINATOR

pp .....

MUNKONDYA MOSES

MANAGER ENVIRONMENT SMELTERCO

Table 14 Borehole monitoring data

SAMPLE DATE	SAMPLE DESCRIPTION	BOREHOLE ID	pH	TSS (ppm)	TDS (ppm)	Conductivity (µS/m)	Sulphates
Aug-23	Settling ponds	NKWMC 01	4.1	19	658	944	114
	HFO Day Tanks	NKWMC 02	4.9	241	649	931	237
	Main HFO Tanks	NKWMC 03	3.2	318	14039	20131	3951
	Mining siding Acid L/bay	NKWMC 04	5.0	22	1392.	1997	239
	Copper loading bay	NKWMC 05	4.2	38	1430	2051	1391
	No. 3 Acid plant	NKWMC 08	4.0	50	722	1036	1433
Sep-23	Settling ponds	NKWMC 01	5.0	110	623	894	313
	HFO Day Tanks	NKWMC 02	4.4	230	621	890	239
	Main HFO Tanks	NKWMC 03	4.7	361	19597	28100	4982
	Mining siding Acid L/bay	NKWMC 04	3.7	10	1474	2113	1312
	Copper loading bay	NKWMC 05	3.6	7	1544	2214	901
	No. 3 Acid plant	NKWMC 08	3.0	81	862	1236	142
	Settling ponds	NKWMC 01	5.0	7	637	9.14	208
	HFO Day Tanks	NKWMC 02	4.3	44	636	9.12	147
	Main HFO Tanks	NKWMC 03	3.9	210	19457	27900	5381
	Mining siding Acid L/bay	NKWMC 04	3.8	3	1627	2334	1441
	Copper loading bay	NKWMC 05	4.1	15	1617	2319	1309
	No. 3 Acid plant	NKWMC 08	3.9	8	1098	1575	1213