forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
**REPUBLIC OF SOUTH AFRICA**

APPLICATION FORM FOR EXCLUSION OF WASTE STREAM OR PORTION OF WASTE STREAM FROM THE DEFINITION OF WASTE IN TERMS OF GN 715 OF 18 JULY 2018.

| | (For official use only) |
|---|---|
| File Reference Number: | 12/9/11 |
| NEAS Reference Number: | |
| Date Received: | |

Application for exclusion of waste stream or portion of waste stream in terms of the National Environmental Management: Waste Act, 2008(Act No.59 of 2008), as amended.

**Kindly note that:**

1. This application form is current as of 18 July 2018. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

2. The application must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. Spaces are provided in tabular format and will extend automatically when each space is filled with typing.

3. Where applicable **black out** the boxes that are not applicable in the form.

4. Incomplete applications may be returned to the applicant for revision.

5. The use of the phrase “not applicable” in the form must be done with circumspection. Should it be done in respect of material information required by the competent authority for assessing the application, it may result in the refusal of the application as provided for in the Regulations.

6. This application must be handed in at the offices of the relevant competent authority as determined by the Act and regulations.

7. Unless protected by law, all information filled in on this application will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this application on request, during any stage of the application process.

**Queries must be addressed to the contact hereunder:**

**Departmental Details**

| |
|---|
| **Postal address:**<br>Department of Environment, Forestry and Fisheries<br>Attention: Director: Licensing<br>Private Bag X447<br>Pretoria<br>0001<br><br>**Physical address**:<br>Department of Environment, Forestry and Fisheries<br>Environment House (473 Steve Biko Rd, corner Steve Biko and Soutpansberg Rds)<br>Arcadia X6<br>PRETORIA<br>0002<br><br>Application queries should be directed to the Directorate: Licensing on:<br><br>Tel : 012 3999 791 Email: Lmahlangu@environment.gov.za |

**COMMENCEMENT: Has the activity (ies) commenced: Yes or No**

**If yes, When (provide the Year, Month and Date):**

| | | | |
|---|---|---|---|
| **WASTE STREAM/PORTION OF WASTE STREAM** | **>10 years ago** | | |
| Sodium Chloride (NaCl) residues generated from the effluent treatment process and plant at Anglo American Platinum (AAP) Precious Metal Refiners (PMR) site | | | |

**BENEFICIAL USE**

| |
|---|
| As a raw material for the soap and detergent manufacturing industry. Other potential uses could be in pulp and paper, textiles, glass and dyes industries or for de-icing roads. |

**SITE GPS CO-ORDINATES**

Please provide the geographic co-ordinates of **all corners** of the waste generating site; in degrees, decimal minutes, and seconds for all sites (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site). Provide geographic coordinates for all corners of the facility (ies) ONLY THE FORMAT PRESCRIBED (e.g. $60^0$ 29' 30" Latitude; $34^o$ 20' 15" Longitude)

**Google image attached as part of this submission as well.**

| CORNER | LATITUDE | | | LONGITUDE | | |
|---|---|---|---|---|---|---|
| **Corner 1** | **-25°** | **41'** | **12.47''** | **27°** | **20'** | **43.56''** |
| **Corner 2** | **-25°** | **41'** | **26.33''** | **27°** | **21'** | **9.87''** |
| **Corner 3** | **-25°** | **41'** | **30.33''** | **27°** | **21'** | **9.69''** |
| **Corner 4** | **-25°** | **41'** | **21.75''** | **27°** | **20'** | **40.20''** |

## 1. BACKGROUND INFORMATION

| | | | |
|---|---|---|---|
| Applicant: | Anglo American Platinum (PMR site) | | |
| Trading name (if any): | N/A | | |
| Contact person: | Nongaka Khaas | | |
| Physical address: | Portion 4 of Klipfontein, 300 JQ Bleskop, Rustenburg | | |
| Postal address: | Anglo American Platinum PMR, PO Box 331, Kroondal, 0350 | | |
| Postal code: | 0350 | | |
| Telephone: | 014 567 9317 | Cell: | 083 996 8116 |
| E-mail: | Nongaka.khaas@angloamerican.com | Fax: | - |
| SAWIS registration number: | D01194-01 | | |
| Nearest town or districts: | Rustenburg | | |

## 2. DETAILED DESCRIPTION OF WASTE GENERATING PROCESS (Attach supporting illustrations)

| **Supporting documents attached?** | **Yes** | **No** |
|---|---|---|
| Production Process Flow Chart | x | |
| Waste Classification | x | |
| Chemical and technical specification[1] (pre-beneficiation) | See SRK Report | |

[1] Chemical and technical specifications must include the following:
- Leaching potential

| | | |
|---|---|---|
| Chemical and technical specification (post beneficiation) | See SRK Report | |
| Risk Assessment Report | x | |
| Risk Management Plan | x | |

## 3. DECLARATIONS

3.1 The Applicant

I, James Lake (Representative for Anglo American)
declare that I -

- am, or represent[2], the applicant in this application;
- will provide the Minister with access to all information at my disposal that is relevant to the application;
- hereby indemnify the Government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant is responsible for in terms of these Regulations;
- will perform all other obligations as expected from an applicant in terms of the Regulations;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 14(1) of these regulations and is punishable in terms of regulation 14(2) of these Regulations.

SRK Consulting - Certified Electronic Signature
srk consulting
592095/45158/Other
2522-17-4914-LAKJ-22/08/2023
This signature has been printed digitally. The Author has given permission for its use for this document. The details are stored in the SRK Signature Database

Signature of the applicant[3]/ Signature on behalf of the applicant:

SRK Consulting (Pty) Ltd
Name of company (if applicable):

22/08/2023
Date:

- Long term stability and functionality
- Reactivity with environmental factors
- Storage requirements (to be included in the Risk Assessment and Risk Management Plan)

[2] If this is signed on behalf of the applicant, proof of such authority from the applicant must be attached.
[3] If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.

Signature of the Commissioner of Oaths:

A. J. Fourie

Name of the Commissioner of Oaths:

23/08/2023

Date:

Commissioner of Oaths

Designation:

Official Stamp:

CERTIFIED A TRUE COPY OF THE ORIGINAL

Signature:.....

2023 -08- 23

ANDRIES JACOBUS FOURIE (PrDM)
COMMISSIONER OF OATHS
35 TOPAAS CRESCENT
NOORDHEUWEL, KRUGERSDORP

# Anglo American Platinum PMR - NaCl Exclusion from the Definition of Waste Assessment

**Report Prepared for**

## Anglo American Platinum

**Report Number 592095**

**Report Prepared by**

srk consulting

**April 2023**

# Anglo American Platinum PMR - NaCl Exclusion from the Definition of Waste Assessment

## Anglo American Platinum

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**SRK Project Number 592095**

**April 2023**

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# Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by Anglo American Platinum (Anglo). The opinions in this Report are provided in response to a specific request from Anglo to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

# 1 Introduction

SRK Consulting (South Africa) Pty Ltd was appointed by Anglo American Platinum (Anglo) Precious Metal Refiners (PMR) to assist PMR complete the process that would allow Sodium Chloride (NaCl) and Gypsum residues to be excluded from the definition of waste. If the process is successful, it would allow PMR to beneficially utilise the residues and divert the residues from a disposal process.

As no gypsum sample is available currently due to the plant being offline, this report constitutes an assessment of the NaCl waste residue only.

# 2 Background and Brief

## 2.1 Background of the project

The Regulations (R715 of 2018) of the National Environmental Management Waste Act (59 of 2008) (NEMA) that allow for the exclusion of waste, prescribes the process to follow as well as the documentation that requires submission to allow for the exclusion. As the process to apply for exclusion is prescriptive, SRK has adopted the process for PMR.

SRK has had sight of the SANS 10234 classification[1] and Safety Data Sheet[2] that Interwaste (Pty) Ltd completed for PMR for the NaCl waste stream, however, this does not include the assessment of the NaCl residue as required by the waste management regulations. Therefore, SRK proposed the submission of a NaCl residue sample (provided by Anglo) for analysis as per the waste management regulations in order to complete the process.

In NEMA, "waste" means any substance, whether or not that substance can be reduced, re-used, recycled and recovered—

(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of;

(b) which the generator has no further use of for (he purposes of production;

(c) that must be treated or disposed of; or

(d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but—

(i) a by-product is not considered waste; and

(ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.

# 3 Program Objectives and Scope of Work

## 3.1 Objective

The main objective of the assessment is to complete the process that would allow the NaCl residue to be excluded from the definition of waste as defined in NEMA, thereby allowing for the beneficial reuse of the residue.

[1] SANS 10235 Classification Report: Anglo American – PMR, Sodium Chloride, Interwaste (Pty) Ltd (November 2018)
[2] SANS 10234 Safety Data Sheet, Anglo American PMR, Sodium Chloride Waste, Interwaste (14 November 2018)

## 3.2 Scope of Work

The scope of work included the following:

- Obtaining a NaCl residue sample from Anglo PMR and submission of the sample to the ISO 17025 accredited Bureau Veritas laboratory based in Ormonde, Gauteng;
- Analysis of the sample for Total Concentration (TC) and Leachable Concentration (LC) of metal and inorganic ions as per the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R635 of NEMA: Waste Act, 2008);
- Using a combination of the analysis results, the Interwaste reports and information provided by Anglo, undertake a process that involves:
  - Demonstrating that the waste is being used or has been used for a specific purpose either locally or internationally;
  - Completing a risk assessment demonstrating that the use of the specific waste can be managed in such a way as to ensure that the use will not result in significant adverse impacts on the environment; and
  - A risk management plan responding to the risks identified in the risk assessment undertaken.

## 3.3 Exclusions and Assumptions

The following exclusions and assumptions apply to this assessment:

- No organic or pesticide analysis was undertaken on the NaCl residue sample as, based on the Interwaste data, organic matter is expected to be at insignificant concentrations in the residue;
- It was assumed that the Interwaste classification is sufficient for the risk assessment;
- PMR had already identified the beneficial use of the residue (to be included in the motivation for excluding the residue from the definition of waste) although SRK has researched potential local and international uses of the residues as well;
- This process excludes any other authorisation processes that may be associated with the reuse of the residue (e.g., environmental assessments/authorisation/licences).

# 4 Results

## 4.1 Process Generating the Residue and Intended Use

Based on information received from Anglo, SRK understands that the NaCl residue is generated at the effluent treatment plant at PMR. The triple effect evaporators receive liquor with dissolved NaCl from the effluent dams after removing the calcium. The triple effect evaporators use steam and vacuum to increase the temperature, generate condensate from the effluent liquor and saturate the liquor with NaCl. The saturated liquor precipitates out the NaCl, the resultant pulp (slurry) is separated via centrifugal mechanisms in the centrifuges, with the NaCl residue dropped into the discharge chutes and screw feeders into 1 ton bulk bags. The generated condensate is recycled back into the process via the cooling water system.

A process flow diagram, provided by Anglo, is included in Appendix A.

Anglo has identified intended uses of the NaCl in the soaps and textiles manufacturing industries. Based on information from sources on the web (www.chemicalsafetyfacts.org/chemical/sodium-chloride), NaCl is used in various manufacturing processes (pulp and paper, textiles, soaps and detergents, plastic, rubber, glass, dyes) and is also used to de-ice roads.

## 4.2 Conclusions of the Interwaste Reports

According to the Interwaste report and SDS, the NaCl residue classifies as not hazardous when applying the criteria of SANS 10234.The sample was composed of 99.5-100 % by weight NaCl, 0-1 % by weight of calcium carbonate and 0-5 % by weight of gypsum.

## 4.3 Laboratory Analysis

A sample of the NaCl residue was provided by Anglo and was submitted by SRK to the Bureau Veritas laboratory based in Gauteng.

The sample was analysed for TC and LC metal ions, pH, chloride, fluoride, nitrate, sulfate, cyanide, and total dissolved solids (TDS) as per GN R635 of the NEMA: Waste Act.

The LC analysis were undertaken on a 5% aqueous extract of the sample provided as the residue is non-putrescible and is not being assessed for disposal to a waste site.

The results were compared to the Total Concentration Threshold (TCT) and Leachable Concentration Threshold (LCT) limits as detailed in GN R635. These results and the resultant waste type are presented in Table 4-1 and Table 4-2.

Based on the laboratory results for total and leachable concentrations, as a worst-case scenario, the residue classifies as Type 1 waste due to the presence of TC antimony (75.84 mg/kg) and LC TDS (48 818 mg/L). For the remaining parameters, the waste classifies mostly as Type 3 or Type 4.

The LC result for antimony is 0.025 mg/L (slightly above the LCT0 limit of 0.02 mg/L), indicating that antimony has very low leachability under aqueous conditions.

Boron is the metal with the highest TC (473 mg/kg), however the LC (0.105 mg/L) is lower than the LCT0 limit.

NaCl is a salt and is expected to have elevated sodium and chloride concentrations, hence the TDS is expected to be elevated.

The laboratory certificates are included in Appendix B.

**Table 4-1: TC and TCT Concentrations (mg/kg)**

| Parameter | Total Concentrations Threshold (TCT) Limits (mg/kg) | | | | |
|---|---|---|---|---|---|
| | TCT0 | TCT1 | TCT2 | NaCl Results | Waste Type |
| **Metals** | | | | | |
| As, Arsenic | 5.8 | 500 | 2000 | <2 | 4 |
| B, Boron | 150 | 15 000 | 60 000 | 473 | 2 or 3 |
| Ba, Barium | 62.5 | 6 250 | 25 000 | 17.45 | 4 |
| Cd, Cadmium | 7.5 | 260 | 1040 | 10.03 | 2 or 3 |
| Co, Cobalt | 50 | 5 000 | 20 000 | <0.1 | 4 |
| Cr, Chromium Total | 46 000 | 800 000 | N/A | 29.11 | 4 |
| Cr(VI), Chromium (VI), | 6.5 | 500 | 2000 | <0.01 | 4 |
| Cu, Copper | 16 | 19 500 | 78 000 | <0.2 | 4 |
| Hg, Mercury | 0.93 | 160 | 640 | <0.1 | 4 |
| Mn, Manganese | 1 000 | 25 000 | 100 000 | <0.1 | 4 |
| Mo, Molybdenum | 40 | 1 000 | 4 000 | <0.1 | 4 |
| Ni, Nickel | 91 | 10 600 | 42 400 | 8.74 | 4 |
| Pb, Lead | 20 | 1 900 | 7 600 | 15.69 | 4 |
| Sb, Antimony | 10 | 75 | 300 | 75.84 | 1 |
| Se, Selenium | 10 | 50 | 200 | <3 | 4 |
| V, Vanadium | 150 | 2 680 | 10720 | 47.96 | 4 |

| Parameter | Total Concentrations Threshold (TCT) Limits (mg/kg) | | | | |
|---|---|---|---|---|---|
| | TCT0 | TCT1 | TCT2 | NaCl Results | Waste Type |
| Zn, Zinc | 240 | 160 000 | 640 000 | <0.5 | 4 |
| **Inorganic Anions** | | | | | |
| F, Fluoride | 100 | 10 000 | 40 000 | 11.8 | 4 |
| CN (total), Cyanide Total | 14 | 10 500 | 42 000 | <0.1 | 4 |

**Table 4-2 LC and LCT Concentrations (mg/L unless stated)**

| Parameter | Leachable Concentrations Threshold (LCT) Limits (mg/l) | | | | | |
|---|---|---|---|---|---|---|
| | LCT0 | LCT1 | LCT2 | LCT3 | NaCl Result | Waste Type |
| **Metal Ions** | | | | | | |
| As, Arsenic | 0.01 | 0.5 | 1 | 4 | 0.057 | 3 |
| B, Boron | 0.5 | 25 | 50 | 200 | 0.105 | 4 |
| Ba, Barium | 0.7 | 35 | 70 | 280 | 0.03 | 4 |
| Cd, Cadmium | 0.003 | 0.15 | 0.3 | 1.2 | 0.005 | 3 |
| Co, Cobalt | 0.5 | 25 | 50 | 200 | <0.001 | 4 |
| $Cr_T$, Chromium Total | 0.1 | 5 | 10 | 40 | <0.002 | 4 |
| Cr(VI), Chromium (VI) | 0.05 | 2.5 | 5 | 20 | <0.01 | 4 |
| Cu, Copper | 1 | 50 | 100 | 400 | <0.002 | 4 |
| Hg, Mercury | 0.006 | 0.03 | 0.6 | 2.4 | <0.001 | 4 |
| Mn, Manganese | 0.5 | 25 | 50 | 200 | <0.001 | 4 |
| Mo, Molybdenum | 0.07 | 3.5 | 7 | 28 | <0.001 | 4 |
| Ni, Nickel | 0.07 | 3.5 | 7 | 28 | 0.172 | 3 |
| Pb, Lead | 0.01 | 0.5 | 1 | 4 | 0.815 | 2 |
| Sb, Antimony | 0.02 | 1 | 2 | 8 | 0.025 | 3 |
| Se, Selenium | 0.01 | 0.5 | 1 | 4 | 0.144 | 3 |
| V, Vanadium | 0.2 | 10 | 20 | 80 | <0.001 | 4 |
| Zn, Zinc | 5 | 250 | 500 | 2 000 | <0.001 | 4 |
| **Inorganic Anions** | | | | | | |
| TDS | 1000 | 12 500 | 25 000 | 100 000 | 48 818 | 1 |
| Chloride | 300 | 15 000 | 30 000 | 120 000 | 28 353 | 2 |
| Sulphate, $SO_4$ | 250 | 12 500 | 25 000 | 100 000 | 18.52 | 4 |
| $NO_3$ as N, Nitrite-N | 11 | 550 | 1100 | 4 400 | 0.332 | 4 |
| Fluoride | 1.5 | 75 | 150 | 600 | 0.505 | 4 |

# 5 Risk Assessment

A risk assessment in terms of Regulation 8 of the Waste Exclusion Regulations (R715) has been completed and is presented in Appendix C. A risk management plan in terms of Regulation 10 of the Waste Exclusion Regulations in included in Appendix D.

The intended use of the NaCl residue is as a raw material in the manufacturing of soaps and detergents. Although some of the metals (arsenic, boron, barium, cadmium, total chromium, nickel, lead, antimony; selenium and vanadium) are at TC > 1 mg/kg, the LC concentrations are very low (generally < 0.2 mg/l except for lead at 0.815 mg/L).

Boron has the highest TC result, however, boron is added to soaps and detergents during manufacturing (https://www.borax.com/products/applications/cleaners-detergents).

For the above manufacturing use, the NaCl residue is expected to present a low to insignificant environmental or health risk (should the residue maintain the same composition as the sample analysed), based on the waste classification and laboratory analytical results. Metal leachability is low due to the composition and pH. Leachate results are generally of greater concern for environmental and health related impacts due to greater bioavailability. The pH of the aqueous leach is 6.5 pH units, indicating very slight acidity and a low propensity for metal leaching from the residue. In general, the LC results are low, resulting in the residue being classified as Type 4 waste for the majority of the parameters.

The abstract of a study[3] on the risk of human exposure to metals in some household hygienic products (HHPs including soaps) in Nigeria was as follows:

*"This study presents data on the levels and risk of human exposure to Cd, Pb, Cr, Ni, Cu, Co, Mn, Zn and Fe in some popular brands of household hygienic products (HHPs) available in Nigeria. The HHPs were digested with a mixture of $HNO_3$, HCl and $HClO_4$ in a ratio of 1:3:1 and the concentrations of the selected metals were quantified by atomic absorption spectrophotometry. The metal concentrations (in µg g−1) in these products ranged from 0.4 to 5.4, < 0.09–47.0, < 0.12–43.7, < 0.06–7.5, < 0.12–9.5, < 0.06–15.0, < 0.09–24.5, 9.0–675 and 62.4–434 for Cd, Pb, Cr, Cu, Co, Ni, Mn, Zn and Fe respectively. The systemic exposure dosages for the metals, arising from the use of these HPPs, were less than their respective provisional tolerable daily intake/ recommended dietary allowance values. The household hygienic products are safe to use by humans based on the margin of safety values that were all above 100[4]. However, the products contained significant levels of toxic (Cd and Pb), allergenic (Ni and Cr) and other low toxicity metals (Mn, Zn and Fe), which could be a potential threat to the environment"*.

It must be noted that the concentrations in the above study were a result of an aggressive acid digestion, an unlikely scenario for household uses of soaps and detergents. The LC concentrations following an aqueous leach (more likely household scenario) for the NaCl residue are significantly lower than the above concentrations.

[3] Risk of human exposure to metals in some household hygienic products in Nigeria, Chukwujindu M.A. Iwegbue et al. (2019) available from https://www.sciencedirect.com/science/article/pii/S2214750018305699

[4] The uncertainty factor termed "margin of safety" (MoS) was used to determine the likely risk to humans from exposure to metals in these HHPs. The MoS is obtained by normalizing "the lowest no-observed adverse-effect-level (NOAEL) value of the metals" with their respective estimated systemic exposure dosage (SED). The MoS value of 100 is set as the minimum acceptably safe level for a product that is used on human skin.

A United States Food and Drug Administration (FDA) study[5] on metal content in cosmetics indicated that in general, cosmetics may contain up to a maximum of 1 ppm for mercury, 10 ppm for lead and colour additives used in cosmetics not more than 3 ppm of arsenic. In a related draft guidance document[6], it is stated that "*Dermal absorption of lead from externally applied cosmetics is very small. Results for lead uptake by the skin were reported for four lead compounds that resemble cosmetic ingredients (Ref. 11). Based on those data, we estimated that only a very small amount (0.41%) of the lead present as an impurity in an externally applied cosmetic is absorbed by the skin".*

Based on the above, and that in the manufacturing process, the salt will be mixed with large volumes of other constituents of soap/detergents (oils, lye, water, etc.), the potential risk to end-users of the soap/detergents from the salt alone is considered insignificant.

The use of the residue as raw material for other manufacturing industries is also an option. NaCl can also be used to de-ice roads although this can have detrimental effects by increasing the salinity of soil and nearby water bodies through runoff.

# 6 Conclusions

Based on the outcomes of this assessment, the following are concluded:

- The NaCl residue should be excluded from the definition of waste, based on the waste classification and laboratory results;
- The residue can be re-used as a raw material in the soap and detergent manufacturing industry (and other uses as detailed in this report can be investigated);
- The residue must be re-assessed should changes in the process generating the residues have the potential to change the composition of the residue.

[5] https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/fdas-testing-cosmetics-arsenic-cadmium-chromium-cobalt-lead-mercury-and-nickel-content#limits

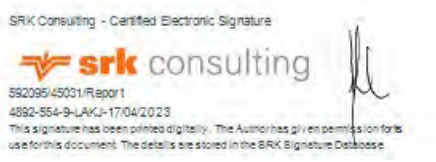
[6] Lead in Cosmetic Lip Products and Externally Applied Cosmetics: Recommended Maximum Level Guidance for Industry Draft Guidance, U.S. Department of Health and Human Services Food and Drug Administration Center for Food Safety and Applied Nutrition (December 2016)

**Prepared by**


B. Sahadeo Pr.Sci.Nat

Principal Scientist

**Reviewed by**



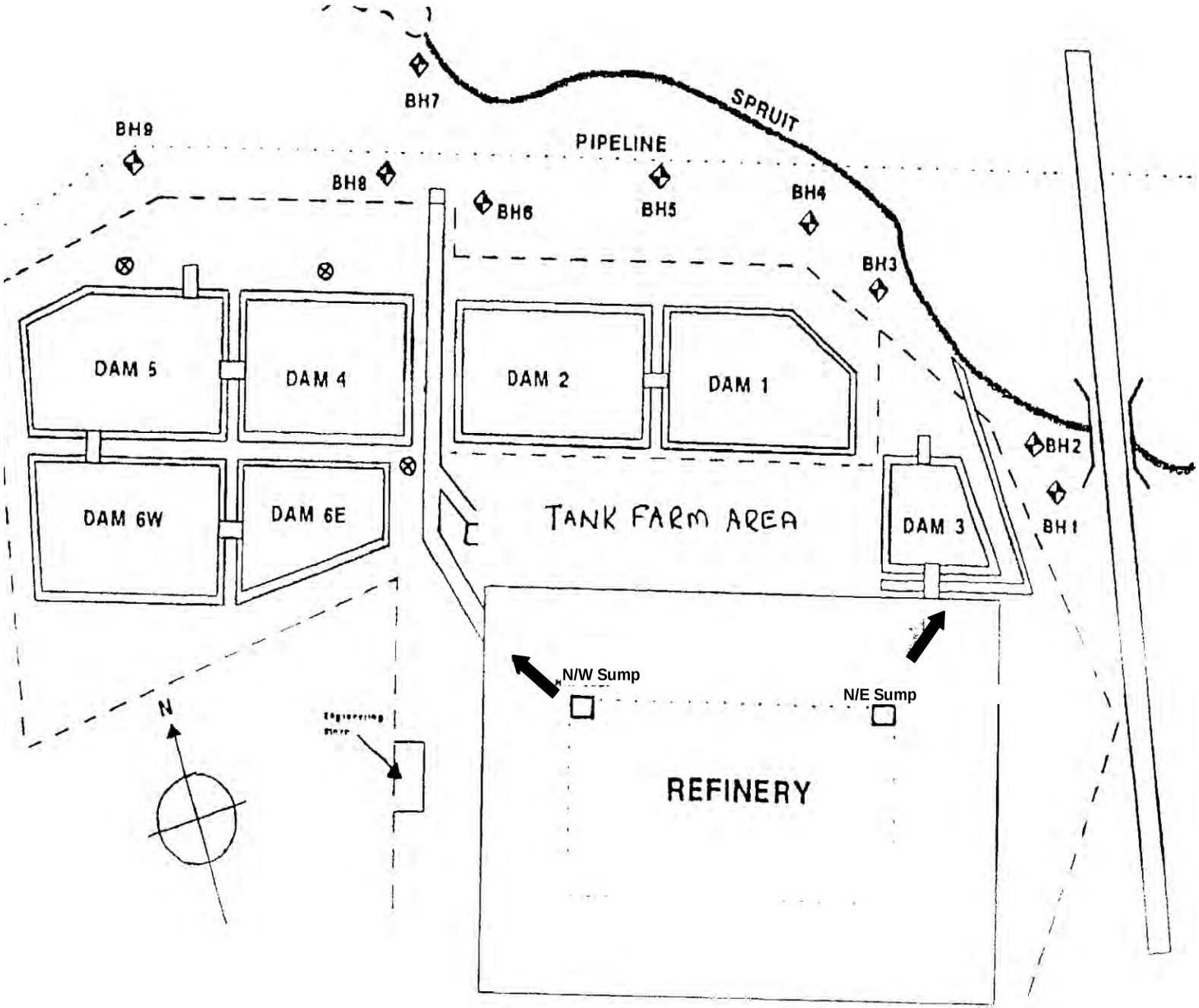

J. Lake Pr.Sci.Nat

Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

# Appendices

# Appendix A: Process Flow Diagram


BH7
SPRUIT
BH9
PIPELINE
BH8
BH6
BH5
BH4
BH3
DAM 5
DAM 4
DAM 2
DAM 1
BH2
DAM 6W
DAM 6E
TANK FARM AREA
DAM 3
BH1
N/W Sump
N/E Sump
N
REFINERY

Dams categories and sources:

1. Stormwater dams
   Dam 3A and B
   Collects the operation's rain water, water runoff and cooling water circuit blow down

2. Acid Effluent dams
   Dams 1, 2, 4 and 5
   Receives effluent from the lime neutralization plant
   Effluent is also circulated amongst these dams

3. Alkaline effluent dams
   Dams 6E and W
   Alkaline effluent with pH 9 to pH 11

Dam water recovery:

All dams are (can be) pumped into Effluent Treatment Plant to precipitate out salts and recover water back into the process.

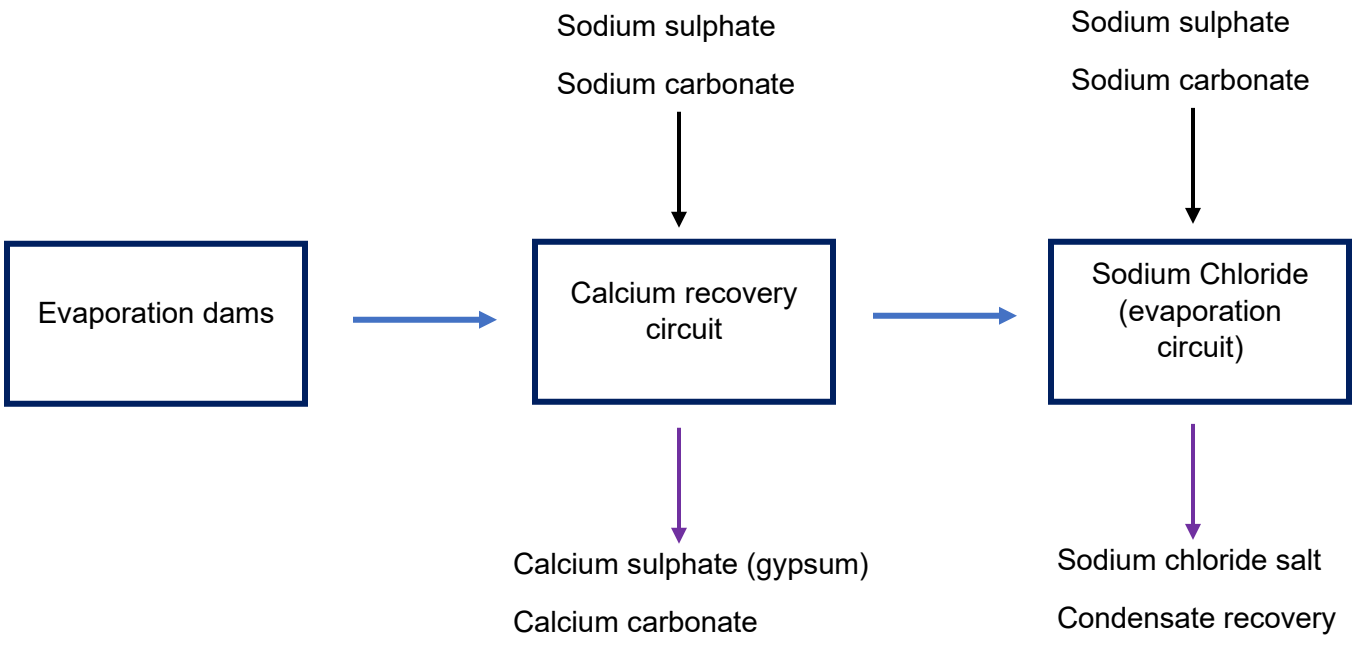
Compounds recovered:

Calcium sulphate

Calcium carbonate

Sodium chloride

Mixed salts



# Appendix B: Laboratory Certificates

**M and L Laboratory Services (Pty) Ltd**
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T: +27 11 661 7900
F: +27 11 496 2238
info.646@bureauveritas.com

# TEST REPORT

**SRK CONSULTING - JHB**
**P O BOX 55291 , NORTHLANDS,**
**JOHANNESBURG, SOUTH AFRICA**

**Report No.: 1069776**

**Attn:Bish Sahadeo**

| | | | |
|---|---|---|---|
| **Job/Sample No :** | ML-2022-11424-001 | **Container Type :** | Plastic Sachet |
| **Contract No :** | 1212401 | **Batch/Barcode No :** | N/A |
| **Date Received :** | 30 Nov 2022 | **Description :** | NaCl Sample |

**Date Reported:13/01/2023**

| Test | Method | Units | Results |
|---|---|---|---|
| Arsenic as As | W044-28-O | mg/L | 0.057 |
| Boron as B | W044-28-O | mg/L | 0.105 |
| Barium as Ba | W044-28-O | mg/L | 0.030 |
| Cadmium as Cd | W044-28-O | mg/L | 0.005 |
| Cobalt as Co | W044-28-O | mg/L | <0.001 |
| Chromium as Cr | W044-28-O | mg/L | <0.002 |
| Copper as Cu | W044-28-O | mg/L | <0.002 |
| Mercury as Hg | W044-28-O | mg/L | <0.001 |
| Manganese as Mn | W044-28-O | mg/L | <0.001 |
| Molybdenum as Mo | W044-28-O | mg/L | <0.001 |
| Nickel as Ni | W044-28-O | mg/L | 0.172 |
| Lead as Pb | W044-28-O | mg/L | 0.815 |
| Antimony as Sb | W044-28-O | mg/L | 0.025 |
| Selenium as Se | W044-28-O | mg/L | 0.144 |
| Vanadium as V | W044-28-O | mg/L | <0.001 |
| Zinc as Zn | W044-28-O | mg/L | <0.001 |

*Tests marked with an (*) indicate that those tests are not SANAS Accredited and are not included in the SANAS Schedule of Accreditation*

**Notes: The analyses were carried out on a 5% AQUEOUS Extract of the sample as received:**

**Reported by**

**Ndileka Bangani**

**M and L Laboratory Services (Pty) Ltd**
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Ormonde,
Johannesburg, 2135
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# TEST REPORT

**SRK CONSULTING - JHB**
**P O BOX 55291 , NORTHLANDS,**
**JOHANNESBURG, SOUTH AFRICA**

**Report No.: 1069776**

**Attn:Bish Sahadeo**

| | | | |
|---|---|---|---|
| **Job/Sample No :** | ML-2022-11424-001 | **Container Type :** | Plastic Sachet |
| **Contract No :** | 1212401 | **Batch/Barcode No :** | N/A |
| **Date Received :** | 30 Nov 2022 | **Description :** | NaCl Sample |

**CHEMICAL ANALYSIS Date Reported:13/01/2023**

| Test | Method | Units | Results |
|---|---|---|---|
| pH Value @ 25°C | W044-27-O | - | 6.3 |
| Total dissolved solids, TDS | W044-47-W | mg/L | 48818 |
| Chloride | W044-50-W | mg/L | 28353 |
| Hexavalent Chromium as Cr6+ | W044-50-W | mg/L | <0.01 |
| Fluoride | W044-50-W | mg/L | 0.505 |
| Nitrate as NO3 | W044-50-W | mg/L | 1.47 |
| Nitrate as N | W044-50-W | mg/L | 0.332 |
| Nitrite NO2 | W044-50-W | mg/L | <0.1 |
| Nitrite as N | W044-50-W | mg/L | <0.1 |
| Sulphate | W044-50-W | mg/L | 18.52 |
| Cyanide | W044-50-W | mg/L | <0.1 |
| Alkalinity | W044-50-W | mg/L | <10 |
| Free Cyanide | W044-50-W | mg/L | <0.01 |

*Tests marked with an (*) indicate that those tests are not SANAS Accredited and are not included in the SANAS Schedule of Accreditation*

**Notes: The analyses were carried out on a 5% AQUEOUS Extract of the sample as received:**

**Reported by**

**Ndileka Bangani**

**Reported by**

**Tabisa Matanda**

# Appendix C: Risk Assessment

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

**RISK ASSESSMENT IN TERMS OF REGULATION 8 OF THE WASTE EXCLUSION REGULATIONS**

| | |
|---|---|
| **APPLICANT** | Anglo American Platinum |
| **WASTE STREAM OR PORTION OF A WASTE STREAM** | NaCl residue is generated at the effluent treatment plant at the Precious Metal Refiners (PMR) site |
| **BENEFICIAL USE/S** | Manufacture of soaps and detergents |
| | Raw material in the textile, pulp and paper, plastic, rubber, glass, dyes industries |
| | De-icing of roads |
| | |
| | |

| | |
|---|---|
| **WASTE GENERATING FACILITY** | PMR effluent treatment plant |
| **PHYSICAL ADDRESS OF FACILITY** | Precious Metals Refiners, Administration Building, Portion 4 of Klipfontein, 300 JQ Bleskop, Rustenburg |
| **GPS CO-ORDINATES OF WASTE GENERATING FACILITY** | S 25º 41.767'<br>E 27º 20.934' |
| **CONTACT PERSON** | |
| **NAME** | Nongaka Khaas |
| **ADDRESS** | Administration Building Portion 4 of Klipfontein<br>300JQ Bleskop Rustenburg District<br><br>P O Box 331 Kroondal 0350, South Africa |
| **EMAIL ADDRESS** | nongaka.khaas@angloamerican.com |
| **TELEPHONE** | 014 567 9317 |
| *** DETAILED DESCRIPTION OF WASTE GENERATING PROCESS** | The triple effect evaporators receive liquor with dissolved NaCl from the effluent dams after removing the calcium. The triple effect evaporators use steam and vacuum to increase the temperature, generate condensate from the effluent liquor and saturate the liquor with NaCl. The saturated liquor precipitates out the NaCl, the resultant pulp (slurry) is separated via centrifugal mechanisms in the centrifuges, with the NaCl residue dropped into the discharge chutes and screw feeders into 1 ton bulk bags. The generated condensate is recycled back into the process via the cooling water system. |
| | |

| | | | |
|---|---|---|---|
| **PRODUCTION PROCESS FLOW CHART ATTACHED** | **YES**<br>**Attached in the main report** | | **NO** |
| **WASTE CLASSIFICATION SANS 10234:** | **HAZARDOUS WASTE**<br>Not classified by SANS 10234 as an environmental hazard | **GENERAL WASTE** | |
| | **REPORT ON RESULTS OF ENVIRONMENTAL HAZARD ASSESSMENT ATTACHED** | **YES X**<br>**Waste Classification Report and SDS attached (indicating not classified as an environmental hazard)** | |
| *__A process flow chart must be attached to the process description__ | | | |

**RISK ASSESSEMENT**

**RISK ASSESSEMENT**

| Activity | Risk Description | Affected Pathways | Environmental receptors | Impact | Assessment of impact criteria | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probability | Magnitude | Duration | Scale | |
| Residues collected in bags at end of process | Exposure to dust particles during loading into bags if correct PPE not worn | Air | Site workers | Prolonged dermal contact with residue may lead to skin irritation through repeated and frequent exposure. | 2 | 2 | 1 | 1 | 8 |
| | | | | Prolonged, frequent and repeated exposure may lead to eye irritation | 2 | 2 | 1 | 1 | 8 |
| | | | | Prolonged, frequent and repeated exposure may lead to respiratory impairment | 2 | 2 | 1 | 1 | 8 |

| Activity | Risk Description | Affected Pathways | Environmental receptors | Impact | Assessment of impact criteria | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probability | Magnitude | Duration | Scale | |
| Raw material storage at site of reuse | NaCl is not appropriately stored and runoff managed with the result that sediments wash from the stockpile onto adjacent soils and into adjacent water courses (should be noted that the salt is collected in bags at the PMR) | Soils | Site soils and those onto which the salt is washed during rainfall | Change in soil quality from baseline | 2 | 8 | 4 | 1 | 26 |
| | | Surface water | Water courses into which salt is spilled or washed | Change in surface water quality from baseline | 2 | 8 | 4 | 1 | 26 |
| Manufacturing using salt | Salt particulates actuated during manufacturing process using salt, which are then inhaled, with a subsequent deterioration in workers' health | Air | Workers using salt in products | Prolonged, frequent and repeated exposure with salt particulates may lead to respiratory impairment | 2 | 6 | 5 | 1 | 24 |
| | Salt particulates actuated during manufacturing processes using salt, which then come into dermal contact, with a subsequent deterioration in workers' health | Air | Workers using salt in products | Prolonged, frequent and repeated exposure may lead to eye irritation Prolonged dermal contact with salt particulates may lead to skin irritation through repeated and frequent exposure. | 2 | 2 | 5 | 1 | 16 |
| Storage of salt at users premise potentially generating leachate during rainfall | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms | Soil | Groundwater users | Soil quality change from baseline | 3 | 2 | 4 | 1 | 21 |

| Activity | Risk Description | Affected Pathways | Environmental receptors | Impact | Assessment of impact criteria | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probability | Magnitude | Duration | Scale | |
| | and Standards, mobilisation of low concentrations of salts and metals during rainfall may accumulate in the soils underlying the storage site | | | | | | | | |
| | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms and Standards, mobilisation of low concentrations of salts and metals during rainfall may migrate into the aquifer below the storage site | Groundwater | Groundwater | Groundwater quality change from baseline | 2 | 6 | 4 | 2 | 24 |
| | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms and Standards, mobilisation of low concentrations of salts | Surface water | Surface water organisms | Surface water quality change from baseline | 2 | 6 | 4 | 3 | 26 |

| Activity | Risk Description | Affected Pathways | Environmental receptors | Impact | Assessment of impact criteria | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Probability | Magnitude | Duration | Scale | |
| | and metals during rainfall into runoff that is then discharged to an adjacent water course may increase salt load of the water course | | | | | | | | |
| Use of end products such as soaps and detergents | Exposure to elevated levels of contaminants in end products during use | Dermal | Human end-users | Prolonged dermal contact with residue may lead to skin irritation through repeated and frequent exposure. | 2 | 6 | 3 | 4 | 26 |
| | Ingestion of elevated levels of contaminants in products during use | Ingestion | Human end-users | Prolonged ingestion of soaps and detergents may lead to ill-health effects | 1 | 8 | 1 | 4 | 13 |

## The following factors and criteria must be used to assess the impacts of the activities:

| Criteria | |
|---|---|
| **MAGNITUDE (Severity)** | **DURATION** |
| 10 - Very high | 5 – Permanent (longer than 10 years) |
| 8 – High | 4 - Long-term (5 to 10 years) |
| 6 – Moderate | 3 - Medium-term (12 months to 5 years) |
| 4 – Low | 2 - Short-term (0 to 12 months) |
| 2 – Minor | 1 – Immediate |

| SCALE | PROBABILITY (Likelihood) |
|---|---|
| 5 – International | 5 - Definite |
| 4 – National | 4 - Highly probable |
| 3 – Regional | 3 - Medium probability |
| 2 – Local | 2 - Low probability |
| 1 - Site only | 1 – Improbable |
| 0 – None | 0 – None |

**Magnitude**
Magnitude measures the size of the impact

**Duration**
Duration refers to the lifetime of the impact i.e. how long it will last

**Scale**
The scale refers to the extent of the impact, i.e. will the impact be felt at the local, regional, global scale and so.

**Probability**
The probability refers to the chance of impact to occur. The potential impact could be most likely to occur, unlikely, etc.

Assessment of Significance of impact

Significance rating of the potential impacts illustrates the importance of the impact itself. The size of area affected by pollution may be extremely high but the significance of this effect is dependent on the concentration or level of pollution in that area. In order to determine the significance of impact, the following method was used:

Significance Points (SP) = (Magnitude + Duration + Scale) x Probability

The values of SP are then ranged as follows:

| Rating | | Description |
|---|---|---|
| **SP >60** | Indicates **high** environmental significance | An impact which could influence the decision about whether or not to proceed with the activities regardless of any possible mitigation. |
| **SP 30 – 60** | Indicates **moderate** environmental significance | An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated. |
| **SP <30** | Indicates **low** environmental significance | Impacts with little real effect and which will not have an influence on or require modification of the activities. |
| **+** | **Positive impact** | An impact that is likely to result in positive consequences/effects |

I, James Lake hereby declare that I have read the completed the Risk Assessment form and hereby confirm that the information is to the best of my knowledge true and correct.

Furthermore, I declare that I am fully aware of my responsibilities in terms of the Waste Exclusion Regulations, and that failure to comply with these Regulations may constitute an offence in terms of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008).

Applicant (Full names): James Lake

Designation: Partner

Signature: 


Date: 17 April 2023 Place: Illovo, Johannesburg

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| | | | | | |
|---|---|---|---|---|---|
| Date Received | | | | | |
| Decision Taken | Authorised | | Not Authorised( provide reasons) | | |

| | |
|---|---|
| Reference Number | |

# Appendix D: Risk Management Plan

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

# RISK MANAGEMENT PLAN IN TERMS OF REGULATION 10 OF WASTE EXCLUSION REGULATONS

| | | | |
|---|---|---|---|
| **APPLICANT** | Anglo American Platinum | | |
| **SOURCE (S) OF WASTE** | Anglo American Platinum | | |
| **WASTE TO BE BENEFICIATED** | NaCl residue is generated at the effluent treatment plant at the Precious Metal Refiners (PMR) site | | |
| **BENEFICIAL USE/S** | Manufacture of soaps and detergents | | |
| | Raw material in the textile, pulp and paper, plastic, rubber, glass, dyes industries | | |
| | De-icing of roads | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **MSDS ATTACHED IF HAZARDOUS** | **YES** | **NO** | Not hazardous |
| **WASTE GENERATING FACILITY** | Precious Metal Refiners | | |
| **PHYSICAL ADDRESS** | Precious Metals Refiners, Administration Building, Portion 4 of Klipfontein, 300 JQ Bleskop, Rustenburg | | |

| | |
|---|---|
| **GPS CO-ORDINATES OF WASTE GENERATING FACILITY** | S 25º 41.767'<br>E 27º 20.934' |
| **POSTAL ADDRESS** | Anglo American Platinum PMR<br>P.O.Box 331<br>Kroondal<br>0350 |
| **CONTACT PERSON** | Nongaka Khaas |
| **TELEPHONE** | 014 567 9317 |
| **EMAIL** | nongaka.khaas@angloamerican.com |

## RISK MANAGEMENT PLAN

| Risk Sources | Risk Description | Action(s) to minimise/ manage the risk |
|---|---|---|
| Workers handling salt | Deterioration of workers health if the appropriate Personal Protective Equipment is not utilised when working with salt | Access to the site to be limited only to authorised personnel<br>Workers to utilise all required PPE as specified in the SDS when potentially exposed to salt |
| Raw material storage at site of reuse | Salt is not appropriately stored and runoff managed with the result that sediments wash from the stockpile onto adjacent soils and into adjacent water courses | Salt to continue being collected in bags at PMR to be stored on a low permeability base capable of limiting infiltration into the underlying soils.<br>Storage area to be equipped with storm water control mechanisms to contain runoff as per statutory requirements |
| Manufacturing using salt | Salt particulates actuated during manufacturing process using salt, which are then inhaled, with a subsequent deterioration in workers' health | Access to the site to be limited only to authorised personnel<br>Workers to utilise all required PPE as specified in the SDS when potentially exposed to salt |
| | Salt particulates actuated during manufacturing processes using salt, which then come into dermal contact, with a subsequent deterioration in workers' health | |

| Risk Sources | Risk Description | Action(s) to minimise/ manage the risk |
|---|---|---|
| Storage of salt at users premise potentially generating leachate during rainfall | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms and Standards, mobilisation of low concentrations of salts and metals during rainfall may accumulate in the soils underlying the storage site | Salt to be stored on a low permeability base capable of limiting infiltration into the underlying soils.<br><br>Consider storing salt on hardstanding in an enclosed building<br><br>To re-assess salt should changes in the waste generation process result in a potential change in the salt composition |
| | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms and Standards, mobilisation of low concentrations of salts and metals during rainfall may migrate into the aquifer below the storage site | |
| | Although the leach testing undertaken on salt indicates that the leachable fractions are generally below the Leachate Concentration Threshold 1 of the Norms and Standards, mobilisation of low concentrations of salts and metals during rainfall into runoff that is then discharged to an adjacent water course may increase salt load of the water course | Storage area to be equipped with storm water control mechanisms to contain runoff as per statutory requirements<br><br>Consider storing salt on hardstanding in an enclosed building<br><br>To re-assess salt should changes in the waste generation process result in a potential change in the salt composition |

| Risk Sources | Risk Description | Action(s) to minimise/ manage the risk |
|---|---|---|
| Dermal contact and ingestion of contaminants in soaps and detergents | Prolonged dermal contact and ingestion of soap and detergents manufactured using salt may lead to ill-health effects | Current concentrations of metals and inorganic anions are considered to be too low to pose significant health risks. AAP to monitor for changes in process generating the salt that may cause changes in the salt concentration or composition, and reassess salt should process changes occur |

**DECLARATION**

I, James Lake hereby declare that I have read the completed a Risk Management form and hereby confirm that the information is to the best of my knowledge true and correct.

Furthermore, I declare that I am fully aware of my responsibilities in terms of the Waste Exclusion Regulations, and that failure to comply with these Regulations may constitute an offence in terms of the National Environmental Management: Waste Act, 2008( Act 59 of 2008).

Applicant (Full names): Mr James Lake

Designation: Partner

Signature


Date: 17 April 2023 Place: Illovo, Johannesburg

| **FOR OFFICE USE ONLY** |
|---|

| | | | | | |
|---|---|---|---|---|---|
| Date Received | | | | | |
| Decision Taken | Authorised | | Not authorised(provide reason) | | |
| Reference Number | | | | | |

# SRK Report Distribution Record

Report No. 592095

| Name/Title | Company | Copy | File Type | Date | Authorised by |
|---|---|---|---|---|---|
| Ms. N. Khaas | Anglo American Platinum | 1 | PDF | 06 Feb 2023 | J. Lake |
| | | | | | |
| | | | | | |
| | | | | | |

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ANGLO AMERICAN - PMR

# SANS 10234 Classification Report

## Anglo American - PMR, Sodium Chloride

**Interwaste (PTY) Ltd.**

**November 2018**

[Classification of Anglo American – PMR's, Sodium chloride, in terms of SANS 10234 (the Globally Harmonized System of Classification and Labelling of Chemicals) as mandated by GN R 634 of 2013 under the National Environmental Management: Waste Act, 2008]

# ANGLO AMERICAN – PMR

## Anglo American - PMR., Sodium Chloride – SANS 10234 Classification Report

**Prepared on behalf of:**
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# EXECUTIVE SUMMARY:

| Summary of SANS 10234 Classification – Sodium Chloride | |
|---|---|
| Hazard Classes & Categories Hazard Classes & Categories | *Not classified as hazardous under SANS 10234 |
| GHS Pictogram | **N/A** |
| Signal Word | **N/A** |
| Hazard Statements | **N/A** |

| Waste Profile and classification | | |
|---|---|---|
| **Item** | **Description** | **Classified / Included** |
| **General Waste** | A waste that does not pose an immediate hazard or threat to health or to the environment, and includes domestic, building and demolition waste, business waste and inert waste. | ✓ |
| **Hazardous Waste** | Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment. | × |
| **Safety Data Sheet** | Preparation of a Safety Data Sheet (SDS). A SDS is required for all hazardous wastes (excluding Health Care Risk Waste (HCRW) in terms of Regulation 5(1) of GN. R. 634 of 2013. | × |
| **SANS 10234 Classification** | Classification as hazardous or non-hazardous in accordance with SANS 10234 (Regulation 4(2) of GN 634 of 2013). This is not a requirement where a waste can categorically be defined under Annexure 1 to GN. R. 634 of 2013. | ✓ |

remains the waste generator's responsibility for determining whether their waste is fit for a particular purpose and suitable for user's/waste manager's method of use, management or application. Given the variety of factors that can affect the management, transport, storage and handling of the waste, some of which are uniquely within the generator's knowledge and control, it is essential that the generator evaluate the subject Report and SDS to determine whether they are fit for the particular purpose and suitable for third party user's / manager's method of use or application. Interwaste cannot be held liable for changes in the waste's constituents caused by a change in process, or raw material input into the process. The make up of waste is, by its very nature, variable. The manner in which the waste is to be handled may vary depending on its constituents.

## DEFINITIONS:

**Dermal corrosion:** See skin corrosion.

**Dermal irritation:** See skin irritation.

**Eye irritation:** The production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application.

**Flash point:** The lowest temperature (corrected to a standard pressure of 101.3 kPa) at which the application of an ignition source causes the vapours of a liquid to ignite under specified test conditions.

**Hazard statement:** A statement assigned to a hazard class and category that describes the nature of the hazards of a hazardous product, including, where appropriate, the degree of hazard.

**Hazard category**: The division of criteria within each hazard class, e.g. oral acute toxicity includes five hazard categories and flammable liquids includes four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally; Hazard class means the nature of the physical, health or environmental hazard, e.g. flammable solid, carcinogen, oral acute toxicity.

**Label means:** An appropriate group of written, printed or graphic information elements concerning a hazardous product, selected as relevant to the target sector(s) that is affixed to, printed on, or attached to the immediate container of a hazardous product, or to the outside packaging of a hazardous product.

**Mixture:** A mixture or a solution composed of two or more substances in which they do not react.

**Mutagen:** An agent giving rise to an increased occurrence of mutations in populations of cells and /or organisms.

**Pictogram:** A graphical composition that may include a symbol plus other graphic elements, such as a border, background pattern or colour that is intended to convey specific information.

**Precautionary Statements:** phrase or pictogram (or both) that describes recommended measures that should be taken into account to minimize or prevent adverse effects resulting from exposure to a hazardous product, or improper storage or handling of a hazardous product.

**Regulations:** The Waste Classification and Management Regulations under the NEM:WA.

**Serious eye damage:** The production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the

anterior surface of the eye, which is not fully reversible within 21 days of application.

**Signal word:** A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The GHS uses "Danger" and "Warning" as signal words.

**Skin corrosion:** The production of irreversible damage to the skin following the application of a test substance for up to 4 hours.

**Skin irritation:** The production of reversible damage to the skin following the application of a test substance for up to 4 hours.

**Substance:** Chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

**Symbol:** A graphical element intended to succinctly convey information.

# ABBREVIATIONS:

| | |
|---|---|
| **CDC:** | Centres for Disease Control & Prevention |
| **DEA:** | Department of Environmental Affairs |
| **GHS:** | Globally Harmonized System of Classification and Labelling of Chemicals. |
| **IARC:** | International Agency for Research on Cancer |
| **MSDS:** | Material Safety Data Sheet |
| **NEM:WA:** | National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [NEM:WA] |
| **NEM:WAA:** | National Environmental Management: Waste Amendment Act, 2014 (Act No. 26 of 2014) [NEM:WAA] |
| **SANS:** | South African National Standard |
| **SDS**: | Safety Data Sheet |
| **STOT**: | Specific Target Organ Toxicity |
| **USEPA**: | United States Environmental Protection Agency |

# 1. BACKGROUND AND INTRODUCTION

Anglo American – PMR, commissioned Interwaste (Pty) Ltd. (hereinafter referred to as 'Interwaste') to classify their sodium chloride, in terms of SANS 10234 (Globally Harmonised System of Classification and Labelling of Chemicals, GHS). The above mentioned material falls within the ambit of the definition of 'waste' provided for in the National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)[NEM:WAA], and thus need to be managed in accordance with the relevant provisions of the Act, as well as any relevant Regulations promulgated thereunder.


Figure 1: Sodium Chloride

Interwaste has adopted a hierarchical approach toward classifying the subject waste stream. The approach is intended to inform the classification of the subject waste stream according to SANS 10234 in an efficient, cost effective and orderly manner, without compromising on the quality of the classification or the need to adhere to applicable legal requirements. Key to this approach is to use available laboratory analysis on the subject waste stream in conjunction with existing hazard information on the waste as a whole, or key ingredients/components thereof, thereby avoiding the need for potentially costly 'duplicate' testing and the unnecessary use of test animals.

Regulation 4 (2) of the Department of Environmental Affairs' (DEA) *Waste Classification and Management Regulations* (GN. R. 634 of 23 August 2013), hereinafter referred to as 'the Regulations', have been used as the legal trigger toward the requisite classification of this waste stream. Accordingly, in terms of Regulation 4 (2), Interwaste has classified the waste according to the relevant provisions of SANS 10234 (Globally Harmonised System of Classification and Labelling of Chemicals, GHS).

## 1.1 WASTE GENERATION PROCESS OVERVIEW

The sodium chloride is generated at the effluent treatment plant at PMR. The effluent treatment plant recovers process condensate from the effluent, the sodium chloride is recovered during this process.

| **Defined or 'Pre-classified' Waste.** | |
|---|---|
| Waste listed in Schedule 3 of NEM:WAA (Act 26 of 2014) | ✓ |
| **Category A: Hazardous Waste,** 17) Wastes from waste management facilities (b) hazardous portion of wastes from physico/chemical treatments of waste | |
| Waste listed as pre-classified in Annexure 1 to GN.R. 634, 23 August 2013) | ✖ |
| Not listed | |

## 1.2 OVERVIEW OF SANS 10234, GHS

The SANS 10234, GHS, standard covers the harmonized criteria for the classification of hazardous substances and mixtures, including waste, for their safe transport, storage and handling, according to their intrinsic health, environmental and physical hazards. It gives the harmonized communication elements for labelling and Safety Data Sheets (SDS). The standard accordingly provides detail on classification criteria (including tests methods, for physical hazard classes, often with reference to SANS 10228), labelling, hazard identification symbols (pictograms), packaging and the minimum information required for a Safety Data Sheet (SDS).

The promulgation of the National Waste Classification and Management Regulations under the National Environmental Management: Waste Act, 2008 (Act 59 of 2008)[NEM:WA] has significantly altered the regulatory environment in South Africa in respect of the classification of waste; where until now the comprehensive classification of waste has not been a clear legal requirement.

Importantly, the classification of a waste has little bearing on the disposal or management requirements thereof, but is used primarily to inform

i) appropriate handling and storage of hazardous waste, as well as

ii) the development of an associated Safety Data Sheet (SDS) for the waste in terms of SANS10234, as is required in terms of Regulation 5 (1).

The classification of the waste, in terms of SANS 10234, does not necessarily inform the disposal requirements thereof, but may be used to a degree to inform the potential applicability of landfill restrictions imposed under section 5 (1) of the Standard for the Disposal of Waste to Landfill, GN. R. 635 of 23 August 2013.

## 2. SAMPLING AND ANALYSIS

| Sampler | Date | Method |
|---|---|---|
| Interwaste Representative | 04/09/2018 | A sample of the sodium chloride was delivered to Interwaste's Waste Analytical Laboratory in Germiston, Gauteng. |

| Laboratory Analysis—Elemental (XRF) | | | |
|---|---|---|---|
| **Compositional characterisation** | **Laboratory** | **Total Concentration** | **Leachable Concentration** |
| • Metals and metalloids, as listed in GN. R. 635 | Interwaste Laboratory | ✓ | ✓ |
| • Other detectable metals | | ✓ | N/A |
| Inorganic anions, as listed in GN.R. 635: ($Cl$, $F$, $NO_3$, $SO_4$, $CN$) | | ✓ | x |
| • Organics, as listed in GN.R. 635 | | ✓ | N/A |
| • Other detectable organic substances | | ✓ | N/A |

| Laboratory Analysis—Crystalline phases (XRD | Laboratory | Total Concentration |
|---|---|---|
| Amorphous content | XRD analytical and consulting | ✓ |
| Crystalline content (all detectable crystalline compounds) | | ✓ |

| Physical and chemical properties | Laboratory | Range |
|---|---|---|
| • pH | Interwaste Laboratory | ✓ |
| • Flash point | | X |

N/A = not applicable

Raw data from the laboratory analysis are attached hereto in Annexure B

## 2.1 RESULTS AND DISCUSSION

All analytical results received were converted to a percentage by mass basis, in order to assess the contaminant concentrations against the prescribed cut-off values / concentration limits (Table 1 & Table 2) to be applied for human health and environmental hazard classes as per SANS 10234.

Table 1: SANS10234 Cut-off values/concentration limits for hazard classes

| Hazard Class | | Cut-off Value (concentration limit); % |
|---|---|---|
| Acute toxicity | | ≥ 1.0% |
| Skin corrosion | | ≥ 1.0% |
| Skin irritation | | ≥ 1.0% |
| Serious eye damage | | ≥ 1.0% |
| Eye irritation | | ≥ 1.0% |
| Respiratory sensitisation | | ≥ 1.0% |
| Skin sensitisation | | ≥ 1.0% |
| Mutagenicity | Category 1 | ≥ 0.1% |
| | Category 2 | ≥ 1.0% |
| Carcinogenicity | | ≥ 0.1% |
| Reproductive toxicity | | ≥ 0.1% |
| Target organ systemic toxicity | Single exposure | ≥ 1.0% |
| | Repeat exposure | ≥ 1.0% |
| Hazardous to the aquatic environment | | ≥ 1.0% |

The application of the cut-off values, as per Table 1, shows two (2) contaminants in the waste to be considered potentially relevant to the classification thereof in terms of SANS 10234; with reasons for 'relevance' indicated where applicable.

| Table 2: Sodium Chloride Sample Analysis, ingredients ≥ 0.1% by mass – Relevant ingredient determination | | | |
|---|---|---|---|
| **Compound Form** | **Concentration Ranges (%)** | **Relevant to classification** | **Reason** |
| Sodium Chloride (NaCl)[A] | 99.5 – 100 | ✓ | >1.0% |
| Calcium Carbonate ($CaCO_3$)[B] | 0.1 – 0.5 | X | >0.1% but <1.0% and not C, M, or R* |
| Gypsum ($CaSO_4$)[B] | 0 – 5 | ✓ | >1.0% |

* C = Carcinogenic, M = Mutagenic or R = Reproductive Toxin (with cut-off values of 0.1% relevant to these hazard classes, as opposed to 1% for all remaining human health and aquatic hazard classes)

[A] Crystalline form as per XRD analysis.

[B] Chemical form assumed based on literature, or associated elemental concentrations in the waste.

| Table 3: Sodium Chloride – Relevant ingredient hazard data | | | |
|---|---|---|---|
| **Ingredient** | | **Sodium Chloride** | **Gypsum** |
| Chemical composition by weight % | | 99.5 - 100 | 0 - 5 |
| CAS Number | | 7647-14-5 | 7778-18-9 |
| Human health hazards | | | |
| Acute Toxicity | Oral | | |
| | Inhalation | | |
| | Dermal | | |
| Skin corrosion / irritation | | | |
| Eye damage / irritation | | | |
| Mutagenicity | | | |
| Carcinogenicity | | | |
| Reproductive toxicity | | | |
| Specific Target Organ Toxicity (STOT) | Single Exposure | | |
| | Repeat Exposure | | |
| Aspiration Hazard | | | |
| Skin/respiratory sensitisation | | | |
| Aquatic hazards | | | |
| Acute | | | |
| Chronic | | | |

# 3. SANS 10234 CLASSIFICATION – 'INGREDIENT' HAZARD DATA

SANS 10234 makes a general allowance for the use of existing hazard data on classified 'ingredients' in a mixture toward the classification of that mixture. This is primarily aimed at avoiding unnecessary testing in the laboratory on the mixture (i.e. the waste in this instance) as a whole, particularly as it pertains to animal testing in respect of human health and environmental hazard groups. This process (in general terms) relies on knowing the intrinsic hazards or hazardous properties of the ingredients in a mixture, in combination with knowledge of the contribution thereof (by mass) to the overall mixture / waste.

The following phased approach was adopted by Interwaste toward classifying the subject waste stream, so that the outcomes are scientifically correct and the output thereof defensible:

1. Waste generator discussions and review of the process(es) generating the waste, as well as any existing/relevant SDS's;
2. Laboratory analysis, focused on relevant contaminants of concern;
3. Literature review / assimilation of hazard data and existing GHS classifications on the waste / mixture as a whole, or similar waste streams; where… "*test data already generated for the classification of a chemical under existing systems shall be accepted when classifying a waste under the harmonised system, thereby avoiding duplicate testing and the unnecessary use of test animals*" (SANS 10234);
4. A) Application of bridging principles prescribed under SANS 10234 towards hazard class classification, given the lack of availability of existing hazard information on similar waste streams (Annexure A has reference);

   B) Application of additivity principles under the GHS where bridging principles inadequate towards hazard class classification; given that no hazard data is available on the waste/mixture as a whole, but where there is sufficient existing hazard data on the ingredients/constituents of the waste to allow for such.

To this end, the available knowledge on the ingredient composition for the subject waste stream has been used to source available hazard data for each of the relevant ingredients. The term 'relevant ingredients' is used to describe those ingredients in the waste that were measured at a concentration of >0.1% (by mass); where Table 2 refers.

## SANS 10234 (GHS) Detailed Waste Classification

| | |
|---|---|
| **Waste appearance** | White Coarse Salt. |

**Classification Summary**

**No classified as hazardous when compared against the criteria set out in SANS 10234.**

**Assumptions and limitations**

- The measured metal substances were assumed to be present in oxide form as found in literature for waste similar to the subject waste stream.
- Hazard information for substances is sourced from:
  - Analytical results
  - Hazardous relevant ingredients, SDS (where relevant).
  - Supplement to SANS 10234:2008 Edition 1.
  - European Chemicals Agency, Classification & Labelling Inventory Database.
  - US Centre for Disease Control (CDC).
- The mixture has a pH of 6.1

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| **Physical Hazards** | | | | |
| **Explosives** | Division 1.1 – 1.6 | According to the results of the tests in Part I of the UN Manual of tests and criteria | No substance identified | |
| **Flammable Gases** | 1 | Gases and gas mixtures that, at 20$^0$C and a standard pressure of 101.3 kPa:<br>a) Are ignitable when in a mixture of 13% or less by volume in air, or<br>b) Have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit | No substance identified | |
| | 2 | Gases or gas mixtures, other than those of category 1, which, at 20$^0$C and a standard pressure of 101.3 kPa, have a flammable range while mixed in air | No substance identified | |
| **Flammable Aerosols** | 1 - 2 | On the basis of its components, of its chemical heat of combustion and, if applicable, of the results of the foam test, for foam aerosols, and of the ignition distance test and enclosed space test, for spray aerosols (see Part III, section 31 of the UN Manual of tests and criteria) | No substance identified | |
| **Oxidizing Gases** | 1 | Any gas that may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does | No substance identified | |
| **Gases Under Pressure** | Compressed Gas | A gas that, when packaged under pressure, is entirely gaseous at -50$^0$C, including all gases with a critical temperature ≤ -50$^0$C | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | Liquefied Gas | A gas that, when packaged under pressure, is partially liquid at temperatures above -50$^0$C<br><br>A distinction is made between:<br><br>a) High pressure liquefied gas, a gas with a critical temperature between -50$^0$C and +65$^0$C, and<br>b) Low pressure liquefied gas, a gas with a critical temperature above +65$^0$C | No substance identified | |
| | Refrigerated Liquefied Gas | A gas that, when packaged, is made partially liquid because of its low temperature | No substance identified | |
| | Dissolved Gas | A gas that, when packaged under pressure, is dissolved in a liquid phase solvent | No substance identified | |
| **Flammable Liquids** | 1 | Flash point < 23$^0$C and initial boiling point ≤ 35$^0$C | No substance identified | |
| | 2 | Flash point < 23$^0$C and initial boiling point > 35$^0$C | No substance identified | |
| | 3 | Flash point < 23$^0$C and ≤ 60$^0$C | No substance identified | |
| | 4 | Flash point > 60$^0$C and ≤ 93$^0$C | No substance identified | |
| **Flammable Solids** | 1 | a) substance and mixtures other than metal powders<br><br>The wetted zone does not stop the fire and the burning time is < 45s, or the burning rate is > 2,2mm/s<br><br>b) The burning time is ≤ 5 min | No substance identified | |
| | 2 | a) substance and mixtures other than metal powders<br><br>The wetted zone does not stop the fire for at least 4 minutes and the burning time is < 45s, or the burning rate is > 2,2mm/s<br><br>b) The burning time is > 5 min and ≤ 10min | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| **Self-Reactive Substances** | Type A | According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria | No substance identified | |
| | Type B | According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria | No substance identified | |
| | Types C and D | According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria | No substance identified | |
| | Types E and F | According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria | No substance identified | |
| | Type G | According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria | No substance identified | |
| **Pyrophoric Liquids** | 1 | The liquid ignites within 5 min when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 min | No substance identified | |
| **Pyrophoric Solids** | 1 | The solid ignites within 5 min of coming into contact with air | No substance identified | |
| **Self-Heating Substances** | 1 | A positive result is obtained in a test using a cubical container of sides 25 mm at $140^0$C | No substance identified | |
| | 2 | a) A positive result is obtained in a test using a cubical container of sides 100 mm at $140^0$C and a negative result is obtained in a test using a cubical container of sides 25 mm at $140^0$C and the substance is to be packed in the packages with a volume of more than 3 $m^3$, or<br>b) A positive result is obtained in a test using a cubical container of sides 100 mm at 1400C and a negative result is obtained in a test using a cubical container of sides 25 mm at $140^0$C, a positive result is obtained in a test using a cubical container of sides 100mm at $120^0$C and the substance is to be packed in packages with a volume of more than 450litres, or<br>c) A positive result is obtained | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | | in a test using a cubical container of sides 100 mm at $140^0$C and a negative result is obtained in a test using a cubical container of sides 25 mm at $140^0$C and a positive result is obtained in a test using a cubical container of sides 100 mm at $100^0$C | | |
| **Substances that, on contact with water, emit flammable gases** | 1 | Any substance that reacts vigorously with water at ambient temperatures and demonstrates a tendency for the gas produced to ignite spontaneously, or that reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10L/kg of substance over any 1min | No substance identified | |
| | 2 | Any substance that reacts vigorously with water at ambient temperatures and demonstrates a tendency for the gas produced to ignite spontaneously, or that reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10L/kg of substance over any 1min | No substance identified | |
| | 3 | Any substance that reacts slowly with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 1L/kg of substance per hour, and that does not meet the criteria for the categories 1 and 2 | No substance identified | |
| **Oxidizing Liquids** | 1 | Any substance that, in the 1 : 1 mixture, by mass, of substance and cellulose tested, spontaneously ignites, or the mean pressure rise time of a 1 : 1 mixture, by mass of 50% perchloric acid and cellulose | No substance identified | |
| | 2 | Any substance that, in the 1 : 1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or to the mean pressure rise time of a 1 : 1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose, and the criteria for category 1 are not met | No substance identified | |
| | 3 | Any substance that, in the 1 : 1 mixture by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1 : 1 mixture, by mass, of 65% aqueous nitric acid and cellulose, and the | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | | criteria for categories 1 and 2 are not met | | |
| **Oxidizing Solids** | 1 | Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time less than the mean burning time of a 3 : 2 mixture, by mass, of potassium bromate and cellulose | No substance identified | |
| | 2 | Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time equal to or less than the mean burning time of a 2 : 3 mixture, by mass, of potassium bromate and cellulose and the criteria for category 1 are not met | No substance identified | |
| | 3 | Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time equal to or less than the mean burning time of a 3 : 7 mixture, by mass, of potassium bromate and cellulose and the criteria for categories 1 and 2 are not met | No substance identified | |
| **Organic Peroxides** | Type A | According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria | No substance identified | |
| | Type B | According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria | No substance identified | |
| | Type C and D | According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria | No substance identified | |
| | Type E and F | According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria | No substance identified | |
| | Type G | According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria | No substance identified | |
| **Corrosive to Metals** | 1 | Corrosion rate on steel or aluminium surfaces exceeding 6,25mm/year at $55^0$C | No substance identified | |
| **Health Hazards** | | | | |
| **Acute toxicity** | 1, 2, 3, 4 & 5 | If a mixture acute toxicity estimate (ATE) is within a specified range specific to routes of exposure. | No substance identified | |
| **Skin Corrosion/ Irritation** | 1 | If an individual substance ≥ 5% and is classified under category 1, or if a mixture pH ≥ 11.5 or ≤ 2, or if an individual substance ≥ 1% has pH ≥ 11.5 or ≤ 2, or if an individual | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | | substance ≥ 1% for which additivity does not apply is corrosive (category 1). | | |
| | 2 | If an individual substance ≥ 1% but ≤ 5% and is classified under category 1, or if an individual substance ≥ 10% and is classified under category 2, or if (10 × skin category 1) +skin category 2 ≥ 10%, or if an individual substance ≥ 3% for which additivity does not apply and is classified skin irritant category 2. | Calcium Carbonate (Category 2), between 0.1-0.5% | Not Classified |
| | 3 | If an individual substance < 10% but ≥ 1% and is classified under category 2, or if an individual substance ≥ 10% and is classified under category 3, or if (10 × skin category 1) +skin category 2 < 10% but ≥ 1%, or if (10 × skin category 1 + skin category 2 + skin category 3) ≥ 10% | No substance identified | |
| **Serious Eye Damage/Eye irritation** | 1 | If an individual substance ≥ 3% and is classified skin/eye category 1, or if a mixture pH ≥ 11.5 or ≤ 2, or if (skin category 1 + eye category 1) ≥ 3%, or if an individual substance ≥ 1% has pH ≥ 11.5 or ≤ 2, or if an individual substance ≥ 1% for which additivity does not apply is corrosive (category 1).. | No substance identified | |
| | 2 | If an individual substance ≥ 1% but < 3% and is classified skin/eye category 1, or if an individual substance ≥ 10% and is classified under category 2A, or if (10 × eye category 1 +eye category 2A) ≥ 10%, or if (skin category 1 + eye category 1) ≥ 1% but < 3%, or if an individual substance ≥ 3% for which additivity does not apply and is classified skin/eye irritant category 2, or if (10 × eye category 1 + 10 × skin category 1 + eye category 2A/2B) ≥ 10%. | Calcium Carbonate (Category 2), between 0.1-0.5% | Not Classified |
| **Respiratory sensitization and skin sensitization** | Skin sensitization Category 1 | If an individual substance ≥ 0.1% and is classified skin sensitization category 1 | No substance identified | |
| | Respiratory sensitization Category 1 | If an individual solid or liquid or gaseous substance ≥ 0.1% and is classified respiratory sensitization category 1 | No substance identified | |
| **Germ Cell Mutagenicity** | 1 | If an individual substance ≥ 0.1% and is classified under category 1 | No substance identified | |
| | 2 | If an individual substance ≥ 0.1% and is classified under category 2 | No substance identified | |
| **Carcinogenicity** | 1A | If an individual substance ≥ 0.1% and is classified category 1 carcinogen | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | | (known) | | |
| | 1B | If an individual substance ≥ 0.1% and is classified category 1 carcinogen (presumed) | No substance identified | |
| | 2 | If an individual substance ≥ 0.1% and is classified category 2 carcinogen. | No substance identified | |
| **Reproductive Toxicity** | 1A | If an individual substance ≥ 0.1% and is classified reproductive toxicant category 1 (known). | No substance identified | |
| | 1B | If an individual substance ≥ 0.1% and is classified reproductive toxicant category 1 (presumed). | No substance identified | |
| | 2 | If an individual substance ≥ 0.1% and is classified reproductive toxicant category 2. | No substance identified. | |
| | Category for effects on, or via lactation | If an individual substance ≥ 0.1% and is classified reproductive toxicant for effects on, or via lactation. | No substance identified | |
| **Specific Target Organ Toxicity – Single Exposure** | 1 | If an individual substance ≥ 1% and is classified STOT – single exposure category 1. | No substance identified | |
| | 2 | If an individual substance ≥ 1% and is classified STOT – single exposure category 2. | No substance identified | |
| | 3 | If an individual substance ≥ 20% and is classified STOT – single exposure category 3. | Calcium Carbonate (Category 3), between 0.1-0.5% | Not Classified |
| **Specific Target Organ Toxicity – Repeated Exposure** | 1 | If an individual substance ≥ 1% and is classified STOT – repeated exposure category 1. | No substance identified | |
| | 2 | If an individual substance ≥ 1% and is classified STOT – Repeated exposure category 2 | No substance identified | |
| **Aspiration Hazards** | 1 | If an individual substance ≥ 10% and is classified as aspiration toxicant category 1 and has a kinematic viscosity ≤ 20.5 $mm^2/s$, at 40 °C | No substance identified | |
| | 2 | If an individual substance ≥ 10% and is classified as aspiration toxicant category 2 and has a kinematic viscosity ≤ 14 $mm^2/s$, at 40 °C | No substance identified | |
| **Hazards to the Aquatic Environment** | | | | |
| **Acute Aquatic Toxicity** | 1 | If (Multiplication factor as determined in the GHS × Acute 1) > 25%. | No substance identified | |
| | 2 | If (Multiplication factor as determined in the GHS × 10 × Acute 1 + Acute 2) > 25%. | No substance identified | |
| | 3 | If (Multiplication factor as determined in the GHS × 100 × Acute 1 + 10 × Acute 2 + Acute 3) > 25%. | No substance identified | |
| **Chronic Aquatic Toxicity** | 1 | If (Multiplication factor as determined in the GHS × Chronic 1) | No substance identified | |

| Hazard Class | Hazard Category | Classification Criteria | Assessed Concentration wt.% | Waste Hazard Category |
|---|---|---|---|---|
| | | > 25%. | | |
| | 2 | If (Multiplication factor as determined in the GHS × 10 × Chronic 1 + Chronic 2) > 25%. | No substance identified | |
| | 3 | If (Multiplication factor as determined in the GHS × 100 × | No substance identified | |
| | 4 | If (Chronic 1 + Chronic 2 + Chronic 3 + Chronic 4) > 25% | No substance identified | |

# 4. DISCUSSION

The sodium chloride classifies as not hazardous when applying the criteria prescribed under SANS 10234.

As per the 'Waste Classification and Management Regulations, 2013 (GNR634)', a safety data sheet (SDS) is not required for the sodium chloride waste stream.

# ANNEXURE A: GHS CLASSIFICATION CRITERIA

## Skin Corrosion/irritation

| SANS10234, Table 26 – Cut-off values/concentration limits of the ingredients of a mixture classified as skin category 1, 2 or 3 that trigger classification of the mixture as hazardous to skin | | | |
|---|---|---|---|
| Sum of ingredients classified as: | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture % | | |
| | Skin corrosive | Skin irritant | |
| | Category 1 | Category 2 | Category 3 |
| Skin category 1 | ≥ 5 | ≥1 but < 5 | |
| Skin category 2 | | ≥10 | 10 > C ≥ 1 |
| Skin category 3 | | | ≥10 |
| (10 X skin category 1) + skin category 2 | | ≥10 | 10 > C ≥ 1 |
| (10 X skin category 1) + skin category 2 + skin category 3 | | | ≥10 |

## Serious Eye Damage/Eye Irritation

| SANS 10234 Table 30 – Cut-off values/concentration limits of the ingredients of a mixture classified as category for skin effects and/or category 1 or 2 for eye effects that trigger classification of the mixture as hazardous to the eye | | |
|---|---|---|
| Sum of ingredients classified as: | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture % | |
| | Irreversible eye effects | Reversible eye effects |
| | Category 1 | Category 2 |
| Eye or skin category 1 | ≥ 3 | 3 > C ≥ 1 |
| Eye category 2A | | ≥10 |
| (10 X eye category 1) + eye category 2A | | ≥10 |
| Skin category 1 + eye category 1 | ≥ 3 | 3 > C ≥ 1 |
| 10 X (skin category 1 + eye category 1) + eye category 2A or 2B | | ≥10 |

## Carcinogenicity

| SANS10234, Table 39 - Cut-off values/concentration limits of ingredients classified as carcinogens that trigger classification of a mixture. | | |
|---|---|---|
| Ingredient classified as: | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture<br>% | |
| | Category 1 carcinogen | Category 2 carcinogen |
| Category 1 carcinogen | ≥ 0.1% | |
| Category 2 carcinogen | - | ≥ 0.1% |
| | | ≥ 1.0% |

## Reproductive Toxicity—Fertility

| SANS10234, Table 42 – Cut-off values/concentration limits of the ingredients of a mixture classified as reproductive toxicants that trigger classification of the mixture | | | |
|---|---|---|---|
| Sum of ingredients classified as: | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture<br>% | | |
| | Category 1 | Category 2 | Additional category for effects on, or via lactation |
| Category 1 reproductive toxicant | ≥0.1 | | |
| Category 2 reproductive toxicant | | ≥0.1 | |
| Additional category for effects on, or via lactation | | | ≥0.1 |

## Germ Cell Mutagenicity

| SANS 12034, Table 36 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as germ cell mutagens | | |
|---|---|---|
| Hazard category of the ingredient(s) | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture<br>% | |
| | Category 1 | Category 2 |
| Category 1 | ≥ 0.1% | |
| Category 2 | | ≥ 1% |

## Specific Target Organ Toxicity (STOT)—Single Exposure

| SANS 12034, Table 46 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as a specific target organ toxicant – single exposures | | |
|---|---|---|
| Hazard category of the ingredient(s) | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture % | |
| | Category 1 | Category 2 |
| Category 1 | ≥ 1% | |
| Category 2 | | ≥ 1% |

## Specific Target Organ Toxicity (STOT)—Repeated Exposure

| SANS 12034, Table 51 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as a specific target organ toxicant – repeated exposures | | |
|---|---|---|
| Hazard category of the ingredient(s) | Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture % | |
| | Category 1 | Category 2 |
| Category 1 | ≥ 1% | |
| Category 2 | | ≥ 1% |

## Hazards to the Aquatic Environment

| SANS 10234, Table 58 – Classification of Mixtures for Acute Hazards to the Aquatic Environment, based on the summation of classified components | |
|---|---|
| Sum of the components/ingredients classified as: | Acute hazard category of the mixture |
| Acute 1 X M<br>>25% | 1 |
| (M X 10 X Acute 1) + Acute 2<br>>25% | 2 |
| (M X 100 X Acute 1) + (10 X Acute 2) + Acute 3<br>>25% | 3 |

* LC50 KMnO4 ≥ 0.1 ≤ 1.0 mg/l; therefore M = 1

| SANS 10234, Table 59 – Classification of Mixtures for Chronic Hazards to the Aquatic Environment, based on the summation of classified components | | |
|---|---|---|
| Sum of the components/ingredients classified as: | | Chronic hazard category of the mixture |
| Chronic 1 X M | >25% | 1 |
| (M X 10 X Chronic 1) + Chronic 2 | >25% | 2 |
| (M X 100 X Chronic 1) + (10 X Chronic 2) + Chronic 3 | >25% | 3 |
| Chronic 1 + Chronic 2 + Chronic 3 + Chronic 4 | >25% | 4 |

* NOEC KMnO4 > 0.01mg/l ≤ 0.1mg/l; therefore M = 1

# ANNEXURE B: LABORATORY RESULTS

# ANNEXURE C: GENERATOR SANS 10234 SAFETY DATA SHEET (SDS) FOR SODIUM CHLORIDE

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

# CERTIFICATE OF REGISTRATION

This is to certify that

## Precious Metals Refiners

*Hazardous Waste Generator*

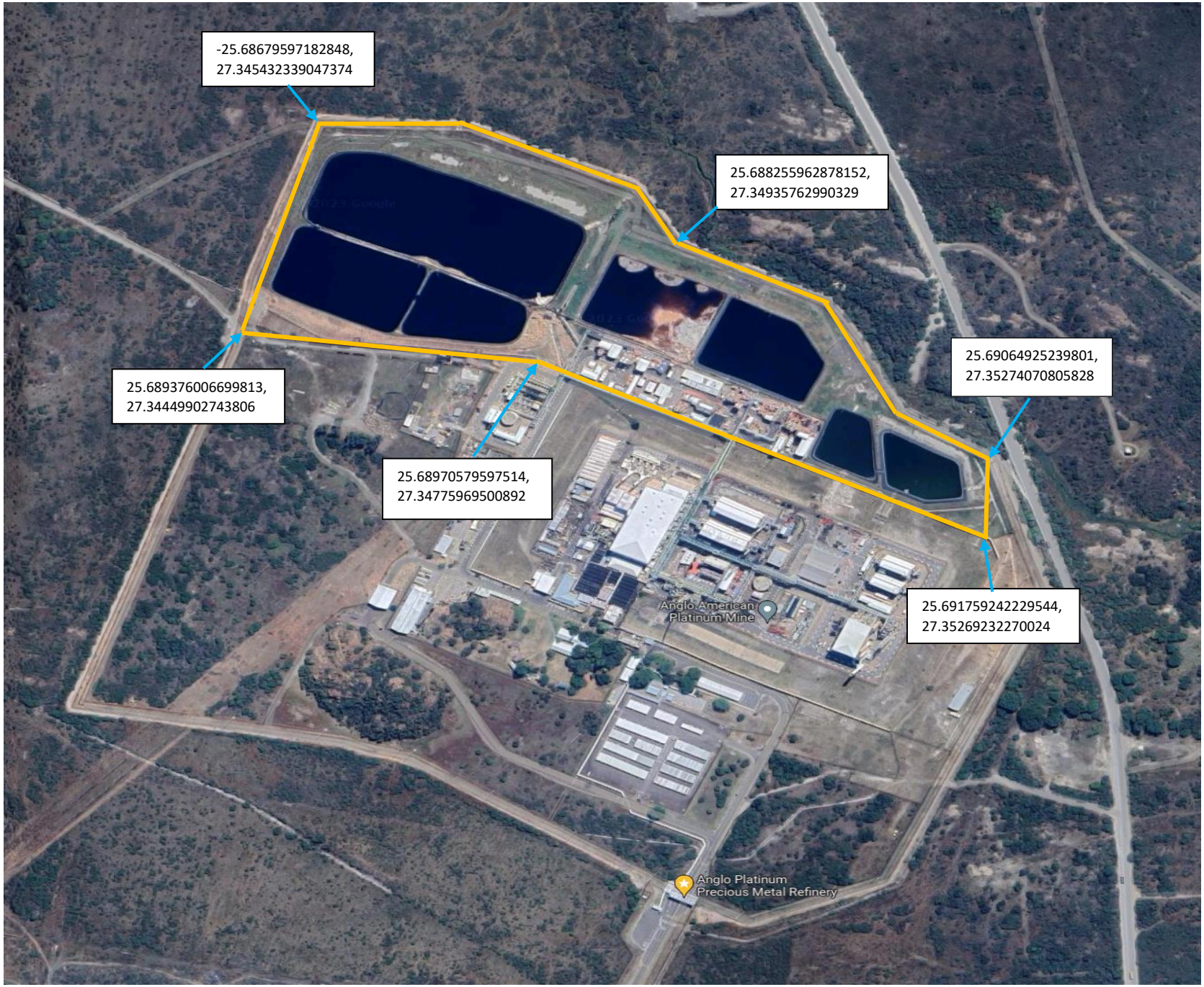
has been registered with the South African Waste Information System
established in terms of chapter 6 of the
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

## D01194-01

Date of Registration: 2013-02-27

SAWiC

*Disclaimer: This certificate is issued with a unique registration number specifically for provision of information to the South African Waste Information System (SAWIS) and does not exempt its holders from complying with chapter 5 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and other applicable legislation*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Anglo American
Platinum Mine
Anglo Platinum
Precious Metal Refinery