



Ekurhuleni
METROPOLITAN MUNICIPALITY

**CITY OF EKURHULENI
DEPARTMENT OF HEALTH AND SOCIAL DEVELOPMENT
ENVIRONMENTAL HEALTH DIVISION**

**APPLICATION FORM FOR ATMOSPHERIC EMISSION LICENCE / PROVISIONAL ATMOSPHERIC
EMISSION LICENCE IN TERMS OF CHAPTER 5 OF THE NATIONAL ENVIRONMENTAL
MANAGEMENT: AIR QUALITY ACT, 2004 (ACT NO. 39 OF 2004)**

Ekurhuleni Air Quality Officer
Health and Social Development Department
P O Box 4
Alberton
1450

Tel: (011)999 2470
Email: Edmund.Van.Wyk@ekurhuleni.gov.za

Name of Enterprise: Kusasa Refining (Pty) Ltd

Declaration of accuracy of information provided:

Application for an atmospheric emission licence / provisional atmospheric emission licence as envisaged in chapter 5 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004).

I, A. Grobbelaar [*delegated by the Accounting Officer*], declare that the information provided in this application or attached to the application is, to the best of my knowledge, in all respects factually true and correct. I am aware that the supply of false or misleading information in the application form is a criminal offence in terms of section 51(1)(f) of the Act.

Signed at Wadeville on this 18 day of March 2026



SIGNATURE

General Manager
CAPACITY OF SIGNATORY

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NB: PLEASE COMPLETE ALL SECTIONS. KINDLY MARK WITH AN X IN SPACES WHERE APPLICABLE. IF THE SPACE PROVIDED IS INSUFFICIENT, THE REQUIRED INFORMATION MAY BE SUBMITTED IN THE FORM OF A MEMORANDUM. ATTACH REQUIRED MAPS AND SKETCHES. GRAPHICS MUST BE CLEAR, LABELED AND, WHERE APPLICABLE.

1 TYPE OF APPLICATION

	New Application		Transfer
	Renewal	X	Variation/Amendment/Review

Current APPA Permit / Atmospheric Emission Licence Number:	14/1/1/7/8/188/Kusasa/Wadeville/ALB
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2 ENTERPRISE INFORMATION

Enterprise Name	Kusasa Refining Proprietary Limited
Trading As	Kusasa Refining Proprietary Limited
Type of Enterprise, e.g. Company/Close Corporation/Trust, etc	Company
Company/Close Corporation/Trust Registration Number (Registration Numbers if Joint Venture)	2018/235292/07
Registered Address	535 Murray Road, Wadeville
Postal Address	P.O. Box 14079, Wadeville, 1422
Telephone Number (General)	082 084 4497
Fax Number (General)	N/A
Industry Type/Nature of Trade	Metal Recovery / Precious Metals Refiner and Trader
Land Use Zoning as per Town Planning Scheme	Industrial Area
Land Use Rights if outside Town Planning Scheme	N/A

Responsible Person Name or Emission Control Officer (where appointed)	Kabelo Mashabela
Telephone Number	010 001 6284
Cell Phone Number	063 827 0762
Fax Number	N/A
E-mail Address	production2@kusasarefining.co.za
After Hours Contact Details	063 827 0762

3 SITUATION AND EXTENT OF PLANT

3.1 Location and extent of plant

Physical Address of the Plant	Corner of Murray and Wadeville Road, Wadeville, Germiston
Description of Site (Where No Street Address)	N/A
Coordinates of Approximate Center of Operations	North-south: 26° 15' 34.88" S East-west: 28° 10' 50.95" E
Extent (km ²)	3 200 m ²
Elevation Above Mean Sea Level (m)	1 583 m
Province	Gauteng
Metropolitan /District Municipality	Metropolitan
Local Municipality	City of Ekurhuleni
Designated Priority Area	Highveld Priority Area

3.2 Description of surrounding land use (within 5 km radius)

Kusasa Refining is located at the intersection of Rossouw and Murray Roads, in the industrial area of Wadeville. The closest residential areas to the facility are Mimosa Park, about 300 m north north-west; and Lambton Gardens, about 400 m north north-east of the site. Other nearby residential area include Estera, Castlevue, Dinwiddie, Elsburg, Lambton, Albemarle, Verwoerdpark, Delville, Tedstone Ville and Reiger Park.

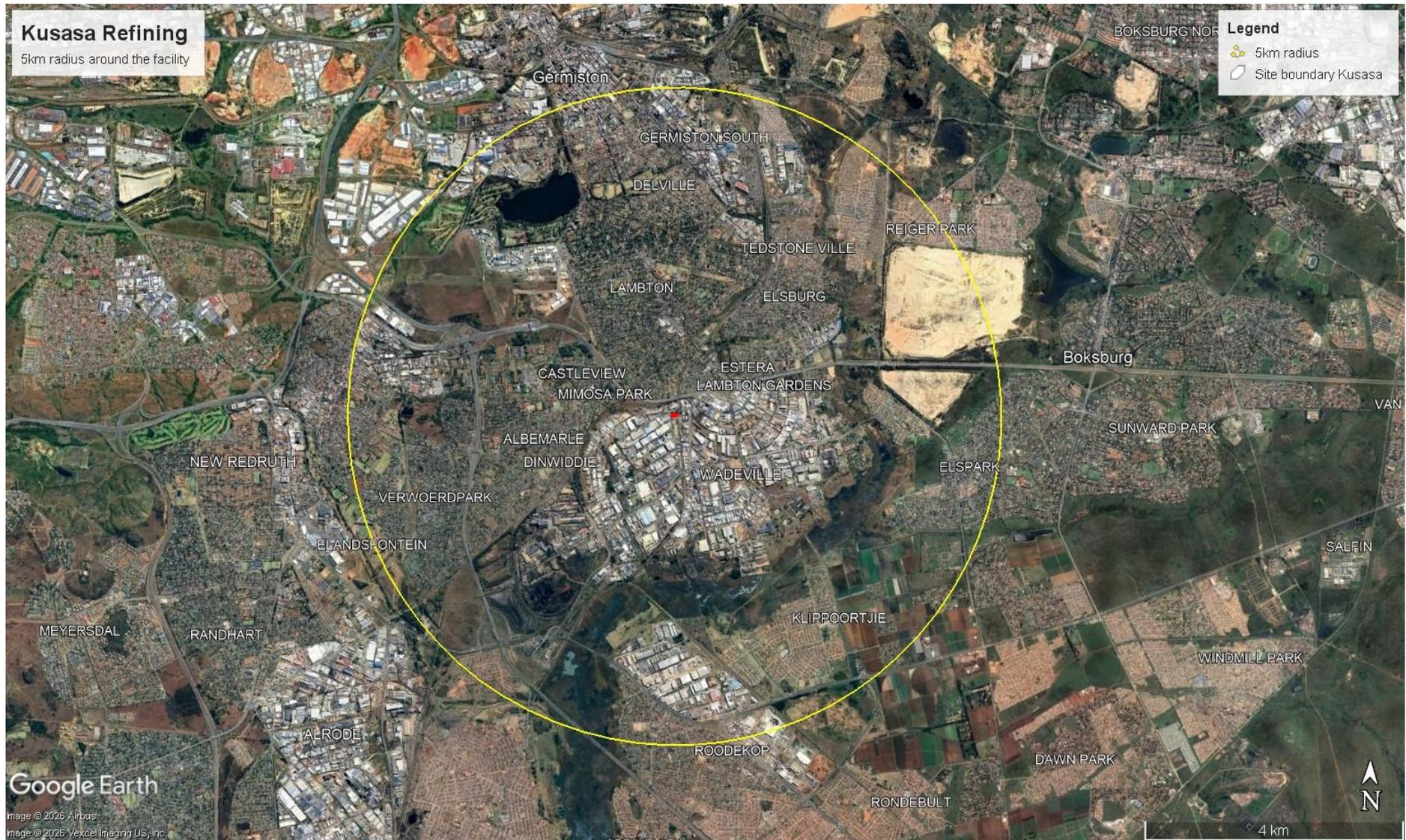


Figure 1: Location of Kusasa Refining and residential areas within a 5 km radius



Figure 2: Site layout of Kusasa Refining

4 NATURE OF PROCESS

4.1 Process description

Kusasa Refining specialises in extracting precious and base metals from jewellery waste materials (i.e. jewellery scrap metals) and mined material through chemical treatment. The jewellery waste and mined material mainly consist of metallic ingots and broken individual jewellery items in some cases. Kusasa Refining extracts the precious metals using chemical treatment – either via aqua regia or electrowinning

The process for refining precious metals (PMs) focuses on gold, silver, and the following proposed platinum group metals (PGMs) refining: platinum, palladium, rhodium, iridium, and ruthenium. The process-intent is to, in an economically efficient and environmentally conscious manner, separate these elements into saleable products into both the local and international markets. Depending on the element the saleable product might be a refined bullion bar, pure powder, metal-salt powder or sludge(s).

The process commences with the raw material obtained in the form of a crude impure bar containing the PMs and other dilutants from suppliers' processes like copper, zinc, iron and others. The bars are accepted with full documentation, weighted, classified and sampled. The samples are processed, typically in-house, with the standard fire assay and ICP processes that's already in use to obtain accurate indicators of the bars' precious metal contents.

The sampled bars are grouped and aggregated until a production-ready batch is formed.

For PGM-containing batches the production size will be such that the volume is compatible with all unit process as well as regulatory limits imposed by the existing AEL. The production batch is first granulated in a high-temperature induction melter. The granulated metal grain/flake is fed into an existing acid parting process that aims to dissolve the contained silver, palladium and base metals, leaving the gold and other PGMs as undissolved solids. The resultant solution is mixed with another acid to precipitate silver-cement as a product to be filtered out. The silver sediment proceeds to an existing silver processing circuit where it is processed to nearly pure metallic silver powder. This powder is melted into silver bars and introduced to the electrowinning cell(s) for further refining to 99.99% pure silver crystals for melting, sampling and sale.

The acid solution that previously would've only been neutralized, filtered for copper sludge, and stored for collection by waste contractor, is now further treated with organic complexing agent in a mixing tank to create a yellow palladium precipitation salt to be recovered via filtering. The filtered salt is heated in the existing roasting/calcining muffle furnace. The roast drives off the organics, moisture and chlorides (all to be directed into the wet scrubbing circuit for capture) to leave a crude palladium sponge that is melted in the current induction melter and cast into a pure bullion bar for sampling and sale.

The undissolved solids from the acid parting step is fed into an aqua regia reactor for dissolution. After 6 hours the tank is emptied onto a filter. Iridium and ruthenium remains undissolved whereas the gold, platinum and rhodium will be dissolved. The iridium and ruthenium are oxidized in the roasting muffle furnace to produce compounds that can be subsequently dissolved in aqua regia. The aqua regia solution from the reactor proceeds to mixer tank for conditioning before gold precipitation. The conditioned solution is mixed with a reductant, facilitating precipitation into suspended metallic gold particles. The gold powder is filtered out, washed, dried and melted (in an existing melter) into pure bullion bars for sampling and sale.

The filtered solution proceeds to a subsequent mixer tank for pH conditioning and concentration prior to platinum precipitation. The resultant platinum salt solid is filtered out, washed, and heated in the roasting muffle furnace. A platinum sponge is obtained that is melted in a high-temperature induction furnace to yield a bullion bar for sampling and sale.

At this stage rhodium, iridium and ruthenium are still in solution for recovery. A mixer tank is used to contact the solution with a strong alkaline base causing rhodium-hydroxide to precipitate out as a solid. The sediment is filtered, washed, and heated in the muffle furnace to yield a rhodium-rich sponge for melting, sampling and sale.

Iridium is dropped from solution to produce an iridium precipitate. This salt is filtered out, washed, and heated in the muffle furnace to yield a crude iridium sponge. The powder product is sampled and stored as-is for sale.

The solution is then mixed and conditioned to favour the formation of ruthenium-hydroxide precipitate. This brown-black salt is filtered, washed and heated in the roasting muffle furnace to yield a crude ruthenium-oxide sponge for sampling and sale.

The now-barren solution is lastly mixed with zinc powder to ensure all remaining trace precious metals are cemented out of solution prior to the liquid proceeding to the effluent treatment circuit. The solution is neutralised resulting in copper (and other base metals if present) precipitating out as hydroxides in sludge form. This sludge is separated from the effluent with a filter press, recovered and stored for offtake into the market. The effluent is stored in tanks for removal by accredited and registered waste contractors for responsible treatment and disposal.

4.2 Listed activities

List all Listed Activities, as published in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), proposed to be conducted at the premises in terms of this application:

Listed Activity Number	Category of Listed Activity	Sub-category of the Listed Activity	Name of the Listed Activity	Description of the Listed Activity
1	4	4.17	Precious and base metal production and refining	The production or processing of precious and associated base metals through chemical treatment

4.3 Unit process

List all unit processes associated with the listed activities in operation at the premises by the atmospheric emission licence holder, highlighting unit processes proposed in respect of this application:

Unit Process	Unit Process Function	Batch or Continuous Process
Granulation melter	Impure jewellery scrap metals are granulated in electric induction melters.	Batch
Refining reactor	Use of HCl and HNO ₃ to chemically refine and treat the precious metals into separation of silver and gold pure metals.	Batch
Electrowinning baths	Used to purify relatively pure precious and base metals via application of electrical current into an electrolyte liquid that contains dissolved precious metals.	Batch
Assaying oven	Used in the fire assay process for cupellation where gold analysis is conducted.	Batch
Assaying fume hood	Used in the fire assay process for dissolution where impure constituents are removed.	Batch
Effluent treatment	Spent acids and process liquids are neutralised and filtered to recover precious sludge, storage of neutral process grey water in outside tanks for disposal by an accredited waste handler.	Batch
Pure metal melter	The final pure metal sponge is melted and cast into ingots, plates or bars for sale or reuse.	Batch

*Unit process means a single component (equipment) with identifiable inputs and outputs within a process flow. A series of unit processes make up the full manufacturing process, for example, boiler, furnace, distillation column, etc.

4.4 Hours of operation

Provide the hours of operation of all unit processes associated with the listed activities in operation at the premises by the atmospheric emission licence holder, highlighting unit processes proposed in respect of this application:

Unit Process	Operating Hours	Number of Days Operated per Year
Granulation melter	24	365
Refining reactor	24	365
Electrowinning baths	24	365
Assaying oven	24	365
Assaying fume hood	24	365
Effluent treatment	24	365
Pure metal melter	24	365

4.5 Graphical process information

Attach the following for the entire operation being undertaken at the site of the works:

- Simplified block diagram with the name of each unit process in a block; showing links between all unit processes or blocks.
- Process flow chart(s) clearly indicating inputs, outputs and emissions at the site of works, including points of potential fugitive emissions and emergency releases.
- Site layout diagram (plan view and to scale) indicating location of unit processes, plants, buildings, stacks, stockpiles and roads (include true north arrow and scale).

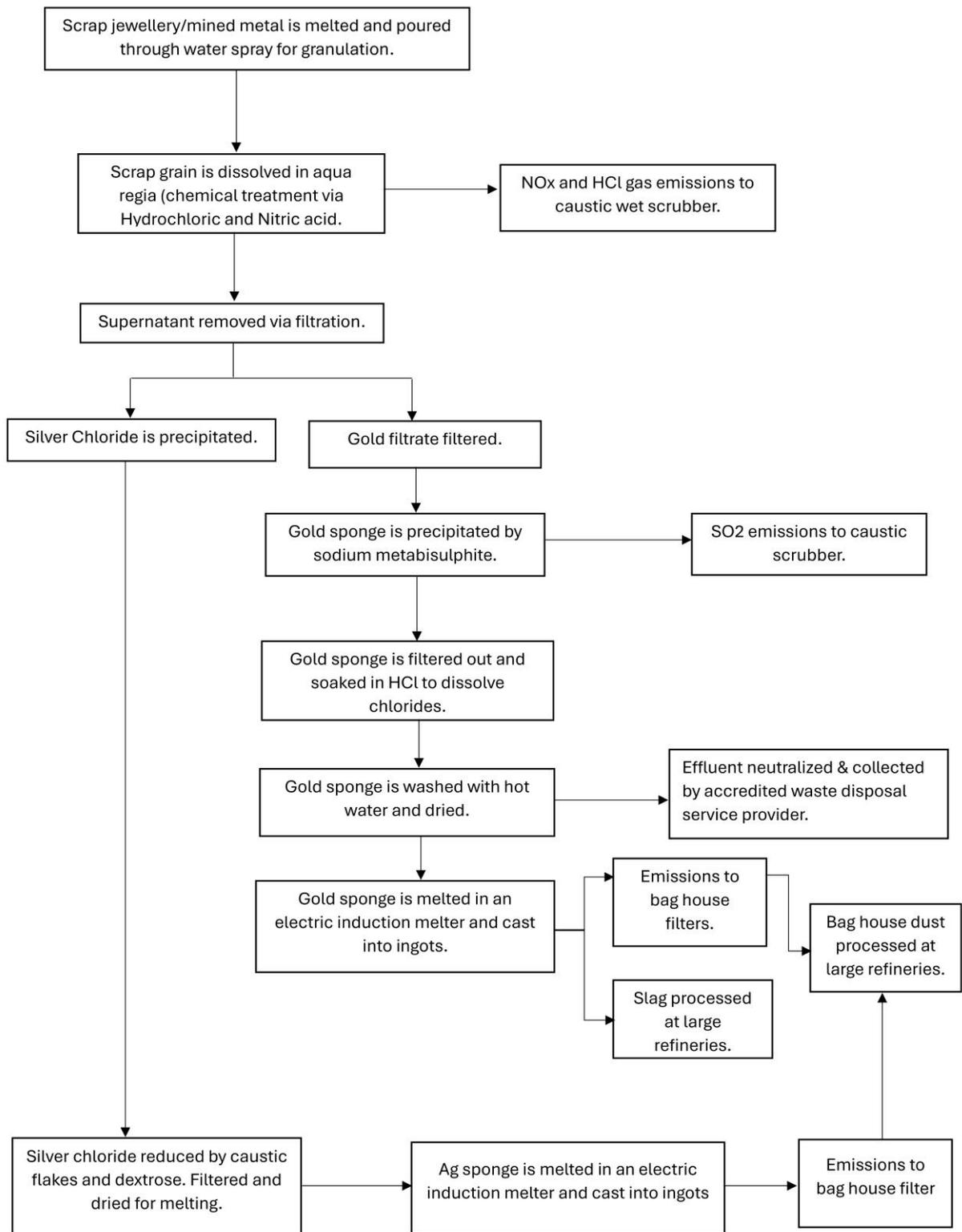


Figure 3: Simplified process flow diagram for current Kusasa Refining

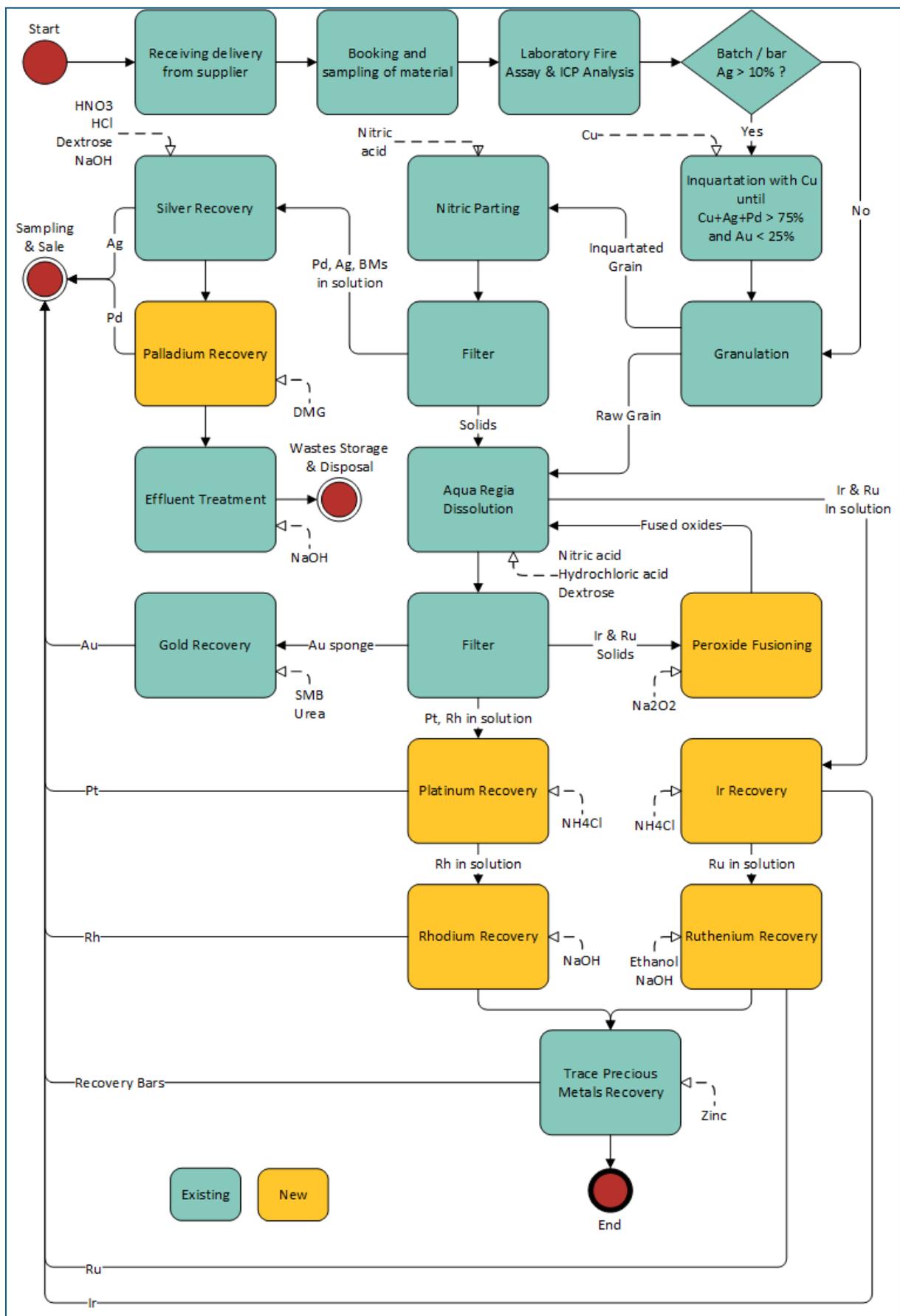


Figure 4: Simplified process flow diagram for proposed Kusasa Refining

5 RAW MATERIALS AND PRODUCTS

Provide raw material information, production and by-production rates and emissions information.

5.1 Raw materials used

Raw Material Type	Maximum Permitted Consumption Rate (Quantity)	Design Consumption Rate (Quantity)	Actual Consumption Rate 2025 (Quantity)	Units (Quantity/Period)
jewellery waste	28	28	3.9	tonne/annum
hydrochloric acid	25 920	25 920	1 750	litres/month
nitric acid	19 200	19 200	500	litres/month
sodium metabisulfite	5 280	5 280	158	kg/month
ammonium chloride	7 200	7 200	★	kg/month
sodium hydrosulphide	300	300	100	kg/month
ethanol	120	120	5	litres/month
mine waste (rudimentary bars)	3	3	1.47	tonne/month
sodium hydroxide	11 580	11 580	1 200	litres/month
dimethylglyoxime	3 000	3 000	★	kg/month
soda ash	200	200	50	kg/month
zinc	114	114	★	kg/month
sodium peroxide	4 800	4 800	★	kg/month
hydrogen peroxide	10	10	★	litres/month
urea	1 920	1 920	50	kg/month
dextrose	100	100	70	kg/month
borax	800	800	400	kg/month

★ New chemical

5.2 Production rates

Production Name	Maximum Production Capacity Permitted (Quantity)	Design Production Capacity (Quantity)	Actual Production Capacity 2025 (Quantity)	Units (Quantity/Period)
gold	160	160	8	kg/day
silver	80	80	16	kg/day
platinum	40	40	★	kg/day
palladium	40	40	★	kg/day
rhodium	20	20	★	kg/day
iridium	20	20	★	kg/day
ruthenium	20	20	★	kg/day

★ New product

By-Product Name	Maximum Production Capacity Permitted (Quantity)	Design Production Capacity (Quantity)	Actual Production Capacity 2025 (Quantity)	Units (Quantity/Period)
copper	100	100	5	kg/day
slag	60	60	60	kg/day

5.3 Materials used in energy sources

The applicant must specify the materials used in energy sources, namely, coal, oil, gas or wood.

Materials for Energy	Sulphur Content of the Material (%)	Ash Content of Material (%)	Maximum Permitted Consumption Rate (Quantity)	Design Consumption Rate (Quantity)	Actual Consumption Rate 2025 (Quantity)	Units (Quantity/Period)
Electricity	N/A	N/A	2 432	2 432	1 420	kWh/day
LPG			700	700	45	kg/month
diesel					19	litres/hour

5.4 Sources of atmospheric emission (including all tiers of greenhouse gas)

Provide emissions averaging periods that correspond to the averaging periods as set out in the national ambient air quality standards published under Government Notice No. 1210, Gazette No. 32816 dated 24 December 2009, and/or the minimum averaging periods of the relevant pollutant in relation to its health impact.

5.4.1 Point source parameters

Unique Stack ID	Source Name	Latitude (decimal degrees)	Longitude (decimal degrees)	Height of Release Above Ground (m)	Height Above Nearby Building (m)	Diameter at Stack Tip / Vent Exit (m)	Actual Gas Exit Temperature (°C)	Actual Gas Volumetric Flow (m ³ /hr)	Actual Gas Exit Velocity (m/s)
SV001	Scrubber stack (linked to chemical processes)	26° 15' 34.54" S	28° 10' 52.07" E	9	0	0.78	28.1	6 432	3.6
SV002	Baghouse stack (linked to the induction melting processes)	26° 15' 35.08" S	28° 10' 52.20" E	8	0	0.49	45.7	4 464	6.3

*Point source means a single identifiable source and fixed location of atmospheric pollution, e.g. stack, chimney, etc.

5.4.2 Point Source Emissions

Provide emission values as being measured under normal conditions of 273 K, 101.3 kPa, specific oxygen percentage and dry gas.

As per 5.4.1 ID	Pollutant Name	Maximum Release Rate				Emissions Hours	Type of Emissions (Continuous / Routine but Intermittent / Emergency Only)
		(mg/Nm ³)	(mg/Am ³)	(kg/hr)	(tpa)		
SV001	PM	50	40	0.26	2.27	24	Routine but intermittent
	Cl ₂	50	40	0.26	2.27	24	Routine but intermittent
	SO ₂	400	322	2.07	18.15	24	Routine but intermittent
	HCl	30	24	0.16	1.36	24	Routine but intermittent
	HF	30	24	0.16	1.36	24	Routine but intermittent
	NH ₃	100	81	0.52	4.54	24	Routine but intermittent
	NO _x	300	242	1.55	13.61	24	Routine but intermittent
SV002	PM	50	38	0.17	1.49	24	Routine but intermittent
	Cl ₂	50	38	0.17	1.49	24	Routine but intermittent
	SO ₂	400	304	1.36	11.90	24	Routine but intermittent
	HCl	30	23	0.10	0.89	24	Routine but intermittent
	HF	30	23	0.10	0.89	24	Routine but intermittent
	NH ₃	100	76	0.34	2.98	24	Routine but intermittent
	NO _x	300	228	1.02	8.93	24	Routine but intermittent

5.4.3 Point source current emissions monitoring

Provide information on emission monitoring requirements.

As per 5.4.1 ID	Emission Sampling / Monitoring Method	Sampling Frequency	Sampling Duration	Measured Parameters
SV001	Sampling as required in part 2. Section 5, 6 and 7 of GN 893 of 22 November 2013, as amended.	Annually	As required in Part 2 Section 18(b) (v) of GN893 of 22 November 2013, as amended.	Air pollutants listed in listed subcategory 4.17.
SV002	Sampling as required in part 2. Section 5, 6 and 7 of GN 893 of 22 November 2013, as amended.	Annually	As required in Part 2 Section 18(b) (v) of GN893 of 22 November 2013, as amended.	Air pollutants listed in listed subcategory 4.17.

5.4.4 Point source emission estimation information

As per 5.4.1 ID	Basis for Emission Rates
SV001	MES for 4.17
SV002	

5.4.5 Area and/or line source parameters

Unique Area Source ID	Source Name	Source Description	Latitude (decimal degrees) of SW corner	Longitude (decimal degrees) of SW corner	Height of Release Above Ground (m)	Length of Area (m)	Width of Area (m)	Angle of Rotation from True North (°)
GEN	Generator	Diesel fumes from site electrical generator (open air fugitive source)	26°09'92"S	28°24'86"E	2.2	4.5	1.3	0

*Area source means air pollution source from a specified area, e.g., pollution from a landfill site, fugitive dust from a process.

*Line source means a moving source of pollutants, e.g., motor vehicles.

5.4.6 Area and/or line source emissions

As per 5.4.5 ID	Pollutant Name	Maximum Release Rate (quantity per period)	Average Annual Release Rate (quantity per period)	Emission Hours	Type of Emission (Continuous / Intermittent)	Wind Dependent (Yes / No)
GEN	PM, NO _x , SO ₂	-	-	Dependant on power outages	Intermittent	No

5.4.7 Area and/or line source – management and mitigation measures

Provide information on management and mitigation measures.

As per 5.4.5 ID	Description of Specific Measures	Timeframe for Implementation of Specific Measures	Method of Monitoring Measure Effectiveness	Contingency Measure
GEN	Diesel fumes from site electrical generator (open air fugitive source)	Immediately	As required by maintenance procedures and service book	Maintenance

6 APPLIANCES AND MEASURES TO PREVENT AIR POLLUTION

6.1 Appliances and control measures

Provide information on appliances and measures implemented to prevent air pollution for the entire operation at the site of the works, highlighting information for listed activity or activities proposed in respect of this application.

Appliances				Abatement Equipment Control Technology							
Associated Unique Stack ID	Appliance / Process Equipment Number	Appliance Type / Description	Appliance Serial Number	Abatement Equipment Manufacture Date	Abatement Equipment Name and Model	Abatement Equipment Technology Type	Commission Date	Date of Significant Modification / Upgrade	Design Capacity	Minimum Control Efficiency (%)	Minimum Utilization (%)
SV001	Reactors	Refining processes	Au pre-scrubber (BR800, BR100, PR001 and PR002), lab fume hoods, silver cells, nitric parting tank, AG reactor, neutralisation tank, acid holding tanks. <u>PGM pre-scrubber (titanium reactor, PGM precipitation tanks), neutralisation tank.</u>	April 2017	SG plastic polyprop caustic wet scrubber	Wet scrubber	October 2017	Unknown	9 522 Nm ³ /hr	99	100
SV002	Induction melters, lab furnaces	Melting process, cupellation and annealing	Induction melters (melter1-3), lab furnaces (LE0019, LE0020, LE0021), front loading furnace. <u>Process Makina melter, SuperbMelt melter, roasting muffle furnace</u>	November 2018	Dust extraction baghouse	Baghouse	December 2018	Unknown	TBC	99	100

6.2 Start-up, maintenance and shut-down conditions

List potential start up, maintenance, shut down, upset conditions and associated responses related to the operations at the site of the works, highlight possible releases and responses for the proposed listed activity or activities in respect of the current application.

Unit Process	Description of Occurrence of Potential Releases	Pollutants and associated amount of emissions	Briefly Outline Back Up Plan

6.3 Routine reporting and record-keeping

6.3.1 Complaints register

Is a complaints register maintained at the site works?

X	Yes	
	No	
	To be initiated, by date:	

Please provide a copy of complaints received and corrective actions taken over the past two years.

7. DISPOSAL OF WASTE AND EFFLUENTS ARISING FROM ABATEMENT EQUIPMENT CONTROL TECHNOLOGY

Provide the following information for any waste and effluent arising from abatement equipment control technology that are currently in place at the site of the works:

Unique Stack or Area ID (As per 5.4.1 or 5.4.5 above)	Waste / Effluent Type	Hazardous Components Present	Method of Disposal
SV001	Spent scrubbing liquid	Caustic soda and sodium hydrosulphide	Neutralisation of liquid to pH=7, then filtration to remove all solids. The removal by accredited hazardous waste management specialists to secure offsite treatment and final disposal.
SV002	Baghouse dust	Traces of zinc, lead and gold	To be gathered until there is a batch large enough to be sold to larger refineries for recovery of residual precious metals.

