# Preliminary Economic Assessment Report

For the

# Manono Lithium Tailings Project
# Manono, Democratic Republic of Congo

Prepared for

**Tantalex Lithium Resources**

Prepared by:

| | |
|---|---|
| **Effective Date:** | **06-October-2023** |
| **Issue Date:** | **19-October-2023** |

***IMPORTANT NOTICE***

*This report was prepared as a National Instrument NI 43-101 Technical Report for Tantalex Lithium Resources Corp (Tantalex) by Sedgman Novopro Projects Inc. (SN), Canada and The MSA Group (Pty) Ltd (MSA), South Africa. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in Report Author's services, based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Tantalex subject to the terms and conditions of its contract with the Report Authors. Except for the purposes legislated under Canadian provincial securities law, any other uses of this report by any third party is at that party's sole risk.*

## Statement of Certification by Author

I, Antoine Lefaivre, P.Eng., do hereby certify that:

1. I am a Lead Process Engineer at:

   Sedgman Novopro Inc.,

   1350 Sherbrooke West, Suite 600,

   Montreal QC, H3G 1J1,

   Canada.

2. This Certificate applies to the Technical Report titled "*Manono Lithium Tailings Project, Manono, Democratic Republic of Congo, NI43-101 Technical Report – 19 October*" effective date: October 6th, 2023,
3. I am a graduate of Ecole Polytechnique, Montreal, Quebec, Canada with a B.Sc. Chemical Engineering 2007.
4. I am a member in good standing of the Ordre des Ingénieurs du Québec, license no. 5002027.
5. I have over 15 years of experience executing industrial projects, economic and feasibility studies, process development, and due-diligence reviews, and have participated in projects for potash, lithium, magnesium products, using both conventional and solution mining for ore recovery in Canada, United States, Africa, South America and Australia.
6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101), and past relevant work experience, I meet the requirements to be a "qualified person" for the purposes of NI 43-101.
7. I am co-author of the report titled "*Tantalex Lithium Resources Corp., Manono Lithium Tailings Project, Democratic Republic of Congo, NI43-101 Technical Report – 04 September 2023" effective date: August 23rd, 2023*, being author for Item 13.
8. I did not undertake a site visit because of COVID restrictions and the ongoing conflict in DRC.
9. I have not had any prior involvement with the property previous to this Technical Report.
10. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the parts of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I do not hold, nor do I expect to receive, any securities or any other interest in any corporate entity, private or public, with interests in the properties that are the subject of the Technical Report or in the properties themselves, nor do I have any business relationship with any such entity apart from a professional consulting relationship with Tantalex Lithium Resources Corporation.
12. I am independent of Tantalex Lithium Resources Corporationas defined by Section 1.5 of NI 43-101.
13. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in accordance with that instrument and form.

Dated the 19th day of October 2023

"Signed and Stamped"

(Antoine Lefaivre, P.Eng.)

## Statement of Certification by Author

I, James Brebner, P.Eng., do hereby certify that:

1. I am the Engineering Manager at:

   Sedgman Novopro Inc.,

   1350 Sherbrooke West, Suite 600

   Montreal QC, H3G 1J1

   Canada.

2. This Certificate applies to the Technical Report titled "Manono Lithium Tailings Project, Manono, Democratic Republic of Congo, NI43-101 Technical Report – 19 October" effective date: October 6th, 2023,
3. I am a graduate of University of New Brunswick, Fredericton, New Brunswick Canada with a B.Sc. Mechanical Engineering 1983.
4. I am a member in good standing of the Ordre des Ingénieurs du Québec, license no. 41110.
5. I have over 35 years of experience executing industrial projects, economic and feasibility studies, process development, and due-diligence reviews, and have participated in multiple industrial and mining projects including potash, lithium, and light metals in Canada, United States, Africa, South America and Australia.
6. I have read the definition of "qualified person" set out in the National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with professional associations (as defined in 43-101), and past relevant work experience, I meet the requirements of a "qualified person" for the purposes of 43-101.
7. I am a co-author of the Technical Report titled "Manono Lithium Tailings Project, Manono, Democratic Republic of Congo, NI43-101 Technical Report – 19 October" effective date: October 6th, 2023, being co-author for Sections 1, 2, 24, 25, 26 and 27 and author of Sections 18, 19, 20, 21 and 22
8. I have not had any prior involvement with the property previous to this Technical Report.
9. I did not undertake a site visit, so all information pertaining to site conditions are considered relied upon information by other qualified persons.
10. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the parts of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Report not misleading.
11. I do not hold, nor do I expect to receive, any securities or any other interest in any corporate entity, private or public, with interests in the properties that are the subject of the Technical Report or in the properties themselves, nor do I have any business relationship with any such entity apart from a professional consulting relationship with Tantalex Lithium Resources Corp (Tantalex).
12. I am independent of Tantalex Lithium Resources Corp as defined by Section 1.5 of NI-43-101.
13. I have read NI-43-101 and Form 43-101F, and the Technical Report has been prepared in accordance with that document.

Dated the 19th day of October 2023

"Signed and Stamped"

(James Brebner, P.Eng)

## CERTIFICATE OF QUALIFIED PERSON

I, Rui Goncalves, Pr.Sci.Nat., do hereby certify that:

1. I am a Senior Mineral Resource Consultant of:

   The MSA Group (Pty) Ltd
   Henley House, Greenacres Office Park,
   Victory Park, Randburg, 2195
   South Africa

2. This certificate applies to the technical report titled "Manono Lithium Tailings Project – Preliminary Economic Assessment – Manono, Democratic Republic of Congo", that has an effective date of 6 October 2023 and an issue date of 19 October 2023(the Technical Report).

3. I graduated with a BSc (Hons) degree in Geology from the University of Pretoria in 2010. In addition, I obtained a Master of Science degree in Engineering from the University of Witwatersrand in 2021.

4. I am a registered Professional Natural Scientist (Geological Science) with the South African Council for Natural Scientific Professions (SACNASP) and a Member of the Geological Society of South Africa.

5. I have worked as a geologist for a total of 13 years, during which time I have worked in a number of roles in precious and base metal exploration, mine geology and Mineral Resource estimation. I have conducted Mineral Resource estimates and reviews for a wide range of commodities and styles of mineralisation including copper-cobalt, gold, tin, nickel, platinum group elements, rare earth elements and niobium. Specific tailings experience includes copper-cobalt deposits in the Democratic Republic of Congo (DRC), tin experience includes shear-hosted tin deposits in the DRC.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I visited the Manono Tailings property for two days from 29 to 30 April 2022.

8. I am responsible for the preparation of items 3 to 12,14, 23 and co-responsible for items 1,2 and 24 to 27.

9. I have not had prior involvement with the property that is subject of the Technical Report.

10. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.

11. I am independent of the issuer according to the definition of independence described in section 1.5 of National Instrument 43-101.

12. I have read National Instrument 43-101 and Form 43-101F1 and, as of the date of this certificate, to the best of my knowledge, information and belief, those portions of the Technical Report for which I am responsible have been prepared in compliance with that instrument and form.

13. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 19th day of October, 2023.

"signed and stamped"

(Rui Goncalves, Pr. Sci. Nat)

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# 1 SUMMARY

## 1.1 Property Description and Ownership

Tantalex Lithium Resources Corporation (Tantalex) is a Canadian exploration company listed on the Canadian Securities Exchange, the Frankfurt Stock Exchange and the United States OTCQB Venture Market. The subject of this report is the Manono lithium-tin-tantalum tailings deposit, located 490 km north of Lubumbashi, in the Tanganyika Province of the Democratic Republic of Congo (DRC).

The Manono Lithium tailings are located within the Tailings Exploitation Permit PER 13698, which is located adjacent to the town of Manono. It consists of 11 tailings dumps spanning a length of 12 km from the southwest towards the northeast. The license is held by Minocom Mining SAS, of which Tantalex holds 52%; 18% is held by MINOR and the remaining 30% by Cominière.

## 1.2 Geology and Mineralisation

The Manono Lithium tailings are technogenic deposits, created from the processing of material from the Manono-Kitolo deposit, which was mined from 1919 to the mid-1980’s for tin and columbite-tantalite (coltan). Nine out of the eleven tailings were drilled, of which five form this Mineral Resource Estimate. The tailings deposits stretch over a length of 12 km, in a northeast-southwest direction, immediately adjacent to the mined pits. Several of the deposits consist of a mixture of material types, typically pegmatite and laterite, with some clay material being present in minor quantities in specific deposits.

The deposits are named alphabetically, with a suffix used to differentiate between coarse (c) and fine (f) material. The nine tailings that make up the project are from north to south named Cc, Cf, Ec, Hc, Hf, Gc, Gf, Ic and K.

The lithium mineralisation is primarily hosted in spodumene with minor lepidolite. Tin mineralisation is hosted in cassiterite and tantalum in tantalite.

## 1.3 Exploration Status

The nine tailings deposits have been evaluated by aircore drilling, completed from September 2021 to July 2022. A total of 368 drillholes, amounting to 11,922.4 meters of drilling, have been completed, which took place over two phases.

Drilling was orientated vertically, with the densest drilling found on the K deposit, where holes were spaced 40 m apart. The Gf and Hf deposits were drilled at a spacing of 80 m. The remaining deposits were drilled on an irregular spacing ranging from 20 m to 80 m. Most of the drilling has intercepted the contact representing the pre-depositional surface.

### 1.4 Mineral Resource Estimate

The Manono Lithium tailings were visited by Rui Goncalves, who is a Senior Mineral Resource Geologist with the MSA Group (PTY) (MSA) and the Qualified Person for this Mineral Resource estimate, on April 29th and 30th 2022. The occurrences and setting of the lithium mineralisation were observed in the field as well as in a selection of chip samples from the first phase of drilling. No drilling was taking place at the time of the site visit, however discussions with Tantalex and observations on-site indicated that reasonable documented procedures and protocols were used in the drilling.

The assay results received from the primary laboratory (SGS in Johannesburg, South Africa) were subjected to a quality assurance and quality control programme and the assays have been confirmed by check assays completed by ALS (Ireland). Both these laboratories are commercial laboratories independent of Tantalex and MSA.

The drilling, logging, sampling, and assay data is contained in Microsoft Excel spreadsheets, which were validated by MSA prior to use in Mineral Resource estimation.

Three dimensional volumes were constructed for each tailings deposit. Where applicable, individual volumes representing pegmatite, laterite and clay layers were modelled for each deposit.

Ordinary Kriging was used to estimate lithium oxide ($Li_2O$), tin (Sn) and tantalum (Ta) grades into a three-dimensional block model for the K deposit. Due to the paucity of the data, inverse distance squared was used to estimate the grades for the remaining seven deposits. Tin and tantalum were only estimated for the K, Gf, Gc and Ic deposits. One deposit (Cf) was not estimated at all due to insufficient drilling coverage.

The Mineral Resource was estimated using The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Best Practice Guidelines (2019) and is reported in accordance with the 2014 CIM Definition Standards, which have been incorporated by reference into National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101).

The Mineral Resources were classified into the Measured, Indicated, and Inferred categories for each deposit and reported at a cut-off grade of 0.20% $Li_2O$ (Table 1-1). The cut-off grade was calculated based on a mining cost of 2.17 USD/tonne, a processing cost of 11.18 USD/tonne, transport cost of 361 USD/tonne, G&A costs of 76.5 USD/tonne, marketing costs of 178.4 USD/tonne, a mining recovery of 99%, process recovery of 63% and a lithium price of 2800 USD/tonne for spodumene concentrate (SC6), which the QP considers will satisfy “reasonable prospects for eventual economic extraction”. No Mineral Resources for the Ec, Hc and Hf deposits were declared.

**Table 1-1: Manono Mineral Resources at 0.20% Li2O Cut-Off Grade – 23 August 2023**

| Deposit | Classification | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| Cc | Inferred | 2.99 | 0.32 | - | - |
| Ic | Inferred | 0.51 | 0.49 | 583 | 29 |
| Gc | Indicated | 0.29 | 0.78 | 579 | 30 |
| | Inferred | 0.51 | 0.84 | 554 | 29 |
| Gf | Indicated | 1.39 | 0.35 | 183 | 22 |
| | Inferred | 0.13 | 0.33 | 209 | 26 |
| K | Measured | 3.77 | 0.86 | 305 | 25 |
| | Inferred | 2.33 | 0.67 | 652 | 35 |
| **$Li_2O$, Sn and Ta Mineral Resources** | | | | | |
| **Total** | Measured | 3.77 | 0.86 | 306 | 25 |
| | Indicated | 1.69 | 0.42 | 252 | 24 |
| | **Measured & Indicated** | **5.46** | **0.73** | **289** | **25** |
| | Inferred | 3.48 | 0.66 | 614 | 33 |
| **$Li_2O$ only Mineral Resources** | | | | | |
| **Total** | Inferred | 2.99 | 0.32 | - | - |

*Notes:*

1. *All tabulated data have been rounded and as a result minor computational errors may occur.*
2. *Mineral Resources are not Mineral Reserves, have no demonstrated economic viability.*
3. *$Li_2O$ % grades calculated by applying a factor of 2.153 to Li % grades.*
4. *Mt = Million tonnes, ppm = parts per million*
5. *Inferred $Li_2O$, Sn and Ta Mineral Resources are totalled for the Southern Sector dumps (Ic, Gc, Gf and K).*
6. *Inferred $Li_2O$ only Mineral Resources are for the Cc dump.*

The Mineral Resources presented in this Technical Report represent an update to the Mineral Resource estimate with an effective date 23 August 2023 and now includes tin and tantalum.

Additional drilling is recommended for several deposits in order to improve the confidence in the Mineral Resource estimates.

### 1.5 Mining Method

The tailings dumps will be reclaimed by an excavator at each of K, I and G dumps and loaded onto dump trucks for transport onto an overland conveyor that will feed a stockpile at the process plant.

### 1.6 Recovery Methods

Material from the tailings dumps will be processed into a 5.5wt% $Li_2O$ concentrate using a robust process flowsheet consisting of crushing, dense media separation, and flotation, dewatering and bagging plants.

### 1.7 Infrastructure

The project site will consist of the raw material dumps, processing plant, power generation, water supply and wastewater treatment, offices, warehouse, maintenance, and tailings storage facility.

### 1.8 Capital and Operating Costs

The total project CAPEX of $147,722,000 as presented in Table 1-2 with Direct CAPEX to bring the Project to operation estimated to be $80,611,000 with a total of $34,157,000 allocated for the Indirect costs and a further $10,000,000 budget allowance for road rehabilitation.

The project budget further includes a recommended Contingency of $22,954,000 (20% of direct and indirect costs).

**Table 1-2: Project CAPEX Summary (USD)**

| Area | Total |
|---|---|
| **DIRECT COSTS** | **$ 80,611,000** |
| Civil | $ 10,073,000 |
| Concrete | $ 4,829,000 |
| Structural | $ 5,794,000 |
| Architectural | $ 2,547,000 |
| Mechanical | $ 32,191,000 |
| Mobile Equipment | $ 4,254,000 |
| Piping | $ 9,657,000 |
| Electrical | $ 6,438,000 |
| Instrumentation & Telecommunication | $ 4,829,000 |
| **INDIRECT COSTS** | **$ 34,157,000** |
| Construction indirects | $ 4,031,000 |
| Freight, handling, and logistics | $ 9,673,000 |
| Commissioning & (1) year operational & capital | $ 1,612,000 |
| First fill | $ 2,429,000 |
| Vendor Representative | $ 290,000 |
| EPCM Services | $ 9,673,000 |
| Owner's costs | $ 6,449,000 |
| **Total Before Contingency** | **$ 114,769,000** |
| **Contingency** | **$ 22,954,000** |
| Project Recommended Contingency | $ 22,954,000 |
| **Total Costs** | **$ 137,722,000** |
| **Road Rehabilitation Allowance** | **$ 10,000,000** |
| **Total Project Budget** | **$ 147,722,000** |

The total estimated OPEX is $45.1M per year or $404.50 per tonne lithium spodumene produced. Of this cost, $36.6M per year or $328.00 per tonne are direct production costs (81%) and $8.5M per year or $76.50 per tonne are indirect production costs (19%). The OPEX are summarized in Table 1-3.

**Table 1-3: Project OPEX Summary**

| Item Description | OPEX Summary 112,167 MTPA USD/yr | USD/MT | % of Total |
|---|---|---|---|
| **DIRECT COSTS** | | | |
| Diesel - Generators | $ 19,700,000 | $ 176.00 | 44% |
| Diesel - Fleet | $ 3,408,000 | $ 30.50 | 8% |
| Reagents & Consumables | $ 6,796,000 | $ 61.00 | 15% |
| Maintenance | $ 4,318,000 | $ 38.50 | 10% |
| Mobile Equipment Maintenance | $ 639,000 | $ 6.00 | 1% |
| Direct Manpower | $ 1,497,000 | $ 13.50 | 3% |
| **Total Direct Costs** | **$ 36,358,000** | **$ 325.50** | **81%** |
| **INDIRECT COSTS** | | | |
| Indirect Manpower | $ 3,413,000 | $ 30.50 | 8% |
| Insurances | $ 3,141,000 | $ 28.50 | 7% |
| G&A | $ 1,000,000 | $ 9.00 | 2% |
| Community Devleopment Fund | $ 943,000 | $ 8.50 | 2% |
| **Total Indirect Costs** | **$ 8,497,000** | **$ 76.50** | **19%** |
| **Total Direct + Indirect Costs** | **$ 44,855,000** | **$ 402.00** | **100%** |
| **TOTAL OPEX incl. Contingency** | **$ 44,855,000** | **$ 402.00** | **100%** |

### 1.9 Economic Analysis

An economic model was prepared for the Project to estimate annual cash flows and assess sensitivities to certain economic parameters. The results of the model show an NPV (10% discount) of $764M, with an IRR of 87.4% on a nominal basis and an NPV (10% discount) of $638M, with an IRR of 82.3% on a real basis.

### 1.10 Environmental Studies, Permitting and Social or Community Impact

Collection of baseline data for the Manono Lithium Tailings Project has been ongoing since October 2022 by a local DRC contactor. The baseline studies were designed and implemented to support requirements for future planning purposes and designed to international standards. The baseline studies will be subject peer reviewed by an independent consultant SRK to ensure all activities are compliant with international lending standards.

### 1.11 Interpretation and Conclusions

This PEA demonstrates that the Manono Lithium Tailings Project has the potential to be a technically viable Project to produce lithium spodumene concentrate which is marketable. Furthermore, the preliminary economic evaluation demonstrates a very robust project, given the assumptions used.

### 1.12 Recommendations

Given the technical and economic findings thus far presented within this report, it is recommended by the Tantalex to further advance the Project by moving to a Feasibility Study stage to allow the project to further address the remaining risks as identified and develop the engineering of the project such that it allows for its equity and debt financing to take place.

The Feasibility Study is estimated at $4.0 million and involves additional drilling, mineral processing test work, Geotechnical investigation, completion of the ESIA program and engineering and cost estimation producing an AACE Class 3 estimate.

# 2 INTRODUCTION

The MSA Group (Pty) Ltd (MSA) was commissioned by Tantalex Lithium Resources Corp (Tantalex) to complete a Mineral Resource Estimate for the Manono Lithium Tailings Project (Manono or the Project).

Sedgman Novopro Projects Inc. (SN) was commissioned by Tantalex to complete the Preliminary Economic Assessment (PEA), based on the Mineral Resource Estimate by MSA, in accordance with the guidelines of the Canadian Securities Administrators National Instrument 43-101 (NI 43-101) and Form 43-101 F1.

Manono is a lithium-tin-tantalum tailings project located in the Tanganyika Province of the Democratic Republic of Congo.

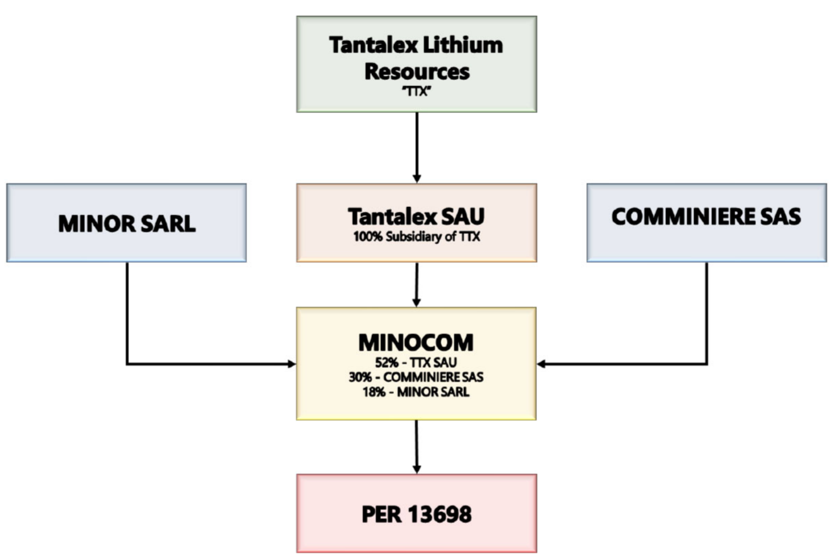
The mineralisation is contained in technogenic deposits, formed from the processing of lithium-caesium-tantalum (LCT) pegmatites of the historical Manono-Kitotolo (MK) mine which operated from 1919 to the mid-1980's. During this time, the mine produced an estimated 140,000 to 180,000 tonnes of tin and 4,500 tonnes of coltan (columbite-tantalite) concentrate, while lithium, primarily hosted within spodumene, was not recovered.

## 2.1 Tantalex Lithium Resources

Tantalex was originally named Tantalex Resources Corporation, which was founded on 21 October 2013. Effective May 26, 2022, Tantalex Resources Corp. changed its name to Tantalex Lithium Resources Corp. to reflect the company's engagement in the acquisition, exploration, development and distribution of lithium, tantalum, and other high-tech minerals.

On 23rd of March 2017, the Manono exploitation license (PER 13698) was awarded to MINOCOM, a joint venture between MINOR SARL and Cominière SAS, which held 70% and 30% of MINOCOM respectively. Tantalex, via its 100% held Congolese subsidiary, Tantalex SAU, acquired 25% ownership of MINOCOM from MINOR on 2nd July 2021, with an additional 27% acquired on 17 May 2022. TTX SAU currently holds Right of First Refusal on the remaining 18% of MINOR. The company structure for Tantalex is shown in Figure ***2-1***.

**Figure 2-1: Manono Tailings Ownership Structure**



## 2.2 Purpose and Terms of Reference

MSA and SN have been commissioned by Tantalex to provide an Independent Technical Report on the Company's lithium-tin-tantalum tailings project located in Tanganyika Province of the Democratic Republic of Congo.

This Independent Technical Report has been prepared to comply with disclosure and reporting requirements set forth in the Toronto Venture Exchange (TSX-V) Corporate Finance Manual, Canadian National Instrument (NI) 43-101, Companion Policy 43-101CP, Form 43-101F1, the 'Standards of Disclosure for Mineral Projects' (the Instrument) and the Mineral Resource and Reserve classifications adopted by CIM Council in May 2014.

## 2.3 Principal Sources of Information

SN has based this Technical Report for the Manono Lithium Tailings Project on MSA's mineral Resources estimate (effective date of 23 August 2023) and information provided by Tantalex along with other relevant published and unpublished data.

The Technical Report has been prepared based on information available up to and including 5 May 2023, with the Mineral Resource having an effective date of 23 August 2023. The data used to estimate the Manono Lithium Tailings Mineral Resources represent the entire database for the drilling completed.

## 2.4 Qualifications, Experience, and Independence

The Report Authors are specialists in the fields of geology, exploration, mineral resource estimation, mining, metallurgical testing, mineral processing, processing design, civil, mechanical, electrical, capital, and operating cost estimation, and mineral economics.

None of the Report Authors or any associates employed in the preparation of this report has any beneficial interest in Tantalex. The Report Authors are not insiders, associates, or affiliates of Tantalex. The results of this Technical Report are not dependent upon any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings between Tantalex and the Report Authors. The Report Authors are being paid a fee for their work in accordance with normal professional consulting practice.

## 2.5 Report Responsibility and Qualified Persons

The following individuals, by virtue of their education, experience, and professional association, are considered Qualified Persons (QP) as defined in the NI 43-101 standard, for this report, and are members in good standing of appropriate professional institutions:

a) Rui Goncalves (BSc Hons, MSc (Eng.), Senior Mineral Resource Consultant, The MSA Group;
b) James Brebner P.Eng, Engineering Manager, Sedgman Novopro;
c) Antoine Lefaivre, P.Eng, Lead Process Engineer, Sedgman Novopro.

The preceding QPs have contributed to the writing of this Report and have provided QP certificates that are included at the beginning of this Report. The information contained in the certificates outlines the sections in this Report for which each QP is responsible. Table 2-1 outlines the responsibilities for the various sections of the Report and the name of the corresponding Qualified Person.

**Table 2-1: Report Responsibility Matrix**

| Section | Title | Qualified Person | Company |
|---|---|---|---|
| 1 | Summary | James Brebner<br>Rui Goncalves | SN<br>MSA |
| 2 | Introduction | James Brebner<br>Rui Goncalves | SN<br>MSA |
| 3 | Reliance on Other Experts | Rui Goncalves | MSA |
| 4 | Property Description and Location | Rui Goncalves | MSA |
| 5 | Accessibility, Climate, Local Resources, Infrastructure and Physiology | Rui Goncalves | MSA |
| 6 | History | Rui Goncalves | MSA |
| 7 | Geological Setting and Mineralisation | Rui Goncalves | MSA |
| 8 | Deposit Type | Rui Goncalves | MSA |
| 9 | Exploration | Rui Goncalves | MSA |
| 10 | Drilling | Rui Goncalves | MSA |
| 11 | Sample Preparation, Analyses and Security | Rui Goncalves | MSA |
| 12 | Data Verification | Rui Goncalves | MSA |
| 13 | Mineral Processing and Metallurgical Testing | Antoine Lefaivre | SN |
| 14 | Mineral Resource Estimates | Rui Goncalves | MSA |
| 15 | Mineral Reserve Estimate | N/A | N/A |
| 16 | Mining Methods | Antoine Lefaivre | SN |
| 17 | Recovery Methods | Antoine Lefaivre | SN |
| 18 | Project Infrastructure | James Brebner | SN |
| 19 | Market Studies and Contracts | James Brebner | SN |
| 20 | Environmental Studies, Permitting and Social or Community Impact | James Brebner | SN |
| 21 | Capital and Operating Costs | James Brebner | SN |
| 22 | Economic Analysis | James Brebner | SN |
| 23 | Adjacent Properties | Rui Goncalves | MSA |
| 24 | Other Relevant Data and Information | James Brebner<br>Rui Goncalves | SN<br>MSA |
| 25 | Interpretation and Conclusions | James Brebner<br>Rui Goncalves | SN<br>MSA |
| 26 | Recommendations | James Brebner<br>Rui Goncalves | SN<br>MSA |
| 27 | References | James Brebner<br>Rui Goncalves | SN<br>MSA |

### 2.6 Site Visit

A personal inspection was made by Rui Goncalves on the 29th and 30th of April 2022. Mr. Goncalves has endeavoured, by making all reasonable enquiries, to confirm the authenticity and completeness of the technical data upon which the MSA Technical Report (23 August 2023 effective date) is based. A final draft of the Technical Report was also provided to Tantalex, along with a written request to identify any material errors or omissions prior to lodgement.

## 2.7 Currency, Units of Measure, and Calculations

Unless otherwise specified or noted, the units used in this Report are metric. Every effort has been made to clearly display the appropriate units being used throughout the Report.

The locations of all maps are referenced to WGS 84, UTM Zone 35M, unless otherwise stated.

Currency is in United States dollars, presented as USD or $, unless otherwise noted.

This Report includes technical information that required subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the QPs consider them immaterial.

# 3 RELIANCE ON OTHER EXPERTS

The Report Authors have not independently verified, nor is it qualified to verify, the legal status of these concessions. The present status of tenements listed in this report is based on information and copies of documents provided by Tantalex, and the report has been prepared on the assumption that the tenements will prove lawfully accessible for evaluation. These documents include:

- 3.1 Tailings Licence PER 13698, Tantalex Resources
- Acte de Cession – TTX Minor – DRC-20210207
- PER13698 – 2022 Surface Rights – 50% payable to CAMI-MINOCOM-ND-DF-01784 DFA_2022
- PER13698 – 2022 Surface Rights – 50% payable to DGRAD-MINOCOM-NP-H3781185

Neither MSA or SN nor the authors of this report are qualified to provide extensive comment on legal issues associated with joint venture agreements. Comment on these agreements is for introduction only and should not be relied on by the reader.

Similarly, the Report Authors are not qualified to provide comment on environmental issues associated with the Project.

No warranty or guarantee, be it express or implied, is made by the Report Authors with respect to the completeness or accuracy of the legal or environmental aspects of this document. The Report Authors do not undertake or accept any responsibility or liability in any way whatsoever to any person or entity in respect of these parts of this document, or any errors in or omissions from it, whether arising from negligence or any other basis in law whatsoever.

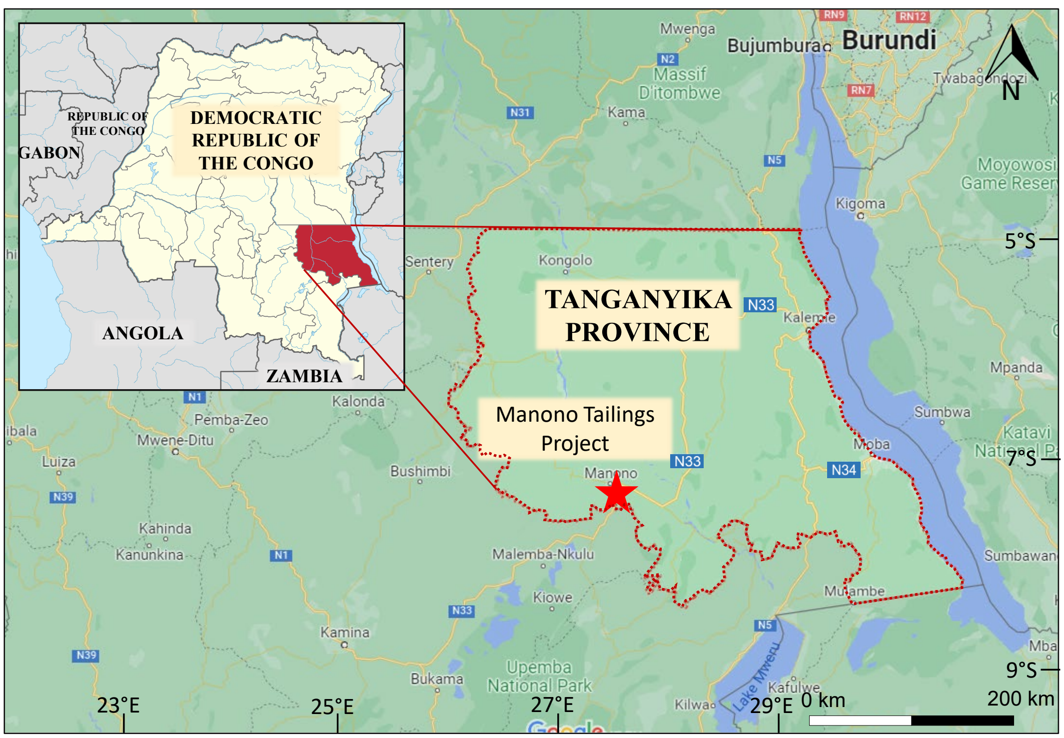
# 4 PROPERTY DESCRIPTION AND LOCATION

The Manono Lithium Tailings Project deposits are technogenic in nature, formed from the deposition of concentrator discard material created from processing of ore mined from the adjacent Manono tin mine. A total of approximately 100 million m$^3$ of material was mined from eluvial and weathered pegmatites between 1919 and 1982 (AVZ, 2017).

## 4.1 Location

The Manono Lithium Tailings Project is located directly south of the town of Manono, in the Tanganyika Province of the Democratic Republic of the Congo (DRC). The Project is located approximately 490 km north of the city of Lubumbashi, the second largest city in the DRC. The mining settlement towns of Manono and Kitotolo are partially located within the license boundary, to the west and east respectively. The Project is approximately located at a latitude of 7°17’S and a longitude of 27°24’E. The regional Project location is presented in Figure 4-1.

**Figure 4-1: Regional Project location**




*__Source__: Adapted from Wikipedia and Google Maps (2022)*

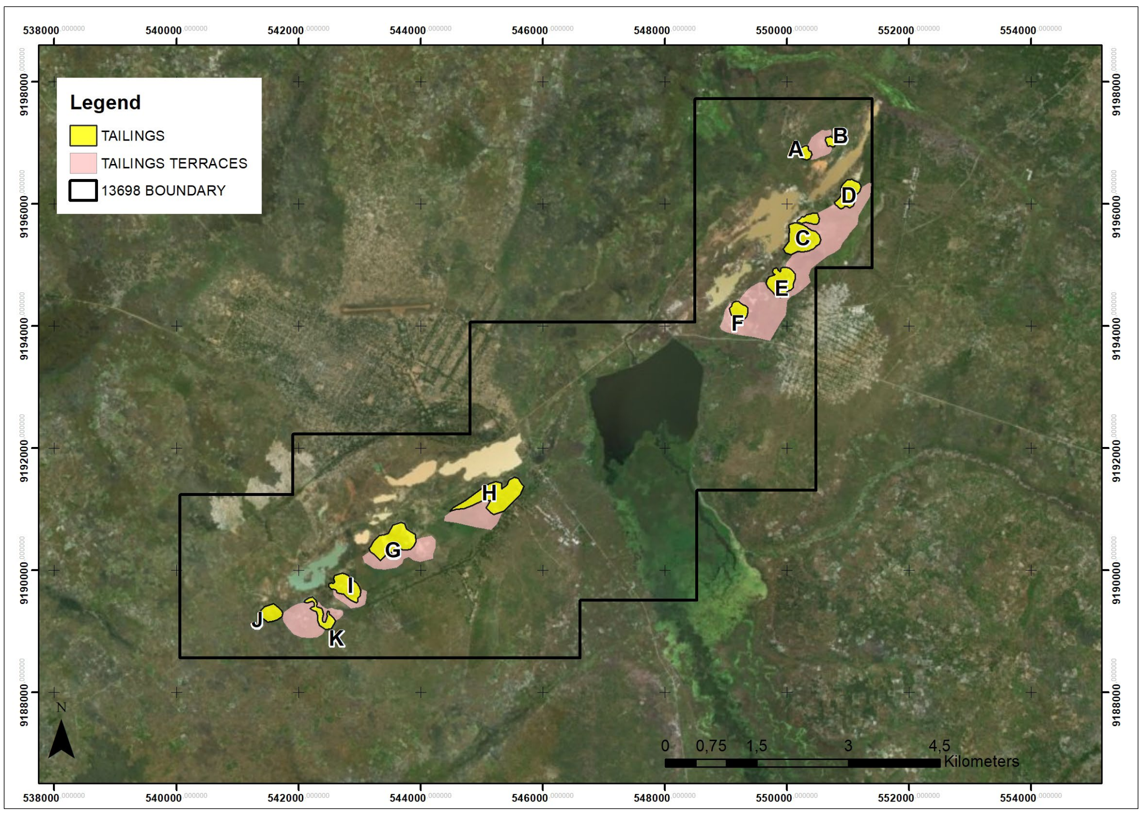
The Project consists of 11 coarse tailings dumps divided into a northern and southern sector and named alphabetically from A to K. The Northern Manono Sector contains dumps A to F while the Southern Kitotolo Sector contains dumps labelled G to K. A 12th overburden dump, labelled dump J, consists of laterite only. A fine tailings terrace is located directly adjacent to the coarse tailing dumps. The tailings dumps are labelled with a suffix “c” and the adjacent fine fraction is labelled “f”.

Estimates were generated for 8 tailings dumps as listed below, of which five constitute Mineral Resources:

- C coarse (Cc)
- E coarse (Ec)
- H coarse (Hc)
- H fine (Hf)
- G coarse (Gc)
- G fine (Gf)
- I coarse (Ic)
- K coarse (Kc or just K)

The positions of the tailings deposits relative to one another are shown in Figure 4-2.

**Figure 4-2: Manono Lithium Tailings Project area**

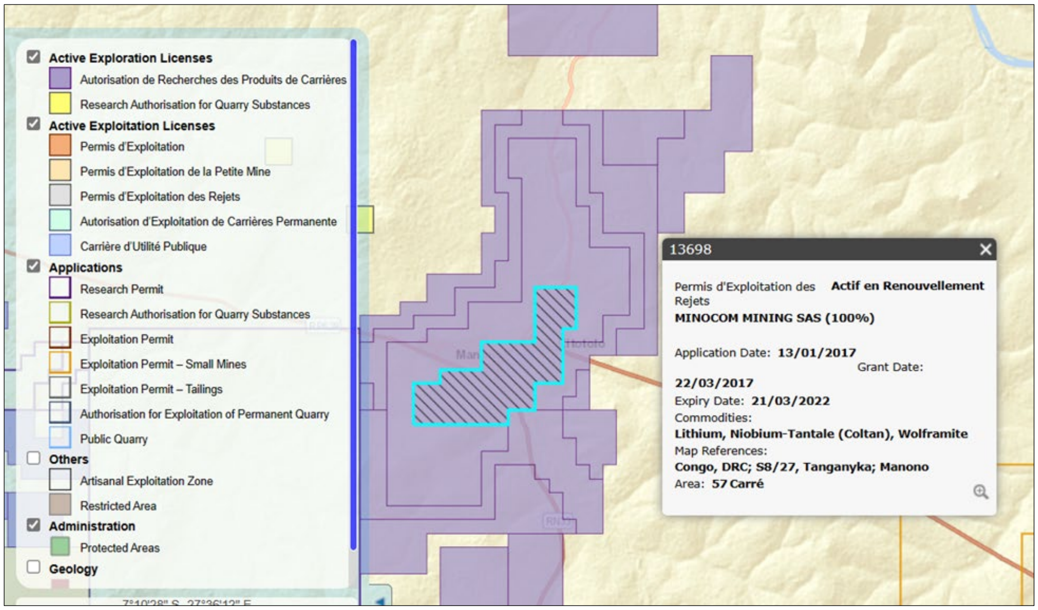



***Source**: Tantalex (2022)*

## 4.2 Mineral Tenure, Permitting, Rights and Agreements

Tailings Exploitation Permit PER 13698 (covers 57 km$^2$;Figure 4-3) is held by Minocom Mining SAS, a joint venture with 52% held by Tantalex, 18% held by MINOR and 30% held by the state-owned company Cominière. The permit was granted on 23 March 2017. Tailings exploitation licenses are renewable every 5 years and require the submission of an environmental and technical study. A renewal of the current license has received ''Avis favorable'' from the Mining Cadastre CAMI in July 2023 and currently awaiting the same from the Ministry of Mines. Once received, this will essentially grant the renewal of the licence for an additional period of 5 years. The Mining Code stipulates that upon renewal every 5 years, the Concession holder must give to the Government 5 % of the ownership in the concession.

**Figure 4-3: Manono Lithium Tailings Project License Area**




***Source**: [http://drclicences.cami.cd/EN/](http://drclicences.cami.cd/EN/) (2022)*

### 4.3 Surface Rights

The DRC government has exclusive rights to all land but can grant surface rights to private or public parties. Surface rights are distinguished from mining rights and are payable in the event of granting a mining or quarry exploitation right as an annual fee per quadrangle. A mining right does not imply the right for any surface occupation over the surface, other than what is required for the operation.

The 2002 Mining Codes and its amendments, states that subject to any rights of third parties over the surface concerned, the holder of an exploitation mining right has the right to occupy within the granted mining perimeter the land necessary for mining and associated industrial activities, including the construction of industrial plants and dwellings, water use, dig canals and channels and establish means of communication and transport of any type.

Occupation of land that deprives surface right holders of using the surface, or any modification rendering the land unfit for cultivation, entails an obligation on the part of the mining rights holder to pay fair compensation to the surface right holders. The mining rights holder is also liable for damage caused to the occupant's land due to any mining activity, even if such activity has been permitted and authorised.

# 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

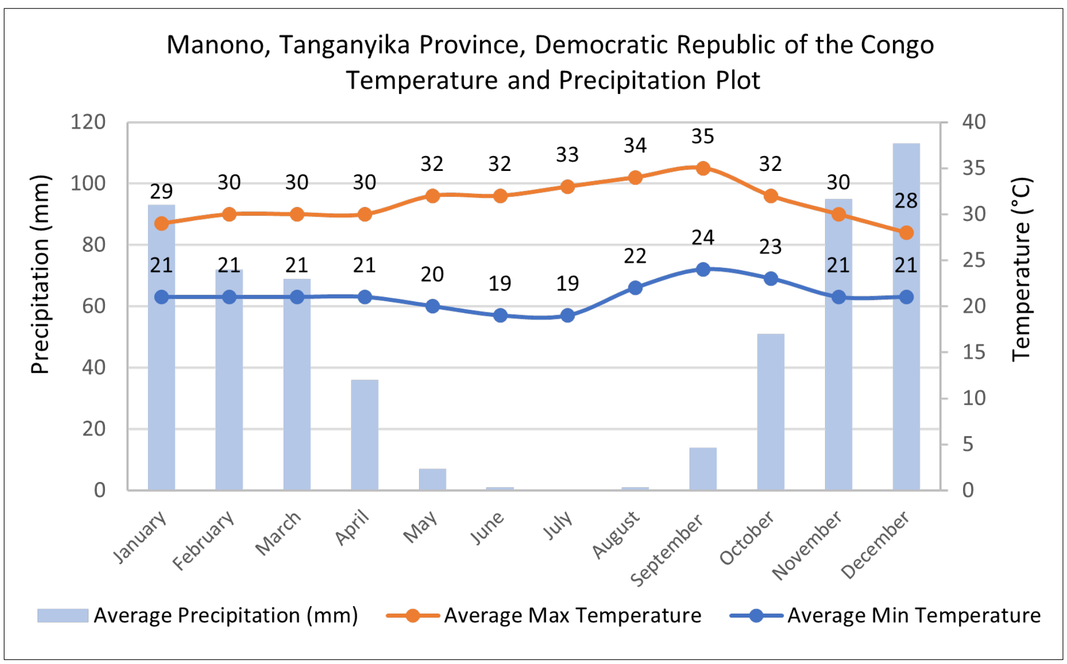
## 5.1 Topography, Elevation, Drainage and Vegetation

The topography of the Manono Lithium Tailings Project area is generally flat with an average elevation of 635 metres above mean sea level (mamsl). The tailings dumps reach a maximum height of approximately 70 m above the surrounding plains. The region supports a variety of vegetation that ranges from dense humid forest and clear forest to savannah and meadowlands. Within the Congo River Basin, the Lukushi river runs from south to north through the Tanganyika Province, passing the towns of Manono and Kitotolo, shortly before joining the major Luvua River.

## 5.2 Climate

The Project area has a tropical savanna climate with warm temperatures year-round (Figure 5-1). The wet season typically runs from October to March with an average of 19.2 rainy days per month and approximately 1,200 mm of rainfall per year. The dry season typically runs from April to September. The climate is not expected to affect the length of the operating season which typically runs throughout the entire year. Heavy rainfall may occasionally affect access to the site.

**Figure 5-1: Manono Temperature and Precipitation Plot**




***Source**: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/manono_dr-congo_209598 (2022)*

## 5.3 Access

Access to the Manono Lithium Tailings Project area is gained from Lubumbashi via a scheduled 1.5-hour flight to a small airport in Manono. Access may also be gained via road however wet weather conditions may affect road conditions. The road route from Lubumbashi to Manono is approximately 630 km.

The Project is approximately 215 km south of the Kongolo Railway station on the Great Lakes Line (Second Section). The national railway line is mostly operated by the Société Nationale des Chemins de Fer du Congo (SNCC). Railway lines are not all linked but are generally connected by river transport.

## 5.4 Local Resources and Infrastructure

Infrastructure in the adjacent mining towns of Manono and Kitotolo is currently limited. Power supply is generated by a solar power plant that was commissioned in March 2018. The solar power plant is the largest off-grid solar power plant in the region and supplies a new isolated network of the Société Nationale d'Électricité (SNEL). The production capacity is 1 MWp (megawatt peak). Since 2018, a hospital, a school, the airport, shops, and housing are now connected to electricity (Groupe Forrest International, n.d.)

Water supply is in abundance for both local use and mining activities.

# 6 HISTORY

The Manono Lithium tailings originated from the processing of lithium-caesium-tantalum (LCT) enriched pegmatite material from the historical Manono-Kitolo mine, which operated from 1919 to the mid-1980's. In total, it is estimated that the mine produced 140,000 to 185,000 tonnes of tin and 4,500 tonnes of coltan concentrate while lithium, in the form of spodumene, was not recovered (Scholtz, 2019).

## 6.1 Prior Ownership History of the Manono Lithium Tailings Project

La Congolaise d'Exploitation Minière S.A. (Cominière) is a state-owned enterprise created April 12th, 2010 under the Ministry of Portfolio to manage and add value to the assets and concessions previously held by Zaire Etain. Zaire Etain was the last producer of the historical Manono-Kitotolo mine. PER13698 was initially held through a Cominière JV held by Manomin as part of the PE12202. PE12202 expired on March 22, 2017 and was subsequently separated into two licences by Cominière: PER13698 which became the object of the JV MINOCOM MINING SAS and also PR13359 which was held until recently by DATHCOM MINING SAS.

Tantalex is unaware of any previous exploration work related to lithium undertaken on PER 13698 pertinent to the tailings.

## 6.2 Historical Mineral Resources and Reserves

Mineral Resources and Reserves have not been previously declared for the Manono Lithium Tailings Project.

## 6.3 Previous Production

There are no records of previous production from the tailings.

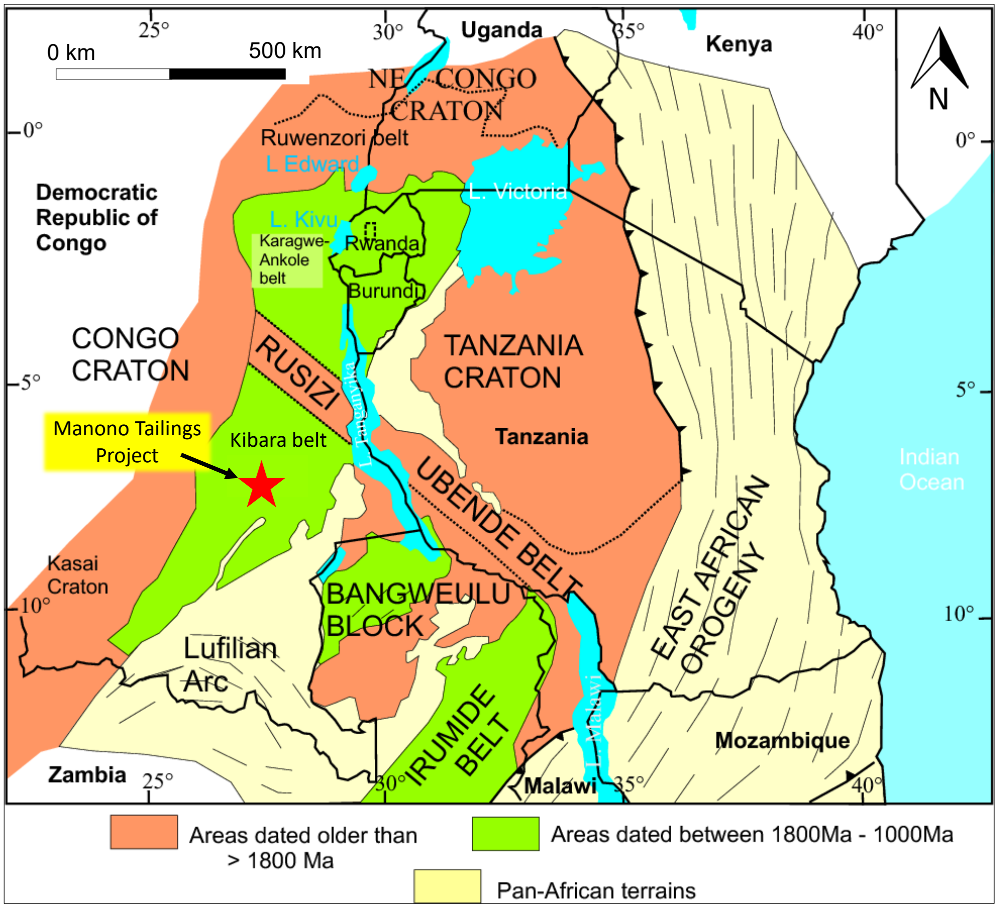
# 7 GEOLOGICAL SETTING AND MINERALISATION

## 7.1 Regional Geology

The Manono Lithium Tailings Project is located within the northeast-southwest trending Central African Kibara Belt, which together with the Karagwe-Ankole Belt, a Mesoproterozoic intracratonic mobile belt, extend over 1,300 km from Katanga in the DRC to southwestern Uganda through Rwanda and Burundi (Figure 7-1). The southern Kibara and northern Karagwe-Ankole Belts formed between the Archaean-Palaeoproterozoic Congo craton to the west and north, the Archaean Tanzanian Craton to the east, and the Bangweulu Block to the south. Both the Kibara and the Karagwe-Ankole Belts form a large metallogenic province that hosts a variety of granite-related Sn-W-Nb-Ta mineralisation.

The Central African Kibara Belt comprises Palaeo- and Mesoproterozoic clastic sediments with minor metavolcanic rocks that have been intruded by multiple generations of granitoids ranging in age from approximately 1.4 Ga to 1.0 Ga. The oldest peraluminous granitoids (G1 and G2 granitic orthogneisses) were emplaced between 1.40 Ga and 1.38 Ga during an accretionary stage. The post-orogenic S-type tin-bearing granites (G4 Granites), and associated Sn-Ta-Nb-Li bearing pegmatites, veins, and greisen bodies, intruded from 1.00 Ga to 0.95 Ga. The G4 Granites intruded the older Kibaran orthogneisses as well as the Kibaran metasedimentary units during continental collision and post-orogenic uplift (Pohl et al., 2013; Kokonyangi et al., 2006). A number of small stocks of this granite occur in the immediate vicinity of the workings at Manono and Kitotolo sectors (Dewaele et al., 2016).

**Figure 7-1: Manono Lithium Tailings Project Regional Geology**




***Source**: Adapted from Dewaele et al. (2013)*

Structural orientations are related to two major deformation events, D1 and D2. The D1 deformation resulted in an east-west to northeast trending fabric southwest of Manono, which changes to a northeast to north-northeast orientation in the Kalima area. The D2 deformation resulted in a northeast to north-northeast trending fabric. The mineralised veins and pegmatites are frequently orientated parallel to the northeast trending D2 fabrics, although some may have northwest, southeast or east-west orientations (Kokonyangi, 2004 and Kokonyangi et al., 2006).

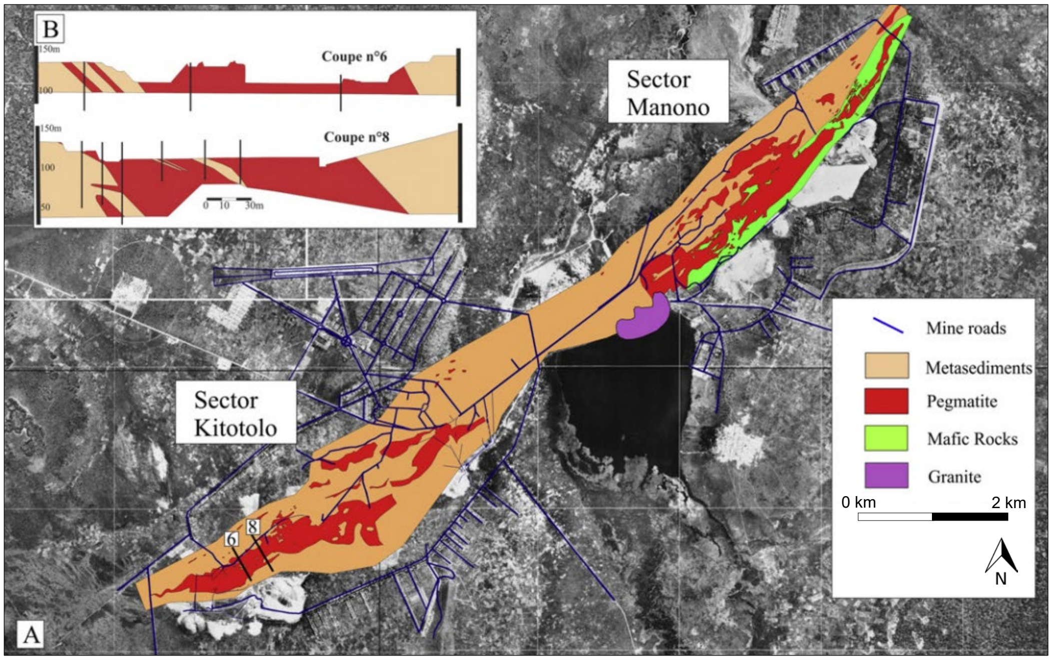
The Manono-Kitotolo deposit is considered the largest pegmatite hosted tin-columbite-tantalite-spodumene deposit in the DRC and one of the largest in the world (Dewaele et al., 2016). Dewaele et al., (2016) dated it at approximately 940 Ma which is consistent with the ages of the postulated parental G4 (tin) Granites and other pegmatites in the region.

Weathering and erosion of the quartz vein- and pegmatite-hosted tin and columbo-tantalite mineralisation has resulted in the significant alluvial and eluvial deposits in the recent and palaeo-drainage basins and floodplains throughout the region.

## 7.2 Local Geology

The Manono Lithium tailings are composed of concentrator reject material from processing of the Manono-Kitotolo deposit mined from various open pits that extend over the Manono-Kitotolo deposit area of approximately 800 m by 15 km (Figure 7-2). The Manono-Kitotolo deposit consists of two zones, the Manono-Kuhungwe Sector in the northeast and the Kitotolo Sector in the southwest, separated by the 2 km wide artificial Lake Lukushi.

**Figure 7-2: Manono Lithium Tailings Local Geology**




***Source**: Adapted from Dewaele et al. (2016)*

Several large pegmatite intrusions have been recognised in the Manono-Kitotolo Sector along with numerous smaller pegmatite intrusions. The Roche Dure pegmatite is the largest intrusive body in the Kitotolo Sector with a strike length of at least 2 800 m and a width of 250 m. Pegmatites occur within the phyllitic or mica-schist host rocks with minor meta-sandstone horizons. In the Manono-Kahungwe Sector, pegmatites crosscut meta dolerites. The general strike of the pegmatites is at a bearing of 055° with a dip varying from 50°N to 50°S but predominantly subvertical (Dewaele, 2016). The pegmatite-metasediment contact shows minor small-scale folding but is largely parallel to the regional foliation orientation (Dewaele, 2016).

## 7.3 Project Geology

The Manono Lithium Tailings Project is composed of nine coarse tailings dumps and fine tailings terraces produced from mining and processing of material from the various Manono-Kitotolo open pits. The tailings material is typically coarse, ranging from 1 mm to 5 mm sized gravel as shown in Figure 7-3.

**Figure 7-3: Manono Lithium Tailings Project Coarse Tailings Material**


***Source**: Goncalves (2022)*

The material composition of each tailings deposit varies, with many being composed of a combination of pegmatite, laterite and/or clay material. Figure 7-4 illustrates the heterogeneity of the deposits, as observed for the Ic deposit. The contrast of the two material types is noticeable with the reddish-brown laterites juxtaposed against white pegmatite material. The J deposit is visible in background which consists exclusively of laterite material.

**Figure 7-4: Ic Deposit (Looking Southwest) Illustrating the Mixed Nature of the Materials Making up These Deposits**

***Source**: Goncalves (2022)*

Few deposits appear to consist of a single material type, the exception to this being the K-dump which is primarily composed of pegmatite. The K-dump consists of tailings lying over a flat area 675 m by 500 m in extent, with depths up to 15 m in the centre, gradually thinning out to 3 m along the edges. Stacked tailings, up to 20 m high are located in the northwest corner of the K-dump, while stacked tailings in a cone-like shaped feature are found in the east of the deposit, attaining a maximum thickness of 45 m. Figure 7-5 shows the white, pegmatite tailings and the partially vegetated cone-like feature of the K-dump.

**Figure 7-5: K-Dump with the Stacked, Cone-Like Features of the K-Dump (Looking South)**

***Source**: Goncalves (2022)*

Fine vegetation, consisting of shrubs and tall grass, covers the majority of the tailings deposits. This tends to be thicker in the lower lying tailings of the K, Gf and Hf deposits. Some deposits show evidence of historical and recent artisanal mining activity for cassiterite and coltan as observed by the disturbed ground in the foreground of Figure 7-6.

**Figure 7-6: Pegmatite Tailings of the K-Dump, Illustrating Vegetation Cover and Historical Artisanal Mining in the Foreground**

***Source**: Goncalves (2022)*

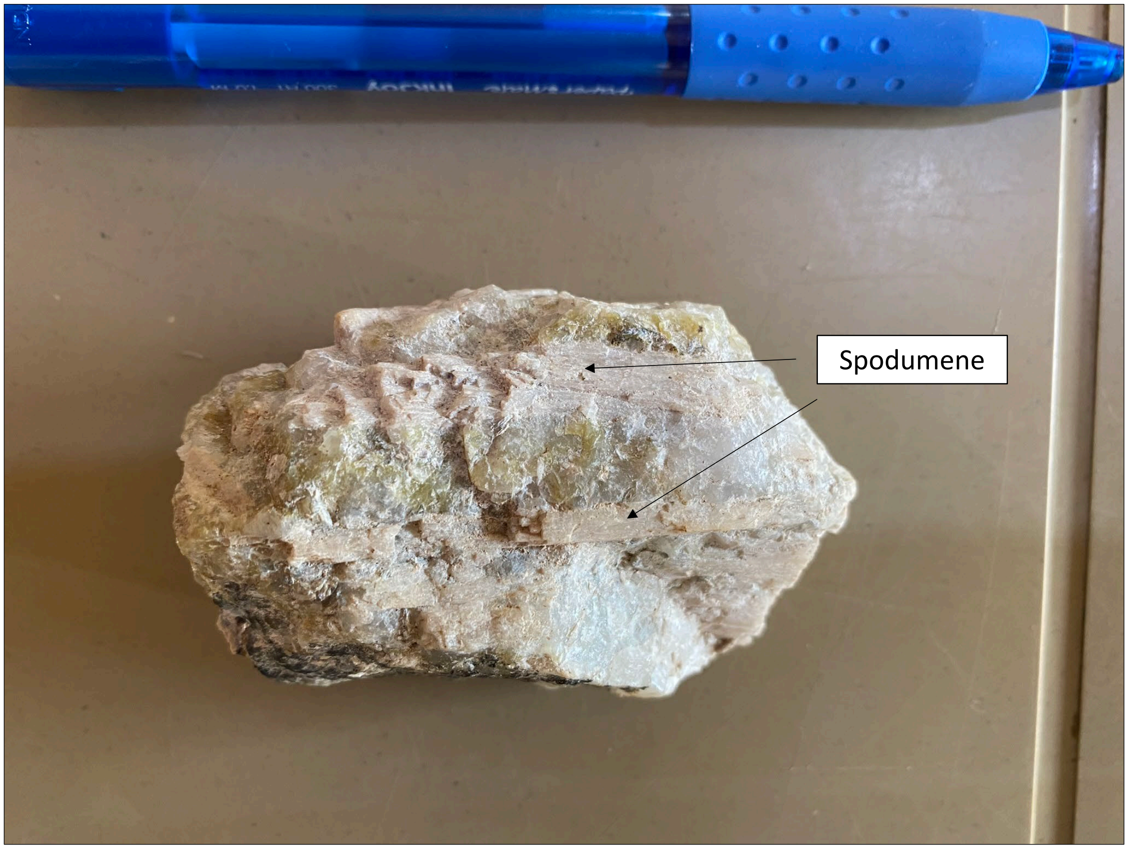
### 7.4 Mineralisation

The Manono-Kitotolo mine exploited a large pegmatite deposit that produced between 140,000 tonnes and 185,000 tonnes of tin and 4,500 tonnes of coltan concentrate (Scholtz, 2019). The reject processed material was deposited on the coarse tailings dumps and fine tailings terraces that make up the Manono Lithium Tailings Project.

Lithium is present in the minerals spodumene and lepidolite, and tin is present in cassiterite. The tailings still contain cassiterite currently being mined by artisanal miners. The majority of the pegmatites mined also contain spodumene (and/or lepidolite) and the minerals can be visually identified in the material on the coarse tailings dumps (Scholtz, 2019). The relatively high grade of lithium in spodumene was analysed in two grab samples by BRGM (1.7% to 2% $Li_2O$) and indicates that lithium was likely not recovered during historical processing (Scholtz, 2019).

A centimetre sized sample of pegmatite recovered from the project area is illustrated in Figure 7-7. This shows visible spodumene crystals which can be easily identified by the presence of prismatic cleavage.

**Figure 7-7: Pegmatite Sample from Manono Illustrating Prismatic Cleavage**




***Source**: Goncalves (2022)*

# 8 DEPOSIT TYPE

The Manono Lithium Tailings Project is composed of the reject LCT (Lithium-Caesium-Tantalum) pegmatite material processed at the Manono-Kitotolo mine from 1919 to the mid-1980s. Technogenic deposits are a category of superficial formations created by anthropogenic direct or induced depositional processes.

Tailings from the Manono-Kitotolo open pits were deposited on the ground adjacent to the various open pits. The coarse tailings were deposited over many years into raised heaps that reach heights up to 70 m above surface. The fine tailings material was deposited into flat terraces adjacent to the coarse tailings dumps.

Many of the tailings deposits are composite in nature, consisting of layers of pegmatite, laterite and/or clay layers. These were deposited by mechanical means, including most of the deposits denoted as “fines”, with the exception of the Hf and Gf deposits, which are assumed to have formed due to the settling of fine material in standing ponds of water as evidenced by the presence of clay layers in these deposits.

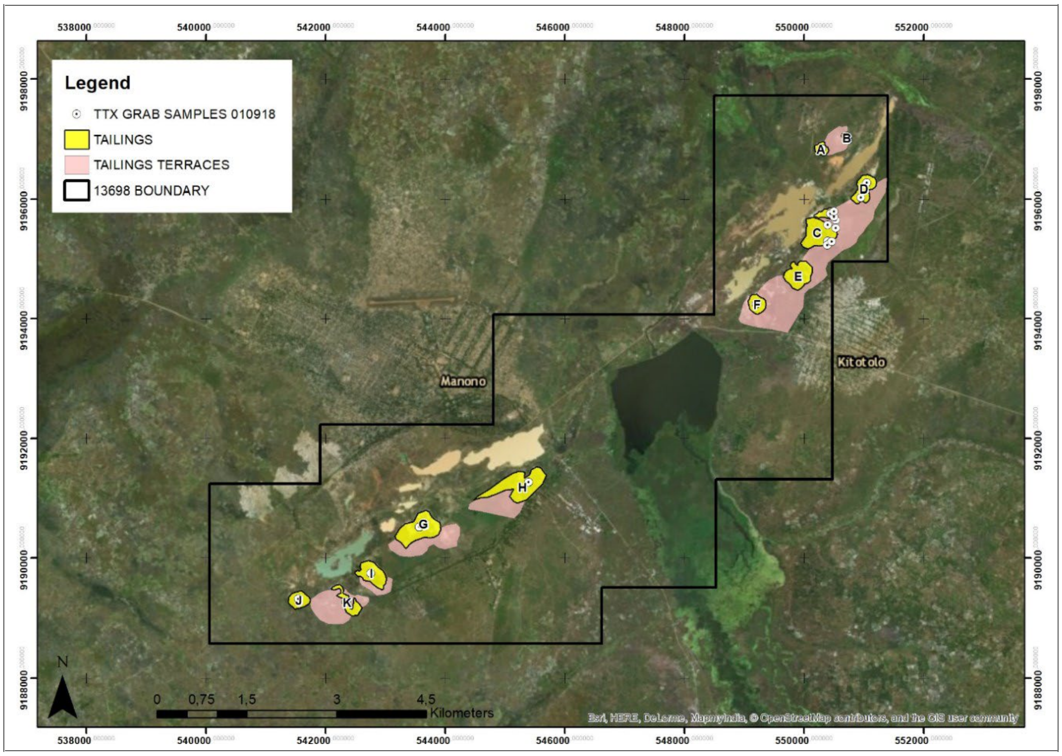
Technogenic deposits such as those at Manono are typical of many mining operations across the globe and often contain concentrations of various metals of economic value due to incomplete recovery during the processing of the raw, in-situ source material. Their extents and depths tend to be well defined and due to their recent formation, the only processes affecting their evolution is erosion due to fluvial or aeolian processes.

# 9 EXPLORATION

## 9.1 Previous Exploration

In 2019, a grab sampling program was conducted by Nico Scholtz (a consultant to Tantalex) and the Tantalex field team. The grab sampling was conducted on ten of the coarse tailings dumps and associated fine tailings terraces as indicated in Figure 9-1.

**Figure 9-1: Location of Grab Samples**




***Source**: Scholtz (2019)*

In total 43 grab samples were taken from various parts of all the tailings and tailings types. These included tailings dump gravel, lepidolite, various spodumene samples, spodumene pegmatite and weathered samples. Grab samples are not considered representative of the Manono Lithium Tailings Project's mineralisation and do not form part of the Mineral Resource estimate. The purpose of the grab sampling was solely for identifying the presence of mineralisation and the more prospective dumps.

## 9.2 Bulk Sampling

An initial bulk sampling program was conducted by Nico Scholtz and the Tantalex field team. The bulk sample was collected from the "C" dump and included both the coarse and fine material. The "C" dump was considered to be most representative of the tailings mineralisation and was most accessible at the time of sampling. Eighteen bulk sample bags with a weight of approximately 50 kg each were collected for metallurgical testwork purposes (Scholtz, 2019).

### 9.3 Cobra Drilling

Prior to the commencement of the Mineral Resource drilling campaign, Tantalex undertook a trial drilling campaign using a handheld Atlas Copco Cobra Combi rock drill, which was modified to hold a core barrel for sample collection. A total of 132 Cobra holes were drilled on four deposits, namely the C (56 drillholes), the G (16 drillholes), the H (38 drillholes) and the K (22 drillholes) dumps, totalling 967.8 metres of drilling.

Twenty-two of the Cobra drillholes, representing 101.3 m of drilling, were sampled, and assayed. Samples were taken at 3 m intervals, which resulted in 19 samples from 8 drillholes that were submitted to ALS, and 19 samples from 14 drillholes that were submitted to SGS Johannesburg. The samples were all taken from the K dump, results for which are presented in Table 9-1.

**Table 9-1: Results of Cobra Drilling Program**

| Drillhole ID | Depth from m | Depth to m | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| MDC046 | 0 | 2.7 | 0.88 | 87 | 10.3 |
| MDC049 | 0 | 3 | 1.26 | 432 | 35.8 |
| MDC049 | 3 | 4.5 | 1.16 | 309 | 30.2 |
| MDC051 | 0 | 3 | 0.01 | 79 | 8.0 |
| MDC051 | 3 | 6 | 0.01 | 185 | 13.1 |
| MDC052 | 0 | 2.6 | 0.85 | 198 | 22.9 |
| MDC052 | 2.6 | 4.3 | 0.76 | 258 | 30.5 |
| MDC053 | 0 | 2.5 | 1.71 | 443 | 33.7 |
| MDC055 | 0 | 3 | 1.37 | 576 | 46.8 |
| MDC057 | 0 | 3 | 1.27 | 558 | 43.6 |
| MDC058 | 0 | 3 | 1.27 | 454 | 36.7 |
| MDC059 | 0 | 3 | 0.63 | 253 | 23.0 |
| MDC060 | 0 | 3 | 1.45 | 439 | 34.0 |
| MDC062 | 0 | 3 | 1.53 | 394 | 36.0 |
| MDC062 | 3 | 6 | 1.09 | 258 | 35.4 |
| MDC063 | 0 | 3 | 1.49 | 574 | 47.6 |
| MDC065 | 0 | 3 | 1.56 | 508 | 49.3 |
| MDC065 | 3 | 6 | 1.36 | 350 | 31.7 |
| MDC067 | 0 | 2 | 0.34 | 217 | 21.1 |
| MDC047 | 0 | 3 | 1.13 | 320 | 25.1 |
| MDC047 | 3 | 5.6 | 0.98 | 382 | 22.5 |
| MDC048 | 0 | 3 | 1.10 | 382 | 24.8 |
| MDC048 | 3 | 6 | 0.14 | 243 | 15.9 |
| MDC048 | 6 | 7 | 0.02 | 176 | 5.8 |
| MDC050 | 0 | 3 | 1.12 | 457 | 24.7 |
| MDC050 | 3 | 6 | 1.01 | 388 | 22.5 |
| MDC054 | 0 | 3 | 0.75 | 779 | 38.0 |
| MDC054 | 3 | 6 | 0.93 | 527 | 37.3 |

| Drillhole ID | Depth from m | Depth to m | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| MDC056 | 0 | 3 | 1.09 | 626 | 49.4 |
| MDC056 | 3 | 6 | 1.13 | 726 | 35.1 |
| MDC056 | 6 | 7 | 1.44 | 673 | 36.5 |
| MDC061 | 0 | 3 | 1.13 | 499 | 29.2 |
| MDC061 | 3 | 5.8 | 1.21 | 395 | 26.8 |
| MDC061 | 5.8 | 6.7 | 1.09 | 320 | 25.5 |
| MDC064 | 0 | 3 | 1.06 | 557 | 27.7 |
| MDC064 | 3 | 5 | 1.24 | 522 | 35.1 |
| MDC066 | 0 | 3 | 1.07 | 336 | 22.2 |
| MDC066 | 3 | 6 | 0.56 | 352 | 23.3 |

The results of the Cobra drilling were not used for Mineral Resource estimation due to the limited penetration into the dump. However, they provided an indication of the magnitude of the grade of tin, tantalum, and lithium mineralisation in the four dumps and the motivation to carry out a Mineral Resource drilling programme.

### 9.4 Geophysical Survey

In 2017, an aeromagnetic geophysical survey was conducted over the Manono Lithium Tailings Project area by International Geoscience Services (IGS), funded by the World Bank PROMINES project in support of the Ministry of Mines of the DRC. The high resolution regional airborne survey was flown by New Resolution Geophysics (NRG) from South Africa, at a line spacing of 400 m, with selected targets being surveyed at a closer spacing of 200 m. IGS was responsible for the management and technical coordination of the project on behalf of the Ministry. Tantalex does not have access to the report resulting from this survey but has acquired the associated data, which is of no direct relevance to the tailings deposits.

# 10 DRILLING

Drilling at the Manono Lithium Tailings Project began in September 2021 and was completed In July 2022 using a track mounted aircore/RC rig with an onboard compressor. Aircore drilling was undertaken using an 80 mm outer diameter core bit and a 30 mm inner core diameter bit. A geologist was present throughout the drilling operation to supervise both the drilling and sampling process.

Drilling took place in two phases, with the first phase ending in November 2021. Tantalex subsequently decided to undertake further drilling, with the intention of providing closer spaced drilling information for higher confidence estimates for several deposits. Phase 2 commenced on 15 June 2022 and concluded on 8 July 2022.

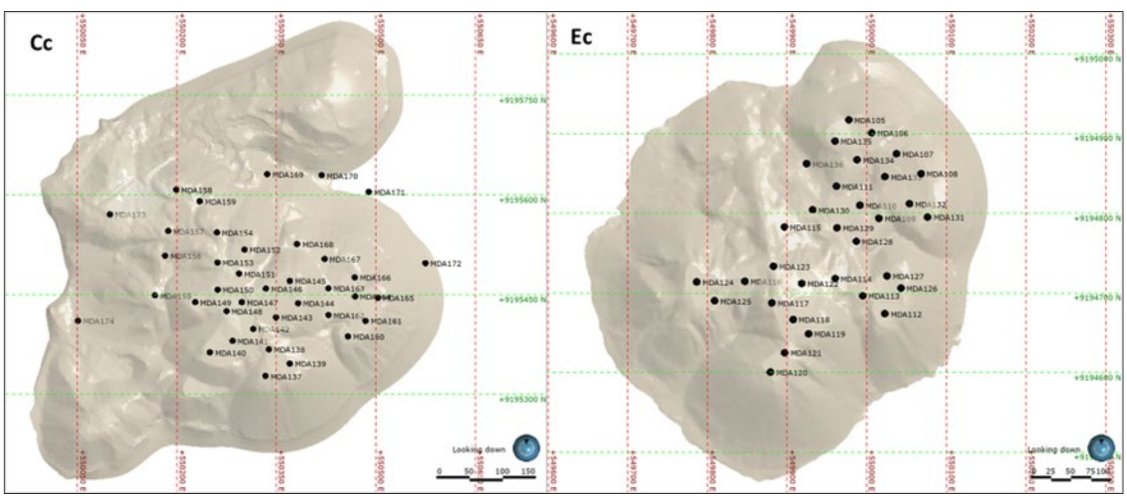
A summary of the two phases of the Tantalex drilling campaign is presented Table 10-1.

**Table 10-1: Tantalex Drilling Campaign Summary**

| Phase | From | To | Type | Number of Drillholes | Metres Drilled |
|---|---|---|---|---|---|
| Phase 1 | September 2021 | November 2021 | Aircore | 174 | 9,279.9 |
| Phase 2 | June 2022 | July 2022 | Aircore | 194 | 2,657.0 |

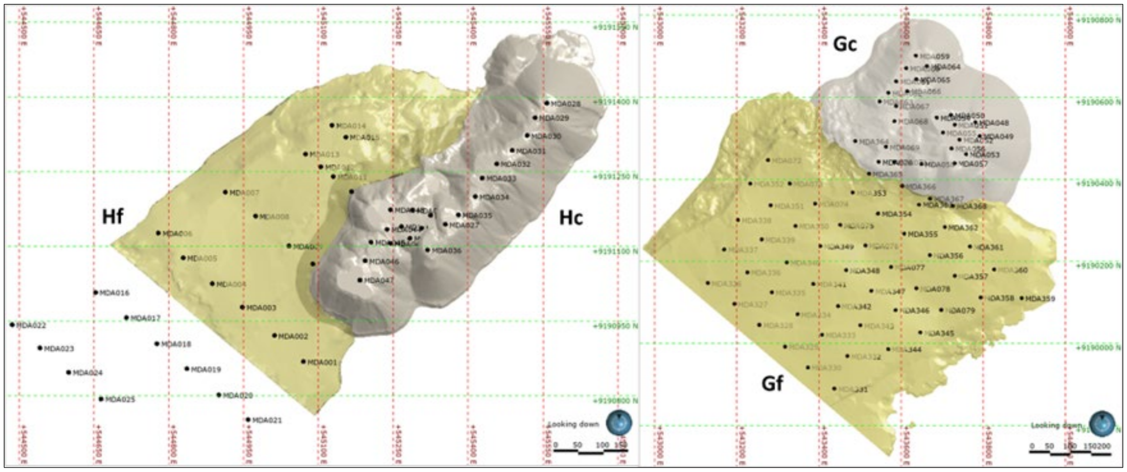
The collar locations for the drilling campaign are presented in Figure 10-1 for the Cc and Ec deposits, Figure 10-2 for the Hc, Hf, Gc and Gf deposits and Figure 10-3 for the Ic and K deposits.

**Figure 10-1: Manono Lithium Tailings Project Drillhole Collars for Cc and Ec Deposits**



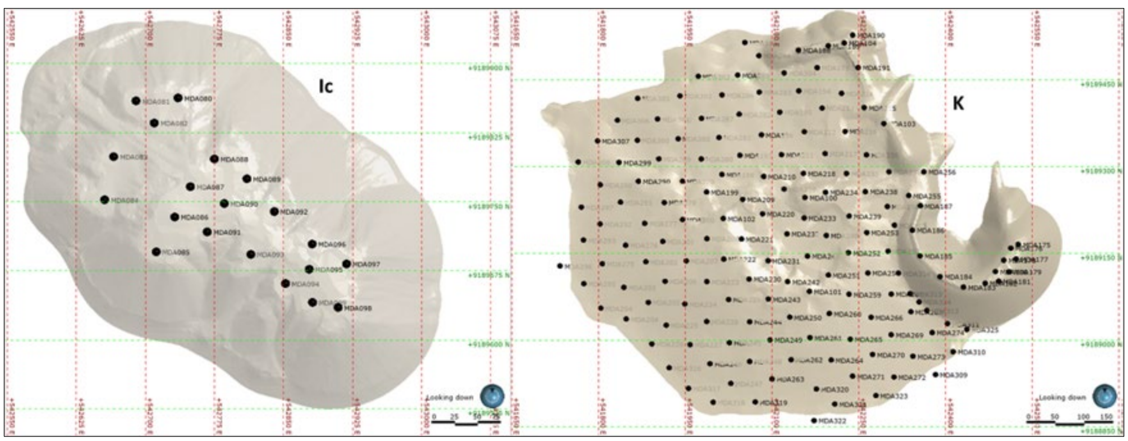

***Source:*** *MSA (2022)*

**Figure 10-2: Manono Lithium Tailings Project Drillhole Collars for Hc, Hf, Gc and Gf Deposits**




***Source:*** *MSA (2022)*

**Figure 10-3: Manono Lithium Tailings Project Drillhole Collars for Ic and K Deposits**




***Source:*** *MSA (2022)*

## 10.1 Drillhole Sample Recovery

The weight of each aircore sample was recorded and used as a proxy to calculate an average sample recovery. On average, each sample weighed between 2.5 kg to 5 kg, with an average recovered weight of 3.9 kg.

## 10.2 Collar Surveys

The collar coordinates were surveyed on completion of the hole using a Trimble R4s GNSS (Global Navigation Satellite System) and were captured in the WGS84 UTM35S Zone geodetic system. The Trimble R4s utilises signals from all six GNSS and produces a Real-time Kinematic position (RTK) with a horizontal accuracy of 8 mm and a vertical accuracy of 15 mm (Optron, 2022).

The drillhole collars were marked with a concrete beacon recording relevant details of each hole as shown in Figure 10-4.

**Figure 10-4: Concrete Plinth Over Collar MDA050**


***Source:*** *Goncalves (2022)*

## 10.3 Downhole Surveys

All holes were drilled vertically with an approximate average depth of 32 m and a maximum depth of 86 m. Downhole surveying to check hole deviation was deemed not necessary as minimal deviation is expected to occur.

# 11 SAMPLE PREPARATION, ANALYSES AND SECURITY

## 11.1 Logging

The geologist logged a wet sieved (+3 mm) portion of between 200 g to 300 g of each 1 m sample interval (Figure 11-1). The sieved sample was transferred to a plastic chip tray prior to detailed logging directly into a Microsoft Excel spreadsheet. Each chip tray contains coarse- and fine-grained material as a representation of the 1 m sampled interval (Figure 11-2).

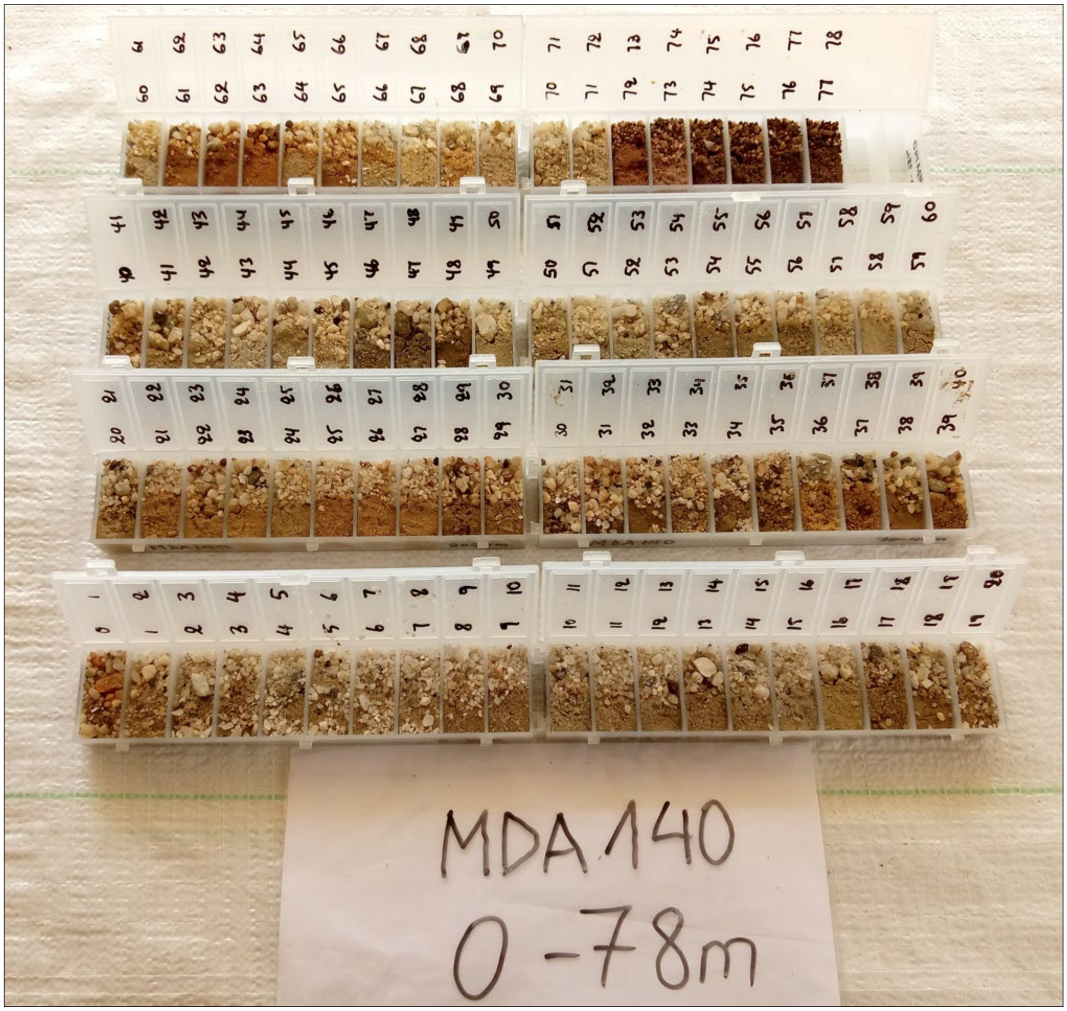
**Figure 11-1: Manono Lithium Tailings Project Geological Logging**


***Source:*** *Lindhorst (2022)*

The geologist recorded the sample weight, lithology, and colour. Any additional grain size, mineralisation and alteration information was generally recorded as a comment.

Once logged, the chip trays were photographed using a digital camera and images are stored on the Tantalex Dropbox™ file hosting service.

**Figure 11-2: Manono Lithium Tailings Project Chip Tray Photograph Example**




***Source:*** *Tantalex (2022)*

## 11.2 Sample Handling

Samples weighing between 2.5 kg and 5 kg were collected at 1 m intervals in large polyweave bags from the rig-mounted cyclone (Figure 11-3).

**Figure 11-3: Track Mounted Aircore Rig with Mounted Cyclone**

Samples were transferred into calico bags which were pre-labelled with the drillhole number and the relevant metre interval. Samples were laid out at the drill site in sequential order to ensure all 1 m sample intervals are accounted for and to check that all samples are correctly and clearly labelled. A list of the required QAQC samples to be inserted at regular, predetermined intervals was recorded by the geologist (Lindhorst, 2022, personal communication).

Samples were collected into larger 50 kg polyweave bags for transport by the Tantalex drivers to the Manono base camp for temporary storage before transportation to the on-site sample preparation facility. The Sample Preparation Facility Manager was responsible for organising the transport of the samples from the Manono base camp to the preparation facility (Lindhorst, 2022).

## 11.3 Sample Compositing

The 1 m sample intervals were prepared into 3 m composite samples. Each sample was passed through a Jones Riffle Splitter to halve the initial 1 m samples. The three half-samples were combined and mixed into a single composite sample and then riffle split down to 400 grams for pulverisation and assay. The reject half sample of each initial 1 m sample was returned to the original bag and retained for future reference (Lindhorst, 2022).

In the early stages of the drilling campaign, sampling was carried out at 1 m intervals, however, soon afterwards this was changed to 3 m composite samples as described above. From a total of 3,271 samples, 1,126 were taken at 1 m intervals, 90 samples were taken as 2 m composites and 2 samples were taken as 4 m composites (in both cases at the end of a drillhole), while the remainder (2,053) of the samples were taken at 3 m intervals.

## 11.4 Sample Preparation

A geologist was responsible for ensuring that the Sample Preparation Facility Manager received the QAQC sample list for insertion of the required QAQC samples. The Tantalex Preparation Facility utilised one of three different protocols for sample preparation during the 2021-2022 drilling program. Sampling Protocol One (the original protocol) was utilised until the breakdown of the on-site sample pulveriser, after which Sampling Protocol Two was implemented. Sampling Protocol Three was further implemented after the breakdown of the on-site roll crusher (Lindhorst, 2022).

### 11.4.1 *Sample Preparation Protocol One*

a) Samples were weighed and the weights recorded on paper for later digitisation into the 'Sample Preparation Data' Microsoft Excel spreadsheet by the Sample Preparation Facility Manager.

b) Sample material was transferred from the calico sample bags to 40 cm by 60 cm sample drying trays. The sample ID was recorded onto a cardboard tag which was placed into the drying tray. The trays were placed onto a metal plate oven and heated for approximately 10 to 20 minutes by a wood burning fire (Figure 11-4).

**Figure 11-4: Wood Fire Ovens and Drying Pans Used to Dry Samples**

c) Once dry, samples were allowed to cool for approximately 10 minutes before being transferred back to the original calico sample bag, together with the sample tag.

d) The dry samples were weighed, and the weights recorded on paper for later digitisation into the 'Sample Preparation Data' Microsoft Excel spreadsheet.

e) Samples were screened using a 5 mm sieve. The +5 mm size fraction was weighed, and weights recorded for metallurgical purposes, after which it was added back to the sample.

f) The entire sample was passed through a roll crusher to reduce the size to 2 mm.

g) The crushed sample was passed through a Jones Riffle Splitter in order to obtain a 200 g sample.

h) The 200 g sample was sub-sampled into a 100 g sample using the cone and quartering technique. The 200 g sample was homogenised by transfer between containers for three passes. The sample was then formed into a cone and flattened. The two 50 g opposite quarters were selected to make up the 100 g sample.

i) The 100 g sample was pulverised to more than 80% finer than 75 µm.

j) The pulverised samples were packaged into boxes with the inserted QAQC samples for transport to Lubumbashi.

k) The 100 g reject sample was retained for future reference.

l) A sample submission form was created in Lubumbashi for inclusion with the samples that were sent to ALS, Ireland by via FEDEX courier service.

m) Sample dispatch details were entered into the Assay Register spreadsheet.

### 11.4.2 *Sample Preparation Protocol Two*

After the breakdown of the on-site pulveriser, samples were initially prepared as per Protocol One and crushed to reduce the sample size to 2 mm, thereafter:

a) The entire 200 g sample was transferred into pulp paper sampling packet for transport to the COPROCO warehouse in Lubumbashi.

b) A sample submission form for the ALS affiliated Congolese Analytical Laboratory SARL (COAL) Laboratory was created in Lubumbashi after sample checks.

c) Samples were transported to the COAL Laboratory located at the SOMIKA mining site.

d) The entire sample was pulverised using a LM3 ring mill to more than 85% finer than 75 µm.

e) A 100 g sub-sample was transferred to a labelled, pulp paper sampling packet.

f) The 100 g reject sample was placed into a labelled, zip-lock plastic bag.

g) The 100 g pulp samples were packed by Tantalex into labelled ALS sample boxes for transport by FEDEX courier services to either ALS, Ireland or to SGS, Randfontein, South Africa. The reject samples are stored in boxes at the COPROCO locked warehouse facility.

h) At ALS, Ireland, samples were re-pulverised to more than 85% finer than 75 µm (technique code PUL-31) to ensure homogenisation after transport.

i) At SGS, South Africa, samples were re-pulverised to more than 85% finer than 75 µm to ensure homogenisation after transport.

j) Reject pulps are stored in a locked room at the COPROCO Mineral Processing Warehouse located at 21 Nyanza Lubumbashi.

k) Sample dispatch details were entered into the Assay Register spreadsheet.

### 11.4.3 *Sample Preparation Protocol Three*

a) After the breakdown of the on-site crusher, samples were weighed, dried and screened as per Protocol One, thereafter the entire 400 g screened was transported to the COAL Laboratory Lubumbashi.

b) The entire sample was crushed at the laboratory to a 2 mm size fraction using a benchtop jaw crusher.
c) Reject preparation samples are stored at the COAL Laboratory for future retrieval.
d) Samples were couriered to either ALS, Ireland or SGS, Randfontein, as per Protocol One and Two.

## 11.5 Sample Analyses

The sub-samples were analysed at ALS, Ireland, (Irish National Accreditation Board (INAB) accreditation number 173T, ISO 17025) or SGS, South Africa (SANAS accreditation number T0265, ISO 17025). In total, 8,038 metres of core were sent for analysis, of which 28% were analysed at ALS. The primary laboratory was changed to SGS due to cost reasons.

At ALS, Ireland, samples were analysed using the following techniques:

- Super Trace Na2O2 by ICP-MS (technique code ME-MS89L), for Ag ppm, As ppm, Ba ppm, Be ppm, Bi ppm, Ca%, Cd ppm, Ce ppm, Ce ppm, Co ppm, Cs ppm, Cu ppm, Dy ppm, Er ppm, Eu ppm, Fe%, Ga ppm, Gd ppm, Ge ppm, Ho ppm, In ppm, K%, La ppm, Li ppm, Lu ppm, Mg%, Mn ppm, Mo ppm, Nb ppm, Nd ppm, Ni ppm, Pb ppm, Pr ppm, Rb ppm, Re ppm, Sb ppm, Se ppm, Sn ppm, Sr ppm, Ta ppm, Tb ppm, Te ppm, Th ppm, Ti%, Tl ppm, Tm ppm U ppm, V ppm, W ppm, Y ppm, Yb ppm and Zn ppm;
- Na2O2 fusion and ICP-AES for high-grades (technique code ME-ICP82b) for Li%;
- Lithium Borate Fusion and ICP-MS (technique code ME-MS81) for Ba ppm, Ce ppm, Cr ppm, Cs ppm, Dy ppm, Er ppm, Eu ppm, Ga ppm, Gd ppm, Hf ppm, Ho ppm, La ppm, Lu ppm, Nb ppm, Nd ppm, Pr ppm, Rb ppm, Sm ppm, Sn ppm, Sr ppm, Ta ppm, Tb ppm, Th ppm, Tm ppm, U ppm, V ppm, V ppm, W ppm, Y ppm Yb ppm, Zr ppm.

At SGS, South Africa, samples were initially analysed using the following technique:

- Na2O2 Fusion with HNO3 acid digest, combined ICP-OES and ICP-MS (technique code GE_IMS90A50) for Ag ppm, Al%, As ppm, Ba ppm, Be ppm, Bi ppm, Ca%, Cd ppm, Ce ppm, Co ppm, Cr ppm, Cs ppm, Cu ppm, Dy ppm, Er ppm, Eu ppm, Fe%, Ga ppm, Gd ppm, Ge ppm, Ho ppm, In ppm, K%, La ppm, Li ppm, Lu ppm, Mg%, Mn ppm, Mo ppm, Nb ppm, Nd ppm, Ni ppm, P%, Pb ppm, Pr ppm, Rb ppm, S%, Sb ppm, Si%, Sm ppm, Sn ppm, Sr ppm, Ta ppm, Tb ppm, Te ppm, Th ppm, Ti%, Tl ppm, Tm ppm, U ppm, V ppm, W ppm, Y ppm, Yb ppm and Zn ppm.

Prior to the release of the maiden Mineral Resource estimate, MSA identified issues with the accuracy and precision of the tin and tantalum assays which resulted in a comprehensive internal review by SGS. Subsequently, the samples were re-submitted for repeat analyses for tin and tantalum, with Tantalex opting to re-assay samples from the K, Ic, Gc and Gf dumps only as the other deposits do not form part of the Mineral Resources. SGS concluded that the inconsistent results in the tin and tantalum assays were caused by incomplete furnace fusion at 600°C and poor stability using nitric acid as a leaching media. As a result, the analytical method for these two elements was adjusted, with a flame fusion and hydrochloric acid digest being used instead. Furthermore, an additional 66 previously un-assayed samples, representing 7 drillholes from the Ic dump, were included by Tantalex for lithium analysis.

## 11.6 Sampling Governance, Storage and Security

Geological samples are stored in the ten-sample plastic chip trays in sequential order in the sample warehouse on-site (Figure 11-5).

**Figure 11-5: Manono Lithium Tailings Project Chip Sample Storage**

***Source:*** *Lindhorst (2022)*

The reject half sample of each original 1 m sample interval was returned to the original bag and retained for future reference at the on-site preparation facility. All rejects from the 3 m composite samples are also stored at the on-site preparation facility (Figure 11-6).

**Figure 11-6: Sample Storage Facilities and Polyeave Bags Containing Samples**


The -2 mm crushed rejects prepared on-site are stored at the on-site preparation facility. All 100 g sample and pulp rejects from the Lubumbashi COAL Laboratory are stored at the COPROCO mineral processing facility in a locked storage room at 2 Nyanza Ave, Kampemba, Lubumbashi DRC. The sample rejects at the Manono site and in Lubumbashi will be kept indefinitely.

Sample rejects processed at ALS, Ireland, have been disposed of. Sample rejects processed at SGS, South Africa, are currently still available at the laboratory and will be disposed of on completion of the project.

## 11.7 Quality Assurance and Quality Control

Appropriate quality assurance and quality control (QAQC) monitoring is a critical aspect of the sampling and assaying process in any exploration programme. Monitoring the quality of laboratory analyses is fundamental to ensuring the highest degree of confidence in the analytical data and providing the necessary confidence to make informed decisions when interpreting all the available information. Quality assurance may be defined as information collected to demonstrate that the data used further in the Project are valid. Quality control (QC) comprises procedures designed to maintain a desired level of quality in the assay database. Effectively applied, QC leads to identification and corrections of errors or changes in procedures that improve overall data quality. Appropriate documentation of QC measures and regular scrutiny of quality control data are important as a safeguard and form the basis for the quality assurance programme implemented during exploration.

In order to ensure quality standards are met and maintained, planning and implementation of a range of external quality control measures is required. Such measures are essential for minimizing uncertainty and improving the integrity of the assay database and are aimed to provide:

a) An integrity check on the reliability of the data;
b) Quantification of accuracy and precision;
c) Confidence in the sample and assay database; and
d) The necessary documentation to support database validation.

The Manono QAQC programme reserved three in every twenty samples as QC samples (resulting in approximately 16% QAQC samples), usually one duplicate, one Certified Reference Material (CRM) and one certified blank sample.

### 11.7.1 *Blank Samples*

Certified blank sample material was purchased from African Mineral Standards (AMIS0439), consisting of silica chips. Blank samples were inserted at a frequency rate of approximately one in every twenty samples, although a lower, irregular frequency was used in the early stages of the exploration programme. The blank samples were subjected to the same sample preparation and analytical processes and were within the same sample stream as the routine field samples.

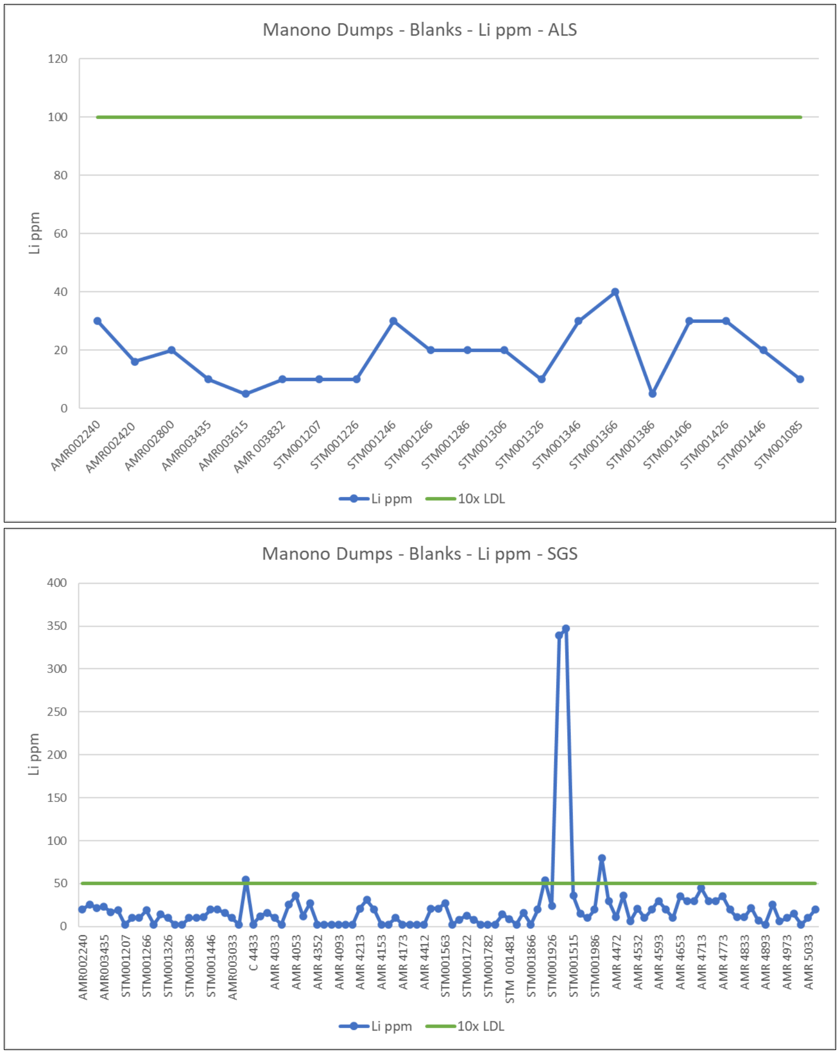
A summary of the number of blanks analysed and total failures is shown in Table 11-1.

**Table 11-1: Summary of Blank Samples Used in the Drilling Programme**

| Li | | | Sn | | | Ta | | |
|---|---|---|---|---|---|---|---|---|
| ALS | SGS | Failure Rate | ALS | SGS | Failure Rate | ALS | SGS | Failure Rate |
| 20 | 112 | 4 % | 3 | 87 | 1% | 3 | 87 | 1% |

The overall failure rate is low for the three elements. No failures were reported for lithium assays analysed by ALS, based on a threshold of 100 ppm which is ten times the lower detection limit (LDL). There are a total of five failures for lithium, two of which (AMR4713 and AMR4733) reported values well above the acceptable limit of 50 ppm, for SGS. Given that these failures are rare and isolated events, and the degree of potential contamination is significantly below the lithium cut-off grade considered for the deposit, potential errors in this regard will not have a material impact to the Mineral Resource estimate. Graphical representations of the blank sample results for lithium are shown in Figure 11-7 for ALS and SGS.

**Figure 11-7: 2022 Li ppm in Blank Analysis (ALS and SGS)**

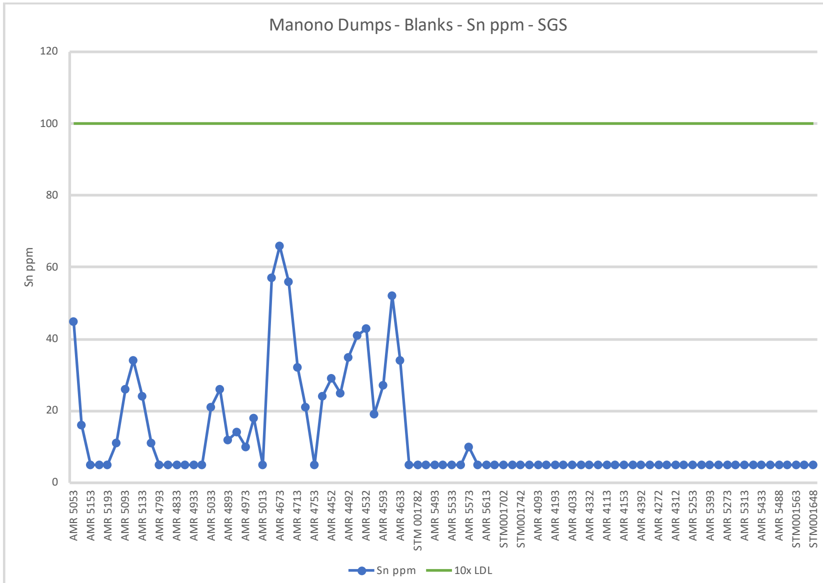


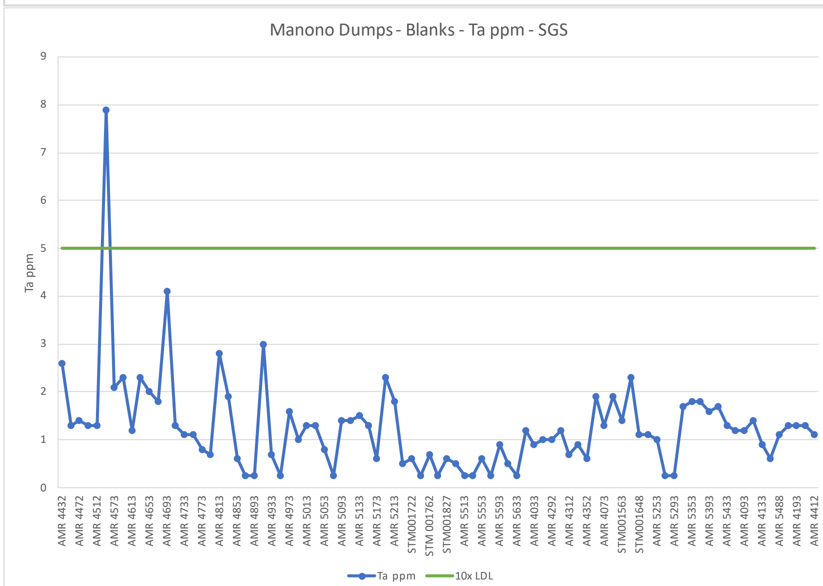

***Source**: MSA (2022)*

A total of 90 blank samples were for analysed for Sn and Ta, with only three of these being analysed at ALS and the remainder at SGS. A ten times detection limit threshold was applied. The thresholds used to determine a failure for Sn and Ta were 100 ppm and 5 ppm respectively for samples analysed at SGS. The thresholds applied to the ALS samples were 10 ppm Sn and 1 ppm Ta. The overall failure rate for both elements is low, at 1% of the total samples, which equates to one failure for each element. The failure for Sn occurs on a sample analysed at ALS, while the failure for Ta was analysed at SGS.

Blank analysis control charts for Sn and Ta are shown in Figure 11-8. Graphs for ALS are omitted due to the small number of samples. The charts show a decrease in tin grade reported in a blank sample after a change in analytical methodology was introduced by SGS following close monitoring of the results by Tantalex and MSA, which prompted an internal investigation by the laboratory. SGS adjusted the analytical method, by using a flame fusion with a hydrochloric acid digest instead of an oven fusion at 600°C and nitric acid digest.

**Figure 11-8: Blank Analysis for Sn and Ta (SGS Only)**




### 11.7.2 *Certified Reference Material (CRM) Samples*

CRM samples were purchased from AMIS and OREAS for insertion into the sampling stream at an approximate rate of 1 in every 20 samples. During the early stages of the drilling campaign, a lower rate of insertion was used which varied from 1 in 25 to 1 in 60 samples.

#### *11.7.2.1* Lithium

Six different CRM samples were utilised with certified grades ranging from 1,603 ppm Li to 7,268 ppm Li. A summary of the number of CRMs for lithium, certified values, analytical failure rates and bias in terms of percentage and absolute differences is presented in Table 11-2.

**Table 11-2: Manono Lithium Tailings Project Certified CRM Details for Li**

| CRM Name | Number of CRM samples | Certified Value (Li ppm) | Three Standard Deviations | Failure Rate | | Difference | |
|---|---|---|---|---|---|---|---|
| | | | | Number of Samples | Percentage of Failures | Average Bias | Absolute Difference (ppm) |
| AMIS0338 | 31 | 1707 | 477.0 | 1 | 3% | 2% | 37 |
| AMIS0341 | 30 | 5041 | 333.0 | 1 | 3% | 2% | 103 |
| AMIS0342 | 1 | 1603 | 298.5 | 0 | 0% | 10% | 181 |
| AMIS0343 | 34 | 7180 | 2,287.5 | 3 | 9% | 3% | 218 |
| AMIS0355** | 23 | 7268 | 1,254.0 | 0 | 0% | 4% | 290 |
| AMIS0629 | 32 | 2153 | 376.5 | 1 | 3% | 1% | 29 |
| AMIS0656 | - | - | - | - | - | - | - |

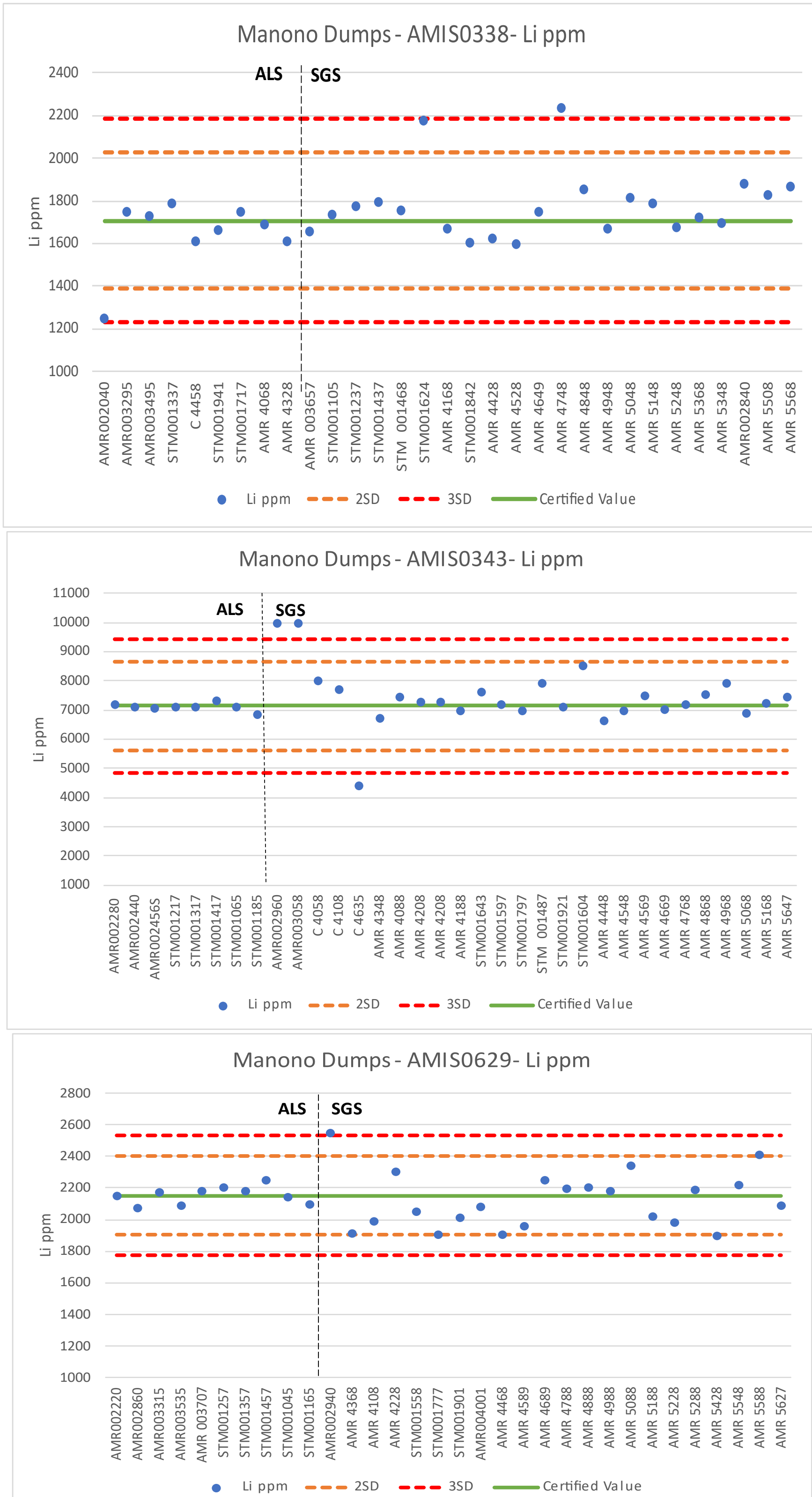
***Notes**: ** indicates ICP analysis*

AMIS0656, although certified for lithium, was only used to assess the accuracy of the tin and tantalum analyses. Two uncertified standards, WJL017 and WJL016, from Wheale Jane Laboratory in Cornwall, were inserted into the sampling stream during the earlier part of the resource drilling campaign. These were used as a temporary measure until certified CRMs were obtained. A total of 6 WJL016 and 5 WJL017 standard samples were used. All eleven were analysed for lithium while only nine were analysed for tin and tantalum. Due to their lack of certification, WJL standards were not used in the QAQC assessment.

There is a generally low (<4%) average bias between the analysed and certified values for lithium, except for AMIS0342 that reported 10% difference for a single sample that was analysed.

A selection of control charts representative of the lithium grade range of the CRMs assayed is presented in Figure 11-9. Most reported values are well within acceptable limits (three standard deviations of the certified value). Only one CRM assay (AMIS 0338) by ALS was a near failure (outside two standard deviations of the certified value), while one near failure was noted on the same CRM for SGS and one failure. Three failures were noted for AMIS0343 assayed at SGS, with two samples reporting >10,000 ppm (i.e., above the upper detection limit for the analytical method) and one below the lower acceptance limit. Only one failure was noted for AMIS0629, which was an assay by SGS just outside of the upper acceptance limit.

**Figure 11-9: Control Charts for Li in CRMs AMIS0338, AMIS0343 and AMIS0629**




***Source**: MSA (2023)*

#### *11.7.2.2* Tin

The CRMs used in the drilling programme to assess the accuracy of tin assays have certified values ranging from 35.6 ppm to 6,061 ppm. A summary of the number of CRMs for tin, certified values, analytical failure rates and bias in terms of percentage and absolute differences is presented in Table 11-3.

**Table 11-3: Manono Lithium Tailings Project Certified CRM details for Sn**

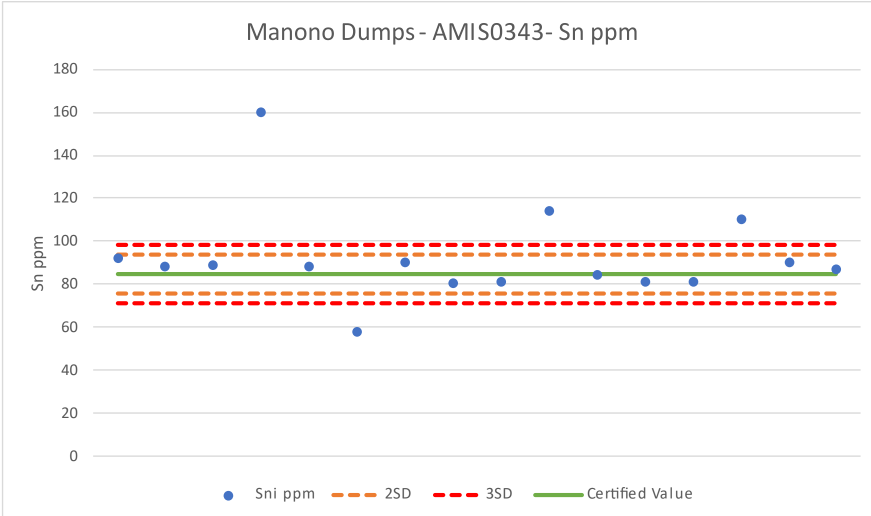
| CRM Name | Number of CRM samples | Certified Value (Sn ppm) | Three Standard Deviations | Failure Rate | | Difference | |
|---|---|---|---|---|---|---|---|
| | | | | Number of Samples | Percentage of Failures | Average Bias | Absolute Difference (ppm) |
| AMIS0338* | 21 | 35.6* | 10.5* | 8 | 38% | 18% | 8 |
| AMIS0342 | 1 | 1,662 | 156 | 1 | 100% | - | - |
| AMIS0343 | 16 | 85 | 13.5 | 4 | 25% | 8% | 7 |
| AMIS0355 | 16 | 470 | 57 | 0 | 0% | 3% | 13 |
| AMIS0629 | 20 | 1,662 | 156 | 0 | 0% | 1% | 17 |
| AMIS0656 | 5 | 573 | 66 | 1 | 20% | 24% | 111 |
| OREAS 140 | 3 | 1,755 | 183 | 0 | 0% | 3% | 47 |
| OREAS 141 | 1 | 6,061 | 1,017 | 0 | 0% | 4% | 251 |

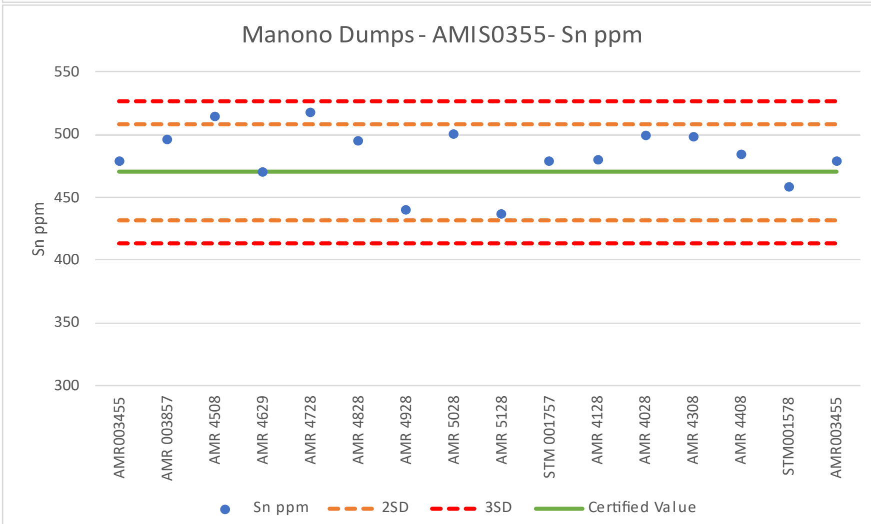
***Notes:*** *** indicates provisional values (not certified values)***

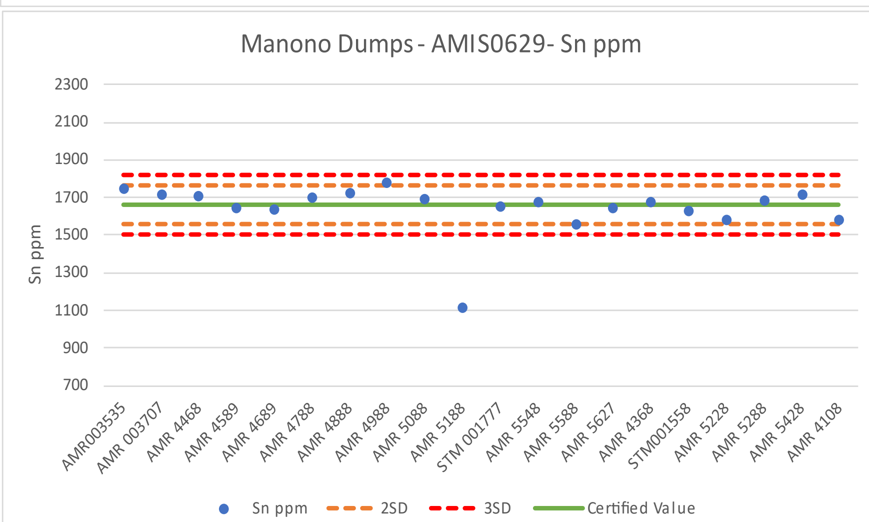
A small number of CRM samples were assayed for AMIS0342, AMIS0656, OREAS 140 and OREAS 141. These were too few to allow meaningful observations on the accuracy. A high number of failures, representing 38% out of a total of 21 CRMs were reported for AMIS0338, however, this standard is only provisionally certified for tin and therefore a conclusive opinion cannot be made. Twenty-five percent of the AMIS0343 samples failed by reporting outside the acceptable limits, although this CRM has a very narrow range of certification, with a three standard deviation value of 13.5 ppm. Regardless, the average bias and absolute difference for AMIS0343 is low. Similarly, low biases are noted for AMIS0355, and AMIS0629 which has a single failure below the certified mean.

A selection of control charts representative of the tin grade range of the CRMs assayed is presented in Figure 11-10.

**Figure 11-10: Control Charts for Sn in CRMs AMIS0343, AMIS0355 and AMIS0629**



#### *11.7.2.3* Tantalum

The CRMs used in the drilling programme to assess the accuracy of tantalum assays have certified values ranging from 43 ppm to 740 ppm. A summary of the number of CRMs for tantalum, certified values, analytical failure rates and bias in terms of percentage and absolute differences is presented in Table 11-4.

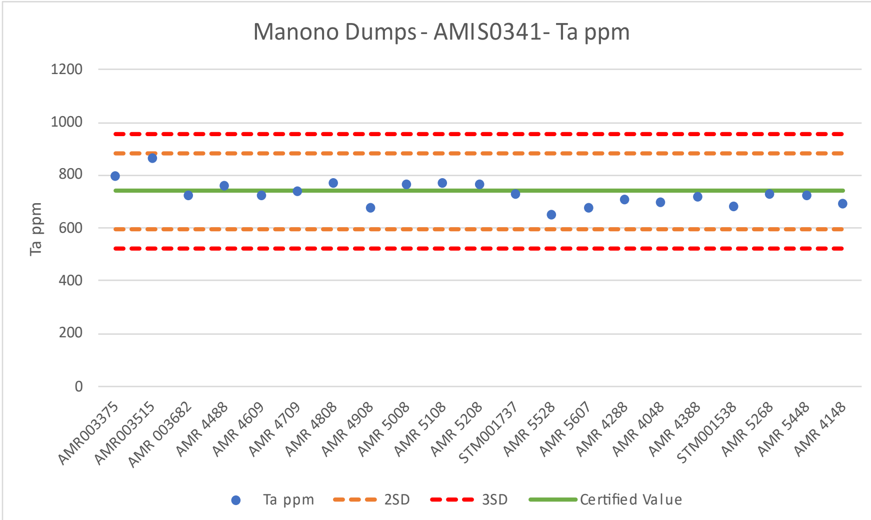
**Table 11-4: Manono Lithium Tailings Project Certified CRM Details for Ta**

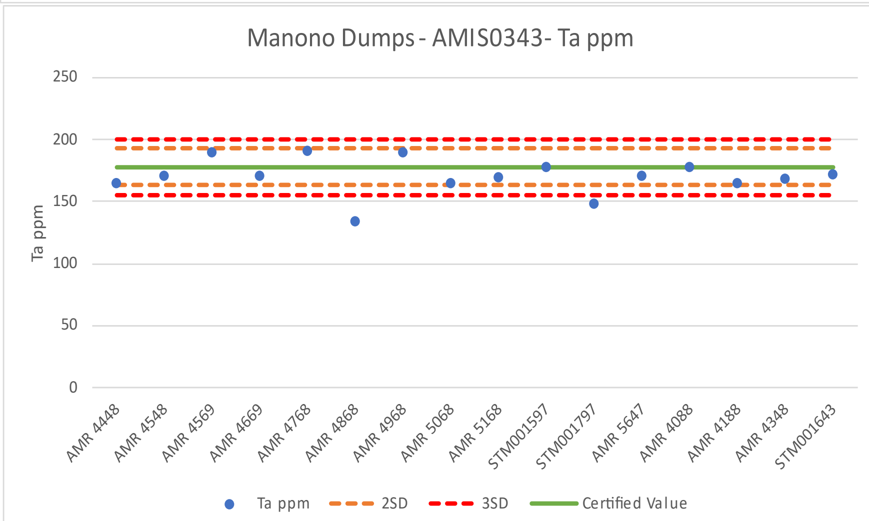
| CRM Name | Number of CRM samples | Certified Value (Ta ppm) | Three Standard Deviations | Failure Rate | | Difference | |
|---|---|---|---|---|---|---|---|
| | | | | Number of Samples | Percentage of Failures | Average Bias | Absolute Difference (ppm) |
| AMIS0338 | 21 | 43 | 15 | 1 | 5% | 2% | 1 |
| AMIS0341 | 21 | 740 | 216 | 0 | 0% | 1% | 6 |
| AMIS0342 | 1 | 169 | 25.5 | 0 | 0% | 1% | 1 |
| AMIS0343 | 16 | 178 | 22.5 | 2 | 13% | 5% | 8 |
| AMIS0355 | 16 | 214 | 63 | 0 | 0% | 1% | 3 |
| AMIS0629 | 20 | 103 | 7.5 | 2 | 10% | 0% | 0 |
| AMIS0656 | 5 | 179 | 39 | 1 | 20% | 20% | 29 |
| OREAS 140 | - | - | - | - | - | - | - |
| OREAS 141 | - | - | - | - | - | - | - |

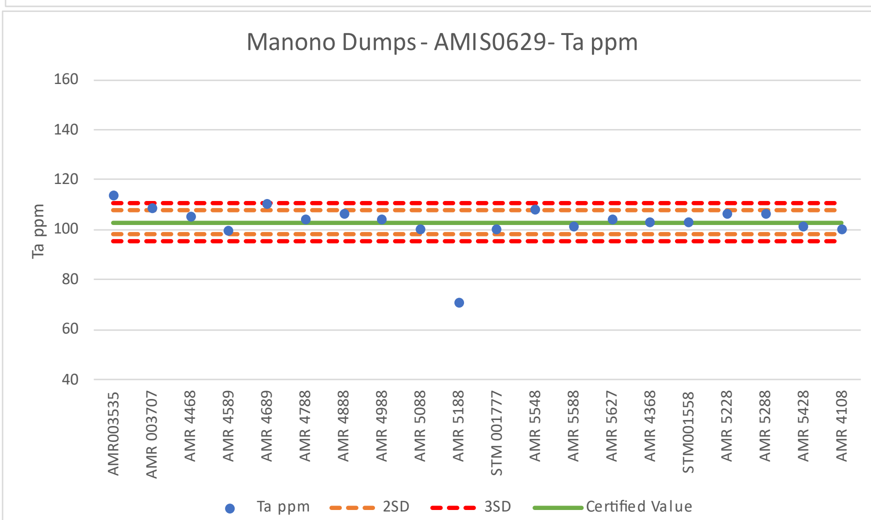
Overall, the accuracy of the tantalum analyses is good, with low failure rates for most CRMs. One of the five AMIS0656 samples has an assay value significantly lower than the certified mean. AMIS0343 has a 13% failure rate, which represents 2 samples out of 16, while the average bias is low at 5% with an absolute difference of 8 ppm.

A selection of control charts representative of the tantalum grade range of the CRMs assayed is presented Figure 11-11.

**Figure 11-11: Control Charts for Ta in CRMs AMIS0341, AMIS0343 and AMIS0629**



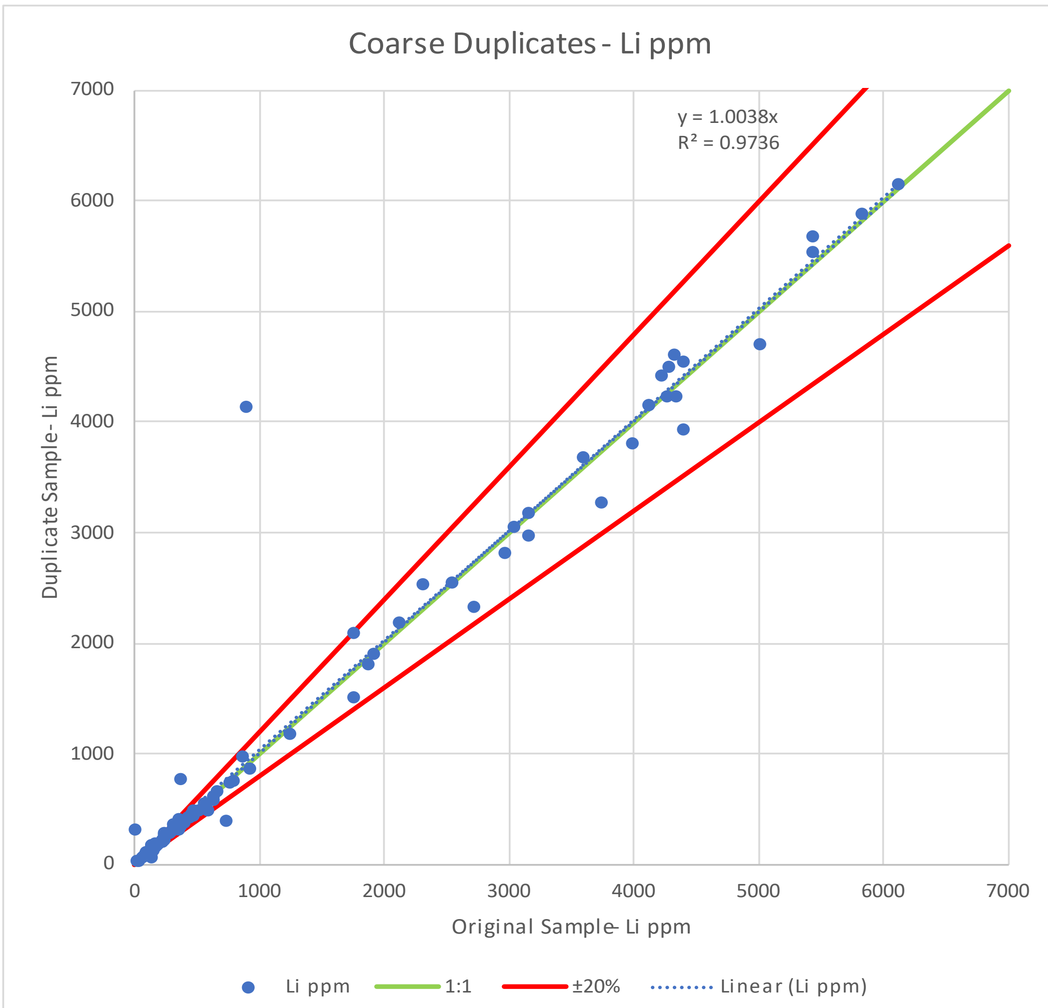



### 11.7.3 *Duplicate Samples*

#### *11.7.3.1* Lithium

A total of 116 coarse duplicates were submitted by Tantalex for analyses, thirteen of these were submitted to ALS and the remainder to SGS. A comparison between the original and duplicate assays (Figure 11-12) for lithium shows good precision. This is corroborated by 89% of the samples having a half absolute relative difference (HARD) of less than 10% and 95% of the samples with a HARD of less than 20%. The mean lithium grade of the original samples is 1,322 ppm compared to 1,355 ppm for the duplicates. This small discrepancy in the means can be accounted for by a single anomalous sample pair that has a grade of 884 ppm Li for the original and 4,130 ppm Li for the duplicate.

**Figure 11-12: Precision of Lithium in 108 Coarse Duplicate Pairs**

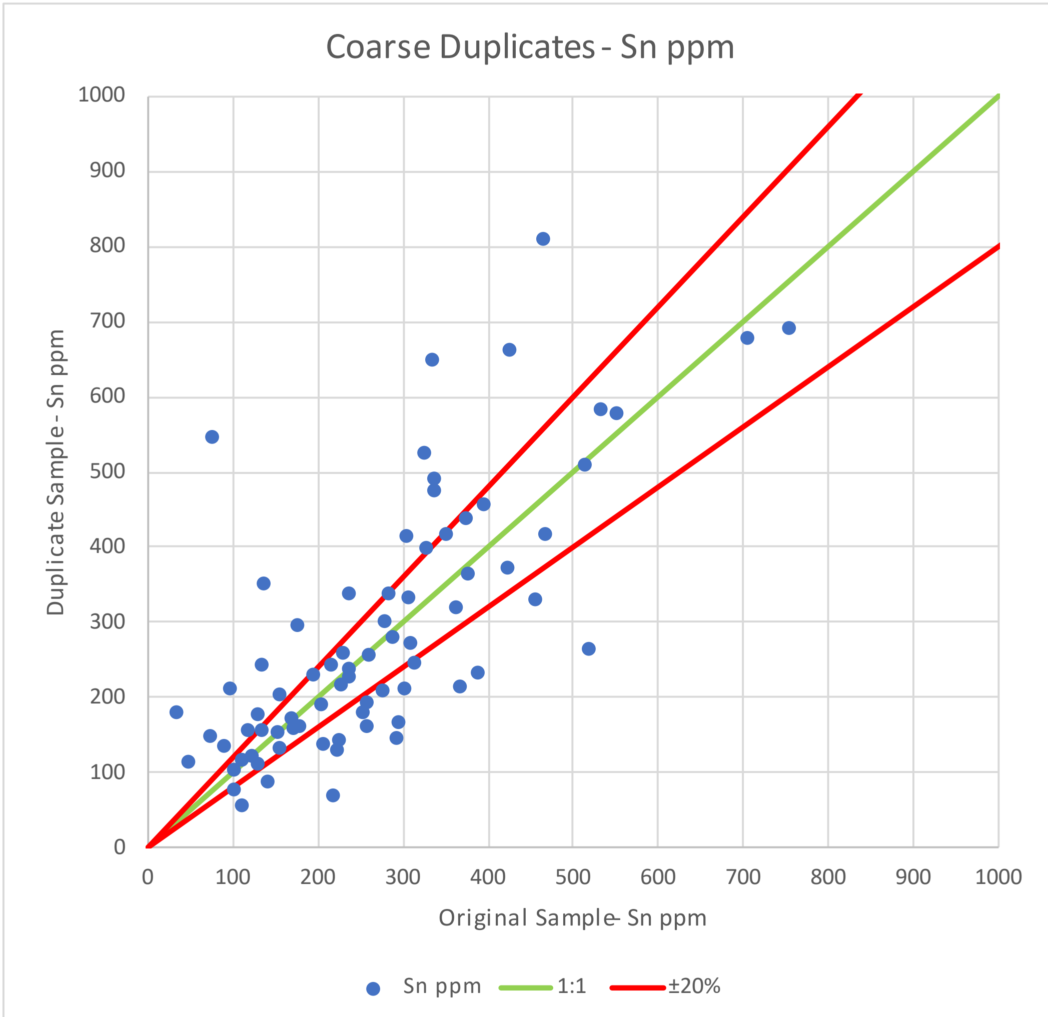



***Source***: *MSA (2023)*

#### *11.7.3.2* Tin

A total of 78 coarse duplicates were submitted for tin analyses. Figure 11-13 shows a scatterplot comparing the tin assays of the original and duplicate sample pairs. The graph shows considerable scatter, and only 46% of the samples have a HARD value of less than 20%. However, in terms of mean values, the two legs are similar, with the original samples having a mean tin grade of 303 ppm versus 293 ppm for the duplicates.

**Figure 11-13: Precision of Tin in 78 Coarse Duplicate Pairs**

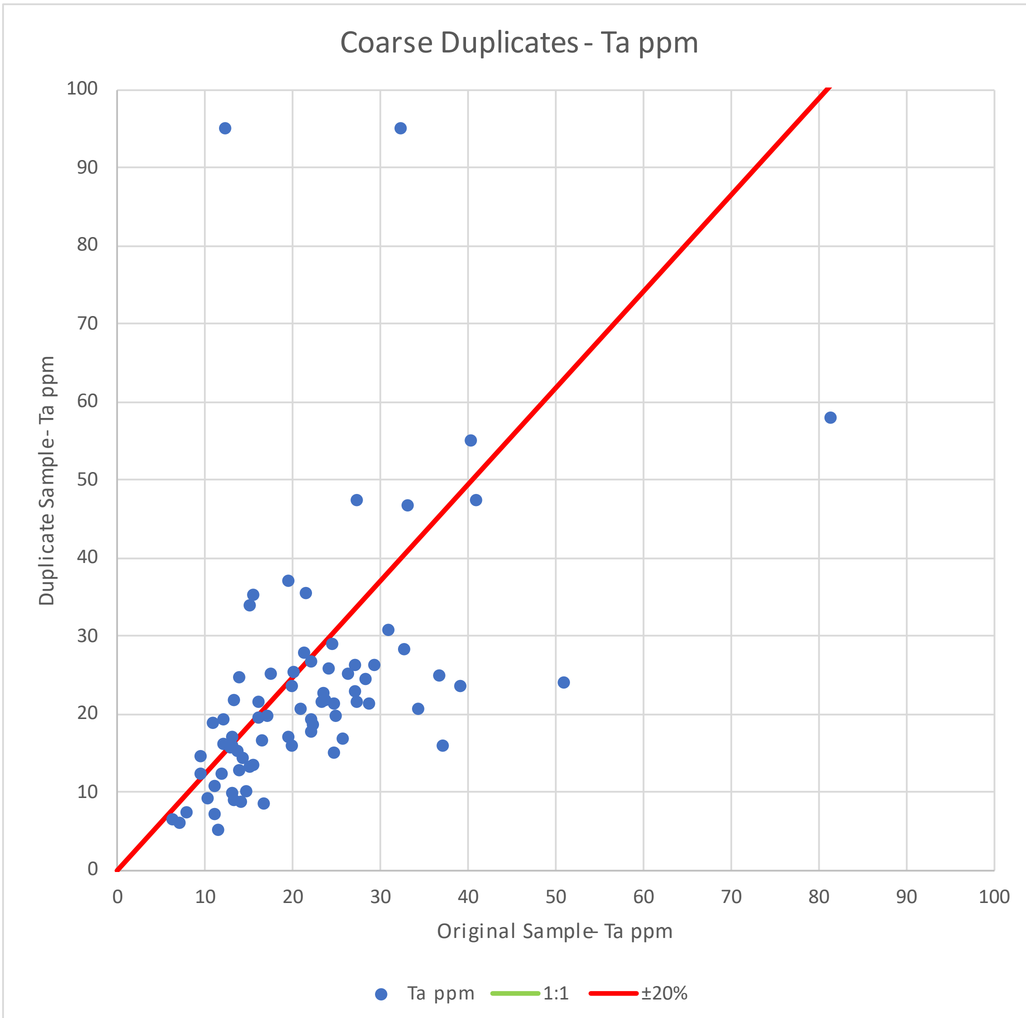



***Source**: MSA (2023)*

### *11.7.3.3* Tantalum

A total of 78 sample pairs were analysed for tantalum. A scatterplot comparing the original and duplicate pairs is shown in Figure 11-14. This comparison shows poor precision with significant scatter and many pairs being greater than 20% different to each other. Similarly, as observed for tin, a total of only 46% of the tantalum assays have a HARD value of less than 20%. When comparing the means between the two datasets, the original samples have a mean tantalum grade of 21 ppm while the duplicate samples have a mean grade of 25 ppm. When excluding two outlier samples with HARD values above 100%, this difference becomes negligible.

**Figure 11-14: Precision of Tantalum in 78 Coarse Duplicate Pairs**




***Source**: MSA (2023)*

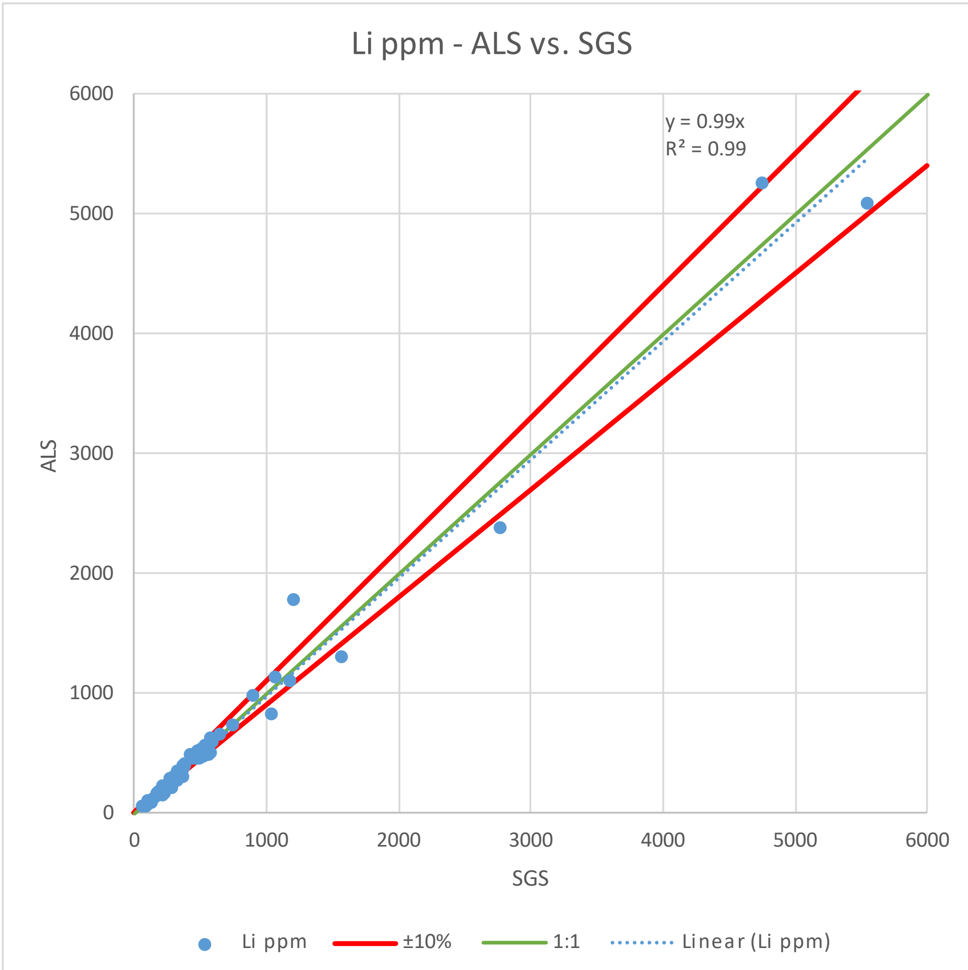
### 11.7.4 *Second Laboratory Check Assays*

Tantalex submitted a total of 67 samples assayed for secondary laboratory check analysis in two batches. Of these, 66 sample pairs returned with a lithium assay. For tin and tantalum, only 40 sample pairs were used in the inter-laboratory comparison as the first batch was analysed at SGS before issues with the accuracy were identified.

#### *11.7.4.1* Lithium

The correlation between SGS and ALS for lithium is presented in Figure 11-15, indicating good inter-lab precision, as evidenced by a $R^2$ value of 0.99 suggesting a strong linear relationship between the sample pairs.

**Figure 11-15: ALS versus SGS – Li ppm**




***Source**: MSA (2023)*

A summary on the sample repeatability between ALS and SGS for lithium is shown in Table 11-5.The mean of the ALS and SGS assays are comparable, with only a 1% difference and an absolute difference of 6.4 ppm. A total of 77% of the samples have a HARD of less than 10%, which is below the expected value of 90% for pulp samples. However, many of the sample pairs with poor correlation have grades ranging from 70 ppm to 200 ppm Li. At such low values, variability introduced during the sample preparation combined with equipment sensitivity and accuracy have a higher impact on analytical precision.

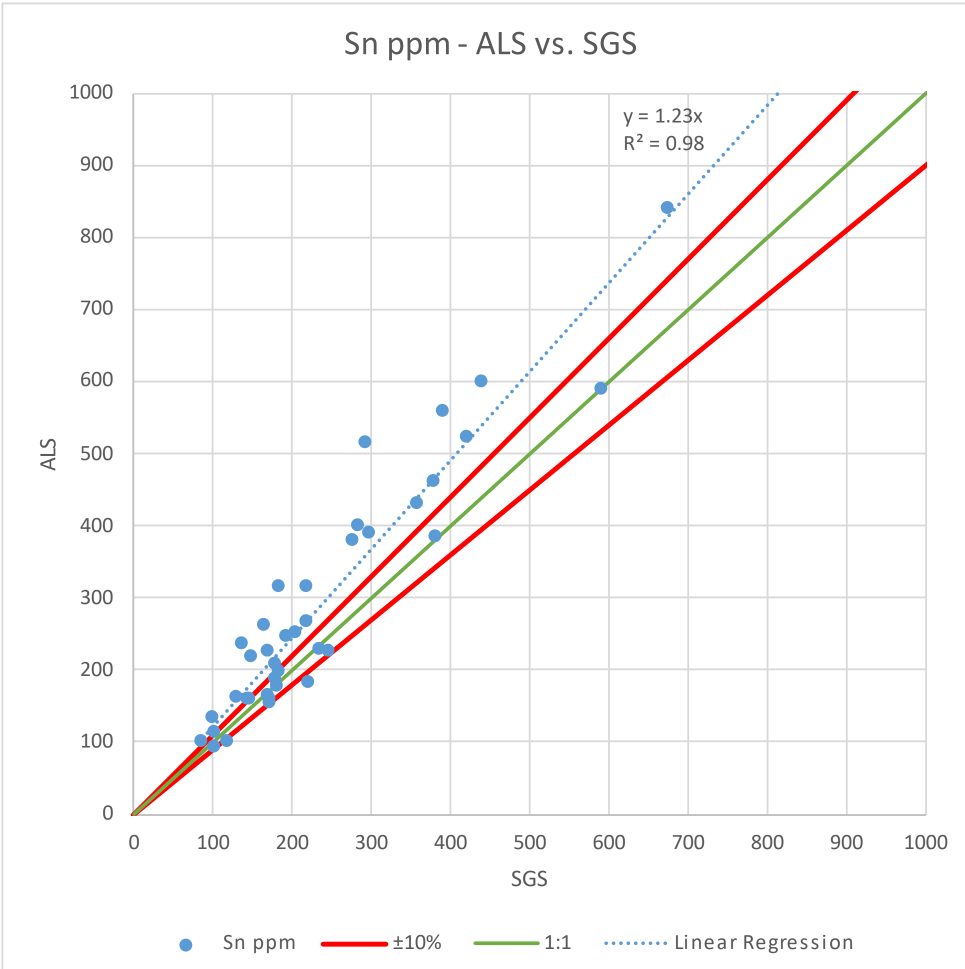
**Table 11-5: Summary of Sample Repeatability Comparing ALS Against SGS for Lithium**

| Number of Samples | Mean ALS Li ppm | Mean SGS Li ppm | Percentage Difference | Absolute Difference Li ppm | HARD | |
|---|---|---|---|---|---|---|
| | | | | | <10% | <20% |
| 66 | 597 | 603 | 1% | 6.4 | 77% | 97% |

#### *11.7.4.2* Tin

The correlation between the SGS and ALS sample pairs shows a strong bias towards ALS and significant scatter suggesting poor inter-lab precision for tin.

**Figure 11-16: ALS versus SGS – Sn ppm**




***Source***: *MSA (2023)*

There is an 18% difference in the mean tin grade between ALS and SGS, which in absolute terms translates to a mean difference of 57.1 ppm Sn (Table 11-6). Only 40% of the samples have a HARD value of less than 10%, however 80% of the duplicate pairs have a HARD value of less than 20%.

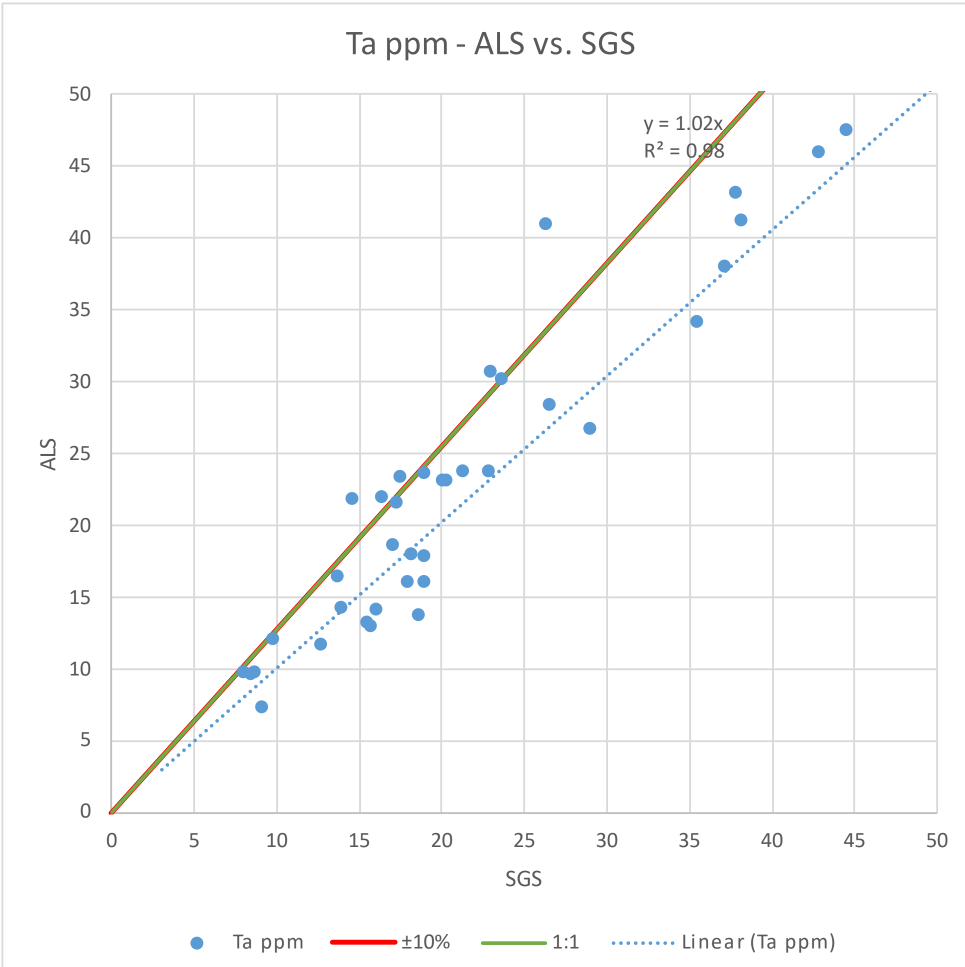
**Table 11-6: Summary of Sample Repeatability Comparing ALS Against SGS for Tin**

| Number of Samples | Mean ALS Sn ppm | Mean SGS Sn ppm | Percentage Difference | Absolute Difference Sn ppm | HARD | |
|---|---|---|---|---|---|---|
| | | | | | <10% | <20% |
| 40 | 309 | 252 | 18% | 57.1 | 40% | 80% |

#### *11.7.4.3* Tantalum

Tantalum check assays show a slight bias towards ALS, although significant scatter is observed, particularly in grades below 25 ppm Ta (Figure 11-7).

**Figure 11-17: ALS versus SGS – Ta ppm**




***Source***: *MSA (2023)*

Table 11-7 shows that ALS assays are on average 6% higher than SGS, which in absolute terms translates to 2 ppm. Proportionally, 80% of the samples have a HARD less than 10%, which is below the ideal limits, although 93% of the tantalum assays have a HARD of 20% or less, which is acceptable.

**Table 11-7: Summary of Sample Repeatability Comparing ALS Against SGS for Tantalum**

| Number of Samples | Mean ALS Ta ppm | Mean SGS Ta ppm | Percentage Difference | Absolute Difference Ta ppm | HARD | |
|---|---|---|---|---|---|---|
| | | | | | <10% | <20% |
| 40 | 28 | 26 | 6% | 2 | 80% | 93% |

It is likely that sample heterogeneity at low grades will impact precision for tantalum.

### 11.8 Density Measurements

In 2022, a sampling program was conducted by Tantalex to support a dry bulk density calculation for use in the Mineral Resource estimate. Samples were collected from 64 sample locations on five coarse tailings dumps (and associated fine tailings terraces), namely “G”, “H”, “I”, “K” and “C” dumps. Lithologies sampled included pegmatite, laterite, and clay (Kinyaga, 2022).

A pit was excavated approximately 1 m below surface in order to avoid sampling less consolidated tailings at surface. Density samples were collected by driving a steel cylinder into the pit base with the assistance of an excavator. The steel cylinder was dug out with shovels to prevent any loss of the contained tailings material (Figure 11-18). The cylinder contents were transferred to a sampling bag and the weight (wet and dry) was recorded. Density was calculated using the formula:

$$Density = Weight_{(dry)} \ / \ Volume_{(cylinder)}$$

Two samples, approximately 3 m to 4 m apart, were averaged to calculate the density for one excavation.

**Figure 11-18: Bulk Density Sampling**


**Source**: Adapted from Kinyaga (2022)

The results of the dry bulk sampling program indicate different densities are applicable to different lithologies. Average density was assigned in the Mineral Resource estimate for each deposit based on the density data belonging to those particular tailings. A summary of the density data is presented in Table 11-8.

**Table 11-8: Density Ranges and Averages per Material Type**

| Material Type | Number of Samples | Minimum | Maximum | Mean |
|---|---|---|---|---|
| Laterite | 22 | 1.42 | 1.77 | 1.65 |
| Clay | 6 | 1.13 | 1.45 | 1.29 |
| Metasediment | 4 | 1.52 | 1.68 | 1.61 |
| Pegmatite | 86 | 1.35 | 1.78 | 1.57 |
| Pegmatite Sand | 8 | 1.42 | 1.56 | 1.49 |
| Pegmatite Clay | 2 | 1.44 | 1.56 | 1.56 |

## 11.9 Adequacy of Drilling Procedures, Sample Preparation, and Analytical Procedures

All aspects of the sample handling, logging, bagging, labelling, and sample submission process are considered reasonable and acceptable for use in a Mineral Resource estimate. MSA recommends that Tantalex develops in-house Standard Operating Procedures (SOPs) for any future drilling programs that will cover geological logging, drilling, sampling, QAQC, sample storage and data management.

The analyses of the QAQC data found the following:

- There is no indication of significant contamination for lithium, tin and tantalum, with blank samples reporting low failure rates.
- The CRM analysis for lithium, tin and tantalum show an acceptable level of accuracy. The number of failures is generally low for each element and the average bias between the samples and certified values is often insignificant.
- Coarse duplicates for lithium indicate good precision, with little bias between the original and duplicate sample pairs. However, analytical precision is poor for both tin and tantalum.
- Second laboratory duplicate checks on lithium by ALS largely confirm the SGS results, although a slight bias was noted towards the primary laboratory.

The re-assay exercise for tin and tantalum resulted in a vast improvement on the accuracy of the analyses although precision remained poor at the low grades of the tailings material.

MSA considers that the lithium assays from the 2021-2022 drilling program are of acceptable quality for use in a Mineral Resource estimate as demonstrated by the QAQC data. Although analytical precision is poor, the tin and tantalum assays are of acceptable accuracy and there is no indication of contamination. Repeatability can be poor with low grade tin and tantalum samples due to the nuggety nature of the cassiterite and tantalite mineralisation even after milling. Poor precision impacts on local selectivity and enough samples should be used in the estimation to cater for high grade variability caused by poor precision.

# 12 DATA VERIFICATION

A "Current Personal Inspection" was conducted by the Qualified Person for the Mineral Resource on the 29th and 30th of April 2022.

a) No drilling activities were taking place at the time of the site visit. The first phase of the drilling campaign ended in November 2021, with the second phase beginning on the 15 June 2022, after the site visit took place.

b) An inspection of K, Gc, Hf and Hc deposits was undertaken. The tailings deposits were observed to align with the topographical surveys generated by Tantalex.

c) The collars of 16 Tantalex drillholes were located and the collar coordinates were taken with a handheld GPS. The final surveys of the collar positions correlated reasonably well with the measurements taken with the handheld GPS within acceptable limits for handheld GPS measurements (Table 12-1).

**Table 12-1: Comparison Between Surveyed Coordinates and Handheld GPS Measurements for Selected Drillhole Collars**

| Drillhole ID | Collar Coordinates | | GPS Coordinates | | Difference (m) | |
|---|---|---|---|---|---|---|
| | X | Y | X | Y | X | Y |
| MDA001 | 545070.0 | 9190869.9 | 545073.0 | 9190864.5 | -3.0 | 5.4 |
| MDA002 | 545012.0 | 9190921.9 | 545015.3 | 9190916.1 | -3.3 | 5.8 |
| MDA048 | 543780.9 | 9190539.1 | 543784.3 | 9190534.5 | -3.4 | 4.5 |
| MDA050 | 543721.3 | 9190556.7 | 543722.9 | 9190551.7 | -1.6 | 5.0 |
| MDA051 | 543730.6 | 9190533.1 | 543730.3 | 9190528.5 | 0.4 | 4.5 |
| MDA054 | 543686.8 | 9190550.3 | 543687.4 | 9190545.5 | -0.7 | 4.8 |
| MDA059 | 543636.0 | 9190701.6 | 543635.9 | 9190697.4 | 0.1 | 4.2 |
| MDA061 | 543587.8 | 9190638.4 | 543589.6 | 9190634.1 | -1.9 | 4.3 |
| MDA062 | 543569.1 | 9190610.9 | 543570.1 | 9190606.0 | -1.0 | 4.8 |
| MDA067 | 543587.7 | 9190578.4 | 543591.4 | 9190574.6 | -3.7 | 3.8 |
| MDA068 | 543584.0 | 9190541.6 | 543586.6 | 9190538.5 | -2.6 | 3.1 |
| MDA100 | 542157.1 | 9189247.0 | 542157.1 | 9189242.0 | 0.1 | 5.0 |
| MDA101 | 542164.9 | 9189084.7 | 542163.5 | 9189080.0 | 1.4 | 4.7 |
| MDA102 | 542015.9 | 9189210.7 | 542016.9 | 9189205.6 | -0.9 | 5.1 |
| MDA103 | 542293.4 | 9189374.6 | 542296.1 | 9189369.3 | -2.7 | 5.3 |
| MDA104 | 542225.2 | 9189514.1 | 542226.2 | 9189510.2 | -1.0 | 3.8 |

d) The original paper logs were inspected. These are in good condition and stored in a secure location in Manono.

e) The chip trays for a selection of the completed drillholes were inspected, including the five drillholes that were available for the K dump, namely MDA100, MDA101, MDA102, MDA103 and MDA104. The logging was found to be an accurate representation of the material contained in the chip trays. The mineralisation observed in the chips was compared with the assay data available at the time and some high lithium grades could be correlated with identifiable spodumene mineralisation.

f) The logging and sampling procedures were discussed with Tantalex geologists on site, and these were found to be appropriate for the purpose of evaluating the Mineral Resource.

## 12.1 Check Sampling

As part of a data verification exercise, 16 samples from the K dump were selected from the available reject samples stored at the sample preparation facility and re-submitted to SGS Johannesburg for analysis. The samples were sealed by the QP using numbered tamper proof cable ties, in order to ensure that these were not tampered with. Confirmation of the intact, tamper-proof sealed samples was received by Mr. Jhoel Mbuya of COAL on the 4th of June 2022 (Figure 12-1).

**Figure 12-1: Sealed Check Samples from Manono at COAL**


***Source**: Mbuya (2022)*

The samples underwent the same sample preparation and analytical procedure at SGS South Africa as the original Tantalex samples. The check samples were done on the first sample submission to SGS, prior to the issues with the tin and tantalum being identified, therefore the results for these two elements were discarded. As the pulps for these samples were no longer available for re-analysis for tin and tantalum, only lithium results were considered for the check samples.

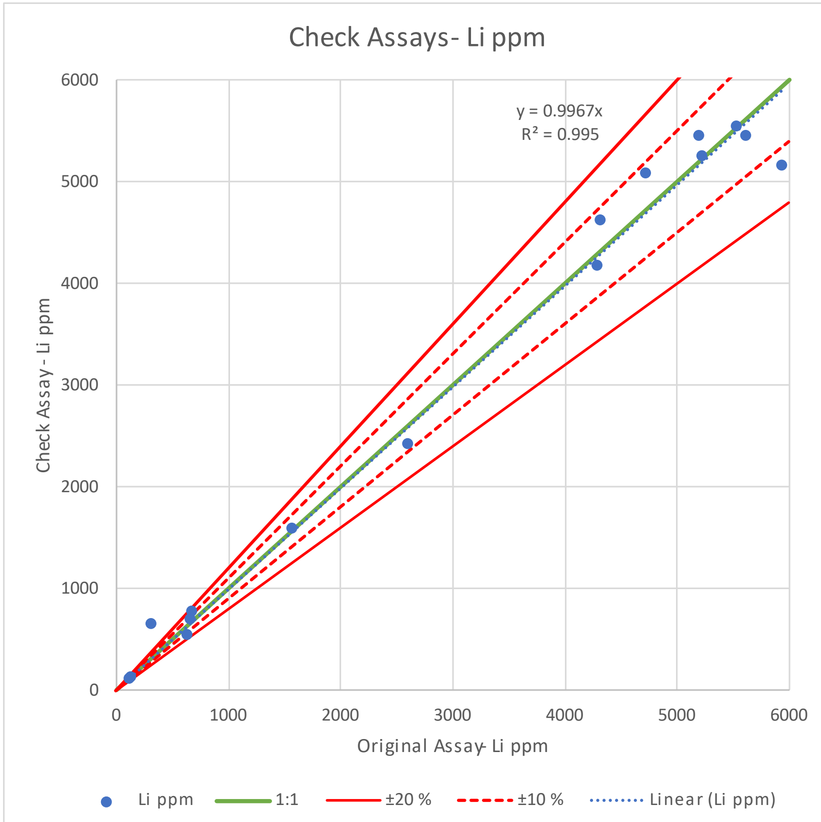
A statistical comparison between the original and check samples for lithium  is shown in Table 12-2 The mean lithium grades of the original and check assays are consistent, with a 0.9% difference between the mean values of the two sets of data and a similar coefficient of variation (CV). Only one sample pair was outside the 20% limits and therefore the check assays confirm the original lithium assays.

**Table 12-2: Comparison of Original vs. Check Assays**

| Attribute | Original Assay | | Check Assay | | Percentage Difference | Percentage Outside 20% Limit |
|---|---|---|---|---|---|---|
| | Mean | CV | Mean | CV | | |
| Li ppm | 2967 | 0.76 | 2995 | 0.73 | 0.9% | 6% |

Scattergrams were used to compare the check assays with the original assays. Figure 12-2 illustrates the high correlation and minimum bias between the two sets of lithium assay data.

**Figure 12-2: Scattergram for Lithium – Check vs. Original Samples**




#### 12.1.1 *Qualified Persons Opinion on the Check Assaying*

The check samples for lithium have confirmed the original sample analyses, with no significant bias identified. Similar checks on tin and tantalum were not possible, as the original samples were analysed prior to issues with the SGS analytical procedure were identified, with sample pulps no longer being available.

# 13 MINERAL PROCESSING AND METALLURGICAL TESTING

## 13.1 Introduction

The metallurgical testwork on the Project was carried out in 2022 and 2023 using bulk samples obtained from C-dump, G-dump, and K-dump. The samples were subjected to testing at several laboratories as summarized in Table 13-1.

**Table 13-1: Bulk Sample Tests and Laboratories**

| Laboratory | Test | Location |
|---|---|---|
| Coremet Mineral Processing | • Feed Grade Mineralogy<br>• Minerology<br>• Beneficiation<br>• Granulometry<br>• Crushability<br>• Heavy Liquid Separation<br>• Fines Beneficiation | Pretoria, South Africa |
| Pesco Services | Dense Media Separation | Durban, South Africa |
| Sepro Laboratories | Dense Media Separation | Vancouver, Canada |
| SGS Canada | Flotation | Lakefield, Canada |
| Nagrom | Reflux Classifier | Perth, Australia |

The purpose of this testwork was to:

a) Establish the mineralogical characterisation of the dump material and determine if there were any significant variabilities across the different dumps.
b) Provide information of all the valuable minerals contained in the tailings dumps and develop adequate beneficiation methods.
c) Determine the crushability of the dumps and select a crushing top size for further processing.
d) Perform a Dense Media Separation (DMS) investigation on the coarse material fraction to determine the ideal cut points for maximum $Li_2O$ recovery.
e) Perform Flotation testwork to determine the ideal parameters for $Li_2O$ recovery.
f) Perform Reflux Classifier (RC) testwork to determine this technologies affinity for mica removal.
g) Perform slimes beneficiation testwork to determine the recovery potential of heavy minerals (Sn and Ta).

All available results at the time of this report are presented here, with additional results expected by Q4 2023.

## 13.2 Testwork Sample Selection and Feed Grades

To conduct the mineral characterisation testwork, bulk sample locations were selected based on the assay results from the aircore and cobra drillholes shown in Table 13-2. A total sample of 9,015 kg was collected of which 7,964 kg of sample was shipped and received by CoreMet in South Africa. The bulk samples are considered to be representative of the type and style of mineralisation of the deposit.

**Table 13-2: Bulk Sample Locations and Weights**

| Prospect | Hole ID Position Sample | Lithology | Weight (kg) | +25mm (kg) | -25 mm (kg) | % +25mm | % -25mm | Sample +25mm (kg) | Sample -25mm (kg) | Total Sample (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| K-dump | MDC047 | Pegmatite | 4,860 | 0 | 4,860 | 0 | 100 | 0 | 1,002 | 1,002 |
| K-dump | MDC056 | Pegmatite | 4,681 | 0 | 4,681 | 0 | 100 | 0 | 1,008 | 1,008 |
| K-dump | MDC064 | Pegmatite | 4,860 | 0 | 4,860 | 0 | 100 | 0 | 1,008 | 1,008 |
| G-dump | MDA048 | Pegmatite | 9,952 | 843 | 9,109 | 8 | 92 | 127 | 1,373 | 1,500 |
| G-dump | MDA059 | Pegmatite | 3,940 | 94 | 3,846 | 2 | 98 | 36 | 1,464 | 1,500 |
| C-dump | MDA150 | Pegmatite | 5,067 | 104 | 4,963 | 2 | 98 | 31 | 1,469 | 1,499 |
| C-dump | MDA158 | Pegmatite | 6,317 | 1,388 | 4,929 | 22 | 78 | 329 | 1,170 | 1,499 |
| | | **Total** | **39,677** | **2,430** | **37,247** | **6** | **94** | **522** | **8,493** | **9,015** |

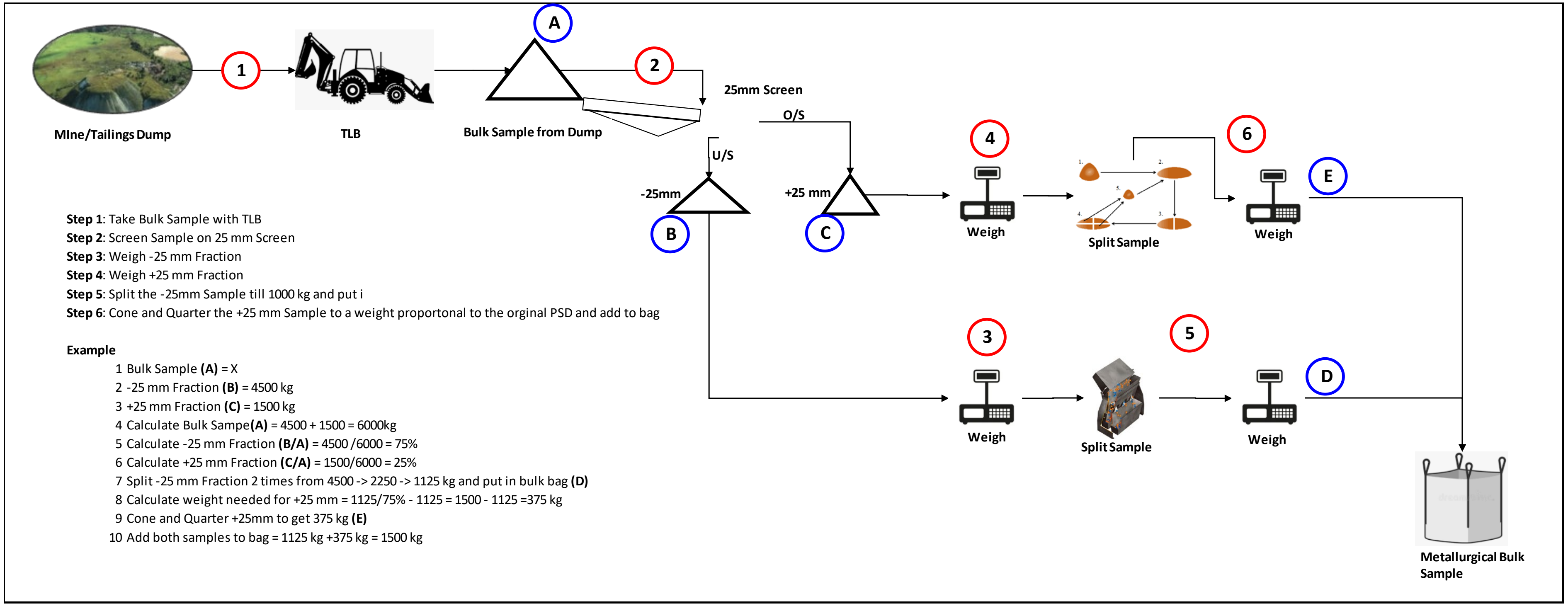
The lithium, tin and tantalum feed grades associated with each dump are tabulated in Table 13-3. Tin and tantalum grades across the dumps are similar while lithium grades are more variable.

**Table 13-3: Feed Grades**

| Dump | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|
| C-Dump | 0.33 | 443.35 | 38.16 |
| G-Dump | 0.61 | 464.42 | 32.17 |
| K-Dump | 1.05 | 485.55 | 34.08 |

The philosophy of the bulk sampling process is illustrated in Figure 13-1.

**Figure 13-1: Bulk Sampling Process**



### 13.3 Mineralogical Testwork

Prepared samples from each dump were sent for chemical analysis by Inductively Coupled Plasma (ICP) and X-Ray Diffraction (XRD) to understand the composition of each dump as well as the distribution of target minerals in the various dumps..

The mineralogical analysis for the feed samples is tabulated in Table 13-4. The mineralogical analysis of the three dumps with associated heavy liquid separation (HLS) testwork indicated the following:

a) Nearly all the lithium is contained in spodumene,
b) Cassiterite is the only tin bearing mineral,
c) The majority of tantalum occurs as tantalite with low concentrations of tapiolite,
d) The main gangue minerals identified were quartz (25-37%), albite (18-38%), Microline (12-21%) and muscovite (4-15%).

**Table 13-4: Feed Sample Mineralogical Analysis**

| Mineral | Empirical Formula | Density ($t/m^3$) | C-Dump (wt%) | G-Dump (wt%) | K-Dump (wt%) |
|---|---|---|---|---|---|
| Albite | $NaAlSi_3O_8$ | 2.62 | 18.24 | 37.49 | 37.95 |
| Clinochlore | $(Mg,Fe^{2+})_5Al(Si_3\ Al)O_{10}(OH)_8$ | 2.65 | 2.79 | 0.00 | 1.07 |
| Kaolinite | $Al_2Si_2O_5(OH)_4$ | 2.60 | 0.00 | 0.00 | 0.00 |
| Magnetite | $Fe_3O_4$ | 5.15 | 2.52 | 3.29 | 1.35 |
| Microline | $K(AlSi_3O_8)$ | 2.57 | 21.06 | 11.98 | 13.91 |
| Muscovite | $KAl_2(Si_3Al)O_{10}(OH,F)2$ | 2.80 | 14.60 | 3.89 | 7.32 |
| Quartz | $SiO_2$ | 2.62 | 36.94 | 35.80 | 25.56 |
| Spodumene | $LiAlSi_2O_6$ | 3.15 | 3.83 | 7.53 | 12.85 |
| **Total** | | | **100** | **100** | **100** |

### 13.4 Beneficiation Testwork

Particle size analysis (PSD) and heavy liquid separation (HLS) testwork were conducted to establish that the lithium, tin, and tantalum can be extracted from the dumps.

The HLS tests were performed over four size fractions, -5 mm +1.2 mm, -1.2 mm +0.6 mm, -0.6 mm +250 µm and -250 µm +45 µm. The + 5 mm fraction was not testing during this phase of testwork. The heavy liquid separation testwork was performed over three densities which included 2.95, 3.20 and 3.50 t/m3. Each density produced a float and sink stream that was subject to mineralogical and elemental analysis to determine recoveries and grades.

The as received bulk samples were crushed to 100% passing 15 mm and screened at 5 mm. Figure 13-2 shows that K-dump has very limited +5 mm particles which will limit crushing requirements. C-dump and G – dump have a similar PSD distribution with about 30% of the material subject to further crushing if it proves to be economical.

**Figure 13-2: Particle Size Distribution**

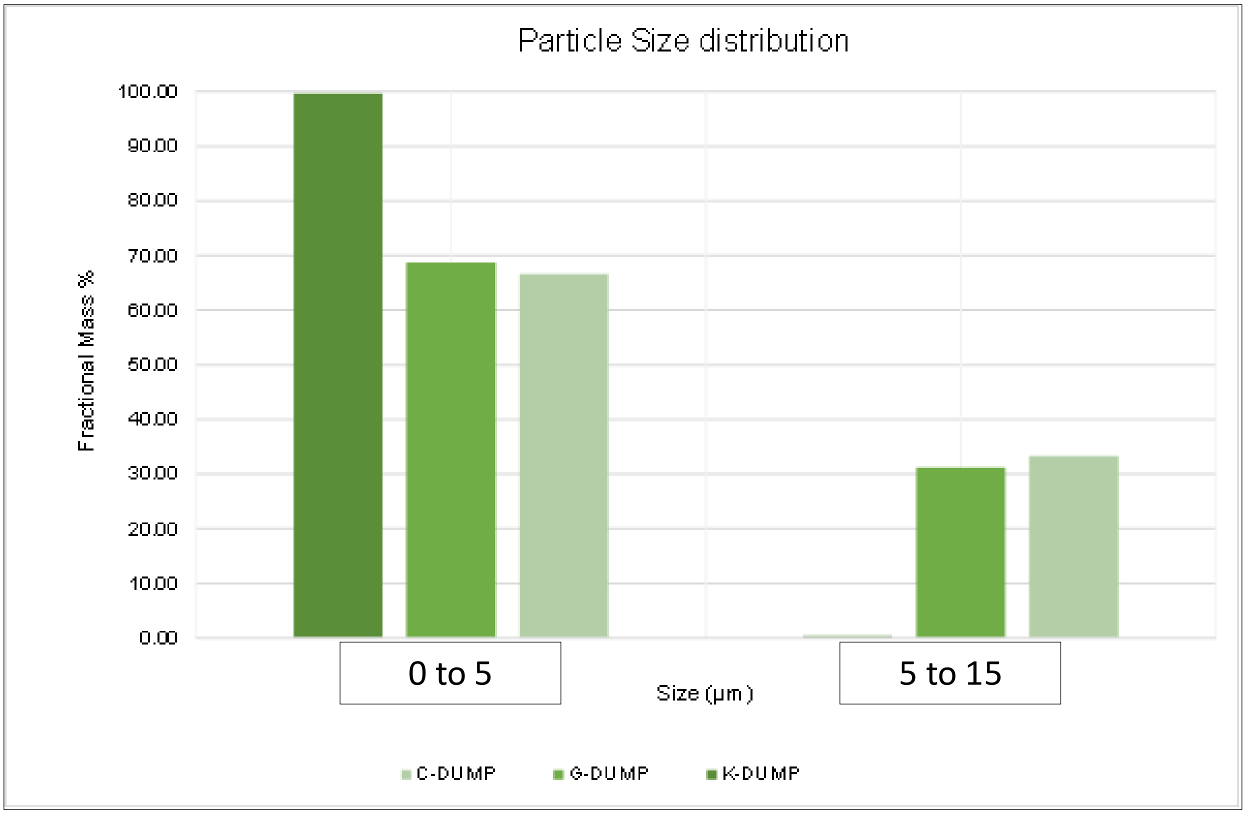
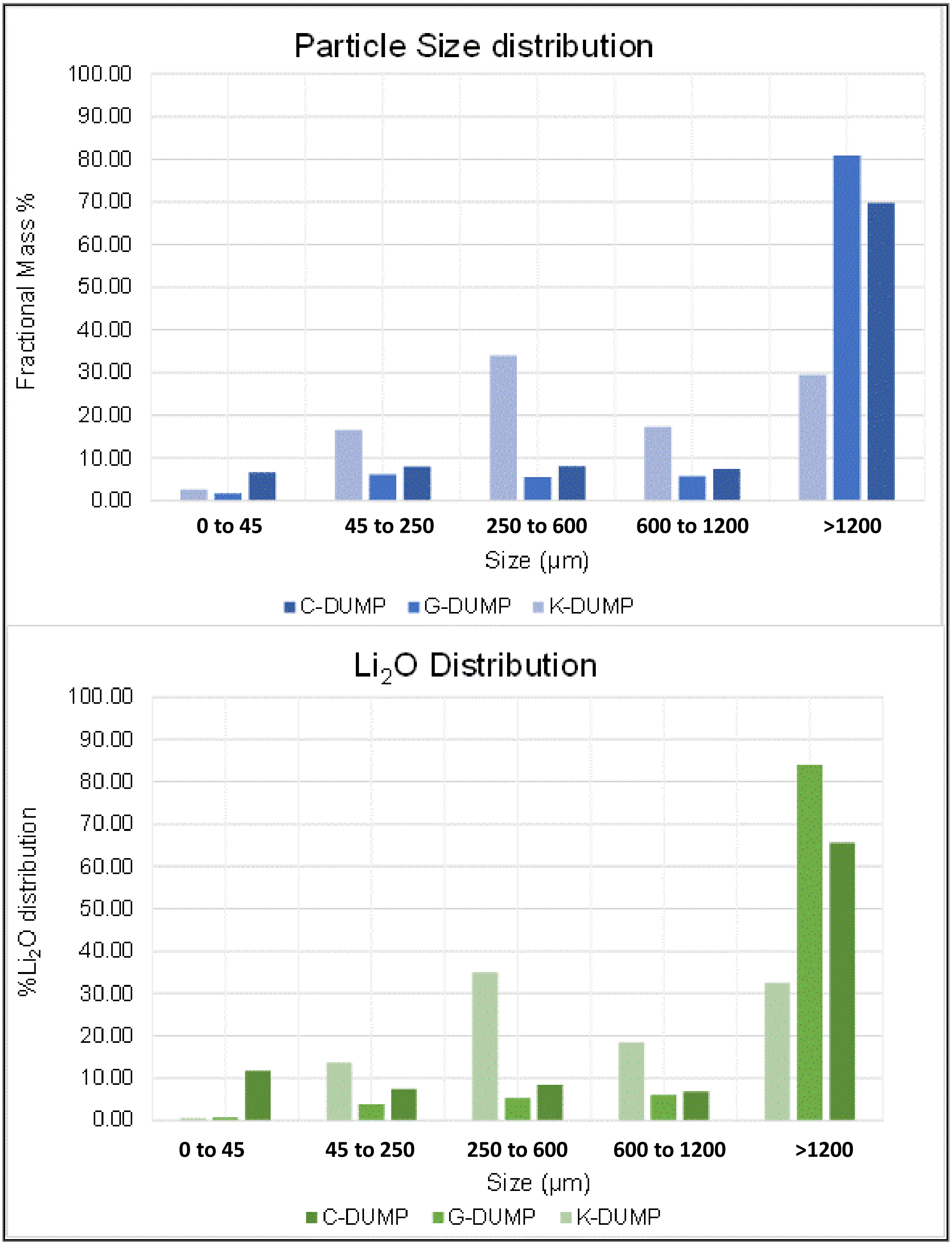



Figure 13-3 shows the PSD and lithium distribution across the dumps that were subjected to the HLS testwork. It can be concluded that lithium is evenly distributed across the different size range for K-dump while it is concentrated in the -5 mm +1.2 mm fraction for C-dump and G-dump. This means that most conventional mineral processing techniques can be utilised to process the coarse fraction (+0.5 mm). At size fraction less than 0.5 mm conventional beneficiation methods have inferior efficiencies and more site-specific methods will have to be investigated to optimise the recovery in the fine fraction.

**Figure 13-3: HLS Feed PSD and Distribution**



A summary of the HLS results is available in Table 13-5. The HLS test produced spodumene concentrate grades of 6.5% $Li_2O$ at overall recoveries across the size range of 47% and 63% for G-dump and K-dump respectively. The testwork did not produce a SC6 product from the C-dump, this requiring further investigation. These results are for all the dump material with a PSD smaller than 5 mm.

The lithium recoveries increased with size fraction while the tin and tantalum required further liberation to improve recoveries.

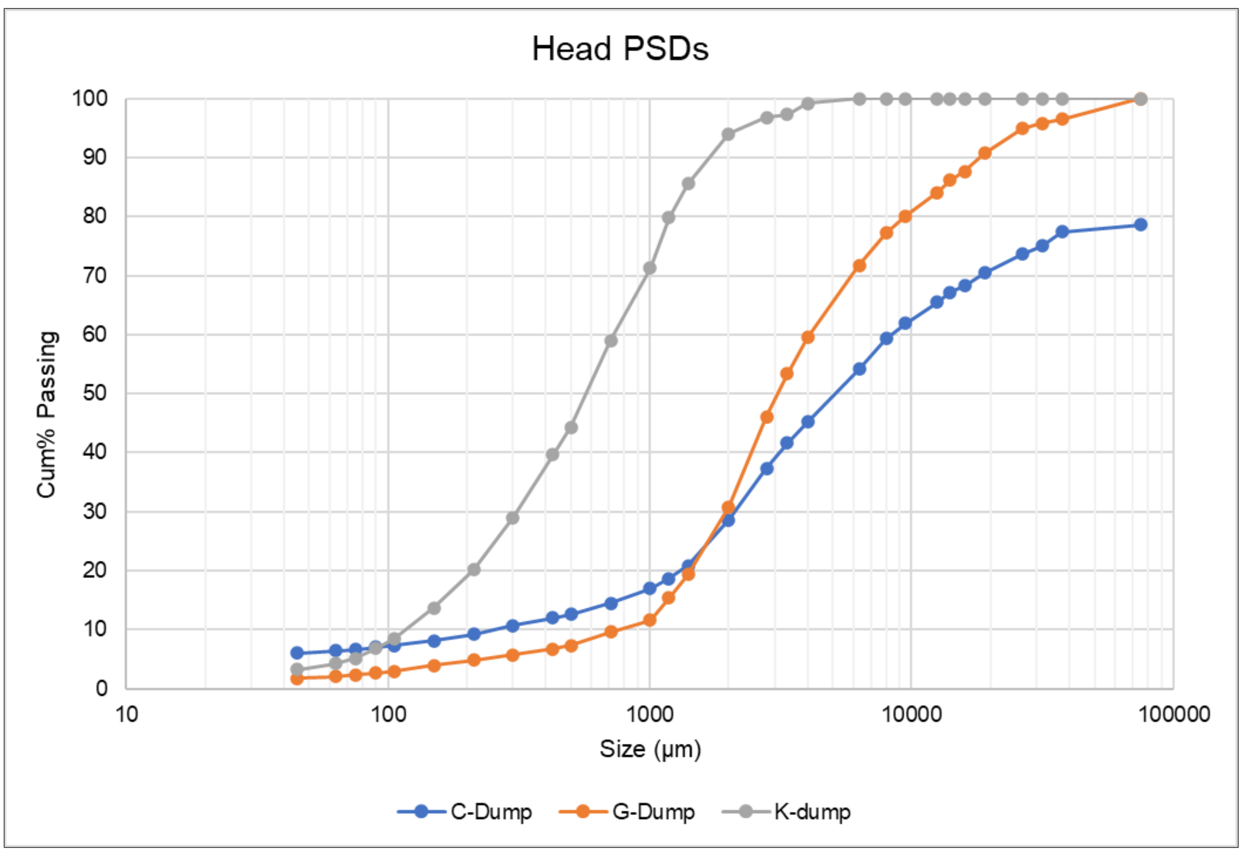
**Table 13-5: HLS Summary Results**

| Element | Item | Unit | C-Dump | G-Dump | K-Dump |
|---|---|---|---|---|---|
| $Li_2O$ | Head Grade | % | 0.33 | 0.61 | 1.05 |
| | Recovery | % | 28 | 47 | 63 |
| | **Concentrate Grade** | **%** | **4.9** | **6.5** | **6.5** |
| Sn | Head Grade | ppm | 443 | 464 | 486 |
| Ta | Recovery | % | 34 | 41 | 24 |

### 13.5 Granulometry

Coremet conducted head grade PSD analysis of C-dump, G-dump, and K-dump and is presented in Figure 13-4.

**Figure 13-4: K-dump, G-dump, and C-dump PSDs**

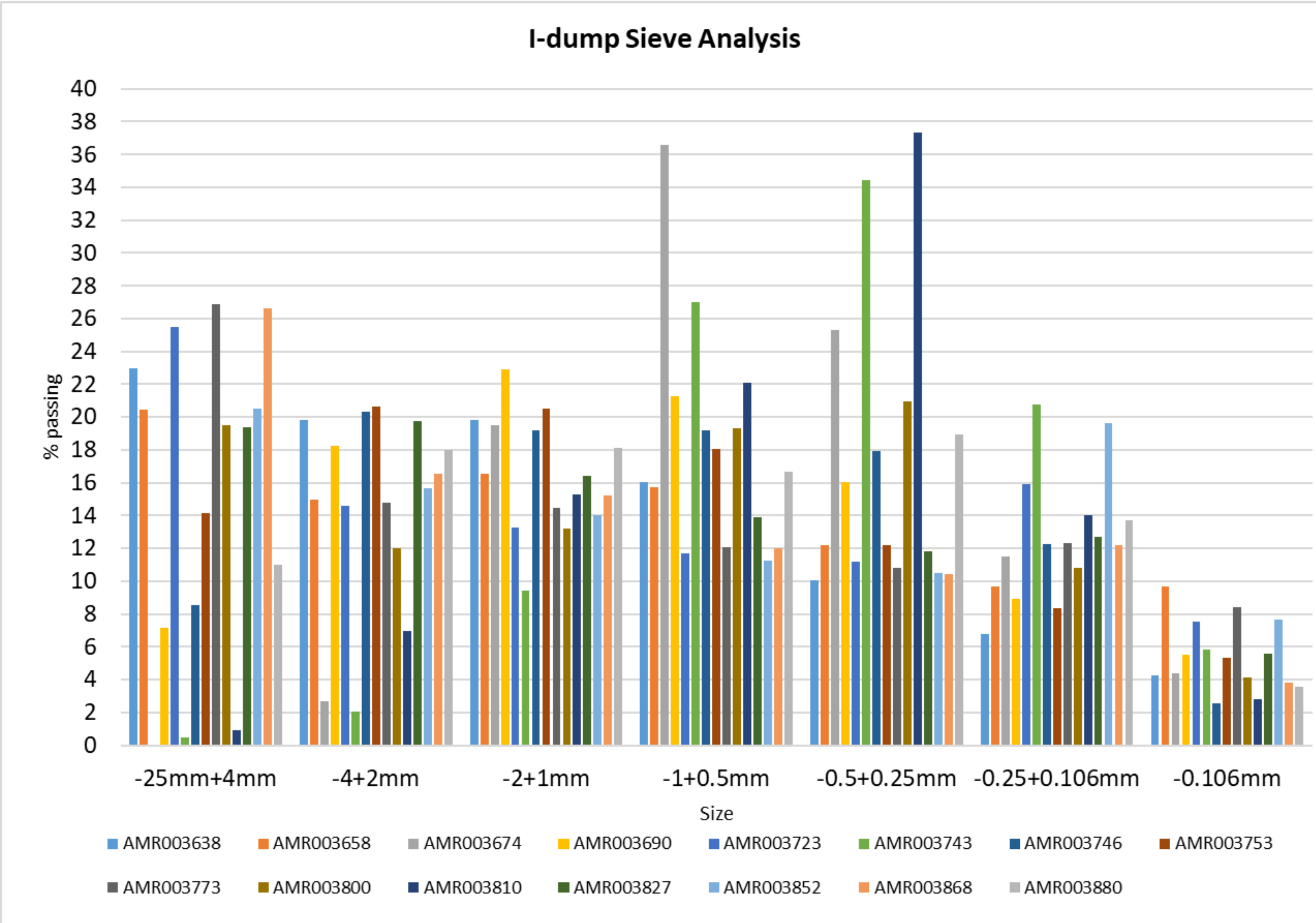


Tantalex performed a sieve analysis on four I-dump boreholes at multiple depths and the results are presented in Table 13-6 and Figure 13-5. These preliminary results indicate that G-dump and I-dump have similar granulometry and it has been assumed that they would behave similarly during processing.

**Table 13-6: I-Dump Sieve Analysis Results**

| Hole_ID | Sample_ID | From (m) | To (m) | -25mm+4mm | -4+2mm | -2+1mm | -1+0.5mm | -0.5+0.25n | -0.25+0.10 | -0.106mm |
|---|---|---|---|---|---|---|---|---|---|---|
| MDA083 | AMR003638 | 5 | 6 | 23.0 | 19.8 | 19.8 | 16.0 | 10.0 | 6.8 | 4.3 |
| MDA083 | AMR003658 | 24 | 25 | 20.4 | 15.0 | 16.5 | 15.7 | 12.2 | 9.7 | 9.7 |
| MDA083 | AMR003674 | 40 | 41 | 0.0 | 2.7 | 19.5 | 36.5 | 25.3 | 11.5 | 4.4 |
| MDA087 | AMR003690 | 11 | 12 | 7.1 | 18.2 | 22.9 | 21.3 | 16.0 | 8.9 | 5.5 |
| MDA087 | AMR003723 | 43 | 44 | 25.5 | 14.6 | 13.3 | 11.7 | 11.2 | 15.9 | 7.5 |
| MDA087 | AMR003743 | 62 | 63 | 0.5 | 2.0 | 9.4 | 27.0 | 34.5 | 20.7 | 5.8 |
| MDA087 | AMR003746 | 65 | 66 | 8.6 | 20.3 | 19.2 | 19.2 | 17.9 | 12.2 | 2.5 |
| MDA093 | AMR003753 | 4 | 5 | 14.2 | 20.6 | 20.5 | 18.1 | 12.2 | 8.4 | 5.3 |
| MDA093 | AMR003773 | 23 | 24 | 26.9 | 14.8 | 14.5 | 12.0 | 10.8 | 12.3 | 8.4 |
| MDA093 | AMR003800 | 49 | 50 | 19.5 | 12.0 | 13.2 | 19.3 | 20.9 | 10.8 | 4.1 |
| MDA093 | AMR003810 | 58 | 59 | 0.9 | 7.0 | 15.3 | 22.1 | 37.4 | 14.0 | 2.8 |
| MDA095 | AMR003827 | 11 | 12 | 19.4 | 19.7 | 16.4 | 13.9 | 11.8 | 12.7 | 5.6 |
| MDA095 | AMR003852 | 35 | 36 | 20.5 | 15.6 | 14.0 | 11.3 | 10.5 | 19.6 | 7.7 |
| MDA095 | AMR003868 | 50 | 51 | 26.6 | 16.6 | 15.2 | 12.0 | 10.4 | 12.2 | 3.8 |
| MDA095 | AMR003880 | 62 | 63 | 11.0 | 18.0 | 18.1 | 16.6 | 18.9 | 13.7 | 3.6 |

**Figure 13-5: I Dump Sieve Analysis Results**



### 13.6 Crushability

As the PSD of K-dump is less than the required 10 particle of -75mm/+50mm it was omitted from the crushability testing performed by Coremet. Samples of G-dump and C-dump were analysed to determine SAG Mill Comminution (SMC) and Bond Crushing Work (CWi) parameters. Analysis of the results indicated an average CWi of 10±3.4, with a maximum of 17.7.

10 kg samples of each dump were crushed to -5mm, -3mm, and -1.2mm, and screened at 0.5mm. All samples were sent for HLS testing at 2.9 $t/m^3$ to determine the crushing size to use for the overall process. Results are presented in Table 13-7.

Analysis of these results shows little difference in the mass yield of the coarse fraction between a crush size of 5 mm or 3 mm. To reduce power consumption, a 5 mm crush size was selected. Refer to Appendix A for more details on Coremet tests results.

## Table 13-7: HLS Yields of Crushed Samples

**C- Dump - HLS@2.9**

5mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x5mm | 1774.00 | 64.42 |
| 0x0.5mm | 980.00 | 35.58 |
| **Total** | **2754.00** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 34.95 | 4.94 | 3.18 |
| Floats | 672.43 | 95.06 | 61.23 |
| **Total** | **707.38** | **100.00** | **64.42** |

3mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x3mm | 1773.60 | 63.17 |
| 0x0.5mm | 1034.00 | 36.83 |
| **Total** | **2807.60** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 38.35 | 5.52 | 3.49 |
| Floats | 656.42 | 94.48 | 59.68 |
| **Total** | **694.77** | **100.00** | **63.17** |

1.2mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x1.2mm | 1043.30 | 37.15 |
| 0x0.5mm | 1765.00 | 62.85 |
| **Total** | **2808.30** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 35.41 | 5.67 | 2.10 |
| Floats | 589.56 | 94.33 | 35.05 |
| **Total** | **624.97** | **100.00** | **37.15** |

**G- Dump - HLS@2.9**

5mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x5mm | 2026.20 | 79.42 |
| 0x0.5mm | 525.20 | 20.58 |
| **Total** | **2551.40** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 61.98 | 10.01 | 7.95 |
| Floats | 557.43 | 89.99 | 71.47 |
| **Total** | **619.41** | **100.00** | **79.42** |

3mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x3mm | 1884.70 | 75.25 |
| 0x0.5mm | 620.00 | 24.75 |
| **Total** | **2504.70** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 82.96 | 11.08 | 8.34 |
| Floats | 665.87 | 88.92 | 66.91 |
| **Total** | **748.83** | **100.00** | **75.25** |

1.2mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x1.2mm | 1090.00 | 40.52 |
| 0x0.5mm | 1600.00 | 59.48 |
| **Total** | **2690.00** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 84.19 | 12.80 | 5.19 |
| Floats | 573.55 | 87.20 | 35.33 |
| **Total** | **657.74** | **100.00** | **40.52** |

**K- Dump - HLS@2.9**

5mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x5mm | 1218.00 | 51.31 |
| 0x0.5mm | 1156.00 | 48.69 |
| **Total** | **2374.00** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 101.06 | 13.87 | 7.11 |
| Floats | 627.71 | 86.13 | 44.19 |
| **Total** | **728.77** | **100.00** | **51.31** |

3mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x3mm | 1255.80 | 51.07 |
| 0x0.5mm | 1203.00 | 48.93 |
| **Total** | **2458.80** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 105.39 | 13.97 | 7.13 |
| Floats | 649.22 | 86.03 | 43.94 |
| **Total** | **754.61** | **100.00** | **51.07** |

1.2mm

| Description | Mass (g) | Mass (%) |
|---|---|---|
| 0.5x1.2mm | 1054.70 | 43.37 |
| 0x0.5mm | 1377.00 | 56.63 |
| **Total** | **2431.70** | **100.00** |

| Description | Mass (g) | % Yield | Overall Mass yield |
|---|---|---|---|
| Sink | 95.45 | 15.09 | 6.54 |
| Floats | 537.13 | 84.91 | 36.83 |
| **Total** | **632.58** | **100.00** | **43.37** |

### 13.7 Sepro Dense Media Separation

Sepro Laboratories (Sepro) of Vancouver, Canada performed a two stage DMS pilot plant test on material from G-dump, K-dump, and a K/G blend (84%/16%) to simulate commercial plant feed in 2022. Samples were screened to -5 mm/+500 µm and processed through a two stage DMS pilot plant. The -500 µm material was not used in the tests. A primary cut point of 2.74 t/m3 and secondary cut point of 2.93 t/m3 were selected, as this have been shown to produce 6.0 wt% Li2O concentrate for similar materials. The results are summarized in Table 13-8.

**Table 13-8: Sepro Pilot DMS Results**

**G Dump**

| Description | Weight | | Li2O Grade | Li Distribution |
|---|---|---|---|---|
| | (kg) | (%) | Li2O (%) | Li2O (%) |
| Sinks (D50 = 2.95) | 5.14 | 2.8 | 6.00 | 25.4 |
| Middlings | 13.25 | 7.3 | 2.83 | 30.9 |
| Floats (D50 = 2.75) | 140.32 | 77.2 | 0.30 | 34.8 |
| *Fines (-0.5 mm)* | *23.11* | *12.7* | *0.47* | *9.0* |

**K Dump**

| Description | Weight | | Li2O Grade | Li Distribution |
|---|---|---|---|---|
| | (kg) | (%) | Li2O (%) | Li2O (%) |
| Sinks (D50 = 2.95) | 3.97 | 2.8 | 6.16 | 17.4 |
| Middlings | 11.95 | 8.5 | 3.21 | 27.3 |
| Floats (D50 = 2.74) | 65.77 | 46.5 | 0.38 | 17.7 |
| *Fines (-0.5 mm)* | *59.72* | *42.2* | *0.88* | *37.6* |

**K/G Blend**

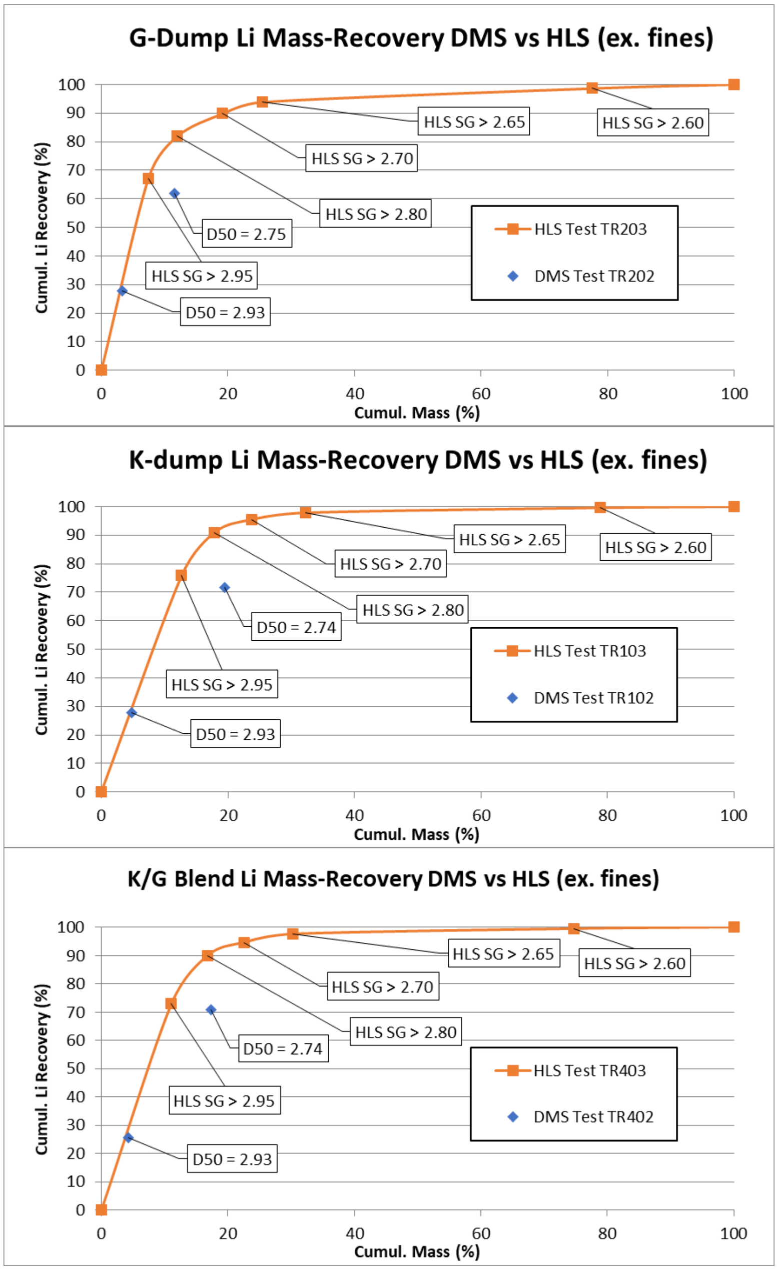
| Description | Weight | | Li2O Grade | Li Distribution |
|---|---|---|---|---|
| | (kg) | (%) | Li2O (%) | Li2O (%) |
| Sinks (D50 = 2.95) | 4.64 | 2.7 | 6.23 | 17.2 |
| Middlings | 14.18 | 8.3 | 3.61 | 30.4 |
| Floats (D50 = 2.74) | 89.36 | 52.3 | 0.37 | 19.5 |
| *Fines (-0.5 mm)* | *62.61* | *36.7* | *0.88* | *32.9* |

These results indicated that a primary cut point of 2.74 t/m3 and a secondary cut of 2.93 t/m3 can produce a concentrate grade that is above or equal to 6 wt% Li2O. The tailings generated by this combination are above the cut off grade of 0.2 wt% Li2O.

Additional HLS tests were conducted at lower cut points to determine the optimal primary cut point to produce tailings below the cut off grade of 0.2 wt% Li2O. Lithium mass recovery curves from the DMS and HLS results were generated and are presented in Figure 13-6.

These HLS test results and mass recovery curves indicated that a primary cut point of near 2.65 t/m3 would produce tailings below the cut off grade of 0.2wt% Li2O and a final product near 6.0wt% Li2O. Refer to Appendix B for more details on Sepro tests results.

**Figure 13-6: Sepro Li Mass Recovery Curves**




### 13.8 Pesco Dense Media Separation

Pesco Services (Pesco) in Durban, South Africa was requested to run a DMS pilot plant test to match that of Sepro. Pesco selected a primary cut point of 2.75 t/m3 and a secondary cut point of 2.95 t/m3. These results are presented in Table 13-9 and showed that a primary cut point of 2.75 t/m3 would produce tailings above the 0.2 wt% Li2O cut off grade and a concentrate grade higher than 6 wt% Li2O.

**Table 13-9: Pesco Pilot Plant Results**

| | Primary @ 2.75 cut density | | | | | Secondary @ 2.95 cut density | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | % $Li_2O$ Overall Recovery | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % |
| Feed | | 1.10 | | 0.74 | | | 4.10 | | | 1.90 | |
| Sinks (%) | 16.7 | 4.07 | 64.05 | 1.88 | 85.91 | 33.8 | 6.93 | 57.21 | 36.64 | 1.86 | 69.86 |
| Floats (%) | 83.3 | 0.46 | 35.95 | 0.55 | 14.09 | 66.2 | 2.65 | 42.79 | 15.38 | 1.91 | 30.14 |
| **Total** | **100** | **1.06** | **100** | **1.40** | **100** | **100** | **4.10** | **100** | | **1.88** | **100** |

DMS testing is ongoing by Pesco Services (Pesco) in Durban, South Africa in 2023, investigating various cut points for both primary and secondary stages of DMS. To date, primary cut points of 2.55 t/m3, 2.65 t/m3, 2.70 t/m3, and 2.75 t/m3 have been tested and the results are presented in Table 13-10. These results confirm that a primary DMS cut point of 2.65 t/m3 will produce a tailing grade of 0.19 wt% Li2O for K-dump, 0.11 wt% Li2O for G-dump, and 0.10 wt% Li2O for C-dump, all below the 0.2 wt% Li2O cut off grade. It should be noted that the concentrate grade of C-dump produced at the 2.65 t/m3 is only 0.57 wt% Li2O and is too low to produce a secondary concentrate grade close to the desired 6 wt% Li2O. For this reason, no further testing was investigated on C-dump.

Secondary DMS testing at 2.85 t/m3, 2.90 t/m3, and 2.95 t/m3 is planned on the sink's product of 2.55 t/m3, 2.65 t/m3, and 2.70 t/m3 primary DMS. In the absence of secondary DMS results, the Sepro and Pesco pilot plant results have been interpolated. A secondary DMS cut point of 2.85 t/m3 has been selected for the process design. Refer to Appendix A for more details on the test results.

## Table 13-10: Pesco Primary DMS Results

**C-Dump**

2.55

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 94.4 | 58.4 | 0.45 | 1.73 | 82.7 | 58.6 |
| Floats | 67.2 | 41.6 | 0.13 | 1.72 | 17.3 | 41.4 |
| **Total** | **161.6** | **100.0** | **0.32** | **1.72** | **100** | **100** |

2.65

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 73.6 | 46.7 | 0.57 | 1.63 | 83.3 | 47.6 |
| Floats | 84.1 | 53.3 | 0.10 | 1.57 | 16.7 | 52.4 |
| **Total** | **157.7** | **100.0** | **0.32** | **1.60** | **100** | **100** |

2.7

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 25.8 | 16.3 | 1.03 | 2.21 | 53.0 | 23.0 |
| Floats | 133.0 | 83.7 | 0.18 | 1.43 | 47.0 | 77.0 |
| **Total** | **158.8** | **100.0** | **0.31** | **1.56** | **100** | **100** |

2.75

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 14.1 | 8.8 | 2.44 | 3.93 | 67.9 | 20.5 |
| Floats | 145.2 | 91.2 | 0.11 | 1.48 | 32.1 | 79.5 |
| **Total** | **159.3** | **100.0** | **0.32** | **1.69** | **100** | **100** |

**G-Dump**

2.55

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 143.0 | 83.6 | 0.81 | 2.16 | 97.4 | 93.7 |
| Floats | 28.1 | 16.4 | 0.11 | 0.74 | 2.6 | 6.3 |
| **Total** | **171.1** | **100.0** | **0.69** | **1.93** | **100** | **100** |

2.65

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 48.7 | 28.5 | 2.14 | 5.12 | 88.2 | 80.1 |
| Floats | 122.1 | 71.5 | 0.11 | 0.51 | 11.8 | 19.9 |
| **Total** | **170.7** | **100.0** | **0.69** | **1.82** | **100** | **100** |

2.7

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 36.6 | 20.8 | 2.85 | 7.23 | 86.6 | 74.7 |
| Floats | 138.9 | 79.2 | 0.12 | 0.64 | 13.4 | 25.3 |
| **Total** | **175.5** | **100.0** | **0.69** | **2.02** | **100** | **100** |

2.75

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 24.8 | 14.1 | 3.99 | 8.54 | 80.7 | 63.9 |
| Floats | 150.7 | 85.9 | 0.16 | 0.80 | 19.3 | 36.1 |
| **Total** | **175.5** | **100.0** | **0.70** | **1.89** | **100** | **100** |

**K-Dump**

2.55

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 64.0 | 68.2 | 1.67 | 0.35 | 95.0 | 79.5 |
| Floats | 29.9 | 31.8 | 0.19 | 0.19 | 5.0 | 20.5 |
| **Total** | **94.0** | **100.0** | **1.20** | **0.30** | **100** | **100** |

2.65

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 21.3 | 22.2 | 4.32 | 0.59 | 86.6 | 43.6 |
| Floats | 74.7 | 77.8 | 0.19 | 0.22 | 13.4 | 56.4 |
| **Total** | **95.9** | **100.0** | **1.11** | **0.30** | **100** | **100** |

2.7

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 22.0 | 23.0 | 4.15 | 0.59 | 86.1 | 43.4 |
| Floats | 73.7 | 77.0 | 0.20 | 0.23 | 13.9 | 56.6 |
| **Total** | **95.7** | **100.0** | **1.11** | **0.31** | **100** | **100** |

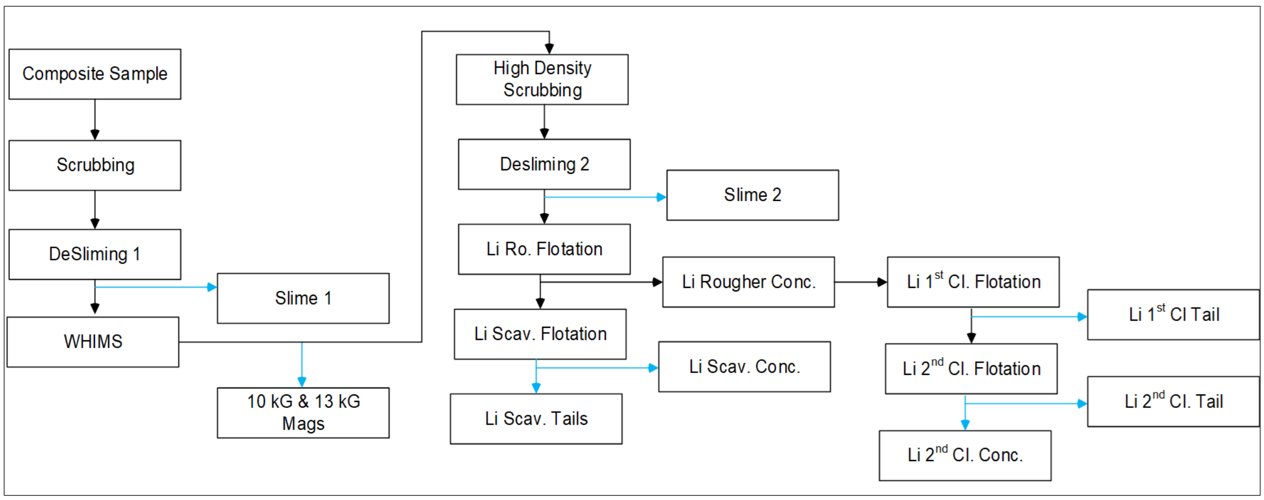
2.75

| Description | Mass (kg) | % Yield | % $Li_2O$ | % $Fe_2O_3$ | % $Li_2O$ Recovery | $Fe_2O_3$ Recovery % |
|---|---|---|---|---|---|---|
| Sinks | 13.0 | 14.2 | 5.23 | 0.54 | 70.2 | 25.4 |
| Floats | 78.5 | 85.8 | 0.37 | 0.26 | 29.8 | 74.6 |
| **Total** | **91.5** | **100.0** | **1.05** | **0.30** | **100** | **100** |

## 13.9 Flotation Testing

SGS Canada Inc. (SGS) of Lakefield, Canada conducted flotation testing, in 2023 on K-dump and G-dump samples passing 500 µm (fresh feed) generated by Sepro, as well as middlings (secondary DMS floats) produced from Sepro's DMS pilot testing. Samples were ground to a P100 of 300µm and passed through a Knelson concentrator for heavy mineral removal. Knelson tailings were sent through magnetic separation prior to being processed in a two-stage mica reverse flotation, followed by a three stage spodumene flotation. The complete testing flowsheet is shown in Figure 13-7.

**Figure 13-7: SGS Flotation Test Flowsheet**




Results on the fresh feed samples of K-dump show that a final concentrate of 5.9 wt% Li2O can be produced. The concentrate generated from the fresh feed of G-dump is 2.65 wt% Li2O.

Additional tests were performed on a sample that blended the middlings from the K-dump with the K-dump fresh feed. The concentrate produced was 6.74wt% Li2O and these results are presented in Table 13-11. G-dump middlings were processed without blending in fresh G-dump feed and results showed that a 6.44 wt% Li2O concentrate can be produced, shown in Table 13-12.

Additional testing on a composite sample blending fresh feed and middling of both K-dump and G-dump is planned. Refer to Appendix C for more details on the test results.

## Table 13-11: Flotation Results on K-Dump Fresh Feed and Middlings

| Test No. | Product | Weight | | Assays % | | | | Distribution % | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Objective | | g | % | Li | $Li_2O$ | $K_2O$ | $Fe_2O_3$ | Li | $K_2O$ | $Fe_2O_3$ |
| F4 | F4 Li 2nd Cl Conc. | 223 | 10.4 | 3.13 | 6.74 | 0.28 | 0.82 | 56.1 | 1.1 | 5.9 |
| K Dump | F4 Li 1st Cl Conc. | 274 | 12.7 | 2.97 | 6.40 | 0.39 | 0.82 | 65.4 | 1.9 | 7.3 |
| Midd& Fines | F4 Li Ro. Conc. | 338 | 15.7 | 2.65 | 5.70 | 0.64 | 0.80 | 71.8 | 3.9 | 8.7 |
| -300 mic | F4 Li Ro & Scav Conc | 391 | 18.1 | 2.41 | 5.19 | 0.81 | 0.80 | 75.7 | 5.7 | 10.1 |
| | F4 Li Ro Tail | 1284 | 59.6 | 0.06 | 0.14 | 2.58 | 0.34 | 6.6 | 60.4 | 14.1 |
| | F4 Li Ro Scav Tail | 1232 | 57.2 | 0.03 | 0.06 | 2.61 | 0.32 | 2.8 | 58.6 | 12.7 |
| Based on F2 | F4 Mica Conc. | 79.1 | 3.7 | 0.39 | 0.85 | 7.96 | 2.31 | 2.5 | 11.5 | 5.9 |
| but on the DMS | F4 Mag Conc | 62.3 | 2.9 | 0.56 | 1.21 | 3.31 | 9.77 | 2.8 | 3.8 | 19.6 |
| U/S + Middling | F4 Knelson Conc. | 68.1 | 3.2 | 0.42 | 0.90 | 3.43 | 2.48 | 6.3 | 2.3 | 3.7 |
| | F4 Total Slimes | 322 | 15.0 | 0.38 | 0.83 | 3.09 | 4.63 | 9.9 | 18.1 | 48.0 |
| | Head (calc.) | 2153 | 100 | 0.58 | 1.24 | 2.55 | 1.44 | 100 | 100 | 100 |
| | Head (calc.fines + Mid.) | | | 0.61 | 1.30 | 2.23 | 1.33 | | | |

## Table 13-12: Flotation Results on G-Dump Middlings

| Test No. | Product | Weight | | Assays % | | | | Distribution % | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Objective | | g | % | Li | $Li_2O$ | $K_2O$ | $Fe_2O_3$ | Li | $K_2O$ | $Fe_2O_3$ |
| F3 | F3 Li 2nd Cl Conc. Non-mag | 549 | 25.8 | 2.99 | 6.44 | 0.18 | 0.45 | 63.3 | 3.2 | 1.4 |
| G Dump Middlir | F3 Li 2nd Cl Conc. | 580 | 27.3 | 2.88 | 6.21 | 0.19 | 1.25 | 64.5 | 3.6 | 4.1 |
| -300 mic | F3 Li 1st Cl Conc. | 639 | 30.1 | 2.78 | 5.99 | 0.22 | 1.26 | 68.5 | 4.5 | 4.5 |
| | F3 Li Ro. Conc. | 750 | 35.3 | 2.52 | 5.43 | 0.30 | 1.20 | 73.0 | 7.2 | 5.0 |
| | F3 Li Ro & Scav Conc | 797 | 37.5 | 2.42 | 5.21 | 0.32 | 1.18 | 74.4 | 8.1 | 5.3 |
| First Trial for | F3 Li Ro Tail | 470 | 22.1 | 0.10 | 0.22 | 1.20 | 0.41 | 1.8 | 18.0 | 1.1 |
| Floating | F3 Li Ro Scav Tail | 424 | 19.9 | 0.03 | 0.05 | 1.26 | 0.36 | 0.4 | 17.1 | 0.9 |
| Spodumene | F3 Mica Conc. | 160 | 7.5 | 0.74 | 1.58 | 6.11 | 2.37 | 4.6 | 31.4 | 2.1 |
| from G-Dump | F3 Mag Conc | 350 | 16.4 | 0.36 | 0.78 | 1.47 | 33.56 | 4.9 | 16.4 | 65.6 |
| Middling | F3 Knelson Conc. | 71.6 | 3.4 | 1.35 | 2.91 | 1.07 | 12.90 | 3.7 | 2.5 | 5.2 |
| Sample | F3 Total Slimes | 324 | 15.2 | 0.96 | 2.08 | 2.37 | 11.62 | 12.0 | 24.6 | 21.0 |
| | Head (calc.) | 2126 | 100 | 1.22 | 2.62 | 1.47 | 8.42 | 100 | 100 | 100 |
| | Head (Dir.) | 0 | 0 | 1.22 | 2.63 | 1.49 | 8.93 | | | |

### 13.10 Reflux Classifier

Nagrom of Australia is conducting batch Reflux Classifier (RC) tests in 2023 to check for effective mica removal from C-dump, G-dump, and K-dump at various size fractions.

Should these results prove positive, trade off studies should be conducted to confirm if the RC can be added into the process.

### 13.11 Processing Flowsheet

A process flowsheet was developed for K-dump and G-dump as illustrated in Figure 17-1. C-dump is excluded from the process as it showed very low concentrate grades in during testing. The conceptual flowsheet includes the following:

a) A crushing circuit to crush all material to -5 mm size prior to beneficiation.
b) Splitting the crushed material into a coarse fraction (-5 mm +0.5 mm) and fine fraction (-0.5 mm) to be processed in two separate circuits.
c) Processing the coarse material through a two stage DMS plant. Secondary cyclone overflow (middlings) is sent to the grinding plant.
d) Processing the -0.5 mm material will be processed through a grinding and flotation plant.

# 14 MINERAL RESOURCE ESTIMATES

On behalf of Tantalex, MSA completed a Mineral Resource estimate for the Manono Lithium Tailings deposits.

To the best of the QP's knowledge there are currently no title, legal, taxation, marketing, permitting, socio-economic or other relevant issues that may materially affect the Mineral Resource described in this Technical Report.

The Mineral Resources presented herein, with an effective date of 23 August 2023, represent an update to the previous Manono Lithium tailings deposits dated 13 December 2022. The updated estimate incorporate drillhole data completed by Tantalex from September 2021 to July 2022 and in the QP's opinion were collected using reasonable procedures and protocols.

The Mineral Resource was estimated using the 2019 CIM "Best Practice Guidelines for Estimation of Mineral Resources and Mineral Reserves" and classified in accordance with the 2014 CIM "Definition Standards". It should be noted that Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.

The Mineral Resource estimates were conducted using Datamine Studio RM software, together with Leapfrog Geo, which was used for the modelling of three-dimensional volumes. Microsoft Excel, JMP statistical software and Datamine Supervisor were used for data analysis.

## 14.1 Mineral Resource Estimation Database

The principal sources of information used for the estimate are the exploration drilling conducted by Tantalex from September 2021 to July 2022. The database provided by Tantalex to inform the Mineral Resource estimates consists of:

a) Information from diamond drillholes in the form of:
    i. Collar surveys.
    ii. Downhole Surveys – all holes were vertically drilled and were not surveyed.
    iii. Sampling and assay data.
    iv. Geology data.
b) Specific gravity (SG) measurements from pits excavated to one metre below the surface of the tailings.
c) Topographic surveys provided as contours in GIS shapefile format.

The drillhole and SG data were provided as Microsoft Excel files.

A total of 367 drillholes, amounting to 11,962 metres of drilling, were completed across nine tailings deposits. The number of drillholes and metres drilled per deposit is summarised in Table 14-1.

**Table 14-1: Number of Drillholes and Total Meters Drilled per Deposit**

| Deposit | Number of Drillholes | Metres Drilled |
|---|---|---|
| Cc | 34 | 2 312 |
| Cf | 4 | 136 |
| Ec | 32 | 1 854 |
| Gc | 24 | 1 479 |
| Gf | 50 | 886 |
| Hc | 21 | 1 260 |
| Hf | 26 | 4 689 |
| Ic | 20 | 1 226 |
| K | 156 | 2 120 |
| **Total** | **367** | **11 962** |

## 14.2 Exploratory Data Analysis of the Raw Data

The dataset examined consisted of sampling and logging data from aircore drillholes. The following attributes are of direct relevance to the estimate:

a) Lithium (Li), tin (Sn) and tantalum (Ta) in parts per million (ppm);
b) Specific gravity measurements;
c) Lithological logs.

Lithium grades in parts per million were converted to percentage lithium oxide ($Li_2O$) by applying a conversion factor of 2.153 and then converting ppm to percent.

A total of 8,038 metres of drillhole samples were assayed, however not all samples were assayed for all three elements. A summary of assayed metres is shown in Table 14-2.

**Table 14-2: Assayed Meters per Deposit**

| Deposit | Drilled Metres | Assayed Metres |
|---|---|---|
| Cc | 2,312 | 860 |
| Cf | 136 | 135 |
| Ec | 1,854 | 661 |
| Gc | 1,479 | 1,453 |
| Gf | 886 | 866 |
| Hc | 1,260 | 600 |
| Hf | 689.4 | 432 |
| Ic | 1,226 | 974 |
| K | 2,120 | 2,057 |

Due to insufficient data coverage, a Mineral Resource estimate was not completed for the Cf deposit.

### 14.2.1 *Validation of the data*

MSA undertook a high-level validation process which included the following checks:

a) Examining the sample assay, collar survey and geology data to ensure that the data are complete for all the drillholes,
b) Examining the de-surveyed data in three dimensions to check for spatial errors,
c) Examination of the assay and density data to ascertain whether they are within expected ranges,
d) Check for “FROM-TO” errors, to ensure that the sample data do not overlap one another or that there are no unexplained gaps in the sampling.

The data validation exercise revealed the following:

a) There are no unresolved errors relating to missing intervals and no overlaps in the drillhole logging data. Absent assays correspond to intervals where no samples were taken, or unassayed values.
b) Examination of the drillhole data in three dimensions shows that the collars of the drillholes surveyed by DGPS plot generally in their expected positions relative to the topographic surface. Where noticeable deviations were noted, Tantalex provided updated topographic data which corrected any issues identified.
c) Extreme assays were checked, and no errors were found.
d) No assays were returned for four samples - AMR5323, AMR5326, AMR5331 and AMR5432.
e) Seven samples returned values at the upper limit of detection (10,000 ppm) with no over limit analysis undertaken. These were found to only affect CRM samples and this issue does not impact the Mineral Resource.
f) Nine tin samples reported tin grades at the upper limit of detection (10,000 ppm) with no over limit analysis undertaken. The tin values for one sample were set to the upper detection limit value of 10,000 ppm.
g) Samples that reported below detection limit values were set to half the detection limit value.

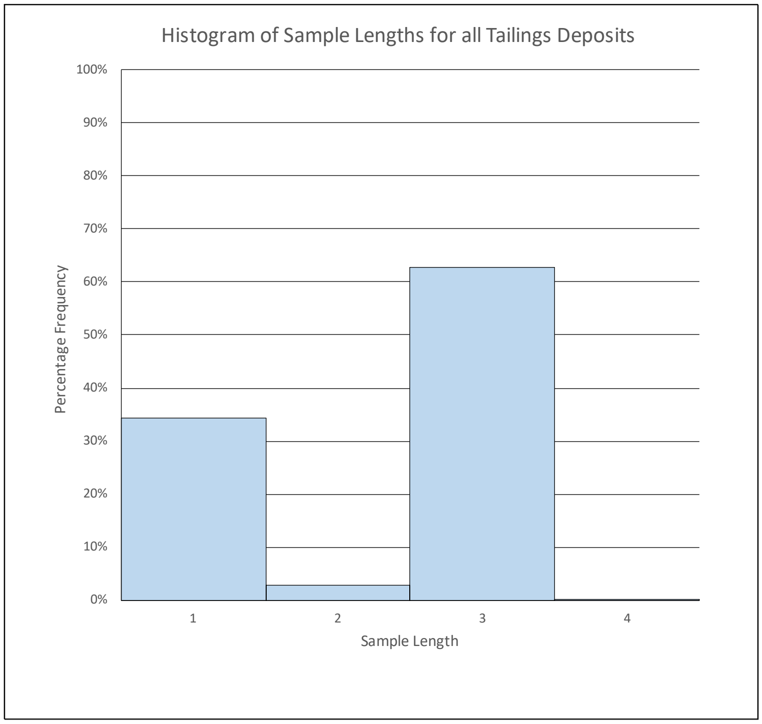
### 14.2.2 *Statistics of the Raw Sample Data*

#### *14.2.2.1* Sample Lengths

Samples were taken at 1 metre intervals during the early phase of exploration; however, the sampling methodology was later changed to three metre composites. As a result, 34% of the total samples were taken at one metre intervals, including the Cc, Gc, Hc, Hf and Ic deposits. The remainder of the samples were mostly taken at three metre intervals.

A histogram of the sample intervals for the combined nine deposits is shown in Figure 14-1. Samples taken at 2 m and 4 m make a small percentage of the samples, which tend to occur along the base of the deposits and are not representative of the total drilled tailings.

**Figure 14-1: Sample Length Histogram for Manono Samples**



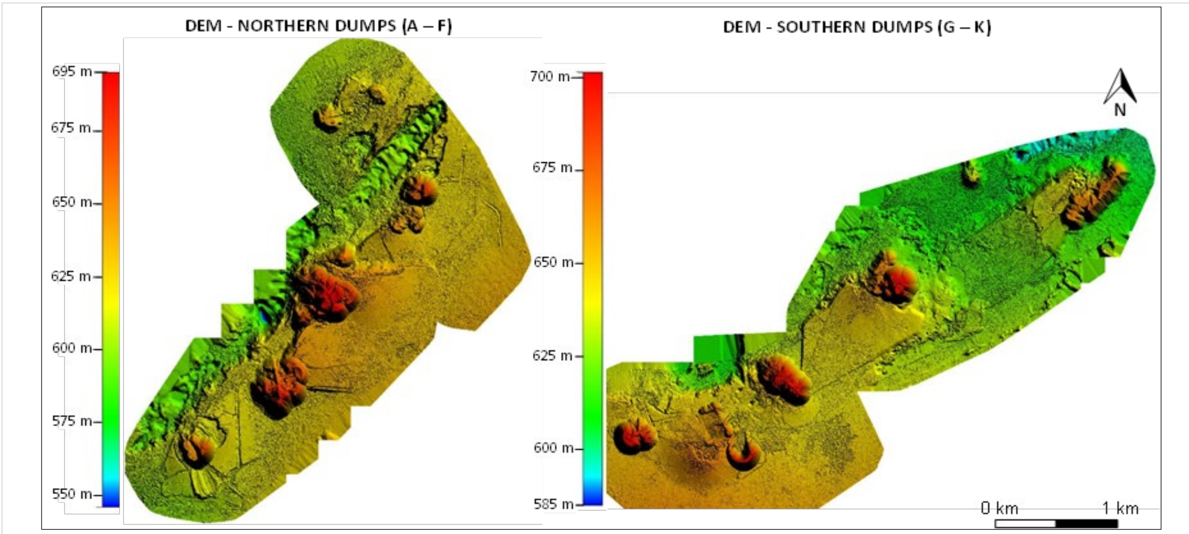

## 14.3 Geological Modelling

### 14.3.1 *Topography*

A topographic digital surface model (DSM) covering the Manono Lithium Tailings Project area was provided by Tantalex. An unmanned aerial vehicle (UAV), photogrammetry topographical survey and volumetric estimation of the Project was conducted by Ikigai Environmental Specialists during September 2022. The survey was conducted within UTM Zone 35 S and referenced to the WGS84 datum.

The survey area spanned a total of 1,309.4 hectares and the data was processed using Pix4D software to provide 1 m contour interval, digital elevation models (DEMs) (Ikigai, 2021) (Figure 14-2). Geovia Surpac was used to calculate the final volumetric estimates (Ikigai, 2021).

**Figure 14-2: Manono Lithium Tailings Project DEMs**



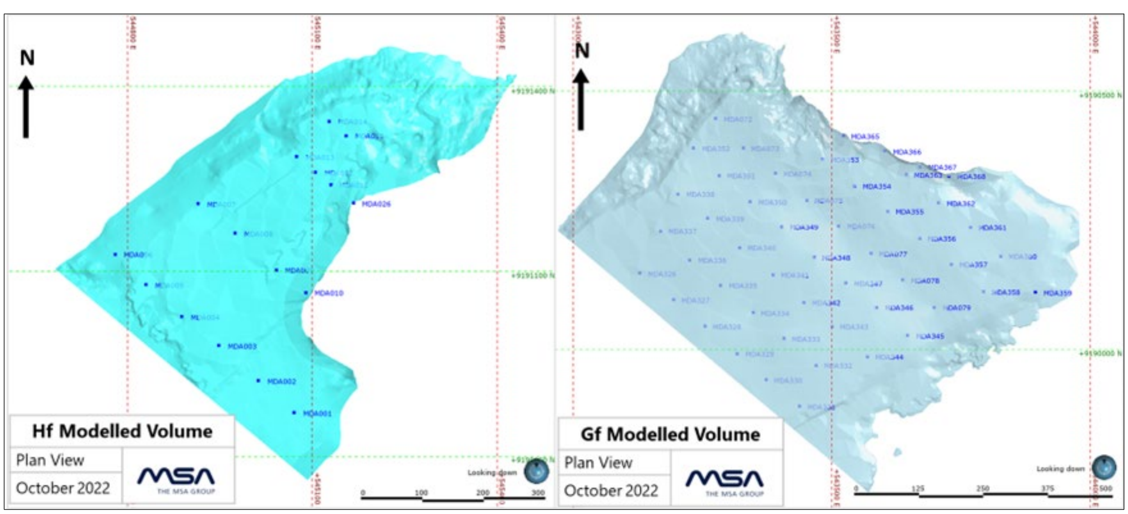

***Source:*** *Adapted from Ikigai (2021)*

### 14.3.2 *Tailings Volumes*

Leapfrog Geo was used to generate three-dimensional volumes representing the tailings deposits. The upper limit of the tailings deposits was defined using the supplied topographical surveys. Due to the absence of a pre-depositional surface, the base of a deposit was interpreted to occur when laterite material or saprolite was intercepted. Since many of Manono's deposits consist of large volumes of laterite, the base was interpreted to occur where the last laterite horizon was intercepted in each drillhole. In the absence of a basal laterite, grade data was used to guide the modelling.

The volume of each deposit was generated by intercepting the modelled base with the topography. The exception to this being the Hf and Gf deposits, which remain unexplored in the Southwest, therefore the extent of the volumes was limited to half the drillhole spacing in this direction (Figure 14-3).

**Figure 14-3: Volumes for the Hf and Gf Deposits**



As the lithology logging is recorded on one metre intervals while the majority of the samples were assayed at three metre intervals, there were instances where basal laterite was found to contain significant lithium grades due to sample compositing taking place across lithology types. This was found to particularly impact the K tailings, therefore a combination of lithology and grade data was used to define the base of the deposit.

Several of the deposits consist of a combination of material types, including laterite, pegmatite, and clay. Where sufficient data was available, volumes for each material type were modelled, with each deposit being treated as a separate domain. In the absence of data, an angle of repose between 30° and 35° was assumed when modelling each layer.

Volumes for the Ic and Hc deposits are presented in Figure 14-4 and Figure 14-5.

**Figure 14-4: Modelled Volumes of the Ic Tailings Deposit**

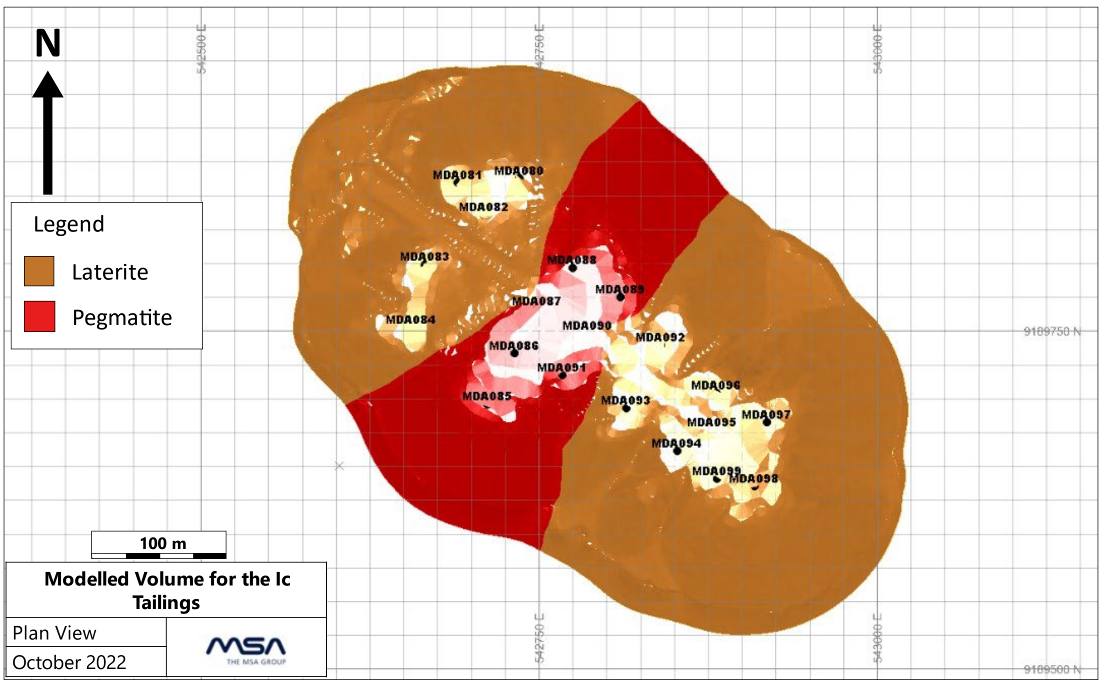
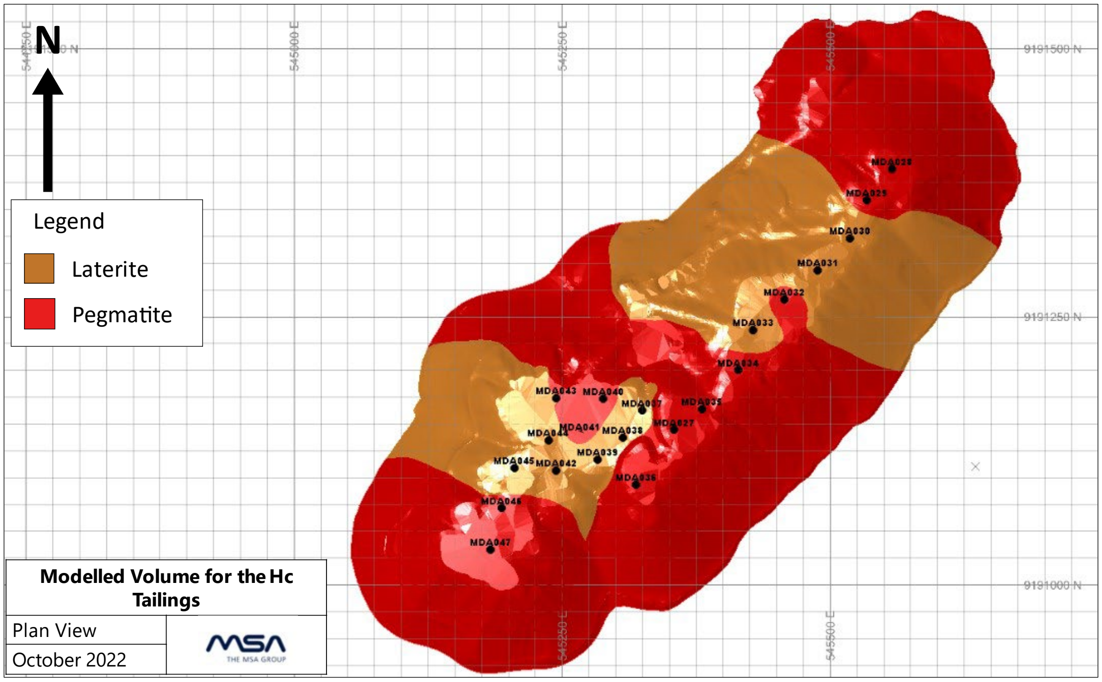
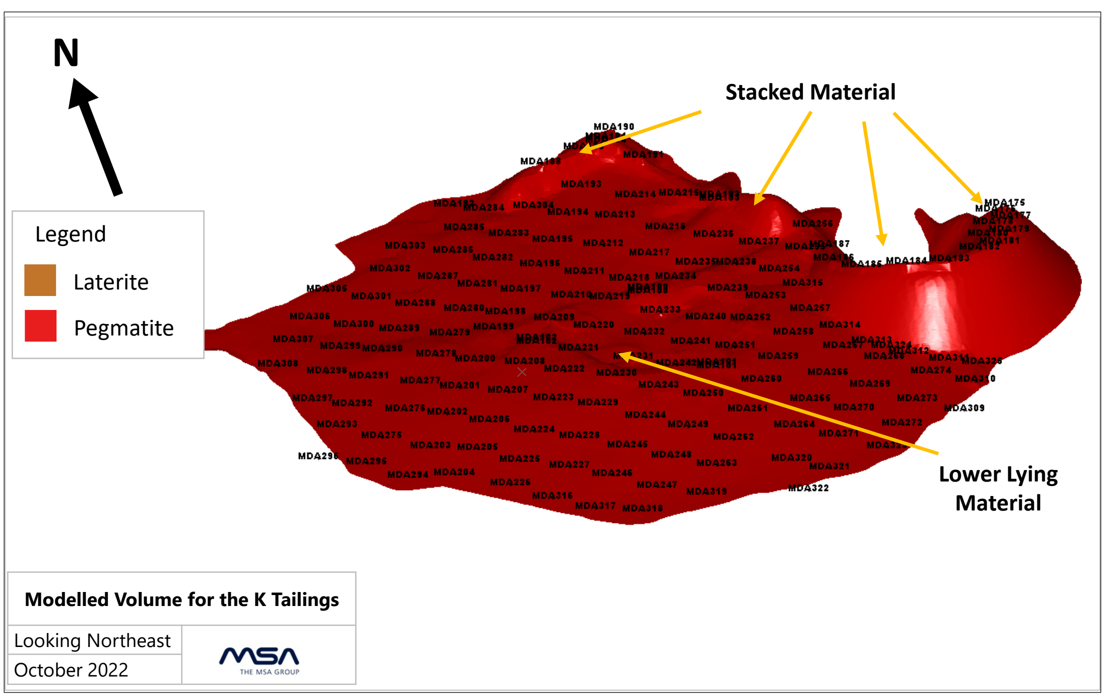


**Figure 14-5: Modelled Volumes of the Hc Tailings Deposit**




The K deposit is exclusively composed of pegmatite material. Figure 14-6 shows the modelled volume, with the stacked material visible in the background while the thin, lower lying material is shown in the foreground. During estimation, the stacked material was separated from the lower lying tailings using a digitised polyline.

**Figure 14-6: Modelled Volumes of the K Tailings Deposit**



The modelled lithological zones for each deposit were treated as discrete estimation domains, therefore, each volume was given an identifier number. A summary of the volumes modelled for each deposit is presented in Table 14-3.

**Table 14-3: Number of Volumes per Material Type Modelled for Each Deposit**

| Material Type | Cc | Ec | Gc | Gf | Hc | Hf | Ic | K |
|---|---|---|---|---|---|---|---|---|
| Pegmatite | 1 | 3 | 3 | 2 | 3 | 1 | 2 | 1 |
| Laterite | 0 | 2 | 3 | 1 | 2 | 1 | 2 | 0 |
| Clay | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |

### 14.4 Statistical Analysis of the Composite Data

Samples were composited to 3 m lengths using length weighting.

#### 14.4.1 *Lithium Oxide ($Li_2O$)*

Summary statistics for lithium oxide for the three-metre composite samples are presented in Table 14-4.

The highest $Li_2O$ grades are present in the K dump with the stacked material having a mean $Li_2O$ grade of 0.66%, while the lower lying material has a mean grade of 0.85% $Li_2O$. The grade variability is typically low for all the domains, as seen by the low coefficient of variation (CV) values. This is with the exception of the Cc and Gc dumps which have CV values larger than 1. Higher lithium grades typically occur in pegmatite tailings, with laterites generally reporting lithium grades below 0.10% $Li_2O$.

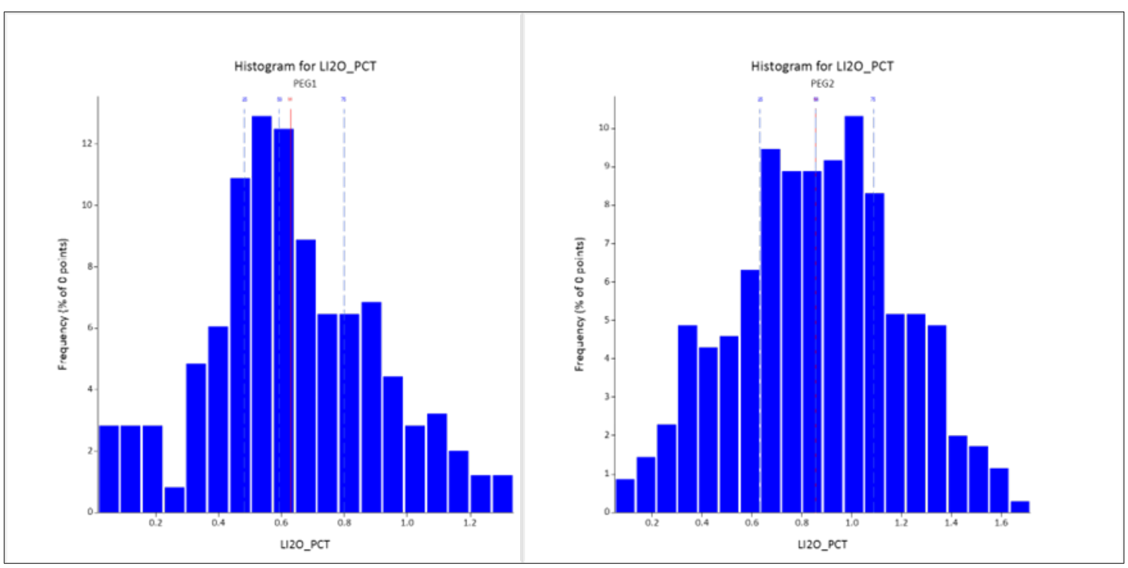
**Table 14-4: Summary Statistics for Lithium Oxide per Domain**

| Domain | Number of Composites | Minimum % | Maximum % | Mean % | CV |
|---|---|---|---|---|---|
| **Cc Dump** | | | | | |
| PEG1 | 271 | 0.02 | 0.98 | 0.14 | 1.16 |
| **Ec Dump** | | | | | |
| LAT1 | 38 | 0.03 | 0.27 | 0.06 | 0.57 |
| LAT2 | 30 | 0.03 | 0.09 | 0.05 | 0.27 |
| PEG1 | 28 | 0.01 | 0.13 | 0.05 | 0.53 |
| PEG2 | 87 | 0.03 | 0.21 | 0.07 | 0.40 |
| PEG3 | 21 | 0.04 | 0.10 | 0.06 | 0.23 |
| **Gc Dump** | | | | | |
| LAT1 | 19 | 0.02 | 0.09 | 0.04 | 0.46 |
| LAT2 | 338 | 0.01 | 0.39 | 0.04 | 0.77 |
| LAT3 | 2 | 0.02 | 0.05 | 0.04 | 0.51 |
| PEG1 | 15 | 0.02 | 0.37 | 0.08 | 1.17 |
| PEG2 | 85 | 0.02 | 1.41 | 0.31 | 1.29 |
| PEG3 | 4 | 0.05 | 0.08 | 0.06 | 0.18 |

| Domain | Number of Composites | Minimum % | Maximum % | Mean % | CV |
|---|---|---|---|---|---|
| **Gf Dump** | | | | | |
| CLA1 | 59 | 0.02 | 0.56 | 0.16 | 0.42 |
| CLA2 | 16 | 0.07 | 0.17 | 0.12 | 0.27 |
| LAT1 | 70 | 0.02 | 0.22 | 0.10 | 0.44 |
| PEG1 | 81 | 0.00 | 0.72 | 0.24 | 0.81 |
| PEG2 | 7 | 0.01 | 0.09 | 0.03 | 0.82 |
| **Hc Dump** | | | | | |
| LAT1 | 49 | 0.02 | 0.07 | 0.03 | 0.35 |
| LAT2 | 27 | 0.01 | 0.08 | 0.03 | 0.55 |
| PEG1 | 10 | 0.03 | 0.06 | 0.04 | 0.32 |
| PEG2 | 93 | 0.02 | 0.28 | 0.08 | 0.55 |
| PEG3 | 13 | 0.03 | 0.07 | 0.04 | 0.18 |
| **Hf Dump** | | | | | |
| LAT1 | 28 | 0.01 | 0.14 | 0.04 | 0.70 |
| PEG1 | 91 | 0.01 | 0.18 | 0.09 | 0.37 |
| **Ic Dump** | | | | | |
| LAT1 | 140 | 0.01 | 0.18 | 0.04 | 0.60 |
| LAT2 | 72 | 0.00 | 0.15 | 0.04 | 0.70 |
| PEG1 | 77 | 0.01 | 0.26 | 0.09 | 0.63 |
| PEG2 | 19 | 0.04 | 1.05 | 0.39 | 0.69 |
| **K Dump** | | | | | |
| PEG1 | 237 | 0.11 | 1.34 | 0.66 | 0.38 |
| PEG2 | 356 | 0.05 | 1.72 | 0.85 | 0.39 |

Histograms for $Li_2O$ grade for the two domains of the K dump are shown in Figure 14-7. The two distributions approximately resemble the bell curve of a normal distribution, particularly PEG2, while PEG1 shows a slight positive skewness.

**Figure 14-7: Sample Histograms for $Li_2O$ for the Stacked Tailings (PEG1) and the Lower Lying Tailings (PEG2)**



### 14.4.2 *Tin*

Summary Statistics for tin for the three metre composite samples are presented in Table 14-5.

For the five dumps that were estimated, there is very little variability in mean tin grades between the dumps. This lack of variability extends between the material types, where there is very little difference in mean tin grades between pegmatite and laterite material. An exception to this being PEG2 in the Gc dump and the two pegmatite layers of the Ic dump. For the K dump, the stacked tailings (PEG1) have a mean tin grade that is almost double the lower lying, fine material (PEG1).

**Table 14-5: Summary Statistics for Tin per Domain**

| Domain | Number of Composites | Minimum ppm | Maximum ppm | Mean ppm | CV |
|---|---|---|---|---|---|
| | | | **Gc Dump** | | |
| LAT1 | 19 | 139 | 587 | 245 | 0.47 |
| LAT2 | 328 | 26 | 1693 | 250 | 0.73 |
| LAT3 | 2 | 114 | 415 | 265 | 0.57 |
| PEG1 | 18 | 31 | 655 | 213 | 0.83 |
| PEG2 | 83 | 50 | 5296 | 470 | 1.75 |
| PEG3 | 4 | 213 | 267 | 232 | 0.09 |
| | | | **Gf Dump** | | |
| CLA1 | 59 | 60 | 308 | 143 | 0.28 |
| CLA2 | 16 | 93 | 322 | 198 | 0.27 |
| LAT1 | 70 | 35 | 315 | 146 | 0.36 |
| PEG1 | 81 | 68 | 789 | 190 | 0.60 |
| PEG2 | 7 | 62 | 285 | 197 | 0.37 |
| | | | **Ic Dump** | | |
| LAT1 | 140 | 124 | 1640 | 370 | 0.61 |
| LAT2 | 129 | 94 | 940 | 361 | 0.55 |
| PEG1 | 96 | 136 | 1680 | 573 | 0.50 |
| PEG2 | 19 | 205 | 863 | 491 | 0.40 |
| | | | **K Dump** | | |
| PEG1 | 226 | 27 | 2265 | 662 | 0.45 |
| PEG2 | 352 | 5 | 4613 | 319 | 0.91 |

### 14.4.3 *Tantalum*

Summary Statistics for tantalum for the three metre composite samples are presented in Table 14-6.

The average tantalum grades across the five estimated tailings do not differ substantially, this lack of variability is observed between the material types as well. The stacked tailings of the K dump (PEG1) report a slightly higher mean Ta grade of 33 ppm, while the low-lying material of the K dump has a mean Ta grade that is within range of the other deposits.

**Table 14-6: Summary Statistics for Tantalum per Domain**

| Domain | Number of Composites | Minimum ppm | Maximum ppm | Mean ppm | CV |
|---|---|---|---|---|---|
| **Gc Dump** | | | | | |
| LAT1 | 19 | 8 | 33 | 19 | 0.40 |
| LAT2 | 328 | 2 | 148 | 21 | 0.83 |
| LAT3 | 2 | 11 | 16 | 13 | 0.18 |
| PEG1 | 18 | 6 | 41 | 13 | 0.62 |
| PEG2 | 83 | 5 | 75 | 23 | 0.62 |
| PEG3 | 4 | 12 | 35 | 27 | 0.33 |
| **Gf Dump** | | | | | |
| CLA1 | 59 | 7 | 27 | 17 | 0.26 |
| CLA2 | 16 | 16 | 47 | 24 | 0.29 |
| LAT1 | 70 | 5 | 38 | 20 | 0.33 |
| PEG1 | 81 | 10 | 200 | 25 | 0.89 |
| PEG2 | 7 | 8 | 20 | 13 | 0.31 |
| **Ic Dump** | | | | | |
| LAT1 | 140 | 5 | 52 | 14 | 0.55 |
| LAT2 | 72 | 5 | 173 | 15 | 1.12 |
| PEG1 | 77 | 7 | 34 | 19 | 0.70 |
| PEG2 | 19 | 8 | 83 | 28 | 0.50 |
| **K Dump** | | | | | |
| PEG1 | 226 | 4 | 149 | 33 | 0.45 |
| PEG2 | 352 | 0 | 121 | 25 | 0.48 |

## 14.5 Cutting and Capping

### 14.5.1 *Lithium Oxide*

Histograms and log probability plots for each domain were examined for outliers. A decision to apply capping to a domain was guided by breaks in the distribution of each variable and the spatial location of the outlier samples relative to one another.

The capping typically affected three or less samples per domain (Table 14-7).

**Table 14-7: Capping for $Li_2O$ Grade per Domain for Each Deposit**

| Deposit | Domain | Number of Composites | Uncapped Mean % | Uncapped CV | Cap Value % | Number of Composites Capped | Capped Mean % | Capped CV |
|---|---|---|---|---|---|---|---|---|
| **Ec** | | | | | | | | |
| Ec | PEG1 | 38 | 0.06 | 0.57 | 0.078 | 3 | 0.05 | 0.37 |
| | PEG2 | 312 | 0.07 | 0.40 | 0.126 | 2 | 0.07 | 0.35 |
| | LAT1 | 38 | 0.06 | 0.57 | 0.099 | 2 | 0.06 | 0.32 |
| **Gc** | | | | | | | | |
| Gc | PEG1 | 15 | 0.37 | 1.17 | 0.128 | 3 | 0.06 | 0.71 |
| | LAT2 | 338 | 0.04 | 0.77 | 0.181 | 2 | 0.04 | 0.65 |
| **Gf** | | | | | | | | |
| Gf | CLA1 | 59 | 0.16 | 0.42 | 0.226 | 2 | 0.15 | 0.26 |
| **Hc** | | | | | | | | |
| Hc | PEG3 | 13 | 0.08 | 0.55 | 0.049 | 1 | 0.04 | 0.11 |
| **Hf** | | | | | | | | |
| Hf | LAT1 | 28 | 0.04 | 0.70 | 0.059 | 3 | 0.03 | 0.47 |
| **Ic** | | | | | | | | |
| Ic | LAT1 | 140 | 0.04 | 0.60 | 0.086 | 3 | 0.04 | 0.46 |

### 14.5.2 *Tin*

Capping of tin outliers impacted only three deposits and six domains in total as shown in Table 14-8. Generally, the capping affected two or three samples, with six samples being capped for the stacked tailings of the K dump.

**Table 14-8: Capping for Sn Grade per Domain for Each Deposit**

| Deposit | Domain | Number of Composites | Uncapped Mean ppm | Uncapped CV | Cap Value ppm | Number of Composites Capped | Capped Mean ppm | Capped CV |
|---|---|---|---|---|---|---|---|---|
| **Gc** | | | | | | | | |
| Gc | LAT2 | 328 | 250 | 0.73 | 787 | 2 | 258 | 0.57 |
| | PEG2 | 83 | 470 | 1.75 | 984 | 3 | 382 | 0.69 |
| **Gf** | | | | | | | | |
| Gf | CLA1 | 59 | 143 | 0.28 | 245 | 2 | 142 | 0.25 |
| | PEG1 | 81 | 190 | 0.60 | 545 | 2 | 187 | 0.54 |
| **K** | | | | | | | | |
| K | PEG1 | 226 | 662 | 0.45 | 1365 | 6 | 653 | 0.40 |
| | PEG2 | 352 | 319 | 0.91 | 1259 | 2 | 310 | 0.60 |

### 14.5.3 *Tantalum*

The capping of tantalum outliers affected four deposits, representing a total of ten domains (Table 14-9). The capping had a minimal impact on the mean tantalum grades, with the only discernible difference being in the CV values. LAT2 of the Ic dump registered the largest decrease in variability due to capping.

**Table 14-9: Capping for Ta Grade per Domain for Each Deposit**

| Deposit | Domain | Number of Composites | Uncapped Mean ppm | Uncapped CV | Cap Value ppm | Number of Composites Capped | Capped Mean ppm | Capped CV |
|---|---|---|---|---|---|---|---|---|
| | | | | Gc | | | | |
| Gc | PEG1 | 18 | 13 | 0.62 | 27 | 1 | 13 | 0.52 |
| | PEG2 | 83 | 23 | 0.62 | 44.4 | 4 | 22 | 0.51 |
| | LAT2 | 328 | 21 | 0.83 | 71 | 6 | 21 | 0.63 |
| | | | | Gf | | | | |
| Gf | CLA2 | 16 | 24 | 0.29 | 29 | 2 | 23 | 0.17 |
| | PEG1 | 81 | 25 | 0.89 | 68.7 | 2 | 24 | 0.51 |
| | | | | Ic | | | | |
| Ic | LAT1 | 140 | 14 | 0.45 | 34.5 | 3 | 13 | 0.44 |
| | LAT2 | 72 | 15 | 1.12 | 27.4 | 2 | 14 | 0.40 |
| | PEG2 | 8 | 28 | 0.50 | 43.1 | 1 | 25 | 0.41 |
| | | | | K | | | | |
| K | PEG1 | 226 | 33 | 0.45 | 87.7 | 3 | 33 | 0.41 |
| | PEG2 | 352 | 25 | 0.48 | 63.3 | 5 | 25 | 0.41 |

### 14.6 Geostatistical Analysis

Geostatistical analysis was conducted using Datamine Supervisor software. The grade data were transformed to normal scores for modelling purposes and the sills were back transformed for use in estimation. The large majority of the Manono Lithium Tailings deposits lack sufficient data coverage to model semivariograms, with the exception of the low-lying material of the K dump, which was drilled on a 40 m by 40 m grid.

Experimental semivariograms were calculated for the normal score transformed 3 m composite data. The nugget effect was determined by extrapolating from the first two experimental points of the down-hole semivariogram. The nugget effect for $Li_2O$ grade is low, which is expected due to the low variability observed in the data while the nugget effect for tin grade and tantalum grade was observed to be higher.

Semivariogram maps for the K dump did not indicate the presence of anisotropy in the grade continuity, therefore isotropic semivariogram models were modelled in the horizontal plane resulting in double structured, spherical models for the three elements.

Semivariogram models for $Li_2O$ are presented in Figure 14-8 and the parameters for all three elements are presented in Table 14-10.

**Figure 14-8: Semivariograms for the K-Dump for $Li_2O$ %**

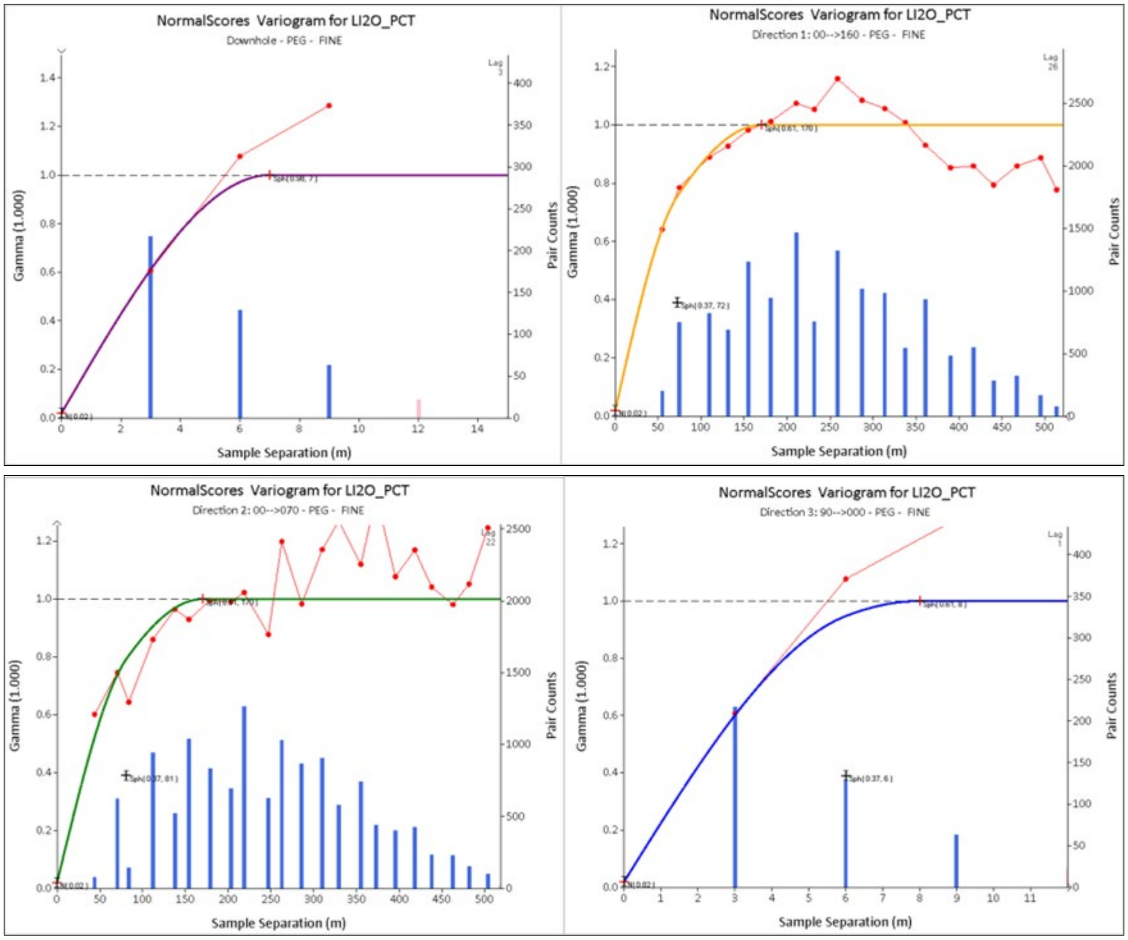



**Table 14-10: Semivariogram Parameters for K-Dump**

| Attribute | Rotation Angles | | | Rotation Axis | | | Nugget Effect (C0) | Range (m) of First Structure (R1) | | | Sill 1 (C1) | Range (m) of Second Structure (R2) | | | Sill 2 (C2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | | 1 | 2 | 3 | | 1 | 2 | 3 | |
| $Li_2O$ % | 0 | 0 | 70 | Z | X | Z | 0.02 | 72 | 81 | 6 | 0.37 | 170 | 170 | 8 | 0.61 |
| Sn ppm | 0 | 0 | 70 | Z | X | Z | 0.51 | 100 | 60 | 7 | 0.13 | 140 | 140 | 13 | 0.36 |
| Ta ppm | 0 | 0 | 70 | Z | X | Z | 0.43 | 57 | 84 | 5 | 0.28 | 160 | 160 | 10 | 0.29 |

## 14.7 Block Modelling

Block models covering each deposit were created using a parent cell of 20 mX by 20 mY by 3 mZ. Sub-celling was applied to optimally fill the modelled volumes, resulting in a minimum sub-cell of 2 mX by 2 mY by 0.5 mZ.

The common origin and block parameters for each deposit are presented in Table 14-11.

**Table 14-11: Model Prototype Origins and Block Size for Manono Lithium Tailings Deposits**

| Deposit | Model Origin | | | Block Size | | | Number of Cells | | |
|---|---|---|---|---|---|---|---|---|---|
| | X | Y | Z | X | Y | Z | X | Y | Z |
| Cc | 549900 | 9195100 | 600 | 20 | 20 | 3 | 37 | 37 | 40 |
| Ec | 549600 | 9194400 | 600 | 20 | 20 | 3 | 30 | 32 | 40 |
| Hc | 545000 | 9190900 | 600 | 20 | 20 | 3 | 35 | 35 | 40 |
| Hf | 544650 | 9190700 | 600 | 20 | 20 | 3 | 43 | 40 | 35 |
| Ic | 542500 | 9189500 | 600 | 20 | 20 | 3 | 30 | 30 | 40 |
| Gc | 543300 | 9190250 | 600 | 20 | 20 | 3 | 35 | 35 | 35 |
| Gf | 542950 | 9189700 | 600 | 20 | 20 | 3 | 53 | 50 | 35 |
| K | 541650 | 9188850 | 625 | 20 | 20 | 3 | 50 | 40 | 34 |

## 14.8 Estimation Parameters

Attributes were estimated into the modelled volumes using the 3 m composite drillhole sample data by inverse distance squared (IDW2) for all deposits with the exception of the low-lying tailings of the K-dump, which was estimated by ordinary kriging (OK). The stacked tailings of the K-dump were estimated by IDW2.

The search distance and rotation angles of the OK estimates were based on the semivariogram ranges. Kriging Neighbourhood Analysis (KNA) was used to determine the minimum and maximum number of samples to be included in the search neighbourhood for the OK estimates and the appropriate discretisation points to be used in a parent cell. The KNA exercise considered kriging efficiency and slope of regression values to quantify the level of conditional bias when selecting the optimal parameters.

The estimates were carried out in three passes. The first pass OK estimate applied the variogram ranges, while the second pass expanded the search volume by a factor of 1.5, while the third pass expanded this volume by a factor of 10 to ensure that all blocks received an estimate. A minimum of 5 and a maximum of 10 samples were used in the first two passes, with the third pass estimate allowing a maximum of 12 samples. A limit of two samples per drillhole was imposed on the estimates. Where domains had less than five samples, the mean composite grade was assigned to the blocks.

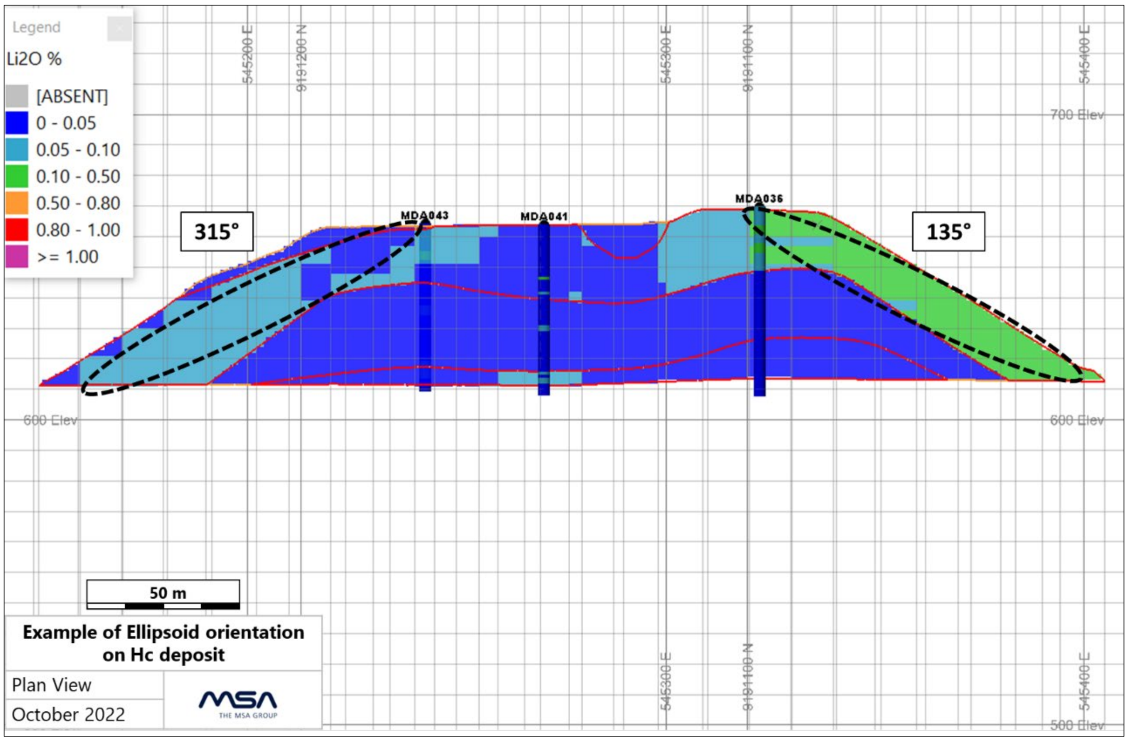
The search parameters for the K-dump OK estimates are shown in Table 14-12.

**Table 14-12: Search Parameters for the K-Dump**

| Attribute | Rotation Angles | | | Rotation Axis | | | Search Distance (m) | | | Number of Composites | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | Y | Z | X | Y | Z | X | Y | Z | Min | Max |
| $Li_2O$ % | 0 | 0 | 70 | Z | X | Z | 170 | 170 | 8 | 5 | 10 |
| Sn ppm | 0 | 0 | 70 | Z | X | Z | 140 | 140 | 13 | 5 | 10 |
| Ta ppm | 0 | 0 | 70 | Z | X | Z | 160 | 160 | 10 | 5 | 10 |

The IDW2 estimates were similarly carried out in three passes, with a minimum of 5 and maximum of 10 samples used in the estimates and a limit of 2 samples per drillhole. The search volume applied to the Cc, Ec, Hc, Ic and Gc deposits was 60 mX by 60 mY by 6 mZ. The search volume was orientated at a 35° angle to mimic the angle of repose of the tailings, which tends to vary from 30° to 35°. The search was orientated by defining a centre line for each deposit, thereby dividing the deposit in half, where each half represents a dominant direction of deposition. The search ellipsoids were then orientated on either side to match this orientation. An example for the Hc block model is shown in Figure 14-9, where one side of the tailings is orientated at a 35° dip at an azimuth of 135°, while the other half is orientated at an azimuth of 315°.

**Figure 14-9: Example of Search Ellipsoid Orientation Used for the Hc Deposit**




The search volume for the Hf and the Gf deposits was orientated horizontally, as these deposits tend to be flat and extend over a larger footprint, lacking the high terraces observed in other deposits. The search ranges applied to the Hf and Gf deposits were 100 mX by 100 mY by 3 mZ and 80 mX by 80 mY by 3 mZ respectively.

### 14.8.1 *Density*

Density data coverage is limited to pits excavated to one metre below the surface of the tailings deposits. The unconsolidated nature of the material being sampled makes it impractical to take density measurements at depth. Density measurements were taken per material type, with these predominantly being either pegmatite, laterite, or clay. Due to the limited data coverage, density could not be interpolated, therefore the average value per material type was assigned directly to the block model.

Density measurements were taken for all deposits except for the Ec tailings, where the average density of the pegmatite and tailings was calculated as the average for all density measurements from the eight deposits. The density assigned per material type for each deposit are summarised in Table 14-13.

**Table 14-13: Average Density Assigned per Material Type for Each Deposit**

| Material Type | Cc | Ec | Gc | Gf | Hc | Hf | Ic | K |
|---|---|---|---|---|---|---|---|---|
| Pegmatite | 1.61 | 1.56 | 1.55 | 1.55 | 1.54 | 1.54 | 1.66 | 1.54 |
| Laterite | - | 1.63 | 1.65 | 1.65 | 1.56 | 1.56 | 1.63 | - |
| Clay | - | - | - | 1.45 | - | 1.15 | - | - |

### 14.9 Validation of Estimates

The models were validated by:

- Comparison of the global estimate against the mean composite grades;
- Visual examination, in cross-section and plan, of the input data against the block model;
- Swath plot validation.

The mean grades of the block model for each domain were validated against the composite grades. Globally the estimated block grades compared favourably to the input data, with relative differences typically less than ten percent. Where larger percentage differences were observed, this typically translated to small relative differences in the mean values.

A comparison for each estimation domain per deposit is presented in Table 14-14.

**Table 14-14: Global Mean Comparison Between Capped Composites and Estimates**

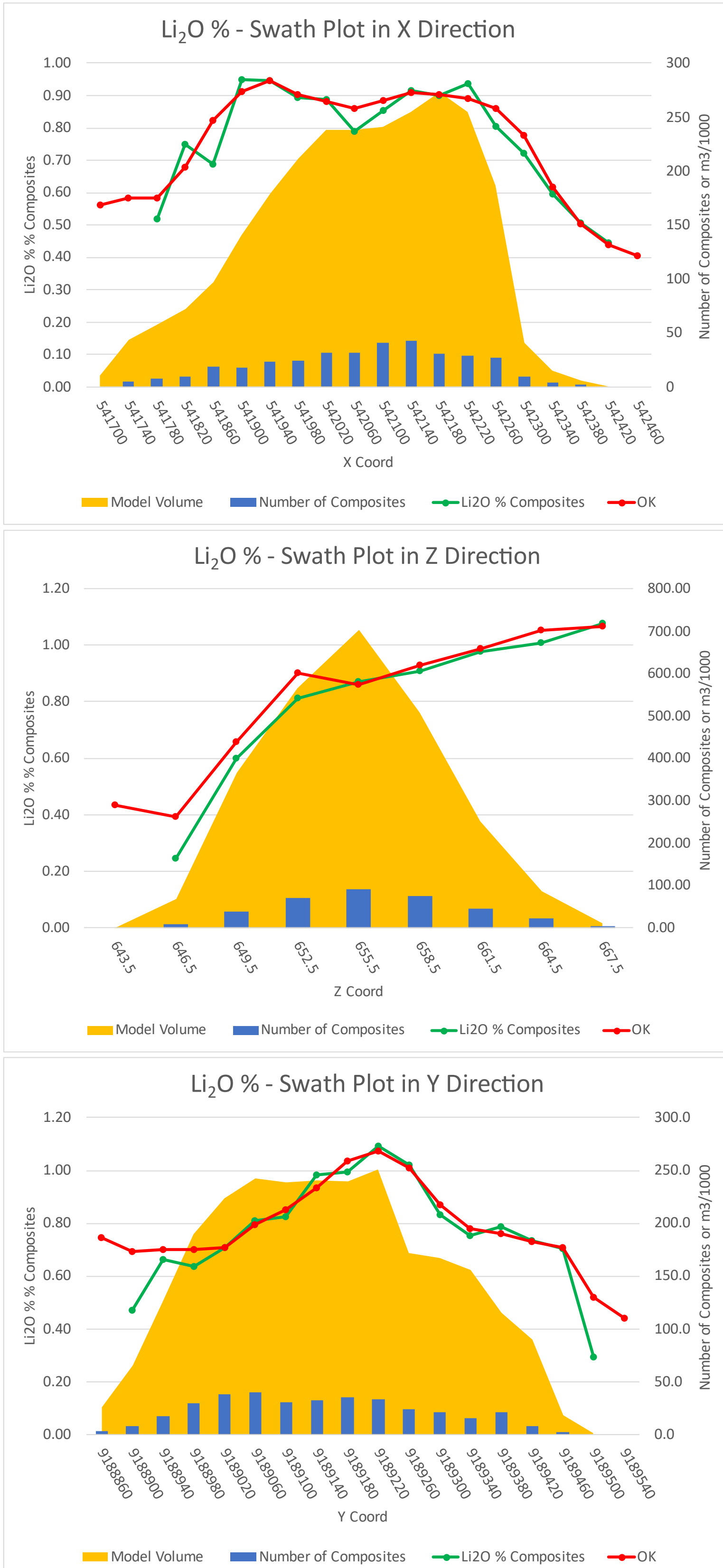
| Assay | Domain | Composites | | | Block Model | | Percentage Difference |
|---|---|---|---|---|---|---|---|
| | | Number of Composites | Mean | CV | Mean | CV | |
| **Cc Dump** | | | | | | | |
| $Li_2O$ % | PEG1 | 271 | 0.14 | 1.16 | 0.14 | 0.75 | 0% |
| **Ec Dump** | | | | | | | |
| $Li_2O$ % | LAT1 | 38 | 0.06 | 0.32 | 0.06 | 0.13 | -3% |
| | LAT2 | 30 | 0.05 | 0.27 | 0.05 | 0.13 | 0% |
| | PEG1 | 28 | 0.05 | 0.37 | 0.05 | 0.20 | 2% |
| | PEG2 | 87 | 0.07 | 0.35 | 0.07 | 0.23 | 1% |
| | PEG3 | 21 | 0.06 | 0.23 | 0.06 | 0.13 | 0% |
| **Gc Dump** | | | | | | | |
| $Li_2O$ % | LAT1 | 19 | 0.04 | 0.46 | 0.04 | 0.18 | -1% |
| | LAT2 | 338 | 0.04 | 0.65 | 0.04 | 0.36 | -2% |
| | LAT3 | 2 | 0.04 | 0.51 | 0.04 | 0.00 | 0% |
| | PEG1 | 15 | 0.06 | 0.71 | 0.06 | 0.22 | 2% |
| | PEG2 | 85 | 0.24 | 1.39 | 0.24 | 1.42 | 0% |
| | PEG3 | 4 | 0.06 | 0.18 | 0.06 | - | - |
| Sn ppm | LAT1 | 19 | 208 | 0.48 | 194.06 | 0.15 | -6% |
| | LAT2 | 328 | 258 | 0.57 | 258.40 | 0.28 | 0% |
| | LAT3 | 2 | 88 | 0.11 | 87.50 | 0.00 | 0% |
| | PEG1 | 18 | 250 | 0.83 | 260.60 | 0.38 | 4% |
| | PEG2 | 83 | 382 | 0.69 | 330.18 | 0.46 | -6% |
| | PEG3 | 4 | 210 | 0.25 | 210.00 | - | - |

| Assay | Domain | Composites | | | Block Model | | Percentage Difference |
|---|---|---|---|---|---|---|---|
| | | Number of Composites | Mean | CV | Mean | CV | |
| Ta ppm | LAT1 | 19 | 21 | 0.52 | 19.84 | 0.13 | -4% |
| | LAT2 | 328 | 21 | 0.63 | 20.05 | 0.30 | -3% |
| | LAT3 | 2 | 9 | 0.01 | 8.85 | - | - |
| | PEG1 | 18 | 13 | 0.52 | 12.18 | 0.24 | -3% |
| | PEG2 | 83 | 22 | 0.51 | 19.80 | 0.34 | -10% |
| | PEG3 | 4 | 21 | 0.26 | 21.35 | - | - |
| **Gf Dump** | | | | | | | |
| $Li_2O$ % | CLA1 | 59 | 0.15 | 0.26 | 0.16 | 0.14 | 3% |
| | CLA2 | 16 | 0.12 | 0.27 | 0.12 | 0.20 | 0% |
| | LAT1 | 70 | 0.10 | 0.43 | 0.10 | 0.35 | 0% |
| | PEG1 | 81 | 0.24 | 0.81 | 0.25 | 0.57 | 2% |
| | PEG2 | 7 | 0.03 | 0.82 | 0.04 | 0.60 | 23% |
| Sn ppm | CLA1 | 59 | 142 | 0.25 | 144 | 0.15 | 2% |
| | CLA2 | 16 | 198 | 0.27 | 198 | 0.12 | 0% |
| | LAT1 | 70 | 146 | 0.36 | 151 | 0.18 | 3% |
| | PEG1 | 81 | 187 | 0.54 | 180 | 0.37 | -4% |
| | PEG2 | 7 | 197 | 0.37 | 204 | 0.16 | 4% |
| Ta ppm | CLA1 | 59 | 17 | 0.26 | 16 | 0.17 | -4% |
| | CLA2 | 16 | 23 | 0.17 | 23 | 0.10 | 1% |
| | LAT1 | 70 | 20 | 0.33 | 21 | 0.22 | 1% |
| | PEG1 | 81 | 24 | 0.51 | 24 | 0.36 | 2% |
| | PEG1 | 7 | 13 | 0.31 | 14 | 0.13 | 5% |
| **Hc Dump** | | | | | | | |
| $Li_2O$ % | LAT1 | 49 | 0.03 | 0.35 | 0.03 | 0.25 | -4% |
| | LAT2 | 27 | 0.03 | 0.55 | 0.04 | 0.37 | 10% |
| | PEG1 | 10 | 0.04 | 0.32 | 0.04 | 0.18 | 2% |
| | PEG2 | 93 | 0.08 | 0.55 | 0.09 | 0.35 | 14% |
| | PEG3 | 13 | 0.04 | 0.11 | 0.04 | 0.04 | 2% |
| **Hf Dump** | | | | | | | |
| $Li_2O$ % | LAT1 | 28 | 0.03 | 0.47 | 0.03 | 0.28 | 2% |
| | PEG1 | 91 | 0.09 | 0.37 | 0.09 | 0.32 | -2% |
| **Ic Dump** | | | | | | | |
| $Li_2O$ % | LAT1 | 140 | 0.04 | 0.46 | 0.04 | 0.28 | -2% |
| | LAT2 | 129 | 0.04 | 0.70 | 0.04 | 0.48 | 2% |
| | PEG1 | 96 | 0.09 | 0.63 | 0.09 | 0.48 | -2% |
| | PEG2 | 19 | 0.39 | 0.69 | 0.39 | 0.41 | 2% |
| Sn ppm | LAT1 | 140 | 370 | 0.61 | 369 | 0.32 | 0% |
| | LAT2 | 129 | 361 | 0.55 | 356 | 0.27 | -1% |
| | PEG1 | 96 | 573 | 0.50 | 556 | 0.31 | -3% |
| | PEG2 | 19 | 491 | 0.40 | 506 | 0.28 | 3% |
| Ta ppm | LAT1 | 140 | 13 | 0.44 | 13 | 0.25 | -2% |
| | LAT2 | 129 | 14 | 0.40 | 14 | 0.22 | 3% |
| | PEG1 | 96 | 19 | 0.37 | 19 | 0.21 | 1% |

| Assay | Domain | Composites | | | Block Model | | Percentage Difference |
|---|---|---|---|---|---|---|---|
| | | Number of Composites | Mean | CV | Mean | CV | |
| | PEG2 | 19 | 25 | 0.41 | 26 | 0.27 | 4% |
| **K Dump** | | | | | | | |
| $Li_2O$ % | PEG1 | 237 | 0.66 | 0.38 | 0.67 | 0.25 | 2% |
| | PEG2 | 356 | 0.85 | 0.39 | 0.87 | 0.29 | 2% |
| Sn ppm | PEG1 | 226 | 653 | 0.40 | 656 | 0.21 | 1% |
| | PEG2 | 352 | 310 | 0.60 | 305 | 0.34 | -1% |
| Ta ppm | PEG1 | 226 | 33 | 0.41 | 35 | 0.25 | 5% |
| | PEG2 | 352 | 25 | 0.41 | 25 | 0.21 | 0% |

Due to the paucity of the data, the majority of the deposits did not lend well to being validated using swath plots, with the exception of the K, Hf and Gf deposits. For these deposits, swath plot validations in the X, Y and Z direction were used to locally validate the block estimates against the sample composites. No material biases in the estimates of the individual elements were identified. Examples of a swath plot validation for Li2O for the K-dump are shown in Figure 14-10.

**Figure 14-10: Swath Plot Validation for $Li_2O$ % for the K Deposit**



The block model was examined visually to ensure that the drillhole grades were locally well represented by the block model and it was found that the model validated reasonably well, with acceptable degrees of smoothing observed for all attributes. Examples of visual validation of the models for the K deposit in plan view and section are shown in Figure 14-11 and Figure 14-12 respectively.

**Figure 14-11: K Deposit Estimated Block Model Plan View – $Li_2O$ %**

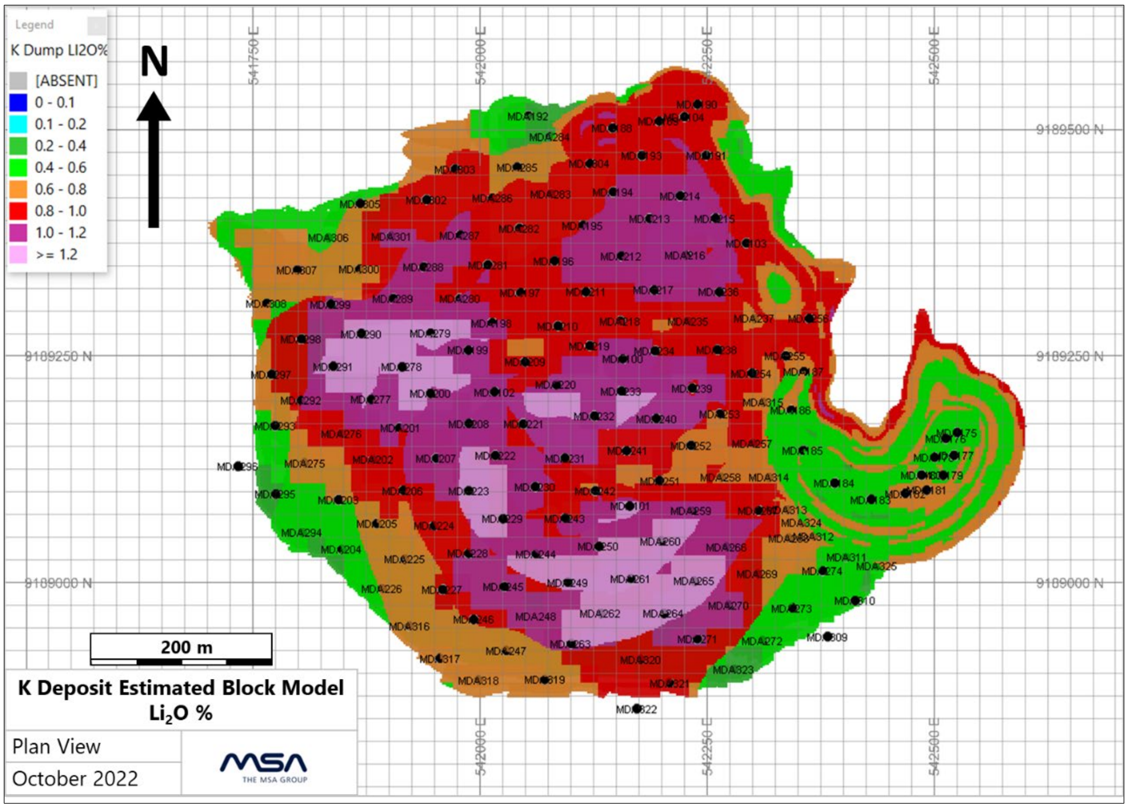
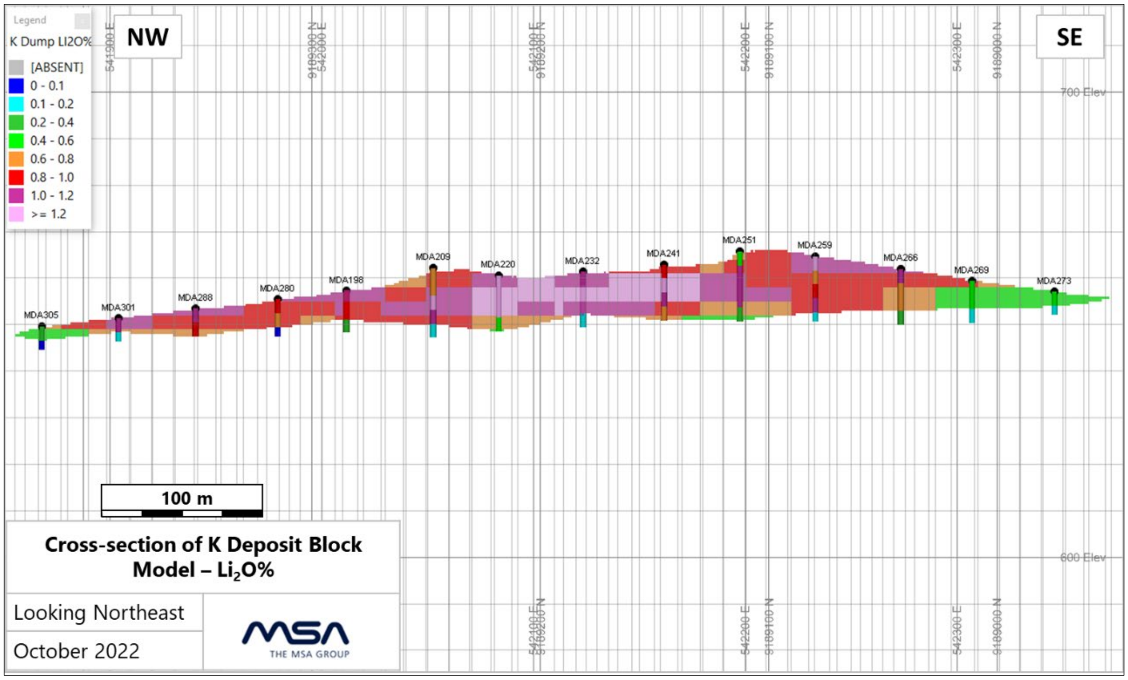
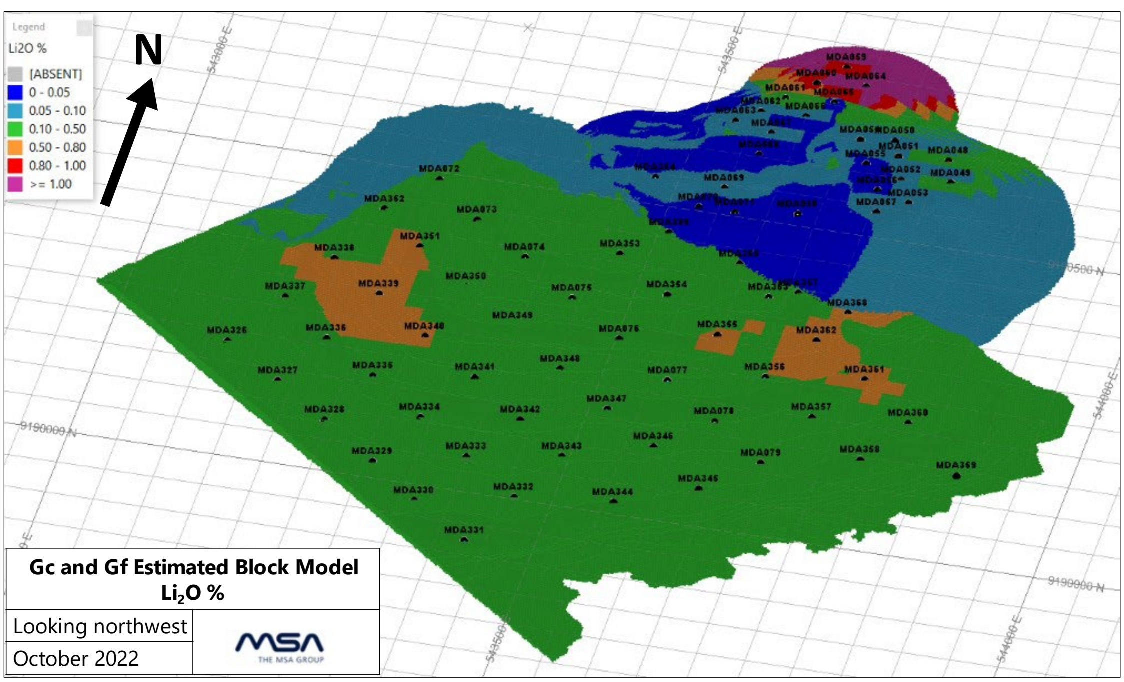


**Figure 14-12: Cross-Section Through K Deposit Coloured on $Li_2O$ % (Looking Northeast)**




The Gc and Gf block models are illustrated in Figure 14-13.

**Figure 14-13: Isometric View of the Gc Deposit in the Background and the Gf Deposit (Foreground)**



### 14.10 Mineral Resource Classification

Classification of the Manono block models was based on the degree of geological uncertainty of the material types which constitute each tailings deposit, lithium grade continuity and variability and the frequency of the drilling data. The main considerations in the classification are as follows:

- The data that informs the Mineral Resource estimate has been collected using acceptable principles and the assays have been demonstrated to be of reasonable accuracy.
- The mineralisation shows reasonable lateral continuity within each tailings deposit.
- For the K deposit, the semivariogram ranges for lithium are 170 m, which is well within the drillhole spacing of 40 m for the lower lying material.

Given the aforementioned factors, the Manono Lithium Tailings Mineral Resources have been classified using the following criteria:

- The Mineral Resource was classified as Measured where the tailings deposit was homogenous in material type, drilled to a nominal 40 m grid spacing and where good continuity of $Li_2O$ grades can be observed.
- Areas informed by drilling with a nominal grid spacing of 40 m to 80 m, with a maximum extrapolation of 40 m from the nearest drillhole were classified as Indicated Mineral Resources.
- Inferred Mineral Resources were classified where confidence in the estimates is low due to sparse drillhole coverage and where local estimates cannot be reliably made.

The Measured Mineral Resources for the Manono Lithium Tailings are exclusively contained in the low-lying tailings material of the K deposit. The stacked tailings of the K deposit were classified as Inferred due to the sparse drillhole coverage. Achieving a dense drilling grid on the stacked tailings proved technically challenging due to the inability to safely drill this unconsolidated material and Tantalex is actively pursuing a way of drilling these tailings in order to increase the confidence in the estimates. The Indicated Mineral Resources are contained predominantly in the Hf deposit with a small portion present in the Gc deposit. The remainder of the Manono deposits were classified as Inferred due to sparse drillhole coverage.

The model classification is illustrated in Figure 14-14 for the K-dump, Figure 14-15 for the Gf-dump and Figure 14-16 for the Gc-dump.

**Figure 14-14: K Deposit Classification**

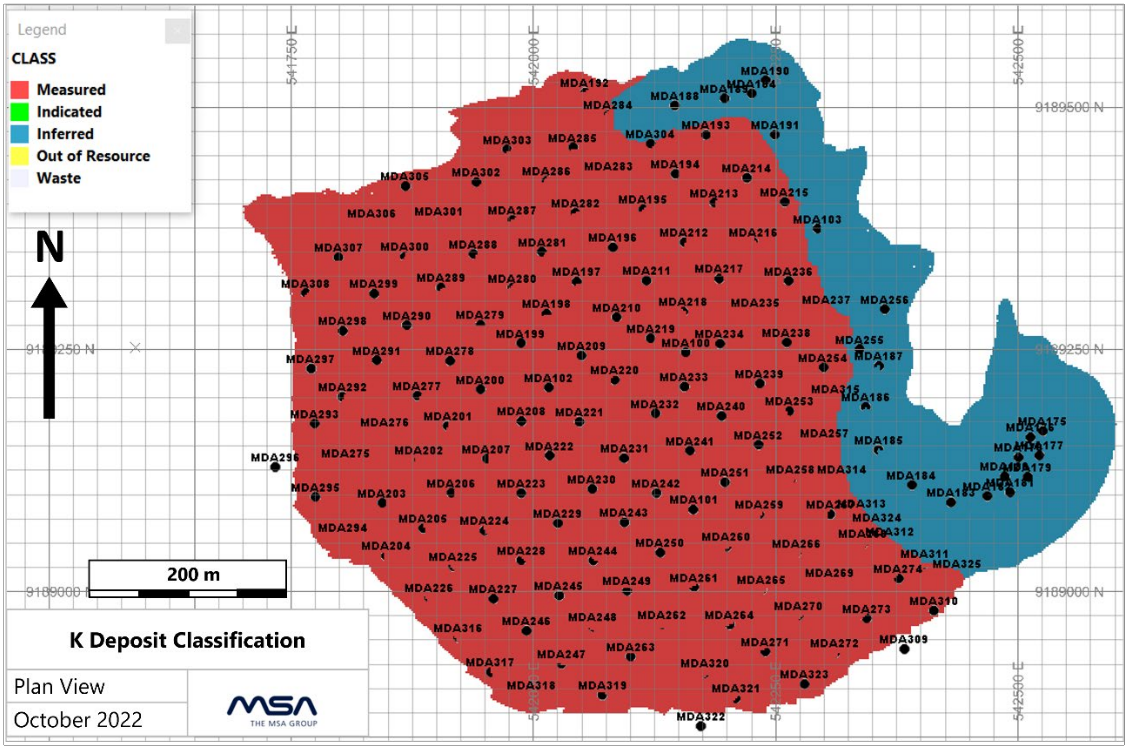



**Figure 14-15: Gc Deposit Classification**

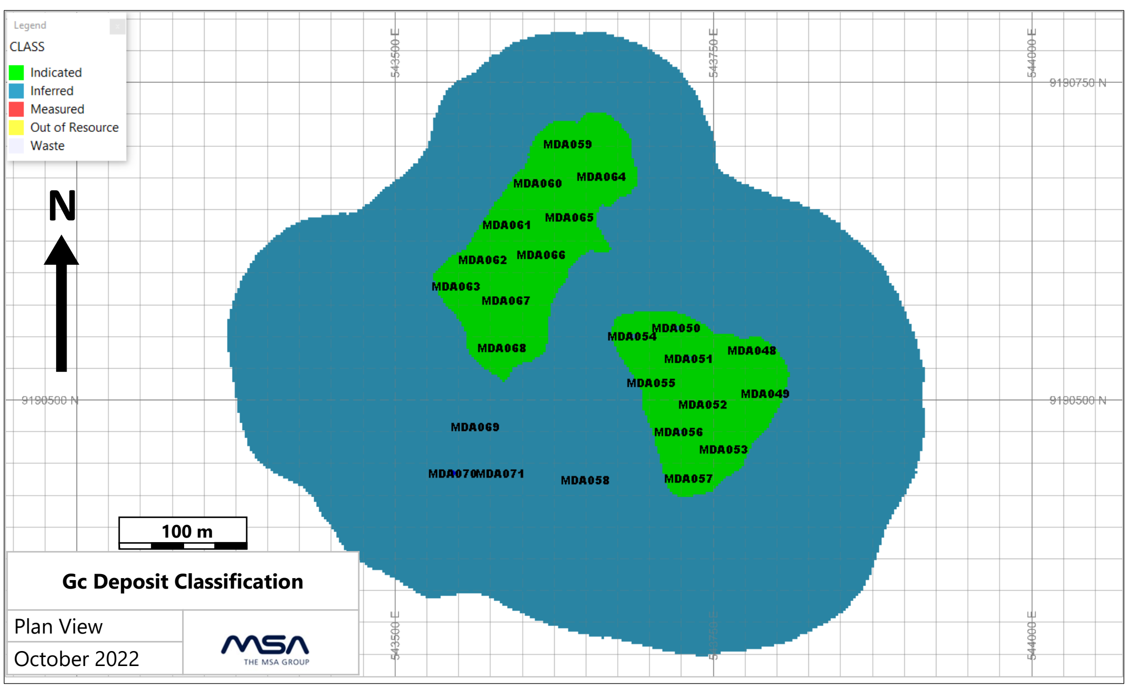
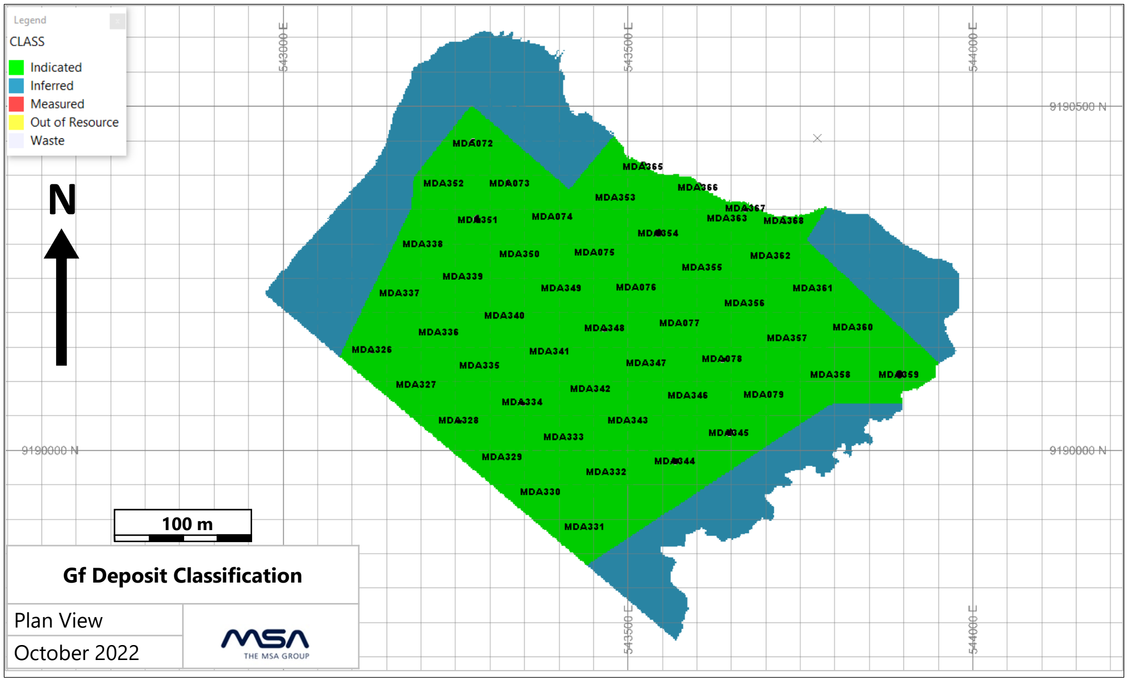


**Figure 14-16: Gf Deposit Classification**




## 14.11 Mineral Resource Statement

The Mineral Resource estimates as of 23 August 2023 are presented at a cut-off grade of 0.20% Li2O for each deposit and totalled for each category, in Table 14-15 for the Southern Sector deposits (Ic, Gc, Gf and K dumps). Due to the spatial arrangement of the high-grade areas, which can be visually discerned from low-grade laterite areas, these deposits offer a sufficient degree of selectivity to be mined at the selected cut-off grade.

At the selected cut-off grade no Mineral Resources are reported for deposits Ec, Hc and Hf.

In the QP's opinion, the Mineral Resources reported herein at the selected cut-off grade have "reasonable prospects for eventual economic extraction", taking into consideration mining and processing assumptions.

**Table 14-15: Manono Mineral Resources at 0.20% $Li_2O$ Cut-Off Grade – 23 August 2023**

| Deposit | Classification | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| Cc | Inferred | 2.99 | 0.32 | - | - |
| Ic | Inferred | 0.51 | 0.49 | 583 | 29 |
| Gc | Indicated | 0.29 | 0.78 | 579 | 30 |
| | Inferred | 0.51 | 0.84 | 554 | 29 |
| Gf | Indicated | 1.39 | 0.35 | 183 | 22 |
| | Inferred | 0.13 | 0.33 | 209 | 26 |
| K | Measured | 3.77 | 0.86 | 306 | 25 |
| | Inferred | 2.33 | 0.67 | 656 | 35 |

| Deposit | Classification | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| **$Li_2O$, Sn and Ta Mineral Resources** | | | | | |
| Total | Measured | 3.77 | 0.86 | 306 | 25 |
| | Indicated | 1.69 | 0.42 | 252 | 24 |
| | **Measured & Indicated** | **5.46** | **0.73** | **289** | **25** |
| | Inferred | 3.48 | 0.66 | 614 | 33 |
| **$Li_2O$ only Mineral Resources** | | | | | |
| **Total** | Inferred | 2.99 | 0.32 | - | - |

*Notes:*

1. *All tabulated data have been rounded and as a result minor computational errors may occur.*
2. *Mineral Resources are not Mineral Reserves, have no demonstrated economic viability.*
3. *$Li_2O$ % grades calculated by applying a factor of 2.153 to Li % grades.*
4. *Mt = Million tonnes, ppm = parts per million*
5. *Inferred $Li_2O$, Sn and Ta Mineral Resources are totalled for the Southern Sector dumps (Ic, Gc, Gf and K).*
6. *Inferred $Li_2O$ only Mineral Resources are for the Cc dump.*

### 14.11.1 *Assessment of Reasonable Prospects for Eventual Economic Extraction (RPEE)*

An assessment of Reasonable Prospects for Eventual Economic Extraction was undertaken based on costs provided by Tantalex and derived from the PEA. The following assumptions have been used to determine the cut-off grade and RPEE.

- Mining: Will be undertaken using bulldozers and loaders.
- Mining cost: $USD 2.17 per tonne of rock
- Mining Recovery: 99%
- Process Recovery: 63 % for $Li_2O$
- Revenue Royalty: 3%
- Payability: 98.5%
- Processing cost: $USD 11.18 per tonne RoM
- Transport Costs: $USD 361 /tonne of concentrate
- Indirect Costs including G&A: $USD 76.5 /tonne of concentrate
- Marketing Costs: $USD 178.4 /tonne of concentrate
- Lithium Price: $USD 2,800/tonne (SC6 – Spodumene Concentrate)

### 14.11.2 *Comparison with Previous Estimate*

The Mineral Resource estimate detailed in this report represents the second Mineral Resource estimate reported for the Manono Lithium Tailings Project. The updated Mineral Resource estimate includes estimates for tin and tantalum which were previously excluded, as well as additional drilling for the Ic deposit.

A comparison for the total Mineral Resources between the previous estimate, with an effective date 13 December 2022, and the current estimate with an effective date 23 August 2023 is presented in Table 14-16.

**Table 14-16: Manono Mineral Resource Estimate Compared with the 13 December 2022 Mineral Resource Estimate**

| Classification | 13 December 2022 | | | | 23 August 2023 | | | |
|---|---|---|---|---|---|---|---|---|
| | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm |
| Measured | 3.77 | 0.86 | - | - | 3.77 | 0.86 | 306 | 25 |
| Indicated | 1.69 | 0.42 | - | - | 1.69 | 0.42 | 252 | 24 |
| **Measured & Indicated** | **5.46** | **0.72** | - | - | **5.46** | **0.73** | **289** | **25** |
| Inferred ($Li_2O$, Sn and Ta) | 3.64 | 0.64 | - | - | 3.48 | 0.66 | 614 | 33 |
| Inferred ($Li_2O$ only) | 2.99 | 0.32 | - | - | 2.99 | 0.32 | - | - |

*Notes:*

1. *All tabulated data have been rounded and as a result minor computational errors may occur.*
2. *Mineral Resources are not Mineral Reserves, have no demonstrated economic viability.*
3. *$Li_2O$ % grades calculated by applying a factor of 2.153 to Li % grades.*
4. *Mt = Million tonnes, ppm = parts per million*
5. *Inferred $Li_2O$, Sn and Ta Mineral Resources are totalled for the Southern Sector dumps (Ic, Gc, Gf and K).*
6. *Inferred $Li_2O$ only Mineral Resources are for the Cc dump.*

# 15 MINERAL RESERVE ESTIMATES

Mineral Reserves have not been declared for the Manono Lithium Tailings Project.

# 16 MINING METHODS

The tailings dumps will be reclaimed by an excavator at each of K, I and G dumps and loaded onto dump trucks for transport onto an overland conveyor that will feed a stockpile at the process plant.

A series of three, 900 mm wide belt overland conveyors will transport a total of 240 tonnes per hours to the process plant stockpile approximately 3,300 m from the reclaimed dump blending pad. The first two segments of the conveyors will be enclosed by guarding and be elevated approximately 1.5 m off the ground on concrete pedestals, elevating higher at the location of the two transfer towers. The final, 295 m conveyor section will be elevated on trestles at approximately 6 m heigh and to allow for safe crossing over a major road and population centre.

# 17 RECOVERY METHODS

## 17.1 Process Design Criteria

The Processing Plant is designed to process the tailings recovered from the K, G and I tailings dumps to produce $Li_2O$ concentrate. The process flowsheet and preliminary mass balance is based on the metallurgical testwork conducted during the study as described in Chapter 13.

The main criteria for the process design are presented in Table 17-1.

**Table 17-1: Process Design Criteria**

| Description | Dry Throughput (TPH) |
|---|---|
| K-dump | 134.2 |
| G-dump | 61.0 |
| I-dump | 20.8 |
| **ROM Feed to Process Plant** | **216** |
| Crusher Feed | 14.6 |
| DMS Plant Feed | 135.9 |
| Flotation Plant Feed | 97.9 |

### 17.1.1 *Production Calculation*

The feed grade as stated in MSA's mineral Resource estimate (effective date of 23 August 2023) was used as the input into the mass balance. The testwork results, presented in Chapter 13 for K-dump and Gc-dump have been applied to I-dump, as I-dump has similar granulometry. Material from the Indicated Gfs-dump has been excluded due to the very low head grade. The testwork results were downgraded to account for process inefficiencies anticipated to occur in a commercial plant, with these corrections summarized in Table 17-2 and included in the mass balance.

**Table 17-2: Corrections Applied to Test Work Results to Represent Commercial Operations**

| DMS Test work Results | Laboratory Value | Commercial Design |
|---|---|---|
| Feed $Li_2O$ wt% | 0.76 | 0.76 |
| DMS Concentrate $Li_2O$ wt% | 6.0 | 5.5 |
| DMS Tailings $Li_2O$ wt% | 0.37 | 0.42 |
| Lithium Recovery % | 51.5 | 45 |
| Weight Recovery % | 6.5 | 6.2 |
| Primary Mass Weight Recovery % | 22.2 | 20.0 |
| Middlings Weight Recovery % | 15.7 | 11.8 |
| Secondary Mass Weight Recovery % | 41.0 | 36.0 |

| Flotation Test work Results | Laboratory Value | Commercial Design |
|---|---|---|
| Feed $Li_2O$ wt% | 1.12 | 1.12 |
| Concentrate $Li_2O$ wt% | 6.0 | 5.5 |
| Tailings $Li_2O$ wt% | 0.25 | 0.34 |
| Lithium Recovery % | 67.1 | 55.0 |
| Weight Recovery % | 8.5 | 7.6 |

The commercial design values listed in Table 17-2 have been incorporated into a mass balance that was used to calculate the production rate of a process plant using DMS and Flotation to produce approximately 112,000 tonnes/year of a 5.5wt% lithium spodumene concentrate, operating for six years. The annual production is summarized in Table 17-3.

**Table 17-3: Process Plant Production**

| Item | Description | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | Plant Feed Total (tonnes) | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | **7,573,000** |
| 1.1 | K Dump* | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | **6,100,000** |
| 1.2 | Gc Dump | 133,833 | 133,833 | 133,833 | 133,833 | 133,833 | 133,833 | **803,000** |
| 1.3 | I Dump | 111,667 | 111,667 | 111,667 | 111,667 | 111,667 | 111,667 | **670,000** |
| 1.4 | Gf Dump | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2 | Crushing & Screening | | | | | | | |
| 2.1 | Total Fines(-0.5mm) to Flotation (tonnes) | 468,443 | 468,443 | 468,443 | 468,443 | 468,443 | 468,443 | **2,810,658** |
| 2.2 | Total Coarses(+0.5mm) to DMS Plant (tonnes) | 793,724 | 793,724 | 793,724 | 793,724 | 793,724 | 793,724 | **4,762,342** |
| 3 | DMS Plant | | | | | | | |
| 3.1 | DMS Production; SC6 (tonnes) | 49,355 | 49,355 | 49,355 | 49,355 | 49,355 | 49,355 | **296,131** |
| 3.2 | DMS Middlings to Flotation (tonnes) | 93,515 | 93,515 | 93,515 | 93,515 | 93,515 | 93,515 | **561,090** |
| 4 | Flotation Plant | | | | | | | |
| 4-1 | Flotation Feed (tonnes)<br>Fines(-0.5mm)+DMS Middlings: (2.1)+(3.2) | 561,958 | 561,958 | 561,958 | 561,958 | 561,958 | 561,958 | **3,371,749** |
| 4-2 | Flotation Product SC6 (tonnes) | 62,812 | 62,812 | 62,812 | 62,812 | 62,812 | 62,812 | **376,871** |
| | **DMS and Flotation Production (tonnes): (3.1)+(4.2)** | **112,167** | **112,167** | **112,167** | **112,167** | **112,167** | **112,167** | **673,003** |

*The quantity of K dump feed is the sum of K coarse and K fines.

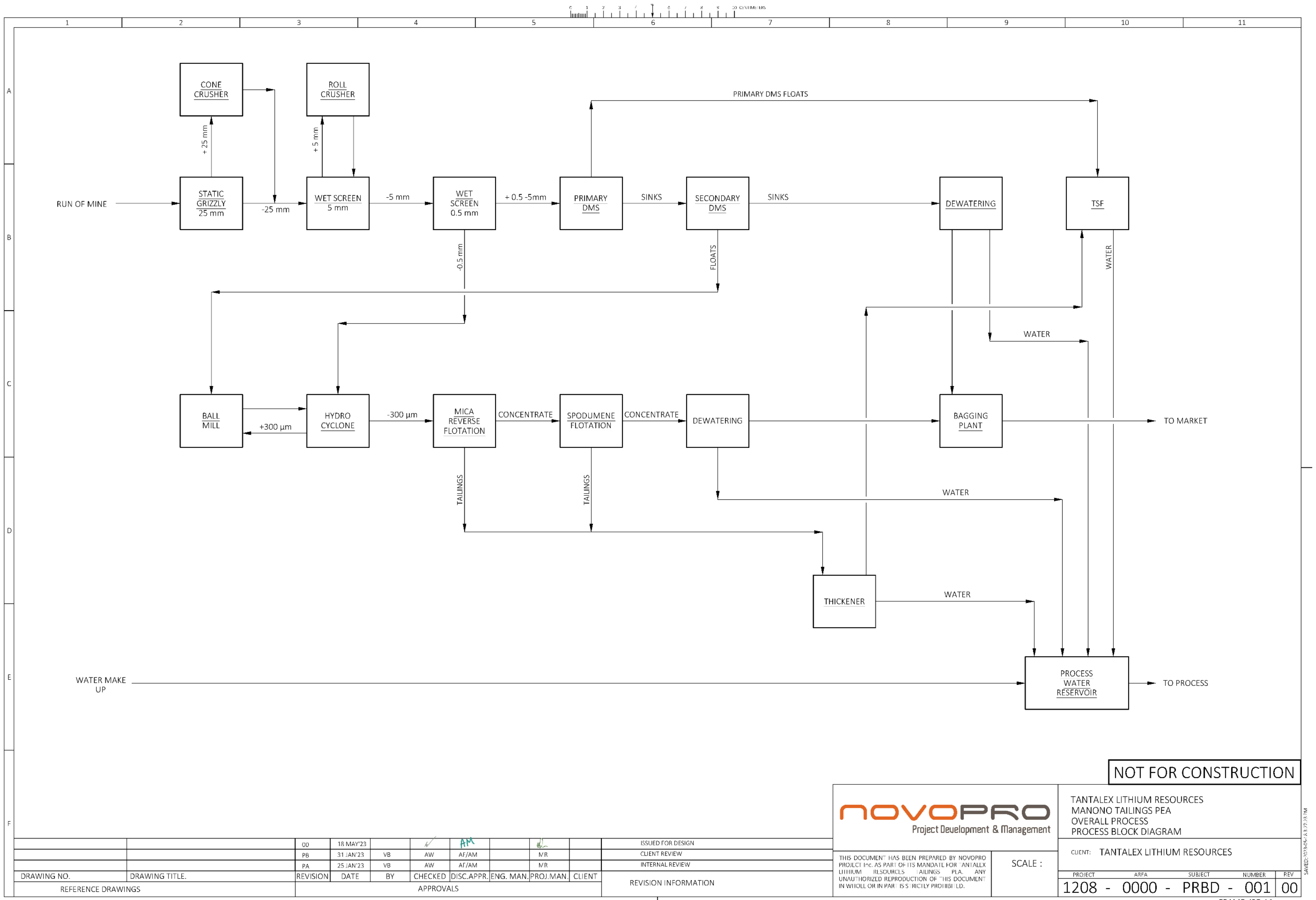
### 17.2 Process Description

Stockpiled material in proximity to the processing facility is reclaimed by front end loader onto a belt conveyor that feeds a vibrating screen with a 5 mm deck. Oversize material falls into a double roll crusher and is returned to the belt conveyor. Screen undersize material is transported onto a wet vibrating screen with a 500 µm deck. Wet screen oversize is transferred into the DMS (Dense Media Separation) plant feed tank, while the wet screen undersize falls into a pump box for feeding into the wet grinding and flotation plant.

A two stage DMS plant is used to produce 5.5 wt% Li2O concentrate where the primary DMS floats (tailings) are transported by a series of moveable conveyors to the TSF. Secondary DMS floats (middlings) are pumped to wet grinding and the flotation plant, followed by dewatering by a centrifuge and are then sent to the bagging plant. Secondary DMS sinks are dewatered by a centrifuge and then sent to the bagging plant.

Figure 17-1 presents the overall process block diagram.

**Figure 17-1: Overall Process Block Diagram**



#### 17.2.1 *Crushing and Screening*

The 15,000 tonnes process plant stockpile will be reclaimed by a front-end loader and fed onto a belt conveyor that will transport the material onto the vibrating, crusher sizing screen. The 5mm screen deck will divert oversized material into a double roll crusher, that will return the material onto the crusher feed conveyor. Spray water will be used on this screen deck to push finer material to the undersize. Screen undersize will flow onto a vibrating wet sizing screen with a 500 µm deck. The wet sizing screen will divert the oversize material into the DMS plant feed tank and the undersize into the wet grinding plant feed pump box.

#### 17.2.2 *DMS Plant*

The wet screen oversize material will be combined with Ferrosilicon (FeSi) media to increase the specific gravity of the slurry to 2.65 t/m$^3$ before entering the primary DMS cyclones. The primary DMS cyclone overflow (floats) will be dewatered through a screen to 15% moisture and transported by a series of grasshopper conveyors to the Tailings Storage Facility (TSF). Primary cyclone underflow (sinks) will be combined with additional FeSi to increase the specific gravity to 2.85 t/m$^3$ before entering the secondary DMS cyclones. Overflow from the secondary cyclone (middlings) will be pumped to the wet grinding plant. Secondary cyclones underflow is transferred to a dewatering centrifuge. FeSi media is recovered from primary and secondary DMS cyclones through drain and rinse screens, and magnetic separators.

#### 17.2.3 *Wet Grinding*

Wet screen undersize and DMS middlings are pumped to a ball mill for wet grinding. The product slurry is pumped to a hydrocyclone with a cut point of 300 µm. Cyclone overflow (-300 µm) is fed to the flotation plant and the underflow (+300 µm) is recycled back to the ball mill.

#### 17.2.4 *Flotation Plant*

The ball mill cyclone overflow is pumped to a high intensity scrubber followed by a desliming cyclone and a magnetic separator. The iron-deficient slurry is then pumped into two-stages of mica reverse flotation cells. The floated mica is pumped to the tailings thickener with the remaining slurry being pumped into a dewatering cyclone.

The mica-deficient, dewatered slurry passes through a high-density scrubber and a desliming cyclone before being pumped into four-stages of lithium spodumene flotation cells. Tailings from the rougher and scavenger cells are pumped to the tailings thickener while the concentrate is pumped to the cleaner cells. Concentrate from the first cleaner stage is pumped into the second stage cleaner to produce a final product concentrate that is pumped to the dewatering centrifuge. Tailings from the cleaner cells are pumped to the tailings thickener.

#### 17.2.5 *Product Dewatering and Bagging*

Spodumene concentrate from the DMS and Flotation plants is pumped into dedicated screen bowl centrifuges for final dewatering, targeting 5% moisture. The dewatered concentrate is transferred into dedicated storage bins to feed the product bagging plants. Each concentrate type will have a dedicated bagging plant that will include automatically filling 1 tonne bulk bags, bag labeling, and transporting the filled bags on an accumulating conveyor for forklift handling. The 1 tonne bulk bags will be removed from the accumulating conveyors by forklifts for storage on wooden pallets in a covered area at the process plant. Forklifts will maneuver the palletized bags onto transport trucks that will deliver the bags to a warehouse location in Lubumbashi. From Lubumbashi, the palletized bags will be loaded onto 26 tonne capacity trucks for transport to the port of Dar es Salaam, Tanzania.

### 17.2.6 *Tailings Dewatering*

A single high-rate thickener will collect various tailings streams generated throughout the process plant. These streams consist of effluent from the DMS plant, fines in the desliming cyclone overflow, overflow from the dewatering cyclones, magnetic separation tailings, mica reserve flotation concentrate and spodumene flotation tailings.

The solids present in the feed streams will settle to the bottom of the thickener and water is recovered through the overflow weir. The recovered water is pumped to the process water pond. The underflow slurry will be pumped to the TSF at 55% moisture.

### 17.2.7 *Reagents*

The DMS Plant will use ferrosilicon (FeSi) as the densifying agent. The FeSi will be stored in waterproof steel drums under a roof at the process plant.

The flotation plant will require several reagent types, that will be stored in plastic totes under a roof at the process plant. The reagents will include frothers, amine collectors and sodium-based compounds as regulators.

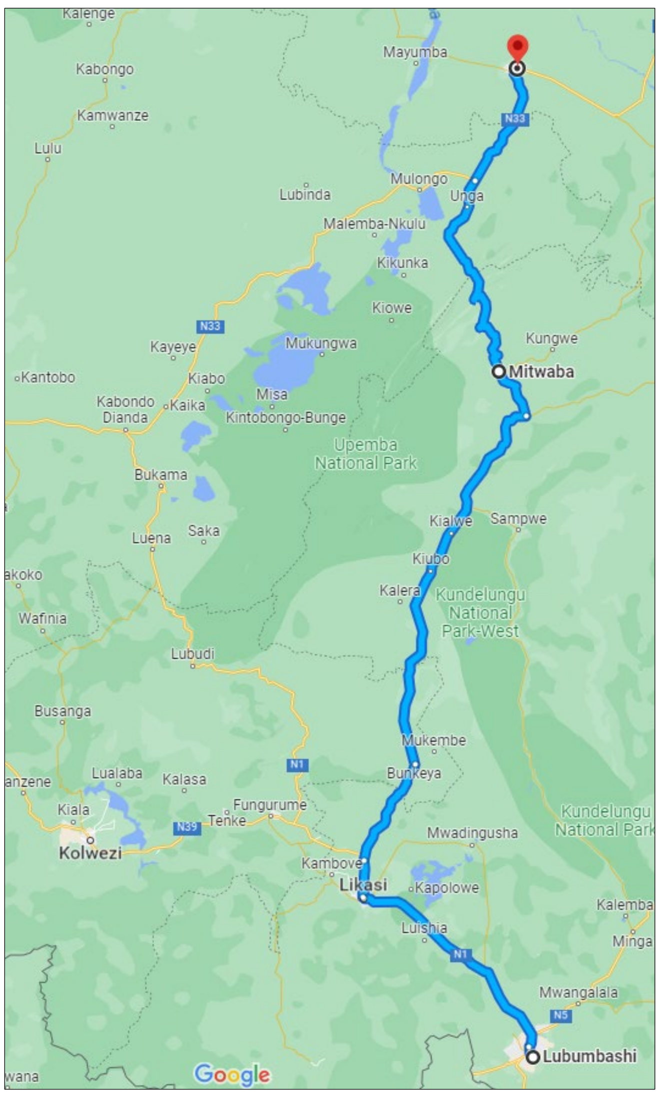
A flocculant will be added to the tailings thickener to assist in solids settling. The flocculant will be stored in plastic totes under a roof at the process plant, near the thickener.

# 18 PROJECT INFRASTRUCTURE

## 18.1 Road Access

There is currently a compacted gravel and sand road from the process plant site that continues along the edge of the Eastern side of the hill that will serve as the primary access point to the project. This hill side road connects to the N33 located to the northeast of the plant site and is the main access road to the towns of Manono and Kitotolo from Lubumbashi. The final 240 km of the N33 between Likasi and Manono is an unpaved road that is prone to wash outs in rainy season. Tantalex is currently conducting a survey of this transport corridor to determine the necessary upgrades that will allow for all year usage of the road. This segment of road also contains several bridges that will require upgrades to handle the increased tonnages. An allowance of USD$ 10 million has been allocated in the CAPEX for improving this road prior to start up of the operations. Figure 18-1 shows the transport corridor between Manono and Lubumbashi.

**Figure 18-1: Transport Corridor to Manono**




***Source***: *Google Maps*

### 18.2 Site Description

The process plant and TSF are located approximately 3 km southeast of the dumps, on the east side of the hill, away from existing settlements and within Tantalex's licence area. The planned site location consists of native vegetation of shrubs and trees with a few farm plots scattered throughout. Refer to Figure 18-2 for the Proposed Site Layout.

### 18.3 Plant Site Layout

The processing plant site includes the following:

- Feed Stockpile
- Process Plant
- Tailings Storage Facility
- Diesel Generators
- Air Compressors
- Control Room
- Warehouse and Maintenance Buildings
- Administration Building
- Storm Water Pond
- Process Water Pond
- Water Treatment Plant
- Waste Water Treatment Plant

On site and off-site accommodations for personnel are not required at the plant site, as the personnel will reside in the town of Manono located approximately 5 km from the Plant Site.

The Plant Site Layout is shown in Figure 18-3.

### 18.4 Process Plant / Equipment Layout

Figure 18-4 shows the process plant and equipment layout.

The feed stockpile, crushing and screening area is located next to the process plant and is orientated north to south matching the process flow. The wet screens and crusher are arranged vertically to minimize material handling and the overall footprint. The wet screen oversize and undersize materials are directed into slurry tanks at ground level.

The DMS and Flotation plants are orientated north to south following the process flow. To minimize the pumping requirements, the cyclones, screens and magnetic separators are arranged vertically at different levels which eventually drain into the tanks located at ground level. The DMS tailings conveyor exits the process plant to the east and continues to the TSF.

The product bagging plants and storage areas are located to the south of the DMS and Flotation plants for ease of loadout access.

**Figure 18-2: Proposed Site Layout**

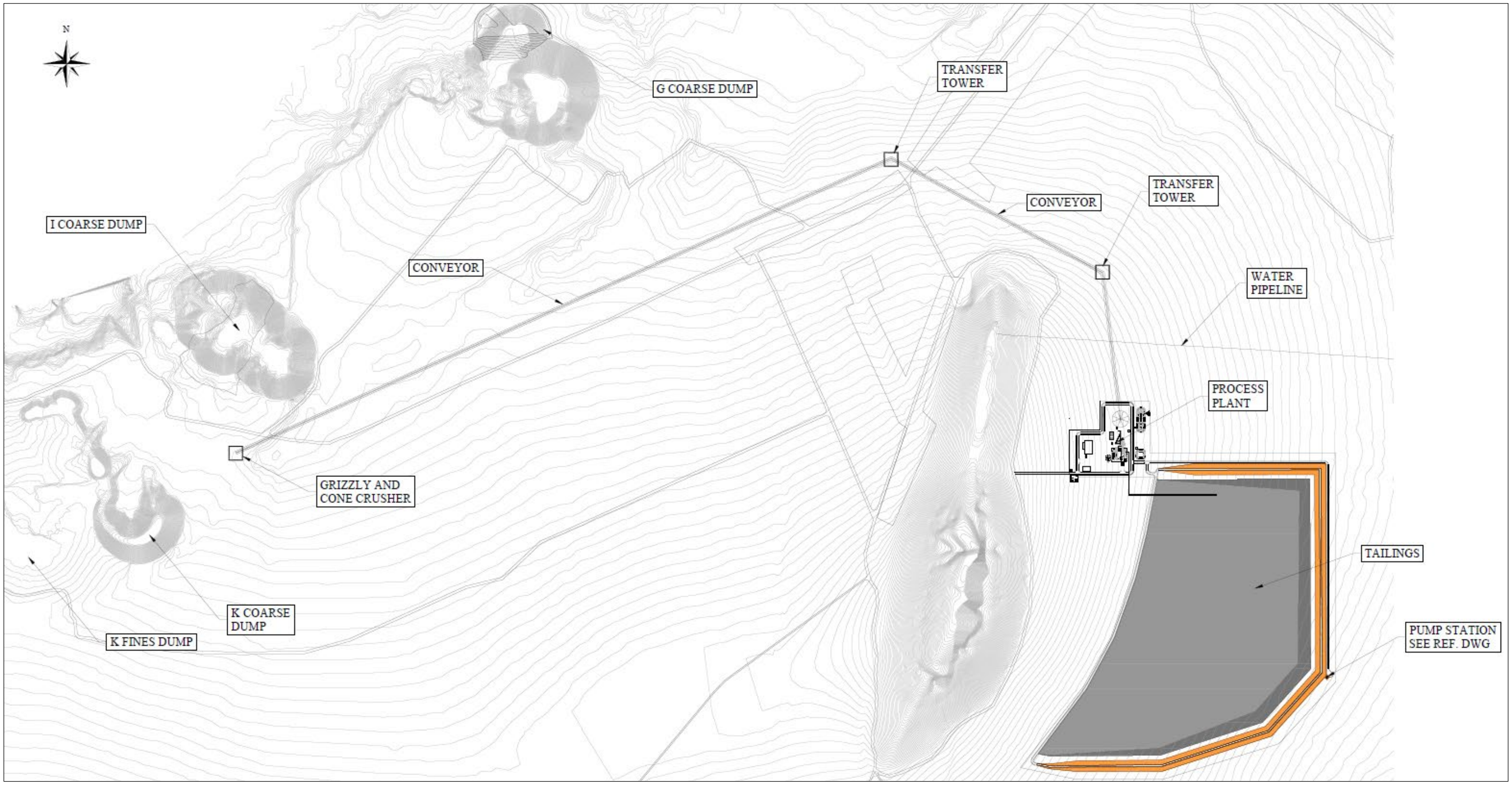
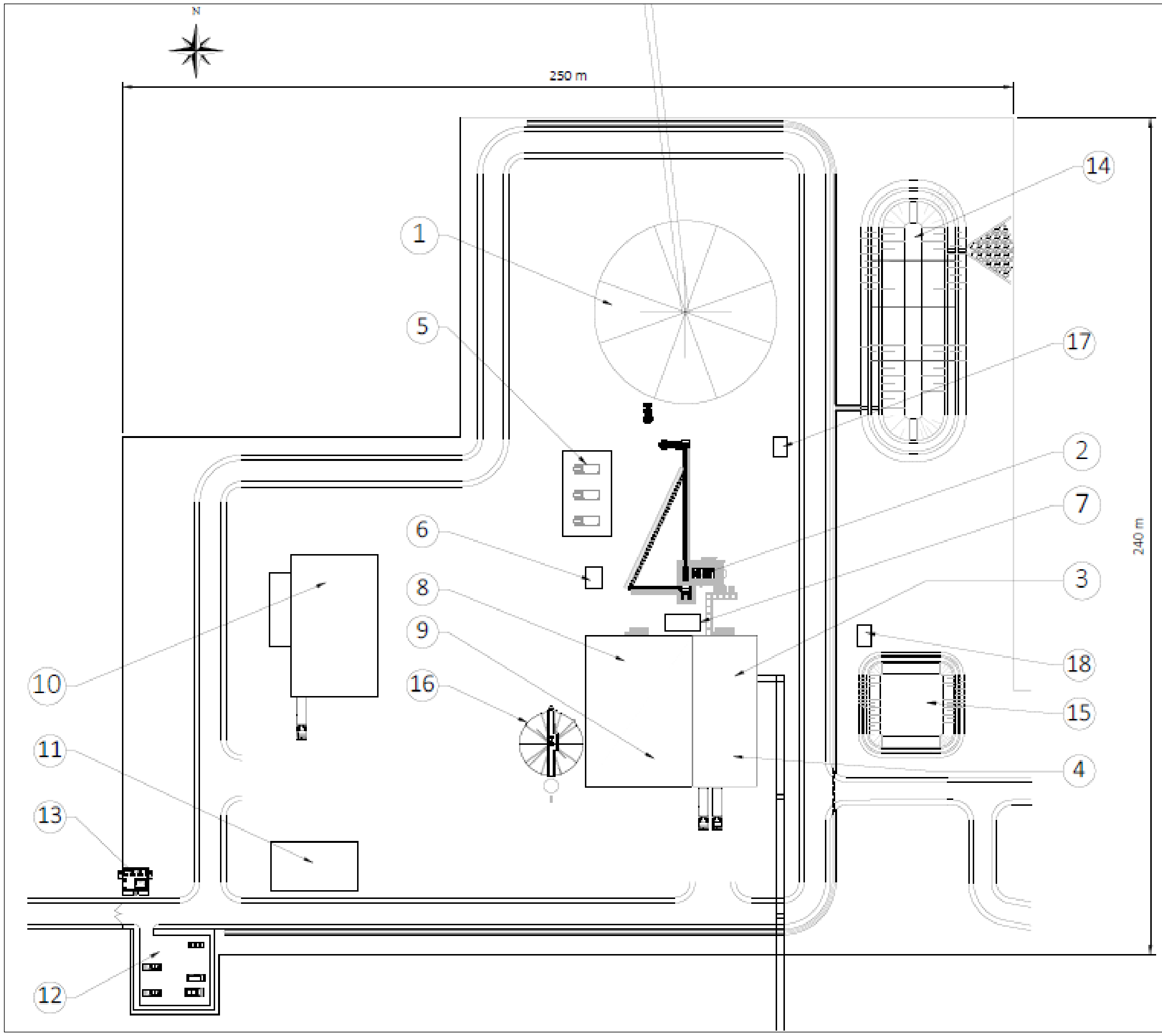
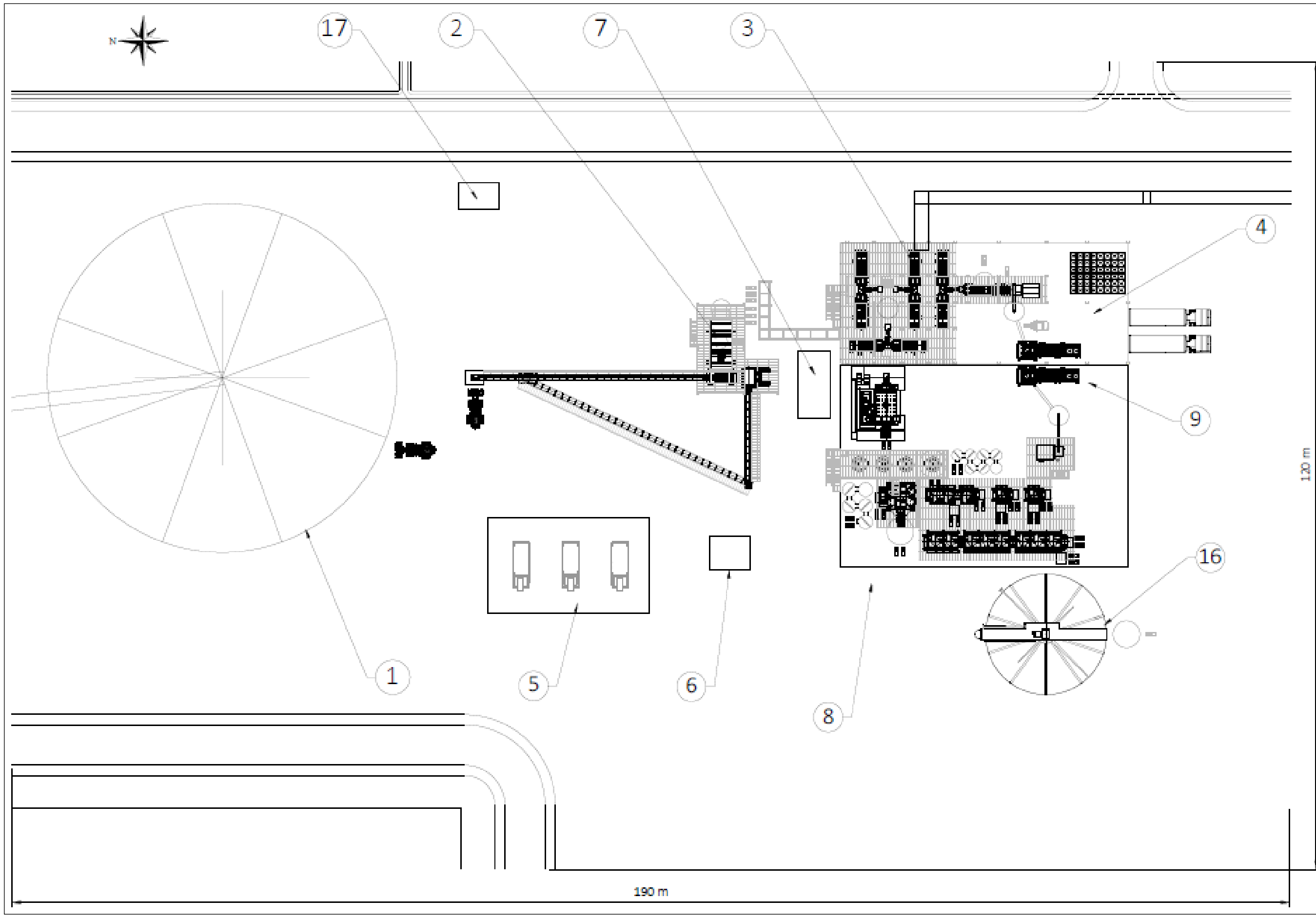


**Figure 18-3: Plant Site Layout**




| AREAS AND BUILDINGS LIST | |
|---|---|
| No. | ITEM |
| 1 | FEED STOCKPILE |
| 2 | CRUSHING AND SCREENING |
| 3 | DENSE MEDIA SEPARATION AND DEWATERING |
| 4 | DENSE MEDIA PRODUCT BAGGING PLANT |
| 5 | DIESEL GENERATORS |
| 6 | AIR COMPRESSING |
| 7 | CONTROL AND ELECTRICAL ROOM |
| 8 | GRINDING, FLOTATION AND DEWATERING |
| 9 | FLOTATION CONCENTRATE BAGGING PLANT |
| 10 | WAREHOUSE AND MAINTENANCE BUILDING |
| 11 | ADMIN BUILDING |
| 12 | PARKING LOT |
| 13 | GUARD HOUSE |
| 14 | STORM WATER POND |
| 15 | PROCESS WATER POND |
| 16 | FLOTATION TAILINGS THICKENER |
| 17 | WASTE WATER TREATMENT PLANT |
| 18 | WATER TREATMENT PLANT |

**Figure 18-4: Process Plant General Arrangement**




| AREAS AND BUILDINGS LIST | |
|---|---|
| No. | ITEM |
| 1 | FEED STOCKPILE |
| 2 | CRUSHING AND SCREENING |
| 3 | DENSE MEDIA SEPARATION AND DEWATERING |
| 4 | DENSE MEDIA PRODUCT BAGGING PLANT |
| 5 | DIESEL GENERATORS |
| 6 | AIR COMPRESSING |
| 7 | CONTROL AND ELECTRICAL ROOM |
| 8 | GRINDING, FLOTATION AND DEWATERING |
| 9 | FLOTATION CONCENTRATE BAGGING PLANT |
| 16 | FLOTATION TAILINGS THICKENER |
| 17 | WASTE WATER TREATMENT |

## 18.5 Controls

The process plant will be monitored and controlled from a single, centrally located control room. The control system will be a combination of programmable logic controllers (PLCs) and human machine interfaces (HMIs). The control system hardware including the networking equipment, servers, and PLC CPU will be housed in a separate, controlled access room inside the control room.

Industrial communication protocols such as Ethernet IP or HART will be utilized to the greatest extent possible. Remote I/O cabinets will be strategically placed throughout the process plant to minimize field cabling.

HMIs in the control room will have real time display graphics of the process plant operations. Overall plant performance and process data will be historically archived and made easily accessible for review and reporting.

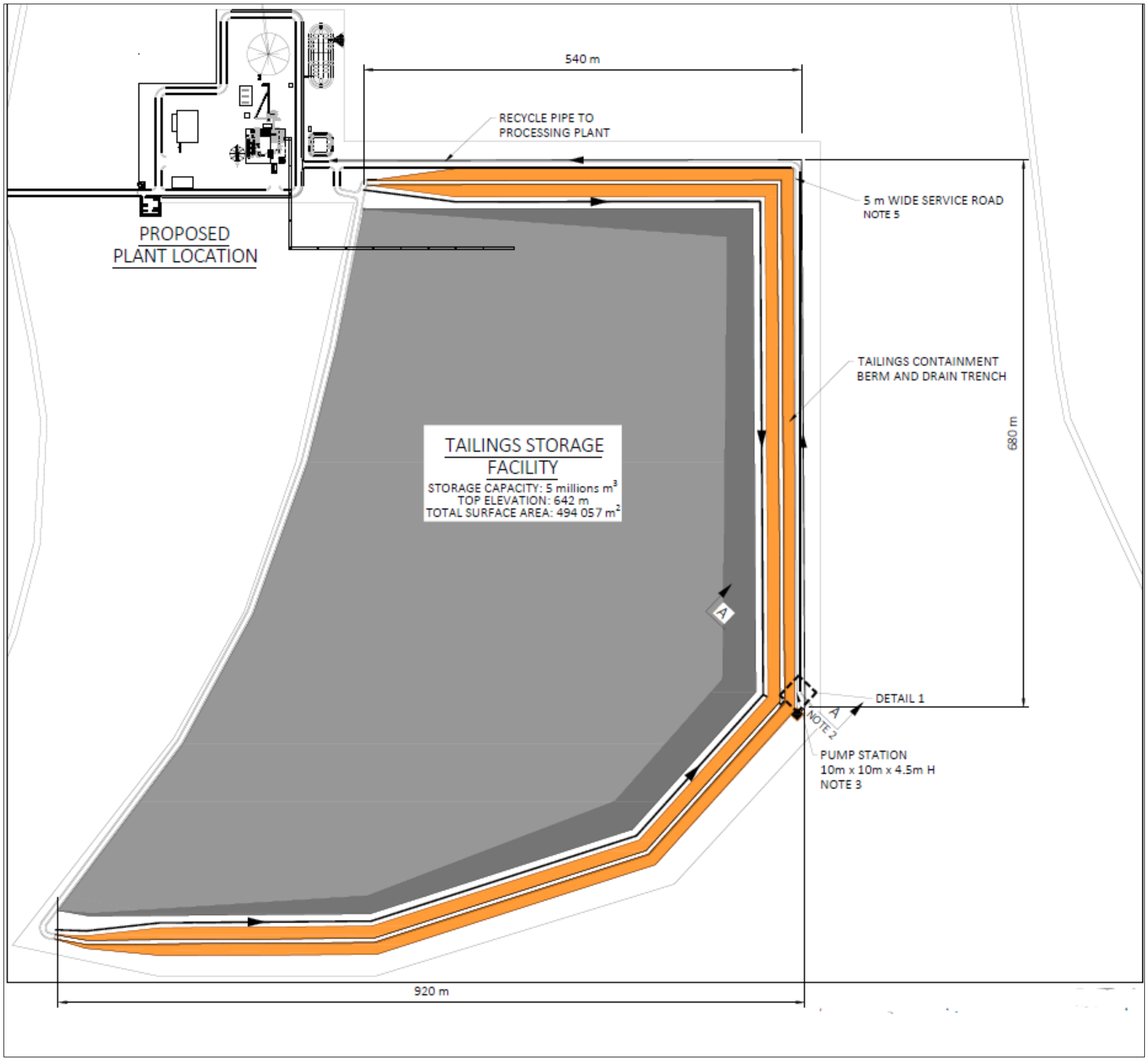
## 18.6 Tailings Management

Primary DMS tailings pass a dewatering screen to achieve 13% moisture and are directed to a series of conveyors running from the process plant to the TSF. The system consists of mobile grasshopper conveyors which direct the solids to an end section that distribute the solids in an arc via a stacker conveyor.

Tailings from the flotation thickener underflow at 55% moisture are pumped via an above ground pipeline to a spigot system along the western side of the TSF.

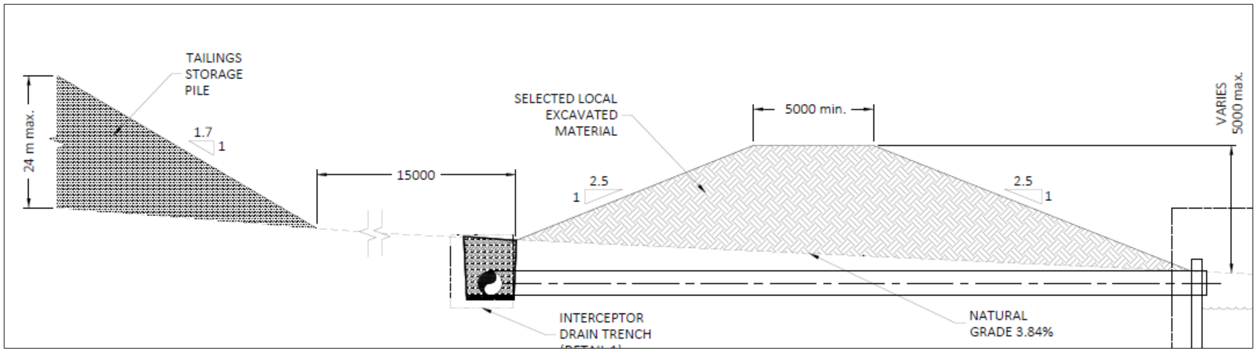
The TSF is sized to store a total of 10 million tonnes of tailings, over the six-year plant life. The TSF is located southeast of the process plant, sloping eastward at an average grade of 3.8%. The natural slope will ensure that the final tailings pile does not exceed a height of 24 m. The entire 494,000 $m^2$ area will be lined with EPDM. Figure 18-5 presents an overall layout of the TSF.

**Figure 18-5: Tailings Storage Facility Layout**




The natural slope will allow for water drainage into a buried interceptor drain trench between the tailings pile and containment berm. The trench will contain an HDPE pipe of varying size that will funnel the water to a pump station at the lowest point of the TSF. The pump station will contain two turbine pumps (one operating, one standby) that will return the water to the process water pond at the plant site. The design of the TSF includes a 15 m space from the toe of the tailings pile and the interior toe of the containment berm. The containment berm will vary in height around the perimeter of the TSF, not exceeding 5 m. The crest of the berm is designed to be flat and 5 m wide to allow for light vehicle traffic access. These details are presented in Figure 18-6.

**Figure 18-6: Tailings Storage Section and Detail**




## 18.7 Site Roads

All site roads will be unpaved, compacted gravel and soil. Roads between the process plant and TSF will be 5 m wide and will have a parallel trench to facilitate water drainage.

## 18.8 Utilities

### 18.8.1 *Electrical Power*

The power requirements for the overall plant, including both mining and processing is 4.0 MW. Electrical power to the plant will be supplied by three 2.5 MW diesel generators, with two operating and one standby.

### 18.8.2 *Diesel Supply*

Diesel is required for the process plant generators and for the mobile equipment fleet.

Diesel consumption of the generators is calculated at 8.2 ML/year with an additional diesel consumption of 1.4 ML/year required for the mobile equipment fleet.

Diesel will be stored inside a 55,000 L tank and dispensed via a fueling station and a fuel truck for the mobile equipment.

### 18.8.3 *Water*

Storm water and surface runoff will be collected by trenches around the perimeter of the process plant and directed to a settling pond at the northeast corner of the plant site. There is a natural low area that enables gravity flow and minimizes earthworks. This pond will have an EPDM liner. The northeast end of this pond will have a catchment to allow for storm water overflow during rain events.

Process water recovered from the TSF will be pumped into a process water pond at the southeast corner of the process plant. The pond will provide time for solids settling before the water is pumped either to the process plant or into the adjacent water treatment plant. This pond will have an EPDM liner.

The TSF is designed to funnel water from the tailings into a single collection point where a turbine pump will transfer the collected water to the process water pond.

Based upon the mass balance, the process will require 52 $m^3$/hr of make up for process water and 10 $m^3$/day of potable water. These water sources will be sourced from a newly drilled well within the site boundary limits.

The process water make-up will be treated through one of two treatment plants, one operating, one standby. Organics will be removed with ozone, then passed through sand and multimedia filtration before being pumped to the process water tank.

A portion of the treated process water make up will be directed through a reverse osmosis system to generate potable water.

Sewage and wastewater will be treated in a packaged sewage treatment plant, located on the eastern side of the process plant, near the storm water pond.

#### 18.8.4 *Compressed Air*

Compressed air will be required for both instrumentation and as plant air, for operations equipment within the processing plant. This will be supplied with conventional compressors and dryers.

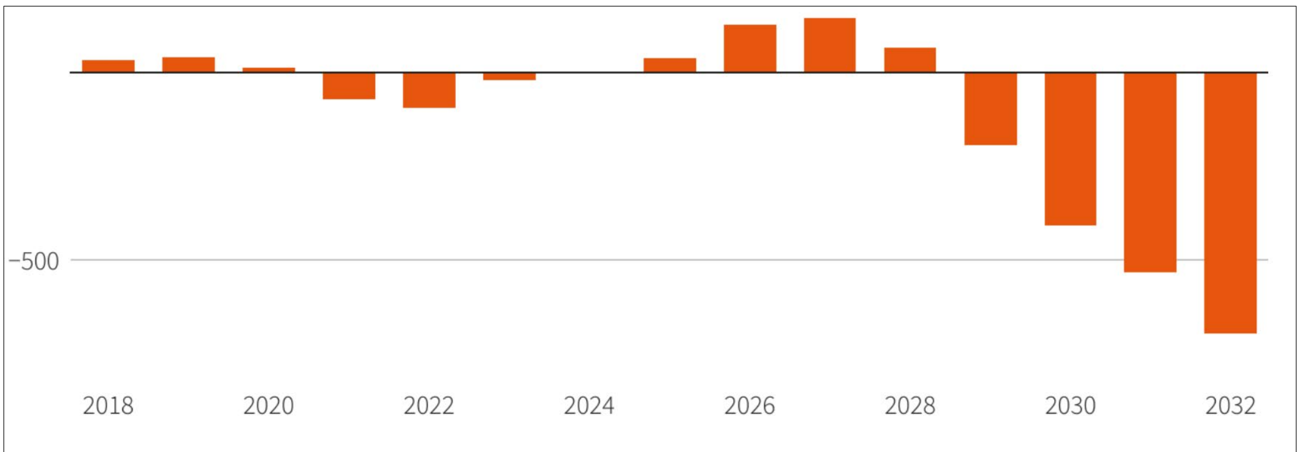
# 19 MARKET STUDIES AND CONTRACTS

## 19.1 Introduction

The demand for lithium continues to grow as the world continues the green energy transition from fossil fuels. The largest demand for lithium is driven by the growing need for rechargeable batteries, particularly those used in electric vehicles. While there are several battery competing battery technologies in the market, lithium is present in all of them. In 2022, global electric vehicles sales jumped 55% globally to 10 million and are expected to climb another 35% in 2023. Other uses for rechargeable lithium-ion batteries are in portable electronic devices and high performing storage cells for intermittent renewable energy sources.

According to the Benchmark Minerals Intelligence, 2023 will experience an overall lithium deficit. As new operations come online and ramp up in 2024, a supply surplus is projected until 2028. Another deficit is projected starting in 2029 as presented in Figure 19-1.

**Figure 19-1: Lithium Demand and Supply Forecast**




Note: Market balance in tonnes of lithium carbonate equivalent
Source: Benchmark Mineral Intelligence

## 19.2 Spodumene Price Assumptions

Argus Media's market report (9-May-2023) states that prices for 6% $Li_2O$ concentrate rose to $3,650-3,800 per tonne CIF China on 9-May-2023 from the the prior assessment of $3,600-3,750 per tonne CIF China on 25-April-2023 in reponse to a recent rebound in salts prices.

A review by Fastmarkets from May 5, 2023 indicates a lithium spodumene concentrate (FOB Australia) of $2,800/tonne for 2025 and 2026.

A price of lithium spodumene concentrate of $2,800/tonne is used for the Project which is based on FOB Africa.

No future spodumene price projections are included in the project costs. The future price of the product is a risk that will need to be born by the project.

# 20 ENVIRONEMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

Tantalex has engaged Transfields Services DRC SARL (Transfields) in Q3 2022 to perform an Environmental and Social Impact Assessment (ESIA) and develop an Environmental and Social Management Plant (ESMP) for the Project. This program was initiated at the time of engagement and is forecast to be completed in Q3 2023.

## 20.1 ESIA Execution Methodology

Table 20-1 presents a list of specialist studies and high-level activities being executed by Transfields.

**Table 20-1: Specialist Studies**

| Study | Activities |
|---|---|
| Climate and Air Quality | • Collect and review available information related to air quality monitoring<br>• Identification of sensitive receptors<br>• Baseline analysis using existing data |
| Noise and Vibration | • Determine noise and vibration levels<br>• Identification of sensitive receptors<br>• Identify project components that have the potential for generating increased noise levels<br>• Discuss implications and measures to mitigate the noise<br>• Predict vibration impacts |
| Traffic | • Update the traffic study taking into account new developments and the connection to the Project site<br>• Undertake a traffic survey on identified roads |
| Terrestrial and Aquatic Biodiversity | • Describe/review the biodiversity of the project area<br>• Assess the potential impacts on flora and fauna |
| Ecosystems Services | • Describe/review ecosystem services of the project area<br>• Characterise services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities; and/or services on which the project is directly dependent for its operations |
| Geology, Soils, Land Use | • Describe the project area geology based on the existing geological data<br>• Assess impacts on soil (land use) accounting for new developments |
| Surface Water Hydrology | • Review of sampling protocol<br>• Mapping of catchments and flood lines based on existing data and observations<br>• Compilation of water balance |
| Hydrogeology and Groundwater | • Collect and review relevant data and documents<br>• Baseline analysis using existing data |
| Water Quality | • Review of data and input into water management design<br>• Water use the in project area |

| Study | Activities |
|---|---|
| Socio-economic | • Collect the socioeconomics data of the project area Focus group workshops with directly affected stakeholders<br>• Review the stakeholder engagement plan<br>• Review of community health, safety & security |
| Ionizing Radiation | • Collect and review relevant data and documents<br>• Baseline analysis using existing data |
| Waste Management | • Collect and review relevant data and documents<br>• Discuss proposed options with relevant authorities and necessary approvals |
| Decommissioning, Mitigation, and Closure | • Review of conceptual closure and rehabilitation planning including visioning, principle and land-use objectives<br>• Review of financial provision for demolition |

Public consultations will be conducted during the ESIA and ESMP process to provide sufficient and accessible information to stakeholders in an objective manner to assist them to:

a) Raise issues of concern and suggestions to minimize negative impacts and enhance positive impacts;
b) Contribute relevant local information and knowledge to the environmental assessment;
c) Make suggestions for reasonable alternatives; and
d) Comment on the findings of the environmental and social assessments.

The completion of the baseline studies will produce the ESIA and ESMP reports. These are envisaged to act as a framework management system, including policy/principles, governance and standards, accountability and responsibility, awareness and education, monitoring and reporting, financing, and framework plans.

Should the development plan or the development footprint at the Property change, the baseline studies may have to be adjusted or expanded as appropriate.

### 20.2 Peer Review to International Standards

Tantalex plans to perform the ESIA and ESMP to a feasibility study (FS) level that will be used to secure international financing to advance the project. While Transfields is an authorized DRC environmental practitioner, they lack the ability to prepare documentation to the international standards required. Tantalex has therefore engaged the services of SRK Consulting South Africa Pty (SRK) to conduct a review of the Transfields work plan. Beginning in Q2 2023, SRK will undertake a gap assessment of the baseline documentation against the eight IFC Performance Standards to determine gaps that will need to be addressed as additional work packages in the ESIA.

### 20.3 International Compliance and Best Practice

Tantalex will consider all the specific environmental, community and governance aspects which are typically required in the DRC.

**Table 20-2: International Compliance and Best Practice for DRC**

| Consideration | Main driver for compliance |
|---|---|
| Land Access | IFC PS 5 |
| Biodiversity & Ecosystem services | IFC PS 6 |
| Human Rights & Security | VPSHR |
| Fight against corruption | EITI |
| Artisanal & Small scale Mining | OECD Due Diligence Guidance |
| Community Health and Safety | IFC PS 4 |
| Local hiring and procurement | ILO/CDF – ELLED |
| Grievance Redress Mechanism | IFC PS 1 |

# 21 CAPITAL AND OPERATING COSTS

## 21.1 Capital Expenditures

### 21.1.1 *Project Capital Cost Estimate*

The total Direct CAPEX to bring the Project to operation is estimated to be $80,611,000 with a total of $34,157,000 allocated for the Indirect costs.

An additional $10,000,000 allowance is allocated for the roads rehabilitation.

An estimated budget of $22,954,000 is allocated to Contingency, which brings the total CAPEX of the Project to $147,722,000.

Table 21-1 presents the Project CAPEX Summary.

**Table 21-1: Project CAPEX Summary**

| Item No. | Area | Total | Remarks |
|---|---|---|---|
| **A** | **DIRECT COSTS** | **$ 80,611,000** | |
| A.1 | Civil | $ 10,073,000 | Refer to Detailed Estimate |
| A.2 | Concrete | $ 4,829,000 | 15% of Mech |
| A.3 | Structural | $ 5,794,000 | 18% of Mech |
| A.4 | Architectural | $ 2,547,000 | Refer to Detailed Estimate |
| A.5 | Mechanical | $ 32,191,000 | Refer to Detailed Estimate |
| A.5 | Mobile Equipment | $ 4,254,000 | Refer to Detailed Estimate |
| A.6 | Piping | $ 9,657,000 | 30% of Mech |
| A.8 | Electrical | $ 6,438,000 | 20% of Mech |
| A.9 | Instrumentation & Telecommunication | $ 4,829,000 | 15% of Mech |
| **B** | **INDIRECT COSTS** | **$ 34,157,000** | |
| B.1 | Construction indirects | $ 4,031,000 | 5% of Directs |
| B.2 | Freight, handling, and logistics | $ 9,673,000 | 12% of Directs |
| B.3 | Commissioning & (1) year operational & capital | $ 1,612,000 | 2% of Directs |
| B.4 | First fill | $ 2,429,000 | 1.3% of Mechanical+FeSi |
| B.5 | Vendor Representative | $ 290,000 | 1% of Mechanical |
| B.6 | EPCM Services | $ 9,673,000 | 12% of Directs |
| B.7 | Owner's costs | $ 6,449,000 | 8% of Directs |
| **A+B** | **Total Before Contingency** | **$ 114,769,000** | |
| **C** | **Contingency** | **$ 22,954,000** | |
| C.1 | Project Recommended Contingency | $ 22,954,000 | 20% of (Directs + Indirect) |
| **A+B+C** | **Total Costs** | **$ 137,722,000** | |
| **D** | **Road Rehabilitation Allowance** | **$ 10,000,000** | |
| **A+B+C+D** | **Total Project Budget** | **$ 147,722,000** | |

### 21.1.2 *Intended Accuracy and Level of the Estimate*

The estimate meets the minimum requirements of a Class V estimate as defined in AACE International Recommended Practice No. 18R-97.

The CAPEX estimate has an intended accuracy of ±35%.

### 21.1.3 *Basis of Estimate*

The project capital expenditures (CAPEX) estimate covers the costs of engineering, administration, procurement services, construction costs, owner's costs, and related services for the mining infrastructure, processing plant, TSF, and all associated infrastructure. Refer to Appendix D for Basis of Estimate and CAPEX.

#### *21.1.3.1* Direct Capital Costs Development

Included within project's direct capital costs are:

a) Civil and Earth Works;
b) Architectural and Building Works;
c) Mechanical Works;
d) Mobile Equipment;
e) Concrete and Structural Steel Works;

f) Piping Works;

g) Electrical Works;

h) Instrumentation and Telecommunication Works.

Civil and earthworks costs were based on calculated quantities calculated for the Project and using in house unit rates from similar projects.

Architectural costs for non-process buildings (e.g., administration, warehouse, maintenance shop, etc.) were based on unit rates from similar projects applied to the total buildings' footprint.

Direct costs of the remaining disciplines were factored from the mechanical equipment cost, with the factors being based on similar projects, these disciplines include:

a) Concrete;

b) Structural;

c) Piping;

d) Electrical;

e) Instrumentation and Telecommunication.

Prices for major the mechanical equipment were obtained from reputable vendors, accounting for 70% of the total mechanical equipment cost, with the balance estimated using in house data. Prices for the mobile equipment were based on budgetary quotations from reputable local vendors, accounting for 90% of the total mobile equipment cost, with the balance estimated using in house data.

#### *21.1.3.2* Indirect Capital Costs Development

Included within the project's indirect capital costs are:

a) Construction In-directs;

b) Engineering Procurement, Construction management (EPCM);

c) Vendor Representatives;

d) Equipment spare parts;

e) Plant first Fills;

f) Owner Cosst;

g) Freight and Logistics Costs;

h) Project Capital Contingency.

#### *21.1.3.3* Construction Indirects

Construction indirect costs cover any construction cost like temporary site equipment, temporary site facilities, site office expenses, site maintenance, construction water and power supply.

This cost is estimated as a percentage of the Direct costs.

#### *21.1.3.4* Freight, Handling, and Logistics

These costs cover all the activities to bring the equipment from the Vendor location to the site warehouse.

This is estimated as a percentage of the Direct costs. The percentage of this category for this project was increased due to its difficult logistical location.

#### *21.1.3.5* Commissioning & 1-Year Operational & Capital Spare

Spare parts include first year initial spares and commissioning spares were estimated as a percentage of the Direct costs.

#### *21.1.3.6* Plant First Fill

First fills include on-site diesel fuel tank fills, reagents, hydraulic fluids, oils, lubricants, glycol, and other fills. This cost was calculated using an allowance as a percentage of direct costs.

Additionally, the costs associated with the FeSi were calculated directly in the estimate file and added to the first fill cost.

#### *21.1.3.7* Vendor Representative

The cost of vendors' representatives included in the CAPEX was intended to be sufficient to bring the Project to mechanical completion.

This cost is estimated as a percentage of the Mechanical costs.

#### *21.1.3.8* EPCM Services

The cost for EPCM services includes all efforts required to detailed engineering design, procurement and manage the project from project kick off to end of commissioning.

This is estimated as a percentage of the Direct costs.

#### *21.1.3.9* Owner's costs

Owner's costs include the costs for the owner's Team to oversee the EPCM packages, as well as the early hiring of the operational crew and the associated training required. This latter component is considered a major expenditure and contributes to the relatively high percentage due to the unavailability of skilled operational and maintenance personnel in the project location.

#### *21.1.3.10* Contingency

Contingency is intended to cover items that are included in the scope of work as described in this report but cannot be accurately defined due to the normal range of variability of quantities, productivity, unit rates, the current level of Engineering and other factors that affect the accuracy of the expected final cost of the Project.

The total for Contingency calculated 20% of the total (direct + indirect) costs.

### 21.1.4 *Exclusions*

The following items were not included in the CAPEX estimate:

a) Development costs (FS, ESIA)

b) Bridge Engineering, Front-End Engineering Design, or any other costs for development activities ahead of financial close;

c) Working capital required during start of the project;

d) Cost changes due to currency fluctuation;

e) Force Majeure issues;

f) Scope changes;

g) Changes due to government legislation;

h) Project delays because of abnormal climatic conditions;

i) Lost time due to industrial disputes, strikes, or civil unrest;

j) Environmental, ecological, or cultural considerations other than those addressed in the current design;

k) Closure Costs.

## 21.2 Operational Expenditures (OPEX)

### 21.2.1 *Project Annual Operating Costs Estimate*

The total estimated OPEX is $44.9M per year or $402.00 per tonne lithium spodumene produced (dry basis). Of this cost, $36.4M per year or $325.50 per tonne are direct production costs (81%) and $8.5M per year or $76.50 per tonne are indirect production costs (19%).

Table 21-2 presents a summary of the Annual Operational Expenditures (OPEX) for the Project.

**Table 21-2: Project OPEX Summary**

| Item Description | OPEX Summary | | | Notes |
|---|---|---|---|---|
| | 112,167 MTPA | | | |
| | USD/yr | USD/MT | % of Total | |
| **DIRECT COSTS** | | | | |
| Diesel - Generators | $ 19,700,000 | $ 176.00 | 44% | $ 2.40 USD/L |
| Diesel - Fleet | $ 3,408,000 | $ 30.50 | 8% | $ 2.40 USD/L |
| Reagents & Consumables | $ 6,796,000 | $ 61.00 | 15% | DMS, Flotation, Product Packaging, Comminution |
| Maintenance | $ 4,318,000 | $ 38.50 | 10% | 5% of Direct Costs |
| Mobile Equipment Maintenance | $ 639,000 | $ 6.00 | 1% | 15% of Mobile Equipment Direct Costs |
| Direct Manpower | $ 1,497,000 | $ 13.50 | 3% | 65 total on payroll |
| **Total Direct Costs** | **$ 36,358,000** | **$ 325.50** | **81%** | |
| **INDIRECT COSTS** | | | | |
| Indirect Manpower | $ 3,413,000 | $ 30.50 | 8% | 93 total on payroll |
| Insurances | $ 3,141,000 | $ 28.50 | 7% | 1% of Gross Revenue |
| G&A | $ 1,000,000 | $ 9.00 | 2% | Allowance |
| Community Devleopment Fund | $ 943,000 | $ 8.50 | 2% | 0.3% of Gross Revenue |
| **Total Indirect Costs** | **$ 8,497,000** | **$ 76.50** | **19%** | |
| **Total Direct + Indirect Costs** | **$ 44,855,000** | **$ 402.00** | **100%** | |
| **TOTAL OPEX incl. Contingency** | **$ 44,855,000** | **$ 402.00** | **100%** | |

### 21.2.2 *Intended Accuracy and Level of the Estimate*

The estimate meets the minimum requirements of a Class V estimate as defined in AACE International Recommended Practice No. 18R-97.

The OPEX estimate has an intended accuracy of ±35%.

### 21.2.3 *Basis of Estimate*

The project annual operational expenditures (OPEX) estimate covers the following costs:

a) Manpower;
b) Diesel;
c) Reagents and Consumables;
d) Maintenance Materials;
e) Insurances;

f) General & Administration (Indirect Costs);

The following costs were included in the economic analysis presented in Chapter 22:

a) Product Transport; (Included only in cash flow);
b) Marketing; (Included only in cash flow);
c) Royalties; (Included only in cash flow);

The project OPEX was based on Process Flow Diagrams and Mass Balances, Load Lists and Layouts. Other supporting data includes vendor pricing and specifications, and historical data from previous projects.

The full-rate operating hours for the process plant used in the OPEX estimate was 7,600 hours per year. Annual spodumene production was 112,167 tonnes per year on a dry basis and 118,071 tonnes per year on a wet basis.

#### *21.2.3.1* **Manpower**

A manpower organogram was developed which includes estimates for operators, maintenance employees, office workers and management based on specific project requirements. The operation is assumed to be 24 hours per day, so some key operator roles will have three, 8-hour shifts with one spare crew, so that operations can be maintained. Office workers, and management will be day shift only working 8-hour shifts. A combination of local workforce and expatriates have been assumed for the operation as well. Specialized roles such as senior management will be performed by expatriates, which comes at a higher cost. Local wages have been assumed to range between $13,000 - $26,000 per year. Expatriate packages have been assumed to range between $60,000 - $330,000 per year.

In total 158 employees have been assumed to be required on payroll, with 11 expatriates and 147 locals.

#### *21.2.3.2* **Diesel**

Diesel is consumed by the mobile equipment fleet and by two 2.5 MW gensets to run the operational equipment. The mobile equipment fleet was estimated based on the operations and cycle time calculations and the consumption of diesel is found on equipment specification sheets. In total 1,420,000 L/yr of diesel is required for the mobile fleet. Each 2.5 MW genset have been assumed to consume 540 L/h of diesel providing an annual consumption of 8,200,000 L/yr.

The price of diesel used in the OPEX estimate was taken as $2.40/L.

#### *21.2.3.3* **Reagents and Consumables**

The major reagent used within the DMS plant is FeSi and it is estimated that 413 tonnes per year will be required. The price of FeSi reagent is $2,116/tonne.

A number of reagents are required for the flotation plant, consisting of various frothers, collectors and regulators. A combination of quotes and in-house data were used to determine the overall costs.

The comminution circuit consists of a ball mill which requires ongoing ball purchases. 228 tonnes per year is estimated with a cost of $500/tonne.

The final product will also be bagged in 1 tonne bags, where 112,167 bags and pallets are required. The price of 1 tonne product bags is $10.00/bag and the price for pallets is $11.12/pallet.

#### *21.2.3.4* Maintenance Materials

Maintenance is estimated based on percentages of the CAPEX. For mobile equipment the maintenance budget is 15% of the mobile equipment CAPEX per year. The remaining maintenance budget is based on 5% of the remaining equipment direct CAPEX per year. The maintenance budget percentages are greater than what would normally be reserved due to the lack of a detailed sustaining capital estimate for the PEA.

#### *21.2.3.5* Insurances

Insurance is estimated as 1% of the gross revenue.

#### *21.2.3.6* General & Administration

An allowance of $1 million per year has been included for general and administration.

#### *21.2.3.7* Community Development Fund

The community development fund was provided by Tantalex to be 0.3% of the gross revenue.

#### *21.2.3.8* Contingency

No contingency has been considered for the OPEX for the project.

# 22 ECONOMIC ANALYSIS

An engineering economic model was prepared for the Project to estimate annual cash flows and assess sensitivities to certain economic parameters. The Project shows a pre-tax cumulative net revenue of $1,274M, a pre-tax NPV (10% discount) of $764M, with an IRR of 87.4% on a nominal basis. The project shows a pre-tax NPV (10% discount) of $638M, with an IRR of 82.3% on a real basis.

## 22.1 Main Assumptions

The cash flow estimate includes only revenue, CAPEX, and OPEX costs. Corporate obligations, financing costs, and taxes at the corporate level are excluded.

The cash flow model was based on the following:

a) All costs and economics were completed in United States dollars ($USD).
b) 100% equity ownership.
c) Annual inflation of 3%.
d) Exploration costs are deemed outside of the Project.
e) Any additional Project study costs have not been included in the analysis.
f) Annual gross revenue is determined by applying estimated metal prices with payable metal assumption to the annual recovered metal estimated for each operating year.
g) A constant commodity price was used in the economic analysis.

The cash flow is presented in Table 22-1.

## 22.2 CAPEX Expenditure

The implementation schedule currently estimates the construction timeline to be from March 2024 to October 2025 across 20 months. Each year contains 10 months of construction; thus the CAPEX is spent by 50% across 2024 and 50% across 2025.

## 22.3 Off Mine Gate Costs

### 22.3.1 *Product Transport*

The product transport cost is based on a quote received from a local transport agency. The cost is $361tonne and includes the manpower, the maintenance, the diesel and the tire replacements as well as ship freight to China.

### 22.3.2 *Marketing*

The marketing fee was provided by Tantalex and is estimated to be $124.06 USD/tonne.

### 22.3.3 *Royalties*

Royalties have been calculated as 3.0% of the gross revenue.

## 22.4 Production and Sales Price

It was assumed that the project would begin generating product starting in 2026 at a 75% capacity. Years 2027 through 2031 would produce at 100% capacity and 2032 would see a ramp down to 25% capacity, providing 7 years of production.

A Spodumene sales price of $2,800 USD/tonne (based on FOB Africa) was used as this accounts for the current market price and the forecast for 2025 and 2026.

## 22.5 Inflation Rate

A 3% annual inflation rate was assumed for all costs and revenues.

## 22.6 Cash Flows

The cash flows; CAPEX, OPEX and revenues are summarized in Table 22-1. The basis of these figures are assuming a nominal model with a 10% discount rate.

**Table 22-1: Project Cash Flow**

| Sequential Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Actual Year | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
| Mine Year | Year -1 | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
| Inflation | 1.03 | 1.06 | 1.09 | 1.13 | 1.16 | 1.19 | 1.23 | 1.27 | 1.30 |
| Production Curve | 0% | 0% | 75% | 100% | 100% | 100% | 100% | 100% | 25% |
| Production Dry Basis | - | - | 84,125 | 112,167 | 112,167 | 112,167 | 112,167 | 112,167 | 28,042 |
| Cumulative Production Dry Basis | - | - | 84,125 | 196,292 | 308,459 | 420,626 | 532,793 | 644,960 | 673,002 |
| Production Wet Basis | - | - | 88,553 | 118,071 | 118,071 | 118,071 | 118,071 | 118,071 | 29,518 |
| CAPEX | $76,076,982 | $78,359,292 | | | | | | | |
| Direct OPEX | $- | $- | $29,921,891 | $41,092,730 | $42,325,512 | $43,595,277 | $44,903,136 | $46,250,230 | $11,909,434 |
| Indirect OPEX | $- | $- | $9,284,901 | $9,563,448 | $9,850,352 | $10,145,862 | $10,450,238 | $10,763,745 | $11,086,658 |
| Product Transport | $- | $- | $34,936,658 | $47,979,676 | $49,419,067 | $50,901,639 | $52,428,688 | $54,001,548 | $13,905,399 |
| Royalty | $- | $- | $7,721,778 | $10,604,576 | $10,922,713 | $11,250,394 | $11,587,906 | $11,935,543 | $3,073,402 |
| Marketing Fixed Cost | $- | $- | $9,192,593 | $12,624,495 | $6,716,530 | $6,696,663 | $6,897,563 | $7,104,490 | $1,829,406 |
| Marketing Variable Cost | $- | $- | $8,437,796 | $8,520,099 | $8,441,612 | $8,955,706 | $9,501,108 | $10,079,726 | $1,576,933 |
| OPEX Contingency | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Total OPEX | $- | $- | $99,495,617 | $130,385,024 | $127,675,785 | $131,545,542 | $135,768,639 | $140,135,283 | $43,381,232 |
| Gross Revenue | $- | $- | $257,392,610 | $353,485,851 | $364,090,426 | $375,013,139 | $386,263,533 | $397,851,439 | $102,446,746 |
| Net Revenue | $(76,076,982) | $(78,359,292) | $157,896,993 | $223,100,826 | $236,414,641 | $243,467,597 | $250,494,894 | $257,716,156 | $59,065,513 |
| Cumulative Cash Flow | $(76,076,982) | $(154,436,274) | $3,460,718 | $226,561,545 | $462,976,186 | $706,443,783 | $956,938,677 | $1,214,654,834 | $1,273,720,347 |

**22.7 Sensitivity Analysis**

A spider graph sensitivity analysis was used to measure the impact on project economics by changing the following parameters:

a) Product sale price;
b) Operating cost;
c) Capital cost.

To perform a spider graph analysis, the steps below are considered:

a) Determine the economic performance characteristics are to be evaluated (typically: NPV and IRR).
b) Determine which model input parameters have the greatest impact on the economic model (typically: Product Price, CAPEX, OPEX).
c) Determine the possible range in deviation/error from the assumed value of each parameter (typically: ±50%).
d) Determine new economic performance characteristic resulting from the changes to given input.
e) Plot the determined values of performance characteristics.

A base discount rate of 10% was selected, and the product price, CAPEX, and OPEX were adjusted between ±50% of its base input value. The results of the sensitivities are displayed in Table 22-2, Table 22-3,

*Figure* 22-1, and Figure 22-2. Both NPV and IRR are most sensitive to Product Sales Price. The project NPV is least sensitive to CAPEX. The project IRR is least sensitive to OPEX.

Refer to Appendix E for the OPEX and Cash Flow.

**Table 22-2: NPV Sensitivity Analysis**

| NPV | Product Sale Price | CAPEX | OPEX |
|---|---|---|---|
| -50% | $ 99,778,374 | $ 837,959,177 | $ 1,023,141,219 |
| -25% | $ 432,047,866 | $ 801,135,651 | $ 893,726,672 |
| -10% | $ 631,409,561 | $ 779,041,535 | $ 816,077,944 |
| 0% | $ 764,312,125 | $ 764,312,125 | $ 764,312,125 |
| 10% | $ 897,219,922 | $ 749,582,714 | $ 712,546,306 |
| 25% | $ 1,096,581,617 | $ 727,488,599 | $ 634,897,578 |
| 50% | $ 1,428,840,643 | $ 690,665,073 | $ 505,483,031 |

**Figure 22-1: NPV Sensitivity Chart (Pre-tax NPV @ 10%)**

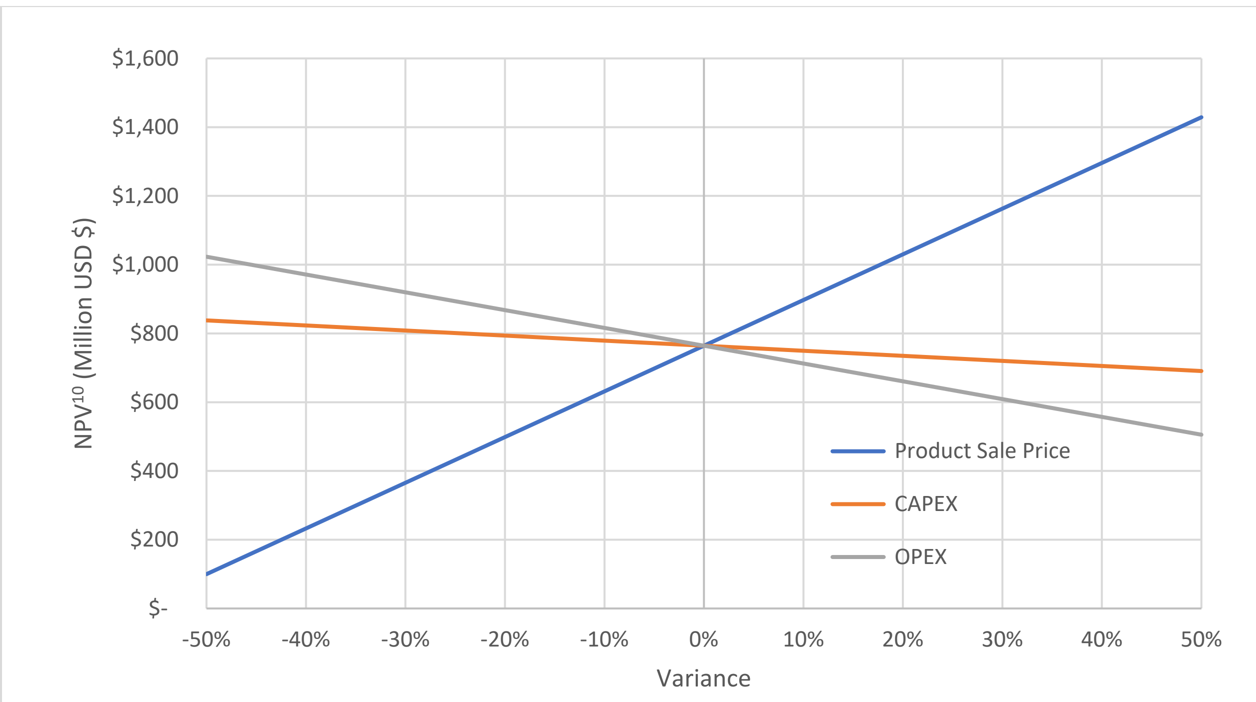
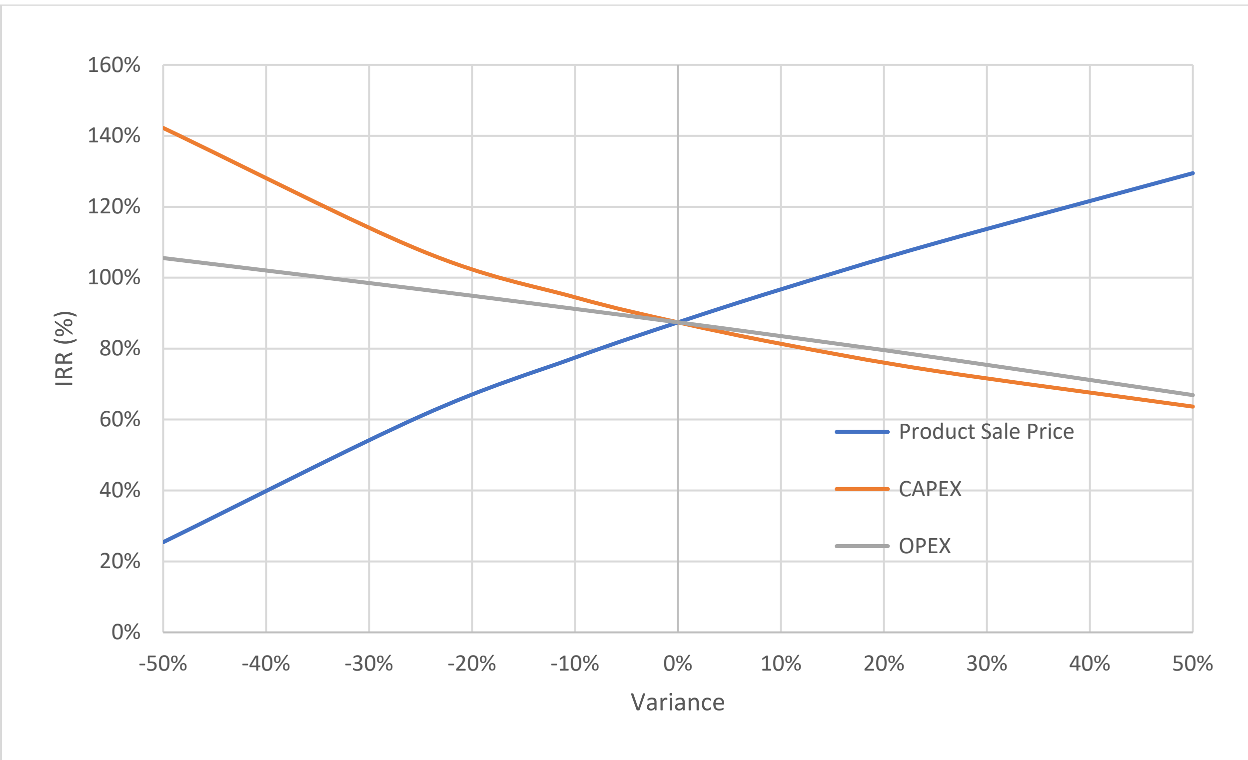


**Table 22-3: IRR Sensitivity Analysis**

| IRR | Product Sale Price | CAPEX | OPEX |
|---|---|---|---|
| -50% | 25.42% | 142.23% | 105.54% |
| -25% | 60.95% | 107.69% | 96.72% |
| -10% | 77.47% | 94.47% | 91.20% |
| 0% | 87.41% | 87.41% | 87.41% |
| 10% | 96.71% | 81.36% | 83.53% |
| 25% | 109.72% | 73.71% | 77.52% |
| 50% | 129.47% | 63.65% | 66.90% |

**Figure 22-2: IRR Sensitivity Chart**



# 23 ADJACENT PROPERTIES

The Manono Lithium Tailings project license for the in-situ pegmatite deposits (PR 13359) has been held 100% by Dathcom Mining SAS until very recently. As of the date of this report, the Mining Cadastre indicates that the licence is now back to being owned 100% by Cominière SAS.

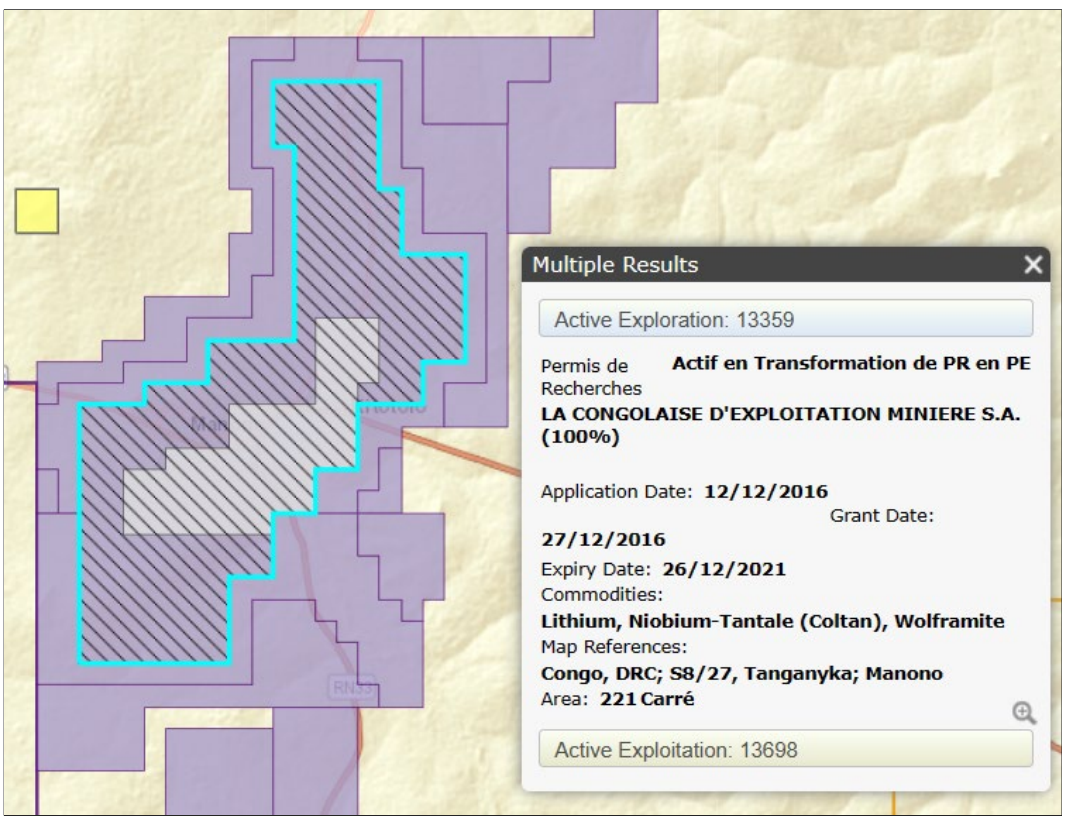
Dathcom was originally a Joint Venture held 30% by Cominière SAS, 10% by Dathomir and 60% by AVZ Minerals. The current ownership of this Joint venture remains disputed and is currently the subject of litigation between the different Parties.

In 2020, Dathcom completed a Definitive Feasibility Study in which they reported a JORC (2012) Mineral Resource estimate as of 21 April 2020 of 269M tonnes in the Measured and Indicated and 131M tonnes in the Inferred category with an average grade of 1.65% Li2O., 715 ppm Sn and 34 ppm Ta for the Manono Lithium and Tin Project (https://avzminerals.com.au/manono-mine).

The exploitation of this subsurface resource will eventually require the removal of some of the tailings from the tailings concession. Although these deposits do not have geological characteristics similar to those being reported, the expansion of these pits have an important bearing on the potential of Manono Lithium Tailings Project.

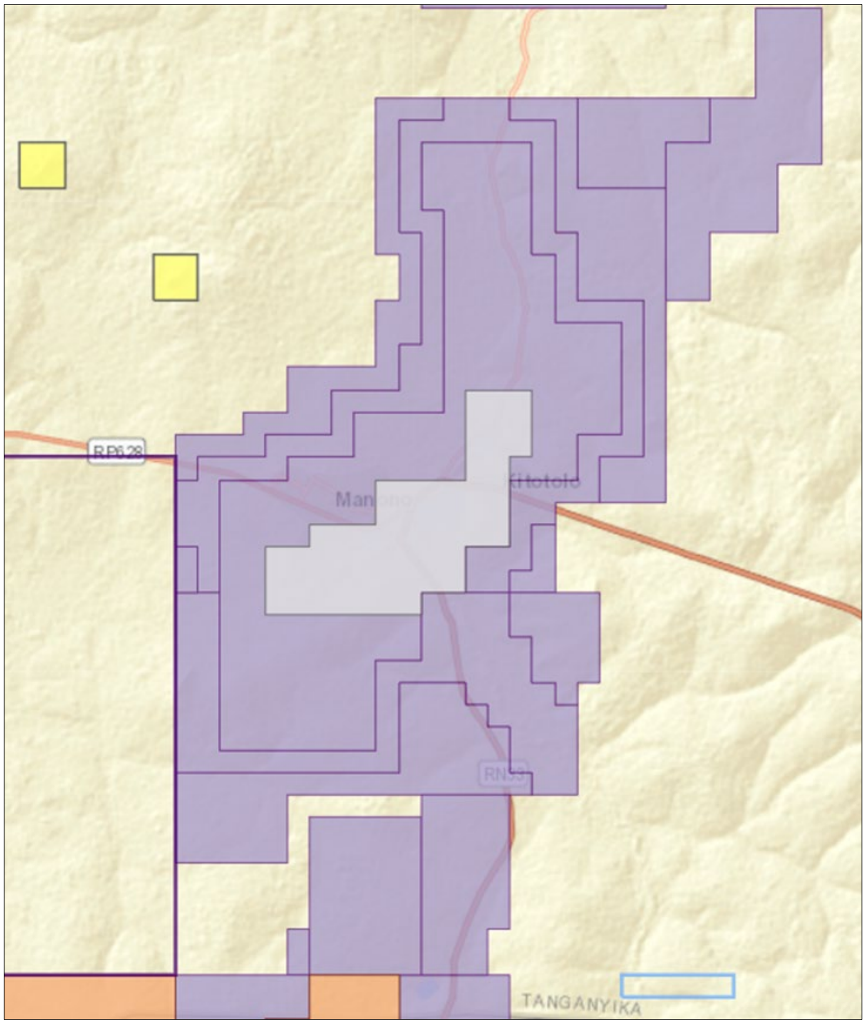
The Research Permits, PER4029 and PER4030, are owned by AVZ Minerals Congo SARLU (100%) granted on 21 July 2016 and expired on 20 July 2021Figure 23-1. The current status on the portal of the Mining Cadastre is as per Figure 23-2 (www.cami.cd).

**Figure 23-1: Manono/Manono Extension Project License Area**




***Source**: http://drclicences.cami.cd/EN/ (2023)*

**Figure 23-2: Current Status on the Portal of the Mining Cadastre**




***Source***: *http://drclicences.cami.cd/EN/ (2023)*

# 24 OTHER RELEVANT DATA AND INFORMATION

To the best of the authors' knowledge, there is no other relevant data, additional information, or explanation necessary to make the Report understandable and not misleading.

# 25 INTERPRETATION AND CONCLUSIONS

## 25.1 Geology and Mineralisation

The Manono Lithium tailings are technogenic deposits, created from the processing of material from the Manono-Kitolo deposit, which was mined from 1919 to the mid-1980's for tin and columbite-tantalite ore (coltan). Nine out of the eleven tailings deposits were drilled, of which five form this Mineral Resource Estimate. The tailings deposits stretch over a length of 12 km in a Northeast-Southwest direction, immediately adjacent to the mined pits. Several of the deposits consist of a mixture of material types, typically pegmatite and laterite, with some clay material being present in minor quantities in specific deposits.

The deposits are named alphabetically, with a suffix used to differentiate between coarse (c) and fine (f) material. The nine tailings that make up the project are from North to South named Cc, Cf, Ec, Hc, Hf, Gc, Gf, Ic and K.

The lithium mineralisation is primarily hosted in spodumene with minor lepidolite, tin mineralisation is hosted in cassiterite and tantalum in tantalite.

## 25.2 Mineral Resource

On behalf of Tantalex, MSA has completed a Mineral Resource estimate for the Manono tailings deposits. The Mineral Resources are based on aircore chips generated from a drilling programme which took place from September 2021 to July 2022.

The samples were subjected to a QAQC programme consisting of the insertion of CRMs, blank samples and the preparation of coarse duplicates. No significant contamination was identified, and the CRM analysis suggests an acceptable degree of accuracy for all three elements. There is good internal and inter-laboratory precision for lithium, however the heterogeneous nature of the tin and tantalum mineralisation influences analytical precision which should be mitigated in the estimates by the use of a sufficient number of samples. The lithium grades were confirmed by a check assaying exercise, but similar checks were not possible for tin and tantalum. The QP is satisfied that the assay results are of sufficient accuracy and precision for use in Mineral Resource estimation.

The estimates were constrained within modelled volumes representing the various material types making up each individual dump. Ordinary kriging was used to estimate the densely drilled K-dump tailings, with the stacked material of the K and the other deposits being estimated using inverse distance squared. The models were validated by statistical and visual means, and it was found that the estimates conformed to the data informing the estimates.

The Mineral Resources were reported in the Measured, Indicated, and Inferred categories as shown in Table 25-1. The Mineral Resource was estimated using The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Best Practice Guidelines (2019) and is reported in accordance with the 2014 CIM Definition Standards, which have been incorporated by reference into National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101).

In the QP's opinion, the Mineral Resources reported herein at the selected cut-off grade have "reasonable prospects for eventual economic extraction", taking into consideration mining and processing assumptions, taking into consideration mining, and processing assumptions. The Mineral Resource was reported at a cut-off grade of 0.20% $Li_2O$.

**Table 25-1: Manono Mineral Resources at 0.20% $Li_2O$ Cut-Off Grade – 23 August 2023**

| Deposit | Classification | Tonnes (Mt) | $Li_2O$ % | Sn ppm | Ta ppm |
|---|---|---|---|---|---|
| Cc | Inferred | 2.99 | 0.32 | - | - |
| Ic | Inferred | 0.51 | 0.49 | 583 | 29 |
| Gc | Indicated | 0.29 | 0.78 | 579 | 30 |
| | Inferred | 0.51 | 0.84 | 554 | 29 |
| Gf | Indicated | 1.39 | 0.35 | 183 | 22 |
| | Inferred | 0.13 | 0.33 | 209 | 26 |
| K | Measured | 3.77 | 0.86 | 305 | 25 |
| | Inferred | 2.33 | 0.67 | 652 | 35 |
| **$Li_2O$, Sn and Ta Mineral Resources** | | | | | |
| **Total** | Measured | 3.77 | 0.86 | 306 | 25 |
| | Indicated | 1.69 | 0.42 | 252 | 24 |
| | **Measured & Indicated** | **5.46** | **0.73** | **289** | **25** |
| | Inferred | 3.48 | 0.66 | 614 | 33 |
| **$Li_2O$ only Mineral Resources** | | | | | |
| **Total** | Inferred | 2.99 | 0.32 | - | - |

*Notes:*

1. *All tabulated data have been rounded and as a result minor computational errors may occur.*
2. *Mineral Resources are not Mineral Reserves, have no demonstrated economic viability.*
3. *$Li_2O$ % grades calculated by applying a factor of 2.153 to Li % grades.*
4. *Mt = Million tonnes, ppm = parts per million*
5. *Inferred $Li_2O$, Sn and Ta Mineral Resources are totalled for the Southern Sector dumps (Ic, Gc, Gf and K).*
6. *Inferred $Li_2O$ only Mineral Resources are for the Cc dump.*

At the selected cut-off grade of 0.2% $Li_2O$, no Mineral Resources are reported for the Ec, Hc and Hf deposits due to their low grade.

### 25.3 Spodumene Production

The work performed has been used to develop a robust process flowsheet consisting of crushing, dense media separation, and flotation. The designed process will produce 673,000 tonnes of lithium spodumene concentrate over a six-year plant life.

**Table 25-2: Process Plant Production**

| Item | Description | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | Plant Feed Total (tonnes) | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | 1,262,167 | **7,573,000** |
| 1.1 | K Dump* | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | 1,016,667 | **6,100,000** |
| 1.2 | Gc Dump | 133,833 | 133,833 | 133,833 | 133,833 | 133,833 | 133,833 | **803,000** |
| 1.3 | I Dump | 111,667 | 111,667 | 111,667 | 111,667 | 111,667 | 111,667 | **670,000** |
| 1.4 | Gf Dump | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2 | Crushing & Screening | | | | | | | |
| 2.1 | Total Fines(-0.5mm) to Flotation (tonnes) | 468,443 | 468,443 | 468,443 | 468,443 | 468,443 | 468,443 | **2,810,658** |
| 2.2 | Total Coarses(+0.5mm) to DMS Plant (tonnes) | 793,724 | 793,724 | 793,724 | 793,724 | 793,724 | 793,724 | **4,762,342** |
| 3 | DMS Plant | | | | | | | |
| 3.1 | DMS Production; SC6 (tonnes) | 49,355 | 49,355 | 49,355 | 49,355 | 49,355 | 49,355 | **296,131** |
| 3.2 | DMS Middlings to Flotation (tonnes) | 93,515 | 93,515 | 93,515 | 93,515 | 93,515 | 93,515 | **561,090** |
| 4 | Flotation Plant | | | | | | | |
| 4-1 | Flotation Feed (tonnes)<br>Fines(-0.5mm)+DMS Middlings: (2.1)+(3.2) | 561,958 | 561,958 | 561,958 | 561,958 | 561,958 | 561,958 | **3,371,749** |
| 4-2 | Flotation Product SC6 (tonnes) | 62,812 | 62,812 | 62,812 | 62,812 | 62,812 | 62,812 | **376,871** |
| | **DMS and Flotation Production (tonnes): (3.1)+(4.2)** | **112,167** | **112,167** | **112,167** | **112,167** | **112,167** | **112,167** | **673,003** |

*The quantity of K dump feed is the sum of K coarse and K fines.

### 25.4 Environmental Studies, Permitting and Social or Community Impact

Collection of baseline data for the Manono project has been ongoing since October 2022 by a local DRC contactor. The baseline studies were designed and implemented to support requirements for future planning and permitting purposes. The baseline studies will be subject peer reviewed by an independent consultant to ensure all activities are compliant with international lending standards. Tantalex has taken an active role in communicating and consulting with the local communities.

### 25.5 Project Costs (CAPEX, OPEX and Project Economics)

The estimate meets the minimum requirements of a Class V estimate as defined in AACE International Recommended Practice No. 18R-97. The CAPEX estimate has an intended accuracy of ±35%.

The total Direct CAPEX to bring the Project to operation was estimated to be $80,611,000 with a total of $34,157,000 allocated for the Indirect costs.

An additional $10,000,000 allowance is allocated for the road's rehabilitation.

An estimated budget of $22,954,000 is allocated to Contingency, which brings the total CAPEX of the Project to $147,722,000.

The total estimated OPEX is $44.9M per year or $402.00 per tonne lithium spodumene produced. Of this cost, $36.4M per year or $325.50 per tonne are direct production costs (81%) and $8.5M per year or $76.50 per tonne are indirect production costs (19%).

An engineering economic model was prepared for the Project to estimate annual cash flows and assess sensitivities to certain economic parameters. The Project shows a pre-tax cumulative net revenue of $1,274M, a pre-tax NPV (10% discount) of $764M, with an IRR of 87.4% on a nominal basis. A pre-tax NPV (10% discount) of $638M, with an IRR of 82.3% on a real basis.

## 25.6 Marketing

Argus Media's market report (9-May-2023) states that prices for 6% $Li_2O$ concentrate rose to \$3,650-3,800 per tonne CIF China on 9-May-2023 from the the prior assessment of \$3,600-3,750 per tonne CIF China on 25-April-2023 in reponse to a recent rebound in salts prices. A review by Fastmarkets from May 5, 2023 indicates a lithium spodumene concentrate (FOB Australia) of \$2,800/tonne for 2025 and 2026.

To maintain a conservative estimate, a price of lithium spodumene concentrate of \$2,800/tonne is used for the Project which is based on FOB Africa.

No future spodumene price projections are included in the project costs.

## 25.7 Risk Identification and Mitigation

A Risk Session was held on 4-May-2023 between Tantalex and SN. The high-risk items identified during the session and their mitigation measures are detailed in the Risk Table 25-3, where the highest risk is associated with the grade of the bulk samples tested as part of this Technical Report. To mitigate this risk, representative sampling is presently being executed as described in Section 25.7.1. Another high-level risk is the quantity of Inferred Resource in MSA's MRE. Tantalex and MSA are in discussions to perform additional exploration drilling to convert this Inferred Resource into Indicated Resource. Refer to Appendix G for the Risk and Opportunity Register.

**Table 25-3: High Risks for Project**

| Description | Type | Probability | Impact | Mitigation Method | Level |
|---|---|---|---|---|---|
| Li feed grade to plant is ~25% lower than Bulk samples tested. | Risk | Low | High | Collect representative samples based on SN memo (PM1208-004) for FS testing. | Medium |
| Around half (46%) of the mineral resources in K, Gc and Ic Dumps are categorized as "Inferred" which need to be improved to "Indicated". Conversion to Reserve. The grade in this area could be different from the indicated material. | Risk | High | High | Implement additional drilling on K Coarse, Gc and Ic dumps | High |
| Lithium Spodumene price drops | Risk | Medium | High | Tantalex has engaged a third party to complete a market study for long term spodumene prices that will be used in the PEA OPEX. | High |

### 25.7.1 *Representative Samples*

Not all dumps planned to be utilized for the project were tested, and the bulk samples tested are not considered representative when compared with the core rejects samples presented in the MRE. The grade and granulometry of the samples differ and this posses a technical risk to the process plant design. To mitigate this risk, it is planned to obtain new samples from the existing drill hole rejects which would be sent for testing during the FS. SN has reviewed the core rejects data available supplied by Tantalex, and in consultation with testing laboratories has prepared a recommended quantity to use as representative samples for each dump. The recommended quantities are presented in Table 25-4.

**Table 25-4: Recommended Quantities and Bore Hole Numbers for Representative Samples**

| | | | | | | | Weights for FS Representative Sampling | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dump** | **Holes** | **Storage Category** | **Total weights** | **50% Room 1** | **50% Room 2** | **50% Room 3** | **Tailings Dumps** | **Total weights** | **50% Room 1** | **50% Room 2** | **50% Room 3** |
| **Gc_Dump** | MDA048 To MDA071 | Storage room 1 | 958 | 479 | | | **GC Dump** | 1,032 | 239 | - | - |
| | | Storage room 2 | 1,677 | | 839 | | | | - | 419 | - |
| | | Storage room 3 | 1,492 | | | 746 | | | - | - | 373 |
| **Gf_Dump** | MDA072 To MDA079 | Storage room 2 | 560 | | 280 | | **Gf Dump** | 894 | - | 140 | - |
| | | Storage room 3 | 511 | | | 255 | | | - | - | 128 |
| **G_Dump(2nd Phase)** | MDA326 To MDA368 | Storage room 2 | 1,316 | | 658 | | | | - | 329 | - |
| | | Storage room 3 | 1,188 | | | 594 | | | - | - | 297 |
| **I_Dump** | MDA080 To MDA099 | Storage room 1 | 699 | 349 | | | **I Dump** | 840 | 175 | - | - |
| | | Storage room 2 | 1,578 | | 789 | | | | - | 394 | - |
| | | Storage room 3 | 1,082 | | | 541 | | | - | - | 271 |
| **Kc_Dump (Inferred Area)** | MDA175 TO MDA192 and MDA255,256,103,237,284 | - | | | | | **Kc_Dump** | 700 | | | |
| | | - | | | | | | | | | |
| **Kf_Dump (Measured Area)** | MDA100 To MDA102 and MDA193 To MDA325 | Storage room 2 | 4,230 | | 2,115 | | **Kf_Dump** | 1,400 | - | 700 | - |
| | | Storage room 3 | 4,165 | | | 2,083 | | | - | - | 700 |
| | | | **19,456** | **828** | **4,680** | **4,219** | **Totals** | **4,865** | **414** | **1,983** | **1,768** |

**Storage room 1:** Rejects of samples prepared from 1 meter interval
**Storage room 2**: A splited half sample before 3 meter composite
**Storage room 3**: Rejects of prepared as 3 meters composite samples

## 25.8 Opportunities

The identified Project opportunities are detailed in Table 25-5. These opportunities relate to the optimization of the process flowsheet and increased production of spodumene, tin and tantalum concentrates. Flowsheet optimizations could lower technical complexity of process operation and reduce capital expenditures. Processing A to F dump material could increase Project revenues as would the production of tin and tantalum concentrates. These opportunities will be investigated through additional testing in the next Project phase, as described in Section 26.4. Refer to Appendix G for the Risk and Opportunity Register.

**Table 25-5: Project Opportunity Matrix**

| Description | Type | Probability | Impact | Mitigation Method | Level |
|---|---|---|---|---|---|
| Change size fraction split between DMS and Flotation (currently 500 µm) | Opportunity | Medium | Very High | Include optimized size fraction split in FS test works. | High |
| Production of Tin and Tantalum concentrate | Opportunity | High | High | Include test work and process design during FS | High |
| Alternate production phasing scenario by processing only K dump first | Opportunity | Medium | High | Include a trade-off study during FS. | High |
| Include material from A to F dumps into the processing plant. | Opportunity | High | Very High | Additional drilling activities independent of FS. | Very High |
| The planned road upgrades between Lubumbashi and Manono will decrease transport costs. | Opportunity | Very High | Very High | A road survey to determine costs and scope of these upgrades is ongoing. Tantalex plans to implement these upgrades. | Very High |
| Construction of the "DMS only option" to speed up time to first production | Opportunity | Very High | Very High | Include an investigation of this option in the FS. | Very High |
| Recent Pesco testwork show better results than were used for PEA calculation | Opportunity | High | High | Include an investigation of this option in the FS. | High |
| Availability of a second-hand DMS plant in the region can speed up the plant construction | Opportunity | High | High | Include an investigation of this option in the FS. | High |
| More cost-effective export route may become available in the next years, due to increased activity in the Manono area | Opportunity | High | Medium | Include an investigation of this option in the FS. | High |

| Description | Type | Probability | Impact | Mitigation Method | Level |
|---|---|---|---|---|---|
| Using Reflex Classifier for Mica removal instead of flotation | Opportunity | High | Medium | Include an investigation of this option in the FS. | High |

# 26 RECOMMENDATIONS

The results of this PEA demonstrate that the Manono Lithium Tailings Project has the potential to be technically and economically viable as a producer of lithium spodumene concentrate. This section lists recommendations for updating the resource, optimizing the process flowsheet, and completing a Feasibility Study (FS).

## 26.1 Mineral Resource

A strategy to drill the stacked tailings of the K deposit is currently being investigated, with the aim of providing sufficient data for higher confidence estimates for this material. The budgeted cost to complete this work is approximately 265,000 USD and includes drilling and assaying cost and consulting services to update the Mineral Resource estimates as detailed in Table 26-1.

It is in the QP's opinion that the proposed budget by Tantalex represents a reasonable cost estimate necessary to complete the above recommendations.

**Table 26-1: Estimated Cost of Proposed Program**

| Item | Total (USD) |
|---|---|
| Aircore Drilling (3,300 m) | \$ 132 000 |
| Assay (Including Shipping) | \$ 44 000 |
| Bulldozer | \$ 8 000 |
| Consulting Services | \$ 46 435 |
| **Total (Including 15% Contingency)** | **\$ 265 000** |

## 26.2 Recovery Methods

Not all dumps planned for the project were tested and the bulk samples tested are not considered representative when compared with the core rejects samples presented in the MRE. New samples for K, G, and I dump, based on the existing drill hole rejects grade and granulometry, should be prepared and sent for testing during the FS.

There are several opportunities to optimize the process flowsheet by conducting additional testing of the representative samples. The testing should include the following:

a) Confirm DMS parameters on the representative samples;
b) Confirm flotation parameters on the representative samples;
c) Gravity separation for tin and tantalum concentrate recovery;
d) Gravity separation of slimes (-106µm) to recover spodumene, tin and/or tantalum;
e) A technology trade off for mica removal.

## 26.3 Feasibility Study

It is recommended to complete a Feasibility Study (FS) that would include further testing to mitigate the key risks identified and would also increase the level of detail and confidence in the resource, process plant and associated infrastructure designs, as well as increase the level of accuracy of the CAPEX and OPEX estimates to ±15% AACE Class III.

FS activities would include issuing mechanical equipment Request for Proposal (RFP) packages to equipment vendors, where these bids will provide accurate budgetary prices for the project's capital cost estimate and establish a relationship with the potential equipment suppliers for the project's execution phase. Proposals from equipment-manufacturers will also include operational specifications which will increase the accuracy of the project OPEX. The FS will also further develop all other disciplinary engineering including civil, structural, piping and electrical components.

The FS would run in parallel with the ESIA program, and its completion would coincide with the completion of the EIS, and the receipt of the Environmental Permit for the project.

## 26.4 FS Test Work Activities

Several test work programs are recommended to be carried out during the FS to advance the project from the conceptual stage. Test work results will be used to optimize the process and provide data towards sizing the equipment to support a ±15% capital cost estimate.

### 26.4.1 *Tin & Tantalum*

As the tailing dump materials were generated from historical tin and tantalum mining, the potential to produce tin and tantalum from the material of these dumps should be investigated. It is likely that tin and tantalum minerals are present in the finer particle sizes of the dumps as the historical technology previously used on this material was not able to extract this size of particle. Several gravity separation techniques will be tested on the fine fraction (-500µm) to determine if any tin and/or tantalum product can be produced.

### 26.4.2 *Slimes Beneficiation*

Slimes (material -106µm) will be generated as part of the desliming operation in the process plant. There is a potential for this material to contain lithium, tin, and/or tantalum minerals. Several gravity separation techniques will be tested to determine if these slimes can increase the recovery of the process plant.

### 26.4.3 *Tailings settling*

At this stage, assumptions have been made for the settling behaviour of the various tailings streams generated by the process. To confirm thickener sizing, settling tests are recommended to be conducted on the tailings material.

### 26.4.4 *DMS*

The material selected as representative samples would be tested using the same DMS parameters determined by the testing already completed and incorporated into the mass balance i.e., primary DMS at 2.65 $t/m^3$ and secondary DMS at 2.85 $t/m^3$. The objective of this test work will be to confirm the representative samples will produce the same grade and recovery results as the previous phase.

#### 26.4.5 *Flotation*

Testing by SGS on composite samples, blending both fresh and middlings of both K-dump and G-dump are pending. The composite samples will be tested through the flowsheet presented in Figure 13-7, and a test will be conducted without the two stages of mica removal.

These results will be used as a starting point to determine the parameters to use on the representative samples. The objective of this test work will be to confirm the representative samples will produce the same grade and recovery results as the previous phase.

#### 26.4.6 *Reflux Classification*

Nagrom of Australia is conducting batch Reflux Classifier (RC) tests in 2023 to check for effective mica removal from C-dump, G-dump, and K-dump at various size fractions.

Should these results prove positive, trade off studies should be conducted to confirm if the RC can be added into the process.

#### 26.4.7 *Mica Removal Technology Trade Off*

Based on the results of SGS's flotation and Nagrom's RC testing, a trade off study is recommended to be completed to determine which mica removal technology, if any, could be included in the process flowsheet. It should be noted that the inclusion of any mica removal technology into the process flowsheet will not increase the total quantity of lithium spodumene production. Instead, mica removal may serve to decrease the size of downstream equipment leading to decreased project costs.

### 26.5 FS Budget

The Feasibility Study is estimated at $4.0 million US and involves additional drilling, mineral processing test work, Geotechnical investigation, completion of the ESIA program and engineering and cost estimation producing an AACE Class 3 estimate.

### 26.6 FS Milestones

The critical path is driven by the shipping from site to testing laboratories and testing of representative samples, where Tantalex has indicated that this could take up to 8 weeks. Testing the representative samples is required to confirm the results shown by the overestimated bulk samples will apply to the representative samples with significantly impacting the process flowsheet.

The testing durations for various processing methods are also on the critical path as the results will directly impact the process equipment sizing that vendors can provide. It has been estimated that all testing can occur concurrently over a period of 12 weeks after samples are received from site.

Once all test work is completed the critical path will be the turn around of firm price quotations for various mechanical equipment. It is estimated that this procurement cycle can take up to 6 weeks, with this duration longer than was typical during the PEA phase.

Table 26-2 presents dates for the critical path tasks that drive the FS schedule.

**Table 26-2: FS Milestones**

| Task | Date |
|---|---|
| Test Work | Q4 2023 |
| Finalize Mass Balance and Flowsheets | Q4 2023 |
| Mechanical Equipment Pricing | Q4 2023 and Q1 2024 |
| Electrical Equipment Pricing | Q1 2024 |
| FS Report Issue | Q2 2024 |

### 26.7 Project Implementation

Appendix F presents the overall implementation schedule of the project. The PEA report is schedule for completion in mid October 2023. At the end of October 2023, Tantalex will then decide whether to proceed with the FS.

If approved, the FS, also referred as the Definitive Feasibility Study (DFS), will last approximately 9 months, where it will come to completion in Q2 2024.

The Implementation phase will commence Q3 2024, with a total program to last a total of 20 months. Mechanical Completion and Commissioning would begin Q4 2025 and last for 3 months, at which time Start-Up and Ramp-Up would begin in Q2 2026 and proceed to be operating at Full Capacity in Q3 2026.

Several items have been identified as Critical Path items for the Project Implementation to remain on schedule and are listed below:

a) Identification of test work partners;
b) Decision to proceed with FS program;
c) Issue contract for FS, engineering, equipment purchase contracts, etc.;
d) Incorporation of test work results data into the FS study;
e) Complete FS (NI43-101 compliant report);
f) Delivery of equipment to site;
g) Start-up (first product made);
h) Ramp up of plant;
i) Plant at full capacity.

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# Appendix A: Testing Results Coremet

# TANTALEX MANONO TAILINGS FLOWSHEET CONFIRMATION TESTWORK

**SIGN-OFF:**

| NAME | TITLE | SIGNATURE | DATE |
|---|---|---|---|
| JA Venter | CoreMet, Technical Director | | 5 June 2023 |

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| P1 | 09 December 2022 | Tantalex Manono Tailings Flowsheet confirmation – Crush size Report |
| P2 | 14 December 2022 | Tantalex Manono Tailings Flowsheet confirmation – Optimal Crush size Report |
| | | |

Distribution List

| NAME | TITLE |
|---|---|
| Hannes Miller | Chief Operating Officer, Tantalex Lithium Resources Corporation |
| | |

# EXECUTIVE SUMMARY

Tantalex sent samples from three tailings dumps (C-dump, G-dump and K-dump) on which it owns the exploitation permit in the DR Congo to CoreMet Mineral Processing for characterisation and metallurgical test work to get a better understanding of all valuable minerals contained in the tailings and develop adequate beneficiation methods.

Initial metallurgical testwork confirmed that it is possible to recover lithium and possibly heavy valuable minerals contained in the tailings dumps. For that purpose, a preliminary flowsheet was selected to validate recovery values and technology selection. The selected flowsheet consists of using Dense Medium Separation for coarse (+0.5mm) lithium recovery and flotation for fine (-0.5mm).

CoreMet was requested to investigate the breakage characteristics of the material, the deportation of valuable minerals in different top size crushed product, and the DMS performance on the different dumps at selected optimum crush size.

Crushing all dumps down to 1.2mm generated more than 50% of fine (-0.5mm) material in all three dumps, with K-dump containing 44% of fines before crushing.

In terms of valuable minerals deportment, there was very little difference in particle size distribution and valuable minerals deportation between crushing samples to 3 and 5mm for both C and G dump. This resulted in selecting 5mm as the top size for DMS testwork.

Primary DMS results seen in Table 1 show reasonable performance for both G and K dump compared to C dump. More than 85% of the lithium is recovered in both G and K dump at a density cut point of 2.7 with an upgrade ratio of 4. This was achieved in 21% of the mass for G dump and 23% of the mass for K dump.

Table 1: Summary of Primary DMS results on C, G and K Dumps

| | | C-Dump | | | G-Dump | | | K-Dump | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Stage | RD | %Yield | $\%Li_2O$ | $\%Li_2O$ Recovery | %Yield | $\%Li_2O$ | $\%Li_2O$ Recovery | %Yield | $\%Li_2O$ | $\%Li_2O$ Recovery |
| Primary | 2.55 | 58.4 | 0.45 | 82.7 | 83.6 | 0.81 | 97.4 | 68.2 | 1.67 | 95.0 |
| Primary | 2.65 | 46.7 | 0.57 | 83.3 | 28.5 | 2.14 | 88.2 | 22.2 | 4.32 | 86.6 |
| Primary | 2.70 | 16.3 | 1.03 | 53.0 | 20.8 | 2.85 | 86.6 | 23.0 | 4.15 | 86.1 |
| Primary | 2.75 | 8.8 | 2.44 | 67.9 | 14.1 | 3.99 | 80.7 | 14.2 | 5.23 | 70.2 |

Testwork is still underway to have a full understanding of DMS capabilities to produce a SC6 concentrate from each of the 3 dumps.

An additional request was made to test a blend of 14% G-dump and 86% K-dump material based on the current mining schedule. The composite was crushed to 5mm, deslimed at 0.5mm, then sent for a primary DMS at a density cut point of 2.75, followed by a secondary DMS at a density cut point of 2.95. Results seen in Table 2 shows that it is possible to achieve a spodumene concentrate with a grade of more than 6.5%$Li_2O$ although additional tests need to be done to optimize the recovery by lowering the density cut points and retreating the floats from the secondary DMS.

Table 2: Summary of DMS test on blend

| | Primary at 2.75 cut density | | | Secondary at 2.95 cut density | | | |
|---|---|---|---|---|---|---|---|
| | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | % $Li_2O$ Overall Recovery |
| Sinks (%) | 16.7 | 4.1 | 64.1 | 33.8 | 6.9 | 57.2 | 36.6 |
| Floats (%) | 83.3 | 0.5 | 35.9 | 66.2 | 2.6 | 42.8 | 27.4 |
| **Total** | **100** | **1.06** | **100** | **100.0** | **4.10** | **100.0** | **64.1** |

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## List of Acronyms

| Acronym | Description |
|---|---|
| µm | Micrometre |
| DMS | Dense Medium Separation |
| $g/cm^3$ | Grams per cubic cm |
| HLS | Heavy Liquid Separation |
| ICP-MS | Inductively Coupled Plasma - Mass Spectroscopy |
| ICP-OES | Inductively Coupled Plasma - Optical Emission Spectroscopy |
| kg | Kilograms |
| $Li_2O$ | Lithium Oxide |
| mm | Millimetre |
| P100 | Maximum Product size |
| PSD | Particle Size Distribution |
| Sn | Tin |
| Ta | Tantalum |
| XRD | X-ray Diffraction |

# 1. INTRODUCTION

Tantalex Lithium Resource is the official permit holders of the Manono-Kitolo tailings. Tantalex Lithium Resource requested CoreMet Mineral Processing to conduct a metallurgical study on tailings material collected from three dumps (C, G and K) of the Manono-Kitotolo tailings.

The objective of the study was to determine the mineralogy and metallurgical amenability of the lithium, tin and tantalum bearing minerals, and the extent to which recoveries could be achieved.

The findings of the metallurgical study testwork are contained in a technical report number: C21_29_RPT_2_1A_Rev00, named: Tantalex Manono Tailings Metallurgical Test Report, and dated 07 September 2022.

A preliminary flowsheet was selected to recover lithium bearing minerals and together with tin and tantalum bearing minerals as by-product.

The flowsheet consists of using Dense Medium Separation (DMS) for coarse (+0.5mm) lithium recovery and flotation for fine (-0.5mm) lithium recovery. However, based on recommendation to confirm the flowsheet, a follow up request was introduced to gain better understanding of the breakage characteristics of the material, the deportment of valuable minerals in different size fractions and the use of different technologies.

# 2. SAMPLE DESCRIPTION

The samples delivered to CoreMet was obtained by various excavations conducted on 3 dumps namely C-dump, G-dump and K-dump as seen in Figure 1. Each sample weighed approximately 3tonnes per area.

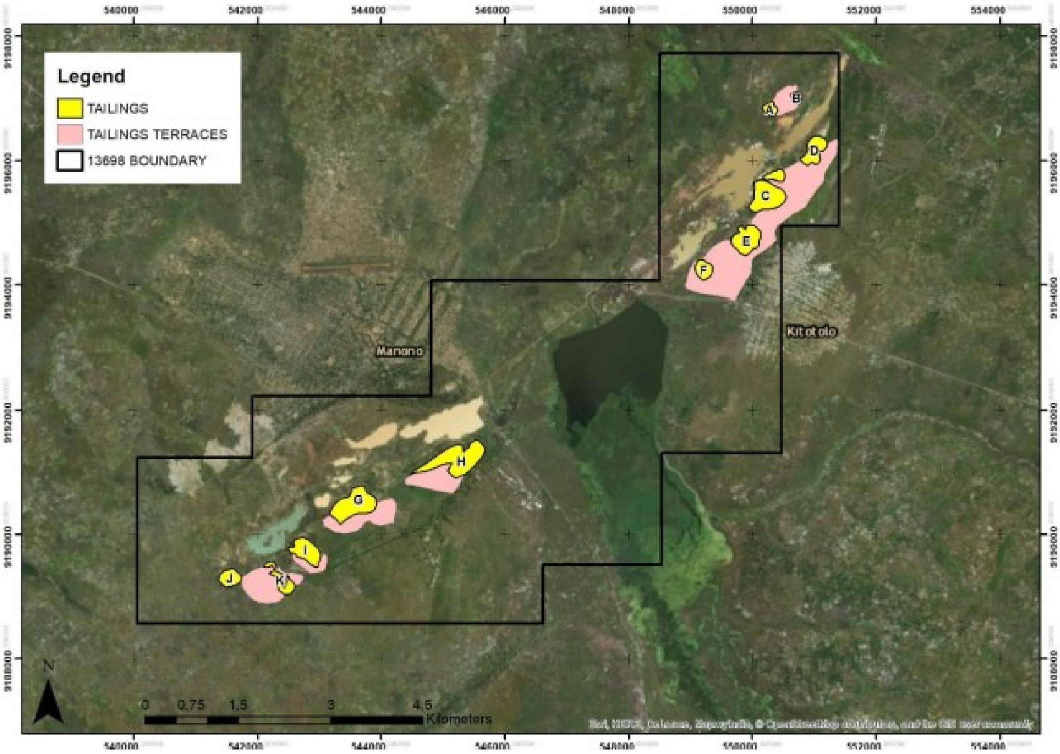


Figure 1: Licence Boundary of PER 13698 and tailings locations

## 3. TEST SCOPE

Test work, as seen in Figure 2 (high level), was performed by LightDeepEarth (LDE) and Bureau Veritas situated in Pretoria-West, South Africa. In order to understand the breakage characteristics of the tailings material, each sample went for comminution test work. To understand the deportation and liberation of valuable minerals in different size fraction, each sample was crushed to different top sizes. The crushed samples were screened at 0.5mm with the undersize taken for chemical analysis by ICP-OES, ICP-MS and XRD. The +0.5mm fraction was sent for heavy liquid separation test. Each fraction produced from HLS was sent for chemical analyses.

Once the optimum top particle size was determined, bulk material from each dump was crushed to the selected top size. Crushed material was screened at 0.5mm to generate a DMS fraction (+0.5mm) and a fine fraction (-0.5mm).

Tantalex requested that a blend of 14% G-dump material and 86% K-dump material be composited in accordance with the current mining schedule. The composite sample was crushed to the selected top size and sent for a primary and secondary DMS test.

Two types of spodumene concentrates are produced namely chemical grade and technical grade. The technical grade concentrate is mostly used in glass and ceramics applications and require low iron contents (maximum of 0.15% $Fe_2O_3$) and a minimum $Li_2O$ grades of 6.5%. The chemical grade concentrate is mostly used for conversion into lithium carbonate, lithium hydroxide and lithium metal used in battery applications. The chemical grade concentrate is less strict and can accept a minimum $Li_2O$ content of 5% and a maximum $Fe_2O_3$ of 1%. It is however important to note that final concentrate specifications are dependent upon customers' requirements.

Tantalex has indicated that a spodumene concentrate of 5.5 to 6.2% $Li_2O$ grade is acceptable.

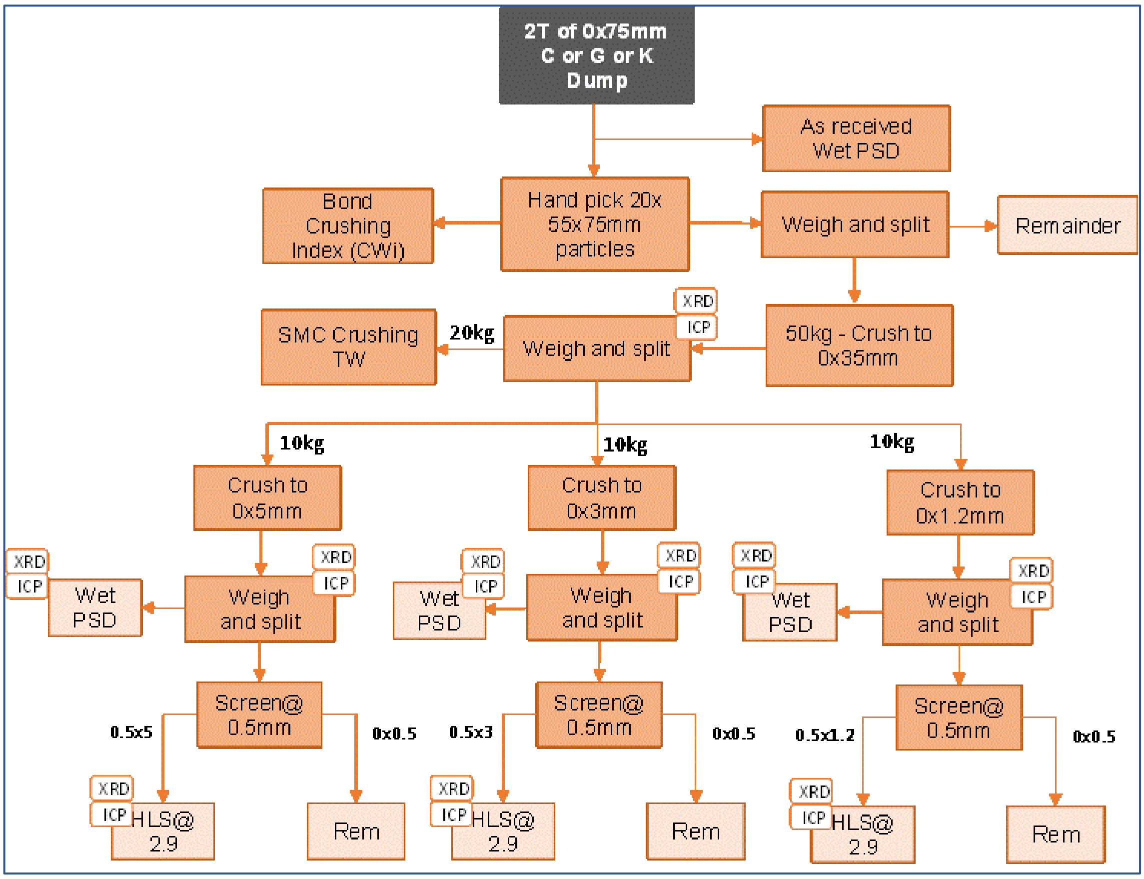


Figure 2: Metallurgical testwork flowsheet for each dump

## 3.1 HEAD ANALYSES

A subsample was split from each dump to conduct a sieve analysis on the “as received” material as well as chemical analyses to confirm the composition of each dump.

## 3.2 COMMINUTION

The following test work were perfromed for better understanding of the Manono tailings breakage characteristics:

### 3.2.1 Bond Crushing Work Index

The Bond Crushing Work Index (CWi) is a comminution test that determines the impact energy at which a specimen fails. It is used for the calculation of the actual crusher power requirements.

The test requires 20 particles of -75+53mm samples.

### 3.2.2 SMC Test

The SMC Test® (developed by Dr Steve Morrell) provides a range of information on the breakage characteristics of the ore. Some of that information are the JK breakage parameters A, b and ta as well as the JK crusher model’s matrix. All these values can be used to simulate crushing and grinding circuits.

The SMC test requires approximately 20kg of sample with a top size of 32mm.

## 3.3 CRUSHING AND DEPORTMENT

To determine the optimal crush size where the highest spodumene liberation is obtained without generating excessive fines, samples from each dump were crushed to 3 different top sizes, namely, 5mm, 3mm and 1.2mm. Crushed samples were screened at 0.5mm and 0.045mm. Each fraction was sent for chemical analysis by ICP and XRD to understand the distribution of target minerals across different size fraction.

## 3.4 LITHIUM LIBERATION STUDY – HLS

Heavy liquid tests were performed on each sample screened at 0.5mm to simulate the actual DMS size fraction. HLS was done at a density of 2.9g/cm$^3$ using Tetrabromoethane (TBE) heavy liquid to determine the theoretical maximum spodumene recovery at selected crush sizes.

HLS separated each sample into two fractions, namely sinks and floats. Sinks and floats fractions were dried, weighed and assayed.

### 3.5 DMS TEST

Dense medium separation tests were conducted using a 200mm DSM cast iron cyclone. Ferrosilicon (FeSi) and magnetite were used to prepare the dense medium. The blends and ratios were adjusted in various proportion to achieve desired cyclone differentials at the target cut densities.

#### 3.5.1 DMS on Individual Dump

Dense medium separation consisted of two stages. The primary stage was done at cut densities of 2.55, 2.65, 2.7 and 2.75. The sinks from each cut density was separated in a second stage at cut densities of 2.85, 2.9, 2.95 and 3.0.

The second stage product samples were processed using a high intensity magnet to reduce the Fe content. Floats from the second stage were composited and a subsample was split and crushed to 1mm for HLS analysis.

#### 3.5.2 DMS on The Blend (G &K)

Dense medium separation on the blend consisted of two stages. The primary stage was done at a cut densities of 2.75. The sinks from 2.75 cut density was separated in a second stage at cut densities of 2.95.

## 4. RESULTS

### 4.1 HEAD ANALYSES

A sub-sample was split from each dump using a rotary splitter for sieve analysis to obtain the particle size distribution (PSD) of the “as received” sample. From Figure 3 , it can be seen that C-dump is the coarsest of the 3 dumps. G-dump shows a narrow size distribution and very little amount of extremely fine material (-100µm) suggesting that desliming could have been done before discarding.

The K-dump proved to be the finest with a top size of 5mm. K-dump also displayed a significant amount of fines (-500µm).

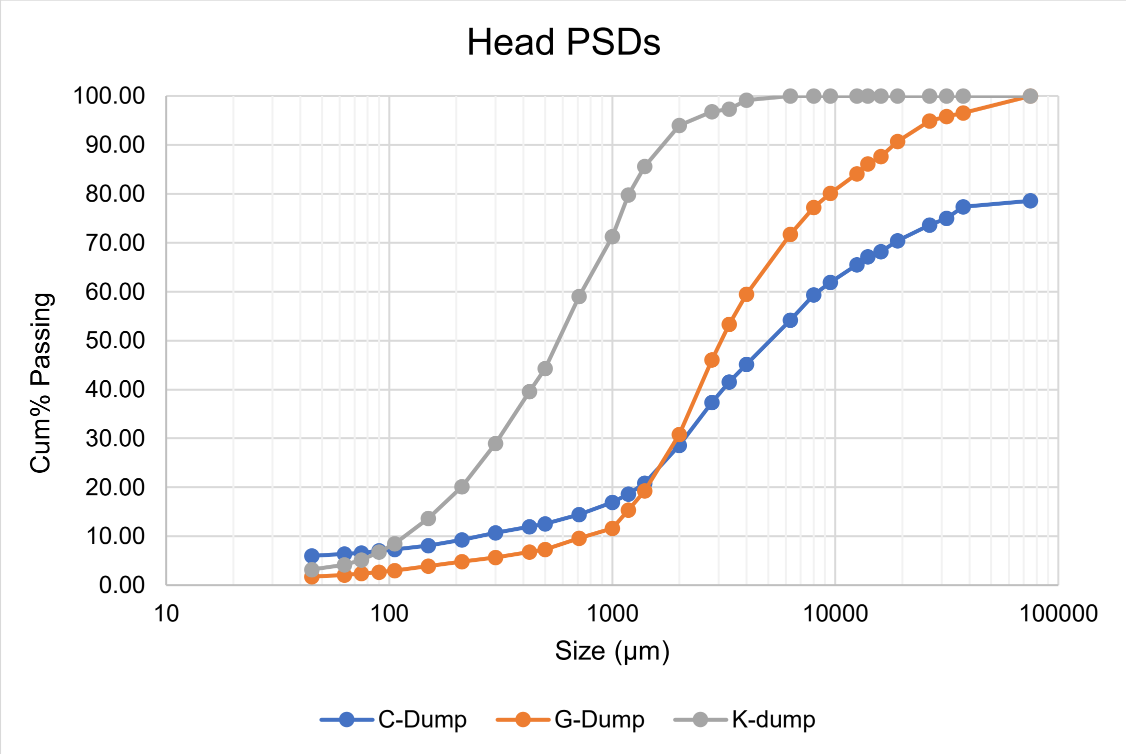


Figure 3: Particle size distribution of "as received" sample from C, G and K dumps

## 4.2 BOND CRUSHING WORK INDEX

The Bond Crushing Work index test (CWi) measures how difficult particles in the 53-75mm range are to crush. The test does not target a product size and is complete when the particles break, regardless of the product size distribution. The crushing work index (CWi) resulting from the test is a measure of the energy (in kWh/t) required to reduce the rock in a crushing application. Metso has developed a classification table (Table 3) describing the meaning of the CWi with reference to crushing.

Table 3: Metso Classification of breakage characteristics of material based on the Bond Work Index

| Classification | Bond Work Index [kW/t] |
|---|---|
| Very easy | 0-7 |
| Easy | 7-10 |
| Medium | 10-14 |
| Diffiuclt | 14-18 |
| Very difficult | >18 |

Due to the lack of coarse particles in K-dump, the Bond crushing work test was only conducted on C- and G-dump. The range of CWi values obtained on samples from C-and G-dumps are shown in Table 4. Based on the average values, both dumps fall under the easy to medium to crush category.

Table 4: CWi values for C and G dumps

| | CWi (kW/t) | | |
|---|---|---|---|
| Dump | Min | Average | Max |
| C | 4.1 | 9.0 | 14.3 |
| G | 4.7 | 10.0 | 17.7 |

## 4.3 SMC

The SMC test, developed by Dr Steve Morrell of SMC Testing Pty LTD (SMCT) provides different ore specific parameters that can be used in the JKSimMet Mineral Processing Simulator software. These parameters, combined with equipment details and operating conditions can be used for crusher selection and performance simulation.

The following parameters are derived from an SMC test:

- JK Drop-Weight index (DWi) which is a measure of the strength of the rock when broken under impact conditions and is expressed in $kWh/m^{3.}$
- Comminution parameters Mia, Mih and Mic. Mia is the work index for grinding of coarser particles (>750µm) in tumbling mills such as autogenous, semi-autogenous, rod and ball mills. Mih is the work index for grinding in High Pressure Grinding rolls (HPGR) and Mic is the work index for size reduction in conventional crushers.
- SAG circuit specific Energy (SCSE) values which is derived from simulations of a standard circuit comprising a SAG mill in closed circuit with a pebble crusher.
- Since the DWi is directly related to the JK rock breakage parameters A and b, it can be used to estimate the A and b parameters as well as the JK abrasion parameter $t_a$.

A summary of SMC test results can be seen in Table 5. However, the full SMC test report can be seen in Appendix B. It is important to note that due to its fine granulometry, K-dump did not meet the sample size requirement for SMC test, hence it did not undergo the test.

Table 5: SMC results for C and G dumps

| ID | DWi | DWi | $M_{ia}$ | $M_{ih}$ | $M_{ic}$ | A | b | SG | $t_a$ | SCSE* |
|---|---|---|---|---|---|---|---|---|---|---|

| | kWh/m$^3$ | % | kWh/t | kWh/t | kWh/t | | | | | kWh/t |
|---|---|---|---|---|---|---|---|---|---|---|
| C-Dump | 1.56 | 3 | 6.3 | 3.5 | 1.8 | 68.5 | 2.44 | 2.61 | 1.66 | 5.87 |
| G-Dump | 3.01 | 10 | 10.5 | 6.6 | 3.4 | 69.5 | 1.26 | 2.63 | 0.86 | 7.14 |

## 4.4 CRUSHING AND PARTICLE SIZE ANALYSIS

Each dump was crushed to a top size of 5mm, 3mm and 1.2mm using a laboratory jaw crusher. Sieve analyses were conducted on crushed material. Additionally crushed materials were screened into 3 fractions, namely 0x45µm representing the slimes, 45x500µm representing the fines that cannot be processed by DMS and the >500µm representing the fraction that can be processed through DMS.

### 4.4.1 C-DUMP

Materials crushed at 5mm and 3mm generated a very similar size distribution as seen in Figure 4. Material crushed at 1.2mm had a significantly finer size distribution.

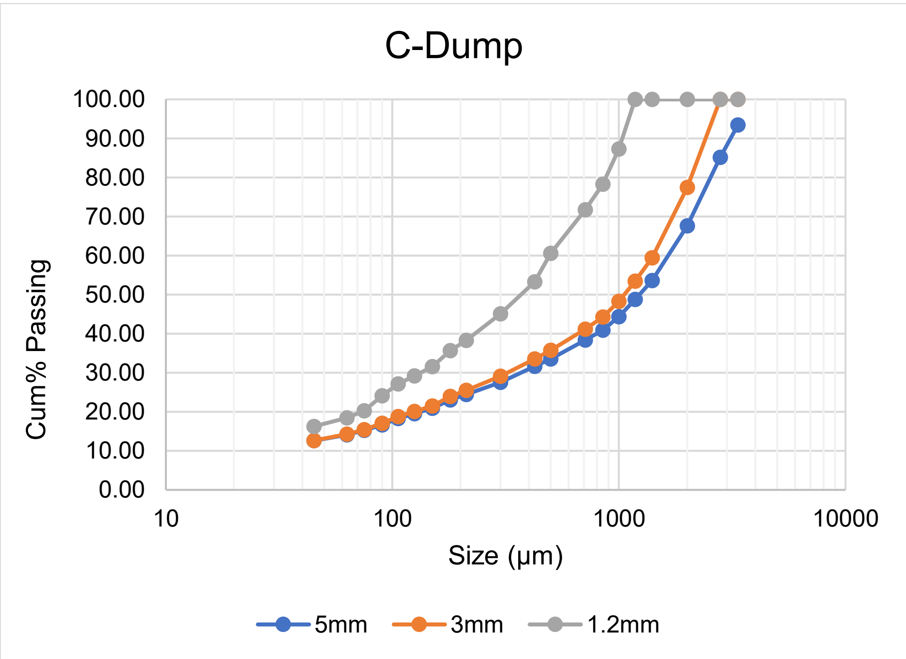


Figure 4:Particle size distribution of C-dump crushed at 5mm, 3mm and 1.2mm

Crushing at 5 and 3mm generated approximately 20% of fine (<500µm) material, whereas crushing at 1.2mm generated up to 60% fine material (<500µm) as seen in Figure 5.

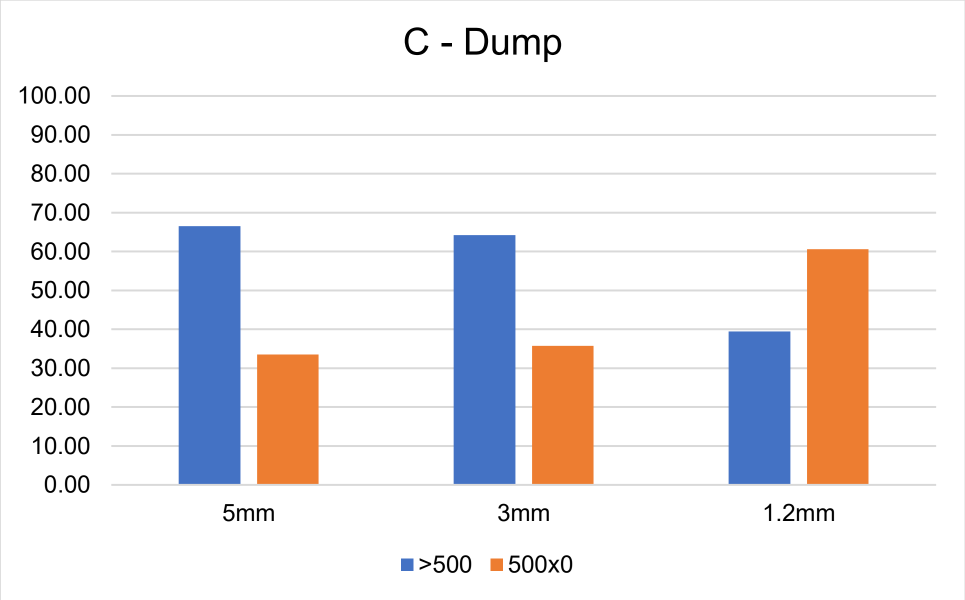


Figure 5: Size comparisons of C-dump crushed at 5mm, 3mm and 1.2mm

### 4.4.2 G-DUMP

Materials crushed at 3mm generated a slightly finer size distribution than the ones crushed at 5mm. Material crushed at 1.2mm produced the finest size distribution as seen in Figure 6.

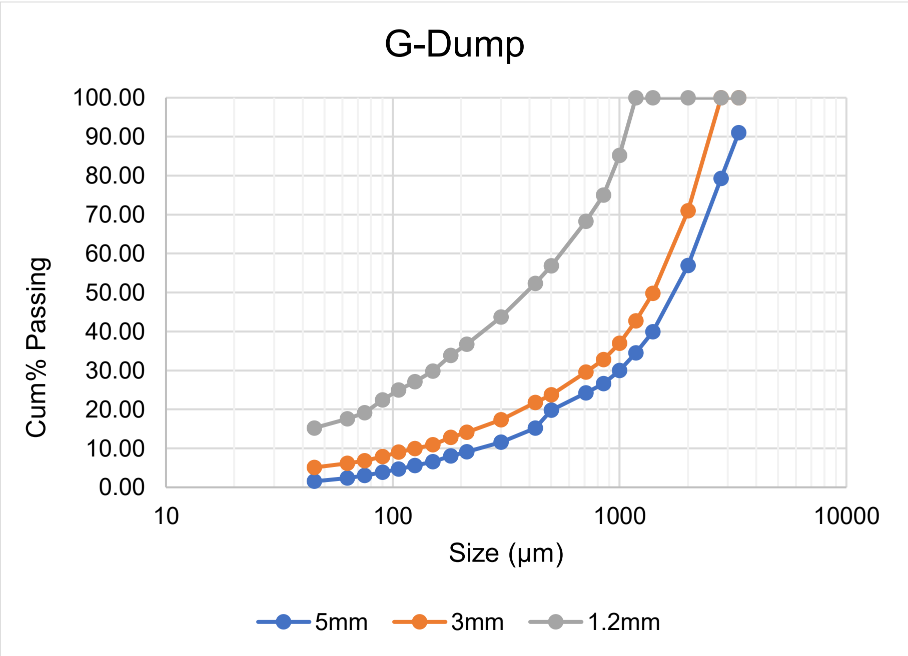


Figure 6:Particle size distribution of G-dump crushed at 5mm, 3mm and 1.2mm

Crushing at 5 and 3mm generated 34 and 36% of fine (<500µm) material respectively, whereas crushing at 1.2mm generated up to 61% fine (<500µm) as seen in Figure 7.

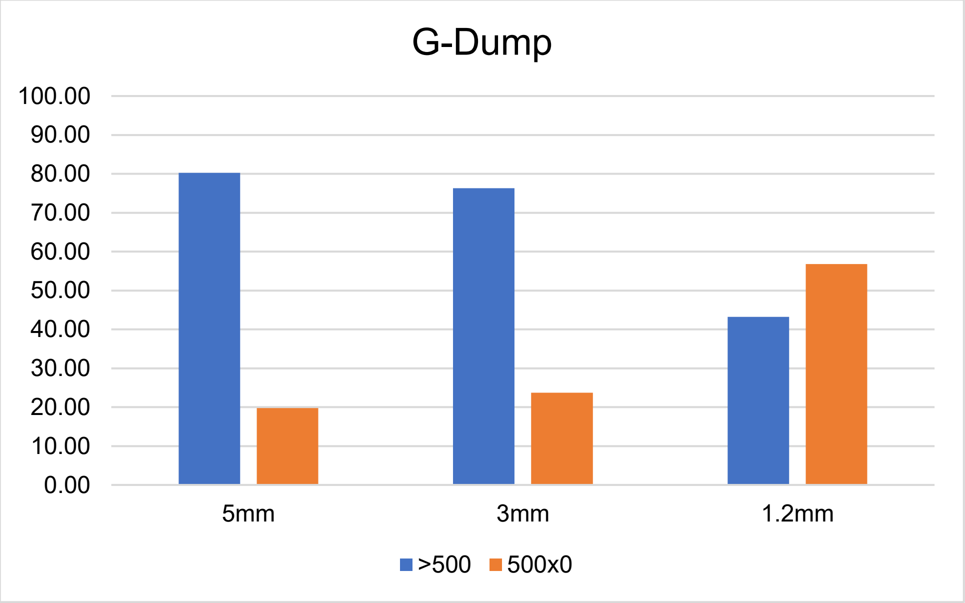


Figure 7: Size comparisons of G-dump crushed at 5mm, 3mm and 1.2mm

### 4.4.3 K-DUMP

There was no difference in size distribution between materials crushed at 5mm and 3mm. Material crushed at 1.2mm generated a slightly finer size distribution than the 5 and 3mm as seen in Figure 8.

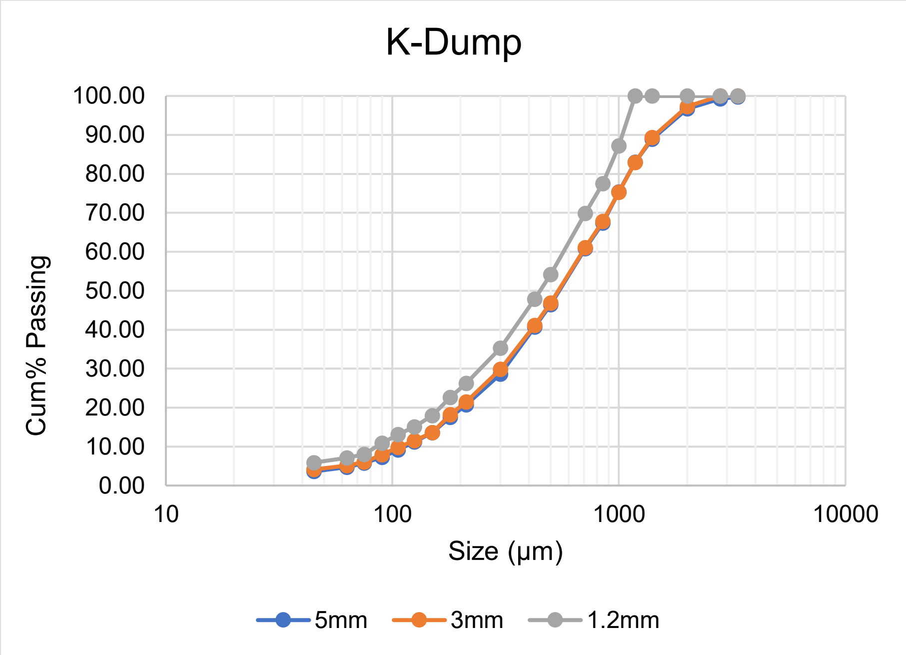


Figure 8:Particle size distribution of C-dump crushed at 5mm, 3mm and 1.2mm

Material crushing at 5 and 3mm show as much as 46% of fine (<500µm) material, whereas material crushed at 1.2mm show 54% fine (<500µm) as seen in Figure 9.

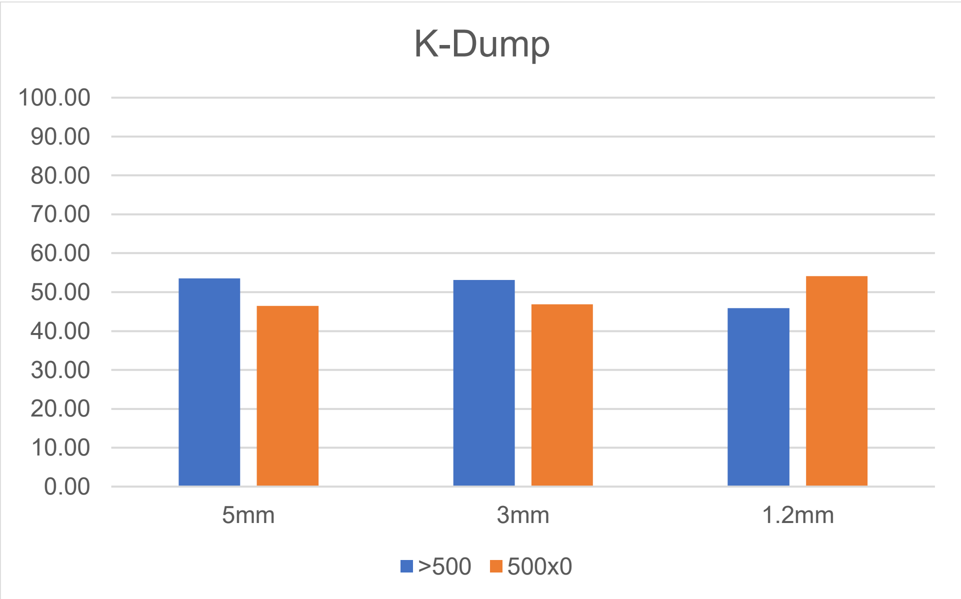


Figure 9: Size comparisons of C-dump crushed at 5mm, 3mm and 1.2mm

## 4.5 DEPORTMENT

Each of the 3 fractions (0x45µm, 45x500µm, >500µ) were sent for analyses by ICP-OES and ICP-MS to understand the deportment of valuable minerals.

### 4.5.1 C-DUMP

Figure 10 shows that when crushing to 5mm that 74% of $Li_2O$ and 46% of Sn report to the >500µm size fraction, while 51% Ta reports to the 500x45µm fraction when crushing down to 5mm.

Figure 11 shows that when crushing to 3mm that 71% of $Li_2O$ and 53% of Sn report to the >500µm size fraction, while 45% Ta reports to the 500x45µm fraction when crushing down to 3mm.

Figure 12 shows that crushing to 1.2mm results in a significant shift in the deportation of valuable minerals, resulting in only 46% of $Li_2O$, 33% of Sn and 32% of Ta content reporting to the >500µm fraction.

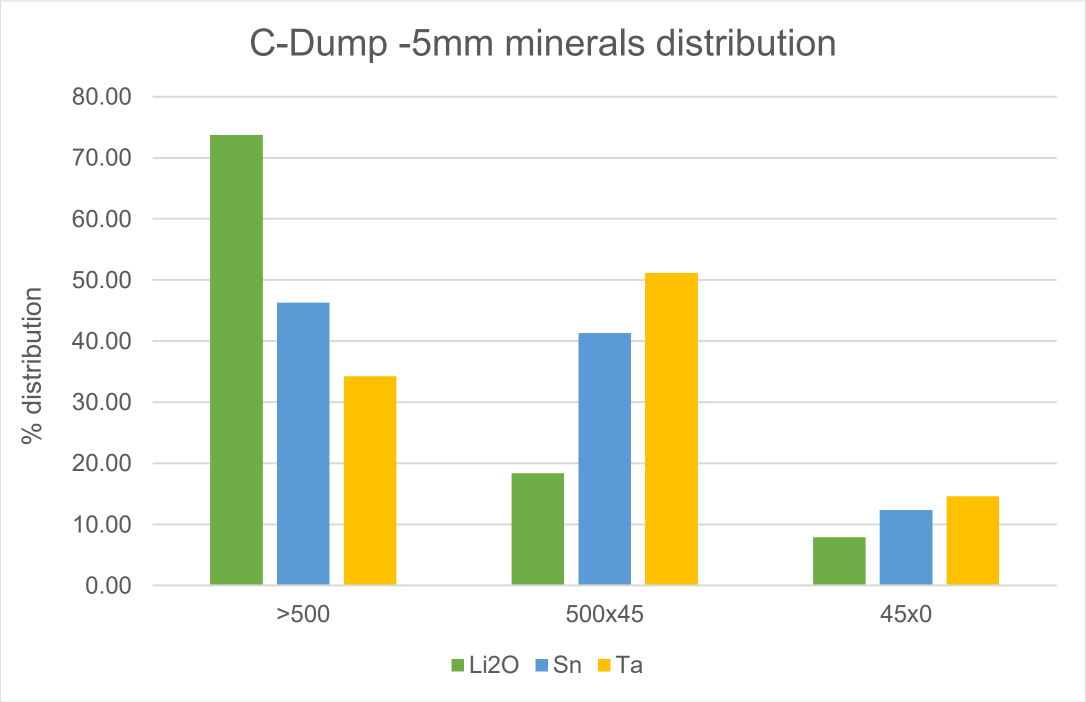


Figure 10:Valuable minerals distribution of C-dump crushed down to 5mm

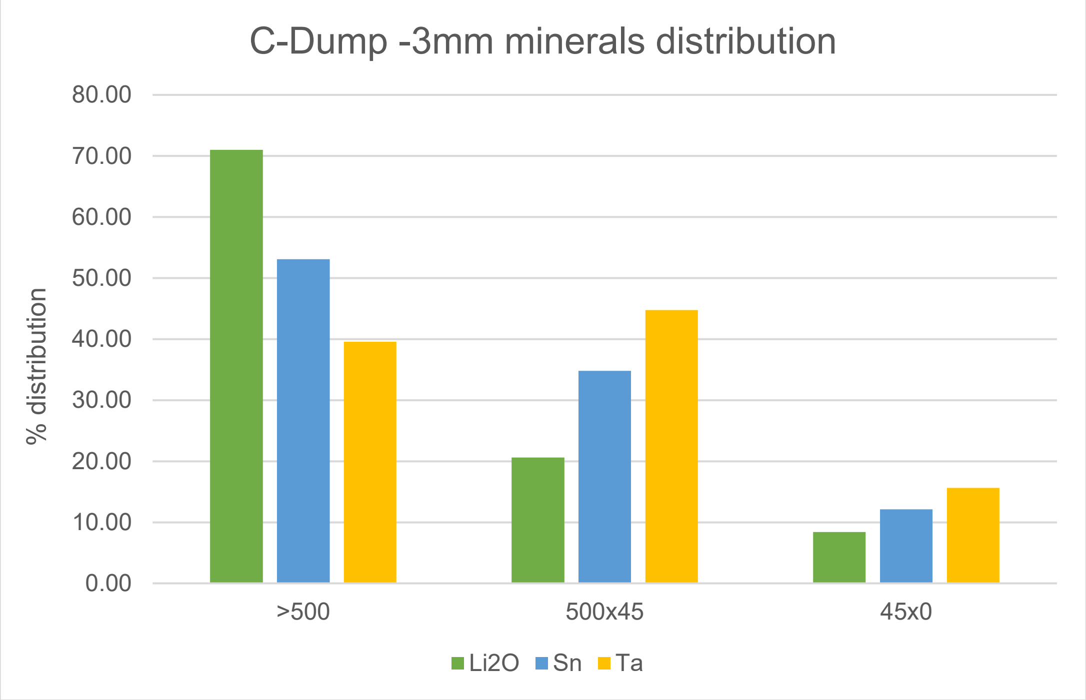


Figure 11: Valuable minerals distribution of C-dump crushed down to 3mm

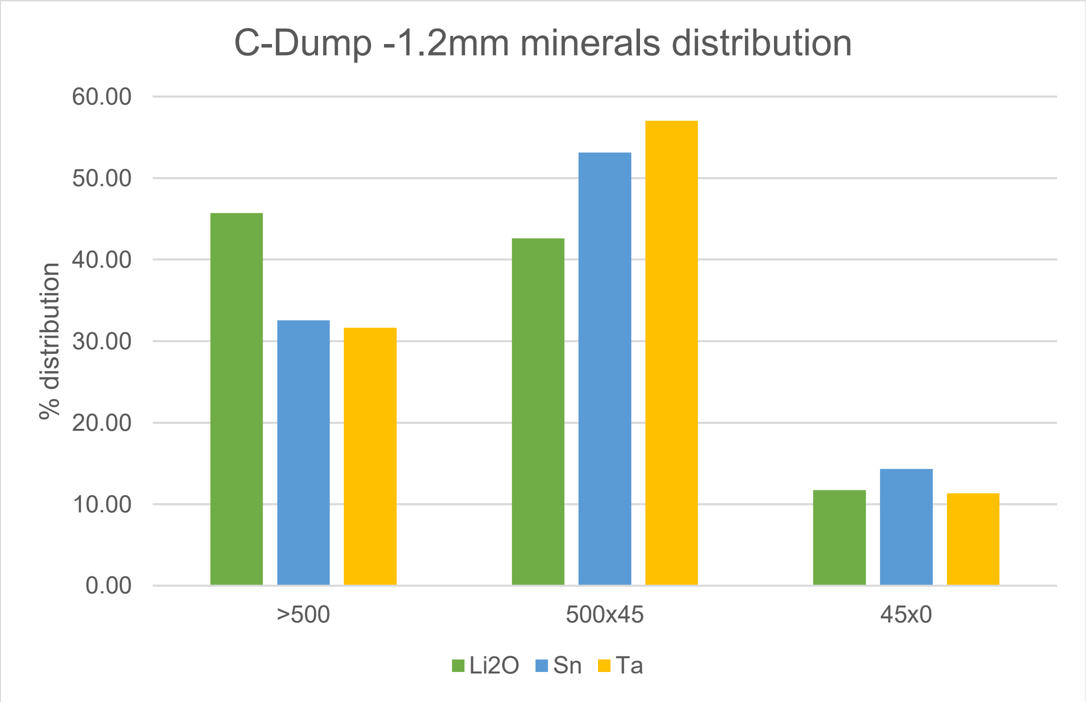


Figure 12: Valuable minerals distribution of C-dump crushed down to 1.2mm

### 4.5.2 G-Dump

Figure 13 shows that when crushing to 5mm most valuable minerals reported to the >500µm size fraction resulting in a content of 87% of $Li_2O$, 73% of Sn and 64% of Ta. There is less than 2% of all three valuable minerals ($Li_2O$, Sn and Ta) in the 45x0µm.

Figure 14 shows that when crushing to 3mm that 85% of $Li_2O$, 59% of Sn and 65% of Ta report to the >500µm size fraction. There is also a slight increase in valuable minerals in the extremely fine fraction (45x0µm).

Figure 15 shows that crushing to 1.2mm results in a significant shift in the valuable minerals deportation, resulting in 56% of $Li_2O$, 38% of Sn and 32% of Ta content reporting to the >500µm size fraction. There is also an increase in valuable minerals in the extremely fine (45x0µm) fraction corresponding to 9% of $Li_2O$, 13% Sn and 15% Ta.

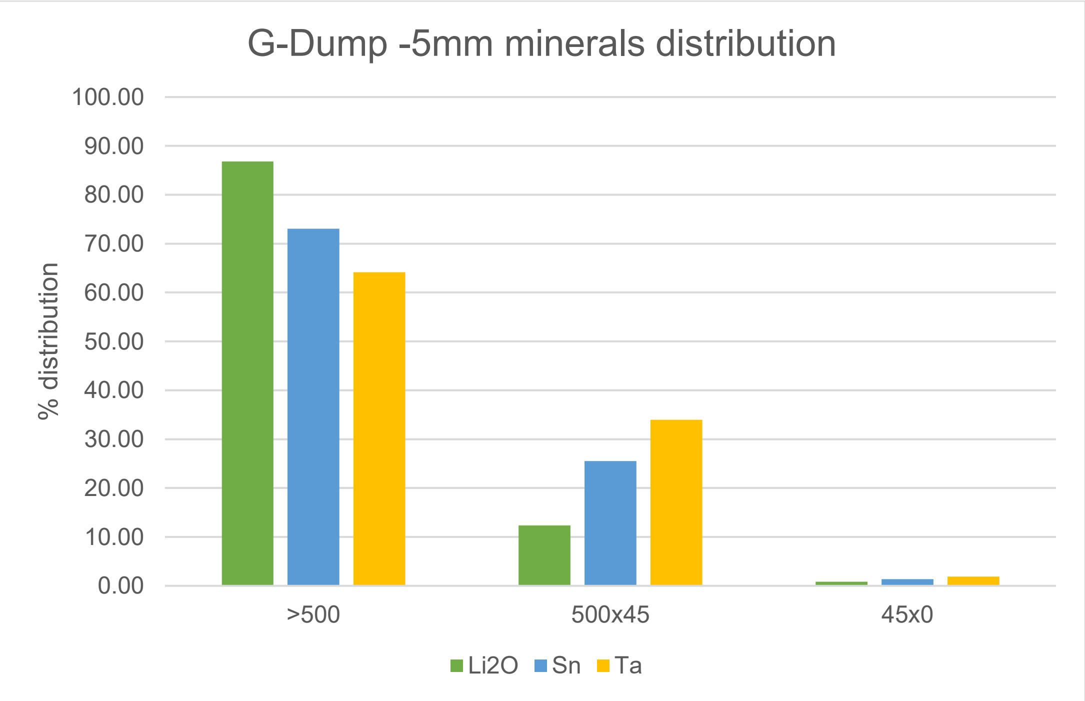


Figure 13: Valuable minerals distribution of G-dump crushed down to 5mm

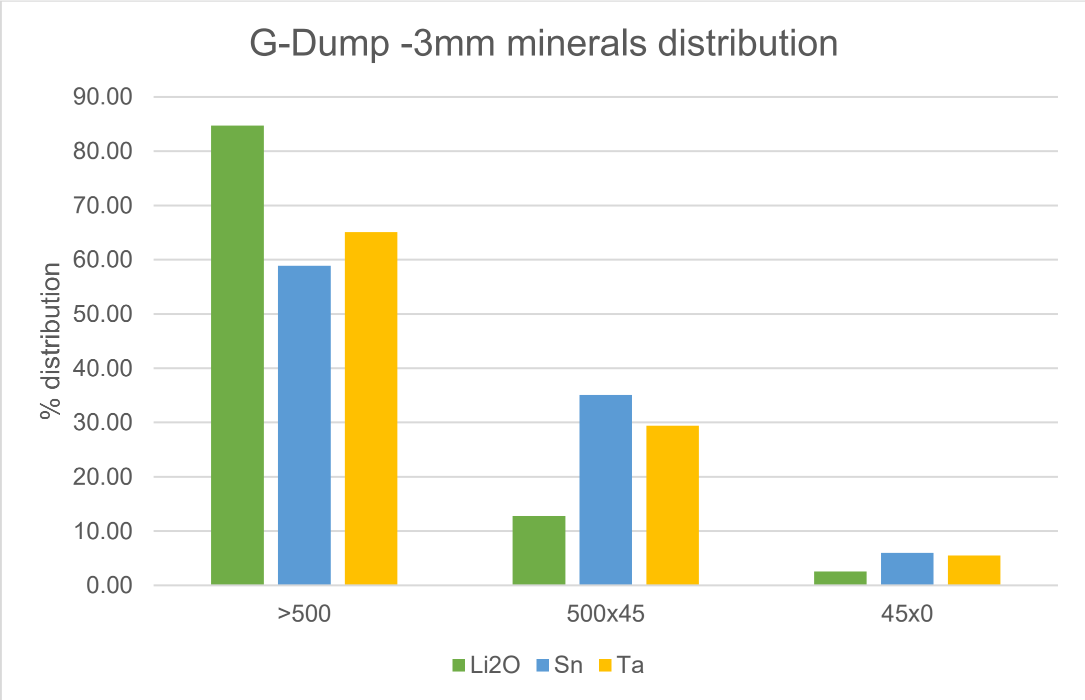


Figure 14: Valuable minerals distribution of G-dump crushed down to 3mm

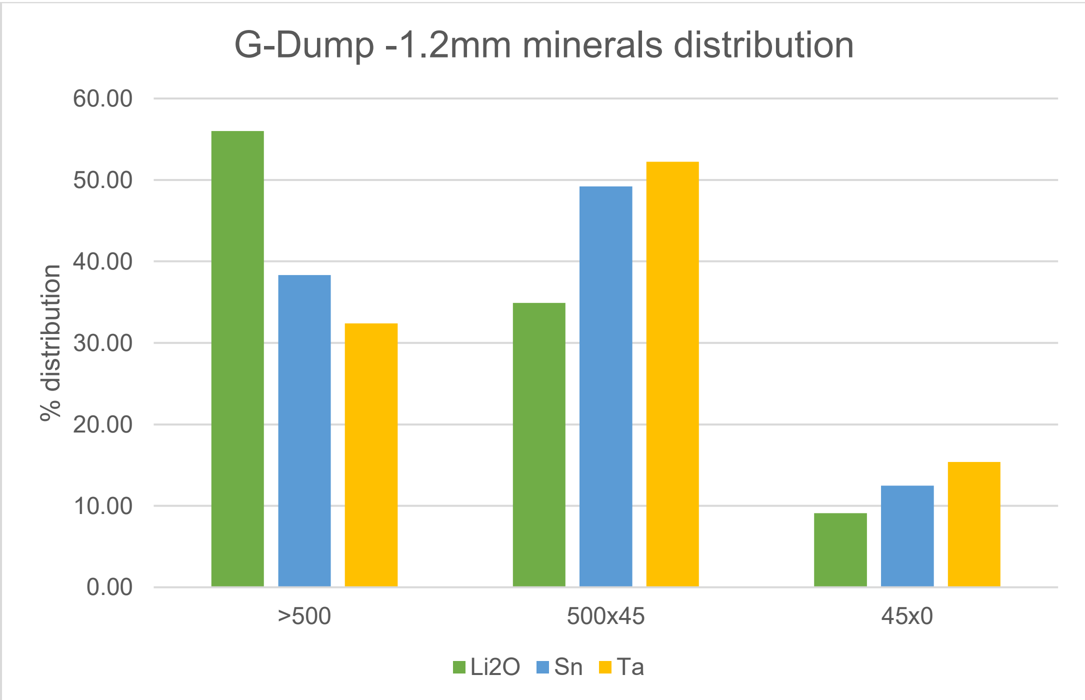


Figure 15: Valuable minerals distribution of G-dump crushed down to 1.2mm

### 4.5.3 K-DUMP

Figure 16, Figure 17 and Figure 18 show very little difference in the distribution of valuable minerals between the different size fractions after crushing to the different top sizes. Only about 51 to 58% of $Li_2O$ occurs in the >500µm fraction regardless of the crushing top size. 33-42% of Sn and Ta occur in the 500x45µm size fraction.

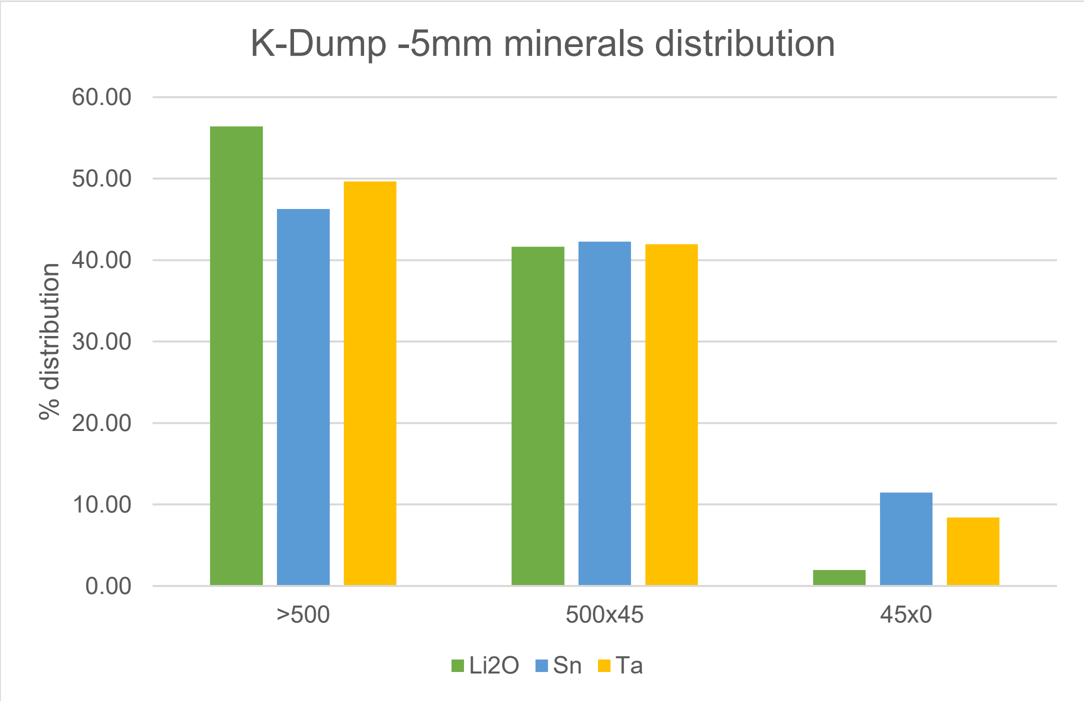


Figure 16: Valuable minerals distribution of K-dump crushed down to 5mm

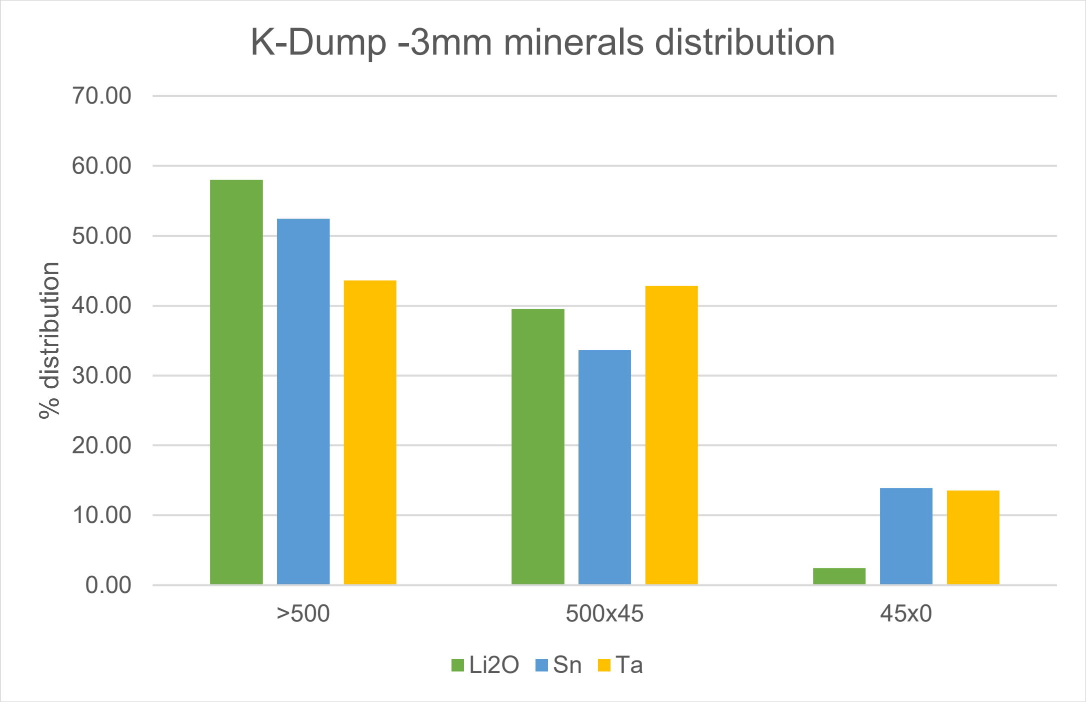


Figure 17: Valuable minerals distribution of K-dump crushed down to 3mm

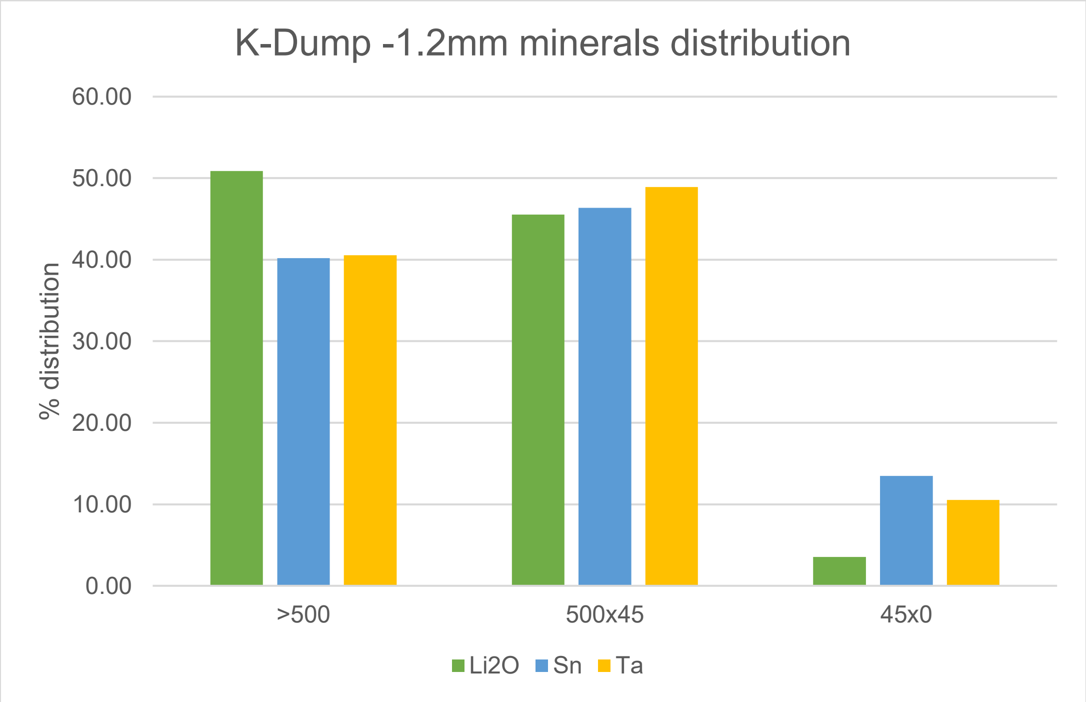


Figure 18: Valuable minerals distribution of K-dump crushed down to 1.2mm

## 4.6 HEAD CHARACTERISATION – BULK MINERALOGY

The XRD results, shown inTable 6, indicates that the only detectable lithium bearing mineral in all three samples is Spodumene. The main gangue minerals identified were Quartz (30-49%), Albite (15-49%), Microcline (12-13%) and Muscovite (4-17%). Magnetite was also detected in all samples at values ranging from 0.7 to 2.2%.

Table 6: XRD results on the head samples and crushed material from different dumps

| | | | C-Dump | | | | G-Dump | | | | K-Dump | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mineral** | **Empirical Formula** | **Density** | **0x1.2mm** | **0x3mm** | **0x5mm** | **0x35mm** | **0x1.2mm** | **0x3mm** | **0x5mm** | **0x35mm** | **0x1.2mm** | **0x3mm** | **0x5mm** | **0x35mm** |
| Albite | $NaAlSi_3O_8$ | 2.62 | 15.24 | 16.06 | 17.43 | 15.88 | 35.07 | 37.77 | 35.22 | 35.98 | 42.75 | 41.58 | 36.41 | 38.60 |
| Kaolinite | $Al_2Si2O_5(OH)_4$ | 2.60 | 4.93 | 4.17 | 2.85 | 1.53 | 0.57 | | | | 0.43 | 0.16 | 0.17 | |
| Magnetite | $Fe_3O_4$ | 5.15 | 0.73 | 0.75 | 0.75 | 0.83 | 1.44 | 2.11 | 2.18 | 1.79 | 1.26 | 1.09 | 1.16 | 1.68 |
| Microcline | $K(AlSi_3O_8)$ | 2.57 | 13.06 | 12.16 | 13.09 | 13.56 | 11.41 | 12.09 | 12.54 | 11.79 | 14.41 | 12.76 | 13.77 | 11.88 |
| Muscovite | $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 2.80 | 15.51 | 17.23 | 15.90 | 15.16 | 7.97 | 8.04 | 7.95 | 7.92 | 4.14 | 7.87 | 8.65 | 9.43 |
| Quartz | $SiO_2$ | 2.62 | 45.70 | 44.86 | 45.04 | 49.21 | 38.72 | 35.30 | 37.47 | 39.00 | 30.87 | 30.20 | 33.44 | 32.43 |
| Spodumene | $LiAlSi_2O_6$ | 3.15 | 1.80 | 1.78 | 1.93 | 1.95 | 3.56 | 4.05 | 4.19 | 3.36 | 5.76 | 5.88 | 5.92 | 5.51 |
| Tourmaline | $(Ca,K,Na)(Al,Fe,Li,Mg,Mn)_3(Al,Cr, Fe,V)_6$ | 2.8-3.3 | 3.04 | 2.97 | 3.01 | 1.88 | 1.26 | 0.64 | 0.46 | 0.17 | 0.38 | 0.46 | 0.49 | 0.47 |
| **Total** | | | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

## 4.7 LITHIUM LIBERATION STUDY – HLS TEST

HLS tests were done at a density of 2.9g/cm$^3$ to have an indication on the lithium recovery that can be obtained in a DMS circuit, but also to understand the impact of the different top sizes on lithium recovery.

Complete HLS results can be seen Appendix A

### 4.7.1 C-DUMP

Crushing down material from C-dump showed a significant increase in lithium recovery as seen in Table 7. However, looking at overall recovery, crushing down to 1.2mm gave the lowest recovery at 36% due to the lithium lost in the -500µm that cannot be processed in a DMS circuit. There was a marginal improvement of overall recovery from 48 to 50% when crushing at 3mm compared to 5mm. As was found during the previous study the C-dump produces low grade concentrate in the >500µm fraction.

Table 7: C-dump HLS at 2.90g/cm$^3$ results for material crushed at 5, 3 and 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % |
|---|---|---|---|---|---|---|
| Crushed to P100 of 5mm | | | | | | |
| Sink | 34.95 | 4.94 | 3.18 | 4.15 | 65.00 | 47.95 |
| Floats | 672.43 | 95.06 | 61.23 | 0.12 | 35.00 | 25.82 |
| **Total** | **707.38** | **100.00** | **64.42** | **0.32** | **100.00** | **73.77** |
| Crushed to P100 of 3mm | | | | | | |
| Sink | 38.35 | 5.52 | 3.49 | 3.96 | 70.34 | 49.96 |
| Floats | 656.42 | 94.48 | 59.68 | 0.10 | 29.66 | 21.06 |
| **Total** | **694.77** | **100.00** | **63.17** | **0.31** | **100.00** | **71.02** |
| Crushed to P100 of 1.2mm | | | | | | |
| Sink | 35.41 | 5.67 | 2.10 | 4.60 | 78.26 | 35.76 |
| Floats | 589.56 | 94.33 | 35.05 | 0.08 | 21.74 | 9.94 |
| **Total** | **624.97** | **100.00** | **37.15** | **0.33** | **100.00** | **45.70** |

### 4.7.2 G-DUMP

As the top size of the material was reduced from G-dump it resulted in an increase in lithium recovery as can be seen in Table 8. However, looking at overall recovery, crushing down to 1.2mm gave the lowest recovery at 49%. Material crushed at 5mm produced an overall lithium recovery of 68.5% compared to 69.4% when crushed to 3mm. It should also be noted that there was an increase in $Li_2O$ grade as the top size was reduced, which indicates better liberation and thus interstage crushing in a DMS flowsheet can add value.

Table 8: G-dump HLS at 2.90g/cm$^3$ results for material crushed at 5, 3 and 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % |
|---|---|---|---|---|---|---|
| Crushed to P100 of 5mm | | | | | | |
| Sink | 61.98 | 10.01 | 7.95 | 5.32 | 78.95 | 68.54 |
| Floats | 557.43 | 89.99 | 71.47 | 0.16 | 21.05 | 18.28 |
| **Total** | **619.41** | **100.00** | **79.42** | **5.48** | **100.00** | **86.82** |
| Crushed to P100 of 3mm | | | | | | |
| Sink | 82.96 | 11.08 | 8.34 | 5.38 | 81.99 | 69.44 |
| Floats | 665.87 | 88.92 | 66.91 | 0.15 | 18.01 | 15.25 |
| **Total** | **748.83** | **100.00** | **75.25** | **5.53** | **100.00** | **84.69** |
| Crushed to P100 of 1.2mm | | | | | | |
| Sink | 84.19 | 12.80 | 5.19 | 5.93 | 86.95 | 48.70 |
| Floats | 573.55 | 87.20 | 35.33 | 0.13 | 13.05 | 7.31 |
| **Total** | **657.74** | **100.00** | **40.52** | **6.06** | **100.00** | **56.01** |

### 4.7.3 K-DUMP

Reducing the top size of the material in K-dump showed an increase in lithium recovery as shown in Table 9. However, looking at overall recovery, crushing down to 1.2mm provides the lowest recovery at 51%. The overall recovery increased from 56% for material crushed at 5mm to 58% for material crushed down to 3mm. Note the current information indicates that the recovery can further increased in the K-dump with a lower separation density while still maintaining grade.

Table 9: K-dump HLS at 2.90g/cm$^3$ results for material crushed at 5, 3 and 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall Li2O Recovery % |
|---|---|---|---|---|---|---|
| Crushed to P100 of 5mm | | | | | | |
| Sink | 101.06 | 13.87 | 7.11 | 6.86 | 85.27 | 48.09 |
| Floats | 627.71 | 86.13 | 44.19 | 0.19 | 14.73 | 8.31 |
| **Total** | **728.77** | **100.00** | **51.31** | **7.05** | **100.00** | **56.40** |
| Crushed to P100 of 3mm | | | | | | |
| Sink | 105.39 | 13.97 | 7.13 | 6.97 | 85.56 | 49.64 |
| Floats | 649.22 | 86.03 | 43.94 | 0.19 | 14.44 | 8.38 |
| **Total** | **754.61** | **100.00** | **51.07** | **7.16** | **100.00** | **58.02** |
| Crushed to P100 of 1.2mm | | | | | | |
| Sink | 95.45 | 15.09 | 6.54 | 6.84 | 90.01 | 45.80 |
| Floats | 537.13 | 84.91 | 36.83 | 0.13 | 9.99 | 5.08 |
| **Total** | **632.58** | **100.00** | **43.37** | **6.97** | **100.00** | **50.89** |

## 4.8 BULK MINERALOGY OF SINKS AND FLOATS

### 4.8.1 C-DUMP

HLS XRD results for C-dump are shown in Table 10. Results indicated that the iron in the sample occurs mainly in Magnetite and Tourmaline which mostly reports to the sinks. It is important to note however that Magnetite which should easily be removed by magnetic separation is by far the largest contributor of iron. XRD results further indicate that the lithium concentrate fractions still contains significant levels of Muscovite (6-10%) which is part of the Mica mineral group. Muscovite removal will have to be investigated to comply with lithium concentrate product specifications if required.

Table 10: C-Dump HLS XRD results

| Mineral | Empirical Formula | Density | 5mm Sinks | 5mm Floats | 3mm Sinks | 3mm Floats | 1.2mm Sinks | 1.2mm Floats |
|---|---|---|---|---|---|---|---|---|
| Albite | $NaAlSi_3O_8$ | 2.62 | | 10.00 | | 10.17 | | 7.98 |
| Cassiterite | $SnO_2$ | 7.15 | 0.73 | | | | 0.39 | |
| Kaolinite | $Al_2Si2O_5(OH)_4$ | 2.60 | | 0.27 | | 0.51 | | 0.29 |
| Magnetite | $Fe_3O_4$ | 5.15 | 3.26 | 1.15 | 2.64 | 0.48 | 4.55 | 0.49 |
| Microcline | $K(AlSi_3O_8)$ | 2.57 | | 14.16 | | 12.82 | | 10.51 |
| Muscovite | $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 2.80 | 6.33 | 10.63 | 10.08 | 13.53 | 10.70 | 12.35 |
| Quartz | $SiO_2$ | 2.62 | 12.98 | 62.24 | 16.43 | 61.54 | 15.63 | 67.20 |
| Spodumene | $LiAlSi_2O_6$ | 3.15 | 60.60 | 1.37 | 50.28 | 0.44 | 59.31 | 1.13 |
| Tourmaline | $(Ca,K,Na)(Al,Fe,Li,Mg,Mn)_3(Al,Cr,Fe,V)_6$ | 2.8-3.3 | 16.09 | 0.17 | 20.56 | 0.51 | 9.42 | 0.06 |
| **Total** | | | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

### 4.8.2 G-DUMP

HLS XRD results for C-dump are shown in Table 11. Results indicated that, similar to C-Dump, Magnetite and Tourmaline mostly reports to the sinks. Additionally, XRD results indicate that the lithium concentrate fractions contains lower levels of Muscovite (3%) in the 5 and 3mm compared to the 1.2mm (6%).

Table 11: G-Dump HLS XRD results

| Mineral | Empirical Formula | Density | 5mm Sinks | 5mm Floats | 3mm Sinks | 3mm Floats | 1.2mm Sinks | 1.2mm Floats |
|---|---|---|---|---|---|---|---|---|
| Albite | $NaAlSi_3O_8$ | 2.62 | 2.27 | 32.08 | 2.75 | 36.37 | 2.48 | 31.73 |
| Cassiterite | $SnO_2$ | 7.15 | | | 0.28 | | | |
| Kaolinite | $Al_2Si2O_5(OH)_4$ | 2.60 | | | | | | |
| Magnetite | $Fe_3O_4$ | 5.15 | 9.81 | 0.66 | 9.73 | 0.80 | 8.45 | 0.82 |
| Microcline | $K(AlSi_3O_8)$ | 2.57 | | 12.14 | | 16.26 | | 6.98 |
| Muscovite | $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 2.80 | 3.18 | 7.40 | 2.59 | 3.45 | 5.82 | 10.13 |
| Quartz | $SiO_2$ | 2.62 | 12.99 | 45.57 | 13.15 | 41.19 | 8.59 | 48.20 |
| Spodumene | $LiAlSi_2O_6$ | 3.15 | 68.44 | 1.69 | 68.61 | 1.48 | 71.20 | 1.54 |
| Tourmaline | $(Ca,K,Na)(Al,Fe,Li,Mg,Mn)_3(Al,Cr,Fe,V)_6$ | 2.8-3.3 | 3.31 | 0.46 | 2.89 | 0.46 | 3.46 | 0.59 |
| **Total** | | | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

### 4.8.3 K-DUMP

K-dump XRD results seen in Table 12 indicated a much lower iron content in the heavy fractions compared to C- and G-dump. XRD results also indicated that the lithium concentrate fractions contains lower levels of Muscovite (2%) in the 1.2mm compared to the 5 and 3mm (4% and 3% respectively).

Table 12: K-Dump HLS XRD results

| | | | 5mm | | 3mm | | 1.2mm | |
|---|---|---|---|---|---|---|---|---|
| **Mineral** | **Empirical Formula** | **Density** | **Sinks** | **Floats** | **Sinks** | **Floats** | **Sinks** | **Floats** |
| Albite | $NaAlSi_3O_8$ | 2.62 | 1.96 | 39.53 | 1.51 | 37.48 | 1.78 | 34.61 |
| Cassiterite | $SnO_2$ | 7.15 | | | | | | |
| Kaolinite | $Al_2Si2O_5(OH)_4$ | 2.60 | | | | | | |
| Magnetite | $Fe_3O_4$ | 5.15 | 1.42 | 0.21 | 1.41 | 0.34 | 1.74 | 0.45 |
| Microcline | $K(AlSi_3O_8)$ | 2.57 | | 14.21 | | 14.69 | | 12.44 |
| Muscovite | $KAl_2(Si_3Al)O_{10}(OH,F)_2$ | 2.80 | 3.86 | 5.82 | 3.42 | 7.62 | 1.77 | 3.94 |
| Quartz | $SiO_2$ | 2.62 | 7.23 | 38.30 | 6.95 | 37.98 | 6.76 | 46.12 |
| Spodumene | $LiAlSi_2O_6$ | 3.15 | 84.91 | 1.48 | 86.23 | 1.42 | 87.00 | 1.50 |
| Tourmaline | $(Ca,K,Na)(Al,Fe,Li,Mg,Mn)_3$ $(Al,Cr, Fe,V)_6$ | 2.8-3.3 | 0.62 | 0.45 | 0.46 | 0.47 | 0.95 | 0.94 |
| **Total** | | | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

## 4.9 DENSE MEDIUM SEPARATION

### 4.9.1 PRIMARY DMS RESULTS ON INDIVIDUAL DUMPS

Primary DMS results on the C-dump (see Table 13) indicates that:

I. It was possible to achieve a concentrate of 2.44% $Li_2O$ in 8.8% of the mass corresponding to 68% $Li_2O$ recovery at a 2.75 density cut point.

II. It was possible to achieve 83% $Li_2O$ recovery in 47% of the mass, however the upgrade ratio was very low, resulting in a 0.57% $Li_2O$ at a density cut point of 2.65.

III. Half of the iron tends to concentrate with the heavy fraction in both the 2.55 and 2.65 density cut points

Table 13: Primary DMS results summary for C dump

| Stage | RD | %Yield | %$Li_2O$ | %$Li_2O$ Recovery | %$Fe_2O_3$ | %$Fe_2O_3$ Recovery |
|---|---|---|---|---|---|---|
| Primary | 2.55 | 58.4 | 0.45 | 82.7 | 1.7 | 58.60 |
| Primary | 2.65 | 46.7 | 0.57 | 83.3 | 1.6 | 47.64 |
| Primary | 2.70 | 16.3 | 1.03 | 53.0 | 2.2 | 23.05 |
| Primary | 2.75 | 8.8 | 2.44 | 67.9 | 3.9 | 20.47 |
| **Feed** | | | **0.32** | | **1.64** | |

Primary DMS results on G-dump shown in Table 14 indicates that:

I. It was possible to achieve a concentrate of 2.8% $Li_2O$ in 20.8% of the mass corresponding to 87% $Li_2O$ recovery at a 2.7 density cut point.

II. At a 2.65 density cut point, 88.2% $Li_2O$ was recovered in 28.5% of the mass resulting in a 2.1% $Li_2O$ concentrate grade.

III. It was possible to achieve 80.7% $Li_2O$ recovery in 14% of the mass, resulting in a concentrate of 4% $Li_2O$ at a density cut point of 2.75.

IV. More than half of the iron tends to concentrate with the heavy fractions. It is important to remove the iron from the final concentrate.

Table 14: Primary DMS results summary for G-dump

| Stage | RD | %Yield | %$Li_2O$ | %$Li_2O$ Recovery | %$Fe_2O_3$ | %$Fe_2O_3$ Recovery |
|---|---|---|---|---|---|---|
| Primary | 2.55 | 83.6 | 0.8 | 97.4 | 2.2 | 93.7 |
| Primary | 2.65 | 28.5 | 2.1 | 88.2 | 5.1 | 80.1 |
| Primary | 2.70 | 20.8 | 2.8 | 86.6 | 7.2 | 74.7 |
| Primary | 2.75 | 14.1 | 4.0 | 80.7 | 8.5 | 63.9 |
| **Feed** | | | **0.69** | | **1.91** | |

Primary DMS results on K-dump shown in Table 15 indicates that:

I. It was possible to achieve a concentrate of 4.2% $Li_2O$ in 23% of the mass corresponding to 86% $Li_2O$ recovery at a 2.7 density cut point. Similar results were achieved at a 2.65 density cut point. (86.6% $Li_2O$ recovery, 22.2% mass pull, 4.3% $Li_2O$ concentrate grade)

II. It was possible to achieve 70.2% $Li_2O$ recovery in 14% of the mass, resulting in a concentrate of 5.2% $Li_2O$ at a density cut point of 2.75.

III. More than half of the iron concentrate with the heavy fraction in the 2.55 cut density. However, K-dump has a low iron concentration in the head sample.

Table 15: Primary DMS results summary for K-dump

| Stage | RD | %Yield | %$Li_2O$ | %$Li_2O$ Recovery | %$Fe_2O_3$ | %$Fe_2O_3$ Recovery |
|---|---|---|---|---|---|---|
| Primary | 2.55 | 68.2 | 1.7 | 95.0 | 0.3 | 79.5 |
| Primary | 2.65 | 22.2 | 4.3 | 86.6 | 0.6 | 43.6 |
| Primary | 2.70 | 23.0 | 4.2 | 86.1 | 0.6 | 43.4 |
| Primary | 2.75 | 14.2 | 5.2 | 70.2 | 0.5 | 25.4 |
| **Feed** | | | **1.12** | | **0.30** | |

### 4.9.2 DMS Results on Blend (G&K-dumps)

DMS test results on the blend are seen in Figure 19 and Table 16. The results show that:

I. The primary DMS at a 2.75 cut density recovered 64% of lithium in 16.7% of the mass.

II. The secondary DMS at a 2.95 cut density produced a 6.9% $Li_2O$ concentrate, which is above the SC6 spodumene specifications requested by Tantalex. However, this was achieved at an overall mass pull of 6% corresponding to an overall recovery of 37%.

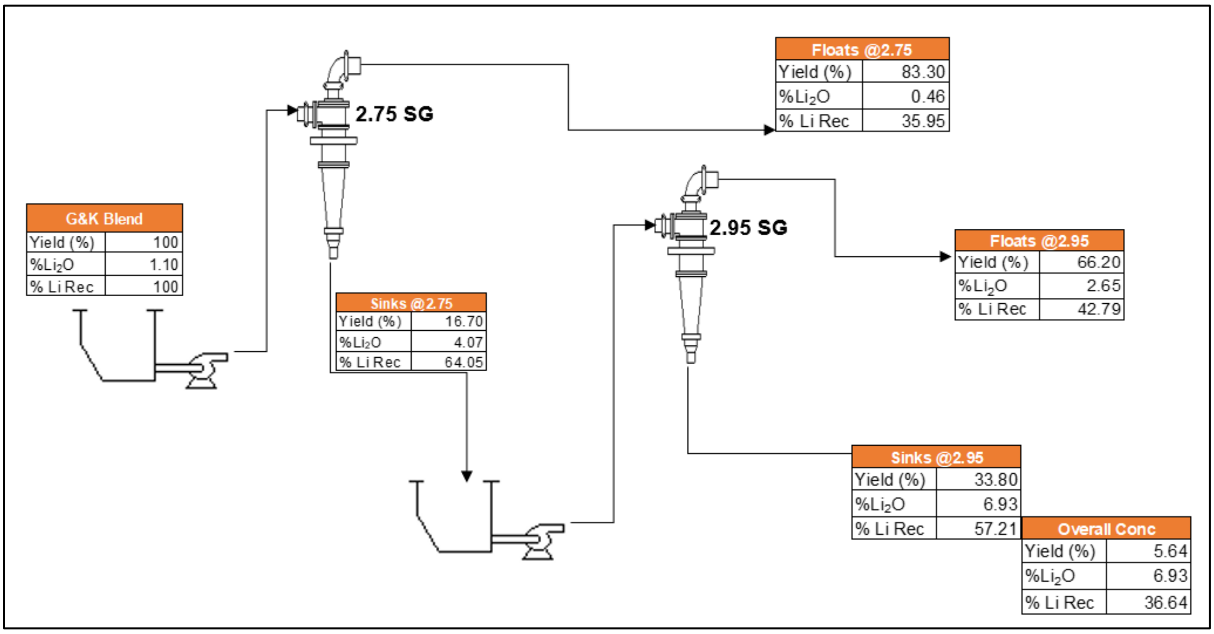


Figure 19: Overview of DMS testwork on the blend (G&K)

Table 16: Summary of DMS test results on the blend (G&K)

| | Primary at 2.75 cut density | | | | | Secondary at 2.95 cut density | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | Mass (%) | % $Li_2O$ | % $Li_2O$ Recovery | % $Li_2O$ Overall Recovery | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % |
| Sinks | 16.7 | 4.1 | 64.1 | 1.9 | 85.9 | 33.8 | 6.9 | 57.2 | 36.6 | 1.9 | 56.5 |
| Floats | 83.3 | 0.5 | 35.9 | 0.6 | 14.1 | 66.2 | 2.6 | 42.8 | 27.4 | 1.9 | 43.5 |
| **Total** | **100** | **1.06** | **100** | **1.40** | **100.0** | **100.0** | **4.10** | **100.0** | **64.1** | **1.89** | **100.0** |

# 5. CONCLUSIONS

The main conclusions from this test campaign are:

I. C- and G-dump material are classified as medium difficult to crush. K-dump material is already fine (97% passing 2.8mm) failing to meet criteria for any comminution test work.

II. Crushing samples down to 1.2mm generated more than 50% of fine (<500µm) in all three dumps. However, K-dump contains about 44% of fines even before crushing.

III. In G-dump, up to 85% of $Li_2O$ deported to the DMS fraction (>500µm) when material is crushed to a top size of 3 and 5mm. 72-73% $Li_2O$ deported to the same fraction in the C-dump. K-dump did not offer much difference in valuable minerals distribution regardless of the top crush size with only about 50-58% of $Li_2O$ reporting to the DMS fraction.

IV. HLS tests have revealed that there is marginal $Li_2O$ recovery increase resulting from crushing down to 3mm compared to 5mm for C- and G-dump. K-dump on the other hand does not offer much difference in $Li_2O$ recoveries between the different size fractions.

V. Primary DMS test on the C-dump have yielded unsatisfactory results, suggesting that the spodumene could not be liberated.

VI. Primary DMS on G- and K-dump have yielded very encouraging results, suggesting that it is possible to reject as much as 80% of the mass in the primary DMS circuit while recovering more than 85% of $Li_2O$. This will result in a smaller similar secondary DMS circuit for both G and K, although it is important to add iron removal on the G-dump circuit.

VII. DMS results on the blend (G&K) have demonstrated that it is possible to produce a SC6 concentrate from the blend using a two stage DMS approach.

# 6. RECOMMENDATIONS

The following recommendations are made for further testwork:

I. Conduct flotation testwork on C-dump to understand the technology capabilities compared to DMS.

II. Investigate iron removal on G-dump to reduce the iron content in the SC6 concentrate.

III. Consider running the primary DMS at a 2.7 density cut-point and explore a lower density cut-point on the secondary DMS for the blend (G&K) to increase lithium recovery.

# APPENDIX A:

# COMPREHENSIVE RESULT HLS AT 2.9G/CM$^3$

Table 17: C-dump comprehensive HLS results at a top size 5mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 34.95 | 4.94 | 3.18 | 4.15 | 65.00 | 47.95 | 6.03 | 17.71 | 5404.80 | 61.63 | 442.93 | 62.92 |
| Floats | 672.43 | 95.06 | 61.23 | 0.12 | 35.00 | 25.82 | 1.46 | 82.29 | 174.93 | 38.37 | 13.56 | 37.08 |
| **Total** | **707.38** | **100.00** | **64.42** | **0.32** | **100.00** | **73.77** | **1.68** | **100.00** | **433.32** | **100.00** | **34.78** | **100.00** |

Table 18: C-dump compressive HLS results at a top size 3mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 38.35 | 5.52 | 3.49 | 3.96 | 70.34 | 49.96 | 5.90 | 17.80 | 1958.40 | 46.85 | 104.98 | 29.03 |
| Floats | 656.42 | 94.48 | 59.68 | 0.10 | 29.66 | 21.06 | 1.59 | 82.20 | 129.81 | 53.15 | 14.99 | 70.97 |
| **Total** | **694.77** | **100.00** | **63.17** | **0.31** | **100.00** | **71.02** | **1.83** | **100.00** | **230.74** | **100.00** | **19.96** | **100.00** |

Table 19: C-dump comprehensive HLS results at a top size 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 35.41 | 5.67 | 2.10 | 4.60 | 78.26 | 35.76 | 5.16 | 19.98 | 4195.20 | 72.31 | 720.79 | 82.26 |
| Floats | 589.56 | 94.33 | 35.05 | 0.08 | 21.74 | 9.94 | 1.24 | 80.02 | 96.51 | 27.69 | 9.34 | 17.74 |
| **Total** | **624.97** | **100.00** | **37.15** | **0.33** | **100.00** | **45.70** | **1.46** | **100.00** | **328.74** | **100.00** | **49.65** | **100.00** |

Table 20: G-dump comprehensive HLS results at a top size 5mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 101.06 | 13.87 | 7.11 | 6.86 | 85.27 | 48.09 | 1.47 | 27.33 | 2419.20 | 64.56 | 50.05 | 31.01 |
| Floats | 627.71 | 86.13 | 44.19 | 0.19 | 14.73 | 8.31 | 0.63 | 72.67 | 213.83 | 35.44 | 17.93 | 68.99 |
| **Total** | **728.77** | **100.00** | **51.31** | **7.05** | **100.00** | **56.40** | **0.75** | **100.00** | **519.66** | **100.00** | **22.38** | **100.00** |

Table 21: G-dump comprehensive HLS results at a top size 3mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 82.96 | 11.08 | 8.34 | 5.38 | 81.99 | 69.44 | 9.94 | 50.63 | 5107.20 | 80.52 | 87.21 | 38.77 |
| Floats | 665.87 | 88.92 | 66.91 | 0.15 | 18.01 | 15.25 | 1.21 | 49.37 | 153.97 | 19.48 | 17.16 | 61.23 |
| **Total** | **748.83** | **100.00** | **75.25** | **5.53** | **100.00** | **84.69** | **2.17** | **100.00** | **702.72** | **100.00** | **24.92** | **100.00** |

Table 22: G-dump comprehensive HLS results at a top size 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 84.19 | 12.80 | 5.19 | 5.93 | 86.95 | 48.70 | 8.27 | 60.96 | 2486.40 | 71.36 | 87.87 | 51.61 |
| Floats | 573.55 | 87.20 | 35.33 | 0.13 | 13.05 | 7.31 | 0.78 | 39.04 | 146.45 | 28.64 | 12.10 | 48.39 |
| **Total** | **657.74** | **100.00** | **40.52** | **6.06** | **100.00** | **56.01** | **1.74** | **100.00** | **445.96** | **100.00** | **21.79** | **100.00** |

Table 23: K-dump comprehensive HLS results at a top size 5mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 101.06 | 13.87 | 7.11 | 6.86 | 85.27 | 48.09 | 1.47 | 27.33 | 2419.20 | 64.56 | 50.05 | 31.01 |
| Floats | 627.71 | 86.13 | 44.19 | 0.19 | 14.73 | 8.31 | 0.63 | 72.67 | 213.83 | 35.44 | 17.93 | 68.99 |
| **Total** | **728.77** | **100.00** | **51.31** | **7.05** | **100.00** | **56.40** | **0.75** | **100.00** | **519.66** | **100.00** | **22.38** | **100.00** |

Table 24: K-dump comprehensive HLS results at a top size 3mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 105.39 | 13.97 | 7.13 | 6.97 | 85.56 | 49.64 | 1.33 | 25.42 | 3014.40 | 74.64 | 61.71 | 30.98 |
| Floats | 649.22 | 86.03 | 43.94 | 0.19 | 14.44 | 8.38 | 0.63 | 74.58 | 166.23 | 25.36 | 22.32 | 69.02 |
| **Total** | **754.61** | **100.00** | **51.07** | **7.16** | **100.00** | **58.02** | **0.73** | **100.00** | **564.01** | **100.00** | **27.82** | **100.00** |

Table 25: K-dump comprehensive HLS results at a top size 1.2mm

| Description | Mass (g) | % Yield | Overall Mass yield | % $Li_2O$ | $Li_2O$ Recovery % | Overall $Li_2O$ Recovery % | % $Fe_2O_3$ | $Fe_2O_3$ Recovery % | ppm Sn | Sn Recovery % | ppm Ta | Ta Recovery % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sink | 95.45 | 15.09 | 6.54 | 6.84 | 90.01 | 45.80 | 1.82 | 28.41 | 2390.40 | 76.65 | 48.51 | 32.33 |
| Floats | 537.13 | 84.91 | 36.83 | 0.13 | 9.99 | 5.08 | 0.82 | 71.59 | 129.42 | 23.35 | 18.05 | 67.67 |
| **Total** | **632.58** | **100.00** | **43.37** | **6.97** | **100.00** | **50.89** | **0.97** | **100.00** | **470.58** | **100.00** | **22.64** | **100.00** |

# APPENDIX B: FULL SMC RESULTS

# SMC TEST® REPORT

## CoreMet Mineral Processing

## Tested by: Geolabs Global

Centurion, South Africa

Prepared by: Matt Weier

JKTech Job No: 22019/P7
Testing Date: November 2022

# Contents

# Appendices

# List Of Figures

# List Of Tables

# 1 Executive Summary

## 1.1 SMC Results Summary

*Table 1 - SMC Test® Results*

| Sample Designation | *DWi* (kWh/m$^3$) | *DWi* (%) | *Mi* Parameters (kWh/t) | | | SG |
|---|---|---|---|---|---|---|
| | | | Mia | Mih | Mic | |
| C-Dump | 1.6 | 3.0 | 6.3 | 3.5 | 1.8 | 2.61 |
| G-Dump | 3.0 | 10.0 | 10.5 | 6.6 | 3.4 | 2.63 |

*Table 2 – Parameters derived from the SMC Test® Results*

| Sample Designation | A | b | A*b | $t_a$ | SCSE (kWh/t) |
|---|---|---|---|---|---|
| C-Dump | 68.5 | 2.44 | 167.1 | 1.66 | 5.87 |
| G-Dump | 69.5 | 1.26 | 87.6 | 0.86 | 7.14 |

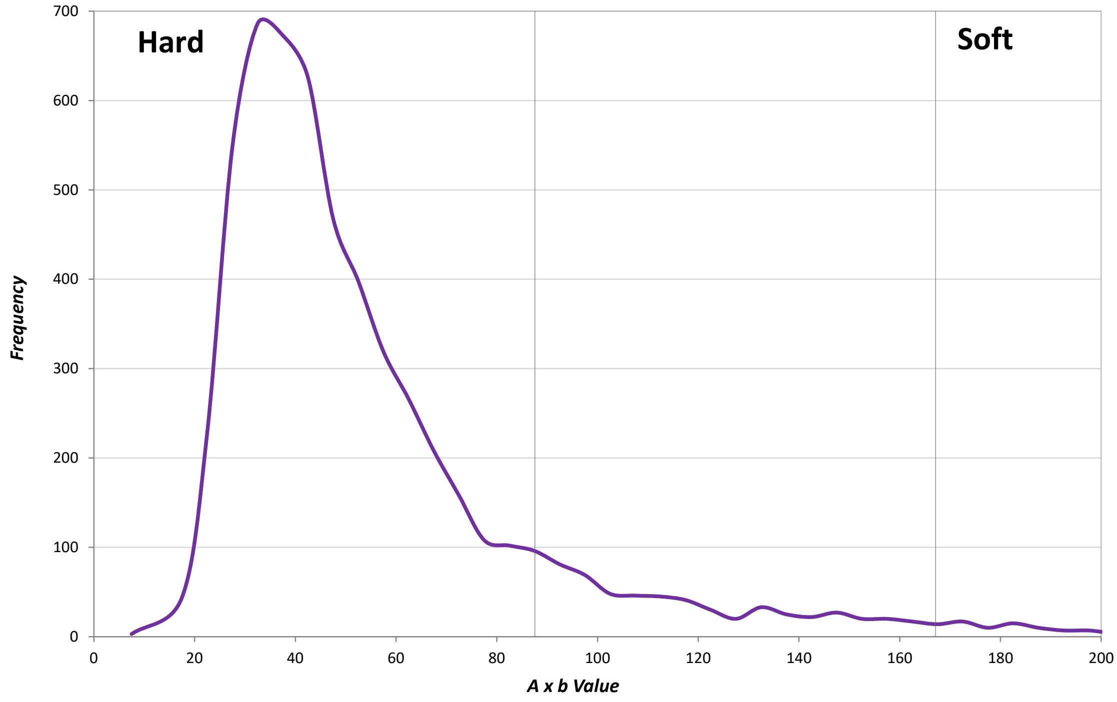


*Figure 1 - Frequency Distribution of A*b in the JKTech Database*

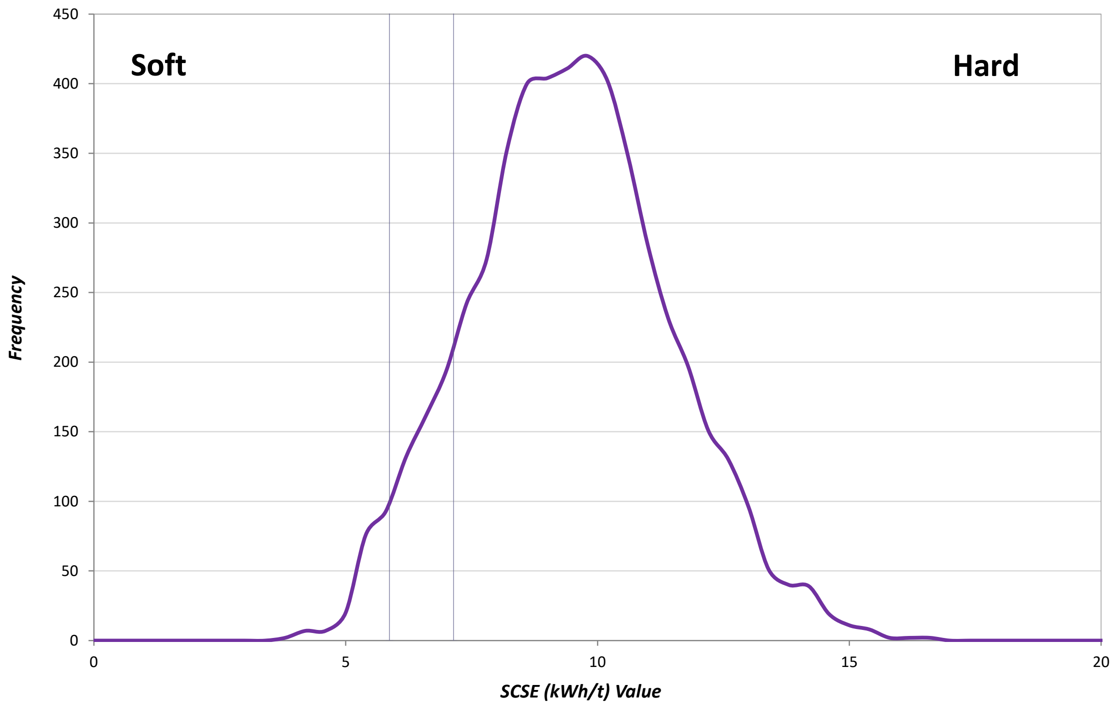


*Figure 2 - Frequency Distribution of SCSE in the JKTech Database*

# 2 Introduction

SMC data for two samples from Manono-Kitotolo Project were received from Geolabs Global on November 15, 2022, by JKTech for SMC test analysis. The samples were identified as C-Dump and G-Dump. The data were analysed to determine the JKSimMet and SMC Test comminution parameters. SMC Test results were forwarded to SMC Testing Pty Ltd for the analysis of the SMC Test data. Analysis and reporting were completed on November 17, 2022.

# 3 The SMC Test®

## 3.1 Introduction

The standard JK Drop-Weight test provides ore specific parameters for use in the JKSimMet Mineral Processing Simulator software. In JKSimMet, these parameters are combined with equipment details and operating conditions to analyse and/or predict SAG/autogenous mill performance. The same test procedure also provides ore type characterisation for the JKSimMet crusher model.

The SMC Test was developed by Steve Morrell of SMC Testing Pty Ltd (SMCT). The test provides a cost effective means of obtaining these parameters, in addition to a range of other power-based comminution parameters, from drill core or in situations where limited quantities of material are available. The ore specific parameters have been calculated from the test results and are supplied to CoreMet Mineral Processing in this report as part of the standard procedure

## 3.2 General Description and Test Background

The SMC Test® was originally designed for the breakage characterisation of drill core and it generates a relationship between input energy (kWh/t) and the percent of broken product passing a specified sieve size. The results are used to determine the so-called JK Drop-Weight index (DWi), which is a measure of the strength of the rock when broken under impact conditions and has the units kWh/m$^3$. The DWi is directly related to the JK rock breakage parameters A and b and hence can be used to estimate the values of these parameters as well as being correlated with the JK abrasion parameter - $t_a$. For crusher modelling the $t_{10}$-$E_{cs}$ matrix can also be derived. This is done by using the size-by-size $A*b$ values that are used in the SMC Test® data analysis (see below) to estimate the $t_{10}$-$E_{cs}$ values for each of the relevant size fractions in the crusher model matrix.

For power-based calculations, (see APPENDIX B), the SMC Test® provides the comminution parameters $M_{ia}$, $M_{ih}$ and $M_{ic}$. $M_{ia}$ is the work index for the grinding of coarser particles (> 750 µm) in tumbling mills such as autogenous (AG), semi-autogenous (SAG), rod and ball mills. $M_{ih}$ is the work index for the grinding in High Pressure Grinding Rolls (HPGR) and $M_{ic}$ for size reduction in conventional crushers.

The SMC Test® is a precision test, which uses particles that are either cut from drill core using a diamond saw to achieve close size replication or else selected from crushed material so that particle mass variation is controlled within a prescribed range. The particles are then broken at a number of prescribed impact energies. The high degree of control imposed on both the size of particles and the breakage energies used, means that the test is largely free of the repeatability problems associated with tumbling-mill based tests. Such tests usually suffer from variations in feed size (which is not closely controlled) and energy input, often assumed to be constant when in reality it can be highly variable (Levin, 1989).

The relationship between the DWi and the JK rock breakage parameters makes use of the size-by-size nature of rock strength that is often apparent from the results of full JK Drop-Weight tests. The effect is illustrated in Figure 3, which plots the normalized values of A*b against particle size. This figure also shows how the gradient of these plots varies across the full range of rock types tested. In the case of a conventional JK Drop-Weight test, these values are effectively averaged and a mean value of A and b is reported. The SMC Test® uses a single size and makes use of relationships such as that shown in Figure 3 to predict the A and b of the particle size that has the same value as the mean for a JK full Drop-Weight test.

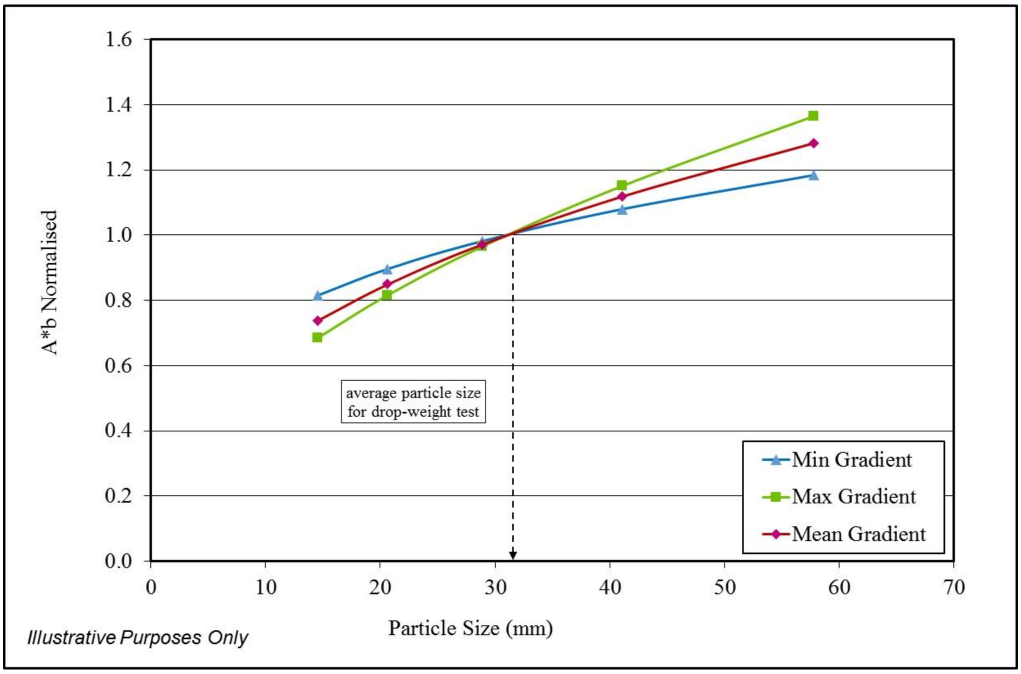


*Figure 3 – Relationship between Particle Size and A*b*

## 3.3 The Test Procedure

In the SMC Test®, five sets of 20 particles are broken, each set at a different specific energy level, using a JK Drop-Weight tester. The breakage products are screened at a sieve size selected to provide a direct measurement of the $t_{10}$ value.

The test calls for a prescribed target average volume for the particles, with the target being chosen to be equivalent to the mean volume of particles in one of the standard JK Drop-Weight test size fractions.

The rest height of the drop-head (gap) is recorded after breakage of each particle to allow for a correction to the drop energy. After breaking all 20 particles in a set, the broken product is sieved at an aperture size, one tenth of the original particle size. Thus, the percent passing mass gives a direct reading of the $t_{10}$ value for breakage at that energy level.

There are two alternative methods of preparing the particle sets for breakage testing: the particle selection method and the cut core method. The particle selection method is the most commonly used as it is generally less time consuming. The cut core method requires less material, so tends to be used as a fallback method, only when necessary to cope with restricted sample availability.

### 3.3.1 Particle Selection Method

For the particle selection method, the test is carried out on material in one of three alternative size fractions: -31.5+26.5, -22.4+19 or -16+13.2 mm. The largest size fraction is preferred but requires more material.

In the particle selection method, particles are chosen so that their individual masses lie within ±30% of the target mass and the mean mass for each set of 20 lies within ±10% of the target mass. A typical set of particles is shown in Figure 4.

*Figure 4 – A Typical Set of Particles for Breakage (Particle Selection Method)*

Before commencing breakage tests on the particles, the ore density is determined by first weighing a representative sample of particles in air and then in water.

### 3.3.2 Cut Core Method

The cut core method uses cut pieces of quartered (slivered) drill core. Whole core or half core can be used, but when received in this form it needs to be first quartered as a preliminary step in the procedure. Once quartered, any broken or tapered ends of the quartered lengths are cut, to square them off. Before the lengths of quartered core are cut to produce the pieces for testing, each one is weighed in air and then in water, to obtain a density measurement and a measure of its mass per unit length.

The size fraction targeted when the cut core method is used depends on the original core diameter. The target size fraction is selected to ensure that pieces of the correct volume will have “chunky” rather than “slabby” proportions.

Having measured the density of the core, the target volume can be translated into a target mass and with the average mass per unit length also known, an average cutting interval can be determined for the core.

Sufficient pieces of the quartered core are cut to generate 100 particles. These are then divided into the five sets of 20 and broken in the JK Drop-Weight tester at the five different energy levels. Within each set, the three possible orientations of the particles are equally represented (as far as possible, given that there are 20 particles). The orientations prescribed for testing are shown in Figure 5.

*Figure 5 – Orientations of Pieces for Breakage (Cut Core Method)*

The cut core method cannot be used for cores with diameters exceeding 70 mm, where the particle masses would be too large to achieve the highest prescribed energy level.

## 3.4 SMC Test® Results

The SMC Test® results for the C-Dump and G-Dump samples from Manono-Kitotolo Project are given in Table 3. This table includes the average rock density and the DWi (Drop-Weight index) that is the direct result of the test procedure. The values determined for the $M_{ia}$, $M_{ih}$ and $M_{ic}$ parameters developed by SMCT are also presented in this table. The $M_{ia}$ parameter represents the coarse particle component (down to 750 µm), of the overall comminution energy and can be used together with the $M_{ib}$ (fine particle component) to estimate the total energy requirements of a conventional comminution circuit. The use of these parameters is explained further in APPENDIX B. The derived estimates of parameters *A*, *b* and $t_a$ that are required for JKSimMet comminution modelling are given in Table 4.

Also included in the derived results are the SAG Circuit Specific Energy (SCSE) values. The SCSE value is derived from simulations of a "standard" circuit comprising a SAG mill in closed circuit with a pebble crusher. This allows *A*b* values to be described in a more meaningful form. SCSE is described in detail in APPENDIX A.

In the case of the C-Dump and G-Dump samples from Manono-Kitotolo Project, the *A* and *b* estimates are based on a correlation using the database of all results so far accumulated by SMCT.

*Table 3 - SMC Test® Results*

| Sample Designation | DWi (kWh/m³) | DWi (%) | Mi Parameters (kWh/t) | | | SG |
|---|---|---|---|---|---|---|
| | | | Mia | Mih | Mic | |
| C-Dump | 1.56 | 3 | 6.3 | 3.5 | 1.8 | 2.61 |
| G-Dump | 3.01 | 10 | 10.5 | 6.6 | 3.4 | 2.63 |

For more details on how the $M_{ia}$, $M_{ih}$ and $M_{ic}$ parameters are derived and used, see APPENDIX B or go to the SMC Testing website at http://www.smctesting.com/about.

*Table 4 – Parameters derived from the SMC Test® Results*

| Sample Designation | A | b | $t_a$ | SCSE (kWh/t) |
|---|---|---|---|---|
| C-Dump | 68.5 | 2.44 | 1.66 | 5.87 |
| G-Dump | 69.5 | 1.26 | 0.86 | 7.14 |

The influence of particle size on the specific comminution energy needed to achieve a particular $t_{10}$ value can also be inferred from the SMC Test® results. The energy requirements for five particle sizes, each crushed to three different $t_{10}$ values, are presented in Table 5.

*Table 5 – Crusher Simulation Model Specific Energy Matrix*

| Sample Designation | Particle Size (mm) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 14.5 | | | 20.6 | | | 28.9 | | | 41.1 | | | 57.8 | | |
| | $t_{10}$ Values (%) for Given Specific Energies in kWh/t | | | | | | | | | | | | | | |
| | 10 | 20 | 30 | 10 | 20 | 30 | 10 | 20 | 30 | 10 | 20 | 30 | 10 | 20 | 30 |
| C-Dump | 0.08 | 0.18 | 0.31 | 0.07 | 0.16 | 0.27 | 0.06 | 0.14 | 0.23 | 0.06 | 0.12 | 0.20 | 0.05 | 0.11 | 0.18 |
| G-Dump | 0.16 | 0.35 | 0.58 | 0.14 | 0.30 | 0.51 | 0.12 | 0.27 | 0.44 | 0.11 | 0.23 | 0.38 | 0.09 | 0.20 | 0.34 |

The SMC Test® database now contains over 40,000 test results on samples representing more than 1300 different deposits worldwide.

Around 99% of the DWi values lie in the range 0.5 to 14.0 kWh/m³, with soft ores being at the low end of this range and hard ores at the high end.

A cumulative graph of DWi values from the SMC Test® Database is shown in Figure 6 below. This graph can be used to compare the DWi of the material from Manono-Kitotolo Project, with the entire population of ores in the SMCT database. The figures on the y-axis of the graph represent the percentages of all ores tested that are softer than the x-axis (DWi) value selected.

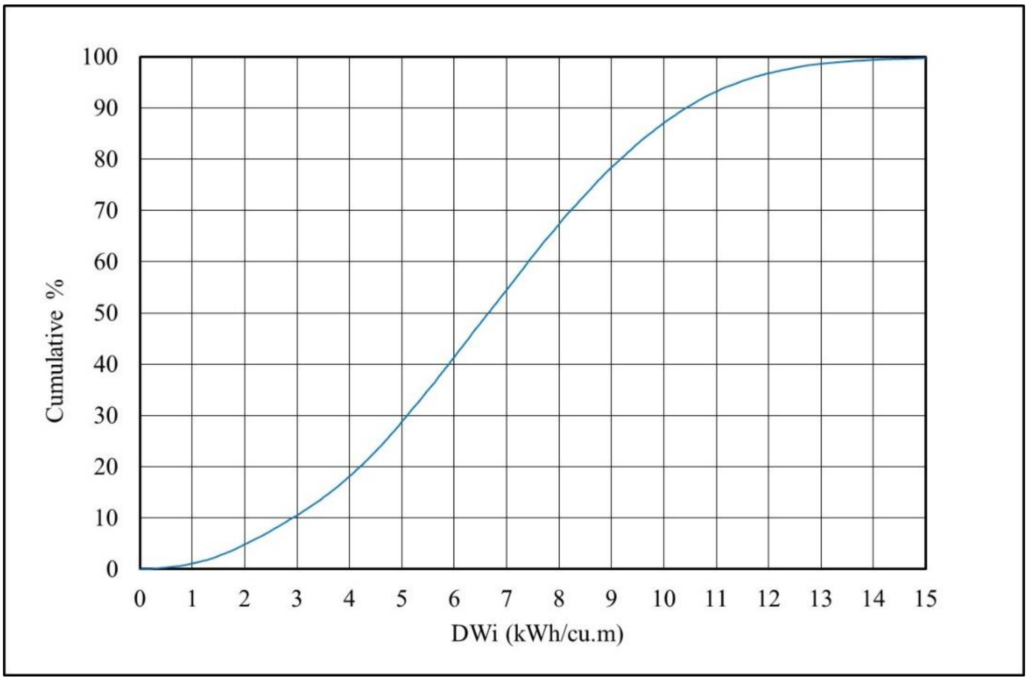


*Figure 6 – Cumulative Distribution of DWi Values in SMCT Database*

A further cumulative distribution graph is provided in Figure 7 to allow a comparison of the $M_{ia}$, $M_{ih}$ and $M_{ic}$ values obtained for the Manono-Kitotolo Project material, with the entire population of values for these parameters contained in the SMCT database.

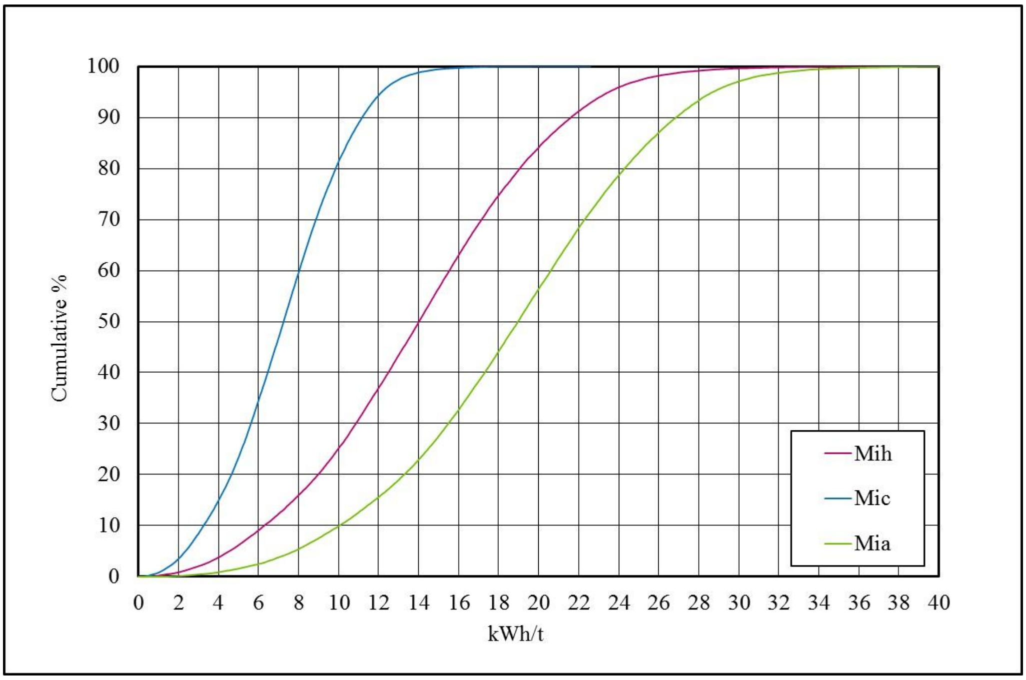


*Figure 7 - Cumulative Distribution of Mia, Mih and Mic Values in the SMCT Database*

The value of *A*b*, which is also a measure of resistance to impact breakage, is calculated and presented in Table 6, which also gives a comparison to the population of samples in the JKTech database, with the percent of samples present in the JKTech database that are softer. Note that in contrast to the DWi, a high value of *A*b* means that an ore is soft whilst a low value means that it is hard.

*Table 6 – Derived Values for A*b, ta and SCSE*

| Sample Designation | *A*b* | | $t_a$ | | *SCSE (kWh/t)* | |
|---|---|---|---|---|---|---|
| | Value | % | Value | % | Value | % |
| C-Dump | 167.1 | 4.0 | 1.66 | 4.7 | 5.87 | 3.1 |
| G-Dump | 87.6 | 14.4 | 0.86 | 16.8 | 7.14 | 12.6 |

In Figure 8 and Figure 9 below, histogram style frequency distributions for the *A*b* values and for the SCSE values in the JKTech JKDW database are shown respectively.

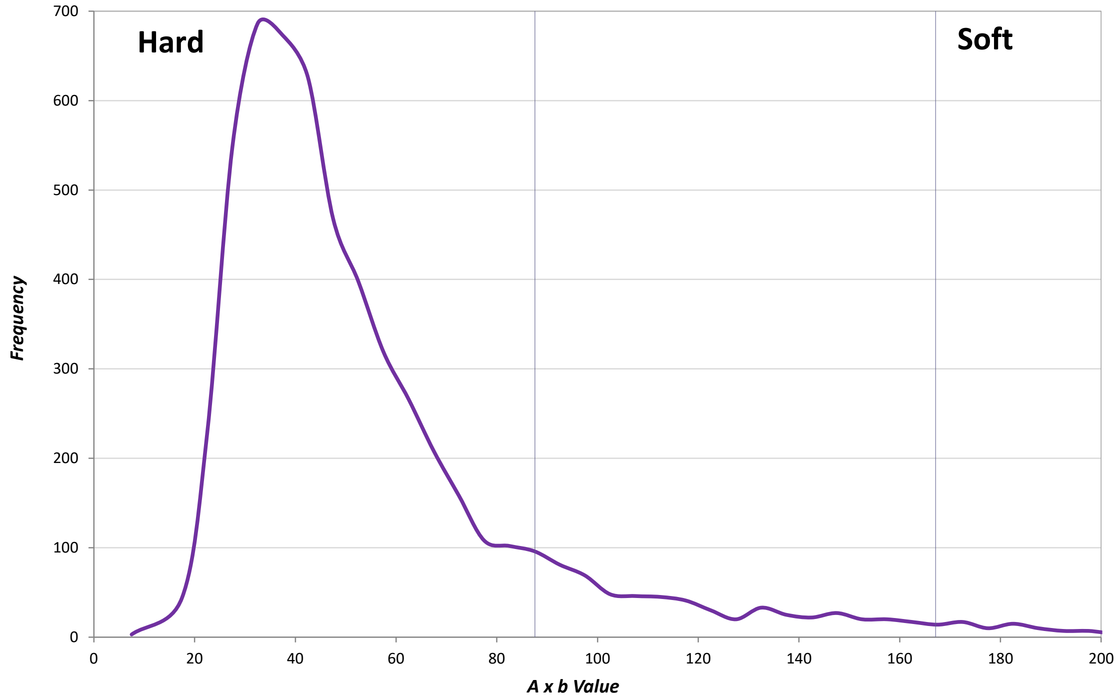


*Figure 8 - Frequency Distribution of A*b in the JKTech Database*

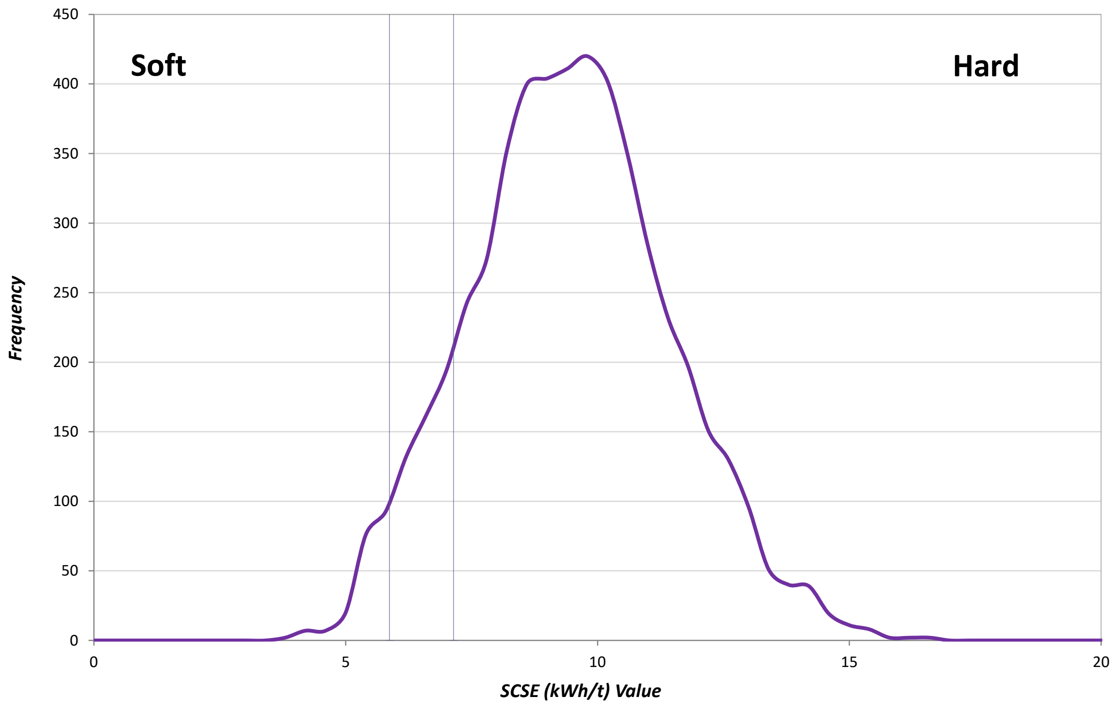


*Figure 9 - Frequency Distribution of SCSE in the JKTech Database*

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# 5 Disclaimer

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   ii) JKTech providing amended Material rectifying the defect.

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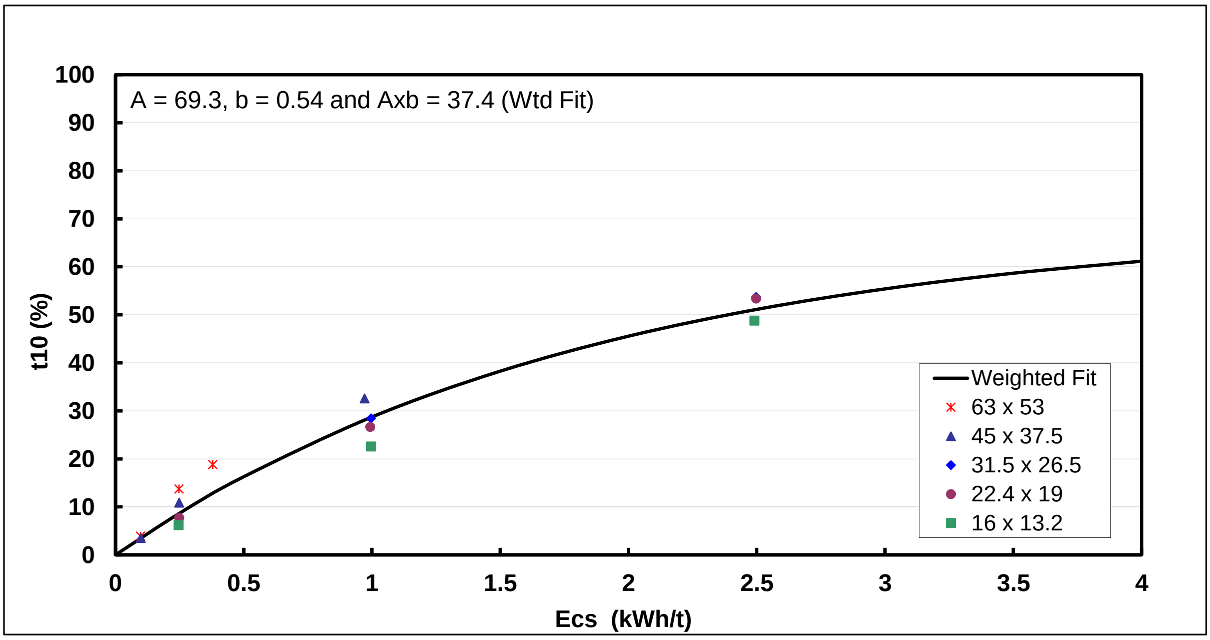
# Appendices

## APPENDIX A. SAG Circuit Specific Energy (SCSE)

For a little over 20 years, the results of JK Drop Weight tests and SMC tests have been reported in part as A, b and $t_a$ parameters. A and b are parameters which describe the response of the ore under test to increasing levels of input energy in single impact breakage. A typical $t_{10}$ v Ecs curve resulting from a Drop Weight test is shown in App Figure 1.




*App Figure 1 – Typical t10 v Ecs curve*

The curve shown in App Figure 1 is represented by an equation which is given in Equation 1.

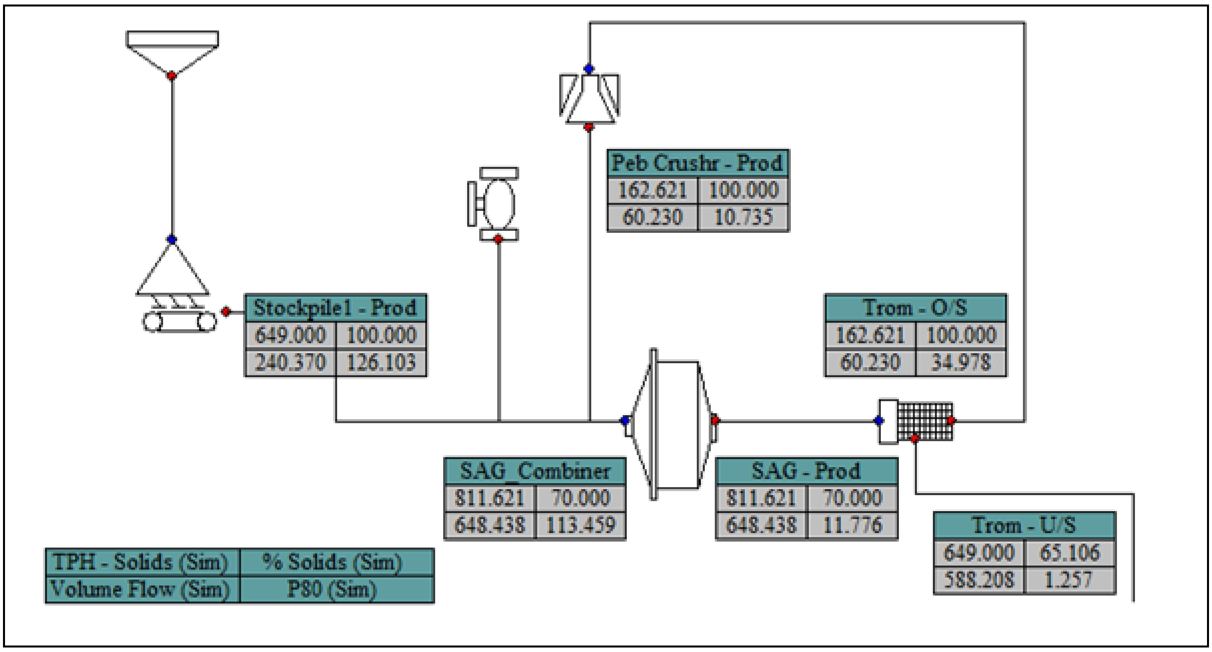
$$t_{10} = A(1 - e^{-b.Ecs}) \qquad \text{Equation 1}$$

The parameters A and b are generated by least squares fitting Equation 1 to the JK Drop Weight test data. The parameter $t_a$ is generated from a tumbling test.

Both A and b vary with ore type but having two parameters describing a single ore property makes comparison difficult. For that reason the product of A and b, referred to as A*b, which is related to the slope of the $t_{10}$ – $E_{cs}$ curve at the origin, has been universally accepted as the parameter which represents an ore's resistance to impact breakage.

The parameters A, b and $t_a$ have no physical meaning in their own right. They are ore hardness parameters used by the AG/SAG mill model in JKSimMet which permits prediction of the product size distribution and the power draw of the AG/SAG mill for a given feed size distribution and feed rate. In a design situation, the dimensions of the mill are adjusted until the load in the mill reaches 25 % by volume when fed at the required feed rate. The model predicts the power draw under these conditions and from the power draw and throughput the specific energy is determined. The specific energy is mainly a function of the ore hardness (A and b values), the feed size and the dimensions of the mill (specifically the aspect ratio) as well as to a lesser extent the operating conditions such as ball load, mill speed, grate/pebble port size and pebble crusher activity.

There are two drawbacks to the approach of using A*b as the single parameter to describe the impact resistance of a particular ore. The first is that A*b is inversely related to impact resistance, which adds unnecessary complication. The second is that A*b is related to impact resistance in a non-linear manner. As mentioned earlier this relationship and how it affects comminution machine performance can only be predicted via simulation modelling. Hence to give more meaning to the A and b values and to overcome these shortcomings, JKTech Pty Ltd and SMC Testing Pty Ltd have developed a “standard” simulation methodology to predict the specific energy required for a particular tested ore when treated in a “Standard” circuit comprising a SAG mill in closed circuit with a pebble crusher. The flowsheet is shown in App Figure 2 .




*App Figure 2 – Flowsheet used for “Standard” AG/SAG circuit simulations*

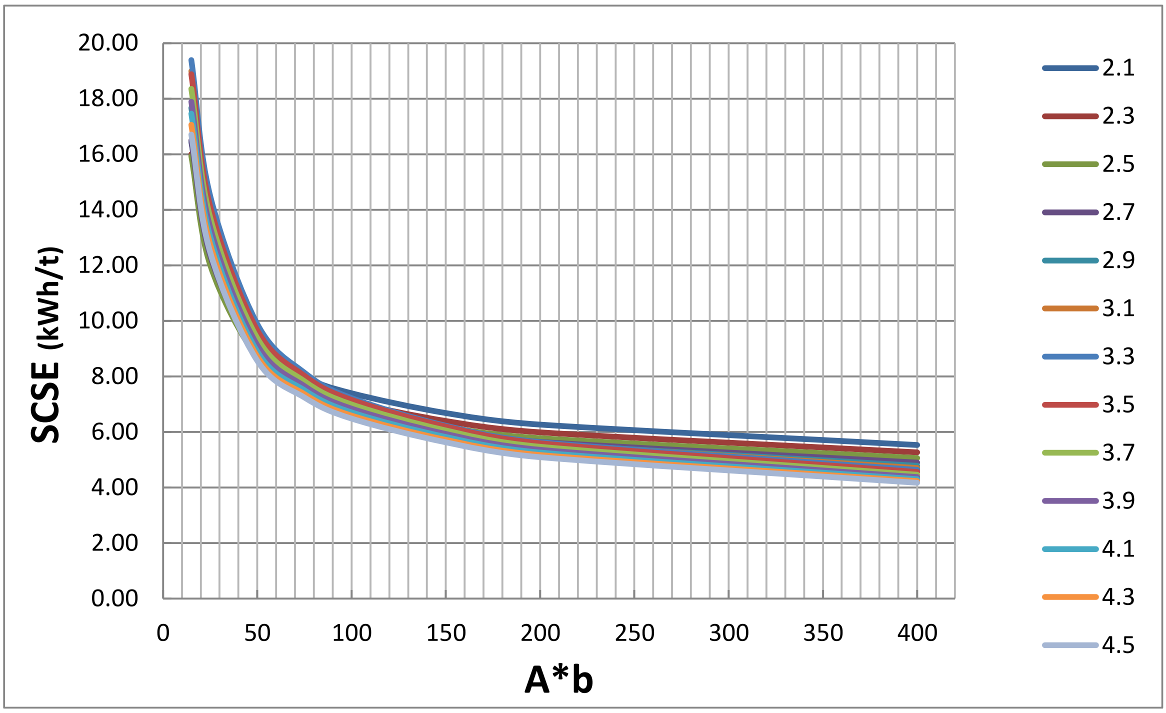
The specifications for the “standard” circuit are:

- SAG Mill
    - inside shell diameter to length ratio of 2:1 with 15 ° cone angles
    - ball charge of 15 %, 125 mm in diameter
    - total charge of 25 %
    - grate open area of 7 %
    - apertures in the grate are 100 % pebble ports with a nominal aperture of 56 mm
- Trommel
    - Cut Size of 12 mm
- Pebble Crusher
    - Closed Side Setting of 10 mm
- Feed Size Distribution
    - $F_{80}$ from the $t_a$ relationship given in Equation 2

The feed size distribution is taken from the JKTech library of typical feed size distributions and is adjusted to meet the ore specific 80 % passing size predicted using the Morrell and Morrison (1996) $F_{80}$ – $t_a$ relationship for primary crushers with a closed side setting of 150 mm given in Equation 2.

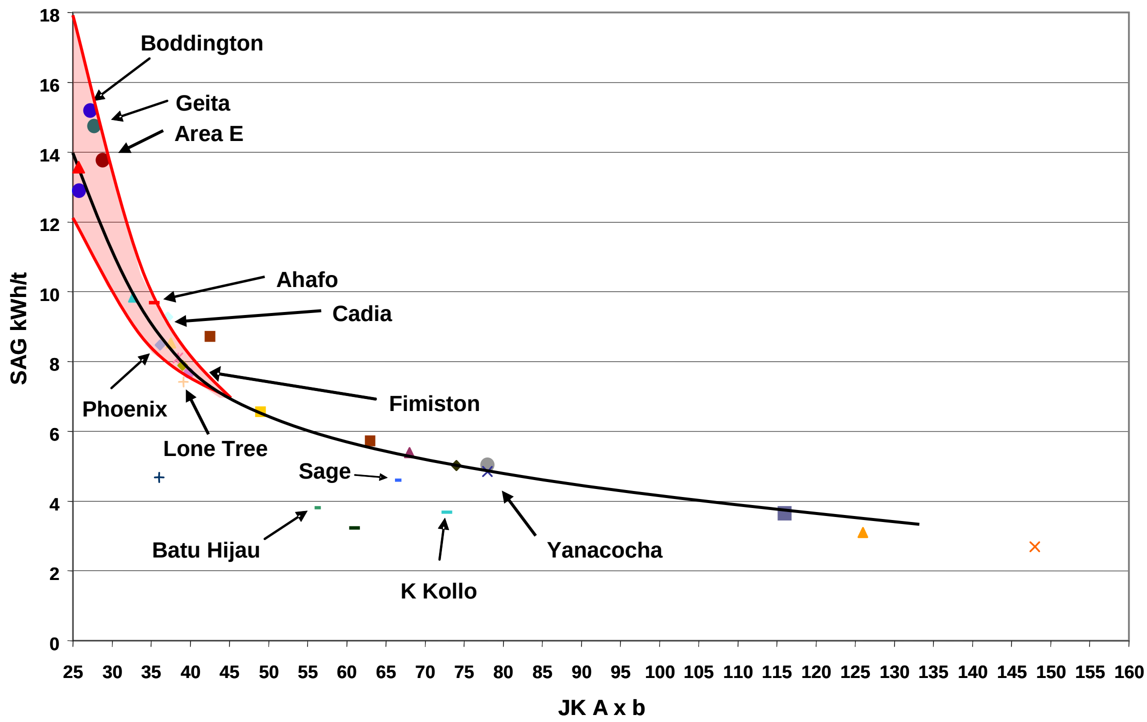
$$F_{80} = 71.3 - 28.4 * \ln(t_a) \qquad \text{Equation 2}$$

Simulations were conducted with A*b values ranging from 15 to 400, $t_a$ values ranging from 0.145 to 3.866 and solids SG values ranging from 2.1 to 4.5. For each simulation, the feed rate was adjusted until the total load volume in the SAG mill was 25 %. The predicted mill power draw and crusher power draw were combined and divided by the feed rate to provide the specific energy consumption. The results are shown in App Figure 3.




*App Figure 3 – The relationship between A*b and specific energy at varying SG for the "Standard" circuit.*

It is of note that the family of curves representing the relationship between Specific energy and A*b for the "standard" circuit is very similar to the specific energy – A*b relationship for operating mills published in Veillette and Parker, 2005 and reproduced here in App Figure 4.



*App Figure 4 – A*b vs SAG kWh/t for operating AG/SAG mills (after Veillette and Parker, 2005).*

Of course, the SCSE quoted value will not necessarily match the specific energy required for an existing or a planned AG/SAG mill due to differences in the many operating and design variables such as feed size distribution, mill dimensions, ball load and size and grate, trommel and pebble crusher configuration. The SCSE is an effective tool to compare in a relative manner the expected behaviour of different ores in AG/SAG milling in exactly the same way as the Bond laboratory ball mill work index can be used to compare the relative grindability of different ores in ball milling (Bond, 1961 and Rowland and Kjos, 1980). However the originally reported A and b parameters which match the SCSE will be still be required in JKSimMet simulations of a proposed circuit to determine the AG/SAG mill specific energy required for that particular grinding task. Guidelines for the use of JKSimMet for such simulations were given in Bailey *et al*, 2009.

# APPENDIX B. Background And Use Of The SMC Test®

## B 1 Introduction

The SMC Test® was developed to provide a range of useful comminution parameters through highly controlled breakage of rock samples. Drill core, even quartered small diameter core is suitable. Only relatively small quantities of sample are required and can be re-used to conduct Bond ball work index tests.

The results from conducting the SMC Test® are used to determine the so-called drop-weight index ($DW_i$), which is a measure of the strength of the rock, as well as the comminution indices $M_{ia}$, $M_{ih}$ and $M_{ic}$ . The SMC Test® also estimates the JK rock breakage parameters *A*, *b* and $t_a$ as well as the JK crusher model's *t10-Ecs* matrix, all of which are generated as part of the standard report output from the test.

In conjunction with the Bond ball mill work index the $DW_i$ and the $M_i$ suite of parameters can be used to accurately predict the overall specific energy requirements of circuits containing:

- AG and SAG mills.
- Ball mills
- Rod mills
- Crushers
- High Pressure Grinding Rolls (HPGR)

The JK rock breakage parameters can be used to simulate crushing and grinding circuits using JKTech's simulator – JKSimMet.

## B 2 Simulation Modelling and Impact Comminution Theory

When a rock fragment is broken, the degree of breakage can be characterised by the "$t_{10}$" parameter. The $t_{10}$ value is the percentage of the original rock mass that passes a screen aperture one tenth of the original rock fragment size. This parameter allows the degree of breakage to be compared across different starting sizes.

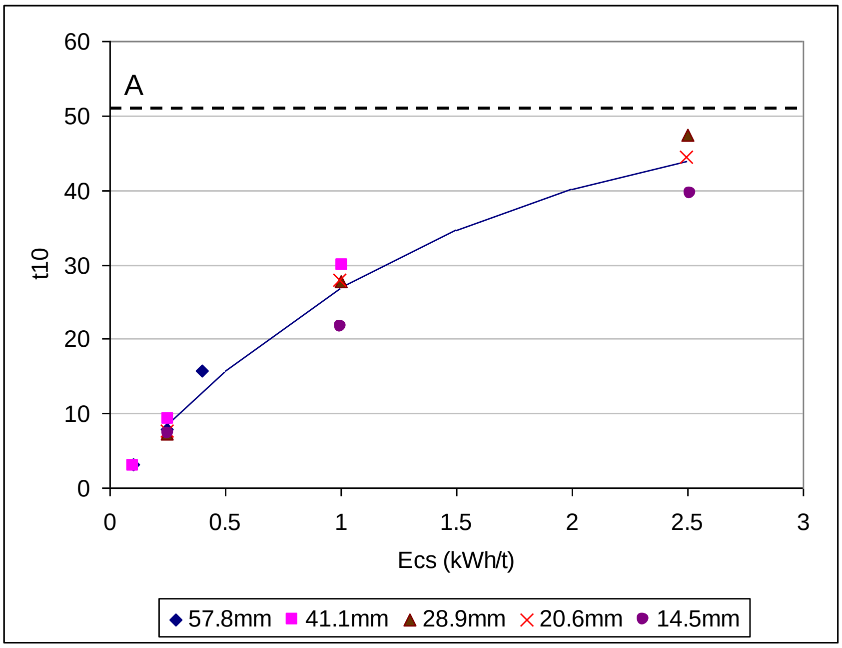
The specific comminution energy (*Ecs*) has the units kWh/t and is the energy applied during impact breakage. As the impact energy is varied, so does the $t_{10}$ value vary in response. Higher impact energies produce higher values of $t_{10}$, which of course means products with finer size distributions.

The equation describing the relationship between the $t_{10}$ and *Ecs* is given below.

$$t_{10} = A(1 - e^{-b.Ecs}) \qquad \text{Equation 1}$$

As can be seen from this equation, there are two rock breakage parameters *A* and *b* that relate the $t_{10}$ (size distribution index) to the applied specific energy (*Ecs*). These parameters are ore specific and are normally determined from a full JK Drop-Weight test.

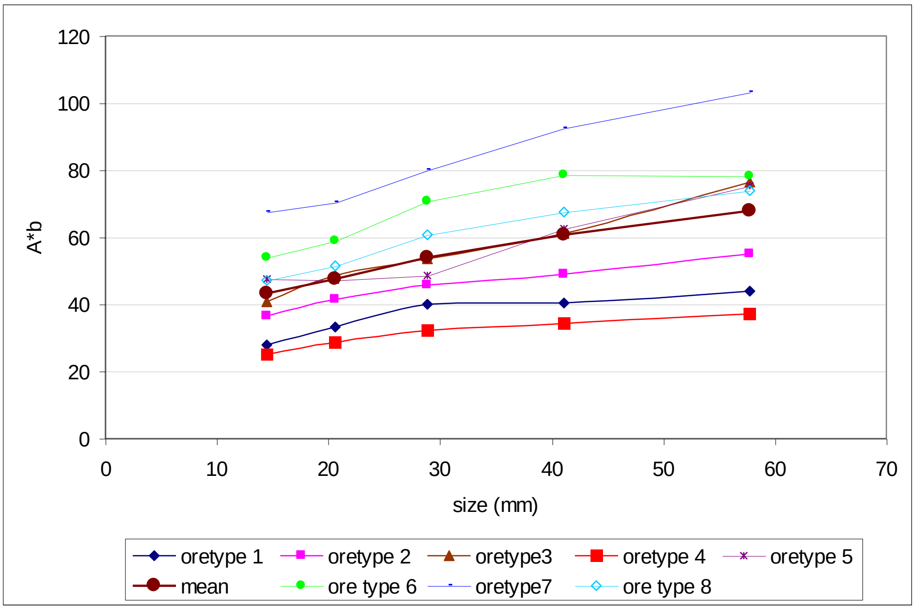
A typical plot of $t_{10}$ vs *Ecs* from a JK Drop-Weight test is shown in App Figure 5. The relationship is characterised by the two-parameter equation above, where $t_{10}$ is the dependent variable.




*App Figure 5 - Typical t10 v Ecs Plot*

The $t_{10}$ can be thought of as a "fineness index" with larger values of $t_{10}$ indicating a finer product size distribution. The value of parameter A is the limiting value of $t_{10}$. This limit indicates that at higher energies, little additional size reduction occurs as the *Ecs* is increased beyond a certain value. *A*b* is the slope of the curve at 'zero' input energy and is generally regarded as an indication of the strength of the rock, lower values indicating a higher strength.

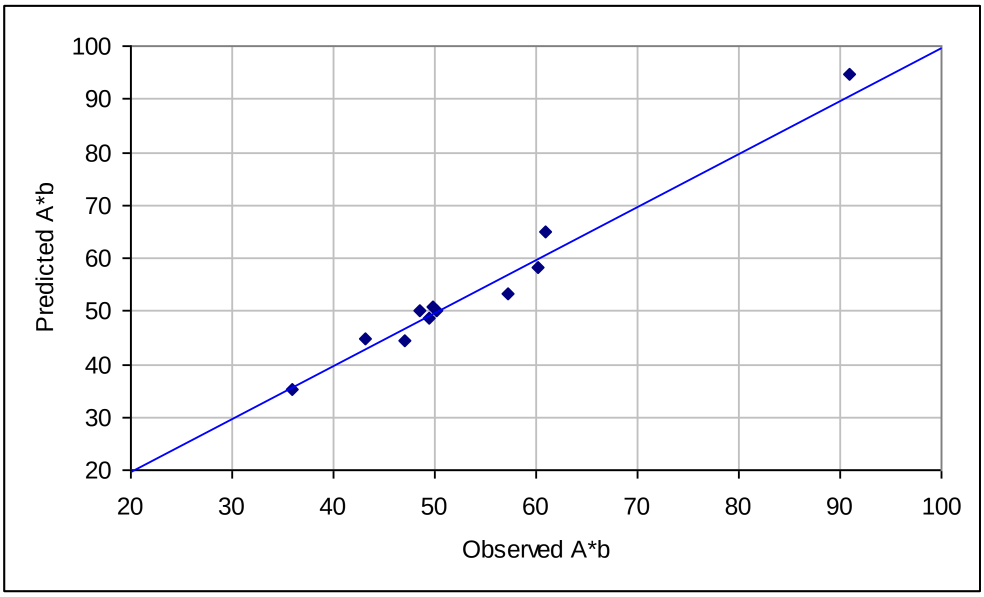
The SMC Test® is used to estimate the JK rock breakage parameters *A* and *b* by utilizing the fact that there is usually a pronounced (and ore specific) trend to decreasing rock strength with increasing particle size. This trend is illustrated in App Figure 6 which shows a plot of *A*b* versus particle size for a number of different rock types.



*App Figure 6 - Size Dependence of A*b for a Range of Ore Types*

In the case of a conventional JK Drop-Weight test these values are effectively averaged and a mean value of *A* and *b* is reported. The SMC Test® uses a single size and makes use of relationships such as that shown in App Figure 6 to predict the *A* and *b* of the particle size that has the same value as the mean for a full JK Drop-Weight test.

An example of this is illustrated in App Figure 7, where the observed values of the product *A*b* are plotted against those predicted using the DWi. Each of the data points in App Figure 7 is a result from a different ore type within an orebody.




*App Figure 7 - Predicted v Observed A*b*

The *A* and *b* parameters are used with Equation 1 and relationships such as illustrated in App Figure 6 to generate a matrix of *Ecs* values for a specific range of $t_{10}$ values and particle sizes. This matrix is used in crusher modelling to predict the power requirement of the crusher given a feed and a product size specification (Napier-Munn et al (1996)).

The *A* and *b* parameters are also used in AG/SAG mill models, such as those in JKSimMet, for predicting how the rock will break inside the mill. From this description the models can predict what the throughput, power draw and product size distribution will be (Napier-Munn et al (1996)). Modelling also enables a detailed flowsheet to be built up of the comminution circuit response to changes in ore type. It also allows optimisation strategies to be developed to overcome any deleterious changes in circuit performance predicted from differences in ore type. These strategies can include both changes to how mills are operated (eg ball load, speed etc) and changes to feed size distribution through modification of blasting practices and primary crusher operation (mine-to-mill).

## B 3 Power-Based Equations

### B 3.1 General

The $DW_i$, $M_{ia}$, $M_{ih}$ and $M_{ic}$ parameters are used in so-called power-based equations which predict the specific energy of the associated comminution machines. The approach divides comminution equipment into three categories:

- Tumbling mills, eg AG, SAG, rod and ball mills
- Conventional reciprocating crushers, eg jaw, gyratory and cone
- HPGRs

Tumbling mills are described using 2 indices: $M_{ia}$ and $M_{ib}$
Crushers have one index: $M_{ic}$
HPGRs have one index: $M_{ih}$

For tumbling mills the 2 indices relate to "coarse" and "fine" ore properties plus an efficiency factor which represents the influence of a pebble crusher in AG/SAG mill circuits. "Coarse" in this case is defined as spanning the size range from a P80 of 750 microns up to the P80 of the product of the last stage of crushing or HPGR size reduction prior to grinding. "Fine" covers the size range from a P80 of 750 microns down to P80 sizes typically reached by conventional ball milling, ie about 45 microns. The choice of 750 microns as the division between "coarse" and "fine" particle sizes was determined during the development of the technique and was found to give the best overall results across the range of plants in SMCT's data base. Implicit in the approach is that distributions are parallel and linear in log-log space.

The work index covering grinding in tumbling mills of coarse sizes is labelled $M_{ia}$. The work index covering grinding of fine particles is labelled Mib (Morrell, 2008). $M_{ia}$ values are provided as a standard output from a SMC Test® (Morrell, 2004a) whilst $M_{ib}$ values can be determined using the data generated by a conventional Bond ball mill work index test ($M_{ib}$ is NOT the Bond ball work index). $M_{ic}$ and $M_{ih}$ values are also provided as a standard output from a SMC Test® (Morrell, 2009).

The general size reduction equation is as follows (Morrell, 2004b):

$$W_i = M_i . 4({x_2}^{f(x_2)} - {x_1}^{f(x_1)}) \qquad \text{Equation 3}$$

where

$M_i$ = Work index related to the breakage property of an ore (kWh/tonne); for grinding from the product of the final stage of crushing to a P80 of 750 microns (coarse particles) the index is labelled Mia and for size reduction from 750 microns to the final product P80 normally reached by conventional ball mills (fine particles) it is labelled $M_{ib}$. For conventional crushing $M_{ic}$ is used and for HPGRs Mih is used.

$Wi$ = Specific comminution (kWh/tonne)

$x_2$ = 80% passing size for the product (microns)

$x_1$ = 80% passing size for the feed (microns)

$f(x_j)$ = $-(0.295 + x_j/1000000)$ (Morrell, 2006) Equation 4

For tumbling mills the specific comminution energy ($Wi$) relates to the power at the pinion or for gearless drives - the motor output. For HPGRs it is the energy inputted to the rolls, whilst for conventional crushers $Wi$ relates to the specific energy as determined using the motor input power less the no-load power.

## B 3.2 Specific Energy Determination for Comminution Circuits

The total specific energy ($W_T$) to reduce primary crusher product to final product size is given by:

$$W_T = W_a + W_b + W_c + W_h + W_s \qquad \text{Equation 5}$$

where

$W_a$ = specific energy to grind coarser particles in tumbling mills

$W_b$ = specific energy to grind finer particles in tumbling mills

$W_c$ = specific energy for conventional crushing

$W_h$ = specific energy for HPGRs
$W_s$ = specific energy correction for size distribution

Clearly only the *W* values associated with the relevant equipment in the circuit being studied are included in Equation 5.

### B 3.2.1 Tumbling mills

For coarse particle grinding in tumbling mills Equation 3 is written as:

$$W_a = K_1 M_{ia} . 4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \quad \text{Equation 6}$$

where
$K_1$ = 1.0 for all circuits that do not contain a recycle pebble crusher and 0.95 where circuits do have a pebble crusher
$x_1$ = $P_{80}$ in microns of the product of the last stage of crushing before grinding
$x_2$ = 750 microns
$M_{ia}$ = Coarse ore work index and is provided directly by SMC Test®

For fine particle grinding Equation 3 is written as:

$$W_b = M_{ib} . 4(x_3{}^{f(x_3)} - x_2{}^{f(x_2)}) \quad \text{Equation 7}$$

where
$x_2$ = 750 microns
$x_3$ = $P_{80}$ of final grind in microns
$M_{ib}$ = Provided by data from the standard Bond ball work index test using the following equation (Morrell, 2006):

$$M_{ib} = 18.18 \Big/ P_1{}^{0.295}(Gbp)(p_{80}{}^{f(p_{80})} - f_{80}{}^{f(f_{80})}) \quad \text{Equation 8}$$

where
*Mib* = fine ore work index (kWh/tonne)
$P_1$ = closing screen size in microns
*Gbp* = net grams of screen undersize per mill revolution
$p_{80}$ = 80% passing size of the product in microns
$f_{80}$ = 80% passing size of the feed in microns

Note that the Bond ball work index test should be carried out with a closing screen size which gives a final product P80 similar to that intended for the full scale circuit.

### B 3.2.2 Conventional Crushers and HPGR

Equation 3 for conventional crushers is written as:

$$W_c = S_c K_2 M_{ic} . 4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \quad \text{Equation 9}$$

where
$S_c$ = coarse ore hardness parameter which is used in primary and secondary crushing situations. It is defined by Equation 10 with $K_s$ set to 55.
$K_2$ = 1.0 for all crushers operating in closed circuit with a classifying screen. If the crusher is in open circuit, eg pebble crusher in a AG/SAG circuit, $K_2$ takes the value of 1.19.
$x_1$ = $P_{80}$ in microns of the circuit feed
$x_2$ = $P_{80}$ in microns of the circuit product

$M_{ic}$ = Crushing ore work index and is provided directly by SMC Test®

The coarse ore hardness parameter (S) makes allowance for the decrease in ore hardness that becomes significant in relatively coarse crushing applications such as primary and secondary cone/gyratory circuits. In tertiary and pebble crushing circuits it is normally not necessary and takes the value of unity. In full scale HPGR circuits where feed sizes tend to be higher than used in laboratory and pilot scale machines the parameter has also been found to improve predictive accuracy. The parameter is defined by Equation 10.

$$S = K_s(x_1.x_2)^{-0.2} \qquad \text{Equation 10}$$

where

$K_s$ = machine-specific constant that takes the value of 55 for conventional crushers and 35 in the case of HPGRs

$x_1$ = $P_{80}$ in microns of the circuit feed

$x_2$ = $P_{80}$ in microns of the circuit product

Equation 3 for HPGR's crushers is written as:

$$W_h = S_h K_3 M_{ih}.4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \qquad \text{Equation 11}$$

where

$S_h$ = coarse ore harness parameter as defined by Equation 10 and with $K_s$ set to 35

$K_3$ = 1.0 for all HPGRs operating in closed circuit with a classifying screen. If the HPGR is in open circuit, K3 takes the value of 1.19.

$x_1$ = $P_{80}$ in microns of the circuit feed

$x_2$ = $P_{80}$ in microns of the circuit product

$M_{ih}$ = HPGR ore work index and is provided directly by SMC Test®

## B 3.2.3 Specific Energy Correction for Size Distribution (Ws)

Implicit in the approach described in this appendix is that the feed and product size distributions are parallel and linear in log-log space. Where they are not, allowances (corrections) need to be made. By and large, such corrections are most likely to be necessary (or are large enough to be warranted) when evaluating circuits in which closed circuit secondary/tertiary crushing is followed by ball milling. This is because such crushing circuits tend to produce a product size distribution which is relatively steep when compared to the ball mill circuit cyclone overflow. This is illustrated in App Figure 8, which shows measured distributions from an open and closed crusher circuit as well as a ball mill cyclone overflow. The closed circuit crusher distribution can be seen to be relatively steep compared with the open circuit crusher distribution and ball mill cyclone overflow. Also the open circuit distribution more closely follows the gradient of the cyclone overflow. If a ball mill circuit were to be fed two distributions, each with same P80 but with the open and closed circuit gradients in App Figure 8, the closed circuit distribution would require more energy to grind to the final P80. How much more energy is required is difficult to determine. However, for the purposes of this approach it has been assumed that the additional specific energy for ball milling is the same as the difference in specific energy between open and closed crushing to reach the nominated ball mill feed size. This assumes that a crusher would provide this energy. However, in this situation the ball mill has to supply this energy and it has a different (higher) work index than the crusher (ie the ball mill is less energy efficient than a crusher and has to input more energy to do the same amount of size reduction). Hence from Equation 9, to crush to the ball mill circuit feed size ($x_2$) in open circuit requires specific energy equivalent to:

$$W_c = 1.19 * M_{ic}.4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \qquad \text{Equation 12}$$

For closed circuit crushing the specific energy is:

$$W_c = 1 * M_{ic}.4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \quad \text{Equation 13}$$

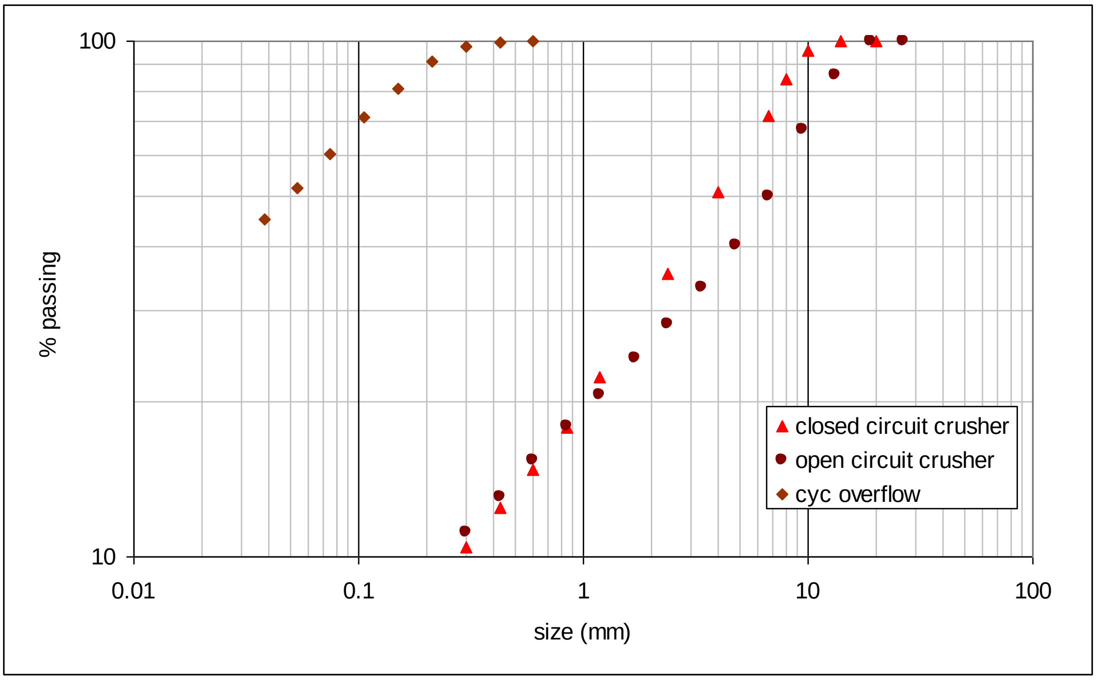
The difference between the two (Equation 12 and Equation 13) has to be provided by the milling circuit with an allowance for the fact that the ball mill, with its lower energy efficiency, has to provide it and not the crusher. This is what is referred to in Equation 5 as $W_s$ and for the above example is therefore represented by:

$$W_s = 0.19 * M_{ia}.4(x_2{}^{f(x_2)} - x_1{}^{f(x_1)}) \quad \text{Equation 14}$$

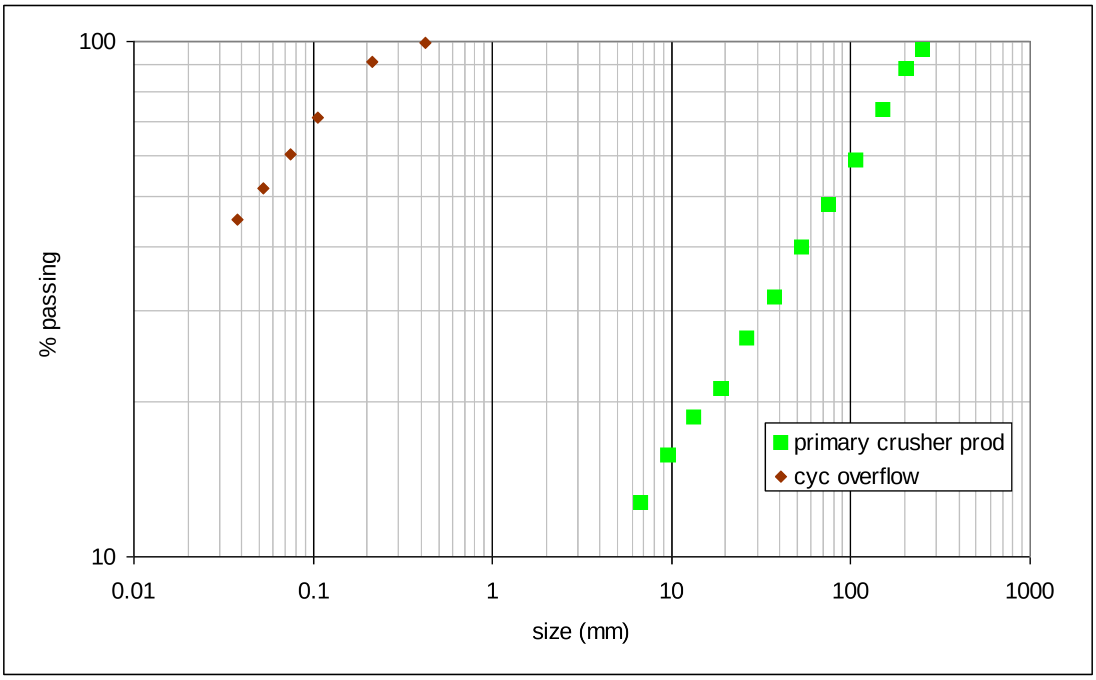
Note that in Equation 14 $M_{ic}$ has been replaced with $M_{ia}$, the coarse particle tumbling mill grinding work index.

In AG/SAG based circuits the need for $W_s$ appears to be unnecessary as App Figure 9 illustrates. Primary crusher feeds often have the shape shown in App Figure 9and this has a very similar gradient to typical ball mill cyclone overflows. A similar situation appears to apply with HPGR product size distributions, as illustrated in App Figure 10. Interestingly SMCT's data show that for HPGRs, closed circuit operation appears to require a lower specific energy to reach the same P80 as in open circuit, even though the distributions for open and closed circuit look to have almost identical gradients. Closer examination of the distributions in fact shows that in closed circuit the final product tends to have slightly less very fine material, which may account for the different energy requirements between the two modes of operation. It is also possible that recycled material in closed circuit is inherently weaker than new feed, as it has already passed through the HPGR previously and may have sustained micro-cracking. A reduction in the Bond ball mill work index as measured by testing HPGR products compared it to the Bond ball mill work index of HPGR feed has been noticed in many cases in the laboratory (see next section) and hence there is no reason to expect the same phenomenon would not affect the recycled HPGR screen oversize.

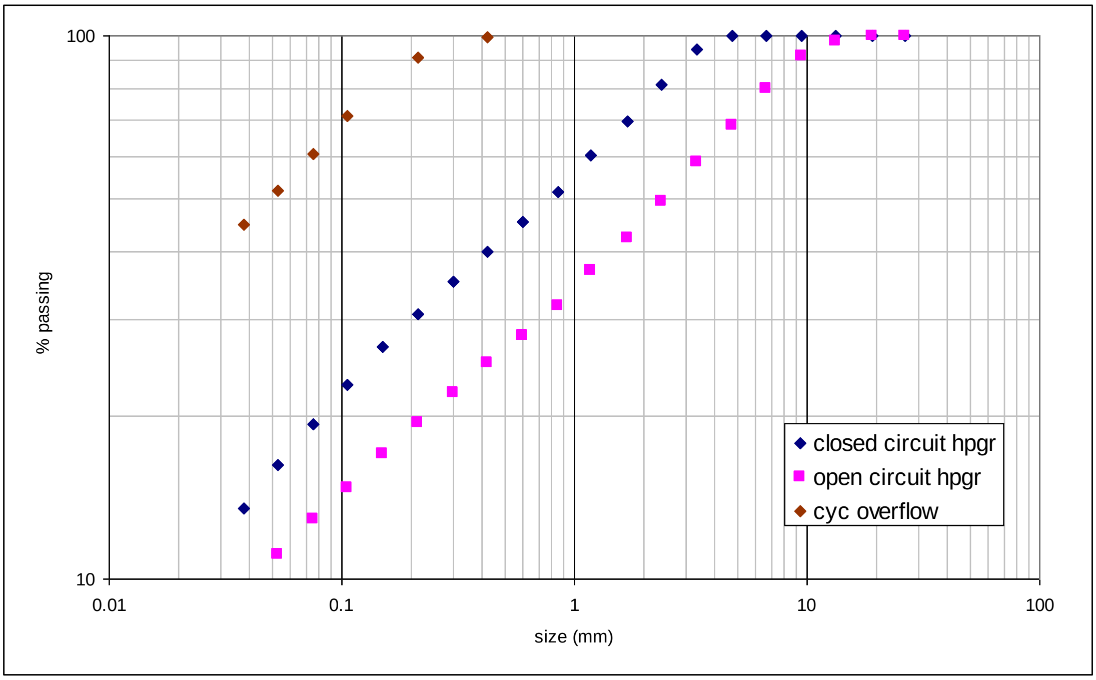
It follows from the above arguments that in HPGR circuits, which are typically fed with material from closed circuit secondary crushers, a similar feed size distribution correction should also be applied. However, as the secondary crushing circuit uses such a relatively small amount of energy compared to the rest of the circuit (as it crushes to a relatively coarse size) the magnitude of size distribution correction is very small indeed – much smaller than the error associated with the technique - and hence may be omitted in calculations.



*App Figure 8 – Examples of Open and Closed Circuit Crushing Distributions Compared with a Typical Ball Mill Cyclone Overflow Distribution*




*App Figure 9 – Example of a Typical Primary Crusher (Open and Circuit) Product Distribution Compared with a Typical Ball Mill Cyclone Overflow Distribution*




*App Figure 10 – Examples of Open and Closed Circuit HPGR Distributions Compared with a Typical Ball Mill Cyclone Overflow Distribution*

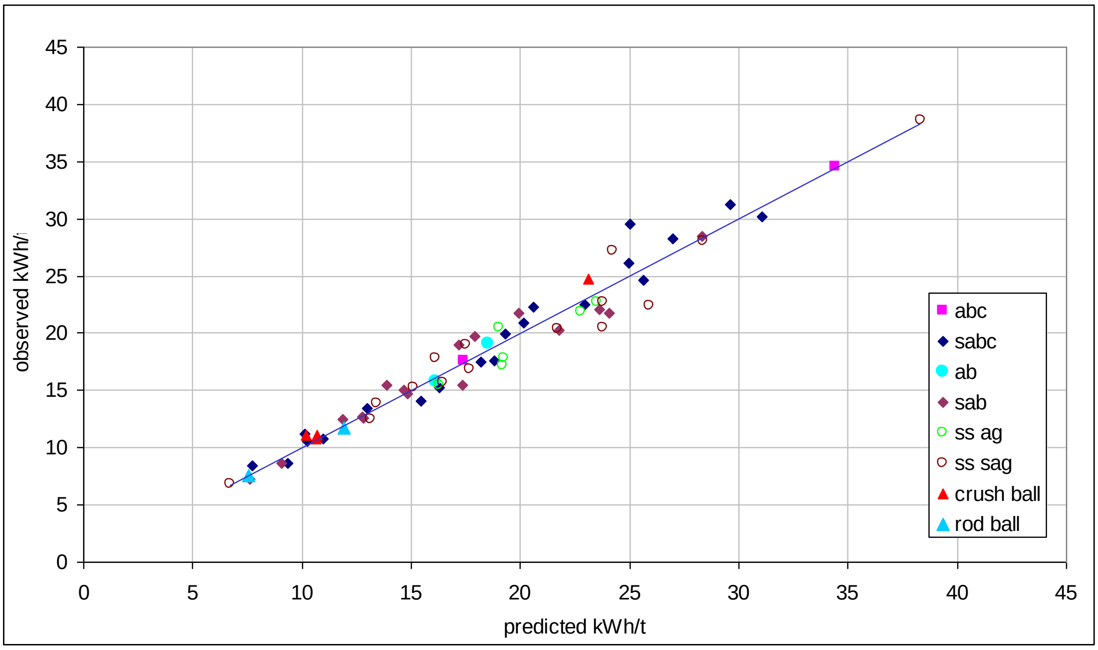
### B 3.2.4 Weakening of HPGR Products

As mentioned in the previous section, laboratory experiments have been reported by various researchers in which the Bond ball work index of HPGR products is less than that of the feed. The amount of this reduction appears to vary with both material type and the pressing force used. Observed reductions in the Bond ball work index have typically been in the range 0-10%. In the approach described in this appendix no allowance has been made for such weakening. However, if HPGR products are available which can be used to conduct Bond ball work index tests on then $M_{ib}$ values obtained from such tests can be used in Equation 7. Alternatively the $M_{ib}$ values from Bond ball mill work index tests on HPGR feed material can be reduced by an amount that the user thinks is appropriate. Until more data become available from full scale HPGR/ball mill circuits it is suggested that, in the absence of Bond ball mill work index data on HPGR products, the $M_{ib}$ results from HPGR feed material are reduced by no more than 5% to allow for the effects of micro-cracking.

## B 3.3 Validation

### B 3.3.1 Tumbling Mill Circuits

The approach described in the previous section was applied to over 120 industrial data sets. The results are shown in App Figure 11. In all cases, the specific energy relates to the tumbling mills contributing to size reduction from the product of the final stage of crushing to the final grind. Data are presented in terms of equivalent specific energy at the pinion. In determining what these values were on each of the plants in the data base it was assumed that power at the pinion was 93.5% of the measured gross (motor input) power, this figure being typical of what is normally accepted as being reasonable to represent losses across the motor and gearbox. For gearless drives (so-called wrap-around motors) a figure of 97% was used.



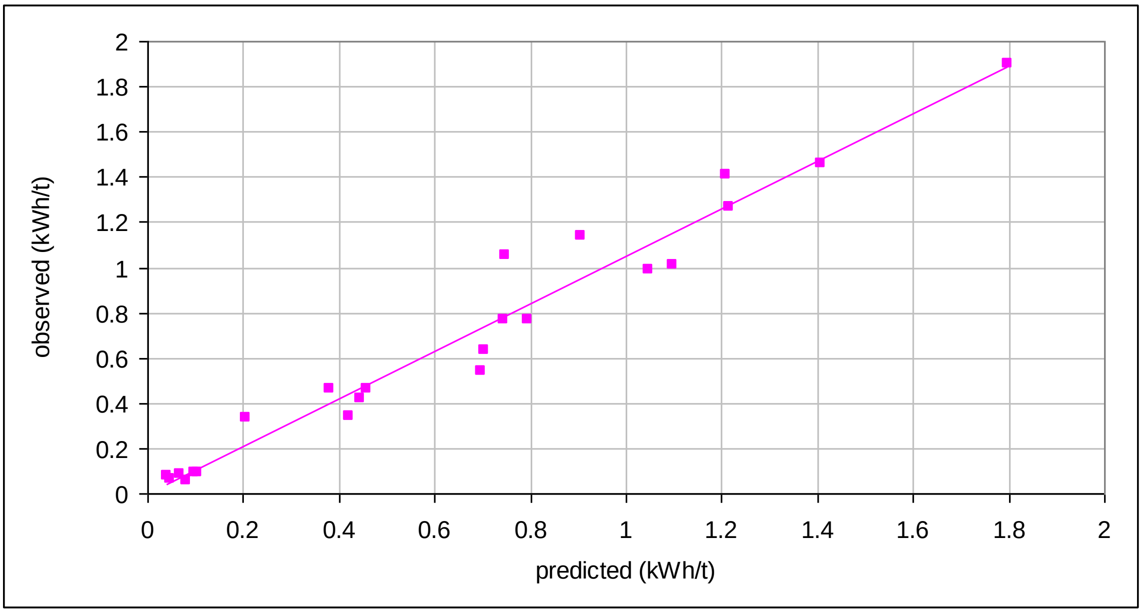

*App Figure 11 – Observed vs Predicted Tumbling Mill Specific Energy*

### B 3.3.2 Conventional Crushers

Validation used 12 different crushing circuits (25 data sets), including secondary, tertiary and pebble crushers in AG/SAG circuits. Observed vs predicted specific energies are given in App Figure 12. The observed specific energies were calculated from the crusher throughput and the net power draw of the crusher as defined by:

Net Power = Motor Input Power – No Load Power Equation 15

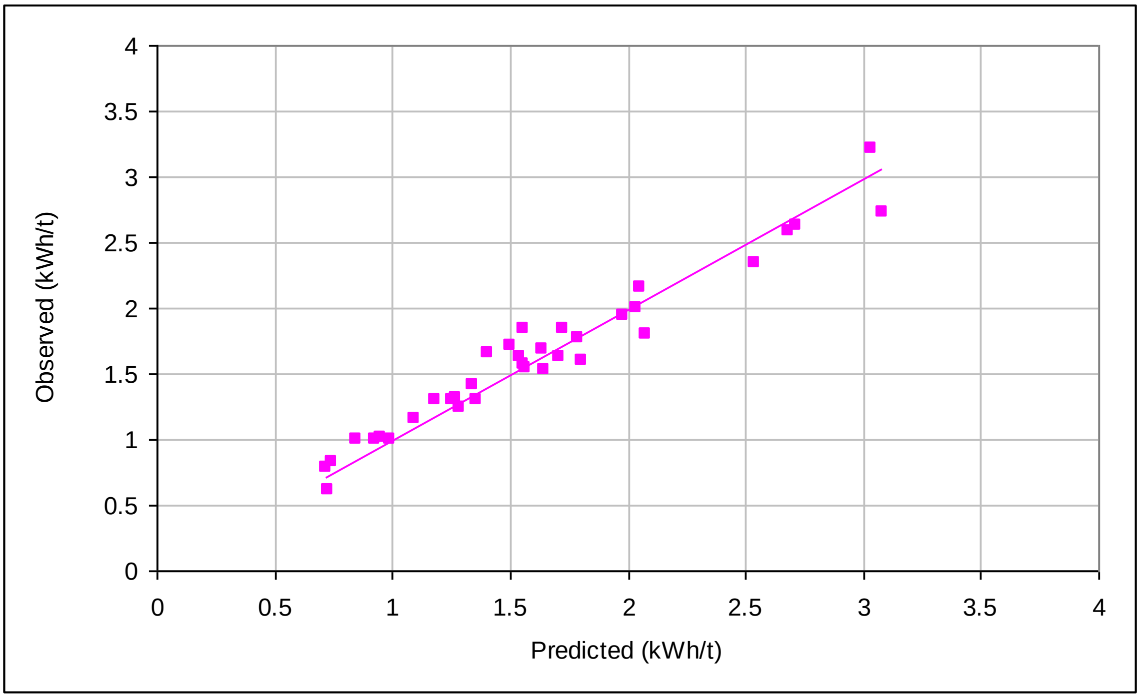
No-load power tends to be relatively high in conventional crushers and hence net power is significantly lower than the motor input power. From examination of the 25 crusher data sets the motor input power was found to be on average 20% higher than the net power.




*App Figure 12 – Observed vs Predicted Conventional Crusher Specific Energy*

### B 3.3.3 HPGRs

Validation for HPGRs used data from 19 different circuits (36 data sets) including laboratory, pilot and industrial scale equipment. Observed vs predicted specific energies are given in App Figure 13. The data relate to HPGRs operating with specific grinding forces typically in the range 2.5-3.5 $N/mm^2$. The observed specific energies relate to power delivered by the roll drive shafts. Motor input power for full scale machines is expected to be 8-10% higher.




*App Figure 13 – Observed vs Predicted HPGR Specific Energy*

## B 4 WORKED EXAMPLES

A SMC Test® and Bond ball work index test were carried out on a representative ore sample. The following results were obtained:

SMC Test®:
$M_{ia}$ = 19.4 kWh/t
$M_{ic}$ = 7.2 kWh/t
$M_{ih}$ = 13.9 kWh/t
Bond test carried out with a 150 micron closing screen:
$M_{ib}$ = 18.8 kWh/t

Three circuits are to be evaluated:

- SABC
- HPGR/ball mill
- Conventional crushing/ball mill

The overall specific grinding energy to reduce a primary crusher product with a $P_{80}$ of 100 mm to a final product $P_{80}$ of 106 µm needs to be estimated.

### B 4.1 SABC Circuit

Coarse particle tumbling mill specific energy:

$$W_a = 0.95 * 19.4 * 4 * \left(750^{-(0.295+750/1000000)} - 100000^{-(0.295+100000/1000000)}\right)$$

= 9.6 kWh/t

Fine particle tumbling mill specific energy:

$$W_b = 18.8 * 4 * \left(106^{-(0.295+106/1000000)} - 750^{-(0.295+750/1000000)}\right)$$

= 8.4 kWh/t

Pebble crusher specific energy:

In this circuit, it is assumed that the pebble crusher feed $P_{80}$ is 52.5mm. As a rule of thumb this value can be estimated by assuming that it is 0.75 of the nominal pebble port aperture (in this case the pebble port aperture is 70mm). The pebble crusher is set to give a product $P_{80}$ of 12mm. The pebble crusher feed rate is expected to be 25% of new feed tph.

$$W_c = 1.19 * 7.2 * 4 * \left(12000^{-(0.295+12000/1000000)} - 52500^{-(0.295+52500/1000000)}\right)$$

= 1.12 kWh/t when expressed in terms of the crusher feed rate
= 1.12 * 0.25 kWh/t when expressed in terms of the SABC circuit new feed rate
= 0.3 kWh/t of SAG mill circuit new feed

Total net comminution specific energy:

$W_T$ = 9.6 + 8.4 + 0.3 kWh/t
= 18.3 kWh/t

## B 4.2 HPGR/Ball Milling Circuit

In this circuit primary crusher product is reduced to a HPGR circuit feed $P_{80}$ of 35 mm by closed circuit secondary crushing. The HPGR is also in closed circuit and reduces the 35 mm feed to a circuit product $P_{80}$ of 4 mm. This is then fed to a closed circuit ball mill which takes the grind down to a $P_{80}$ of 106 µm.

Secondary crushing specific energy:

$$W_c = 1 * 55 * (35000 * 100000)^{-0.2} * 7.2 * 4 * \left(35000^{-(0.295+35000/1000000)} - 100000^{-(0.295+100000/1000000)}\right)$$

= 0.4 kWh/t

HPGR specific energy:

$$W_h = 1 * 35 * (4000 * 35000)^{-.2} * 13.9 * 4 * \left(4000^{-(0.295+4000/1000000)} - 35000^{-(0.295+35000/1000000)}\right)$$

= 2.4 kWh/t

Coarse particle tumbling mill specific energy:

$$W_a = 1 * 19.4 * 4 * \left(750^{-(0.295+750/1000000)} - 4000^{-(0.295+4000/1000000)}\right)$$

= 4.5 kWh/t

Fine particle tumbling mill specific energy:

$$W_b = 18.8 * 4 * \left(106^{-(0.295+106/1000000)} - 750^{-(0.295+750/1000000)}\right)$$

= 8.4 kWh/t

Total net comminution specific energy:

$W_T$ = 4.5 + 8.4 + 0.4 + 2.4 kWh/t
= 15.7 kWh/t

## B 4.3 Conventional Crushing/Ball Milling Circuit

In this circuit primary crusher product is reduced in size to $P_{80}$ of 6.5 mm via a secondary/tertiary crushing circuit (closed). This is then fed to a closed circuit ball mill which grinds to a P80 of 106 µm.

Secondary/tertiary crushing specific energy:

$$W_c = 1 * 7.2 * 4 * \left(6500^{-(0.295 + 6500/1000000)} - 100000^{-(0.295 + 100000/1000000)}\right)$$

= 1.7 kWh/t

Coarse particle tumbling mill specific energy :

$$W_a = 1 * 19.4 * 4 * \left(750^{-(0.295 + 750/1000000)} - 6500^{-(0.295 + 6500/1000000)}\right)$$

= 5.5 kWh/t

Fine particle tumbling mill specific energy:

$$W_b = 18.8 * 4 * \left(106^{-(0.295 + 106/1000000)} - 750^{-(0.295 + 750/1000000)}\right)$$

= 8.4 kWh/t

Size distribution correction;

$$W_s = 0.19 * 19.4 * 4 * \left(6500^{-(0.295 + 6500/1000000)} - 100000^{-(0.295 + 100000/1000000)}\right)$$

= 0.9 kWh/t

Total net comminution specific energy:

$W_T$ = 5.5 + 8.4 + 1.7 + 0.9 kWh/t
= 16.5 kWh/t

# Appendix B: Testing Result Sepro

# TANTALEX LITHIUM RESOURCES
# DENSE MEDIA SEPARATION TESTWORK REPORT

**Prepared for:**

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May 31st, 2023

Note: This report refers to the samples as received. The information contained in this report is provided 'as is' without warranty of any kind with respect to the interpretation and use of the data by the client.

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## 1.0 BACKGROUND

Sepro Laboratories was contacted by Anton Wolf on behalf of Tantalex Lithium Resources to conduct pilot scale dense media separation (DMS) testwork on a spodumene ore sample. On January 25th, 2023, three (3) totes were received from CoreMet Mineral Processing. The sample labels and weights were as follows:

- “CM 22_12_K-Dump HD Client”, 306-kg
- “CM 22_12_C-Dump HD Client”, 222-kg
- “CM 22_12_G-Dump HD Client”, 222-kg

The “C-Dump” sample was not utilized in the testwork conducted for this report. A detailed sample receiving log is presented in **Appendix E**.

The objective of the test program was to perform DMS pilot testing to determine the amenability of the samples to pre-concentration or the production of a saleable concentrate.

## 2.0 METHODOLOGY

The sample preparation and test procedures conducted on the sample are presented below:

i) The three (3) samples were received and catalogued. The C-Dump sample was set aside in storage.
ii) The K-Dump sample was homogenized and split into 24 equal buckets.
iii) The G-Dump sample was stage crushed to 100% passing 6.7mm, homogenized and split into 24 equal buckets.
iv) Representative sub-samples of the head material from both samples were split to generate the head assay cuts, heavy liquid separation (HLS) test charges, and coarse PSA charges.
v) Coarse particle size analysis was conducted on the two (2) samples to determine sample requirements for the creation of the K-G Blend sample.
vi) Using instructions provided by Anton Wolf, the K-G Blend sample was produced using a ratio of 84:16 K-Dump to G-Dump and sub-sampled to generate head assay cuts and heavy liquid separation test charges.
vii) Three (3) DMS and HLS test charges were independently wet screened at 0.5 mm to ensure that the sample was free of fine particles prior to the HLS testwork and DMS pilot testing.
viii) HLS testing was conducted using specific gravity (SG) cut-points of 2.95, 2.80, 2.70, 2.65, and 2.60.
ix) The DMS testing was conducted at an initial $D_{50}$ cut-point of 2.74 to 2.75 (based on 2 tracer tests), followed by a cleaning stage conducted on the sink materials at a $D_{50}$ of 2.93.
x) All test products were then individually crushed, pulverized, and submitted for assaying by Peroxide Fusion with ICP-OES finish.
xi) Additionally, the DMS float products from the G-Dump and K-Dump samples were sub-sampled and subjected to size fraction analysis (SFA).

### 2.1 Heavy Liquid Separation (HLS) Test Procedure

A densiometric analysis is conducted by processing samples through successive baths of increasing or decreasing solution densities with the following key steps:

i) The specific gravity (SG) of the solution is analyzed and adjusted to the desired level.
ii) The ore sub-sample is added to the bath and mixed.
iii) Time is taken to allow the heavy particles to sink and agitated lighter particles to separate.
iv) Floating particles are collected then washed and dried.

v) Once the separation at a given SG is complete, the solution is drained and the particles which sank are collected and prepared for next SG.
vi) The dried floats are prepared for the next test and the process is repeated according to steps i) to v) until to the final SG cut-point.

The S.G. cut-points of 2.95, 2.80, 2.70, 2.65, and 2.60 were targeted for the HLS testwork to generate sufficient data for the DMS pilot plant testing. After separation into the various density ranges, the products were thoroughly washed, dried, and submitted for assays.

The testwork was conducted using lithium metatungstate as the heavy medium. Tungstate based heavy liquids were developed in response to the unacceptable toxicity of organic heavy liquids (TBE, bromoform). The tungstate based heavy liquids are reported to be safe (i.e. non-toxic), economical, and easy to use. The liquid SG is easily adjusted by diluting with water or by heating to evaporate the excess water. On lithium projects, special care is taken to ensure all test products are washed to remove any of the lithium metatungstate media. Through Sepro Laboratories' experience, the sample grades are affected by less than 0.01% $Li_2O$.

### 2.2 Dense Media Separation (DMS) Test Procedure

For the pilot DMS test, the sample was wet screened at 0.5 mm and dried prior to feeding the DMS unit. DMS testing targeting specific gravity (SG) cut-points of 2.75 and 2.95, was conducted in two (2) stages. This testwork utilized the Sepro Condor DMS pilot plant, as presented in **Figure 1**.

**Figure 1: Condor Dense Media Separation System**

Approximately 100 kg of +0.50 mm material from each sample was processed through the DMS pilot plant on February 10th, 2023. The DMS feed for each sample was divided into two (2) halves prior to testing. This is done to assess DMS performance during the testwork by running one (1) half of the sample at a time and allowing for media adjustments to remain on target in terms of expected mass recovery.

Tracer testing was conducted prior to and during DMS testing to confirm the SG cut-point (also known as $D_{50}$), sharpness of cut, and cut quality inside the separator. The detailed tracer test results are presented in **Appendix B**.

## 3.0 RESULTS AND DISCUSSION

The testwork results are summarized in the Appendices according to the order shown in **Table 1**.

**Table 1: Appendix List**

| Appendices | Description |
|---|---|
| A | Heavy Liquid Separation Results |
| B | Dense Media Separation Results |
| C | Particle Size Analysis Results |
| D | Assay Summary |
| E | Sample Receiving Log |

### 3.1 Head Characterization

Sub-samples taken from the K-Dump, G-Dump, and the K-G Blend samples were subjected to chemical analysis by a multi-element Peroxide Fusion with ICP-OES finish, as well as particle size analysis. The complete assay report is available in **Appendix D** and detailed particle size analysis data is available in **Appendix C**.

#### 3.1.1 Chemical Analysis

A summary of the assay results is presented in **Table 2** with a summary of head grades presented in **Table 3: Head Grade Summary**.

**Table 2: Head Assay Summary**

| Test Number | Description | Al % | As % | Ca % | Co % | Cr % | Cu % | Fe % | K % | $Li_2O$ % |
|---|---|---|---|---|---|---|---|---|---|---|
| TR100 | K-Dump Head | 8.06 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.57 | 2.3 | 1.08 |
| TR200 | G-Dump Head | 7.04 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | 1.79 | 2.1 | 0.62 |
| TR400 | K-G Blend Head | 7.44 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | 0.70 | 2.1 | 0.97 |
| **Test Number** | **Description** | **Mg %** | **Mn %** | **Ni %** | **Pb %** | **S %** | **Si %** | **Sn %** | **Ti %** | **Zn %** |
| TR100 | K-Dump Head | 0.08 | 0.07 | <0.005 | <0.01 | <0.01 | 35.2 | 0.05 | 0.02 | 0.01 |
| TR200 | G-Dump Head | 0.08 | 0.05 | <0.005 | <0.01 | 0.01 | 34.9 | 0.03 | 0.03 | 0.02 |
| TR400 | K-G Blend Head | 0.07 | 0.06 | <0.005 | <0.01 | <0.01 | 34.1 | 0.06 | 0.02 | <0.01 |

**Table 3: Head Grade Summary**

| Sample | Test Number | Description | $Li_2O$ (%) |
|---|---|---|---|
| K-Dump | TR100 | Head Assay | 1.08 |
| | TR102 | DMS Calc. Head | 0.99 |
| | TR103 | HLS Calc. Head | 1.04 |
| G-Dump | TR200 | Head Assay | 0.62 |
| | TR202 | DMS Calc. Head | 0.67 |
| | TR203 | HLS Calc. Head | 0.67 |
| K-G Blend | TR400 | Head Assay | 0.97 |
| | TR402 | DMS Calc. Head | 0.98 |
| | TR403 | HLS Calc. Head | 0.97 |

The calculated head grades of the samples from all samples showed good agreement between the assayed and calculated head grades. Sepro Labs prefers to use the calculated head grade since it incorporates assaying from many products.

### 3.1.2 Particle Size Analysis

Sub-samples of head material from the K-Dump and G-Dump samples were independently subjected to particle size analysis. The particle size distribution data for the K-Dump, G-Dump, and K-G blended samples are summarized in **Table 4**, **Table 5**, and **Table 6**, respectively. Detailed particle size analysis results are available in **Appendix C**.

**Table 4: Particle Size Distribution, K-Dump, (Test TR101)**

| Sieve Size | | Weight | Cumulative (%) | |
|---|---|---|---|---|
| US Mesh | Microns | (%) | Retained | Passing |
| 4 | 4,750 | 0.40 | 0.40 | 99.60 |
| 6 | 3,350 | 0.20 | 0.60 | 99.40 |
| 10 | 2,000 | 3.78 | 4.38 | 95.62 |
| 14 | 1,400 | 9.42 | 13.80 | 86.20 |
| 20 | 850 | 20.89 | 34.69 | 65.31 |
| 35 | 500 | 21.75 | 56.44 | 43.56 |
| 50 | 300 | 14.88 | 71.32 | 28.68 |
| 70 | 212 | 8.12 | 79.44 | 20.56 |
| 100 | 150 | 5.86 | 85.30 | 14.70 |
| 140 | 106 | 4.71 | 90.01 | 9.99 |
| 200 | 75 | 4.01 | 94.02 | 5.98 |
| Undersize | -75 | 5.98 | 100.00 | 0.00 |
| | **TOTAL:** | 100.0 | | |

The particle size analysis shows a large distribution of materials down to 0.5 mm, with only 56.44% of the sample retained in the +0.5 mm size fractions. This sample had 43.56% of the mass reporting to the -0.5 mm fractions.

**Table 5: Particle Size Distribution, G-Dump, (Test TR201)**

| Sieve Size | | Weight | Cumulative (%) | |
|---|---|---|---|---|
| US Mesh | Microns | (%) | Retained | Passing |
| 4 | 4,750 | 5.87 | 5.87 | 94.13 |
| 6 | 3,350 | 12.34 | 18.21 | 81.79 |
| 10 | 2,000 | 26.52 | 44.73 | 55.27 |
| 14 | 1,400 | 20.04 | 64.77 | 35.23 |
| 20 | 850 | 15.28 | 80.05 | 19.95 |
| 35 | 500 | 7.58 | 87.62 | 12.38 |
| 50 | 300 | 2.41 | 90.03 | 9.97 |
| 70 | 212 | 1.78 | 91.81 | 8.19 |
| 100 | 150 | 1.50 | 93.31 | 6.69 |
| 140 | 106 | 1.45 | 94.76 | 5.24 |
| 200 | 75 | 1.30 | 96.06 | 3.94 |
| Undersize | -75 | 3.94 | 100.00 | 0.00 |
| | **TOTAL:** | 100.0 | | |

The G-Dump sample had significantly more material in the +0.5 mm size fractions, relative to the K-Dump sample, with 87.62% of the mass reporting to the +0.5 mm fractions.

**Table 6: Particle Size Distribution, K-G Blend, (Test TR401)**

| Sieve Size | | Weight | Cumulative (%) | |
|---|---|---|---|---|
| US Mesh | Microns | (%) | Retained | Passing |
| 4 | 4,750 | 1.29 | 1.29 | 98.71 |
| 6 | 3,350 | 2.18 | 3.47 | 96.53 |
| 10 | 2,000 | 7.49 | 10.95 | 89.05 |
| 14 | 1,400 | 11.15 | 22.10 | 77.90 |
| 20 | 850 | 19.98 | 42.08 | 57.92 |
| 35 | 500 | 19.44 | 61.52 | 38.48 |
| 50 | 300 | 12.85 | 74.37 | 25.63 |
| 70 | 212 | 7.08 | 81.45 | 18.55 |
| 100 | 150 | 5.15 | 86.61 | 13.39 |
| 140 | 106 | 4.18 | 90.79 | 9.21 |
| 200 | 75 | 3.57 | 94.35 | 5.65 |
| Undersize | -75 | 5.65 | 100.00 | 0.00 |
| | **TOTAL:** | 100.0 | | |

Using the blending proportions provided by Anton Wolf, the particle size distribution for the K-G Blend was calculated. Based on the K-G Blend proportions the sample was expected to contain 61.52% of the sample mass in the +0.5 mm fractions.

The samples analyzed were at a much finer size than Sepro Laboratories typically conduct DMS pilot testing.

### 3.2 Heavy Liquid Separation (HLS) Results

Heavy liquid separation (HLS) testing was conducted on the samples at specific gravity (SG) cut-points of 2.95, 2.80, 2.70, 2.65, and 2.60 to determine the expected DMS product mass distribution and provide a bench-mark comparison to the DMS pilot results. Detailed HLS results are available in **Appendix A.**

#### 3.2.1 Heavy Liquid Separation Results, K-Dump Sample

The HLS test conducted on the K-Dump sample are presented in **Table 7**.

**Table 7: HLS Results, K-Dump, (Test TR103)**

| Size Fraction (mm) | Specific Gravity of Fraction | Weight | | | Assay | | Distribution $Li_2O$ | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) | $Li_2O$ (%) | Cumul. $Li_2O$ Grade (%) | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) |
| +0.5 | >2.95 | 56.4 | 12.7 | 12.7 | 6.93 | 6.93 | 63.0 | 47.8 | 47.8 |
| | 2.95/2.80 | | 5.2 | 17.9 | 3.38 | 5.90 | | 9.5 | 57.3 |
| | 2.80/2.70 | | 5.8 | 23.7 | 0.90 | 4.67 | | 2.9 | 60.2 |
| | 2.70/2.65 | | 8.6 | 32.3 | 0.32 | 3.52 | | 1.5 | 61.7 |
| | 2.65/2.60 | | 46.7 | 78.9 | 0.04 | 1.46 | | 1.1 | 62.8 |
| | <2.60 | | 21.1 | 100.0 | 0.02 | 1.16 | | 0.2 | 63.0 |
| | **Sub-total/Average** | | 100.0 | | 1.16 | | | 63.0 | |
| -0.5 | - | 43.6 | | | 0.88 | | 37.0 | | |
| **Total** | | 100.0 | | | 1.04 | | 100.0 | | |

The HLS results for the K-Dump sample showed that a high-grade concentrate with 6.93% $Li_2O$ was produced from this material. The material showed good recovery and rejection of gangue from the +0.5 mm materials from the SG cut-points less than 2.80. Only 5.7% of the $Li_2O$ was lost to the products at SG's less than 2.80. The sample contained a large portion of material less than 0.5mm, comprising 43.6% of the sample mass, containing 37.0% of the sample's $Li_2O$. The large amount of undersize material with a low grade makes the sample less suitable for producing a pre-concentrate material. Further and separate processing of the undersize material to increase $Li_2O$ recovery should be evaluated.

### 3.2.2 Heavy Liquid Separation Results, G-Dump Sample

The HLS test conducted on the G-Dump sample are presented in **Table 8**.

**Table 8: HLS Results G-Dump Sample, (Test TR103)**

| Size Fraction (mm) | Specific Gravity of Fraction | Weight | | | Assay | | Distribution $Li_2O$ | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) | $Li_2O$ (%) | Cumul. $Li_2O$ Grade (%) | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) |
| +0.5 | >2.95 | 87.6 | 7.4 | 7.4 | 6.35 | 6.35 | 91.3 | 61.3 | 61.3 |
| | 2.95/2.80 | | 4.6 | 12.0 | 2.26 | 4.79 | | 13.4 | 74.8 |
| | 2.80/2.70 | | 7.2 | 19.2 | 0.78 | 3.29 | | 7.2 | 82.0 |
| | 2.70/2.65 | | 6.3 | 25.5 | 0.45 | 2.59 | | 3.7 | 85.7 |
| | 2.65/2.60 | | 52.1 | 77.5 | 0.06 | 0.89 | | 4.4 | 90.1 |
| | <2.60 | | 22.5 | 100.0 | 0.04 | 0.70 | | 1.3 | 91.3 |
| | Sub-total/Average | | 100.0 | | 0.70 | | | 91.3 | |
| -0.5 | - | 12.4 | | | 0.47 | | 8.7 | | |
| Total | | 100.0 | | | 0.67 | | 100.0 | | |

The HLS results for the G-Dump sample showed that a high-grade concentrate with 6.35% $Li_2O$ was produced from this material. The material showed good recovery and rejection of gangue from the +0.5 mm materials from the SG cut-points less than 2.80. The +0.5 mm materials with an SG cut-point less than 2.80 contains 16.6% of the sample's $Li_2O$. The sample contained significantly less material in the -0.5 mm size than the K-dump sample, with 12.4% of the sample mass and only 8.7% of the sample's $Li_2O$.

### 3.2.3 Heavy Liquid Separation Results, K-G Blend

The HLS test conducted on the K-G Blended sample are presented in **Table 9.**

**Table 9: HLS Test Results, K-G Blend, (Test TR403)**

<table>
<tr><th rowspan="2">Size Fraction (mm)</th><th rowspan="2">Specific Gravity of Fraction</th><th colspan="3">Weight</th><th colspan="2">Assay</th><th colspan="3">Distribution $Li_2O$</th></tr>
<tr><th>Size Fraction (%)</th><th>Sink-Float Fraction (%)</th><th>Cumul. Fraction (%)</th><th>$Li_2O$ (%)</th><th>Cumul. $Li_2O$ Grade (%)</th><th>Size Fraction (%)</th><th>Sink-Float Fraction (%)</th><th>Cumul. Fraction (%)</th></tr>
<tr><td rowspan="7">+0.5</td><td>>2.95</td><td rowspan="6">61.5</td><td>11.1</td><td>11.1</td><td>6.70</td><td>6.70</td><td rowspan="6">64.8</td><td>47.3</td><td>47.3</td></tr>
<tr><td>2.95/2.80</td><td>5.7</td><td>16.8</td><td>3.01</td><td>5.44</td><td>11.0</td><td>58.3</td></tr>
<tr><td>2.80/2.70</td><td>5.8</td><td>22.6</td><td>0.82</td><td>4.26</td><td>3.0</td><td>61.4</td></tr>
<tr><td>2.70/2.65</td><td>7.6</td><td>30.2</td><td>0.39</td><td>3.28</td><td>1.9</td><td>63.2</td></tr>
<tr><td>2.65/2.60</td><td>44.5</td><td>74.8</td><td>0.04</td><td>1.35</td><td>1.2</td><td>64.5</td></tr>
<tr><td><2.60</td><td>25.2</td><td>100.0</td><td>0.02</td><td>1.02</td><td>0.3</td><td>64.8</td></tr>
<tr><td colspan="2">**Sub-total/Average**</td><td>100.0</td><td></td><td>1.02</td><td></td><td></td><td>64.8</td><td></td></tr>
<tr><td>-0.5</td><td>-</td><td>38.5</td><td></td><td></td><td>0.88</td><td></td><td>35.2</td><td></td><td></td></tr>
<tr><td colspan="2">**Total**</td><td>100.0</td><td colspan="2"></td><td>0.97</td><td></td><td>100.0</td><td></td><td></td></tr>
</table>

The HLS results for the K-G Dump showed that a high-grade concentrate of 6.70% $Li_2O$ was produced from the blended sample. The material showed a good recovery and rejection of gangue from the +0.5 mm materials from the SG cut-points less than 2.80. Only 6.4% of the $Li_2O$ was present in the products below the SG of 2.80.

### 3.2.4 Comparison of the Heavy Liquid Separation Results

The three (3) different samples subjected to HLS testing performed relatively similarly. The HLS results are compared in **Table 10**. The product names were changed to easily contrast the HLS results with DMS results. The sinks are the >2.95 SG products, the mids are the 2.95/2.70 products, and the Floats are the <2.70 products.

**Table 10: HLS Results Summary**

| Sample | Test Number | Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|---|---|
| K-Dump | TR103 | Sinks | 7.2 | 6.93 | 47.8 |
| | | Mids | 6.2 | 2.07 | 12.4 |
| | | Fines | 43.6 | 0.88 | 37.0 |
| | | **Mids & Fines** | **49.8** | **1.03** | **49.4** |
| | | Floats | 43.0 | 0.07 | 2.8 |
| G-Dump | TR203 | Sinks | 6.5 | 6.35 | 61.3 |
| | | Mids | 10.3 | 1.35 | 20.6 |
| | | Fines | 12.4 | 0.47 | 8.7 |
| | | **Mids & Fines** | **22.7** | **0.87** | **29.3** |
| | | Floats | 70.8 | 0.09 | 9.3 |
| K-G Blend | TR402 | Sinks | 6.8 | 6.70 | 47.3 |
| | | Mids | 7.1 | 1.91 | 14.0 |
| | | Fines | 38.5 | 0.88 | 35.2 |
| | | **Mids & Fines** | **45.6** | **1.04** | **49.2** |
| | | Floats | 47.6 | 0.07 | 3.4 |

The key points of the HLS testwork are highlighted as follows:

- Each sample was able to produce high-grade concentrates at an SG cut-point of 2.95 with 6.93% $Li_2O$, 6.35% $Li_2O$, and 6.70% $Li_2O$ for the K-Dump and K-G Blended samples.
- The K-Dump and K-G Blend samples had a finer particle size distribution, causing a large portion of the sample mass to report to the undersize material with higher grades and distributions of $Li_2O$ when compared with the G-Dump sample.
- The G-Dump sample, due to its coarser particle size distribution, had a greater distribution of $Li_2O$ in the SG cut-points of less than 2.80, increasing the distribution of $Li_2O$ in the middlings.

### 3.3 Dense Media Separation (DMS) Results

DMS testing was conducted on the three (3) prepared samples that were screened at 0.50 mm. Approximately 100 kg of the +0.5 mm material from each sample was independently fed through the DMS pilot plant with $D_{50}$ cut-points of approximately 2.74, 2.75, and 2.93. Detailed DMS results for the three (3) samples are presented in **Appendix B**. Detailed size fraction assay results, conducted on the Float products from the K-Dump and G-Dump samples, are available in **Appendix C**.

#### 3.3.1 Dense Media Separation Results, K-Dump Sample

The results from the pilot DMS test conducted on the K-Dump sample are presented in **Table 11**.

**Table 11: Dense Media Separation (DMS) Results, K-Dump Sample, (Test TR102)**

| Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|
| Sinks (D50 = 2.93) | 2.8 | 6.16 | 17.6 |
| Middlings | 8.5 | 3.21 | 27.6 |
| Floats (D50 = 2.74) | 46.5 | 0.35 | 16.7 |
| *Fines (-0.50 mm)* | *42.2* | *0.88* | *38.0* |
| ***Calc. Head*** | ***100.0*** | ***0.98*** | ***100.0*** |
| *Average Head* | | *1.08* | |

At a cut-point of 2.93, 2.8% of the mass was recovered, retaining 17.6% of the $Li_2O$ at a grade of 6.16% $Li_2O$. The DMS cut-point of 2.74 produced a middlings product containing 27.6% of the $Li_2O$ in 8.5% of the mass, with a $Li_2O$ grade of 3.21%. The floats product rejected 46.5% of the overall mass with a loss of 16.7% $Li_2O$. The remaining 38.0% of $Li_2O$ was contained in the -0.5 mm fraction which accounted for 42.2% of the overall mass.

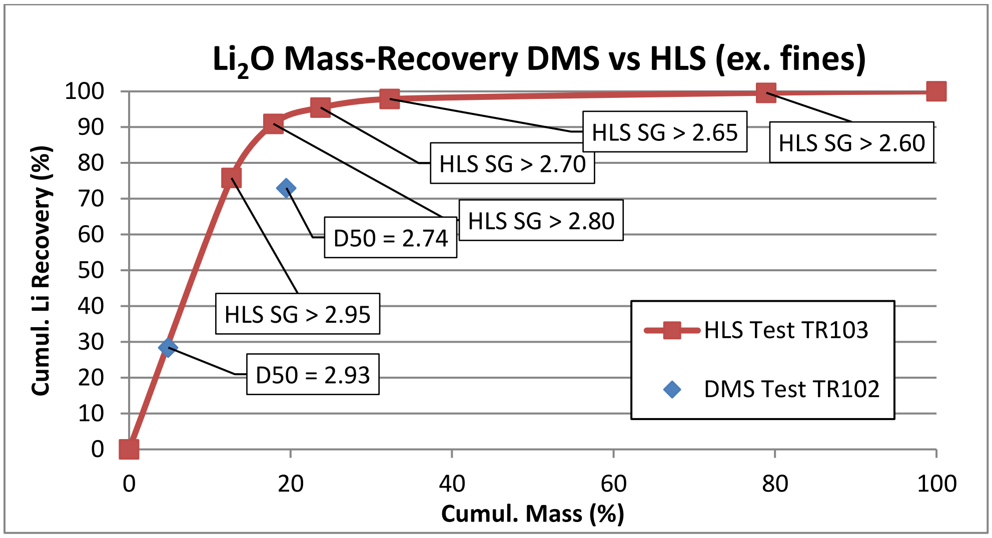



**Figure 2: Mass-Recovery Comparison for DMS and HLS, K-Dump Sample**

**Figure 2** illustrates the difference between the HLS and DMS results for the K-Dump sample. The DMS concentrate had a lower mass and distribution of $Li_2O$, but a similar grade when compared with the HLS results.

The DMS Floats product from the K-Dump sample was sub-sampled and subjected to a size fraction assay. The results are presented in **Table 12**.

**Table 12: Float Products Size Fraction Assay**

| Sieve Size | | Weight | $Li_2O$ | |
|---|---|---|---|---|
| US Mesh | Microns | (%) | Grade (%) | Dist'n (%) |
| 10 | 2,000 | 6.2 | 0.17 | 3.03 |
| 18 | 1,000 | 37.2 | 0.22 | 22.71 |
| 20 | 850 | 11.0 | 0.30 | 9.37 |
| 35 | 500 | 35.6 | 0.43 | 43.52 |
| Undersize | -500 | 10.0 | 0.75 | 21.37 |
| | **TOTAL:** | 100.0 | 0.35 | 100.00 |
| | **Assayed Head:** | | 0.38 | |

The $Li_2O$ grades were higher in the finer size fractions. Notably, the 500 µm and -500 µm sizes had higher grades with 0.43% $Li_2O$ and 0.75% $Li_2O$, respectively. The calculated Floats grade from the size fraction analysis was utilized in the DMS calculations, as it utilized grades from multiple assayed products.

### 3.3.2 Dense Media Separation Results, G-Dump Sample

The results from the pilot DMS test conducted on the G-Dump sample are presented in **Table 13**.

**Table 13: Dense Media Separation (DMS) Results, G-Dump Sample, (Test TR202)**

| Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|
| Sinks (D50 = 2.93) | 2.8 | 6.00 | 27.9 |
| Middlings | 7.3 | 2.83 | 33.9 |
| Floats (D50 = 2.75) | 77.2 | 0.22 | 28.3 |
| *Fines (-0.50 mm)* | *12.7* | *0.47* | *9.9* |
| *Calc. Head* | ***100.0*** | ***0.61*** | ***100.0*** |
| *Average Head* | | *0.62* | |

At a cut-point of 2.93, 2.8% of the mass was recovered, retaining 27.9% of the $Li_2O$ at a grade of 6.00% $Li_2O$. At a cut-point of 2.75, the middlings product contained 33.9% of the $Li_2O$ in 7.3% of the mass, with a grade of 2.83% $Li_2O$. The floats product rejected 77.2% of the overall mass with a loss of 28.3% $Li_2O$. The remaining 9.9% of $Li_2O$ was contained in the -0.5 mm fraction which accounted for 12.7% of the overall mass.

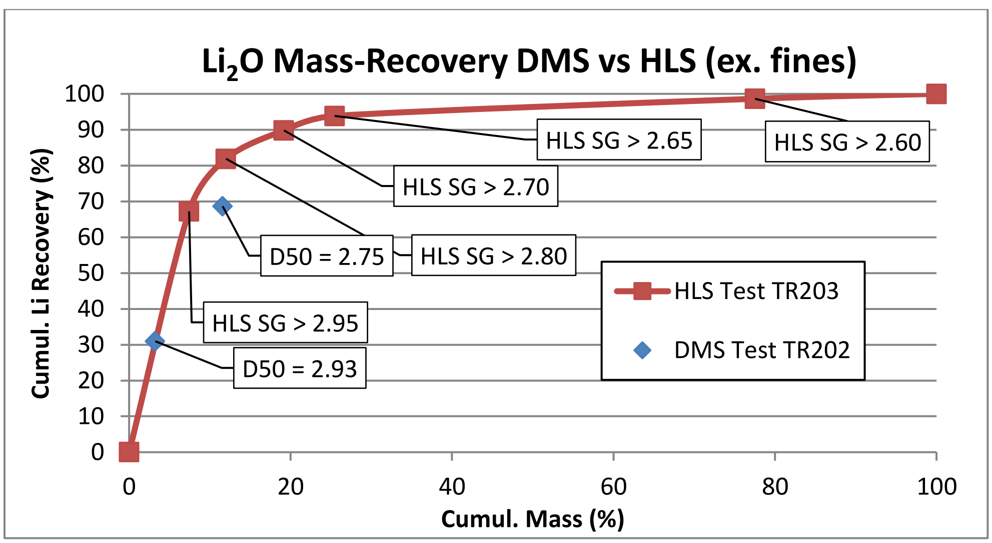



**Figure 3: Mass-Recovery Comparison for DMS and HLS, G-Dump Sample**

**Figure 3** illustrates the difference between the HLS and DMS results for the G-Dump sample. The DMS concentrate had nearly half of the mass recovered and a significantly lower distribution of $Li_2O$ recovered when compared against the HLS results with similar concentrate grades.

The G-Dump sample floats product from the DMS testwork was sub-sampled and subjected to a size fraction assay. The results are presented in **Table 14**.

**Table 14: Size Fraction Assay, 2.75 Floats, G-Dump Sample**

| Sieve Size | | Weight | $Li_2O$ | |
|---|---|---|---|---|
| US Mesh | Microns | (%) | Grade (%) | Dist'n (%) |
| 10 | 2,000 | 72.1 | 0.19 | 62.78 |
| 18 | 1,000 | 23.6 | 0.28 | 29.72 |
| 20 | 850 | 1.7 | 0.37 | 2.75 |
| 35 | 500 | 2.6 | 0.41 | 4.75 |
| Undersize | -500 | | | |
| | **TOTAL:** | 100.0 | 0.22 | 100.00 |
| | **Assayed Head:** | | 0.30 | |

The $Li_2O$ grades followed the same trend as the K-Dump sample, with higher $Li_2O$ grades in the finer size fractions. The calculated floats grade from the size fraction analysis was utilized in the DMS calculations, as it utilized grades from multiple assayed products.

### 3.3.3 Dense Media Separation Results, K-G Blend

The results from the pilot DMS test conducted on the K-G Blend sample are presented in **Table 15**.

**Table 15: Dense Media Separation (DMS) Mass Balance, K-G Blend, (Test TR402)**

| Description | Weight | $Li_2O$ | |
|---|---|---|---|
| | (%) | Grade (%) | Distribution (%) |
| Sinks (D50 = 2.93) | 2.7 | 6.23 | 17.2 |
| Middlings | 8.3 | 3.61 | 30.4 |
| Floats (D50 = 2.74) | 52.3 | 0.37 | 19.5 |
| *Fines (-0.50 mm)* | *36.7* | *0.88* | *32.9* |
| ***Calc. Head*** | ***100.0*** | ***0.98*** | ***100.0*** |
| *Average Head* | | *0.97* | |

At a cut-point of 2.93, 2.7% of the sample mass was recovered, retaining 17.2% of the $Li_2O$ at a grade of 6.23% $Li_2O$. The cut-point of 2.74 produced a middlings product containing 30.4% of the $Li_2O$ in 8.3% of the mass, with a $Li_2O$ grade of 3.61%. The floats product rejected 52.3% of the overall mass with a loss of 19.5% $Li_2O$. The remaining 32.9% of $Li_2O$ was contained in the -0.5 mm fraction which accounted for 36.7% of the overall mass.

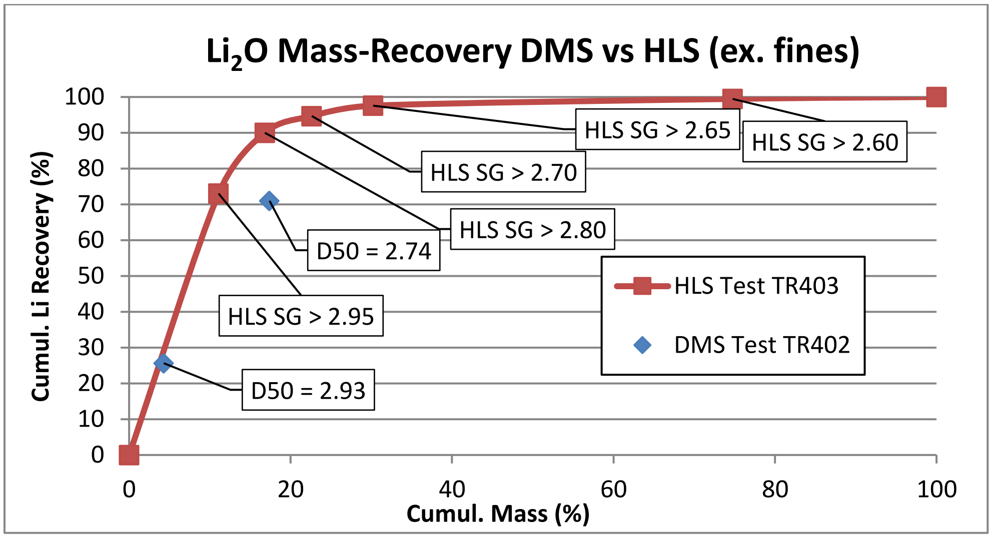



**Figure 4: Mass-Recovery Comparison for DMS and HLS, K-G Blend Sample**

**Figure 4** illustrates the difference between the HLS and DMS results for the K-G Blend sample. The DMS concentrate recovered less mass and a significantly lower distribution of $Li_2O$ when compared against the HLS results. Each sample's DMS results differed in the same manner from HLS while producing similar concentrate grades.

### 3.3.4 Dense Media Separation Results Summary

The DMS results from each sample are summarized in **Table 16**.

**Table 16: DMS Results Summary**

| Sample | Test Number | Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|---|---|
| K-Dump | TR102 | Sinks | 2.8 | 6.16 | 17.6 |
| | | Mids | 8.5 | 3.21 | 27.6 |
| | | Fines | 42.2 | 0.88 | 38.0 |
| | | **Mids & Fines** | **50.7** | **1.27** | **65.7** |
| | | Floats | 46.5 | 0.35 | 16.7 |
| G-Dump | TR202 | Sinks | 2.8 | 6.00 | 27.9 |
| | | Mids | 7.3 | 2.83 | 33.9 |
| | | Fines | 12.7 | 0.47 | 9.9 |
| | | **Mids & Fines** | **20.0** | **1.33** | **43.9** |
| | | Floats | 77.2 | 0.22 | 28.3 |
| K-G Blend | TR402 | Sinks | 2.7 | 6.23 | 17.2 |
| | | Mids | 8.3 | 3.61 | 30.4 |
| | | Fines | 36.7 | 0.88 | 32.9 |
| | | **Mids & Fines** | **45.0** | **1.39** | **63.3** |
| | | Floats | 52.3 | 0.37 | 19.5 |

The key points of the DMS testwork are highlighted as follows:

- Each sample produced high-grade concentrates through DMS testing at an SG cut-point of 2.93 with 6.16% $Li_2O$, 6.00% $Li_2O$, and 6.23% $Li_2O$ for the K-Dump, G-Dump, and K-G Blend samples, respectively.
- The G-Dump sample achieved the best overall recovery with 27.9% $Li_2O$ recovered to the sinks and 61.8% $Li_2O$ cumulative recovery to the middlings and sinks due to its coarser particle size.

The DMS testing produced results quite different from HLS testing. The samples are significantly finer than a standard DMS sample. Due to the DMS Condor separation mechanism, the dense particles need to pass through the media towards the inner walls of the separator to be recovered to the sink products. The dense particles in the finer size fractions can remain in the inner vortex, causing them to report to the floats product. This is observed in the lower mass, grade, and distribution of $Li_2O$ in the 2.93 sink products, a spike in the middlings $Li_2O$ distribution, and in an increase to both mass and $Li_2O$ distribution to the floats rejects when compared against the HLS results.

The DMS testwork should be viewed as having more accurate results due to the behavior of finer samples. Overall, the DMS test results indicate that the samples are amenable to dense media separation to produce high-grade saleable concentrate products (>6% $Li_2O$) with an operating SG of 2.93. The pre-concentration application of the DMS plant is not as suitable with these samples due to their finer size distributions.

## 4.0 SUMMARY AND RECOMMENDATIONS

On January 25th, 2023, Sepro Laboratories received three (3) totes from Met. The samples labeled as, "CM 22_12_K-Dump HD Client" (TR100), and "CM 22_12_G-Dump HD Client" (TR200) were used for the testwork. The "C-Dump" sample, "CM 22_12_C-Dump HD Client", was not utilized in the testwork and placed in storage. The objective of the test program was to perform DMS pilot testing to determine the amenability of the samples to pre-concentration or the production of a saleable concentrate.

The K-G blend sample was produced with instructions from Anton Wolf and used a ratio of 84:16 K-Dump to G-Dump. Sub-samples taken from the K-Dump, G-Dump, and the K-G Blend samples were subjected to chemical analysis by a multi-element Peroxide Fusion with ICP-OES finish. All three (3) samples were comprised primarily of Al and Si, with grades of 1.08% $Li_2O$, 0.62% $Li_2O$, and 0.97% $Li_2O$ for the K-Dump, G-Dump, and the K-G Blend samples, respectively.

Heavy liquid separation (HLS) testing was conducted on the samples at specific gravity (SG) cut-points of 2.95, 2.80, 2.70, 2.65, and 2.60 to determine the expected DMS product mass distribution and provide a bench-mark comparison to the DMS pilot results. The comparative results of the HLS testwork is presented in **Figure 5** with a summary of the HLS results presented in **Table 17**.

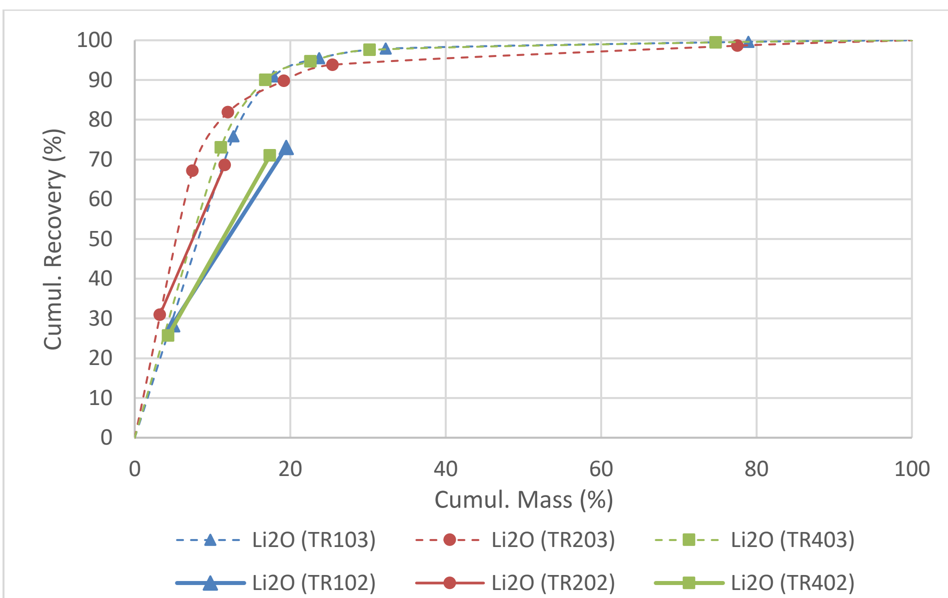



**Figure 5: HLS and DMS Mass-Recovery Comparison, +0.5mm, Excluding Fines**

**Table 17: HLS Results Summary**

| Sample | Test Number | Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|---|---|
| K-Dump | TR103 | Sinks | 7.2 | 6.93 | 47.8 |
| | | Mids | 6.2 | 2.07 | 12.4 |
| | | Fines | 43.6 | 0.88 | 37.0 |
| | | **Mids & Fines** | **49.8** | **1.03** | **49.4** |
| | | Floats | 43.0 | 0.07 | 2.8 |
| G-Dump | TR203 | Sinks | 6.5 | 6.35 | 61.3 |
| | | Mids | 10.3 | 1.35 | 20.6 |
| | | Fines | 12.4 | 0.47 | 8.7 |
| | | **Mids & Fines** | **22.7** | **0.87** | **29.3** |
| | | Floats | 70.8 | 0.09 | 9.3 |
| K-G Blend | TR402 | Sinks | 6.8 | 6.70 | 47.3 |
| | | Mids | 7.1 | 1.91 | 14.0 |
| | | Fines | 38.5 | 0.88 | 35.2 |
| | | **Mids & Fines** | **45.6** | **1.04** | **49.2** |
| | | Floats | 47.6 | 0.07 | 3.4 |

The HLS testwork results are summarized as follows:

- Each sample was able to produce high-grade concentrates at an SG cut-point of 2.95 with 6.93% $Li_2O$, 6.35% $Li_2O$, and 6.70% $Li_2O$ for the K-Dump and K-G Blended samples.
- The samples achieved very similar recoveries at each cut-point, with the K-Dump and the K-G Blend showing nearly identical recoveries and mass rejection.
- The K-Dump and K-G Blend samples had a finer particle size distribution, causing a large portion of the sample mass to report to the undersize material with higher grades and distributions of $Li_2O$ when compared with the G-Dump sample.
- The HLS results represent idealized conditions for the best metallurgical performance achievable by DMS.

DMS testing was conducted on the three (3) prepared samples that were screened at 0.5 mm. Approximately 100 kg of the +0.5 mm material from each sample was independently fed through the DMS pilot plant with $D_{50}$ cut-points of approximately 2.74, 2.75, and 2.93. The DMS results are summarized in **Table 18**.

**Table 18: DMS Results Summary**

| Sample | Test Number | Description | Weight (%) | $Li_2O$ Grade (%) | $Li_2O$ Distribution (%) |
|---|---|---|---|---|---|
| K-Dump | TR102 | Sinks | 2.8 | 6.16 | 17.6 |
| | | Mids | 8.5 | 3.21 | 27.6 |
| | | Fines | 42.2 | 0.88 | 38.0 |
| | | **Mids & Fines** | **50.7** | **1.27** | **65.7** |
| | | Floats | 46.5 | 0.35 | 16.7 |
| G-Dump | TR202 | Sinks | 2.8 | 6.00 | 27.9 |
| | | Mids | 7.3 | 2.83 | 33.9 |
| | | Fines | 12.7 | 0.47 | 9.9 |
| | | **Mids & Fines** | **20.0** | **1.33** | **43.9** |
| | | Floats | 77.2 | 0.22 | 28.3 |
| K-G Blend | TR402 | Sinks | 2.7 | 6.23 | 17.2 |
| | | Mids | 8.3 | 3.61 | 30.4 |
| | | Fines | 36.7 | 0.88 | 32.9 |
| | | **Mids & Fines** | **45.0** | **1.39** | **63.3** |
| | | Floats | 52.3 | 0.37 | 19.5 |

The DMS testwork results are summarized as follows:

- Each sample produced high-grade concentrates through DMS testing at an SG cut-point of 2.93 with 6.16% $Li_2O$, 6.00% $Li_2O$, and 6.23% $Li_2O$ for the K-Dump, G-Dump, and K-G Blended samples.
- The G-Dump sample achieved the best overall recovery with 27.9% $Li_2O$ recovered to the sinks and 61.8% $Li_2O$ combined recovery to the middlings and sinks.
- The DMS plant produced results differing from the HLS testwork, likely due to the samples having significantly finer particle size distribution than a standard DMS sample.

Overall, the DMS test results indicate that the samples are amenable to dense media separation to produce high-grade saleable concentrate products (>6% $Li_2O$) with an operating SG of 2.93. The pre-concentration application of the DMS plant is not as suitable with these samples due to their finer size distributions.

**Recommendations**

- Operating the DMS at lower cut-points in both stages to increase $Li_2O$ recovery for pre-concentration while maintaining a saleable concentrate grade with a higher mass yield.

- Operation of the DMS using a FeSi-Magnetite mixture, which could increase slurry stability for operation at a lower SG to increase the overall recovery of $Li_2O$.
- Assess further processing of the middlings and fines through Flotation to increase recovery of $Li_2O$.

# APPENDICES

# Appendix A

# Heavy Liquid Separation Results

# MS2103 Tantalex

1) **TR103, HLS Test on K-Dump**
2) **TR202, HLS Test on G-Dump**
3) **TR402, HLS Test on K-G Blend**

# HEAVY LIQUID SEPARATION REPORT

sepro laboratories

**Client:** Tantalex
**Test:** TR103
**Sample:** K-Dump, as-received

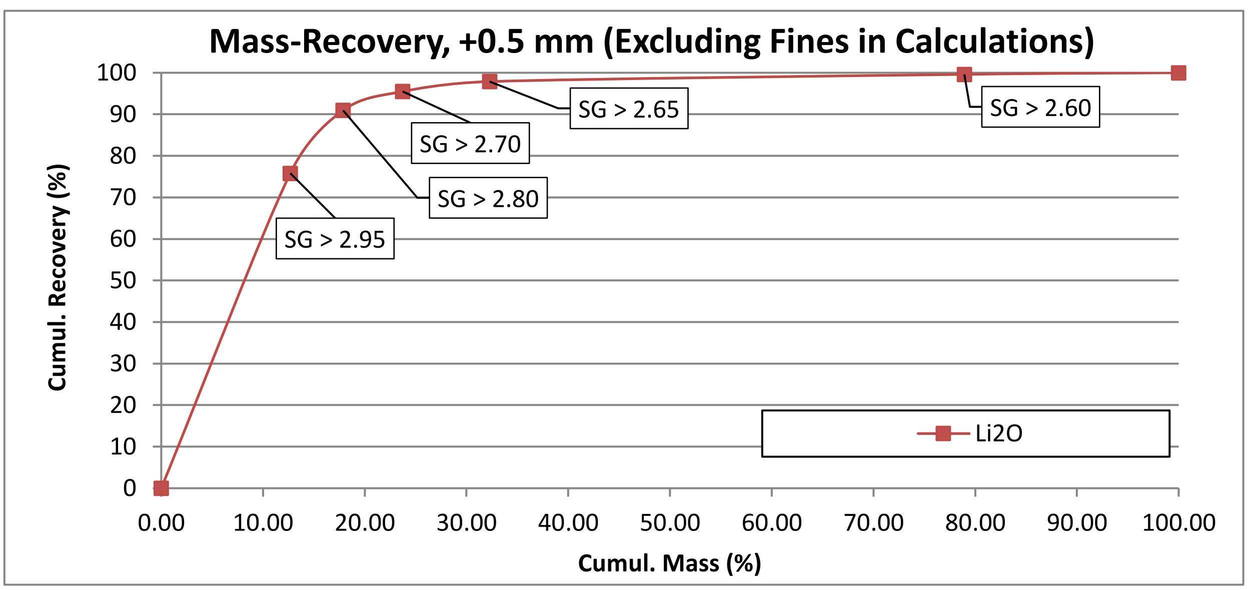
**Date:** 31-Jan-23
**Project:** MS2103

Objective: To compare to Dense Media Separation (DMS) performance.

| Size Fraction (mm) | Specific Gravity of Fraction | Weight | | | Assay | | Distribution Li2O | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) | Li2O (%) | Cumul. Li2O Grade (%) | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) |
| +0.5 | >2.95 | 56.4 | 12.7 | 12.7 | 6.93 | 6.93 | 63.0 | 47.8 | 47.8 |
| | 2.95/2.80 | | 5.2 | 17.9 | 3.38 | 5.90 | | 9.5 | 57.3 |
| | 2.80/2.70 | | 5.8 | 23.7 | 0.90 | 4.67 | | 2.9 | 60.2 |
| | 2.70/2.65 | | 8.6 | 32.3 | 0.32 | 3.52 | | 1.5 | 61.7 |
| | 2.65/2.60 | | 46.7 | 78.9 | 0.04 | 1.46 | | 1.1 | 62.8 |
| | <2.60 | | 21.1 | 100.0 | 0.02 | 1.16 | | 0.2 | 63.0 |
| | **Sub-total/Average** | | **100.0** | | **1.16** | | | **63.0** | |
| -0.5 | - | 43.6 | | | 0.88 | | 37.0 | | |
| **Total** | | **100.0** | | | **1.04** | | **100.0** | | |

**Recovery by SG: Excluding Fines**

| Specific Gravity | Sinks | | | Floats | | |
|---|---|---|---|---|---|---|
| | Wt Rec(%) | Li2O (%) | Rec. (%) | Wt Dist(%) | Li2O (%) | Dist (%) |
| 2.95 | 12.7 | 6.93 | 75.8 | 87.3 | 0.32 | 24.2 |
| 2.80 | 17.9 | 5.90 | 90.9 | 82.1 | 0.13 | 9.1 |
| 2.70 | 23.7 | 4.67 | 95.5 | 76.3 | 0.07 | 4.5 |
| 2.65 | 32.3 | 3.52 | 97.9 | 67.7 | 0.04 | 2.1 |
| 2.60 | 78.9 | 1.46 | 99.6 | 21.1 | 0.02 | 0.4 |



# HEAVY LIQUID SEPARATION REPORT

**Client:** Tantalex
**Test:** TR203
**Sample:** G-Dump, crushed to 6.7 mm top size

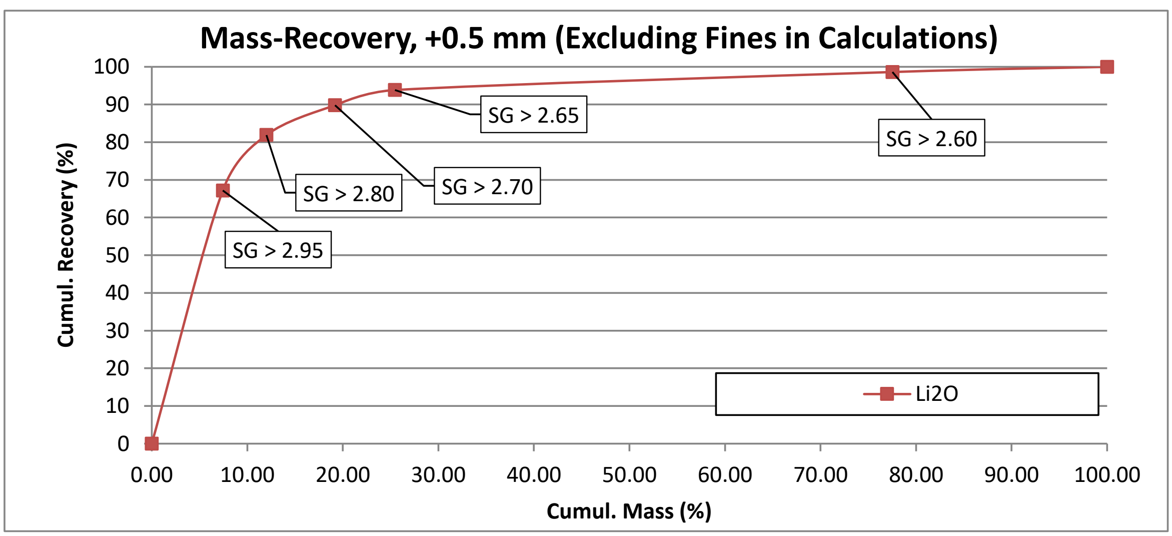
**Date:** 31-Jan-23
**Project:** MS2103

Objective: To compare to Dense Media Separation (DMS) performance.

| Size Fraction (mm) | Specific Gravity of Fraction | Weight | | | Assay | | Distribution Li2O | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) | Li2O (%) | Cumul. Li2O Grade (%) | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) |
| +0.5 | >2.95 | 87.6 | 7.4 | 7.4 | 6.35 | 6.35 | 91.3 | 61.3 | 61.3 |
| | 2.95/2.80 | | 4.6 | 12.0 | 2.26 | 4.79 | | 13.4 | 74.8 |
| | 2.80/2.70 | | 7.2 | 19.2 | 0.78 | 3.29 | | 7.2 | 82.0 |
| | 2.70/2.65 | | 6.3 | 25.5 | 0.45 | 2.59 | | 3.7 | 85.7 |
| | 2.65/2.60 | | 52.1 | 77.5 | 0.06 | 0.89 | | 4.4 | 90.1 |
| | <2.60 | | 22.5 | 100.0 | 0.04 | 0.70 | | 1.3 | 91.3 |
| | **Sub-total/Average** | | **100.0** | | **0.70** | | | **91.3** | |
| -0.5 | - | 12.4 | | | 0.47 | | 8.7 | | |
| **Total** | | **100.0** | | | **0.67** | | **100.0** | | |

**Recovery by SG: Excluding Fines**

| Specific Gravity | Sinks | | | Floats | | |
|---|---|---|---|---|---|---|
| | Wt Rec(%) | Li2O (%) | Rec. (%) | Wt Dist(%) | Li2O (%) | Dist (%) |
| 2.95 | 7.4 | 6.35 | 67.2 | 92.6 | 0.25 | 32.8 |
| 2.80 | 12.0 | 4.79 | 81.9 | 88.0 | 0.14 | 18.1 |
| 2.70 | 19.2 | 3.29 | 89.8 | 80.8 | 0.09 | 10.2 |
| 2.65 | 25.5 | 2.59 | 93.8 | 74.5 | 0.06 | 6.2 |
| 2.60 | 77.5 | 0.89 | 98.6 | 22.5 | 0.04 | 1.4 |



# HEAVY LIQUID SEPARATION REPORT

**Client:** Tantalex  
**Test:** TR403  
**Sample:** K-G Blend (84%-16%)

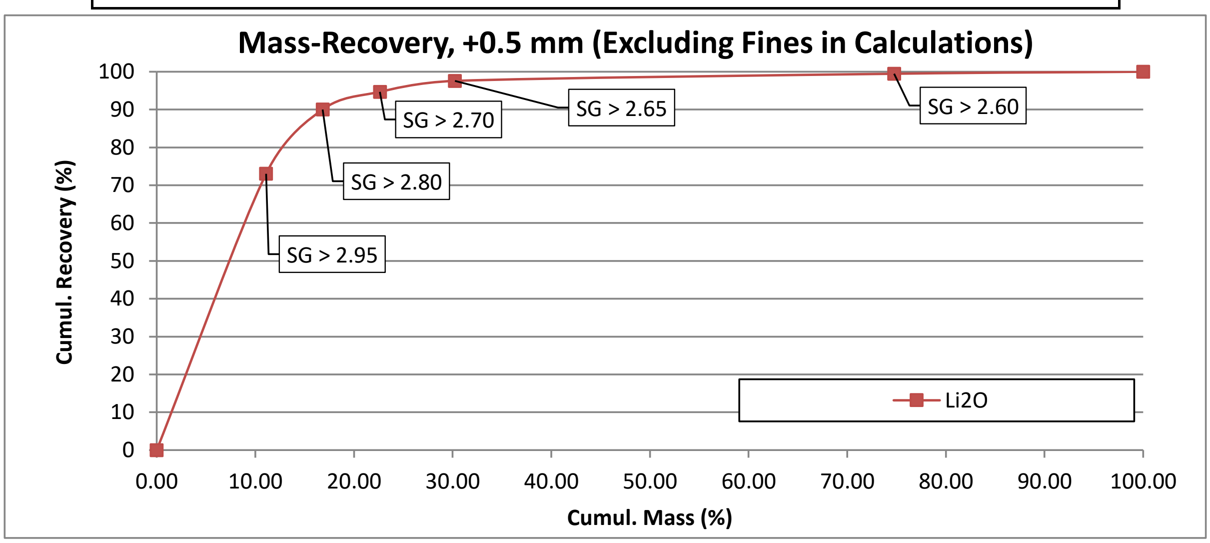
**Date:** 31-Jan-23  
**Project:** MS2103

Objective: To compare to Dense Media Separation (DMS) performance.

| Size Fraction (mm) | Specific Gravity of Fraction | Weight | | | Assay | | Distribution Li2O | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) | Li2O (%) | Cumul. Li2O Grade (%) | Size Fraction (%) | Sink-Float Fraction (%) | Cumul. Fraction (%) |
| +0.5 | >2.95 | 61.5 | 11.1 | 11.1 | 6.70 | 6.70 | 64.8 | 47.3 | 47.3 |
| | 2.95/2.80 | | 5.7 | 16.8 | 3.01 | 5.44 | | 11.0 | 58.3 |
| | 2.80/2.70 | | 5.8 | 22.6 | 0.82 | 4.26 | | 3.0 | 61.4 |
| | 2.70/2.65 | | 7.6 | 30.2 | 0.39 | 3.28 | | 1.9 | 63.2 |
| | 2.65/2.60 | | 44.5 | 74.8 | 0.04 | 1.35 | | 1.2 | 64.5 |
| | <2.60 | | 25.2 | 100.0 | 0.02 | 1.02 | | 0.3 | 64.8 |
| | **Sub-total/Average** | | **100.0** | | **1.02** | | | **64.8** | |
| -0.5 | - | 38.5 | | | 0.88 | | 35.2 | | |
| **Total** | | **100.0** | | | **0.97** | | **100.0** | | |

**Recovery by SG: Excluding Fines**

| Specific Gravity | Sinks | | | Floats | | |
|---|---|---|---|---|---|---|
| | Wt Rec(%) | Li2O (%) | Rec. (%) | Wt Dist(%) | Li2O (%) | Dist (%) |
| 2.95 | 11.1 | 6.70 | 73.0 | 88.9 | 0.31 | 27.0 |
| 2.80 | 16.8 | 5.44 | 90.0 | 83.2 | 0.12 | 10.0 |
| 2.70 | 22.6 | 4.26 | 94.7 | 77.4 | 0.07 | 5.3 |
| 2.65 | 30.2 | 3.28 | 97.6 | 69.8 | 0.04 | 2.4 |
| 2.60 | 74.8 | 1.35 | 99.5 | 25.2 | 0.02 | 0.5 |



# Appendix B

## Dense Media Separation Results

## MS2103 Tantalex

1) **TR102, 2-stage DMS Test on K-Dump**
2) **TR202, 2-stage DMS Test on G-Dump**
3) **TR402, 2-stage DMS Test on K-G Blend**
4) **Stage 1 Tracer Test #1 (G-Dump)**
5) **Stage 1 Tracer Test #2 (K-G Blend & K-Dump)**
6) **Stage 2 Tracer Test (for all)**

101B - 9850 -20 St · Langley, BC · CANADA · V1M 4A3
tel: 604-888-7604 · fax: 604-888-5521 · labs.seprosystems.com

## DMS OVERALL MASS BALANCE

**Client:** Tantalex
**Test:** TR102
**Sample:** K-Dump, as-received

**Date:** 10-Feb-23
**Project:** MS2103

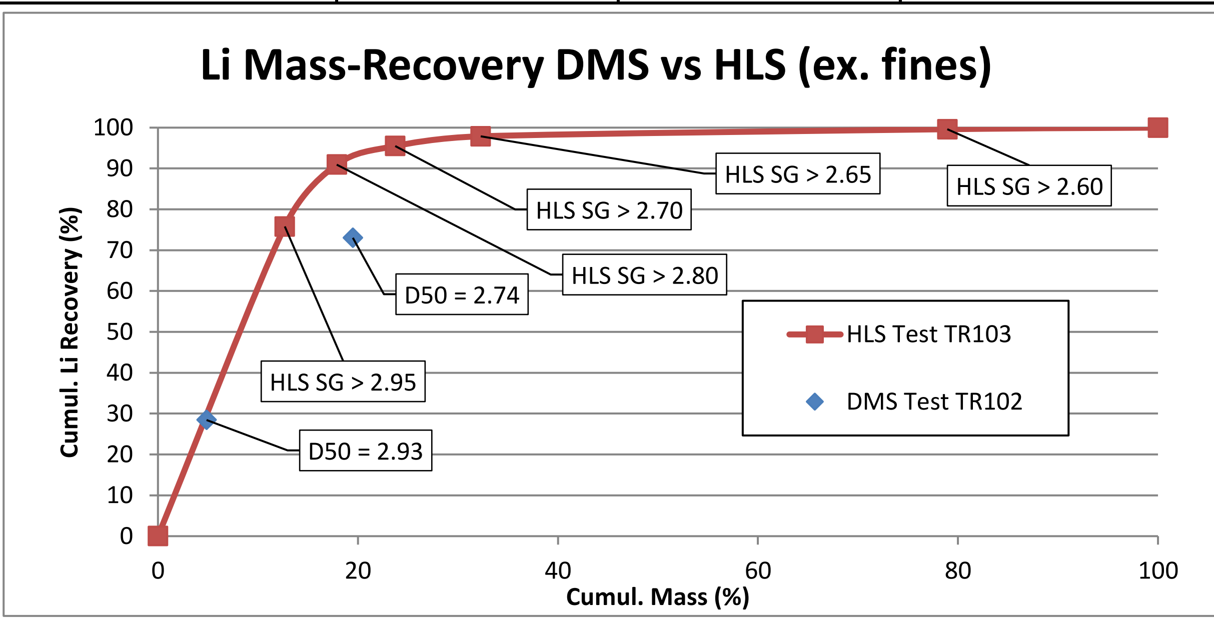
| | $1^{st}$ Stage | $2^{nd}$ Stage |
|---|---|---|
| ***D50 (Specific Gravity):** | 2.74 | 2.93 |

*Based on cut points from tracer tests

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks (D50 = 2.93) | 3.97 | 2.8 | 6.16 | 17.6 |
| Middlings | 11.95 | 8.5 | 3.21 | 27.6 |
| Floats (D50 = 2.74) | 65.77 | 46.5 | 0.35 | 16.7 |
| *Fines (-0.50 mm)* | *59.72* | *42.2* | *0.88* | *38.0* |
| ***Calc. Head*** | ***141.4*** | ***100.0*** | ***0.98*** | ***100.0*** |
| *Average Head* | | | *1.08* | |

***Excluding Fines***

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks | 4.0 | 4.9 | 6.16 | 28.4 |
| Mids | 12.0 | 14.6 | 3.21 | 44.6 |
| Sinks & Mids | 15.9 | 19.5 | 3.94 | 73.0 |



# DMS OVERALL MASS BALANCE

**Client:** Tantalex
**Test:** TR202
**Sample:** G-Dump, crushed to 6.7 mm top size

**Date:** 10-Feb-23
**Project:** MS2103

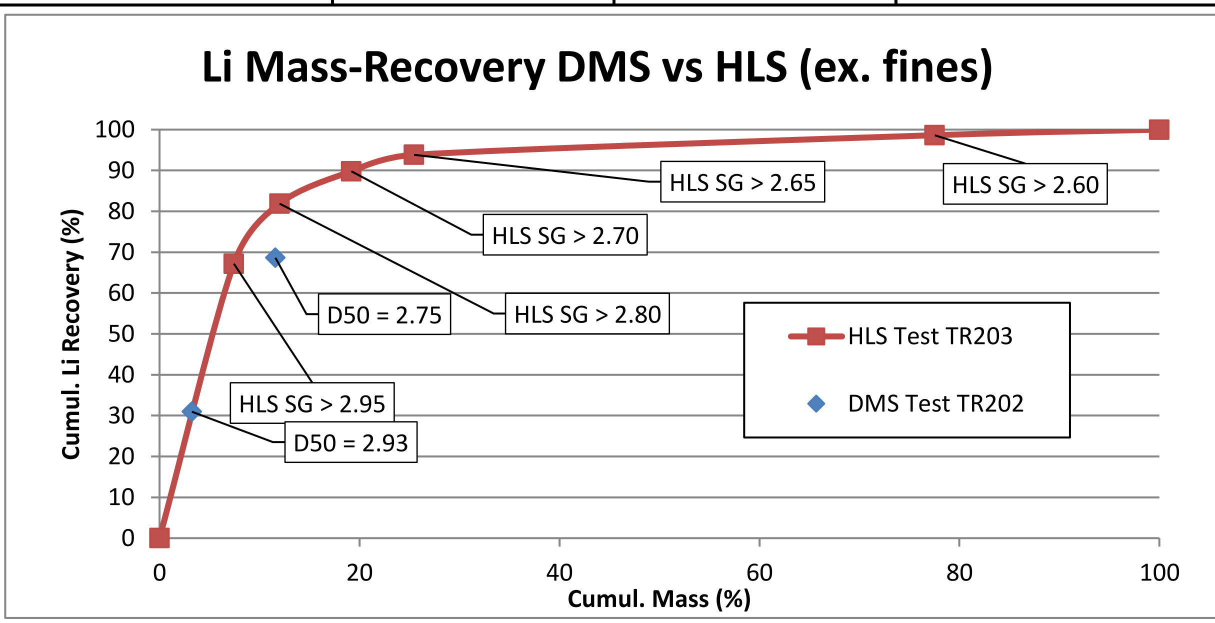
| | 1st Stage | 2nd Stage |
|---|---|---|
| ***D50 (Specific Gravity):** | 2.75 | 2.93 |

*Based on cut points from tracer tests

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks (D50 = 2.93) | 5.14 | 2.8 | 6.00 | 27.9 |
| Middlings | 13.25 | 7.3 | 2.83 | 33.9 |
| Floats (D50 = 2.75) | 140.32 | 77.2 | 0.22 | 28.3 |
| *Fines (-0.50 mm)* | *23.11* | *12.7* | *0.47* | *9.9* |
| ***Calc. Head*** | ***181.8*** | ***100.0*** | ***0.61*** | ***100.0*** |
| *Average Head* | | | *0.62* | |

***Excluding Fines***

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks | 5.1 | 3.2 | 6.00 | 31.0 |
| Mids | 13.3 | 8.3 | 2.83 | 37.7 |
| Sinks & Mids | 18.4 | 11.6 | 3.72 | 68.6 |



## DMS OVERALL MASS BALANCE

**Client:** Tantalex
**Test:** TR402
**Sample:** K-G Blend (84%-16%)

**Date:** 10-Feb-23
**Project:** MS2103

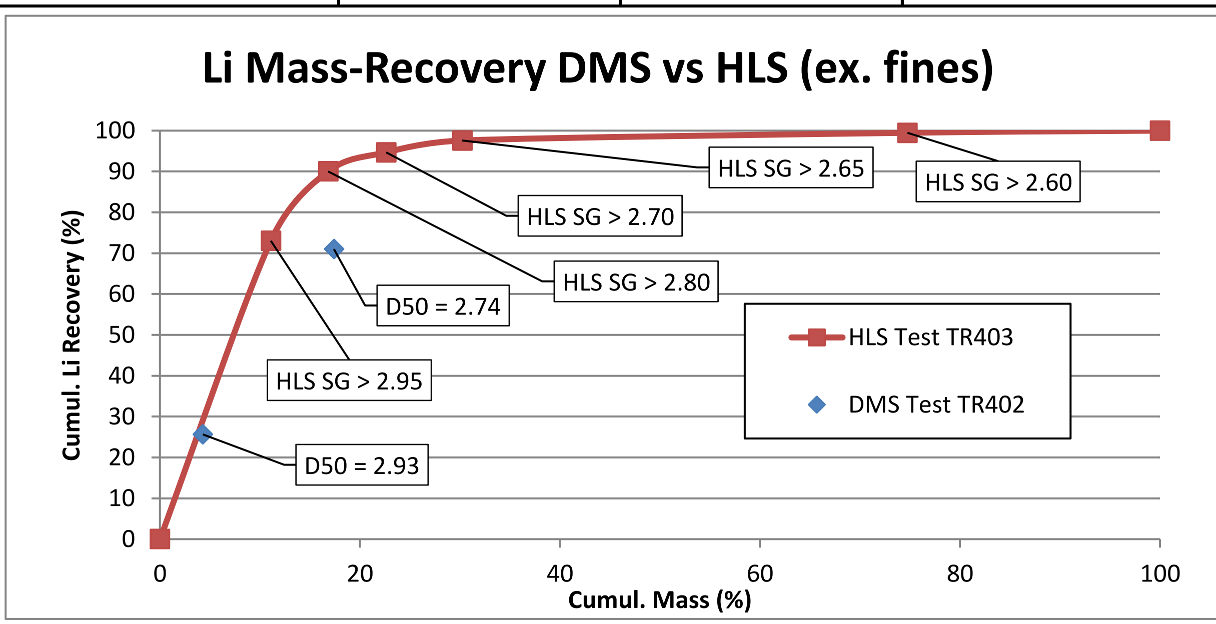
| | 1st Stage | 2nd Stage |
|---|---|---|
| ***D50 (Specific Gravity):** | 2.74 | 2.93 |

*Based on cut points from tracer tests

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks (D50 = 2.93) | 4.64 | 2.7 | 6.23 | 17.2 |
| Middlings | 14.18 | 8.3 | 3.61 | 30.4 |
| Floats (D50 = 2.74) | 89.36 | 52.3 | 0.37 | 19.5 |
| *Fines (-0.50 mm)* | *62.61* | *36.7* | *0.88* | *32.9* |
| ***Calc. Head*** | ***170.8*** | ***100.0*** | ***0.98*** | ***100.0*** |
| *Average Head* | | | *0.97* | |

***Excluding Fines***

| Description | Weight | | Grade | Distribution |
|---|---|---|---|---|
| | | | Li2O | Li2O |
| | (kg) | (%) | (%) | (%) |
| Sinks | 4.6 | 4.3 | 6.23 | 25.6 |
| Mids | 14.2 | 13.1 | 3.61 | 45.3 |
| Sinks & Mids | 18.8 | 17.4 | 4.25 | 71.0 |



**DENSITY TRACER TESTS - CONDOR PILOT PLANT**

**Client:** Tantalex
**Test:** TR202
**Sample:** G-Dump

**Date:** 10-Feb-23
**Project:** MS2103

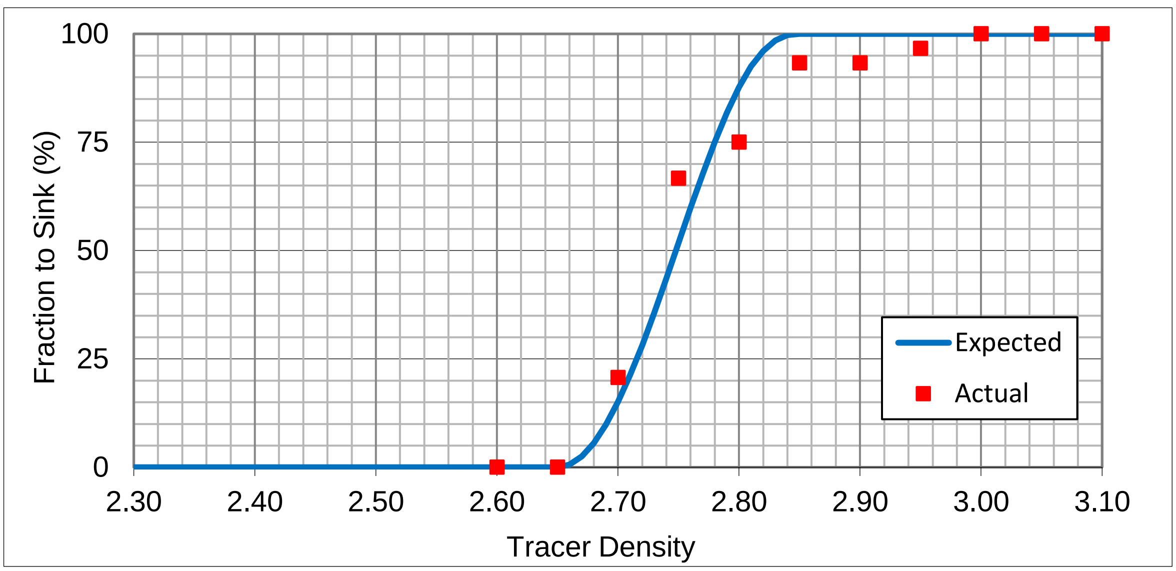
| Operating Parameters | | |
|---|---|---|
| Medium Inlet Density: | 2.51 | SG |
| Inlet Press: | 12 | PSI |
| Pump Setpoint: | 70 | Hz |
| Sinkbox Pipe: | None | - |

| D25 | D50 | D75 |
|---|---|---|
| **2.716** | **2.748** | **2.780** |
| **Ep~** | **0.032** | |

**8mm Tracer Results**

| Color | Density | # | Sinks1 | Float | Sink (%) |
|---|---|---|---|---|---|
| Salmon Pink (-) | 3.10 | 0 | | | 100.0 |
| Mint Green | 3.05 | 0 | | | 100.0 |
| Orange | 3.00 | 30 | 30 | 0 | 100.0 |
| Light Blue | 2.95 | 30 | 29 | 1 | 96.7 |
| Cream (1 marked) | 2.90 | 30 | 28 | 2 | 93.3 |
| Light Green | 2.85 | 30 | 28 | 2 | 93.3 |
| Green | 2.80 | 24 | 18 | 6 | 75.0 |
| Dark Blue | 2.75 | 30 | 20 | 10 | 66.7 |
| Grey | 2.70 | 29 | 6 | 23 | 20.7 |
| Blue/Green | 2.65 | 30 | 0 | 30 | 0.0 |
| Lilac | 2.60 | 30 | 0 | 30 | 0.0 |
| Totals | | 263 | 161 | 104 | |

**Comments:**
11:30 AM



## DENSITY TRACER TESTS - CONDOR PILOT PLANT

**Client:** Tantalex
**Test:** TR102, TR402
**Sample:** K-Dump, K-G Blend

**Date:** 10-Feb-23
**Project:** MS2103

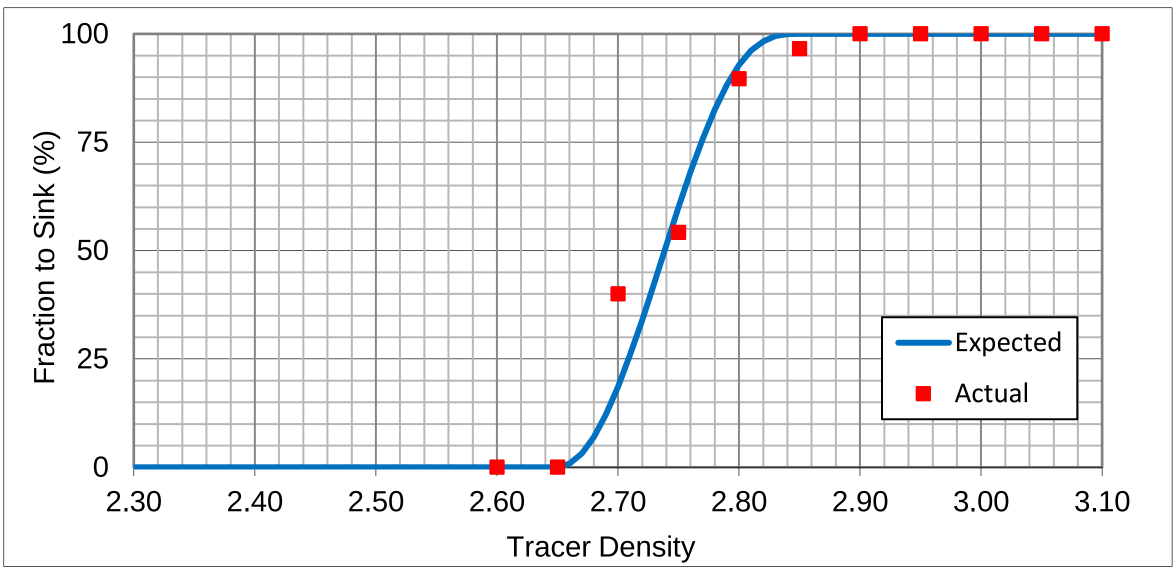
| Operating Parameters | | |
|---|---|---|
| Medium Inlet Density: | 2.41 | SG |
| Inlet Press: | 12 | PSI |
| Pump Setpoint: | 61 | Hz |
| Sinkbox Pipe: | None | - |

| D25 | D50 | D75 |
|---|---|---|
| **2.709** | **2.739** | **2.769** |
| **Ep~** | **0.030** | |

**Comments:**
3:02 PM

**8mm Tracer Results**

| Color | Density | # | Sinks1 | Float | Sink (%) |
|---|---|---|---|---|---|
| Salmon Pink (-) | 3.10 | 0 | | | 100.0 |
| Mint Green | 3.05 | 0 | | | 100.0 |
| Orange | 3.00 | 30 | 30 | 0 | 100.0 |
| Light Blue | 2.95 | 30 | 30 | 0 | 100.0 |
| Cream (1 marked) | 2.90 | 30 | 30 | 0 | 100.0 |
| Light Green | 2.85 | 29 | 28 | 1 | 96.6 |
| Green | 2.80 | 29 | 26 | 3 | 89.7 |
| Dark Blue | 2.75 | 24 | 13 | 11 | 54.2 |
| Grey | 2.70 | 30 | 12 | 18 | 40.0 |
| Blue/Green | 2.65 | 30 | 0 | 30 | 0.0 |
| Lilac | 2.60 | 30 | 0 | 30 | 0.0 |
| Totals | | 262 | 169 | 93 | |



## DENSITY TRACER TESTS - CONDOR PILOT PLANT

**Client:** Tantalex
**Test:** TR102, TR202, TR402
**Sample:** All samples

**Date:** 10-Feb-23
**Project:** MS2103

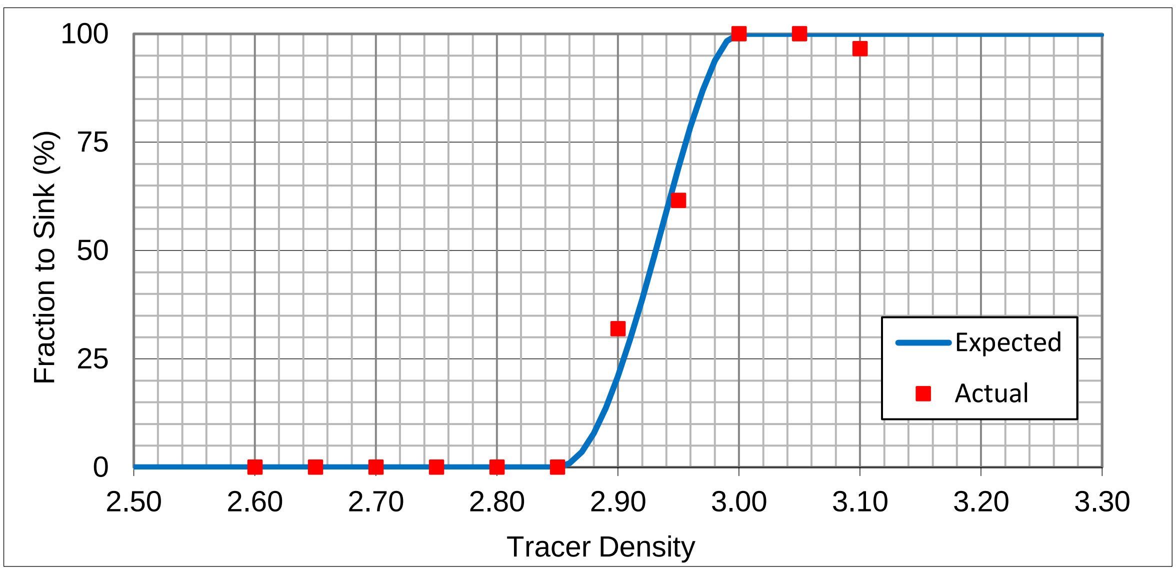
| Operating Parameters | | |
|---|---|---|
| Medium Inlet Density: | 2.58 | SG |
| Inlet Press: | 12 | PSI |
| Pump Setpoint: | 61 | Hz |
| Sinkbox Pipe: | None | - |

| D25 | D50 | D75 |
|---|---|---|
| **2.905** | **2.931** | **2.956** |
| **Ep~** | **0.026** | |

**Comments:**
5:04 PM

**8mm Tracer Results**

| Color | Density | # | Sinks1 | Float | Sink (%) |
|---|---|---|---|---|---|
| Salmon Pink (-) | 3.10 | 29 | 28 | 1 | 96.6 |
| Mint Green | 3.05 | 30 | 30 | 0 | 100.0 |
| Orange | 3.00 | 30 | 30 | 0 | 100.0 |
| Light Blue | 2.95 | 26 | 16 | 10 | 61.5 |
| Cream (1 marked) | 2.90 | 25 | 8 | 17 | 32.0 |
| Light Green | 2.85 | 30 | 0 | 30 | 0.0 |
| Green | 2.80 | 30 | 0 | 30 | 0.0 |
| Dark Blue | 2.75 | 30 | 0 | 30 | 0.0 |
| Grey | 2.70 | 30 | 0 | 30 | 0.0 |
| Blue/Green | 2.65 | 30 | 0 | 30 | 0.0 |
| Lilac | 2.60 | 30 | 0 | 30 | 0.0 |
| Totals | | 320 | 112 | 208 | |



# Appendix C

## Particle Size Analysis Results

## MS2103 Tantalex

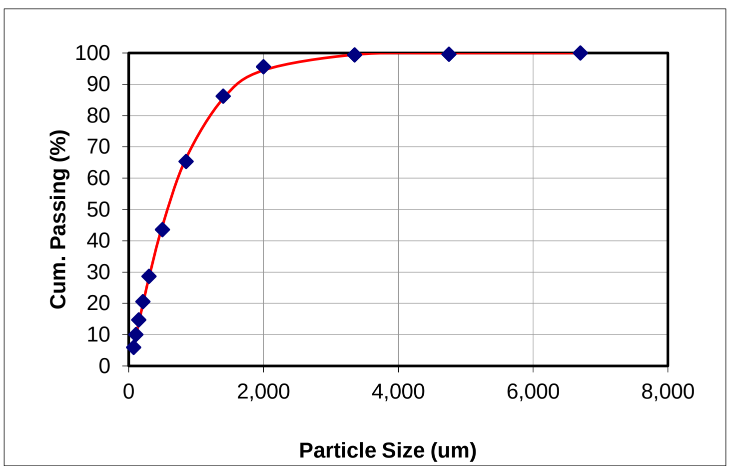
1) **TR101, Particle Size Analysis on K-Dump**
2) **TR201, Particle Size Analysis on G-Dump**
3) **TR401, Calculated Particle Size Analysis on K-G Blend**
4) **TR104, DMS Size Fraction Assay on K-Dump Floats**
5) **TR204, DMS Size Fraction Assay on G-Dump Floats**

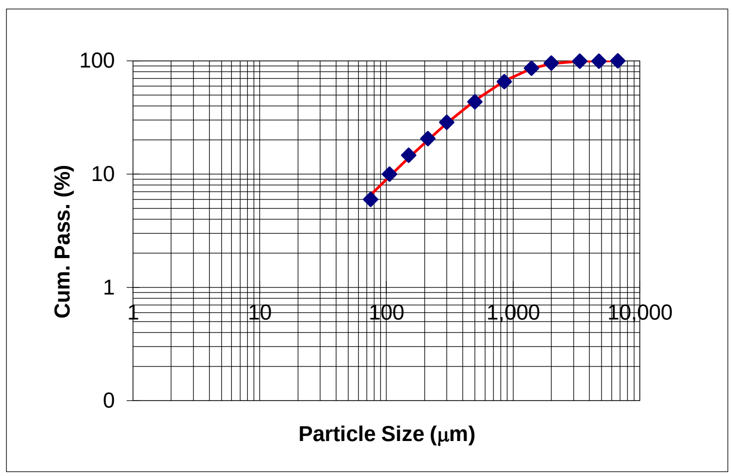
**PARTICLE SIZE ANALYSIS**

**Client:** Tantalex
**Test:** TR101
**Sample:** K-Dump, as-received

**Date:** 27-Jan-23
**Project:** MS2103

| Sieve Size | | Weight | | Cumulative (%) | |
|---|---|---|---|---|---|
| US Mesh | Microns | (g) | (%) | Retained | Passing |
| 0.265" | 6,700 | 0.0 | | | |
| 4 | 4,750 | 8.4 | 0.40 | 0.40 | 99.60 |
| 6 | 3,350 | 4.2 | 0.20 | 0.60 | 99.40 |
| 10 | 2,000 | 80.0 | 3.78 | 4.38 | 95.62 |
| 14 | 1,400 | 199.2 | 9.42 | 13.80 | 86.20 |
| 20 | 850 | 442.0 | 20.89 | 34.69 | 65.31 |
| 35 | 500 | 460.2 | 21.75 | 56.44 | 43.56 |
| 50 | 300 | 314.8 | 14.88 | 71.32 | 28.68 |
| 70 | 212 | 171.7 | 8.12 | 79.44 | 20.56 |
| 100 | 150 | 124.0 | 5.86 | 85.30 | 14.70 |
| 140 | 106 | 99.6 | 4.71 | 90.01 | 9.99 |
| 200 | 75 | 84.8 | 4.01 | 94.02 | 5.98 |
| Undersize | -75 | 126.5 | 5.98 | 100.00 | 0.00 |
| | **TOTAL:** | 2,115.5 | 100.0 | | |



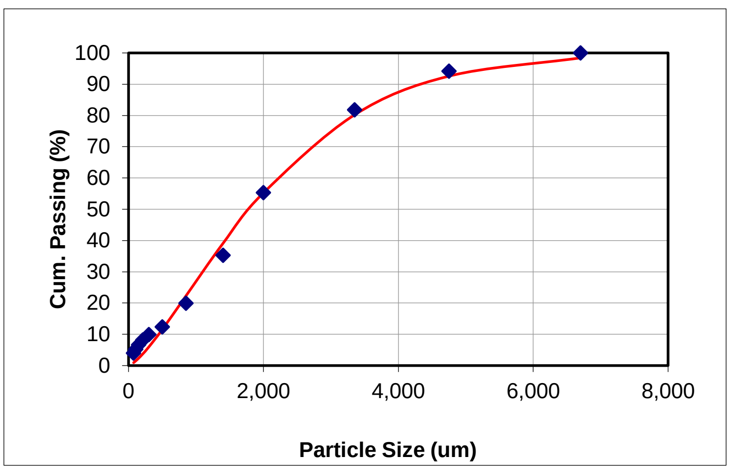



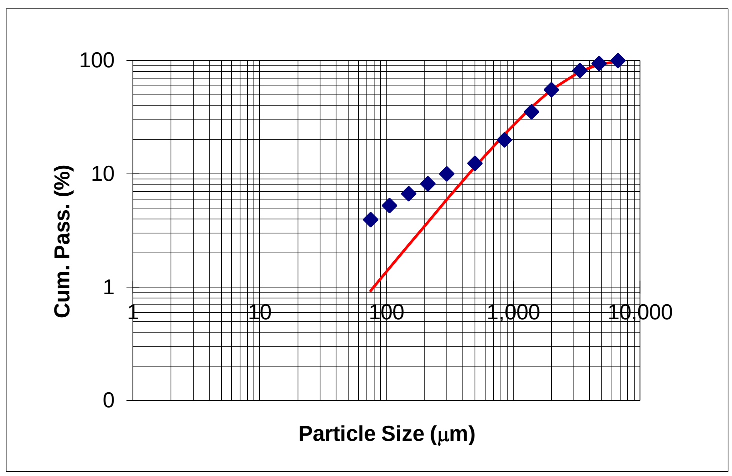
**PARTICLE SIZE ANALYSIS**

**Client:** Tantalex
**Test:** TR201
**Sample:** G-Dump, crushed to 6.7 mm top size

**Date:** 27-Jan-23
**Project:** MS2103

| Sieve Size | | Weight | | Cumulative (%) | |
|---|---|---|---|---|---|
| US Mesh | Microns | (g) | (%) | Retained | Passing |
| 0.265" | 6,700 | 0.0 | | | |
| 4 | 4,750 | 126.2 | 5.87 | 5.87 | 94.13 |
| 6 | 3,350 | 265.5 | 12.34 | 18.21 | 81.79 |
| 10 | 2,000 | 570.4 | 26.52 | 44.73 | 55.27 |
| 14 | 1,400 | 431.1 | 20.04 | 64.77 | 35.23 |
| 20 | 850 | 328.6 | 15.28 | 80.05 | 19.95 |
| 35 | 500 | 163.0 | 7.58 | 87.62 | 12.38 |
| 50 | 300 | 51.8 | 2.41 | 90.03 | 9.97 |
| 70 | 212 | 38.2 | 1.78 | 91.81 | 8.19 |
| 100 | 150 | 32.3 | 1.50 | 93.31 | 6.69 |
| 140 | 106 | 31.2 | 1.45 | 94.76 | 5.24 |
| 200 | 75 | 28.0 | 1.30 | 96.06 | 3.94 |
| Undersize | -75 | 84.7 | 3.94 | 100.00 | 0.00 |
| | **TOTAL:** | 2,150.8 | 100.0 | | |



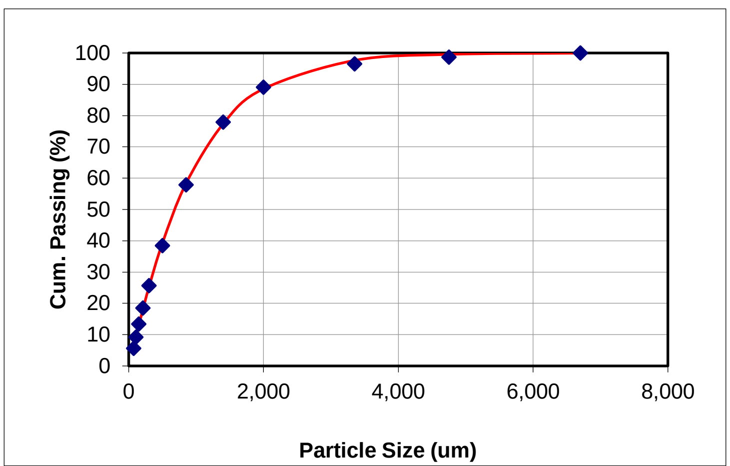



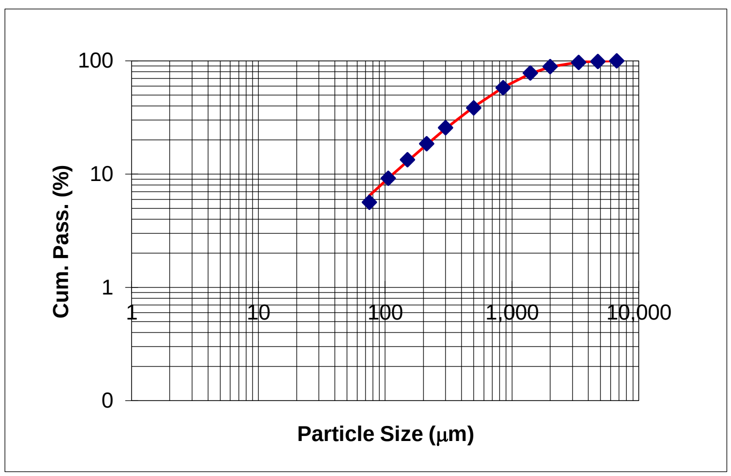
**PARTICLE SIZE ANALYSIS**

**Client:** Tantalex
**Test:** TR101 & TR201
**Sample:** K-G Blend (84%-16%), calculated

**Date:** 27-Jan-23
**Project:** MS2103

| Sieve Size | | Weight | | Cumulative (%) | |
|---|---|---|---|---|---|
| US Mesh | Microns | (g) | (%) | Retained | Passing |
| 0.265" | 6,700 | 0.0 | | | |
| 4 | 4,750 | 27.3 | 1.29 | 1.29 | 98.71 |
| 6 | 3,350 | 46.2 | 2.18 | 3.47 | 96.53 |
| 10 | 2,000 | 158.8 | 7.49 | 10.95 | 89.05 |
| 14 | 1,400 | 236.5 | 11.15 | 22.10 | 77.90 |
| 20 | 850 | 423.7 | 19.98 | 42.08 | 57.92 |
| 35 | 500 | 412.4 | 19.44 | 61.52 | 38.48 |
| 50 | 300 | 272.6 | 12.85 | 74.37 | 25.63 |
| 70 | 212 | 150.3 | 7.08 | 81.45 | 18.55 |
| 100 | 150 | 109.3 | 5.15 | 86.61 | 13.39 |
| 140 | 106 | 88.6 | 4.18 | 90.79 | 9.21 |
| 200 | 75 | 75.7 | 3.57 | 94.35 | 5.65 |
| Undersize | -75 | 119.8 | 5.65 | 100.00 | 0.00 |
| | TOTAL: | 2,121.2 | 100.0 | | |



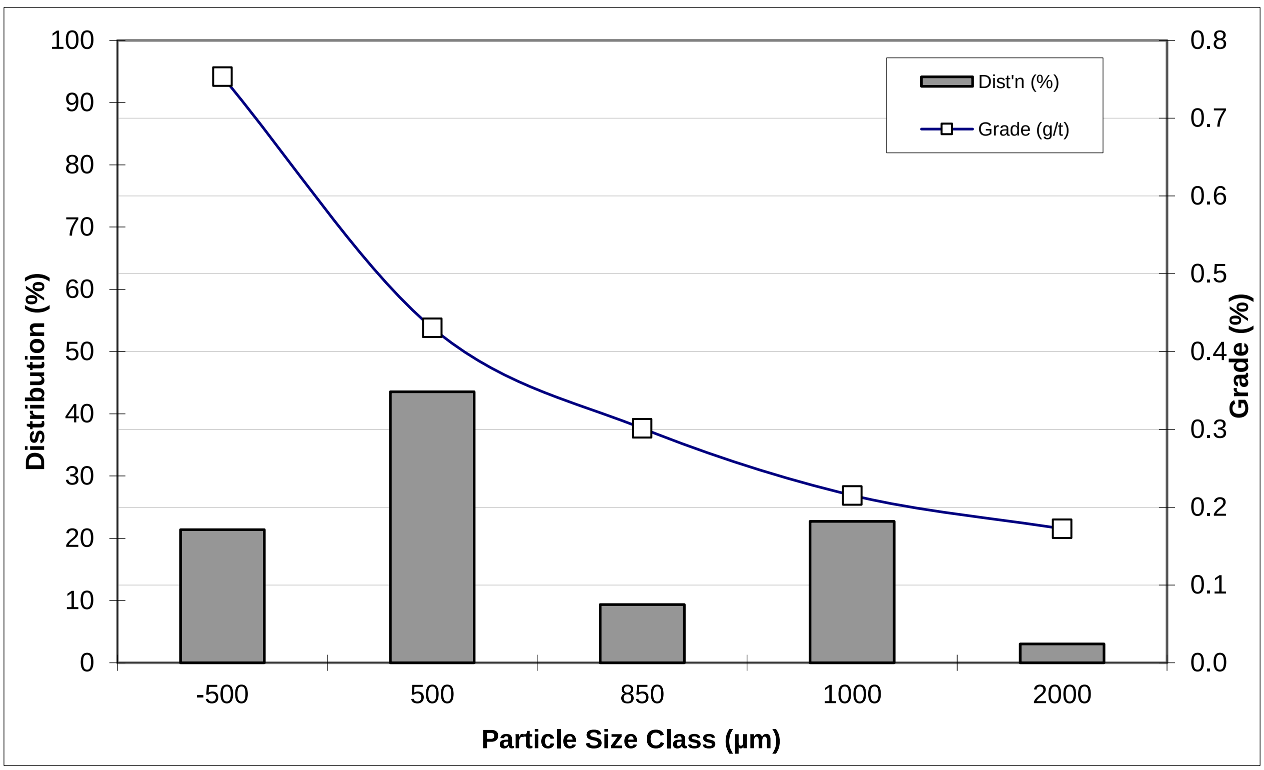



**SIZE BY SIZE ANALYSIS**

**Client:** Tantalex
**Test:** TR104
**Sample:** K-Dump, DMS 2.75 Floats

**Date:** 03-Apr-23
**Project:** MS2103

| Sieve Size | | Weight | | Li2O | |
|---|---|---|---|---|---|
| US Mesh | Microns | (g) | (%) | Grade (%) | Dist'n (%) |
| 10 | 2,000 | 67.8 | 6.2 | 0.17 | 3.03 |
| 18 | 1,000 | 407.0 | 37.2 | 0.22 | 22.71 |
| 20 | 850 | 120.0 | 11.0 | 0.30 | 9.37 |
| 35 | 500 | 390.0 | 35.6 | 0.43 | 43.52 |
| Undersize | -500 | 109.4 | 10.0 | 0.75 | 21.37 |
| | **TOTAL:** | 1,094.2 | 100.0 | 0.35 | 100.00 |
| | **Assayed Head:** | | | 0.38 | |

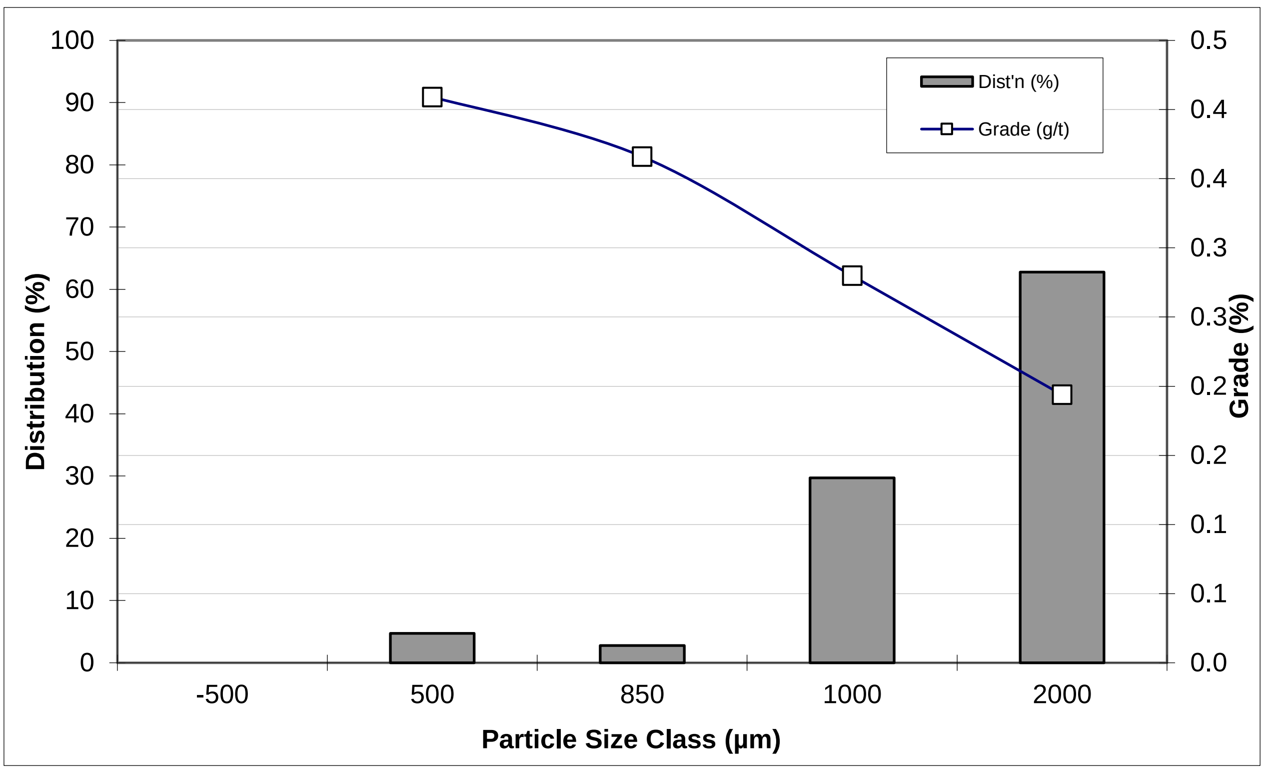


**SIZE BY SIZE ANALYSIS**

**Client:** Tantalex
**Test:** TR204
**Sample:** G-Dump, DMS 2.75 Floats

**Date:** 03-Apr-23
**Project:** MS2103

| Sieve Size | | Weight | | Li2O | |
|---|---|---|---|---|---|
| US Mesh | Microns | (g) | (%) | (%) | Dist'n (%) |
| 10 | 2,000 | 893.0 | 72.1 | 0.19 | 62.78 |
| 18 | 1,000 | 292.7 | 23.6 | 0.28 | 29.72 |
| 20 | 850 | 20.7 | 1.7 | 0.37 | 2.75 |
| 35 | 500 | 32.0 | 2.6 | 0.41 | 4.75 |
| Undersize | -500 | | | | |
| | **TOTAL:** | 1,238.4 | 100.0 | 0.22 | 100.00 |
| | **Assayed Head:** | | | 0.30 | |



## Appendix D

## Assay Summary

## MS2103 Tantalex

101B - 9850 -20 St · Langley, BC · CANADA · V1M 4A3
tel: 604-888-7604 · fax: 604-888-5521 · labs.seprosystems.com

# MS2103 Assay List

| Test Number | Sample ID | Description | Test Number | Sample ID | Description |
|---|---|---|---|---|---|
| TR102 | 128189 | K Dump 2.95 Sink | TR203 | 128234 | G-Dump HLS >2.95 |
| TR102 | 128190 | K Dump 2.95 Sink | TR203 | 128235 | G-Dump HLS 2.95/2.80 |
| TR202 | 128193 | G Dump 2.95 Sink | TR203 | 128236 | G-Dump HLS 2.80/2.70 |
| TR202 | 128194 | G Dump 2.95 Sink | TR203 | 128237 | G-Dump HLS 2.70/2.65 |
| TR402 | 128197 | KG Blend 2.95 Sink | TR203 | 128238 | G-Dump HLS 2.65/2.60 |
| TR402 | 128198 | KG Blend 2.95 Sink | TR203 | 128239 | G-Dump HLS <2.60 |
| TR102 | 128213 | K Dump 2.75 Float | TR403 | 128240 | KG Blend HLS >2.95 |
| TR102 | 128214 | K Dump 2.75 Float | TR403 | 128241 | KG Blend HLS 2.95/2.80 |
| TR202 | 128217 | G Dump 2.75 Float | TR403 | 128242 | KG Blend HLS 2.80/2.70 |
| TR202 | 128218 | G Dump 2.75 Float | TR403 | 128243 | KG Blend HLS 2.70/2.65 |
| TR402 | 128221 | KG Blend 2.75 Float | TR403 | 128244 | KG Blend HLS 2.65/2.60 |
| TR402 | 128222 | KG Blend 2.75 Float | TR403 | 128245 | KG Blend HLS <2.60 |
| TR102 | 128201 | K Dump 2.95 Float | TR100 | 128246 | K Dump Head |
| TR102 | 128202 | K Dump 2.95 Float | TR200 | 128247 | G Dump Head |
| TR202 | 128205 | G Dump 2.95 Float | TR400 | 128248 | KG Blend Head |
| TR202 | 128206 | G Dump 2.95 Float | TR104 | 128422 | K Dump, 2,000µm |
| TR402 | 128209 | KG Blend 2.95 Float | TR104 | 128423 | K Dump, 1,000µm |
| TR402 | 128210 | KG Blend 2.95 Float | TR104 | 128424 | K Dump, 850µm |
| TR102 | 128225 | K Dump -0.5 mm Assay Cut | TR104 | 128425 | K Dump, 500µm |
| TR202 | 128226 | G Dump -0.5 mm Assay Cut | TR104 | 128426 | K Dump, -500µm |
| TR402 | 128227 | KG Blend -0.5 mm Assay Cut | TR204 | 128396 | G Dump, 2,000µm |
| TR103 | 128228 | K-Dump HLS >2.95 | TR204 | 128397 | G Dump, 1,000µm |
| TR103 | 128229 | K-Dump HLS 2.95/2.80 | TR204 | 128398 | G Dump, 850µm |
| TR103 | 128230 | K-Dump HLS 2.80/2.70 | TR204 | 128399 | G Dump, 500µm |
| TR103 | 128231 | K-Dump HLS 2.70/2.65 | | | |
| TR103 | 128232 | K-Dump HLS 2.65/2.60 | | | |
| TR103 | 128233 | K-Dump HLS <2.60 | | | |

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To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

| **TEST REPORT:** | **YVR2310304** |
|---|---|

Project Name: MS2103 All
Job Received Date: 21-Feb-2023
Job Report Date: 02-Mar-2023
Number of Samples: 42
Report Version: Final

**COMMENTS:**

Test results reported relate to the tested samples only on an “as received” basis. Unless otherwise stated above, sufficient sample was received for the methods requested and all samples were received in acceptable condition. Analytical results in unsigned reports marked "provisional" are subject to change, pending final QC review and approval. The customer has not provided any information than can affect the validity of the test results. Please refer to MSALABS' Schedule of Services and Fees for our complete Terms and Conditions. Preliminary results are applicable when a portion of samples in a job is 100% completed and reported or 1 of a number of methods on the same job have been completed 100%. Results cannot change, but additional results or results for additional methods can be added.

| **SAMPLE PREPARATION** | |
|---|---|
| METHOD CODE | DESCRIPTION |
| MET-101 | Log Sample - No preparation required |
| | |

| **ANALYTICAL METHODS** | |
|---|---|
| METHOD CODE | DESCRIPTION |
| MET-510 | Multi-Element, 0.15g, Sodium Peroxide Fusion, ICP-AES |
| | |

**Signature:**

Yvette Hsi, BSc.
Laboratory Manager
MSALABS

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To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310304**

Project Name: MS2103 All
Job Received Date: 21-Feb-2023
Job Report Date: 02-Mar-2023
Report Version: Final

| Sample ID | Sample Type | MET-100 Rec. Wt. kg 0.01 | Method Analyte Units LOR | MET-510 Al % 0.01 | MET-510 As % 0.01 | MET-510 Ca % 0.05 | MET-510 Co % 0.002 | MET-510 Cr % 0.01 | MET-510 Cu % 0.005 | MET-510 Fe % 0.05 | MET-510 K % 0.1 | MET-510 Li % 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 128189 | MET | 0.04 | | 12.08 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.60 | 0.6 | 2.90 |
| 128190 | MET | 0.04 | | 11.77 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.59 | 0.6 | 2.82 |
| 128193 | MET | 0.05 | | 11.77 | 0.02 | 0.07 | <0.002 | <0.01 | <0.005 | 4.72 | 0.3 | 2.81 |
| 128194 | MET | 0.05 | | 11.54 | 0.02 | 0.06 | <0.002 | <0.01 | <0.005 | 4.82 | 0.3 | 2.76 |
| 128197 | MET | 0.05 | | 11.99 | <0.01 | 0.11 | <0.002 | 0.01 | <0.005 | 1.64 | 0.5 | 2.89 |
| 128198 | MET | 0.05 | | 12.10 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 1.54 | 0.5 | 2.90 |
| 128213 | MET | 0.06 | | 6.62 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 0.33 | 2.5 | 0.18 |
| 128214 | MET | 0.06 | | 6.44 | <0.01 | 0.08 | <0.002 | <0.01 | <0.005 | 0.33 | 2.4 | 0.17 |
| 128217 | MET | 0.06 | | 6.27 | <0.01 | 0.08 | <0.002 | <0.01 | <0.005 | 1.10 | 2.1 | 0.13 |
| 128218 | MET | 0.06 | | 6.30 | <0.01 | 0.12 | <0.002 | <0.01 | <0.005 | 0.87 | 2.2 | 0.15 |
| 128221 | MET | 0.04 | | 6.57 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.54 | 2.3 | 0.17 |
| 128222 | MET | 0.04 | | 6.53 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 0.54 | 2.4 | 0.17 |
| 128201 | MET | 0.04 | | 9.24 | <0.01 | 0.11 | <0.002 | 0.01 | <0.005 | 0.58 | 1.6 | 1.47 |
| 128202 | MET | 0.04 | | 9.52 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 0.59 | 1.6 | 1.51 |
| 128205 | MET | 0.04 | | 8.83 | 0.02 | 0.11 | <0.002 | 0.01 | <0.005 | 5.38 | 1.2 | 1.30 |
| 128206 | MET | 0.04 | | 8.98 | 0.02 | 0.12 | <0.002 | 0.01 | <0.005 | 5.30 | 1.2 | 1.33 |
| 128209 | MET | 0.04 | | 9.86 | <0.01 | 0.11 | <0.002 | <0.01 | <0.005 | 1.34 | 1.5 | 1.69 |
| 128210 | MET | 0.04 | | 9.60 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 1.32 | 1.4 | 1.66 |
| 128225 | MET | 0.14 | | 7.91 | <0.01 | 0.12 | <0.002 | <0.01 | <0.005 | 0.57 | 2.2 | 0.41 |
| 128226 | MET | 0.14 | | 8.47 | <0.01 | 0.12 | <0.002 | <0.01 | 0.011 | 2.36 | 2.2 | 0.22 |
| 128227 | MET | 0.14 | | 7.98 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 0.75 | 2.3 | 0.41 |
| 128228 | MET | 0.14 | | 12.69 | <0.01 | 0.08 | <0.002 | 0.01 | <0.005 | 0.66 | 0.3 | 3.22 |
| 128229 | MET | 0.06 | | 12.22 | <0.01 | 0.14 | <0.002 | 0.01 | <0.005 | 1.54 | 3.1 | 1.57 |
| 128230 | MET | 0.07 | | 9.77 | <0.01 | 0.12 | <0.002 | <0.01 | <0.005 | 1.21 | 3.8 | 0.42 |
| 128231 | MET | 0.10 | | 5.80 | <0.01 | 0.12 | <0.002 | 0.01 | <0.005 | 0.57 | 1.7 | 0.15 |

***Please refer to the cover page for comments regarding this test report. ***

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Phone: +1-604-888-0875

To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310304**

Project Name: MS2103 All
Job Received Date: 21-Feb-2023
Job Report Date: 02-Mar-2023
Report Version: Final

| Sample ID | Sample Type | MET-100 Rec. Wt. kg 0.01 | Method Analyte Units LOR | MET-510 Al % 0.01 | MET-510 As % 0.01 | MET-510 Ca % 0.05 | MET-510 Co % 0.002 | MET-510 Cr % 0.01 | MET-510 Cu % 0.005 | MET-510 Fe % 0.05 | MET-510 K % 0.1 | MET-510 Li % 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 128232 | MET | 0.14 | | 4.69 | <0.01 | 0.07 | <0.002 | 0.01 | <0.005 | 0.19 | 0.5 | 0.02 |
| 128233 | MET | 0.12 | | 8.79 | <0.01 | 0.08 | <0.002 | <0.01 | <0.005 | 0.18 | 6.8 | 0.01 |
| 128234 | MET | 0.12 | | 12.28 | 0.01 | 0.09 | <0.002 | 0.01 | <0.005 | 4.63 | 0.3 | 2.95 |
| 128235 | MET | 0.08 | | 9.27 | 0.03 | 0.11 | <0.002 | 0.02 | <0.005 | 8.85 | 1.7 | 1.05 |
| 128236 | MET | 0.12 | | 8.79 | 0.01 | 0.13 | <0.002 | 0.01 | <0.005 | 5.13 | 3.1 | 0.36 |
| 128237 | MET | 0.10 | | 7.22 | <0.01 | 0.12 | <0.002 | 0.01 | <0.005 | 1.49 | 2.1 | 0.21 |
| 128238 | MET | 0.22 | | 4.29 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.27 | 0.4 | 0.03 |
| 128239 | MET | 0.19 | | 8.72 | <0.01 | 0.11 | <0.002 | <0.01 | <0.005 | 0.21 | 5.8 | 0.02 |
| 128240 | MET | 0.15 | | 12.41 | 0.01 | 0.10 | <0.002 | 0.01 | <0.005 | 1.27 | 0.3 | 3.11 |
| 128241 | MET | 0.08 | | 11.06 | <0.01 | 0.12 | <0.002 | <0.01 | <0.005 | 2.81 | 2.7 | 1.40 |
| 128242 | MET | 0.08 | | 9.80 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 2.11 | 3.7 | 0.38 |
| 128243 | MET | 0.11 | | 6.49 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.75 | 2.0 | 0.18 |
| 128244 | MET | 0.18 | | 4.67 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | 0.16 | 0.5 | 0.02 |
| 128245 | MET | 0.18 | | 8.64 | <0.01 | 0.05 | <0.002 | <0.01 | <0.005 | 0.14 | 5.6 | 0.01 |
| 128246 | MET | 0.20 | | 8.06 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 0.57 | 2.3 | 0.50 |
| 128247 | MET | 0.15 | | 7.04 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | 1.79 | 2.1 | 0.29 |
| 128248 | MET | 0.15 | | 7.44 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | 0.70 | 2.1 | 0.45 |
| DUP 128189 | | | | 12.31 | <0.01 | 0.10 | <0.002 | <0.01 | <0.005 | 0.61 | 0.6 | 2.96 |
| STD BLANK | | | | <0.01 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | <0.05 | <0.1 | <0.01 |
| STD MP-1b | | | | 3.51 | 2.29 | 2.48 | <0.002 | <0.01 | 3.142 | 8.12 | 0.2 | <0.01 |
| STD AMIS0340 | | | | | | | | | | | | 1.40 |

***Please refer to the cover page for comments regarding this test report. ***

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To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310304**

Project Name: MS2103 All
Job Received Date: 21-Feb-2023
Job Report Date: 02-Mar-2023
Report Version: Final

| | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 |
|---|---|---|---|---|---|---|---|---|---|
| | Mg | Mn | Ni | Pb | S | Si | Sn | Ti | Zn |
| | % | % | % | % | % | % | % | % | % |
| Sample ID | 0.01 | 0.01 | 0.005 | 0.01 | 0.01 | 0.1 | 0.01 | 0.01 | 0.01 |
| 128189 | 0.04 | 0.24 | <0.005 | <0.01 | 0.02 | 29.5 | 0.45 | <0.01 | <0.01 |
| 128190 | 0.03 | 0.23 | <0.005 | <0.01 | <0.01 | 29.3 | 0.45 | <0.01 | <0.01 |
| 128193 | 0.03 | 0.13 | <0.005 | <0.01 | 0.05 | 27.2 | 0.51 | 0.03 | 0.01 |
| 128194 | 0.03 | 0.17 | <0.005 | <0.01 | 0.05 | 26.6 | 0.68 | 0.03 | 0.01 |
| 128197 | 0.04 | 0.21 | <0.005 | <0.01 | 0.01 | 29.0 | 0.42 | 0.01 | <0.01 |
| 128198 | 0.04 | 0.19 | <0.005 | <0.01 | 0.02 | 29.0 | 0.36 | 0.01 | <0.01 |
| 128213 | 0.06 | 0.04 | <0.005 | <0.01 | <0.01 | 32.8 | 0.01 | <0.01 | <0.01 |
| 128214 | 0.06 | 0.03 | <0.005 | <0.01 | 0.02 | 32.7 | 0.01 | <0.01 | <0.01 |
| 128217 | 0.07 | 0.04 | <0.005 | <0.01 | <0.01 | 34.3 | 0.03 | 0.01 | <0.01 |
| 128218 | 0.06 | 0.03 | <0.005 | <0.01 | <0.01 | 35.9 | 0.01 | 0.01 | <0.01 |
| 128221 | 0.06 | 0.04 | <0.005 | <0.01 | <0.01 | 34.1 | 0.02 | <0.01 | <0.01 |
| 128222 | 0.06 | 0.04 | <0.005 | <0.01 | 0.01 | 33.9 | 0.02 | <0.01 | <0.01 |
| 128201 | 0.07 | 0.09 | 0.008 | <0.01 | <0.01 | 31.6 | 0.06 | <0.01 | <0.01 |
| 128202 | 0.08 | 0.08 | <0.005 | <0.01 | <0.01 | 32.3 | 0.05 | <0.01 | <0.01 |
| 128205 | 0.13 | 0.11 | <0.005 | <0.01 | <0.01 | 28.9 | 0.09 | 0.07 | 0.01 |
| 128206 | 0.13 | 0.10 | <0.005 | <0.01 | 0.02 | 29.1 | 0.08 | 0.07 | 0.01 |
| 128209 | 0.08 | 0.10 | <0.005 | <0.01 | <0.01 | 32.2 | 0.14 | 0.02 | <0.01 |
| 128210 | 0.08 | 0.10 | <0.005 | <0.01 | <0.01 | 31.2 | 0.08 | 0.02 | <0.01 |
| 128225 | 0.10 | 0.08 | <0.005 | <0.01 | 0.01 | 32.2 | 0.06 | 0.03 | 0.01 |
| 128226 | 0.20 | 0.09 | <0.005 | <0.01 | 0.03 | 31.7 | 0.03 | 0.10 | 0.02 |
| 128227 | 0.11 | 0.07 | <0.005 | <0.01 | <0.01 | 32.2 | 0.07 | 0.05 | 0.01 |
| 128228 | 0.03 | 0.15 | <0.005 | <0.01 | <0.01 | 28.8 | 0.24 | <0.01 | <0.01 |
| 128229 | 0.17 | 0.16 | <0.005 | <0.01 | 0.01 | 28.2 | 0.09 | 0.05 | 0.02 |
| 128230 | 0.33 | 0.12 | <0.005 | <0.01 | 0.03 | 30.0 | 0.05 | 0.03 | 0.02 |
| 128231 | 0.12 | 0.07 | <0.005 | <0.01 | <0.01 | 35.1 | 0.03 | <0.01 | 0.01 |

***Please refer to the cover page for comments regarding this test report. ***

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Phone: +1-604-888-0875

To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310304**

Project Name: MS2103 All
Job Received Date: 21-Feb-2023
Job Report Date: 02-Mar-2023
Report Version: Final

| Sample ID | MET-510 Mg % 0.01 | MET-510 Mn % 0.01 | MET-510 Ni % 0.005 | MET-510 Pb % 0.01 | MET-510 S % 0.01 | MET-510 Si % 0.1 | MET-510 Sn % 0.01 | MET-510 Ti % 0.01 | MET-510 Zn % 0.01 |
|---|---|---|---|---|---|---|---|---|---|
| 128232 | 0.02 | 0.02 | <0.005 | <0.01 | <0.01 | 35.0 | <0.01 | <0.01 | <0.01 |
| 128233 | 0.02 | 0.02 | 0.006 | <0.01 | <0.01 | 31.0 | <0.01 | <0.01 | <0.01 |
| 128234 | 0.03 | 0.23 | <0.005 | 0.01 | <0.01 | 27.5 | 0.35 | 0.03 | 0.01 |
| 128235 | 0.17 | 0.13 | <0.005 | 0.01 | <0.01 | 27.5 | 0.07 | 0.15 | 0.02 |
| 128236 | 0.31 | 0.11 | <0.005 | <0.01 | <0.01 | 29.2 | 0.05 | 0.10 | 0.02 |
| 128237 | 0.13 | 0.08 | 0.008 | <0.01 | <0.01 | 33.1 | 0.05 | 0.03 | 0.02 |
| 128238 | 0.03 | 0.02 | <0.005 | <0.01 | <0.01 | 36.6 | <0.01 | <0.01 | <0.01 |
| 128239 | 0.04 | 0.02 | <0.005 | <0.01 | <0.01 | 31.6 | <0.01 | <0.01 | <0.01 |
| 128240 | 0.03 | 0.17 | <0.005 | <0.01 | <0.01 | 28.1 | 0.26 | <0.01 | <0.01 |
| 128241 | 0.16 | 0.14 | <0.005 | <0.01 | <0.01 | 27.1 | 0.10 | 0.08 | 0.02 |
| 128242 | 0.33 | 0.12 | <0.005 | <0.01 | <0.01 | 29.3 | 0.07 | 0.05 | 0.02 |
| 128243 | 0.14 | 0.09 | <0.005 | <0.01 | <0.01 | 35.9 | 0.07 | 0.01 | 0.01 |
| 128244 | 0.02 | 0.02 | <0.005 | <0.01 | <0.01 | 37.5 | <0.01 | <0.01 | <0.01 |
| 128245 | 0.02 | 0.02 | <0.005 | <0.01 | <0.01 | 32.8 | <0.01 | <0.01 | <0.01 |
| 128246 | 0.08 | 0.07 | <0.005 | <0.01 | <0.01 | 35.2 | 0.05 | 0.02 | 0.01 |
| 128247 | 0.08 | 0.05 | <0.005 | <0.01 | 0.01 | 34.9 | 0.03 | 0.03 | 0.02 |
| 128248 | 0.07 | 0.06 | <0.005 | <0.01 | <0.01 | 34.1 | 0.06 | 0.02 | <0.01 |
| DUP 128189 | 0.04 | 0.27 | <0.005 | <0.01 | <0.01 | 30.3 | 0.48 | <0.01 | <0.01 |
| STD BLANK | <0.01 | <0.01 | <0.005 | <0.01 | <0.01 | <0.1 | <0.01 | <0.01 | <0.01 |
| STD MP-1b | 0.04 | 0.06 | <0.005 | 2.10 | 13.83 | 17.1 | 1.62 | 0.07 | 17.06 |
| STD AMIS0340 | | | | | | | | | |

***Please refer to the cover page for comments regarding this test report. ***

MSALABS
Unit 1, 20120 102nd Avenue
Langley, BC V1M 4B4
Phone: +1-604-888-0875

To:
**Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

| **TEST REPORT:** | **YVR2310477** |
|---|---|

| | |
|---|---|
| Project Name: | MS2103 Floats SFAs |
| Job Received Date: | 11-Apr-2023 |
| Job Report Date: | 28-Apr-2023 |
| Number of Samples: | 9 |
| Report Version: | Final |

**COMMENTS:**

Test results reported relate to the tested samples only on an "as received" basis. Unless otherwise stated above, sufficient sample was received for the methods requested and all samples were received in acceptable condition. Analytical results in unsigned reports marked "provisional" are subject to change, pending final QC review and approval. The customer has not provided any information than can affect the validity of the test results. Please refer to MSALABS' Schedule of Services and Fees for our complete Terms and Conditions. Preliminary results are applicable when a portion of samples in a job is 100% completed and reported or 1 of a number of methods on the same job have been completed 100%. Results cannot change, but additional results or results for additional methods can be added.

| **SAMPLE PREPARATION** | |
|---|---|
| METHOD CODE | DESCRIPTION |
| MET-120 | Pulverize, 250g, to 85% passing 75µm |
| PWA-500 | Wash Pulverizer with Barren Material Between Each Sample |
| | |

| **ANALYTICAL METHODS** | |
|---|---|
| METHOD CODE | DESCRIPTION |
| MET-510 | Multi-Element, 0.15g, Sodium Peroxide Fusion, ICP-AES |
| | |

**Signature:**

Yvette Hsi, BSc.
Laboratory Manager
MSALABS

MSALABS
Unit 1, 20120 102nd Avenue
Langley, BC V1M 4B4
Phone: +1-604-888-0875

To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310477**

Project Name: MS2103 Floats SFAs
Job Received Date: 11-Apr-2023
Job Report Date: 28-Apr-2023
Report Version: Final

| Sample ID | Sample Type | MET-100 Rec. Wt. kg 0.01 | Method Analyte Units LOR | MET-510 Al % 0.01 | MET-510 As % 0.01 | MET-510 Ca % 0.05 | MET-510 Co % 0.002 | MET-510 Cr % 0.01 | MET-510 Cu % 0.005 | MET-510 Fe % 0.05 | MET-510 K % 0.1 | MET-510 Li % 0.01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 128422 | MET | 0.06 | | 6.18 | <0.01 | 0.11 | <0.002 | 0.01 | <0.005 | 0.73 | 2.4 | 0.08 |
| 128423 | MET | 0.40 | | 6.16 | <0.01 | 0.07 | <0.002 | <0.01 | <0.005 | 0.48 | 2.3 | 0.10 |
| 128424 | MET | 0.12 | | 6.48 | <0.01 | 0.07 | <0.002 | <0.01 | 0.032 | 0.59 | 2.3 | 0.14 |
| 128425 | MET | 0.40 | | 6.58 | <0.01 | 0.07 | <0.002 | <0.01 | <0.005 | 0.49 | 2.3 | 0.20 |
| 128426 | MET | 0.10 | | 7.26 | <0.01 | 0.11 | <0.002 | <0.01 | 0.011 | 0.75 | 2.3 | 0.35 |
| 128396 | MET | 0.90 | | 6.20 | <0.01 | 0.08 | <0.002 | <0.01 | <0.005 | 1.31 | 2.0 | 0.09 |
| 128397 | MET | 0.30 | | 6.09 | <0.01 | 0.09 | <0.002 | 0.01 | <0.005 | 1.04 | 2.0 | 0.13 |
| 128398 | MET | 0.02 | | 6.21 | <0.01 | 0.06 | <0.002 | <0.01 | 0.016 | 1.86 | 1.9 | 0.17 |
| 128399 | MET | 0.04 | | 6.67 | <0.01 | 0.09 | <0.002 | <0.01 | <0.005 | 1.56 | 2.0 | 0.19 |
| DUP 128399 | | | | 6.33 | <0.01 | 0.06 | <0.002 | <0.01 | <0.005 | 1.47 | 1.8 | 0.19 |
| STD BLANK | | | | <0.01 | <0.01 | <0.05 | <0.002 | <0.01 | <0.005 | <0.05 | <0.1 | <0.01 |
| STD MP-1b | | | | 3.48 | 2.18 | 2.52 | <0.002 | <0.01 | 3.096 | 8.34 | 0.1 | <0.01 |
| STD GTA-01 | | | | | | | | | | | | 0.33 |

***Please refer to the cover page for comments regarding this test report. ***

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To: **Sepro Laboratories**
**Unit 101A-9850 201 Street**
**Langley, BC, V1M 4A3**
**Canada**

**TEST REPORT: YVR2310477**

Project Name: MS2103 Floats SFAs
Job Received Date: 11-Apr-2023
Job Report Date: 28-Apr-2023
Report Version: Final

| | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 | MET-510 |
|---|---|---|---|---|---|---|---|---|---|
| | Mg | Mn | Ni | Pb | S | Si | Sn | Ti | Zn |
| | % | % | % | % | % | % | % | % | % |
| Sample ID | 0.01 | 0.01 | 0.005 | 0.01 | 0.01 | 0.1 | 0.01 | 0.01 | 0.01 |
| 128422 | 0.06 | 0.03 | <0.005 | <0.01 | <0.01 | 34.9 | 0.03 | 0.01 | <0.01 |
| 128423 | 0.06 | 0.04 | <0.005 | <0.01 | <0.01 | 32.9 | <0.01 | <0.01 | <0.01 |
| 128424 | 0.06 | 0.04 | <0.005 | <0.01 | <0.01 | 32.5 | <0.01 | <0.01 | 0.02 |
| 128425 | 0.06 | 0.04 | <0.005 | <0.01 | <0.01 | 32.2 | <0.01 | <0.01 | <0.01 |
| 128426 | 0.06 | 0.05 | <0.005 | <0.01 | <0.01 | 32.7 | <0.01 | <0.01 | <0.01 |
| 128396 | 0.05 | 0.04 | <0.005 | <0.01 | <0.01 | 34.3 | <0.01 | 0.01 | <0.01 |
| 128397 | 0.07 | 0.04 | 0.007 | <0.01 | <0.01 | 34.4 | 0.02 | 0.02 | <0.01 |
| 128398 | 0.07 | 0.05 | <0.005 | <0.01 | <0.01 | 34.6 | <0.01 | 0.02 | 0.01 |
| 128399 | 0.07 | 0.05 | <0.005 | <0.01 | <0.01 | 34.9 | <0.01 | 0.02 | <0.01 |
| DUP 128399 | 0.07 | 0.04 | <0.005 | <0.01 | <0.01 | 32.0 | <0.01 | 0.01 | <0.01 |
| STD BLANK | <0.01 | <0.01 | <0.005 | <0.01 | <0.01 | <0.1 | <0.01 | <0.01 | <0.01 |
| STD MP-1b | 0.03 | 0.06 | <0.005 | 2.12 | 13.85 | 17.0 | 1.64 | 0.08 | 16.59 |
| STD GTA-01 | | | | | | | | | |

***Please refer to the cover page for comments regarding this test report. ***

# Appendix E

# Sample Receiveing Log

# MS2103 Tantalex

101B - 9850 -20 St · Langley, BC · CANADA · V1M 4A3
tel: 604-888-7604 · fax: 604-888-5521 · labs.seprosystems.com

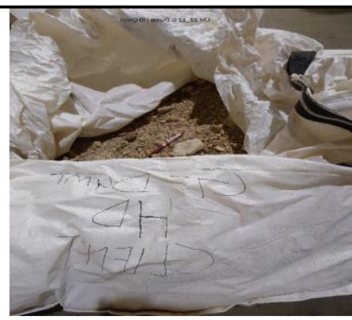
# SAMPLE RECEIVING LOG SHEET

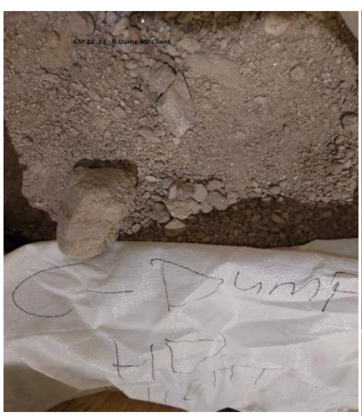
| | | | |
|---|---|---|---|
| **Company:** | CoreMet Mineral Processing | **Courier:** | DHL |
| **Project No:** | MS2103 | **Date:** | Jan 25 2023 |
| **Receiver:** | Daniel | **Page:** | |

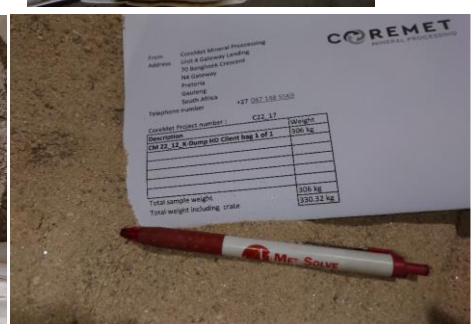
| Count | Sample Label | Container Type | Sample Type (C, R, P, Sl, S) | Wet/ Dry | Top Size | Weight ( kg ) |
|---|---|---|---|---|---|---|
| 1 | CM 22_12_K-Dump HD Client | Tote | P | Moist | 5mm | 306.00 |
| 2 | CM 22_12_C-Dump HD Client | Tote | R | D | 5" | 222.00 |
| 3 | CM 22_12_G-Dump HD Client | Tote | R | D | 3" | 222.00 |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| Note : | | | | | | **750.00** |

**C**ore, **R**eject, **P**ulp, **Sl**urry, **S**olution

Picture:








# Appendix C: Testing Results SGS Flotation

**An Investigation into**

**SCOPING LEVEL FLOTATION TESTWORK ON SPODUMENE DMS PRODUCTS FROM**

**TANTALEX MANONO TAILINGS**

prepared for

**NOVOPRO**

Project 19680-01 – Final Report
June 14, 2023

NOTES



SGS Canada Inc. | P.O. Box 4300, 185 Concession Street, Lakefield, Ontario, Canada K0L 2H0
Tel: (705) 652-2000 Fax: (705) 652-6365 www.met.sgs.com www.ca.sgs.com
Member of the SGS Group (SGS SA)

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# Executive Summary

Samples from the Tantalex Manono tailings were received at SGS Lakefield for a scoping level flotation testwork program on spodumene DMS product (G-dump, K-dump). The DMS fine fractions were screened out from the DMS feed, inventoried, and split into representative 1 kg and 10 kg charges, while the DMS middlings samples were crushed to -6 mesh (-3.35 mm) and then prepared for testwork. The fine fraction from each of the two tailings dumps were tested with froth flotation prior to flotation tests using the DMS middlings or the combined DMS middlings and fine fraction. The final confirmatory flotation tests were conducted on a Composite sample prepared from the DMS fines and DMS middlings products. This program included sample preparation, head sample characterization, stage grinding, and flotation testing.

The objective of the program was to provide a preliminary indication of lithium beneficiation performance by flotation from spodumene-bearing DMS products from the Tantalex Manono Tailings. The metallurgical target was the production of spodumene concentrate grading > 6% $Li_2O$ and < 1% $Fe_2O_3$, while maximizing lithium recovery.

The assays of the DMS products are summarized in Table I. The G-dump fines assayed 0.43% $Li_2O$, while the K-dump fines contained 0.97% $Li_2O$. The grade of the DMS middling products was higher than both of the fine fractions, showing 3.20% $Li_2O$ in the G-dump middlings and 2.62% $Li_2O$ in the K-dump middlings. The G-dump DMS products had much higher $Fe_2O_3$ grade than the K-dump DMS products.

**Table I: Summary of Head Assay Results**

| Sample ID | Assays % | |
|---|---|---|
| | $Li_2O$ | $Fe_2O_3$ |
| DMS Fine G-Dump | 0.43 | 3.54 |
| DMS Fine K-Dump | 0.97 | 0.87 |
| DMS Mid. G-Dump | 3.20 | 8.93 |
| DMS Mid. K-Dump | 2.62 | 0.67 |

Stage-grinding was performed on each DMS product to a top size of 300 µm. The stage-ground sample was split into representative samples used for flotation testwork that included gravity separation, magnetic separation, and desliming.

The final flotation concentrate results of each test are presented in Figure I: . The final concentrates from the G-dump fines (F1 and F5) graded under the target, at < 4% $Li_2O$ with a low lithium recovery < 40%, while the G-dump middlings were able to produce an on-spec concentrate > 6% $Li_2O$ with > 60% lithium recovery. Flotation tests on the K-dump fines (F2) and the combined K-dump products (F4 and F6) produced, a concentrate grading > 6% $Li_2O$ with lithium recoveries around 60% or greater. It was determined that Knelson gravity separation was not required for the K-dump products. Flotation tests with the Composite sample (F7 and F8) showed good flotation performance of 64% to 68% lithium recovery and a concentrate grading > 6% $Li_2O$ when mica pre-flotation was included with the Composite sample.

The results of this flotation testwork program revealed that spodumene concentrates grading over the 6% $Li_2O$ target with reasonable lithium recovery can be produced from the DMS products from the Tantalex Manono Tailings. Processing only G-dump fines material may present challenges; thus, it is recommended to combine the middlings and fines fractions to improve lithium recovery and $Li_2O$ grade or consider the G-dump fines as waste material.

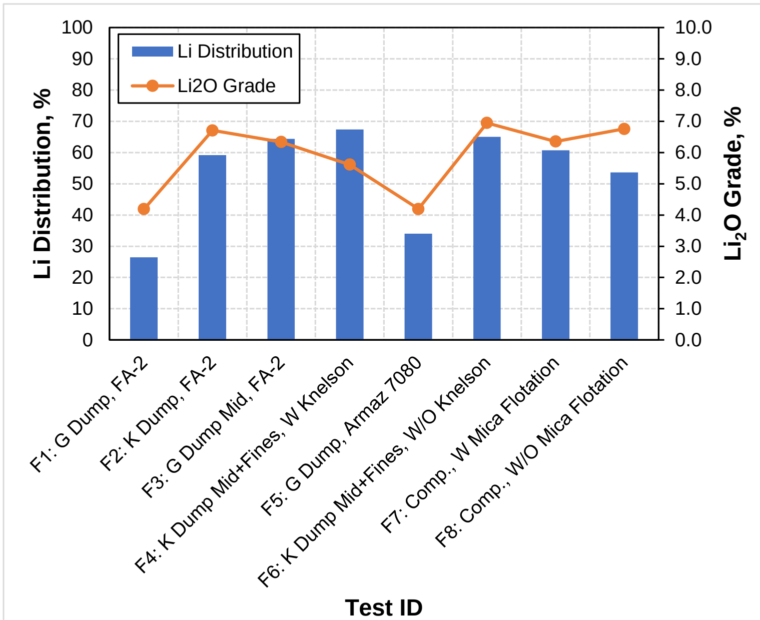


**Figure I: Summary of the Final Concentrate Results**

# *Introduction*

Mr. Anton Wolf from Novopro contacted SGS Lakefield in January, 2023 with a request for scoping level flotation testwork on spodumene DMS products from the Tantalex Manono Tailings.

The main objective of this testwork program was to provide a preliminary indication of potential lithium beneficiation by flotation from a spodumene DMS product from the Tantalex Manono Tailings. The scope of the testwork program was similar to the original scope proposed by Novopro, with modifications made by SGS based on SGS's experience with similar spodumene projects. The scope of work included sample preparation, head sample characterization, mineralogy analysis, stage grinding, gravity separation, magnetic separation, and flotation. The metallurgical objective was to produce spodumene concentrate grading > 6% $Li_2O$ and < 1% $Fe_2O_3$ at maximum lithium recovery.

All testwork was conducted in close consultation with Mr. Anton Wolf through emails and telephone calls, and all results were provided to him as soon as they became available.

Aghamirian

Massoud Aghamirian, Ph.D.
Principal Metallurgist, Mineral Processing

Dan Imeson, M.Sc.
Manager, Mineral Processing

*Experimental work by: Dan Lang, Tracey McNeil*
*Report preparation by: Sugyeong Lee, Brian K. Cook, Massoud Aghamirian*
*Reviewed by: Curtis Mohns, Cheryl Mina, Dan Imeson*

# *Testwork Summary*

## 1. Sample Receipt and Sample Preparation

### 1.1. Sample Receipt

Two shipments were received at the SGS Lakefield site. The first shipment consisted of the DMS fines fractions from G-dump and K-dump and was assigned the internal receipt number 0201-FEB23. The DMS fines fraction from the G-dump totalled 23.1 kg in 2 pails, while the DMS fines fraction from K-dump weighed a total of 45.6 kg in 3 pails. The DMS middlings samples (DMS SG 2.95 Float) from the G-dump and the K-dump arrived in 1 pail in the second shipment which was assigned an internal receipt number of 0129-MAR23 (Figure 1). The weights of the middlings samples were 11.8 kg and 5.3 kg, respectively.


**Figure 1: As-received DMS Middlings Samples from G-dump (Left) and K-dump (Right)**

### 1.2. Sample Preparation

1.2.1. DMS Fine Fractions

The DMS fines fractions from the first shipment were inventoried, then prepared for sample characterization and testwork (Figure 2). Each sample was homogenized before a 6 kg subsample was taken, and split into 1 kg charges, with one charge selected for chemical analysis and particle size analysis. The remainder was split into 10 kg charges to be used for flotation testwork.

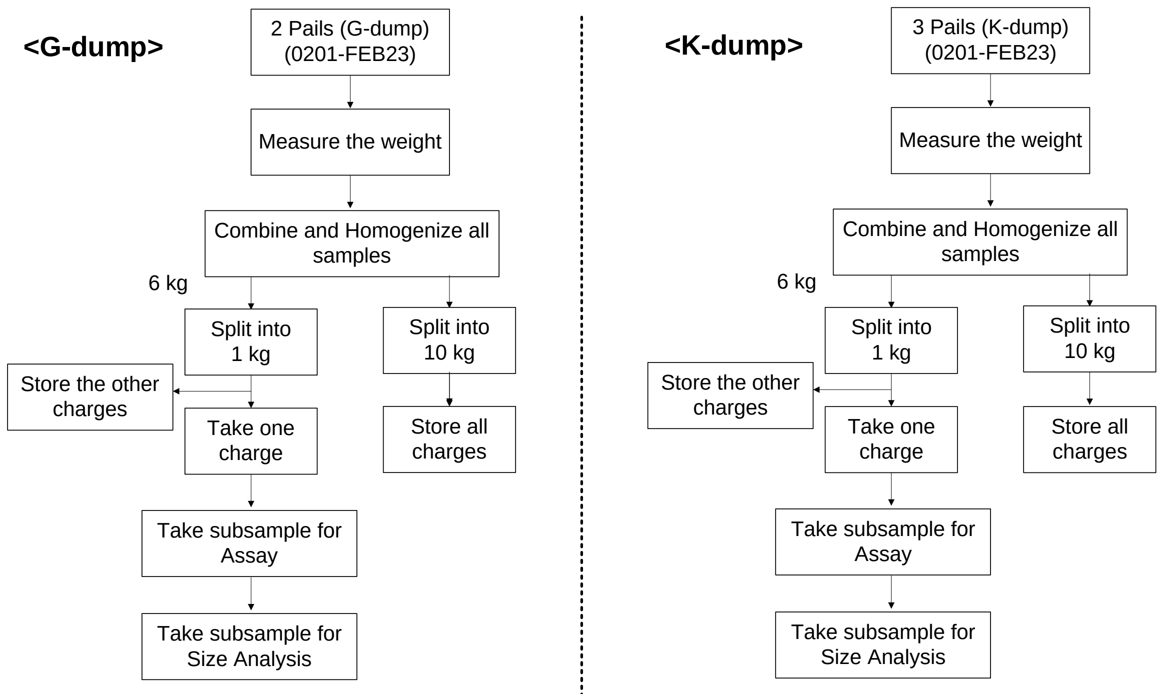


**Figure 2: Sample Preparation Flowsheet for the DMS Fines Fractions**

### 1.2.2. DMS Middlings

The DMS middlings samples in the second shipment were weighed upon receipt, then stage-crushed to -6 mesh (-3.35 mm) (Figure 3). A 1 kg subsample was taken for chemical analysis and the remainder was stored for future flotation testwork.

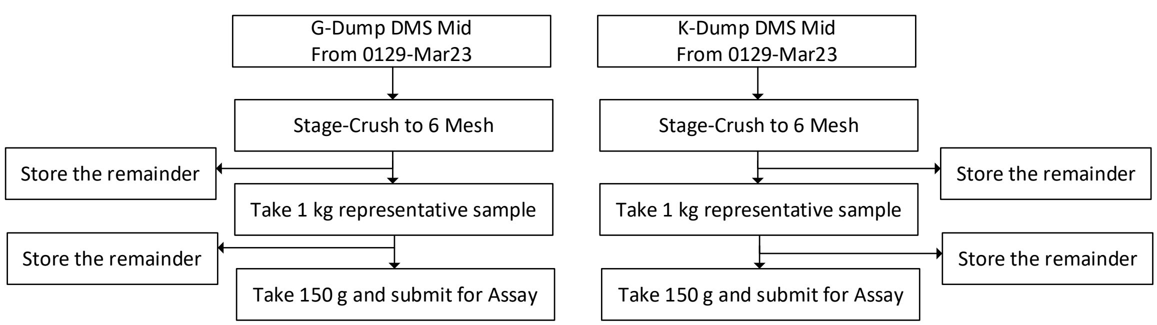


**Figure 3: Sample Preparation Flowsheet for the DMS Middlings**

## 2. Sample Characterization

As-received samples were analyzed for whole rock analysis (WRA), Li, and Sn assays. The $Li_2O$ grades of the DMS fines fractions from the G-dump and the K-dump were 0.43% $Li_2O$ and 0.97% $Li_2O$, respectively (Table 1). The G-dump DMS fines with the lowest low $Li_2O$ grade also had a higher $Fe_2O_3$ grade of 3.54%, while the K-dump DMS fines only had 0.87% $Fe_2O_3$. The as-received particle size of the K-dump fines had a $K_{80}$ of 333 µm while the G-dump fines was finer with a $K_{80}$ of 284 µm (Figure 4). As somewhat anticipated from DMS operations, the DMS middlings samples had higher $Li_2O$ assays than the DMS fines fractions. The G-dump and K-dump middlings graded 3.20% $Li_2O$ and 2.62% $Li_2O$, respectively, and the iron contents followed a similar trend to the fines fraction with 8.93% $Fe_2O_3$ and 0.67% $Fe_2O_3$ in the G-dump and K-dump middlings, respectively.

**Table 1: $Li_2O$, $SnO_2$ and Whole Rock Analysis (WRA) Results**

| Sample ID | Assays % | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | $Cr_2O_3$ | $V_2O_5$ | LOI | Sum | $SnO_2$ |
| DMS Fine G-Dump | 0.20 | 0.43 | 68.1 | 16.8 | 3.54 | 0.30 | 0.13 | 3.76 | 2.62 | 0.18 | 0.12 | 0.12 | < 0.01 | < 0.01 | 2.64 | 98.3 | 0.11 |
| DMS Fine K-Dump | 0.45 | 0.97 | 72.8 | 15.9 | 0.87 | 0.15 | 0.15 | 3.87 | 2.65 | 0.07 | 0.15 | 0.10 | < 0.01 | < 0.01 | 1.31 | 98.0 | 0.09 |
| DMS Mid. G-Dump | 1.22 | 3.20 | 64.4 | 17.4 | 8.93 | 0.23 | 0.14 | 1.38 | 1.49 | 0.13 | 0.10 | 0.10 | 0.03 | 0.02 | 2.71 | 97.1 | - |
| DMS Mid. K-Dump | 1.49 | 2.62 | 71.2 | 19.1 | 0.67 | 0.10 | 0.12 | 2.18 | 1.86 | 0.02 | 0.11 | 0.10 | < 0.01 | < 0.01 | 0.92 | 96.4 | - |

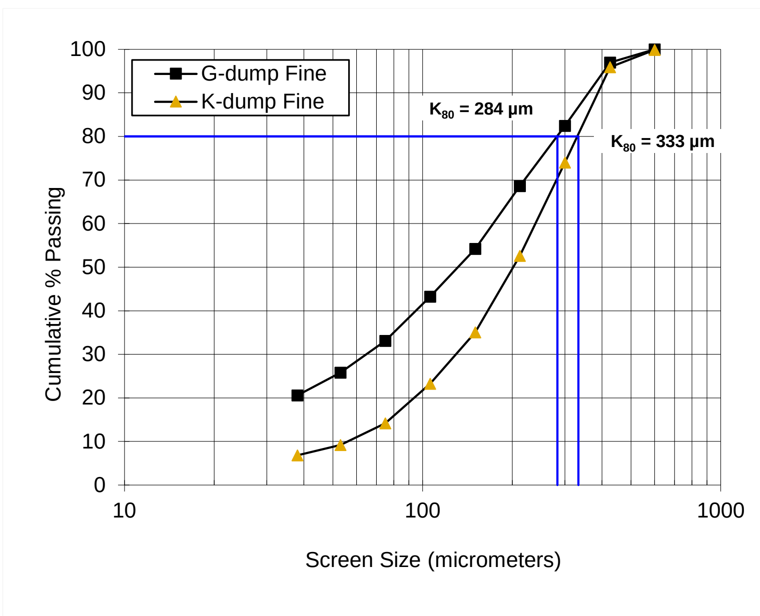


**Figure 4: Particle Size Distribution – G-dump Fines and K-dump Fines Samples**

# 3. Flotation Testwork

The flotation tests performed on the DMS products from the G-dump and K-dump sites included desliming, magnetic separation, and gravity separation. Gravity separation was performed using a Knelson Separator to separate tin as by-product prior to flotation testing. Results are summarized in Table 12 and the detailed flotation test conditions and results are provided in Appendix A.

## 3.1. Stage Grinding

Stage grinding was required to reduce the particle size of the feed sample for flotation. Prior to grinding, each sample was screened at 300 µm to remove the finer particles, then the oversize material was ground in a rod mill. Fourteen kilogram charges from each of the G-dump and K-dump fines samples were subjected to stage grinding which resulted in a $K_{80}$ of 185 µm and 218 µm, respectively (Figure 5). Due to the limited amount of the DMS middlings, only 5 kg from the G-dump and 2 kg from the K-dump were used for stage grinding.

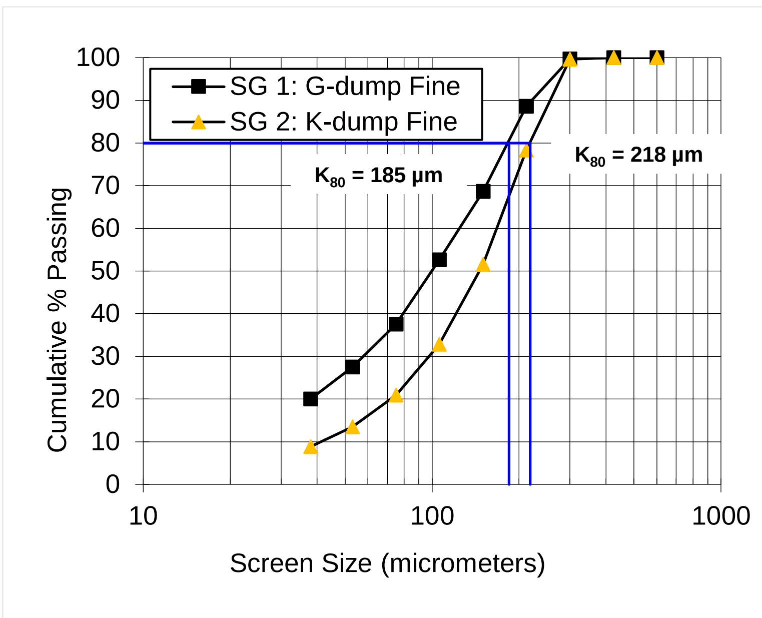


**Figure 5: Particle Size Distribution on the SG 1 and the SG 2**

## 3.2. Reagent Overview

All reagents used in the flotation testwork are described in Table 2, and their corresponding SDS's are provided in Appendix B. The primary spodumene flotation collectors were FA-2 and Armaz 7080, while the reagents used for mica pre-flotation were Armac T and EDA. Dilute NaOH and $Na_2CO_3$ (5% w/w) were used to modify and control the pH during flotation testwork.

**Table 2: Reagents for Flotation**

| Reagent | Manufacturer | Purpose |
|---|---|---|
| NaOH | - | pH modifier |
| $Na_2CO_3$ | - | pH modifier |
| MIBC | - | Frother |
| W55 | Indorama | Frother |
| Armac T | Nouryon | Mica Collector |
| EDA | Clariant | Mica Collector |
| F220 | Pionera | Dispersant |
| FA-2 | Kraton | Spodumene Collector |
| Armaz 7080 | Arkema | Spodumene Collector |

### 3.3. Test Results on the G-dump Fines (SG1)

Flotation tests F1 and F5 were performed on the stage-ground G-dump fines samples (SG1). The stage-ground sample was first deslimed with a cyclone, then passed through a low intensity magnetic separator (LIMS). Next, a second desliming stage was performed on the LIMS non-magnetics and the product was sent to a Knelson Separator and a wet high intensity magnetic separator (WHIMS) to reject high density and iron-bearing particles that would contaminate the spodumene concentrate. The WHIMS non-magnetic product was sent to the flotation circuit, as shown in Figure 6. Test F5 included passing the lithium 2$^{nd}$ cleaner concentrate through a final WHIMS stage.

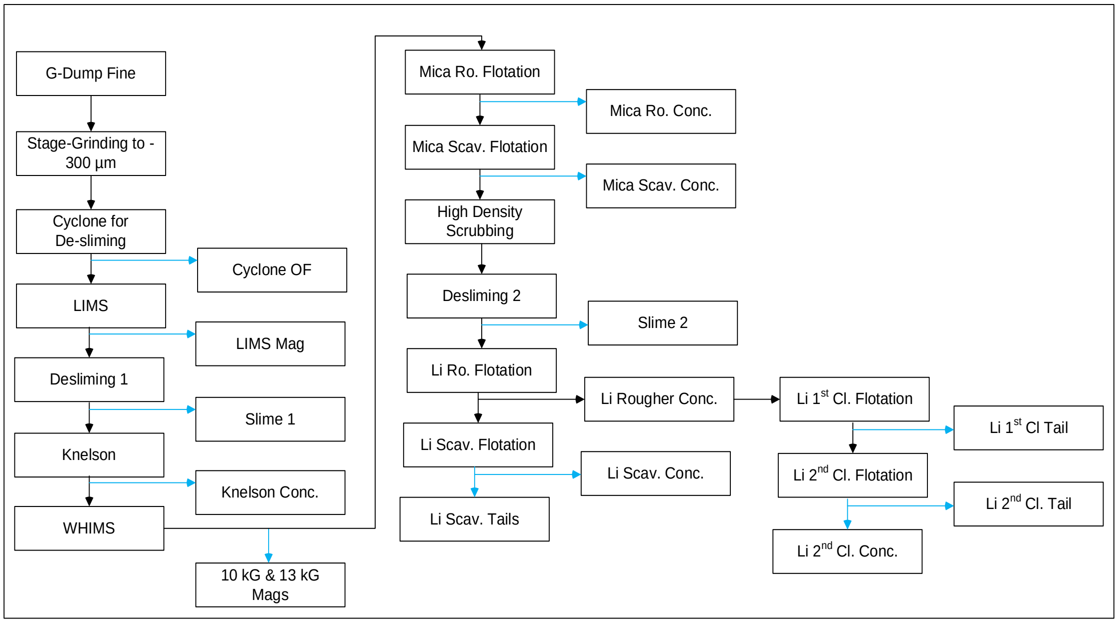


**Figure 6: Flotation Test Flowsheet – Tests F1 and F5**

The two flotation tests were carried out following test conditions in Table 3. The major differences were the use of EDA and Armaz 7080 as the mica and spodumene collectors, respectively, in test F5. The flotation results in Figure 7 revealed that test F5 exhibited better selectivity than test F1 with similar final recoveries. This may be attributed to the performance of the different collector types used in F5 and/or lower dosage of collector in test F5. In addition, as WHIMS was performed on the final F5 concentrate, the grade was further improved from 3.40% $Li_2O$ to 4.11% $Li_2O$; however, this was still well under the metallurgical target grade of 6% $Li_2O$.

**Table 3: Flotation Test Conditions – Tests F1 and F5**

| Test # | | F1 | F5 |
|---|---|---|---|
| Mica Flotation | Collector Type | Armac T | EDA |
| | Ro, g/t | 20 | 10 |
| | Scav 1, g/t | 10 | 10 |
| | Scav 2, g/t | 45 | 10 |
| | Scav 3, g/t | 45 | - |
| Li Flotation | Collector Type | FA-2 | Armaz 7080 |
| | Ro, g/t | 450 | 250 |
| | Scav 1, g/t | 150 | 100 |
| | 1st Cl, g/t | 25 | 10 |
| | 2nd Cl, g/t | 10 | - |

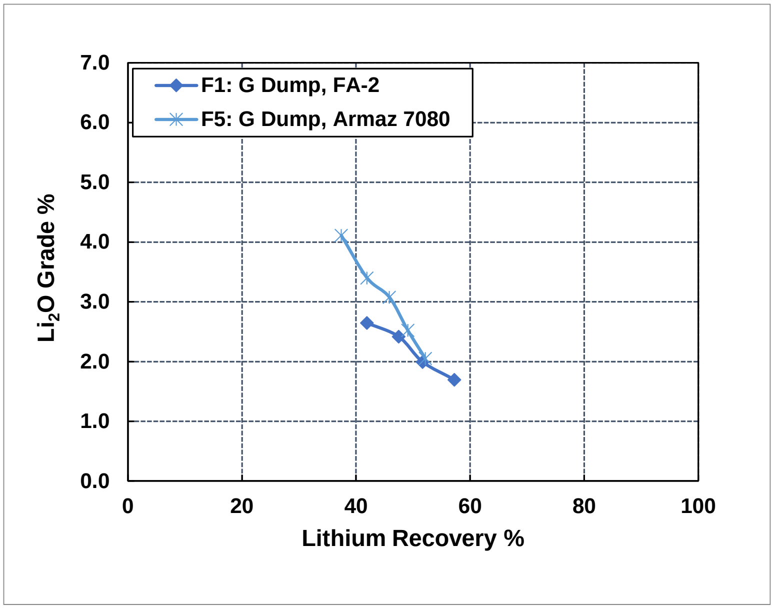


**Figure 7: Lithium Flotation Test Results (F1 and F5)**

Test F5 resulted in a lower lithium recovery than test F1, mainly as a result of losses to the WHIMS magnetic products and higher lithium losses in the mica pre-flotation stage. This indicates that EDA was a stronger collector than Armac T and was able to improve mica rejection; however, EDA also recovered more lithium than Armac T which lowered the lithium distribution of the spodumene flotation feed. It was confirmed that the target grade of 6% $Li_2O$ with a sufficient lithium recovery could not be achieved from the G-dump fines sample by flotation, most likely due to its low head grade of 0.43% $Li_2O$.

3.3.1. X-Ray Diffraction Analysis of Flotation Products

X-ray diffraction (XRD) analysis was performed on the flotation feed SG1 (after LIMS), which was used for tests F1 and F5 (Table 4). The primary lithium-bearing mineral was spodumene, but it only comprised 5.4% of the total sample weight. The main gangue minerals were albite (32.4%) and quartz (31.6%) as well as minor amounts of microcline (9.2%) and muscovite (9.0%). Several other iron-bearing minerals (schorl, siderite, and chlorite) and kaolinite remained in the G-dump fines fraction after LIMS. Although the flotation performance was improved from test F1 to test F5, the lithium grade in the final concentrate was still insufficient. Additional XRD analyses were performed on the selected F5 flotation products (Table 4). The final concentrate contained 49.9% spodumene and 31.5% quartz as the primary gangue minerals. Further mineralogy investigation would be required to show if this is due to poor liberation between spodumene and quartz and if finer grinding could improve the flotation spodumene concentrate grade. Compared to the flotation feed, the albite content was successfully reduced from 32.4% to 4.9%; however, there was very little difference in quartz and schorl contents. The magnetic concentrate from the flotation feed showed that most iron associated minerals (goethite, chlorite) were removed by wet high intensity magnetic separator (WHIMS). The final flotation concentrate from test F5 contained 2.2% muscovite. The reduced muscovite could be attributed to rejection of mica by mica pre-flotation and/or WHIMS (21.3% muscovite in the combined Mag 13 k). The mineralogy analysis on the concentrate and the flotation feed indicated the largest causes of the low $Li_2O$ grade in the final concentrate was attributed to quartz and to a lesser extent albite and schorl. It is possible spodumene could be still associated with these gangue minerals in the flotation feed in these tests at a $K_{80}$ of 185 µm. To investigation further, additional mineral liberation analysis is required, but it was not included in this program. Additionally, these findings indicate the existence of boron in the ore, as schorl, necessitating an assessment of its potential worth as a secondary product.

**Table 4: XRD Analysis Result on the Stage-ground G-dump LIMS Non-magnetic Product and the Flotation Products (Test F5)**

| Mineral | Composition | SG1 LIMS Non-Mag (wt %) | F5 Li 2nd Cl Conc Non-mag (wt %) | F5 Combined Mag 13k (wt %) |
|---|---|---|---|---|
| Spodumene | $LiAlSi_2O_6$ | 5.4 | 49.9 | 4.4 |
| Quartz | $SiO_2$ | 31.6 | 31.5 | 14.3 |
| Albite | $NaAlSi_3O_8$ | 32.4 | 4.9 | 19.1 |
| Microcline | $KAlSi_3O_8$ | 9.2 | - | - |
| Muscovite | $KAl_2(AlSi_3O_{10})(OH)_2$ | 9.0 | 2.2 | 21.3 |
| Schorl | $NaFe_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$ | 4.2 | 4.6 | 16.1 |
| Goethite | $\alpha FeO{\cdot}OH$ | - | 0.7 | 14.3 |
| Kaolinite | $Al_2Si_2O_5(OH)_4$ | 3.8 | - | - |
| Chlorite | $(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$ | 1.6 | - | 3.7 |
| Orthoclase | $KAlSi_3O_8$ | - | 1 | 2.6 |
| Beryl | $Be_3Al_2(Si_6O_{18})$ | - | 2.1 | - |
| Hematite | $Fe_2O_3$ | - | - | 1.7 |
| Andalusite | $Al_2SiO_5$ | - | 1.6 | - |
| Pyrite | $FeS_2$ | - | 0.4 | 0.8 |
| Siderite | $FeCO_3$ | 2.7 | - | - |
| Rutile | $TiO_2$ | - | 0.3 | 0.9 |
| Calcite | $CaCO_3$ | - | 0.8 | 0.6 |
| Total | | 99.9 | 100 | 99.8 |

### 3.4. Test Results on the K-dump Fines (SG2)

The flotation test (F2) performed on the stage-ground DMS fines fraction from the K-dump (SG2) followed the same procedure as presented Figure 6. The detailed test conditions are shown in Table 5.

**Table 5: Flotation Test Conditions – Test F2**

| Test # | | F2 |
|---|---|---|
| Mica Flotation | Collector Type | Armac T |
| | Ro, g/t | 20 |
| | Scav 1, g/t | 10 |
| | Scav 2, g/t | 45 |
| | Scav 3, g/t | 45 |
| Li Flotation | Collector Type | FA-2 |
| | Ro, g/t | 350 |
| | Scav 1, g/t | 150 |
| | 1st Cl, g/t | 25 |
| | 2nd Cl, g/t | 10 |

The final concentrate graded 5.92% $Li_2O$ with 67.1% lithium recovery which was very close to the metallurgical target grade of 6% $Li_2O$ with a lithium distribution of 65% (Figure 8). It is possible that if WHIMS is performed on the 2nd cleaner concentrate, the $Li_2O$ assay could be improved with minimal lithium losses.

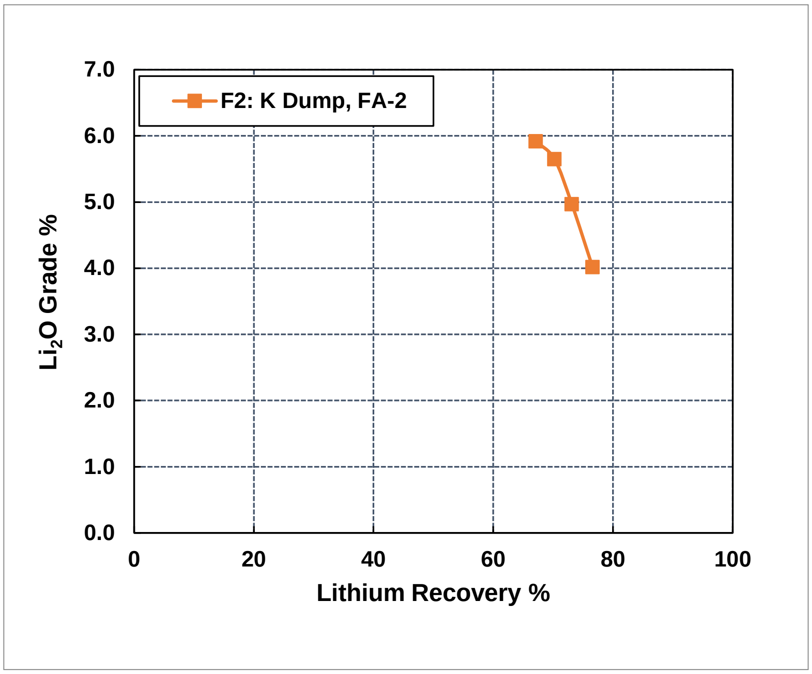


**Figure 8: $Li_2O$ Grade vs. Lithium Recovery – Test F2 on the K-dump DMS Fines Fractions**

### 3.5. Test Results on the G-dump Middlings (SG3)

The flotation test (F3) with the DMS middlings from the G-dump also followed the same flowsheet in Figure 6, but with the addition of WHIMS on the 2nd cleaner concentrate. The reagent dosages and types used are described in Table 6.

**Table 6: Flotation Test Conditions - Test F3**

| Test # | | F3 |
|---|---|---|
| Mica Flotation | Collector Type | Armac T |
| | Ro, g/t | 55 |
| | Scav 1, g/t | 40 |
| | Scav 2, g/t | - |
| | Scav 3, g/t | - |
| Li Flotation | Collector Type | FA-2 |
| | Ro, g/t | 500 |
| | Scav 1, g/t | 150 |
| | 1st Cl, g/t | 25 |
| | 2nd Cl, g/t | - |

The non-magnetic lithium 2nd cleaner concentrate after WHIMS had a high $Li_2O$ grade of 6.44% $Li_2O$ with good lithium recovery at 63.3% (Figure 9). It is worth noting that the target $Li_2O$ grade was already achieved after the 1st cleaner flotation stage, generating a grade of 6.0% $Li_2O$ at a lithium recovery around 69%. Compared with the G-dump fines fraction, the G-dump DMS middlings contained a much higher $Li_2O$ grade, which ultimately led to better flotation performance.

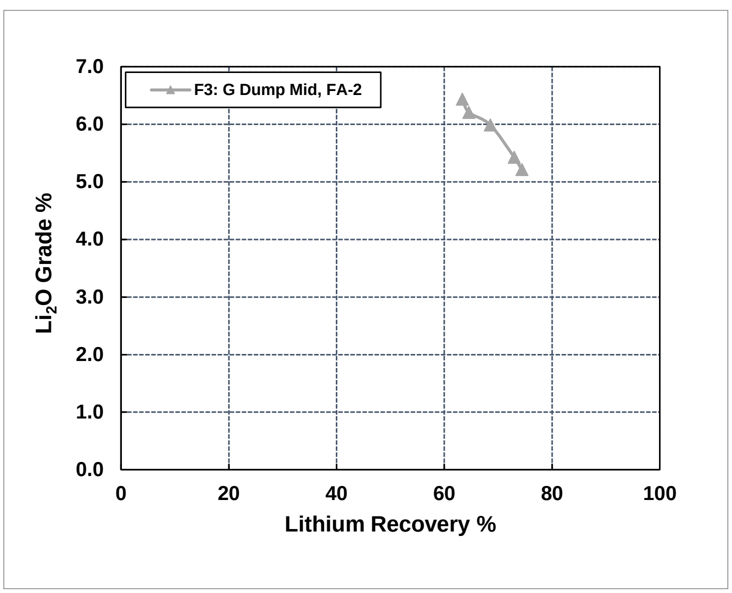


**Figure 9: $Li_2O$ Grade vs. Lithium Recovery – Test F3 on the G-dump DMS Middlings**

Tests F1 and F5 indicated that flotation on the G-dump fines fraction might be not feasible due to its poor performance. However, flotation on the G-dump middlings was able to achieve the desired concentrate $Li_2O$ grade with sufficient lithium recovery.

It was observed during stage-grinding of the G-dump DMS middlings that the screen oversize contained high amounts of spodumene and appeared to get enriched after each grinding stage. This suggests that spodumene tended to deport to the coarse fraction of this material and was more resistant to grinding. To further investigate this, sieve fractional analysis was performed on the G-dump DMS middlings (crushed to -6 mesh) to determine the $Li_2O$ deportments to different fractions. The higher deportment of spodumene to the coarser fractions (+0.85 mm and -0.85 +0.50 mm) is clearly shown in Figure 10. In addition, as the fraction size decreased from -0.85/+0.5 mm to -106 µm, the $Li_2O$ grade was reduced from 2.95% $Li_2O$ to 1.38% $Li_2O$. This might help to explain the low $Li_2O$ grade in the DMS fines fraction from the G-dump.

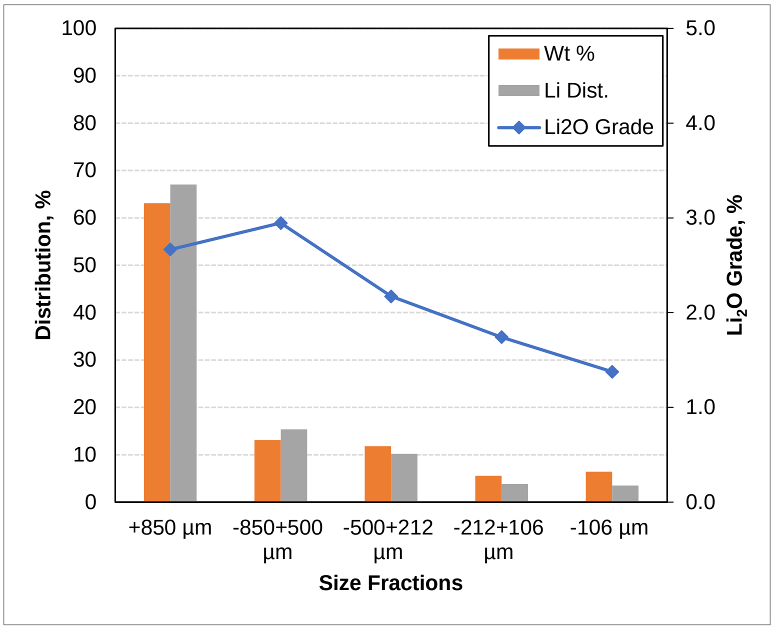


**Figure 10: Size Fractional Analysis Results - G-dump DMS Middlings (100% passing 6 Mesh (3.35 mm)**

### 3.6. Test Results on the Combined K-dump Middlings (SG4) and Fines (SG2)

Only 2 kg of the K-dump DMS middlings was stage-ground due to the low amount of the sample. A 350 g portion of the K-dump middlings and a 1750 g portion of the K-dump fines were combined to evaluate flotation performance on a blended sample. The flotation flowsheet was consistent with the previous flotation tests. However, in test F6, Knelson separation was omitted to evaluate the need for gravity separation. The detailed flotation conditions are provided in Table 7.

**Table 7: Flotation Test Conditions – Tests F4 and F6**

| Test # | | F4 | F6 |
|---|---|---|---|
| Mica Flotation | Collector Type | Armac T | Armac T |
| | Ro, g/t | 55 | 25 |
| | Scav 1, g/t | 30 | 15 |
| | Scav 2, g/t | 20 | - |
| | Scav 3, g/t | - | - |
| Li Flotation | Collector Type | FA-2 | FA-2 |
| | Ro, g/t | 350 | 450 |
| | Scav 1, g/t | 150 | 150 |
| | 1st Cl, g/t | 25 | 150 |
| | 2nd Cl, g/t | 10 | 25+10 |

Without Knelson separation, the lithium recovery increased from test F4 to F6 but the $Li_2O$ grade was slightly reduced, as shown in Figure 11. In test F4, the Knelson concentrate graded 2.48% $Li_2O$ with 6.4% of the lithium distribution. The use of the Knelson potentially aids in the elimination of gangue minerals and can help facilitate the production of a higher grade spodumene concentrate. However, without Knelson separation it was still possible to achieve the target grade of 6% $Li_2O$ with a higher lithium recovery of 69.5% in test F6. Thus, if the recovery of tin as by-product is not the primary objective in this operation, Knelson separation can be omitted.

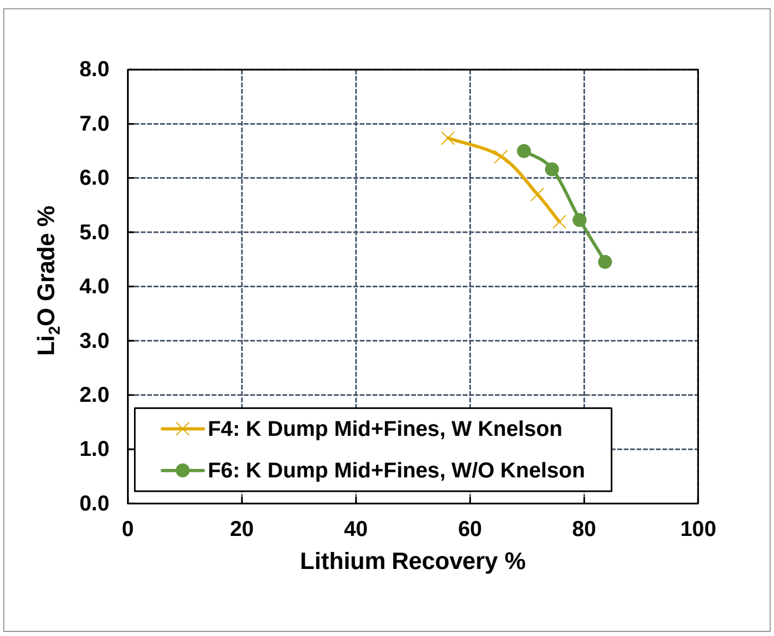


**Figure 11: $Li_2O$ Grade vs. Lithium Recovery – Tests F4 and F6 on the K-dump DMS Middlings with and without Knelson Separator**

### 3.7. Knelson Separation on the Flotation Feed

As illustrated in Figure 6, Knelson separation was performed on stage-ground sample to separate tin as a by-product. The Knelson concentrate from each sample consisted of 1.4 - 2.8% $SnO_2$ and 1.0 - 2.9% $Li_2O$ (Table 8). The DMS fines fraction consisted of 0.11% $SnO_2$ (G-dump fine) and 0.09% $SnO_2$ (K-dump fine). Compared with the feed, through Knelson separation, tin was concentrated 14 - 17 times. However, the Knelson concentrate also contained a high grade of $Li_2O$, resulting in 3.7% (F3) to 8.0% (F2) lithium loss in the Knelson concentrate. The lithium into the Knelson concentrate could be associated with tin minerals and/or spodumene could be concentrated due to its association with tin. For further investigation, additional mineralogy analysis on the Knelson concentrate and optimization of Knelson separation would be required. Tin assaying was performed on the Knelson concentrate and the DMS fines fractions, thus the tin distribution was excluded in Table 8.

**Table 8: Knelson Concentrate Results – Test F1, F2, F3, F4**

| Sample ID | Weight | | Assay % | |
|---|---|---|---|---|
| | g | % | $Li_2O$ | $SnO_2$ |
| F1 Knelson Conc | 72.2 | 3.2 | 0.97 | 1.49 |
| F2 Knelson Conc | 72.9 | 3.0 | 2.15 | 1.57 |
| F3 Knelson Conc | 71.5 | 3.4 | 2.90 | 2.78 |
| F4 Knelson Conc | 68.1 | 3.2 | 2.47 | 1.44 |

### 3.8. Test Results on the Composite Sample

Two tests were completed on composite samples. The composite sample used in the final two flotation tests was prepared from all the DMS fines fractions and DMS middlings samples as shown in Table 9. The material that was previously stage-ground for flotation testwork from each of the four samples was combined, homogenized, and split into representative charges for flotation. The calculated grade of the Composite sample was 1.31% $Li_2O$ and 1.72% $Fe_2O_3$ (Table 10).

**Table 9: Sample Weight for Composite Sample Preparation**

| Sample | Wt., g | Wt., % |
|---|---|---|
| G Dump, DMS Fine SG1 | 560 | 13.3 |
| G Dump, Mid, SG3 | 280 | 6.7 |
| K Dump, DMS Fine SG2 | 2800 | 66.7 |
| K Dump, Mid, SG4 | 560 | 13.3 |
| Total | 4200 | 100 |

**Table 10: Calculated Assays of the Composite Sample**

| Sample ID | Assays % | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO |
| Composite (Calc.) | 0.61 | 1.31 | 72.3 | 16.2 | 1.72 | 0.16 | 0.14 | 3.55 | 2.56 | 0.14 | 0.13 | 0.10 |

As with the previous tests, the sample was passed through desliming and WHIMS, then sent to the flotation circuit; however, the Knelson separation stage was omitted. Mica flotation was performed in test F7 (Figure 12) but was removed in test F8 to investigate the effect of mica flotation (Figure 13). The flotation test conditions for test F7 and F8 are described in Table 11.

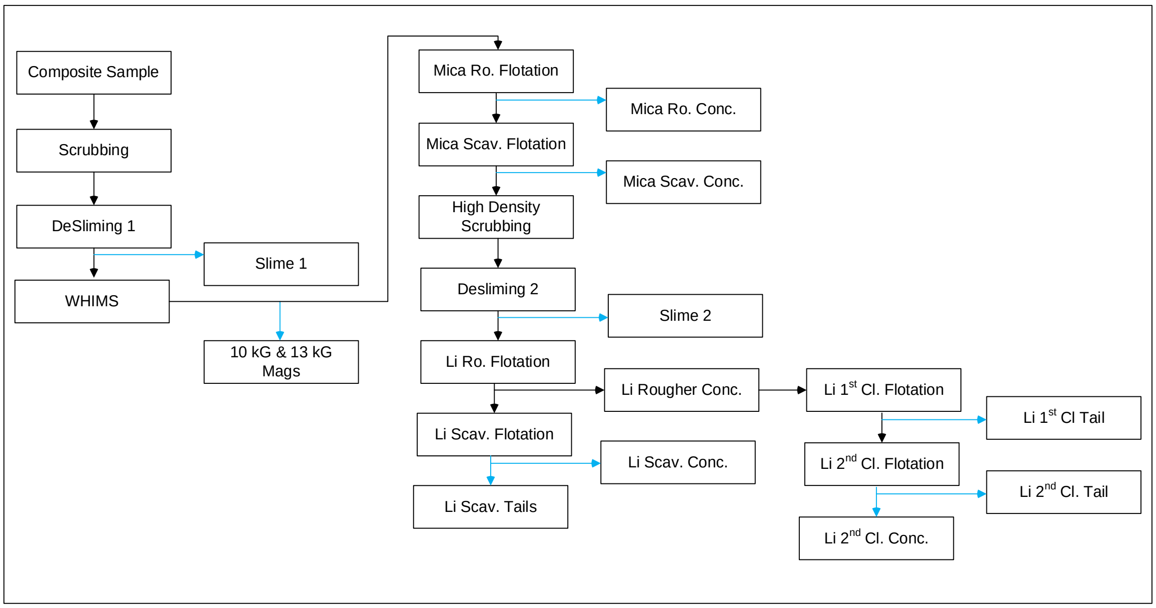


**Figure 12: Flotation Test Flowsheet – Test F7**

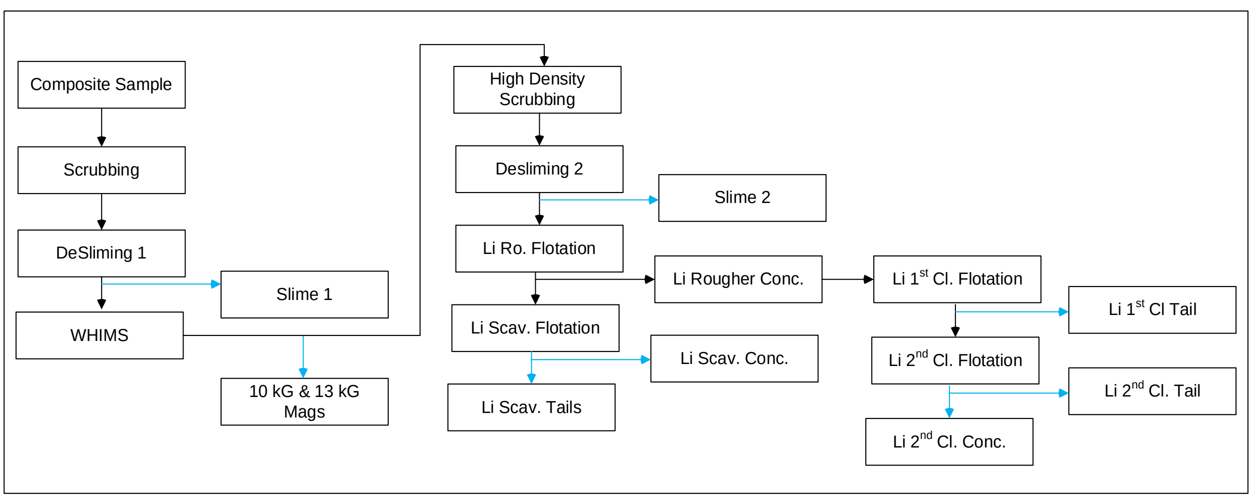


**Figure 13: Flotation Test Flowsheet – Test F8**

**Table 11: Flotation Test Conditions – Tests F7 and F8**

| Test # | | F7 | F8 |
|---|---|---|---|
| Mica Flotation | Collector Type | Armac T | - |
| | Ro, g/t | 25 | - |
| | Scav 1, g/t | 15 | - |
| | Scav 2, g/t | 15 | - |
| | Scav 3, g/t | - | - |
| Li Flotation | Collector Type | FA-2 | FA-2 |
| | Ro, g/t | 450 | 450 |
| | Scav 1, g/t | 150 | 150 |
| | 1st Cl, g/t | 25 | 25 |
| | 2nd Cl, g/t | 10 | 10 |

The effect of mica flotation was clear from the flotation tests with the Composite sample. In Test F7, the use of mica flotation resulted in higher $Li_2O$ grade but at slightly lower lithium recovery than test F8 without mica flotation (Figure 14). Test F8 resulted in higher lithium recovery than test F7, but F7 had higher lithium recovery at same concentrate grade. This confirmed that mica pre-flotation was required for selective spodumene flotation with the Composite sample and would ensure production of a higher concentrate $Li_2O$ grade.

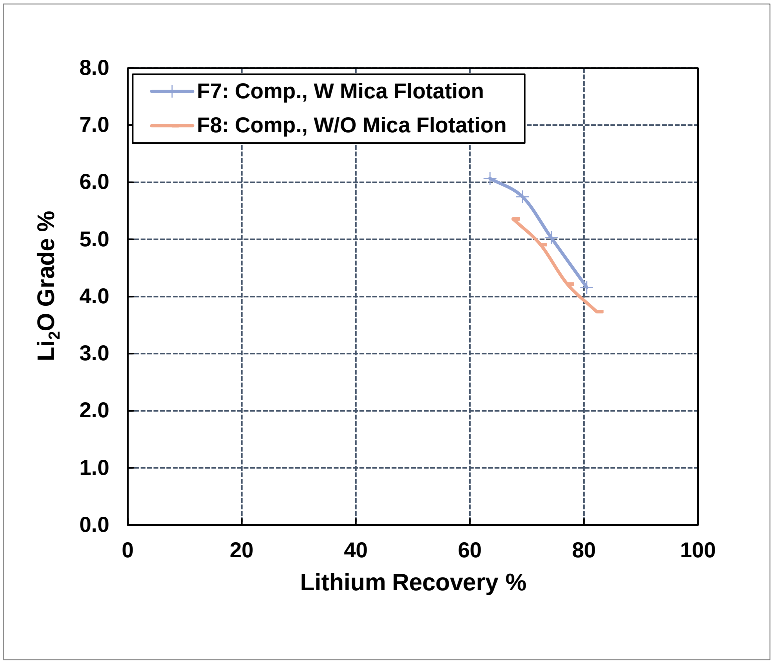


**Figure 14: $Li_2O$ Grade vs. Lithium Recovery – Tests F7 and F8 on the Composite Samples with/without Mica Flotation**

### 3.9. Overall Flotation Test Commentary

A total of eight flotation tests was performed on the various DMS products. Tests F1, F5, and F8 could not achieve the target concentrate lithium grade, while the other tests produced a final concentrate nearing or above 6% $Li_2O$ with 56% – 73% lithium recovery. The tests that did not meet the target concentrate grade were either carried out with very low grade G-dump DMS fines (F1 and F5) or were performed without mica flotation. It was concluded that flotation on the DMS products was promising (with mica pre-flotation) on all samples except for the G-dump DMS fines. Flotation of only the G-dump DMS fines was not feasible, but it could be possible to collect more lithium from the G-dump DMS fines by combining with the other products based on the test result from F7. Otherwise, the G-dump DMS fines would be treated as waste due to its low $Li_2O$ grade, and excluded from flotation processing. For the G-dump DMS fine, stage-grinding to finer particle size needs to be investigated for better flotation performance. For the other DMS products, $P_{100}$ - 300 µm is recommended to produce spodumene concentrate with a metallurgical target.

## Table 12: Flotation Test Results

| Test No. | Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Objective | | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F1 | F1 Li 2nd Cl Conc. | 151 | 6.6 | 1.23 | 2.65 | 73.3 | 16.3 | 0.75 | 0.68 | 0.55 | 0.21 | 0.13 | 0.38 | 2.11 | 41.9 | 7.0 | 6.6 | 1.9 | 1.2 | 21.6 | 4.6 | 7.0 | 20.4 | 4.2 |
| G Dump Fine | F1 Li 1st Cl Conc. | 188 | 8.2 | 1.12 | 2.42 | 74.1 | 15.7 | 0.88 | 0.80 | 0.47 | 0.20 | 0.12 | 0.32 | 2.00 | 47.5 | 8.8 | 7.9 | 2.8 | 1.7 | 23.1 | 5.4 | 8.2 | 21.6 | 4.9 |
| -300 mic | F1 Li Ro. Conc. | 247 | 10.9 | 0.93 | 2.00 | 74.6 | 15.4 | 1.27 | 1.20 | 0.38 | 0.19 | 0.11 | 0.26 | 1.80 | 51.7 | 11.7 | 10.2 | 5.3 | 3.4 | 24.6 | 6.8 | 9.9 | 22.9 | 5.8 |
| | F1 Li Ro & Scav Conc | 322 | 14.2 | 0.79 | 1.70 | 73.8 | 15.9 | 1.92 | 1.39 | 0.31 | 0.18 | 0.11 | 0.21 | 1.69 | 57.2 | 15.0 | 13.7 | 10.3 | 5.1 | 26.4 | 8.3 | 13.1 | 24.2 | 7.1 |
| | F1 Li Ro Tail | 1298 | 57.1 | 0.04 | 0.09 | 77.5 | 13.5 | 2.22 | 5.37 | 0.05 | 0.07 | 0.03 | 0.08 | 0.36 | 12.2 | 63.5 | 46.9 | 48.1 | 79.4 | 17.7 | 13.9 | 11.9 | 36.2 | 6.1 |
| | F1 Li Ro Scav Tail | 1223 | 53.8 | 0.02 | 0.05 | 77.9 | 13.2 | 2.11 | 5.57 | 0.05 | 0.07 | 0.02 | 0.08 | 0.30 | 6.6 | 60.2 | 43.4 | 43.0 | 77.7 | 15.9 | 12.4 | 8.7 | 34.8 | 4.8 |
| First Trial for Floating Spodumene from G-Dump Sample | F1 Mica Conc. | 163 | 7.2 | 0.29 | 0.63 | 53.2 | 27.7 | 7.59 | 1.39 | 0.16 | 0.55 | 0.19 | 0.07 | 2.86 | 10.8 | 5.5 | 12.1 | 20.6 | 2.6 | 6.9 | 12.8 | 11.0 | 4.1 | 6.1 |
| | F1 Mag Conc | 191 | 8.4 | 0.15 | 0.32 | 42.6 | 19.3 | 2.48 | 1.05 | 0.34 | 1.34 | 0.53 | 0.20 | 22.6 | 6.5 | 5.1 | 9.9 | 7.9 | 2.3 | 17.1 | 37.1 | 36.2 | 13.4 | 56.3 |
| | F1 Knelson Conc | 72.3 | 3.2 | 0.45 | 0.97 | 63.5 | 16.2 | 1.55 | 2.91 | 0.32 | 0.43 | 0.36 | 0.24 | 7.55 | 7.3 | 2.9 | 3.1 | 1.9 | 2.4 | 6.0 | 4.5 | 9.3 | 6.2 | 7.1 |
| | F1 Total Slimes | 301 | 13.3 | 0.17 | 0.37 | 59.3 | 21.8 | 3.23 | 2.90 | 0.35 | 0.57 | 0.20 | 0.16 | 4.74 | 11.5 | 11.3 | 17.6 | 16.3 | 10.0 | 27.6 | 25.0 | 21.7 | 17.3 | 18.7 |
| | Head (calc.) | 2273 | 100 | 0.20 | 0.42 | 69.7 | 16.4 | 2.64 | 3.86 | 0.17 | 0.30 | 0.12 | 0.12 | 3.37 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Dir.) | | | 0.20 | 0.43 | 68.1 | 16.8 | 2.62 | 3.76 | 0.13 | 0.30 | 0.12 | 0.12 | 3.54 | | | | | | | | | | |
| F2 | F2 Li 2nd Cl Conc. | 224 | 9.3 | 2.75 | 5.92 | 64.8 | 24.7 | 0.44 | 0.52 | 0.41 | 0.07 | 0.13 | 0.29 | 0.51 | 67.1 | 8.4 | 14.1 | 1.5 | 1.3 | 23.1 | 3.3 | 11.3 | 19.7 | 3.4 |
| K Dump Fine | F2 Li 1st Cl Conc. | 245 | 10.2 | 2.63 | 5.65 | 65.4 | 24.2 | 0.56 | 0.63 | 0.39 | 0.08 | 0.13 | 0.27 | 0.56 | 70.2 | 9.3 | 15.1 | 2.1 | 1.7 | 23.9 | 3.9 | 12.3 | 20.3 | 4.0 |
| -300 mic | F2 Li Ro. Conc. | 290 | 12.1 | 2.31 | 4.97 | 66.5 | 23.1 | 0.91 | 0.96 | 0.34 | 0.09 | 0.12 | 0.24 | 0.61 | 73.1 | 11.2 | 17.0 | 4.1 | 3.1 | 25.1 | 5.2 | 14.0 | 21.2 | 5.2 |
| | F2 Li Ro & Scav Conc | 376 | 15.7 | 1.87 | 4.02 | 66.3 | 22.7 | 1.85 | 1.25 | 0.29 | 0.10 | 0.13 | 0.20 | 0.78 | 76.6 | 14.5 | 21.7 | 10.8 | 5.2 | 27.3 | 8.1 | 18.4 | 22.8 | 8.6 |
| | F2 Li Ro Tail | 1550 | 64.8 | 0.04 | 0.08 | 78.4 | 12.6 | 2.60 | 4.88 | 0.05 | 0.07 | 0.02 | 0.08 | 0.28 | 6.0 | 70.7 | 49.7 | 62.4 | 84.3 | 20.6 | 24.6 | 10.0 | 37.2 | 12.9 |
| | F2 Li Ro Scav Tail | 1464 | 61.2 | 0.02 | 0.03 | 79.2 | 12.1 | 2.46 | 5.03 | 0.05 | 0.07 | 0.01 | 0.08 | 0.22 | 2.6 | 67.4 | 45.1 | 55.8 | 82.1 | 18.4 | 21.7 | 5.7 | 35.7 | 9.5 |
| First Trial for Floating Spodumene from the K-Dump Sample | F2 Mica Conc. | 102 | 4.3 | 0.33 | 0.70 | 52.2 | 29.2 | 8.13 | 1.14 | 0.18 | 0.28 | 0.21 | 0.12 | 2.35 | 3.6 | 3.1 | 7.6 | 12.9 | 1.3 | 4.7 | 6.0 | 8.2 | 3.7 | 7.1 |
| | F2 Mag Conc | 89.9 | 3.8 | 0.38 | 0.82 | 54.1 | 21.0 | 3.40 | 1.91 | 0.82 | 1.22 | 0.92 | 0.63 | 8.82 | 3.7 | 2.8 | 4.8 | 4.7 | 1.9 | 18.6 | 23.2 | 32.1 | 17.2 | 23.4 |
| | F2 Knelson Conc | 72.9 | 3.0 | 1.00 | 2.15 | 67.4 | 18.1 | 1.83 | 2.77 | 0.40 | 0.24 | 0.45 | 0.33 | 1.98 | 8.0 | 2.9 | 3.4 | 2.1 | 2.3 | 7.3 | 3.7 | 12.7 | 7.3 | 4.3 |
| | F2 Total Slimes | 288 | 12.0 | 0.18 | 0.38 | 55.5 | 23.8 | 3.09 | 2.24 | 0.33 | 0.61 | 0.20 | 0.15 | 5.57 | 5.5 | 9.3 | 17.5 | 13.8 | 7.2 | 23.7 | 37.3 | 22.9 | 13.3 | 47.2 |
| | Head (calc.) | 2393 | 100 | 0.38 | 0.82 | 71.9 | 16.4 | 2.70 | 3.75 | 0.17 | 0.20 | 0.11 | 0.14 | 1.42 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Dir.) | | | 0.45 | 0.97 | 72.8 | 15.9 | 2.65 | 3.87 | 0.15 | 0.15 | 0.10 | 0.15 | 0.87 | | | | | | | | | | |
| F3 | F3 Li 2nd Cl Conc. Non-mag | 549 | 25.8 | 2.99 | 6.44 | 66.3 | 24.5 | 0.18 | 0.39 | 0.16 | 0.02 | 0.08 | 0.09 | 0.45 | 63.3 | 26.5 | 36.3 | 3.2 | 7.4 | 24.7 | 2.5 | 18.0 | 23.1 | 1.4 |
| G Dump Mid | F3 Li 2nd Cl Conc. | 580 | 27.3 | 2.88 | 6.21 | 66.0 | 24.0 | 0.19 | 0.39 | 0.18 | 0.04 | 0.09 | 0.11 | 1.25 | 64.5 | 27.9 | 37.5 | 3.6 | 7.8 | 29.6 | 4.6 | 20.2 | 28.9 | 4.1 |
| -300 mic | F3 Li 1st Cl Conc. | 639 | 30.1 | 2.78 | 5.99 | 66.8 | 23.3 | 0.22 | 0.47 | 0.17 | 0.04 | 0.08 | 0.10 | 1.26 | 68.5 | 31.1 | 40.2 | 4.5 | 10.4 | 31.0 | 5.3 | 21.7 | 30.3 | 4.5 |
| | F3 Li Ro. Conc. | 750 | 35.3 | 2.52 | 5.43 | 68.8 | 21.8 | 0.30 | 0.72 | 0.16 | 0.04 | 0.08 | 0.09 | 1.20 | 73.0 | 37.5 | 44.1 | 7.2 | 18.8 | 33.5 | 6.8 | 23.0 | 32.4 | 5.0 |
| | F3 Li Ro & Scav Conc | 797 | 37.5 | 2.42 | 5.21 | 69.6 | 21.2 | 0.32 | 0.80 | 0.16 | 0.04 | 0.07 | 0.09 | 1.18 | 74.4 | 40.3 | 45.5 | 8.1 | 22.1 | 34.7 | 7.2 | 23.8 | 33.0 | 5.3 |
| | F3 Li Ro Tail | 470 | 22.1 | 0.10 | 0.22 | 85.4 | 8.5 | 1.20 | 3.23 | 0.04 | 0.11 | 0.01 | 0.04 | 0.41 | 1.8 | 29.2 | 10.8 | 18.0 | 52.7 | 5.9 | 11.9 | 2.5 | 8.6 | 1.1 |
| | F3 Li Ro Scav Tail | 424 | 19.9 | 0.03 | 0.05 | 85.7 | 8.2 | 1.26 | 3.36 | 0.04 | 0.12 | 0.01 | 0.04 | 0.36 | 0.4 | 26.4 | 9.4 | 17.1 | 49.4 | 4.8 | 11.5 | 1.7 | 7.9 | 0.9 |
| First Trial for Floating Spodumene from G-Dump Middling Sample | F3 Mica Conc. | 160 | 7.5 | 0.74 | 1.58 | 58.9 | 25.2 | 6.11 | 1.00 | 0.21 | 0.39 | 0.17 | 0.11 | 2.37 | 4.6 | 6.9 | 10.9 | 31.4 | 5.6 | 9.4 | 14.3 | 10.9 | 8.1 | 2.1 |
| | F3 Mag Conc | 350 | 16.4 | 0.36 | 0.78 | 38.6 | 14.8 | 1.47 | 0.41 | 0.21 | 0.47 | 0.24 | 0.15 | 33.6 | 4.9 | 9.8 | 14.0 | 16.4 | 5.0 | 20.5 | 36.8 | 34.3 | 25.2 | 65.6 |
| | F3 Knelson Conc. | 71.6 | 3.4 | 1.35 | 2.91 | 56.6 | 17.7 | 1.07 | 0.94 | 0.22 | 0.18 | 0.33 | 0.16 | 12.9 | 3.7 | 2.9 | 3.4 | 2.5 | 2.3 | 4.4 | 2.9 | 9.7 | 5.4 | 5.2 |
| | F3 Total Slimes | 324 | 15.2 | 0.96 | 2.08 | 57.5 | 19.3 | 2.37 | 1.40 | 0.29 | 0.37 | 0.15 | 0.13 | 11.6 | 12.0 | 13.6 | 16.8 | 24.6 | 15.7 | 26.2 | 27.3 | 19.7 | 20.4 | 21.0 |
| | Head (calc.) | 2126 | 100 | 1.22 | 2.62 | 64.6 | 17.4 | 1.47 | 1.36 | 0.17 | 0.21 | 0.12 | 0.10 | 8.42 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Dir.) | 0 | | 1.22 | 2.63 | 64.4 | 17.4 | 1.49 | 1.38 | 0.14 | 0.23 | 0.10 | 0.10 | 8.93 | | | | | | | | | | |
| F4 | F4 Li 2nd Cl Conc. | 223 | 10.4 | 3.13 | 6.74 | 64.6 | 25.3 | 0.28 | 0.39 | 0.36 | 0.06 | 0.12 | 0.26 | 0.82 | 56.1 | 9.4 | 15.6 | 1.1 | 1.2 | 23.1 | 3.4 | 11.5 | 19.3 | 5.9 |
| ne | F4 Li 1st Cl Conc. | 274 | 12.7 | 2.97 | 6.40 | 65.3 | 24.7 | 0.39 | 0.53 | 0.33 | 0.06 | 0.12 | 0.24 | 0.82 | 65.4 | 11.6 | 18.7 | 1.9 | 1.9 | 25.7 | 4.5 | 13.9 | 21.5 | 7.3 |
| -300 mic | F4 Li Ro. Conc. | 338 | 15.7 | 2.65 | 5.70 | 66.7 | 23.3 | 0.64 | 0.91 | 0.29 | 0.07 | 0.11 | 0.21 | 0.80 | 71.8 | 14.6 | 21.8 | 3.9 | 4.1 | 28.1 | 6.1 | 16.0 | 23.6 | 8.7 |
| | F4 Li Ro & Scav Conc | 391 | 18.1 | 2.41 | 5.19 | 67.8 | 22.3 | 0.81 | 1.15 | 0.27 | 0.07 | 0.11 | 0.19 | 0.80 | 75.7 | 17.2 | 24.1 | 5.7 | 5.9 | 29.8 | 7.2 | 17.6 | 24.8 | 10.1 |
| | F4 Li Ro Tail | 1284 | 59.6 | 0.06 | 0.14 | 78.3 | 12.5 | 2.58 | 4.76 | 0.05 | 0.07 | 0.02 | 0.09 | 0.34 | 6.6 | 65.3 | 44.6 | 60.4 | 80.8 | 19.4 | 23.2 | 12.1 | 38.0 | 14.1 |
| | F4 Li Ro Scav Tail | 1232 | 57.2 | 0.03 | 0.06 | 78.5 | 12.4 | 2.61 | 4.85 | 0.05 | 0.07 | 0.02 | 0.09 | 0.32 | 2.8 | 62.7 | 42.2 | 58.6 | 78.9 | 17.7 | 22.2 | 10.5 | 36.8 | 12.7 |
| Based on F2 but | F4 Mica Conc. | 79.1 | 3.7 | 0.39 | 0.85 | 53.5 | 28.6 | 7.96 | 1.26 | 0.09 | 0.26 | 0.20 | 0.06 | 2.31 | 2.5 | 2.7 | 6.3 | 11.5 | 1.3 | 2.1 | 5.3 | 6.8 | 1.4 | 5.9 |
| on the DMS U/S + | F4 Mag Conc | 62.3 | 2.9 | 0.56 | 1.21 | 51.7 | 21.8 | 3.31 | 1.58 | 0.86 | 1.24 | 1.03 | 0.68 | 9.77 | 2.8 | 2.1 | 3.7 | 3.8 | 1.3 | 15.3 | 19.9 | 27.6 | 14.1 | 19.6 |
| Middling | F4 Knelson Conc. | 68.1 | 3.2 | 0.42 | 0.90 | 64.1 | 20.3 | 3.43 | 3.11 | 0.29 | 0.34 | 0.17 | 0.19 | 2.48 | 6.3 | 3.0 | 3.4 | 2.3 | 2.4 | 6.3 | 3.2 | 11.1 | 6.1 | 3.7 |
| | F4 Total Slimes | 322 | 15.0 | 0.38 | 0.83 | 58.5 | 22.7 | 3.09 | 2.39 | 0.31 | 0.51 | 0.19 | 0.16 | 4.63 | 9.9 | 12.2 | 20.2 | 18.1 | 10.2 | 28.9 | 42.3 | 26.4 | 16.8 | 48.0 |
| | Head (calc.) | 2153 | 100 | 0.58 | 1.24 | 71.5 | 16.8 | 2.55 | 3.52 | 0.16 | 0.18 | 0.11 | 0.14 | 1.44 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (calc.fines + Mid.) | | | 0.61 | 1.30 | 71.7 | 16.9 | 2.23 | 3.50 | 0.16 | 0.17 | 0.11 | 0.13 | 1.33 | | | | | | | | | | |

## Table 12: Flotation Test Results

| Test No. | Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Objective | | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F5 | F5 Li 2nd Cl Conc. Non-Mag | 90 | 4.0 | 1.91 | 4.11 | 72.3 | 18.7 | 0.27 | 0.64 | 0.45 | 0.08 | 0.09 | 0.28 | 0.74 | 37.4 | 4.1 | 4.6 | 0.4 | 0.7 | 10.3 | 1.0 | 3.1 | 9.8 | 0.9 |
| G Dump Fine | F5 Li 2nd Cl Conc. | 122 | 5.4 | 1.58 | 3.40 | 70.4 | 17.5 | 0.31 | 0.63 | 0.56 | 0.23 | 0.15 | 0.38 | 3.03 | 41.9 | 5.5 | 5.8 | 0.6 | 0.9 | 17.4 | 4.2 | 6.7 | 18.0 | 4.9 |
| -300 mic | F5 Li 1st Cl Conc. | 147 | 6.5 | 1.43 | 3.08 | 72.3 | 16.3 | 0.39 | 0.74 | 0.48 | 0.21 | 0.14 | 0.33 | 2.96 | 45.8 | 6.8 | 6.5 | 1.0 | 1.2 | 18.1 | 4.5 | 7.7 | 18.7 | 5.8 |
| | F5 Li Ro. Conc. | 192 | 8.5 | 1.17 | 2.52 | 74.6 | 14.8 | 0.64 | 1.16 | 0.39 | 0.18 | 0.12 | 0.27 | 2.61 | 49.1 | 9.1 | 7.7 | 2.1 | 2.5 | 19.1 | 5.0 | 8.7 | 20.1 | 6.6 |
| | F5 Li Ro & Scav Conc | 251 | 11.1 | 0.95 | 2.05 | 75.1 | 14.5 | 1.07 | 1.51 | 0.32 | 0.16 | 0.11 | 0.22 | 2.25 | 52.1 | 12.0 | 9.9 | 4.5 | 4.3 | 20.5 | 5.7 | 10.3 | 21.5 | 7.5 |
| | F5 Li Ro Tail | 1203 | 53.2 | 0.03 | 0.07 | 78.6 | 12.4 | 1.79 | 5.56 | 0.05 | 0.06 | 0.01 | 0.07 | 0.27 | 8.1 | 60.4 | 40.5 | 36.3 | 76.3 | 15.9 | 10.8 | 5.9 | 32.6 | 4.3 |
| Based on Test F1 but with Lower Collector Dosage and Using EDA for Mica Flotation | F5 Li Ro Scav Tail | 1144 | 50.6 | 0.02 | 0.04 | 78.7 | 12.3 | 1.76 | 5.71 | 0.05 | 0.06 | 0.01 | 0.07 | 0.23 | 5.0 | 57.5 | 38.4 | 33.8 | 74.6 | 14.6 | 10.0 | 4.4 | 31.3 | 3.5 |
| | F5 Mica Conc. | 288 | 12.7 | 0.29 | 0.62 | 55.8 | 26.0 | 7.21 | 1.57 | 0.12 | 0.47 | 0.18 | 0.07 | 2.65 | 17.9 | 10.2 | 20.4 | 34.8 | 5.2 | 9.2 | 19.6 | 19.3 | 8.0 | 10.1 |
| | F5 Mag Conc | 204 | 9.0 | 0.16 | 0.35 | 46.5 | 18.7 | 2.58 | 1.48 | 0.32 | 1.17 | 0.45 | 0.19 | 19.5 | 7.2 | 6.1 | 10.4 | 8.9 | 3.4 | 16.5 | 34.8 | 35.1 | 14.8 | 52.8 |
| | F5 Knelson Conc. | 74.5 | 3.3 | 0.41 | 0.88 | 63.9 | 15.8 | 1.56 | 3.08 | 0.31 | 0.42 | 0.32 | 0.22 | 7.07 | 6.7 | 3.0 | 3.2 | 2.0 | 2.6 | 5.9 | 4.6 | 9.1 | 6.4 | 7.0 |
| | F5 Total Slimes | 298 | 13.2 | 0.17 | 0.37 | 58.6 | 21.8 | 3.19 | 2.90 | 0.44 | 0.58 | 0.19 | 0.15 | 4.83 | 11.0 | 11.2 | 17.7 | 16.0 | 9.9 | 33.4 | 25.3 | 21.9 | 18.0 | 19.1 |
| | Head (calc.) | 2260 | 100 | 0.20 | 0.44 | 69.3 | 16.2 | 2.63 | 3.88 | 0.17 | 0.30 | 0.12 | 0.11 | 3.34 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Dir.) | | | 0.20 | 0.43 | 68.1 | 16.8 | 2.62 | 3.76 | 0.13 | 0.30 | 0.12 | 0.12 | 3.54 | | | | | | | | | | |
| F6 | F6 Li 2nd Cl Conc. | 321 | 14.0 | 3.02 | 6.50 | 63.7 | 24.9 | 0.70 | 0.49 | 0.34 | 0.05 | 0.11 | 0.24 | 0.54 | 69.5 | 12.5 | 20.7 | 3.8 | 2.0 | 29.1 | 4.0 | 15.2 | 25.0 | 5.6 |
| K Dump Mid+Fine | F6 Li 1st Cl Conc. | 363 | 15.8 | 2.86 | 6.17 | 64.3 | 24.4 | 0.84 | 0.62 | 0.32 | 0.06 | 0.11 | 0.23 | 0.58 | 74.4 | 14.3 | 22.9 | 5.2 | 2.8 | 30.7 | 5.0 | 17.0 | 26.5 | 6.8 |
| -300 mic | F6 Li Ro. Conc. | 455 | 19.9 | 2.43 | 5.23 | 66.2 | 22.8 | 1.19 | 1.12 | 0.27 | 0.07 | 0.10 | 0.20 | 0.59 | 79.2 | 18.5 | 26.8 | 9.2 | 6.4 | 32.9 | 7.5 | 19.8 | 28.9 | 8.7 |
| | F6 Li Ro & Scav Conc | 565 | 24.7 | 2.07 | 4.46 | 66.1 | 22.6 | 1.86 | 1.35 | 0.23 | 0.08 | 0.10 | 0.17 | 0.71 | 83.7 | 22.8 | 32.9 | 17.8 | 9.6 | 35.0 | 11.5 | 24.9 | 30.6 | 13.0 |
| | F6 Li Ro Tail | 1405 | 61.3 | 0.07 | 0.16 | 77.6 | 13.1 | 2.76 | 4.66 | 0.05 | 0.08 | 0.02 | 0.08 | 0.34 | 7.5 | 66.7 | 47.6 | 65.7 | 82.1 | 19.3 | 26.4 | 10.7 | 35.3 | 15.6 |
| | F6 Li Ro Scav Tail | 1295 | 56.6 | 0.03 | 0.07 | 78.6 | 12.4 | 2.60 | 4.86 | 0.05 | 0.07 | 0.01 | 0.08 | 0.27 | 3.1 | 62.3 | 41.5 | 57.0 | 78.9 | 17.2 | 22.3 | 5.6 | 33.6 | 11.3 |
| Mag Sep on the Head 8, 10 KG | F6 Mica Conc. | 42.1 | 1.8 | 0.47 | 1.01 | 57.5 | 25.7 | 6.66 | 1.88 | 0.12 | 0.23 | 0.16 | 0.08 | 1.88 | 1.4 | 1.5 | 2.8 | 4.7 | 1.0 | 1.3 | 2.4 | 2.9 | 1.1 | 2.6 |
| | F6 Mag Conc | 83.9 | 3.7 | 0.59 | 1.27 | 51.6 | 21.5 | 3.17 | 1.60 | 0.95 | 1.19 | 1.15 | 0.73 | 9.68 | 3.5 | 2.7 | 4.7 | 4.5 | 1.7 | 21.1 | 24.6 | 41.5 | 19.7 | 26.2 |
| | F6 Total Slimes | 304 | 13.3 | 0.38 | 0.82 | 57.7 | 23.0 | 3.09 | 2.31 | 0.31 | 0.52 | 0.19 | 0.15 | 4.78 | 8.3 | 10.7 | 18.1 | 15.9 | 8.8 | 25.3 | 39.2 | 25.2 | 15.0 | 46.9 |
| | Head (calc.) | 2290 | 100 | 0.61 | 1.31 | 71.4 | 16.9 | 2.58 | 3.48 | 0.16 | 0.18 | 0.10 | 0.13 | 1.35 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Fines + Mid.) | | | 0.60 | 1.29 | 71.7 | 16.9 | 2.55 | 3.51 | 0.16 | 0.17 | 0.11 | 0.13 | 1.33 | | | | | | | | | | |
| F7 | F7 Li 2nd Cl Conc. | 298 | 13.2 | 2.82 | 6.07 | 65.1 | 23.9 | 0.35 | 0.48 | 0.34 | 0.07 | 0.11 | 0.24 | 0.81 | 63.5 | 12.1 | 18.8 | 1.9 | 1.8 | 27.8 | 4.6 | 13.7 | 24.2 | 5.1 |
| Composite | F7 Li 1st Cl Conc. | 343 | 15.1 | 2.67 | 5.75 | 66.0 | 23.2 | 0.45 | 0.62 | 0.31 | 0.07 | 0.11 | 0.22 | 0.83 | 69.2 | 14.1 | 21.1 | 2.8 | 2.8 | 29.3 | 5.5 | 15.4 | 25.4 | 6.1 |
| -300 mic | F7 Li Ro. Conc. | 420 | 18.6 | 2.34 | 5.03 | 67.7 | 21.8 | 0.71 | 1.03 | 0.28 | 0.08 | 0.10 | 0.20 | 0.80 | 74.3 | 17.7 | 24.2 | 5.3 | 5.6 | 31.8 | 7.0 | 17.3 | 27.8 | 7.2 |
| | F7 Li Ro & Scav Conc | 552 | 24.4 | 1.93 | 4.16 | 67.7 | 21.3 | 1.46 | 1.36 | 0.23 | 0.09 | 0.10 | 0.16 | 0.87 | 80.5 | 23.3 | 31.1 | 14.4 | 9.7 | 34.7 | 10.8 | 22.8 | 30.4 | 10.2 |
| | F7 Li Ro Tail | 1315 | 58.0 | 0.09 | 0.19 | 78.1 | 12.8 | 2.54 | 4.75 | 0.04 | 0.08 | 0.02 | 0.08 | 0.34 | 8.7 | 64.0 | 44.4 | 59.5 | 80.8 | 15.9 | 24.6 | 10.4 | 34.7 | 9.6 |
| Based on F6 but on the Combined Composite Sample | F7 Li Ro Scav Tail | 1184 | 52.2 | 0.03 | 0.06 | 79.2 | 12.0 | 2.39 | 5.01 | 0.04 | 0.08 | 0.01 | 0.08 | 0.26 | 2.4 | 58.4 | 37.6 | 50.5 | 76.7 | 13.0 | 20.8 | 4.9 | 32.0 | 6.6 |
| | F7 Mica Conc. | 102 | 4.5 | 0.46 | 1.00 | 55.9 | 26.4 | 7.00 | 1.62 | 0.17 | 0.31 | 0.17 | 0.10 | 2.20 | 3.6 | 3.6 | 7.1 | 12.8 | 2.1 | 4.8 | 7.0 | 7.3 | 3.5 | 4.8 |
| | F7 Mag Conc | 134 | 5.9 | 0.48 | 1.04 | 49.4 | 19.1 | 2.66 | 1.51 | 0.55 | 0.93 | 0.73 | 0.42 | 15.9 | 4.9 | 4.1 | 6.8 | 6.4 | 2.6 | 20.2 | 27.4 | 40.9 | 18.9 | 45.2 |
| | F7 Total Slimes | 294 | 13.0 | 0.39 | 0.84 | 57.7 | 22.5 | 3.06 | 2.34 | 0.34 | 0.53 | 0.20 | 0.15 | 5.31 | 8.6 | 10.6 | 17.4 | 16.0 | 8.9 | 27.3 | 34.0 | 24.0 | 15.2 | 33.2 |
| | Head (calc.) | 2265 | 100 | 0.58 | 1.26 | 70.8 | 16.7 | 2.47 | 3.42 | 0.16 | 0.20 | 0.11 | 0.13 | 2.07 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Calc. 4 samples) | | | | | | | | | | | | | | | | | | | | | | | |
| F8 | F8 Li 2nd Cl Conc. | 351 | 15.5 | 2.49 | 5.36 | 65.1 | 23.5 | 0.89 | 0.60 | 0.32 | 0.07 | 0.11 | 0.22 | 0.79 | 67.6 | 14.3 | 21.8 | 5.6 | 2.7 | 30.7 | 5.6 | 15.0 | 27.0 | 5.9 |
| Composite | F8 Li 1st Cl Conc. | 410 | 18.1 | 2.28 | 4.91 | 66.0 | 23.0 | 1.16 | 0.79 | 0.29 | 0.08 | 0.11 | 0.20 | 0.83 | 72.4 | 16.9 | 24.9 | 8.5 | 4.2 | 32.3 | 7.4 | 17.3 | 28.5 | 7.3 |
| -300 mic | F8 Li Ro. Conc. | 509 | 22.5 | 1.96 | 4.22 | 67.2 | 21.8 | 1.52 | 1.20 | 0.25 | 0.09 | 0.10 | 0.17 | 0.83 | 77.1 | 21.3 | 29.3 | 13.8 | 7.9 | 34.5 | 10.4 | 20.0 | 30.9 | 9.0 |
| | F8 Li Ro & Scav Conc | 613 | 27.1 | 1.74 | 3.74 | 66.9 | 21.7 | 2.03 | 1.37 | 0.22 | 0.10 | 0.10 | 0.15 | 0.90 | 82.2 | 25.6 | 35.2 | 22.2 | 10.9 | 36.5 | 13.7 | 24.5 | 32.7 | 11.7 |
| | F8 Li Ro Tail | 1327 | 58.6 | 0.09 | 0.19 | 77.3 | 13.2 | 2.68 | 4.69 | 0.05 | 0.08 | 0.04 | 0.07 | 0.42 | 9.1 | 63.9 | 46.3 | 63.4 | 80.6 | 18.7 | 25.5 | 18.7 | 31.8 | 11.8 |
| Based on F7 but with no Mica Flotation | F8 Li Ro Scav Tail | 1222 | 54.0 | 0.04 | 0.09 | 78.3 | 12.5 | 2.52 | 4.90 | 0.05 | 0.08 | 0.03 | 0.07 | 0.35 | 4.0 | 59.7 | 40.3 | 55.0 | 77.7 | 16.7 | 22.2 | 14.3 | 29.9 | 9.1 |
| | F8 Mag Conc | 139 | 6.1 | 0.48 | 1.03 | 49.4 | 19.2 | 2.66 | 1.50 | 0.60 | 0.94 | 0.73 | 0.44 | 15.8 | 5.2 | 4.3 | 7.1 | 6.6 | 2.7 | 23.0 | 29.5 | 39.4 | 21.6 | 46.5 |
| | F8 Total Slimes | 290 | 12.8 | 0.39 | 0.83 | 57.7 | 22.7 | 3.13 | 2.32 | 0.30 | 0.53 | 0.19 | 0.15 | 5.31 | 8.6 | 10.5 | 17.4 | 16.2 | 8.7 | 23.8 | 34.7 | 21.9 | 15.7 | 32.7 |
| | Head (calc.) | 2265 | 100 | 0.57 | 1.23 | 70.8 | 16.7 | 2.47 | 3.40 | 0.16 | 0.19 | 0.11 | 0.13 | 2.08 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Head (Calc. 4 samples) | | | | | | | | | | | | | | | | | | | | | | | |

# ***Conclusions and Recommendations***

The following conclusions can be drawn from testwork completed with the DMS products from the Tantalax Manono tailings:

- The G-dump and K-dump DMS fines consisted of 0.4% $Li_2O$ and 1.0% $Li_2O$, respectively, while the G-dump and K-dump DMS middlings consisted of 3.2% $Li_2O$ and 2.6% $Li_2O$, respectively. The Composite sample was produced from all DMS products, resulting in a head grade of 1.3% $Li_2O$ and 1.7% $Fe_2O_3$. Due to the low head grade of the G-dump fines material, poor flotation performance was anticipated.

- The K-dump fines showed a good flotation performance, generating a concentrate grading 5.9% $Li_2O$ grade with 67% lithium recovery, while the G-dump fines resulted in < 6% $Li_2O$ in the final concentrate with poor lithium recovery. The low grade of the concentrate from the G-dump fines could be attributed to the low head grade (0.4% $Li_2O$).

- The G-dump middlings was upgraded to 6.4% $Li_2O$ with 63% lithium recovery by flotation. Flotation of the combined K-dump middlings and fines achieved 6.2% – 6.4% $Li_2O$ grade with one stage of cleaner flotation. Without Knelson separation, flotation achieved a higher lithium recovery of 69.5% at a grade of 6.5% $Li_2O$. Test F6 with the combined K-dump middlings and fines resulted in the best flotation result of 6.5% $Li_2O$ concentrate grade and 69.5% lithium recovery. The high $Li_2O$ grade was attributed to the high feed grade (1.3% $Li_2O$) and the presumed high degree of spodumene liberation spodumene in the K-dump material. Due to the low grade of iron in the feed, the final spodumene concentrate resulted in < 1% $Fe_2O_3$ with higher lithium recovery when Knelson separation was excluded. The flotation results on the K-dump indicated that a flotation circuit to process the current DMS exit streams could produce a saleable spodumene concentrate.

- Flotation with the Composite sample achieved a 6.1% $Li_2O$ final concentrate grade with mica pre-flotation and confirmed that mica pre-flotation was necessary to achieve the target grade of 6.0% $Li_2O$. While flotation of the G-dump fines stream alone was not feasible, the flotation on the Composite sample containing G-dump fines resulted in 6.1% $Li_2O$ with 64% lithium recovery and suggests processing the combined DMS streams is one feasible method to beneficiate spodumene from this material.

The following recommendations are made for further testwork:

- Performing mineralogy and liberation analysis on all samples
- Conducting further flotation testwork on a more representative sample from DMS operation to optimize the flowsheet and conditions
- Further optimization of mica pre-flotation to improve its impact on the spodumene flotation performance
- Further evaluation of gravity separation to recover heavy minerals, like tin, and minimize lithium losses to the gravity concentrate
- Further evaluation if boron can be recovered as a valuable by-product
- Performing solid liquid separation and environmental testwork on the final flotation tailings
- Performing magnetic separation on spodumene concentrate for achieving a higher grade of $Li_2O$
- Performing flotation test to investigate the effect of collector dosages for selective flotation performance

# *Appendix A – Flotation Test Results*

| Sample ID | Weight | | Assay % | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | Li2O | SiO2 | Al2O3 | Fe2O3 | MgO | CaO | Na2O | K2O | TiO2 | P2O5 | MnO | Cr2O3 | V2O5 | LOI | Sum | Ta2O5 g/t | Nb2O5 g/t | SnO2 |
| F1 Knelson Conc | 72.2 | 3.2 | 0.45 | 0.97 | 63.5 | 16.2 | 7.55 | 0.43 | 0.32 | 2.91 | 1.55 | 0.52 | 0.24 | 0.36 | 0.07 | 0.02 | 2.39 | 96.0 | | | 1.49 |
| F2 Knelson Conc | 72.9 | 3.0 | 1.00 | 2.15 | 67.4 | 18.1 | 1.98 | 0.24 | 0.40 | 2.77 | 1.83 | 0.25 | 0.33 | 0.45 | 0.03 | < 0.01 | 0.98 | 94.8 | | | 1.57 |
| F3 Knelson Conc | 71.5 | 3.4 | 1.35 | 2.90 | 56.6 | 17.7 | 12.9 | 0.18 | 0.22 | 0.94 | 1.07 | 0.2 | 0.16 | 0.33 | 0.10 | 0.04 | 3.06 | 93.5 | 1460 | 1710 | 2.78 |
| F4 Knelson Conc | 68.1 | 3.2 | 1.15 | 2.47 | 68.3 | 18.3 | 1.69 | 0.18 | 0.32 | 2.67 | 1.89 | 0.17 | 0.27 | 0.38 | 0.04 | < 0.01 | 0.99 | 95.3 | 896 | 1380 | 1.44 |

**Test: F1** 19680-01 Tech: Tracey **Date:** March 7,2023

**Purpose:** **First Trial for Floating Spodumene from G-Dump Sample**

**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.2kg, G-Dump, SG1**
**Grind:** -300 mic
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **MIBC** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 8 min decant at 4L, Repeat at 6 min decant at 4L* | | | | | | | | | | | | 21 | |
| Please Perform Kneslon Sep test first | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Perform Mag Separation on the Kneslon Tailing at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.8-10.5 | 34% | 21 | 2Kg |
| Mica Conditioning 2 | | *20* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 10 | | | | **2** | 10.5 | | 21 | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Scav Flotation 1 | | 10 | 45.6 | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 2 | | 45 | 22.8 | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 3 | | 45 | 22.8 | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| High Density Scrubbing | | | 68.4 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 7 min, Repeat at 5 min* | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| High Density Condition, about 60% | | | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.8 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 450 | 10 | | 6.9 | | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| Li Rougher, continue until froth dies | | | | 34.2 | | | | | | **2.0** | 8.5 | 31% | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.4 | | 22 | 2 Kg |
| | | | | | | | | | | | | | | |
| Li Rougher Scav. | | | | 22.5 | | | | | | **1** | 8.6 | | 22 | 2 Kg |
| | | | | | | | | | | | | | | |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 22.5 | | | | 25 | 1 | **1.5** | 8.5 | | 22 | 250g |
| | | | | | | | | | | | | | | |
| Li 2nd Cleaner | | | | 11.25 | | | | 10 | 1 | **1.5** | 8.5 | | 22 | 250g |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Total | 0 | 120 | 342 | 90 | 0 | | 250 | 635 | 35 | 14 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F1 Li 2nd Cl Conc | 151 | 6.6 | 1.23 | 2.65 | 73.3 | 16.3 | 0.75 | 0.68 | 0.55 | 0.21 | 0.13 | 0.38 | 2.11 | 41.9 | 7.0 | 6.6 | 1.9 | 1.2 | 21.6 | 4.6 | 7.0 | 20.4 | 4.2 |
| F1 Li 2nd Cl Tail | 36.4 | 1.6 | 0.68 | 1.46 | 77.3 | 13.3 | 1.44 | 1.30 | 0.15 | 0.16 | 0.09 | 0.09 | 1.55 | 5.6 | 1.8 | 1.3 | 0.9 | 0.5 | 1.4 | 0.8 | 1.2 | 1.2 | 0.7 |
| F1 Li 1st Cl Tail | 59.7 | 2.6 | 0.31 | 0.67 | 76.4 | 14.2 | 2.50 | 2.46 | 0.10 | 0.16 | 0.08 | 0.06 | 1.16 | 4.2 | 2.9 | 2.3 | 2.5 | 1.7 | 1.6 | 1.4 | 1.7 | 1.3 | 0.9 |
| F1 Li Ro Scav Conc | 74.6 | 3.3 | 0.33 | 0.71 | 70.9 | 17.6 | 4.07 | 2.02 | 0.09 | 0.14 | 0.12 | 0.05 | 1.33 | 5.6 | 3.3 | 3.5 | 5.1 | 1.7 | 1.7 | 1.5 | 3.2 | 1.3 | 1.3 |
| F1 Li Ro Scav Tail | 1223 | 53.8 | 0.02 | 0.05 | 77.9 | 13.2 | 2.11 | 5.57 | 0.05 | 0.07 | 0.02 | 0.08 | 0.30 | 6.6 | 60.2 | 43.4 | 43.0 | 77.7 | 15.9 | 12.4 | 8.7 | 34.8 | 4.8 |
| F1 Slime 2 | 42.9 | 1.9 | 0.14 | 0.30 | 68.6 | 17.3 | 2.12 | 4.31 | 0.61 | 0.26 | 0.08 | 0.14 | 1.79 | 1.4 | 1.9 | 2.0 | 1.5 | 2.1 | 6.8 | 1.6 | 1.2 | 2.1 | 1.0 |
| F1 Mica Ro Conc | 45.7 | 2.0 | 0.32 | 0.69 | 52.4 | 28.5 | 8.05 | 1.30 | 0.15 | 0.52 | 0.19 | 0.10 | 2.77 | 3.3 | 1.5 | 3.5 | 6.1 | 0.7 | 1.8 | 3.4 | 3.1 | 1.6 | 1.7 |
| F1 Mica Ro Scav Conc 1 | 21.2 | 0.9 | 0.28 | 0.60 | 56.6 | 25.5 | 6.74 | 1.93 | 0.19 | 0.52 | 0.17 | 0.09 | 2.58 | 1.3 | 0.8 | 1.5 | 2.4 | 0.5 | 1.0 | 1.6 | 1.3 | 0.7 | 0.7 |
| F1 Mica Ro Scav Conc 2 | 58.7 | 2.6 | 0.29 | 0.62 | 52.0 | 28.5 | 7.91 | 1.18 | 0.16 | 0.60 | 0.19 | 0.05 | 3.02 | 3.8 | 1.9 | 4.5 | 7.7 | 0.8 | 2.4 | 5.1 | 4.0 | 1.0 | 2.3 |
| F1 Mica Ro Scav Conc 3 | 37.2 | 1.6 | 0.28 | 0.60 | 54.2 | 26.9 | 7.02 | 1.52 | 0.17 | 0.51 | 0.20 | 0.06 | 2.87 | 2.3 | 1.3 | 2.7 | 4.4 | 0.6 | 1.6 | 2.7 | 2.7 | 0.8 | 1.4 |
| F1 10kG Mag | 131 | 5.8 | 0.13 | 0.28 | 40.4 | 18.9 | 2.11 | 1.06 | 0.32 | 1.27 | 0.57 | 0.18 | 25.1 | 3.8 | 3.3 | 6.7 | 4.6 | 1.6 | 10.9 | 24.0 | 26.7 | 8.4 | 43.0 |
| F1 13kG Mag | 58.1 | 2.6 | 0.20 | 0.43 | 48.3 | 20.7 | 3.37 | 1.07 | 0.40 | 1.33 | 0.44 | 0.24 | 15.7 | 2.6 | 1.8 | 3.2 | 3.3 | 0.7 | 6.1 | 11.1 | 9.1 | 5.0 | 11.9 |
| F1 Knelson Conc | 72.3 | 3.2 | 0.45 | 0.97 | 63.5 | 16.2 | 1.55 | 2.91 | 0.32 | 0.43 | 0.36 | 0.24 | 7.55 | 7.3 | 2.9 | 3.1 | 1.9 | 2.4 | 6.0 | 4.5 | 9.3 | 6.2 | 7.1 |
| F1 Slime 1 | 196 | 8.6 | 0.16 | 0.34 | 58.7 | 21.7 | 3.44 | 2.88 | 0.27 | 0.65 | 0.21 | 0.15 | 5.64 | 7.1 | 7.3 | 11.4 | 11.2 | 6.4 | 13.8 | 18.4 | 14.7 | 10.5 | 14.4 |
| SG1 LIMS Mag | 1.7 | 0.1 | 0.04 | 0.09 | 22.6 | 4.39 | 0.56 | 0.00 | 0.30 | 7.47 | 0.55 | 0.00 | 60.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.9 | 0.3 | 0.0 | 1.4 |
| SG1 Cyclone OF | 62.7 | 2.8 | 0.22 | 0.47 | 54.6 | 25.0 | 3.35 | 2.00 | 0.43 | 0.55 | 0.26 | 0.21 | 3.96 | 3.1 | 2.2 | 4.2 | 3.5 | 1.4 | 7.0 | 5.0 | 5.8 | 4.7 | 3.2 |
| Head (calc.) | 2,273 | 100 | 0.20 | 0.42 | 69.7 | 16.4 | 2.64 | 3.86 | 0.17 | 0.30 | 0.12 | 0.12 | 3.37 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Dir.) | | | 0.20 | 0.43 | 68.1 | 16.8 | 2.62 | 3.76 | 0.13 | 0.30 | 0.12 | 0.12 | 3.54 | | | | | | | | | | |
| Mica Flotation Feed | 1,751 | 77.0 | 0.19 | 0.41 | 74.6 | 15.1 | 2.59 | 4.38 | 0.12 | 0.14 | 0.05 | 0.10 | 0.83 | 79.9 | 82.5 | 71.3 | 75.5 | 87.5 | 56.1 | 35.11 | 34.1 | 65.3 | 19.0 |
| Spodumene Flot Feed | 1,545 | 68.0 | 0.18 | 0.39 | 77.0 | 13.8 | 2.07 | 4.70 | 0.11 | 0.09 | 0.04 | 0.11 | 0.59 | 63.8 | 75.2 | 57.2 | 53.4 | 82.8 | 42.3 | 20.66 | 21.8 | 59.0 | 11.9 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F1 Li 2nd Cl Conc. | 151 | 6.6 | 1.23 | 2.65 | 73.3 | 16.3 | 0.75 | 0.68 | 0.55 | 0.21 | 0.13 | 0.38 | 2.11 | 41.9 | 7.0 | 6.6 | 1.9 | 1.2 | 21.6 | 4.6 | 7.0 | 20.4 | 4.2 | 65.7 |
| F1 Li 1st Cl Conc. | 188 | 8.2 | 1.12 | 2.42 | 74.1 | 15.7 | 0.88 | 0.80 | 0.47 | 0.20 | 0.12 | 0.32 | 2.00 | 47.5 | 8.8 | 7.9 | 2.8 | 1.7 | 23.1 | 5.4 | 8.2 | 21.6 | 4.9 | 74.4 |
| F1 Li Ro. Conc. | 247 | 10.9 | .93 | 2.00 | 74.6 | 15.4 | 1.27 | 1.20 | 0.38 | 0.19 | 0.11 | 0.26 | 1.80 | 51.7 | 11.7 | 10.2 | 5.3 | 3.4 | 24.6 | 6.8 | 9.9 | 22.9 | 5.8 | 80.9 |
| F1 Li Ro & Scav Conc | 322 | 14.2 | .79 | 1.70 | 73.8 | 15.9 | 1.92 | 1.39 | 0.31 | 0.18 | 0.11 | 0.21 | 1.69 | 57.2 | 15.0 | 13.7 | 10.3 | 5.1 | 26.4 | 8.3 | 13.1 | 24.2 | 7.1 | 89.6 |
| F1 Li Ro Tail | 1298 | 57.1 | 0.04 | 0.09 | 77.5 | 13.5 | 2.22 | 5.37 | 0.05 | 0.07 | 0.03 | 0.08 | 0.36 | 12.2 | 63.5 | 46.9 | 48.1 | 79.4 | 17.7 | 13.9 | 11.9 | 36.2 | 6.1 | |
| F1 Li Ro Scav Tail | 1223 | 53.8 | 0.02 | 0.05 | 77.9 | 13.2 | 2.11 | 5.57 | 0.05 | 0.07 | 0.02 | 0.08 | 0.30 | 6.6 | 60.2 | 43.4 | 43.0 | 77.7 | 15.9 | 12.4 | 8.7 | 34.8 | 4.8 | |
| F1 Mica Conc. | 162.8 | 7.2 | 0.29 | 0.63 | 53.2 | 27.7 | 7.59 | 1.39 | 0.16 | 0.55 | 0.19 | 0.07 | 2.86 | 10.8 | 5.5 | 12.1 | 20.6 | 2.6 | 6.9 | 12.8 | 11.0 | 4.1 | 6.1 | |
| F1 Mag Conc | 191.0 | 8.4 | 0.15 | 0.32 | 42.6 | 19.3 | 2.48 | 1.05 | 0.34 | 1.34 | 0.53 | 0.20 | 22.6 | 6.5 | 5.1 | 9.9 | 7.9 | 2.3 | 17.1 | 37.1 | 36.2 | 13.4 | 56.3 | |
| F1 Knelson Conc | 72.3 | 3.2 | 0.45 | 0.97 | 63.5 | 16.2 | 1.55 | 2.91 | 0.32 | 0.43 | 0.36 | 0.24 | 7.6 | 7.3 | 2.9 | 3.1 | 1.9 | 2.4 | 6.0 | 4.5 | 9.3 | 6.2 | 7.1 | |
| F1 Total Slimes | 301 | 13.3 | 0.17 | 0.37 | 59.3 | 21.8 | 3.23 | 2.90 | 0.35 | 0.57 | 0.20 | 0.16 | 4.74 | 11.5 | 11.3 | 17.6 | 16.3 | 10.0 | 27.6 | 25.0 | 21.7 | 17.3 | 18.7 | |
| | 2,273 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F2** 19680-01 Tech: Tracey **Date:** March 7,2023

**Purpose:** **First Trial for Floating Spodumene from the K-Dump Sample**
Mag Sep on the Head 8, 10 KG
**Procedure:** As outlined below, Using Tap Water
**Feed:** **2kg, K-Dump, SG2**
**Grind:** -300 mic
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **MIBC** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 8 min decant at 4L, Repeat at 6 min decant at 4L* | | | | | | | | | | | | 21 | |
| Please Perform Kneslon Sep test first | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Perform Mag Separation on the Kneslon Tailing at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.8-10.5 | 38% | 21 | 2Kg |
| Mica Conditioning 2 | | *20* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 7.5 | | | | **2** | 10.5 | | 21 | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Scav Flotation 1 | | 10 | 45.6 | | | 7.5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 2 | | 45 | 22.8 | | | 7.5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 3 | | 45 | 22.8 | | | 7.5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| High Density Scrubbing | | | 114 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 7 min, Repeat at 5 min* | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~3333 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.9 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 350 | 10 | | 7.2 | | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| Li Rougher, continue until froth dies | | | | 34.2 | | | | | | **1.5** | 8.5 | 36% | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.2 | | 22 | 2 Kg |
| | | | | | | | | | | | | | | |
| Li Rougher Scav. | | | | 22.8 | | | | | | **1** | 8.5 | | 22 | 2 Kg |
| | | | | | | | | | | | | | | |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 11.4 | | | | 25 | 1 | **1.5** | 8.5 | | 22 | 250g |
| | | | | | | | | | | | | | | |
| Li 2nd Cleaner | | | | 11.4 | | | | 10 | 1 | **1.5** | 8.5 | | 22 | 250g |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Total | 0 | 120 | 388 | 80 | 0 | | 250 | 535 | 35 | 14 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F2 Li 2nd Cl Conc | 224 | 9.3 | 2.75 | 5.92 | 64.8 | 24.7 | 0.44 | 0.52 | 0.41 | 0.07 | 0.13 | 0.29 | 0.51 | 67.1 | 8.4 | 14.1 | 1.5 | 1.3 | 23.1 | 3.3 | 11.3 | 19.7 | 3.4 |
| F2 Li 2nd Cl Tail | 21.5 | 0.9 | 1.33 | 2.86 | 71.2 | 18.8 | 1.78 | 1.81 | 0.14 | 0.13 | 0.12 | 0.08 | 1.03 | 3.1 | 0.9 | 1.0 | 0.6 | 0.4 | 0.8 | 0.6 | 1.0 | 0.5 | 0.7 |
| F2 Li 1st Cl Tail | 45.0 | 1.9 | 0.59 | 1.27 | 72.5 | 17.1 | 2.84 | 2.72 | 0.11 | 0.14 | 0.10 | 0.07 | 0.90 | 2.9 | 1.9 | 2.0 | 2.0 | 1.4 | 1.2 | 1.3 | 1.7 | 1.0 | 1.2 |
| F2 Li Ro Scav Conc | 85.9 | 3.6 | 0.37 | 0.80 | 65.6 | 21.2 | 5.00 | 2.24 | 0.10 | 0.16 | 0.13 | 0.06 | 1.35 | 3.5 | 3.3 | 4.6 | 6.7 | 2.1 | 2.2 | 2.9 | 4.3 | 1.6 | 3.4 |
| F2 Li Ro Scav Tail | 1464 | 61.2 | 0.02 | 0.03 | 79.2 | 12.1 | 2.46 | 5.03 | 0.05 | 0.07 | 0.01 | 0.08 | 0.22 | 2.6 | 67.4 | 45.1 | 55.8 | 82.1 | 18.4 | 21.7 | 5.7 | 35.7 | 9.5 |
| F2 Slime 2 | 22.8 | 1.0 | 0.27 | 0.58 | 65.4 | 19.5 | 2.82 | 3.40 | 0.45 | 0.37 | 0.13 | 0.17 | 1.47 | 0.7 | 0.9 | 1.1 | 1.0 | 0.9 | 2.6 | 1.8 | 1.2 | 1.2 | 1.0 |
| F2 Mica Ro Conc | 27.7 | 1.2 | 0.34 | 0.73 | 50.6 | 30.3 | 8.66 | 1.00 | 0.19 | 0.27 | 0.20 | 0.14 | 2.36 | 1.0 | 0.8 | 2.1 | 3.7 | 0.3 | 1.3 | 1.6 | 2.2 | 1.2 | 1.9 |
| F2 Mica Ro Scav Conc 1 | 23.5 | 1.0 | 0.33 | 0.71 | 57.1 | 25.8 | 6.76 | 1.84 | 0.33 | 0.30 | 0.17 | 0.24 | 1.95 | 0.8 | 0.8 | 1.5 | 2.5 | 0.5 | 2.0 | 1.5 | 1.6 | 1.7 | 1.4 |
| F2 Mica Ro Scav Conc 2 | 37.3 | 1.6 | 0.32 | 0.69 | 50.3 | 30.5 | 8.68 | 0.83 | 0.10 | 0.26 | 0.23 | 0.05 | 2.54 | 1.3 | 1.1 | 2.9 | 5.0 | 0.3 | 0.9 | 2.1 | 3.3 | 0.6 | 2.8 |
| F2 Mica Ro Scav Conc 3 | 13.9 | 0.6 | 0.31 | 0.67 | 52.0 | 29.2 | 7.94 | 1.08 | 0.14 | 0.29 | 0.22 | 0.05 | 2.48 | 0.5 | 0.4 | 1.0 | 1.7 | 0.2 | 0.5 | 0.9 | 1.2 | 0.2 | 1.0 |
| F2 10kG Mag | 58.0 | 2.4 | 0.35 | 0.75 | 51.5 | 21.4 | 3.03 | 1.84 | 0.80 | 1.42 | 1.18 | 0.63 | 10.2 | 2.2 | 1.7 | 3.2 | 2.7 | 1.2 | 11.7 | 17.4 | 26.6 | 11.1 | 17.4 |
| F2 13kG Mag | 31.9 | 1.3 | 0.44 | 0.95 | 58.7 | 20.4 | 4.06 | 2.03 | 0.86 | 0.86 | 0.45 | 0.63 | 6.3 | 1.5 | 1.1 | 1.7 | 2.0 | 0.7 | 6.9 | 5.8 | 5.6 | 6.1 | 5.9 |
| F2 Knelson Conc | 72.9 | 3.0 | 1.00 | 2.15 | 67.4 | 18.1 | 1.83 | 2.77 | 0.40 | 0.24 | 0.45 | 0.33 | 1.98 | 8.0 | 2.9 | 3.4 | 2.1 | 2.3 | 7.3 | 3.7 | 12.7 | 7.3 | 4.3 |
| F2 Slime 1 | 77.4 | 3.2 | 0.26 | 0.56 | 63.2 | 21.1 | 3.52 | 3.06 | 0.33 | 0.40 | 0.19 | 0.20 | 2.61 | 2.2 | 2.8 | 4.2 | 4.2 | 2.6 | 6.4 | 6.5 | 5.7 | 4.7 | 6.0 |
| SG2 Cyclone O/F | 187 | 7.8 | 0.13 | 0.28 | 51.1 | 25.5 | 2.94 | 1.76 | 0.31 | 0.73 | 0.22 | 0.13 | 7.29 | 2.7 | 5.6 | 12.2 | 8.5 | 3.7 | 14.6 | 28.9 | 16.0 | 7.4 | 40.3 |
| Head (calc.) | 2,393 | 100 | 0.38 | 0.82 | 71.9 | 16.4 | 2.70 | 3.75 | 0.17 | 0.20 | 0.11 | 0.14 | 1.42 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Dir.) | | | 0.45 | 0.97 | 72.8 | 15.9 | 2.65 | 3.87 | 0.15 | 0.15 | 0.10 | 0.15 | 0.87 | | | | | | | | | | |
| Mica Flotation Feed | 1,965 | 82.1 | 0.39 | 0.84 | 75.2 | 15.1 | 2.64 | 4.09 | 0.11 | 0.09 | 0.04 | 0.11 | 0.45 | 83.4 | 85.9 | 75.5 | 80.4 | 89.5 | 53.0 | 37.6 | 33.4 | 63.3 | 26.2 |
| Spodumene Flot Feed | 1,840 | 76.9 | 0.39 | 0.85 | 76.6 | 14.3 | 2.33 | 4.26 | 0.10 | 0.08 | 0.03 | 0.10 | 0.33 | 79.1 | 81.9 | 66.8 | 66.5 | 87.3 | 45.7 | 29.8 | 24.0 | 58.4 | 18.1 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F2 Li 2nd Cl Conc. | 224 | 9.3 | 2.75 | 5.92 | 64.8 | 24.7 | 0.44 | 0.52 | 0.41 | 0.07 | 0.13 | 0.29 | 0.51 | 67.1 | 8.4 | 14.1 | 1.5 | 1.3 | 23.1 | 3.3 | 11.3 | 19.7 | 3.4 | 84.8 |
| F2 Li 1st Cl Conc. | 245 | 10.2 | 2.63 | 5.65 | 65.4 | 24.2 | 0.56 | 0.63 | 0.39 | 0.08 | 0.13 | 0.27 | 0.56 | 70.2 | 9.3 | 15.1 | 2.1 | 1.7 | 23.9 | 3.9 | 12.3 | 20.3 | 4.0 | 88.7 |
| F2 Li Ro. Conc. | 290 | 12.1 | 2.31 | 4.97 | 66.5 | 23.1 | 0.91 | 0.96 | 0.34 | 0.09 | 0.12 | 0.24 | 0.61 | 73.1 | 11.2 | 17.0 | 4.1 | 3.1 | 25.1 | 5.2 | 14.0 | 21.2 | 5.2 | 92.4 |
| F2 Li Ro & Scav Conc | 376 | 15.7 | 1.87 | 4.02 | 66.3 | 22.7 | 1.85 | 1.25 | 0.29 | 0.10 | 0.13 | 0.20 | 0.78 | 76.6 | 14.5 | 21.7 | 10.8 | 5.2 | 27.3 | 8.1 | 18.4 | 22.8 | 8.6 | 96.8 |
| F2 Li Ro Tail | 1550 | 64.8 | 0.04 | 0.08 | 78.4 | 12.6 | 2.60 | 4.88 | 0.05 | 0.07 | 0.02 | 0.08 | 0.28 | 6.0 | 70.7 | 49.7 | 62.4 | 84.3 | 20.6 | 24.6 | 10.0 | 37.2 | 12.9 | |
| F2 Li Ro Scav Tail | 1464 | 61.2 | 0.02 | 0.03 | 79.2 | 12.1 | 2.46 | 5.03 | 0.05 | 0.07 | 0.01 | 0.08 | 0.22 | 2.6 | 67.4 | 45.1 | 55.8 | 82.1 | 18.4 | 21.7 | 5.7 | 35.7 | 9.5 | |
| F2 Mica Conc. | 102.4 | 4.3 | 0.33 | 0.70 | 52.2 | 29.2 | 8.13 | 1.14 | 0.18 | 0.28 | 0.21 | 0.12 | 2.35 | 3.6 | 3.1 | 7.6 | 12.9 | 1.3 | 4.7 | 6.0 | 8.2 | 3.7 | 7.1 | |
| F2 Mag Conc | 89.9 | 3.8 | 0.38 | 0.82 | 54.1 | 21.0 | 3.40 | 1.91 | 0.82 | 1.22 | 0.92 | 0.63 | 8.82 | 3.7 | 2.8 | 4.8 | 4.7 | 1.9 | 18.6 | 23.2 | 32.1 | 17.2 | 23.4 | |
| F2 Knelson Conc | 72.9 | 3.0 | 1.00 | 2.15 | 67.4 | 18.1 | 1.83 | 2.77 | 0.40 | 0.24 | 0.45 | 0.33 | 1.98 | 8.0 | 2.9 | 3.4 | 2.1 | 2.3 | 7.3 | 3.7 | 12.7 | 7.3 | 4.3 | |
| F2 Total Slimes | 288 | 12.0 | 0.18 | 0.38 | 55.5 | 23.8 | 3.09 | 2.24 | 0.33 | 0.61 | 0.20 | 0.15 | 5.57 | 5.5 | 9.3 | 17.5 | 13.8 | 7.2 | 23.7 | 37.3 | 22.9 | 13.3 | 47.2 | |
| | 2,393 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F3** 19680-01 Tech: Dan Lang **Date:** March 23,2023

**Purpose:** **First Trial for Floating Spodumene from G-Dump Middling Sample**
Mag Sep on the Head 8, 10 KG
**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.1kg, G-Dump Middling**
**Grind:** -300 mic
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **MIBC** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 8 min decant at 4L, Repeat at 5 min decant at 4L* | | | | | | | | | | | | 21 | |
| Please Perform Knelson Sep test first | | | | | | | | | | | | | | |
| Perform Mag Separation on the Knelson Tailing at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| Mica Conditioning 1 | | | 150 | | | | | | 1 | | 7.8-10.5 | 29% | 21 | 2Kg |
| Mica Conditioning 2 | | *55* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | *** | | | 10 | | | | **2** | 10.5 | | 21 | 2Kg |
| Mica Scav Flotation 1 | | 40 | *** | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| High Density Scrubbing | | | *** | | | | 250 | | 10 | | 11.0 | | 22 | 1Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 5 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~2667 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 9.0 | | 22 | 1 kg |
| High Density Condition 2 | | | | 25 | | | | 500 | 10 | | 6.9 | | 22 | 1Kg |
| Li Rougher, continue until froth dies | | | | 50 | | | | | | **2.0** | 8.5 | 34% | 22 | 1 kg |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.4 | | 22 | 1 kg |
| Li Rougher Scav. | | | | *** | | | | | | **1** | 8.6 | | 22 | 1 kg |
| Examine Scav Conc and decide to Set it aside or combine it with Ro. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | *** | | | | 25 | 1 | **1.5** | 8.5 | | 22 | 500g |
| Li 2nd Cleaner | | | | *** | | | | | 1 | **1.5** | 8.5 | | 22 | 500g |
| Lots of Fe in the final conc therefore, added a Mag sep'n stage at 20K | | | | | | | | | | | | | | |
| Total | 0 | 95 | 150 | 75 | 0 | | 250 | 675 | 33 | 10 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F-3 Li 2nd Cl Conc Non Mag | 549 | 25.8 | 2.99 | 6.44 | 66.3 | 24.5 | 0.18 | 0.39 | 0.16 | 0.02 | 0.08 | 0.09 | 0.5 | 63.3 | 26.5 | 36.3 | 3.2 | 7.4 | 24.7 | 2.5 | 18.0 | 23.1 | 1.4 |
| F-3 2nd Cl Conc Mag | 31.1 | 1.5 | 1.00 | 2.15 | 60.9 | 14.3 | 0.44 | 0.31 | 0.56 | 0.30 | 0.18 | 0.40 | 15.4 | 1.2 | 1.4 | 1.2 | 0.4 | 0.3 | 4.9 | 2.1 | 2.3 | 5.8 | 2.7 |
| F-3 Li 2nd Cl Tail | 58.6 | 2.8 | 1.77 | 3.81 | 74.8 | 16.9 | 0.49 | 1.32 | 0.09 | 0.05 | 0.06 | 0.05 | 1.4 | 4.0 | 3.2 | 2.7 | 0.9 | 2.7 | 1.5 | 0.7 | 1.4 | 1.4 | 0.5 |
| F-3 Li 1st Cl Tail | 111 | 5.2 | 1.03 | 2.22 | 79.9 | 13.1 | 0.74 | 2.17 | 0.08 | 0.06 | 0.03 | 0.04 | 0.9 | 4.4 | 6.5 | 3.9 | 2.6 | 8.4 | 2.5 | 1.5 | 1.4 | 2.1 | 0.5 |
| F-3 Li Scav Conc | 46.4 | 2.2 | 0.80 | 1.72 | 82.6 | 11.0 | 0.61 | 2.06 | 0.09 | 0.04 | 0.04 | 0.03 | 0.8 | 1.4 | 2.8 | 1.4 | 0.9 | 3.3 | 1.2 | 0.4 | 0.8 | 0.7 | 0.2 |
| F-3 Li Scav Tail | 424 | 19.9 | 0.03 | 0.05 | 85.7 | 8.2 | 1.26 | 3.36 | 0.04 | 0.12 | 0.01 | 0.04 | 0.4 | 0.4 | 26.4 | 9.4 | 17.1 | 49.4 | 4.8 | 11.5 | 1.7 | 7.9 | 0.9 |
| F-3 Slime 2 | 57.6 | 2.7 | 1.26 | 2.71 | 64.8 | 18.8 | 1.78 | 1.60 | 0.38 | 0.26 | 0.11 | 0.13 | 6.0 | 2.8 | 2.7 | 2.9 | 3.3 | 3.2 | 6.1 | 3.4 | 2.6 | 3.5 | 1.9 |
| F-3 Mica Ro Conc | 94.1 | 4.4 | 0.50 | 1.08 | 51.7 | 29.4 | 8.44 | 0.72 | 0.09 | 0.39 | 0.22 | 0.05 | 2.8 | 1.8 | 3.5 | 7.5 | 25.4 | 2.3 | 2.4 | 8.3 | 8.5 | 2.2 | 1.5 |
| F-3 Mica Scav Conc | 66.3 | 3.1 | 1.07 | 2.30 | 69.2 | 19.2 | 2.81 | 1.40 | 0.38 | 0.40 | 0.09 | 0.19 | 1.7 | 2.7 | 3.3 | 3.4 | 6.0 | 3.2 | 7.1 | 6.0 | 2.4 | 5.9 | 0.6 |
| F-3 10K Mag 1 | 274 | 12.9 | 0.35 | 0.75 | 37.8 | 14.8 | 1.40 | 0.41 | 0.20 | 0.45 | 0.24 | 0.15 | 34.3 | 3.7 | 7.5 | 10.9 | 12.3 | 3.9 | 15.4 | 27.9 | 26.8 | 19.2 | 52.5 |
| F-3 13K Mag 2 | 75.8 | 3.6 | 0.40 | 0.86 | 41.7 | 15.0 | 1.71 | 0.41 | 0.24 | 0.52 | 0.24 | 0.17 | 30.9 | 1.2 | 2.3 | 3.1 | 4.1 | 1.1 | 5.1 | 8.9 | 7.4 | 6.0 | 13.1 |
| F-3 Knelson Conc | 71.6 | 3.4 | 1.35 | 2.91 | 56.6 | 17.7 | 1.07 | 0.94 | 0.22 | 0.18 | 0.33 | 0.16 | 12.9 | 3.7 | 2.9 | 3.4 | 2.5 | 2.3 | 4.4 | 2.9 | 9.7 | 5.4 | 5.2 |
| F-3 Slime 1 | 123.0 | 5.8 | 1.04 | 2.24 | 60.6 | 18.5 | 2.17 | 1.41 | 0.22 | 0.29 | 0.13 | 0.13 | 10.2 | 4.9 | 5.4 | 6.1 | 8.5 | 6.0 | 7.6 | 8.1 | 6.5 | 7.5 | 7.0 |
| SG3 Slime | 143.2 | 6.7 | 0.78 | 1.68 | 52.0 | 20.1 | 2.79 | 1.30 | 0.31 | 0.49 | 0.18 | 0.14 | 15.1 | 4.3 | 5.4 | 7.8 | 12.8 | 6.4 | 12.5 | 15.9 | 10.5 | 9.4 | 12.1 |
| Head (calc.) | 2,126 | 100 | 1.22 | 2.62 | 64.6 | 17.4 | 1.47 | 1.36 | 0.17 | 0.21 | 0.12 | 0.10 | 8.42 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Dir.) | | | 1.22 | 2.63 | 64.4 | 17.4 | 1.49 | 1.38 | 0.14 | 0.23 | 0.10 | 0.10 | 8.93 | | | | | | | | | | |
| Mica Flot Feed | 1439 | 67.7 | 1.48 | 3.19 | 72.9 | 17.7 | 1.30 | 1.61 | 0.14 | 0.11 | 0.07 | 0.08 | 1.27 | 82.2 | 76.4 | 68.7 | 59.8 | 80.2 | 55.1 | 36.4 | 39.0 | 52.6 | 10.2 |
| Spodumene Flot Feed | 1,221 | 57.4 | 1.59 | 3.42 | 75.2 | 16.7 | .64 | 1.69 | 0.12 | 0.07 | 0.05 | 0.07 | 0.90 | 74.8 | 66.8 | 54.9 | 25.2 | 71.5 | 39.5 | 18.70 | 25.5 | 41.0 | 6.1 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F3 Li 2nd Cl Conc. Non-mag | 549 | 25.8 | 2.99 | 6.44 | 66.3 | 24.5 | 0.18 | 0.39 | 0.16 | 0.02 | 0.08 | 0.09 | 0.45 | 63.3 | 26.5 | 36.3 | 3.2 | 7.4 | 24.7 | 2.5 | 18.0 | 23.1 | 1.4 | 84.7 |
| F3 Li 2nd Cl Conc. | 580 | 27.3 | 2.88 | 6.21 | 66.0 | 24.0 | 0.19 | 0.39 | 0.18 | 0.04 | 0.09 | 0.11 | 1.25 | 64.5 | 27.9 | 37.5 | 3.6 | 7.8 | 29.6 | 4.6 | 20.2 | 28.9 | 4.1 | 86.3 |
| F3 Li 1st Cl Conc. | 639 | 30.1 | 2.78 | 5.99 | 66.8 | 23.3 | 0.22 | 0.47 | 0.17 | 0.04 | 0.08 | 0.10 | 1.26 | 68.5 | 31.1 | 40.2 | 4.5 | 10.4 | 31.0 | 5.3 | 21.7 | 30.3 | 4.5 | 91.6 |
| F3 Li Ro. Conc. | 750 | 35.3 | 2.52 | 5.43 | 68.8 | 21.8 | 0.30 | 0.72 | 0.16 | 0.04 | 0.08 | 0.09 | 1.20 | 73.0 | 37.5 | 44.1 | 7.2 | 18.8 | 33.5 | 6.8 | 23.0 | 32.4 | 5.0 | 97.5 |
| F3 Li Ro & Scav Conc | 797 | 37.5 | 2.42 | 5.21 | 69.6 | 21.2 | 0.32 | 0.80 | 0.16 | 0.04 | 0.07 | 0.09 | 1.18 | 74.4 | 40.3 | 45.5 | 8.1 | 22.1 | 34.7 | 7.2 | 23.8 | 33.0 | 5.3 | 99.5 |
| F3 Li Ro Tail | 470 | 22.1 | 0.10 | 0.22 | 85.4 | 8.5 | 1.20 | 3.23 | 0.04 | 0.11 | 0.01 | 0.04 | 0.41 | 1.8 | 29.2 | 10.8 | 18.0 | 52.7 | 5.9 | 11.9 | 2.5 | 8.6 | 1.1 | |
| F3 Li Ro Scav Tail | 424 | 19.9 | 0.03 | 0.05 | 85.7 | 8.2 | 1.26 | 3.36 | 0.04 | 0.12 | 0.01 | 0.04 | 0.36 | 0.4 | 26.4 | 9.4 | 17.1 | 49.4 | 4.8 | 11.5 | 1.7 | 7.9 | .9 | |
| F3 Mica Conc. | 160 | 7.5 | 0.74 | 1.58 | 58.9 | 25.2 | 6.11 | 1.00 | 0.21 | 0.39 | 0.17 | 0.11 | 2.37 | 4.6 | 6.9 | 10.9 | 31.4 | 5.6 | 9.4 | 14.3 | 10.9 | 8.1 | 2.1 | |
| F3 Mag Conc | 349.5 | 16.4 | 0.36 | 0.78 | 38.6 | 14.8 | 1.47 | 0.41 | 0.21 | 0.47 | 0.24 | 0.15 | 33.6 | 4.9 | 9.8 | 14.0 | 16.4 | 5.0 | 20.5 | 36.8 | 34.3 | 25.2 | 65.6 | |
| F3 Knelson Conc. | 71.6 | 3.4 | 1.35 | 2.91 | 56.6 | 17.7 | 1.07 | 0.94 | 0.22 | 0.18 | 0.33 | 0.16 | 12.9 | 3.7 | 2.9 | 3.4 | 2.5 | 2.3 | 4.4 | 2.9 | 9.7 | 5.4 | 5.2 | |
| F3 Total Slimes | 324 | 15.2 | 0.96 | 2.08 | 57.5 | 19.3 | 2.37 | 1.40 | 0.29 | 0.37 | 0.15 | 0.13 | 11.6 | 12.0 | 13.6 | 16.8 | 24.6 | 15.7 | 26.2 | 27.3 | 19.7 | 20.4 | 21.0 | |
| | 2,126 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F4** 19680-01 Tech: Dan Lang **Date:** March 23,2023

**Purpose:** **Based on F2 but on the DMS U/S + Middling**
Mag Sep on the Head 8, 10 KG Fines/Middling ratio for K-dump= 5/1
**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.1 kg, K-Dump U/S + Middling, (1750 g from K-Dump U/S, G2 Ground Sample, and 350 from K-Dump DMS middling after Grinding to -300 mi**
**Grind:** -300 mic
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **W55** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 6 min decant at 3L, Repeat at 5 min decant at 3L* | | | | | | | | | | | | 21 | |
| Please Perform Knelson Sep test first | | | | | | | | | | | | | | |
| Perform Mag Separation on the Knelson Tailing at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.8-10.5 | 34% | 21 | 2Kg |
| Mica Conditioning 2 | | *55* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 5 | | | | **2** | 10.5 | | 21 | 2Kg |
| Mica Scav Flotation 1 | | 30 | 45.6 | | | 5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 2 | | 20 | 22.8 | | | 5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| High Density Scrubbing | | | 150 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 5 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~3333 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.9 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 350 | 10 | | 7.2 | | 22 | 2Kg |
| Li Rougher, continue until froth dies | | | | 25 | | | | | | **1.5** | 8.5 | 32% | 22 | 2Kg |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.2 | | 22 | 2 Kg |
| Li Rougher Scav. | | | | 25 | | | | | | **1** | 8.5 | | 22 | 2 Kg |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 15 | | | | 25 | 1 | **1** | 8.5 | | 22 | 250g |
| Li 2nd Cleaner | | | | 15 | | | | 10 | 1 | **1** | 8.5 | | 22 | 250g |
| Total | 0 | 105 | 401 | 80 | 0 | | 250 | 535 | 34 | 11 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F-4 2nd Cl Conc | 223 | 10.4 | 3.13 | 6.74 | 64.6 | 25.3 | 0.28 | 0.39 | 0.36 | 0.06 | 0.12 | 0.26 | 0.82 | 56.1 | 9.4 | 15.6 | 1.1 | 1.2 | 23.1 | 3.4 | 11.5 | 19.3 | 5.9 |
| F-4 Li 2nd Cl Tail | 50.9 | 2.4 | 2.28 | 4.91 | 68.3 | 21.9 | 0.87 | 1.16 | 0.18 | 0.08 | 0.11 | 0.13 | 0.84 | 9.3 | 2.3 | 3.1 | 0.8 | 0.8 | 2.6 | 1.0 | 2.4 | 2.2 | 1.4 |
| F-4 Li 1st Cl Tail | 63.5 | 2.9 | 1.25 | 2.69 | 72.9 | 17.5 | 1.70 | 2.54 | 0.13 | 0.10 | 0.08 | 0.10 | 0.72 | 6.4 | 3.0 | 3.1 | 2.0 | 2.1 | 2.4 | 1.6 | 2.2 | 2.1 | 1.5 |
| F-4 Li Scav Conc | 52.8 | 2.5 | 0.91 | 1.96 | 74.8 | 16.0 | 1.90 | 2.66 | 0.11 | 0.08 | 0.07 | 0.07 | 0.80 | 3.9 | 2.6 | 2.3 | 1.8 | 1.9 | 1.7 | 1.1 | 1.6 | 1.2 | 1.4 |
| F-4 Li Scav Tail | 1232 | 57.2 | 0.03 | 0.06 | 78.5 | 12.4 | 2.61 | 4.85 | 0.05 | 0.07 | 0.02 | 0.09 | 0.32 | 2.8 | 62.7 | 42.2 | 58.6 | 78.9 | 17.7 | 22.2 | 10.5 | 36.8 | 12.7 |
| F-4 Slime 2 | 36.1 | 1.7 | 0.48 | 1.03 | 65.0 | 19.9 | 3.07 | 3.14 | 0.48 | 0.36 | 0.14 | 0.17 | 1.74 | 1.4 | 1.5 | 2.0 | 2.0 | 1.5 | 5.0 | 3.3 | 2.2 | 2.0 | 2.0 |
| F-4 Mica Ro Conc | 38.6 | 1.8 | 0.40 | 0.86 | 52.4 | 29.4 | 8.29 | 1.15 | 0.07 | 0.24 | 0.21 | 0.05 | 2.35 | 1.2 | 1.3 | 3.1 | 5.8 | 0.6 | 0.8 | 2.4 | 3.5 | 0.6 | 2.9 |
| F-4 Mica Scav Conc | 40.5 | 1.9 | 0.39 | 0.84 | 54.6 | 27.9 | 7.64 | 1.36 | 0.11 | 0.28 | 0.19 | 0.06 | 2.27 | 1.3 | 1.4 | 3.1 | 5.6 | 0.7 | 1.3 | 2.9 | 3.3 | 0.8 | 3.0 |
| F-4 10K Mag 1 | 40.5 | 1.9 | 0.55 | 1.18 | 50.1 | 22.1 | 3.19 | 1.50 | 0.86 | 1.36 | 1.22 | 0.71 | 10.3 | 1.8 | 1.3 | 2.5 | 2.4 | 0.8 | 10.0 | 14.2 | 21.2 | 9.5 | 13.4 |
| F-4 13K Mag 2 | 21.8 | 1.0 | 0.59 | 1.27 | 54.6 | 21.1 | 3.52 | 1.73 | 0.85 | 1.02 | 0.69 | 0.63 | 8.78 | 1.0 | 0.8 | 1.3 | 1.4 | 0.5 | 5.3 | 5.7 | 6.4 | 4.6 | 6.2 |
| F4 Knelson Conc | 68.1 | 3.2 | 1.15 | 2.48 | 68.3 | 18.3 | 1.89 | 2.67 | 0.32 | 0.18 | 0.38 | 0.27 | 1.69 | 6.3 | 3.0 | 3.4 | 2.3 | 2.4 | 6.3 | 3.2 | 11.1 | 6.1 | 3.7 |
| F-4 Slime 1 | 91.4 | 4.2 | 0.42 | 0.90 | 64.1 | 20.3 | 3.43 | 3.11 | 0.29 | 0.34 | 0.17 | 0.19 | 2.48 | 3.1 | 3.8 | 5.1 | 5.7 | 3.8 | 7.6 | 8.0 | 6.7 | 5.8 | 7.3 |
| F4 Primary Slimes | 194 | 9.0 | 0.35 | 0.75 | 54.6 | 24.3 | 2.93 | 1.92 | 0.29 | 0.62 | 0.21 | 0.14 | 6.18 | 5.5 | 6.9 | 13.1 | 10.4 | 4.9 | 16.3 | 31.0 | 17.6 | 9.0 | 38.7 |
| Head (calc.) | 2,153 | 100 | 0.58 | 1.24 | 71.5 | 16.8 | 2.55 | 3.52 | 0.16 | 0.18 | 0.11 | 0.14 | 1.44 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (calc.fines + Mid.) | | | 0.61 | 1.30 | 71.7 | 16.9 | 2.23 | 3.50 | 0.16 | 0.17 | 0.11 | 0.13 | 1.33 | | | | | | | | | | |
| Mica Flotation Feed | 1,737 | 80.7 | 0.59 | 1.27 | 74.7 | 15.5 | 2.46 | 3.82 | 0.11 | 0.09 | 0.05 | 0.11 | 0.55 | 82.3 | 84.2 | 74.6 | 77.8 | 87.6 | 54.5 | 38.01 | 37.1 | 65.1 | 30.7 |
| Spodumene Flot Feed | 1,622 | 75.3 | 0.60 | 1.30 | 75.9 | 14.8 | 2.18 | 3.96 | 0.10 | 0.07 | 0.04 | 0.11 | 0.44 | 78.4 | 79.9 | 66.4 | 64.3 | 84.8 | 47.5 | 29.37 | 28.2 | 61.6 | 22.8 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F4 Li 2nd Cl Conc. | 223 | 10.4 | 3.13 | 6.74 | 64.6 | 25.3 | 0.28 | 0.39 | 0.36 | 0.06 | 0.12 | 0.26 | 0.82 | 56.1 | 9.4 | 15.6 | 1.1 | 1.2 | 23.1 | 3.4 | 11.5 | 19.3 | 5.9 | 71.5 |
| F4 Li 1st Cl Conc. | 274 | 12.7 | 2.97 | 6.40 | 65.3 | 24.7 | 0.39 | 0.53 | 0.33 | 0.06 | 0.12 | 0.24 | 0.82 | 65.4 | 11.6 | 18.7 | 1.9 | 1.9 | 25.7 | 4.5 | 13.9 | 21.5 | 7.3 | 83.4 |
| F4 Li Ro. Conc. | 338 | 15.7 | 2.65 | 5.70 | 66.7 | 23.3 | 0.64 | 0.91 | 0.29 | 0.07 | 0.11 | 0.21 | 0.80 | 71.8 | 14.6 | 21.8 | 3.9 | 4.1 | 28.1 | 6.1 | 16.0 | 23.6 | 8.7 | 91.6 |
| F4 Li Ro & Scav Conc | 391 | 18.1 | 2.41 | 5.19 | 67.8 | 22.3 | 0.81 | 1.15 | 0.27 | 0.07 | 0.11 | 0.19 | 0.80 | 75.7 | 17.2 | 24.1 | 5.7 | 5.9 | 29.8 | 7.2 | 17.6 | 24.8 | 10.1 | 96.5 |
| F4 Li Ro Tail | 1284 | 59.6 | 0.06 | 0.14 | 78.3 | 12.5 | 2.58 | 4.76 | 0.05 | 0.07 | 0.02 | 0.09 | 0.34 | 6.6 | 65.3 | 44.6 | 60.4 | 80.8 | 19.4 | 23.2 | 12.1 | 38.0 | 14.1 | |
| F4 Li Ro Scav Tail | 1232 | 57.2 | 0.03 | 0.06 | 78.5 | 12.4 | 2.61 | 4.85 | 0.05 | 0.07 | 0.02 | 0.09 | 0.32 | 2.8 | 62.7 | 42.2 | 58.6 | 78.9 | 17.7 | 22.2 | 10.5 | 36.8 | 12.7 | |
| F4 Mica Conc. | 79.1 | 3.7 | 0.39 | 0.85 | 53.5 | 28.6 | 7.96 | 1.26 | 0.09 | 0.26 | 0.20 | 0.06 | 2.31 | 2.5 | 2.7 | 6.3 | 11.5 | 1.3 | 2.1 | 5.3 | 6.8 | 1.4 | 5.9 | |
| F4 Mag Conc | 62.3 | 2.9 | 0.56 | 1.21 | 51.7 | 21.8 | 3.31 | 1.58 | 0.86 | 1.24 | 1.03 | 0.68 | 9.8 | 2.8 | 2.1 | 3.7 | 3.8 | 1.3 | 15.3 | 19.9 | 27.6 | 14.1 | 19.6 | |
| F4 Knelson Conc. | 68.1 | 3.2 | 0.42 | 0.90 | 64.1 | 20.3 | 3.43 | 3.11 | 0.29 | 0.34 | 0.17 | 0.19 | 2.5 | 6.3 | 3.0 | 3.4 | 2.3 | 2.4 | 6.3 | 3.2 | 11.1 | 6.1 | 3.7 | |
| F4 Total Slimes | 322 | 15.0 | 0.38 | 0.83 | 58.5 | 22.7 | 3.09 | 2.39 | 0.31 | 0.51 | 0.19 | 0.16 | 4.63 | 9.9 | 12.2 | 20.2 | 18.1 | 10.2 | 28.9 | 42.3 | 26.4 | 16.8 | 48.0 | |
| | 2,153 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F5** 19680-01 Tech: Tracey **Date:** April 20,2023

**Purpose:** **Based on Test F1 but with Lower Collector Dosage and Using EDA for Mica Flotation**

**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.2kg, G-Dump, SG1**
**Grind:** -300 mic
**Regrind:** None
**Collector** 100% Armaz 7080

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **MIBC** | **F220** | **Armaz 7080** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 8 min decant at 4L, Repeat at 6 min decant at 4L* | | | | | | | | | | | | 21 | |
| Please Perform Kneslon Sep test first | | | | | | | | | | | | | | |
| Perform Mag Separation on the Kneslon Tailing at 13 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.5-10.5 | 34% | 22 | 2Kg |
| Mica Conditioning 2 | 25 | | 22.8 | | | | | | 2 | | 10.5 | | 22 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 10 | | | | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 1 | 12.5 | | 45.6 | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 2 | 25 | | 45.6 | | | 10 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| High Density Scrubbing | | | 77 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 7 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~2300 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.8 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 250 | 10 | | 6.9 | | 22 | 2Kg |
| Li Rougher, continue until froth dies | | | | 34.2 | | | | | | **2.0** | 8.5 | 6% | 22 | 2Kg |
| High Density Condition 3 | | | | | | | | 100 | 3 | | 7.4 | | 22 | 2 Kg |
| Li Rougher Scav. | | | | 55 | | | | | | **1** | 8.7 | | 22 | 2 Kg |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 22.5 | | | | 10 | 1 | **1.5** | 8.5 | | 22 | 250g |
| Li 2nd Cleaner | | | | 11.25 | | | | | 1 | **1.5** | 8.5 | | 22 | 250g |
| WHIMS on 2nd Cl Conc at 13kG | | | | | | | | | | | | | | |
| Total | 63 | 0 | 374 | 123 | 0 | | 250 | 360 | 34 | 12 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F5 Li 2nd Cl Conc Non-Mag | 89.8 | 4.0 | 1.91 | 4.11 | 72.3 | 18.7 | 0.27 | 0.64 | 0.45 | 0.08 | 0.09 | 0.28 | 0.74 | 37.4 | 4.1 | 4.6 | 0.4 | 0.7 | 10.3 | 1.0 | 3.1 | 9.8 | 0.9 |
| F5 Li 2nd Cl Conc Mag | 31.9 | 1.4 | 0.65 | 1.40 | 65.2 | 14.3 | 0.44 | 0.59 | 0.87 | 0.67 | 0.30 | 0.66 | 9.48 | 4.5 | 1.3 | 1.2 | 0.2 | 0.2 | 7.1 | 3.1 | 3.6 | 8.2 | 4.0 |
| F5 Li 2nd Cl Tail | 25.3 | 1.1 | 0.71 | 1.53 | 81.5 | 10.1 | 0.77 | 1.30 | 0.11 | 0.09 | 0.10 | 0.07 | 2.59 | 3.9 | 1.3 | 0.7 | 0.3 | 0.4 | 0.7 | 0.3 | 1.0 | 0.7 | 0.9 |
| F5 Li 1st Cl Tail | 45.0 | 2.0 | 0.33 | 0.71 | 81.9 | 10.0 | 1.45 | 2.51 | 0.09 | 0.07 | 0.06 | 0.08 | 1.48 | 3.2 | 2.4 | 1.2 | 1.1 | 1.3 | 1.0 | 0.5 | 1.0 | 1.4 | 0.9 |
| F5 Li Ro Scav Conc | 59 | 2.6 | 0.24 | 0.52 | 76.7 | 13.5 | 2.46 | 2.65 | 0.09 | 0.09 | 0.07 | 0.06 | 1.06 | 3.1 | 2.9 | 2.2 | 2.4 | 1.8 | 1.3 | 0.8 | 1.6 | 1.4 | 0.8 |
| F5 Li Ro Scav Tail | 1144.1 | 50.6 | 0.02 | 0.04 | 78.7 | 12.3 | 1.76 | 5.71 | 0.05 | 0.06 | 0.01 | 0.07 | 0.23 | 5.0 | 57.5 | 38.4 | 33.8 | 74.6 | 14.6 | 10.0 | 4.4 | 31.3 | 3.5 |
| F5 Slime 2 | 41.2 | 1.8 | 0.14 | 0.30 | 64.9 | 17.9 | 1.94 | 4.06 | 1.21 | 0.29 | 0.10 | 0.14 | 2.63 | 1.3 | 1.7 | 2.0 | 1.3 | 1.9 | 12.7 | 1.7 | 1.6 | 2.3 | 1.4 |
| F5 Mica Ro Conc | 199.6 | 8.8 | 0.31 | 0.67 | 53.4 | 27.5 | 7.82 | 1.35 | 0.10 | 0.50 | 0.19 | 0.06 | 2.84 | 13.5 | 6.8 | 15.0 | 26.2 | 3.1 | 5.1 | 14.6 | 14.5 | 4.7 | 7.5 |
| F5 Mica Ro Scav Conc 1 | 54.0 | 2.4 | 0.27 | 0.58 | 57.2 | 25.1 | 6.66 | 1.72 | 0.17 | 0.44 | 0.17 | 0.09 | 2.53 | 3.2 | 2.0 | 3.7 | 6.0 | 1.1 | 2.3 | 3.5 | 3.5 | 1.9 | 1.8 |
| F5 Mica Ro Scav Conc 2 | 34.1 | 1.5 | 0.17 | 0.37 | 67.6 | 18.5 | 4.48 | 2.66 | 0.20 | 0.30 | 0.10 | 0.11 | 1.74 | 1.3 | 1.5 | 1.7 | 2.6 | 1.0 | 1.7 | 1.5 | 1.3 | 1.5 | 0.8 |
| F5 13KG Mag 1st Pass | 135 | 6.0 | 0.15 | 0.32 | 45.1 | 18.6 | 2.37 | 1.47 | 0.31 | 1.09 | 0.48 | 0.18 | 20.9 | 4.4 | 3.9 | 6.8 | 5.4 | 2.3 | 10.7 | 21.5 | 24.7 | 9.5 | 37.4 |
| F5 13KG Mag 2nd Pass | 67.6 | 3.0 | 0.19 | 0.41 | 49.9 | 19.2 | 3.05 | 1.53 | 0.33 | 1.16 | 0.39 | 0.20 | 15.7 | 2.8 | 2.2 | 3.5 | 3.5 | 1.2 | 5.7 | 11.5 | 10.1 | 5.3 | 14.1 |
| F5 Knelson Conc. | 74.5 | 3.3 | 0.41 | 0.88 | 63.9 | 15.8 | 1.56 | 3.08 | 0.31 | 0.42 | 0.32 | 0.22 | 7.07 | 6.7 | 3.0 | 3.2 | 2.0 | 2.6 | 5.9 | 4.6 | 9.1 | 6.4 | 7.0 |
| F5 Slime 1 | 195 | 8.6 | 0.16 | 0.34 | 58.5 | 21.6 | 3.41 | 2.95 | 0.28 | 0.65 | 0.19 | 0.14 | 5.58 | 6.8 | 7.3 | 11.5 | 11.2 | 6.6 | 13.9 | 18.5 | 14.1 | 10.6 | 14.4 |
| SG1 LIMS Mag | 1.7 | 0.1 | 0.04 | 0.09 | 22.6 | 4.39 | 0.56 | 0.00 | 0.30 | 7.47 | 0.55 | 0.00 | 60.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 1.9 | 0.4 | 0.0 | 1.4 |
| SG1 Cyclone OF | 62.4 | 2.8 | 0.22 | 0.47 | 54.6 | 25.0 | 3.35 | 2.00 | 0.43 | 0.55 | 0.26 | 0.21 | 3.96 | 3.0 | 2.2 | 4.3 | 3.5 | 1.4 | 6.8 | 5.0 | 6.2 | 5.1 | 3.3 |
| Head (calc.) | 2,260 | 100 | 0.20 | 0.44 | 69.3 | 16.2 | 2.63 | 3.88 | 0.17 | 0.30 | 0.12 | 0.11 | 3.34 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Dir.) | | | 0.20 | 0.43 | 68.1 | 16.8 | 2.62 | 3.76 | 0.13 | 0.30 | 0.12 | 0.12 | 3.54 | | | | | | | | | | |
| Mica Flotation Feed | 1,724 | 76.3 | 0.20 | 0.44 | 74.0 | 15.0 | 2.57 | 4.37 | 0.13 | 0.15 | 0.05 | 0.09 | 0.98 | 76.3 | 81.4 | 70.7 | 74.5 | 86.0 | 56.9 | 37.07 | 35.5 | 63.1 | 22.5 |
| Spodumene Flot Feed | 1,395 | 61.7 | 0.95 | 2.05 | 75.1 | 14.5 | 1.07 | 1.51 | 0.32 | 0.16 | 0.11 | 0.22 | 2.25 | 57.1 | 69.5 | 48.3 | 38.3 | 78.9 | 35.0 | 15.77 | 14.7 | 52.8 | 11.0 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F5 Li 2nd Cl Conc. Non-Mag | 90 | 4.0 | 1.91 | 4.11 | 72.3 | 18.7 | 0.27 | 0.64 | 0.45 | 0.08 | 0.09 | 0.28 | 0.74 | 37.4 | 4.1 | 4.6 | .4 | 0.7 | 10.3 | 1.0 | 3.1 | 9.8 | .9 | 65.5 |
| F5 Li 2nd Cl Conc. | 122 | 5.4 | 1.58 | 3.40 | 70.4 | 17.5 | 0.31 | 0.63 | 0.56 | 0.23 | 0.15 | 0.38 | 3.03 | 41.9 | 5.5 | 5.8 | .6 | 0.9 | 17.4 | 4.2 | 6.7 | 18.0 | 4.9 | 73.4 |
| F5 Li 1st Cl Conc. | 147 | 6.5 | 1.43 | 3.08 | 72.3 | 16.3 | 0.39 | 0.74 | 0.48 | 0.21 | 0.14 | 0.33 | 2.96 | 45.8 | 6.8 | 6.5 | 1.0 | 1.2 | 18.1 | 4.5 | 7.7 | 18.7 | 5.8 | 80.2 |
| F5 Li Ro. Conc. | 192 | 8.5 | 1.17 | 2.52 | 74.6 | 14.8 | 0.64 | 1.16 | 0.39 | 0.18 | 0.12 | 0.27 | 2.61 | 49.1 | 9.1 | 7.7 | 2.1 | 2.5 | 19.1 | 5.0 | 8.7 | 20.1 | 6.6 | 85.9 |
| F5 Li Ro & Scav Conc | 251 | 11.1 | .95 | 2.05 | 75.1 | 14.5 | 1.07 | 1.51 | 0.32 | 0.16 | 0.11 | 0.22 | 2.25 | 52.1 | 12.0 | 9.9 | 4.5 | 4.3 | 20.5 | 5.7 | 10.3 | 21.5 | 7.5 | 91.3 |
| F5 Li Ro Tail | 1203 | 53.2 | 0.03 | 0.07 | 78.6 | 12.4 | 1.79 | 5.56 | 0.05 | 0.06 | 0.01 | 0.07 | 0.27 | 8.1 | 60.4 | 40.5 | 36.3 | 76.3 | 15.9 | 10.8 | 5.9 | 32.6 | 4.3 | |
| F5 Li Ro Scav Tail | 1144 | 50.6 | 0.02 | 0.04 | 78.7 | 12.3 | 1.76 | 5.71 | 0.05 | 0.06 | 0.01 | 0.07 | 0.23 | 5.0 | 57.5 | 38.4 | 33.8 | 74.6 | 14.6 | 10.0 | 4.4 | 31.3 | 3.5 | |
| F5 Mica Conc. | 287.7 | 12.7 | 0.29 | 0.62 | 55.8 | 26.0 | 7.21 | 1.57 | 0.12 | 0.47 | 0.18 | 0.07 | 2.65 | 17.9 | 10.2 | 20.4 | 34.8 | 5.2 | 9.2 | 19.6 | 19.3 | 8.0 | 10.1 | |
| F5 Mag Conc | 204.3 | 9.0 | 0.16 | 0.35 | 46.5 | 18.7 | 2.58 | 1.48 | 0.32 | 1.17 | 0.45 | 0.19 | 19.5 | 7.2 | 6.1 | 10.4 | 8.9 | 3.4 | 16.5 | 34.8 | 35.1 | 14.8 | 52.8 | |
| F5 Knelson Conc. | 74.5 | 3.3 | 0.41 | 0.88 | 63.9 | 15.8 | 1.56 | 3.08 | 0.31 | 0.42 | 0.32 | 0.22 | 7.1 | 6.7 | 3.0 | 3.2 | 2.0 | 2.6 | 5.9 | 4.6 | 9.1 | 6.4 | 7.0 | |
| F5 Total Slimes | 298 | 13.2 | 0.17 | 0.37 | 58.6 | 21.8 | 3.19 | 2.90 | 0.44 | 0.58 | 0.19 | 0.15 | 4.83 | 11.0 | 11.2 | 17.7 | 16.0 | 9.9 | 33.4 | 25.3 | 21.9 | 18.0 | 19.1 | |
| | 2,260 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F6** 19680-01 Tech: Tracey **Date:** Apr 21,2023

| | |
|---|---|
| **Purpose:** | **Based on F4 but with more FA-2 Collector and without Gravity Separation** |
| | Mag Sep on the Head 8, 10 KG — Fines/Middling ratio for K-dump= 5/1 |
| **Procedure:** | As outlined below, Using Tap Water |
| **Feed:** | **2.1 kg (dry Based), K-Dump U/S + Middling, (1750 g from K-Dump U/S, G2 Ground Sample, and 350 from K-Dump DMS middling after Grinding to -300 mic** |
| **Grind:** | -300 mic |
| **Regrind:** | None |
| **Collector** | 100% FA/2 |

| | **Reagents added, g/t** | | | | | | | | **Time, minutes** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **W55** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 6 min decant at 3L, Repeat at 5 min decant at 3L* | | | | | | | | | | | | 21 | |
| Perform Mag Separation at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.1-10.5 | 40% | 21 | 2Kg |
| Mica Conditioning 2 | | *25* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 5 | | | | **2** | 10.5 | | 21 | 2Kg |
| | | | | | | | | | | | | | | |
| Mica Scav Flotation 1 | | 15 | 45.6 | | | 5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| High Density Scrubbing | | | | | | | | | | | | | | |
| Deslime | | | 150 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| | *Use 16 L acrylic cylinder fill to 12L settle 5 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | | | | | | | | | | | | | |
| High Density Condition 1 | | ~2860 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 2 | | | | | | | | | 1 | | 8.9 | | 22 | 2Kg |
| | | | | | | | | 450 | 10 | | 6.7 | | 22 | 2Kg |
| Li Rougher, continue until froth dies | | | | | | | | | | | | | | |
| | | | | 25 | | | | | | **2.0** | 8.5 | 17% | 22 | 2Kg |
| | | | | | | | | | | | | | | |
| High Density Condition 3 | | | | | | | | | | | | | | |
| | | | | | | | | 150 | 3 | | 7.2 | | 22 | 2 Kg |
| Li Rougher Scav. | | | | | | | | | | | | | | |
| | | | | 25 | | | | | | **1** | 8.5 | | 22 | 2 Kg |
| Set aside Scav. Conc (assay) | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | | | | | | | | | | | |
| | | | | 15 | | | | 25 | 1 | **2** | 8.5 | | 22 | 250g |
| Li 2nd Cleaner | | | | | | | | | | | | | | |
| | | | | 15 | | | | 10 | 1 | **1** | 8.5 | | 22 | 250g |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| Total | 0 | 40 | 378 | 80 | 0 | | 250 | 635 | 33 | 10 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F6 Li 2nd Cl Conc | 321 | 14.0 | 3.02 | 6.50 | 63.7 | 24.9 | 0.70 | 0.49 | 0.34 | 0.05 | 0.11 | 0.24 | 0.54 | 69.5 | 12.5 | 20.7 | 3.8 | 2.0 | 29.1 | 4.0 | 15.2 | 25.0 | 5.6 |
| F6 Li 2nd Cl Tail | 41.5 | 1.8 | 1.66 | 3.57 | 69.0 | 20.7 | 1.93 | 1.63 | 0.15 | 0.10 | 0.10 | 0.11 | 0.86 | 4.9 | 1.8 | 2.2 | 1.4 | 0.8 | 1.7 | 1.0 | 1.8 | 1.5 | 1.2 |
| F6 Li 1st Cl Tail | 92.6 | 4.0 | 0.73 | 1.57 | 73.8 | 16.4 | 2.56 | 3.06 | 0.09 | 0.11 | 0.07 | 0.08 | 0.65 | 4.8 | 4.2 | 3.9 | 4.0 | 3.6 | 2.2 | 2.5 | 2.8 | 2.4 | 1.9 |
| F6 Li Ro Scav Conc | 110 | 4.8 | 0.57 | 1.23 | 65.4 | 21.6 | 4.66 | 2.32 | 0.07 | 0.15 | 0.11 | 0.05 | 1.21 | 4.5 | 4.4 | 6.1 | 8.6 | 3.2 | 2.0 | 4.0 | 5.2 | 1.8 | 4.3 |
| F6 Li Ro Scav Tail | 1295 | 56.6 | 0.03 | 0.07 | 78.6 | 12.4 | 2.60 | 4.86 | 0.05 | 0.07 | 0.01 | 0.08 | 0.27 | 3.1 | 62.3 | 41.5 | 57.0 | 78.9 | 17.2 | 22.3 | 5.6 | 33.6 | 11.3 |
| F6 Slime 2 | 27.3 | 1.2 | 0.45 | 0.97 | 62.4 | 21.1 | 3.24 | 2.85 | 0.50 | 0.36 | 0.13 | 0.16 | 1.61 | 0.9 | 1.0 | 1.5 | 1.5 | 1.0 | 3.6 | 2.4 | 1.5 | 1.4 | 1.4 |
| F6 Mica Ro Conc | 23.7 | 1.0 | 0.47 | 1.01 | 58.3 | 25.3 | 6.52 | 1.97 | 0.12 | 0.21 | 0.15 | 0.09 | 1.78 | 0.8 | 0.8 | 1.6 | 2.6 | 0.6 | 0.8 | 1.2 | 1.5 | 0.7 | 1.4 |
| F6 Mica Ro Scav Conc 1 | 18.4 | 0.8 | 0.47 | 1.01 | 56.4 | 26.3 | 6.84 | 1.76 | 0.12 | 0.26 | 0.17 | 0.07 | 2.0 | 0.6 | 0.6 | 1.3 | 2.1 | 0.4 | 0.6 | 1.2 | 1.3 | 0.4 | 1.2 |
| F6 10kG Mag | 56.3 | 2.5 | 0.57 | 1.23 | 50.3 | 21.7 | 2.82 | 1.63 | 0.88 | 1.32 | 1.42 | 0.70 | 10.2 | 2.3 | 1.7 | 3.2 | 2.7 | 1.2 | 13.2 | 18.3 | 34.4 | 12.8 | 18.5 |
| F6 13kG Mag | 27.6 | 1.2 | 0.63 | 1.36 | 54.4 | 21.1 | 3.87 | 1.53 | 1.08 | 0.93 | 0.60 | 0.78 | 8.61 | 1.2 | 0.9 | 1.5 | 1.8 | 0.5 | 7.9 | 6.3 | 7.1 | 7.0 | 7.7 |
| F6 Slime 1 | 82.3 | 3.6 | 0.43 | 0.93 | 63.6 | 20.6 | 3.40 | 3.08 | 0.30 | 0.35 | 0.17 | 0.18 | 2.53 | 2.5 | 3.2 | 4.4 | 4.7 | 3.2 | 6.6 | 7.1 | 6.0 | 4.8 | 6.7 |
| F6 Primary Slimes | 194.5 | 8.5 | 0.35 | 0.75 | 54.6 | 24.3 | 2.93 | 1.92 | 0.29 | 0.62 | 0.21 | 0.14 | 6.18 | 4.9 | 6.5 | 12.2 | 9.7 | 4.7 | 15.1 | 29.7 | 17.6 | 8.8 | 38.8 |
| Head (calc.) | 2,290 | 100 | 0.61 | 1.31 | 71.4 | 16.9 | 2.58 | 3.48 | 0.16 | 0.18 | 0.10 | 0.13 | 1.35 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Fines + Mid.) | | | 0.60 | 1.29 | 71.7 | 16.9 | 2.55 | 3.51 | 0.16 | 0.17 | 0.11 | 0.13 | 1.33 | | | | | | | | | | |
| Mica Flotation Feed | 1,929 | 84.3 | 0.64 | 1.39 | 74.2 | 15.8 | 2.48 | 3.74 | 0.11 | 0.08 | 0.04 | 0.11 | 0.45 | 89.0 | 87.6 | 78.7 | 81.1 | 90.5 | 57.2 | 38.65 | 34.9 | 66.7 | 28.3 |
| Spodumene Flot Feed | 1,860 | 81.2 | 0.65 | 1.40 | 74.8 | 15.5 | 2.38 | 3.79 | 0.11 | 0.07 | 0.04 | 0.11 | 0.40 | 86.7 | 85.1 | 74.5 | 74.9 | 88.5 | 52.2 | 33.83 | 30.5 | 64.2 | 24.3 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F6 Li 2nd Cl Conc. | 321 | 14.0 | 3.02 | 6.50 | 63.7 | 24.9 | 0.70 | 0.49 | 0.34 | 0.05 | 0.11 | 0.24 | 0.54 | 69.5 | 12.5 | 20.7 | 3.8 | 2.0 | 29.1 | 4.0 | 15.2 | 25.0 | 5.6 | 80.1 |
| F6 Li 1st Cl Conc. | 363 | 15.8 | 2.86 | 6.17 | 64.3 | 24.4 | 0.84 | 0.62 | 0.32 | 0.06 | 0.11 | 0.23 | 0.58 | 74.4 | 14.3 | 22.9 | 5.2 | 2.8 | 30.7 | 5.0 | 17.0 | 26.5 | 6.8 | 85.7 |
| F6 Li Ro. Conc. | 455 | 19.9 | 2.43 | 5.23 | 66.2 | 22.8 | 1.19 | 1.12 | 0.27 | 0.07 | 0.10 | 0.20 | 0.59 | 79.2 | 18.5 | 26.8 | 9.2 | 6.4 | 32.9 | 7.5 | 19.8 | 28.9 | 8.7 | 91.3 |
| F6 Li Ro &  Scav Conc | 565 | 24.7 | 2.07 | 4.46 | 66.1 | 22.6 | 1.86 | 1.35 | 0.23 | 0.08 | 0.10 | 0.17 | 0.71 | 83.7 | 22.8 | 32.9 | 17.8 | 9.6 | 35.0 | 11.5 | 24.9 | 30.6 | 13.0 | 96.5 |
| F6 Li Ro Tail | 1405 | 61.3 | 0.07 | 0.16 | 77.6 | 13.1 | 2.76 | 4.66 | 0.05 | 0.08 | 0.02 | 0.08 | 0.34 | 7.5 | 66.7 | 47.6 | 65.7 | 82.1 | 19.3 | 26.4 | 10.7 | 35.3 | 15.6 | |
| F6 Li Ro Scav Tail | 1295 | 56.6 | 0.03 | 0.07 | 78.6 | 12.4 | 2.60 | 4.86 | 0.05 | 0.07 | 0.01 | 0.08 | 0.27 | 3.1 | 62.3 | 41.5 | 57.0 | 78.9 | 17.2 | 22.3 | 5.6 | 33.6 | 11.3 | |
| F6 Mica Conc. | 42.1 | 1.8 | 0.47 | 1.01 | 57.5 | 25.7 | 6.66 | 1.88 | 0.12 | 0.23 | 0.16 | 0.08 | 1.88 | 1.4 | 1.5 | 2.8 | 4.7 | 1.0 | 1.3 | 2.4 | 2.9 | 1.1 | 2.6 | |
| F6 Mag Conc | 83.9 | 3.7 | 0.59 | 1.27 | 51.6 | 21.5 | 3.17 | 1.60 | 0.95 | 1.19 | 1.15 | 0.73 | 9.7 | 3.5 | 2.7 | 4.7 | 4.5 | 1.7 | 21.1 | 24.6 | 41.5 | 19.7 | 26.2 | |
| F6 Total Slimes | 304 | 13.3 | 0.38 | 0.82 | 57.7 | 23.0 | 3.09 | 2.31 | 0.31 | 0.52 | 0.19 | 0.15 | 4.78 | 8.3 | 10.7 | 18.1 | 15.9 | 8.8 | 25.3 | 39.2 | 25.2 | 15.0 | 46.9 | |
| | 2,290 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F7** 19680-01 Tech: Tracey **Date:** Apr 21,2023

**Purpose:** **Based on F6 but on the Combined Composite Sample**
Mag Sep on the Head 8, 10 KG — Fines/Middling ratio for K-dump= 5/1
**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.1 Kg of Combined Composite Sample**

**Grind:**
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **W55** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | **size** |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 6 min decant at 3L, Repeat at 5 min decant at 3L* | | | | | | | | | | | | 21 | |
| Perform Mag Separation at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| Mica Conditioning 1 | | | 160 | | | | | | 1 | | 7.8-10.5 | 38% | 21 | 2Kg |
| Mica Conditioning 2 | | *25* | | | | | | | 2 | | 10.5 | | 21 | 2Kg |
| Mica Ro Flotation | | | 22.8 | | | 5 | | | | **2** | 10.5 | | 21 | 2Kg |
| Mica Scav Flotation 1 | | 15 | 22.8 | | | 5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| Mica Scav Flotation 2 (Only if Required) | | 15 | 22.8 | | | 5 | | | 1 | **2** | 10.5 | | 22 | 2Kg |
| High Density Scrubbing | | | 100 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 5 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~2790 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.9 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 450 | 10 | | 6.8 | | 22 | 2Kg |
| Li Rougher, continue until froth dies | | | | 40 | | | | | | **2.0** | 8.5 | 37% | 22 | 2Kg |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.2 | | 22 | 2 Kg |
| Li Rougher Scav. | | | | 25 | | | | | | **1** | 8.5 | | 22 | 2 Kg |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 15 | | | | 25 | 1 | **1** | 8.5 | | 22 | 500g |
| Li 2nd Cleaner | | | | 15 | | | | 10 | 1 | **1** | 8.6 | | 22 | 250g |
| Total | 0 | 55 | 328 | 95 | 0 | | 250 | 635 | 34 | 11 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F7 Li 2nd Cl Conc | 298 | 13.2 | 2.82 | 6.07 | 65.1 | 23.9 | 0.35 | 0.48 | 0.34 | 0.07 | 0.11 | 0.24 | 0.81 | 63.5 | 12.1 | 18.8 | 1.9 | 1.8 | 27.8 | 4.6 | 13.7 | 24.2 | 5.1 |
| F7 Li 2nd Cl Tail | 45.0 | 2.0 | 1.68 | 3.62 | 71.8 | 18.7 | 1.11 | 1.56 | 0.12 | 0.09 | 0.09 | 0.08 | 0.97 | 5.7 | 2.0 | 2.2 | 0.9 | 0.9 | 1.5 | 0.9 | 1.7 | 1.2 | 0.9 |
| F7 Li 1st Cl Tail | 77.3 | 3.4 | 0.86 | 1.85 | 75.3 | 15.3 | 1.85 | 2.82 | 0.12 | 0.09 | 0.06 | 0.09 | 0.66 | 5.0 | 3.6 | 3.1 | 2.6 | 2.8 | 2.5 | 1.5 | 1.9 | 2.4 | 1.1 |
| F7 Li Ro Scav Conc | 131 | 5.8 | 0.63 | 1.36 | 67.9 | 19.8 | 3.87 | 2.43 | 0.08 | 0.13 | 0.10 | 0.06 | 1.09 | 6.3 | 5.6 | 6.9 | 9.1 | 4.1 | 2.9 | 3.8 | 5.5 | 2.7 | 3.0 |
| F7 Li Ro Scav Tail | 1184 | 52.2 | 0.03 | 0.06 | 79.2 | 12.0 | 2.39 | 5.01 | 0.04 | 0.08 | 0.01 | 0.08 | 0.26 | 2.4 | 58.4 | 37.6 | 50.5 | 76.7 | 13.0 | 20.8 | 4.9 | 32.0 | 6.6 |
| F7 Slime 2 | 24.0 | 1.1 | 0.48 | 1.03 | 64.6 | 19.4 | 2.71 | 3.15 | 0.78 | 0.38 | 0.11 | 0.15 | 1.67 | 0.9 | 1.0 | 1.2 | 1.2 | 1.0 | 5.1 | 2.0 | 1.1 | 1.2 | 0.9 |
| F7 Mica Ro Conc | 53.7 | 2.4 | 0.46 | 0.99 | 53.0 | 28.2 | 7.81 | 1.26 | 0.17 | 0.30 | 0.19 | 0.11 | 2.34 | 1.9 | 1.8 | 4.0 | 7.5 | 0.9 | 2.5 | 3.5 | 4.3 | 2.0 | 2.7 |
| F7 Mica Ro Scav Conc 1 | 22.6 | 1.0 | 0.49 | 1.05 | 58.1 | 25.0 | 6.37 | 1.90 | 0.17 | 0.31 | 0.15 | 0.10 | 2.04 | 0.8 | 0.8 | 1.5 | 2.6 | 0.6 | 1.1 | 1.5 | 1.4 | 0.8 | 1.0 |
| F7 Mica Ro Scav Conc 2 | 26.1 | 1.2 | 0.45 | 0.97 | 59.9 | 23.8 | 5.88 | 2.11 | 0.17 | 0.33 | 0.15 | 0.08 | 2.0 | 0.9 | 1.0 | 1.6 | 2.7 | 0.7 | 1.2 | 1.9 | 1.6 | 0.7 | 1.1 |
| F7 10KG Mag | 84.4 | 3.7 | 0.47 | 1.01 | 48.4 | 19.0 | 2.47 | 1.51 | 0.52 | 0.92 | 0.80 | 0.41 | 16.9 | 3.0 | 2.5 | 4.2 | 3.7 | 1.6 | 12.0 | 17.1 | 28.2 | 11.7 | 30.4 |
| F7 13KG Mag | 49.6 | 2.2 | 0.50 | 1.08 | 51.1 | 19.4 | 2.98 | 1.50 | 0.60 | 0.95 | 0.61 | 0.43 | 14.1 | 1.9 | 1.6 | 2.5 | 2.6 | 1.0 | 8.2 | 10.4 | 12.7 | 7.2 | 14.9 |
| F7 Slime 1 | 105 | 4.6 | 0.40 | 0.86 | 61.4 | 20.6 | 3.33 | 2.90 | 0.30 | 0.43 | 0.19 | 0.17 | 3.99 | 3.2 | 4.0 | 5.7 | 6.2 | 3.9 | 8.6 | 9.9 | 8.3 | 6.0 | 8.9 |
| SG1 Cyclone O/F | 8.0 | 0.4 | 0.22 | 0.47 | 54.6 | 25.0 | 3.35 | 2.00 | 0.43 | 0.55 | 0.26 | 0.21 | 3.96 | 0.1 | 0.3 | 0.5 | 0.5 | 0.2 | 0.9 | 1.0 | 0.9 | 0.6 | 0.7 |
| SG2 Cyclone O/F | 114.3 | 5.0 | 0.13 | 0.28 | 51.1 | 25.5 | 2.94 | 1.76 | 0.31 | 0.73 | 0.22 | 0.13 | 7.29 | 1.1 | 3.6 | 7.7 | 6.0 | 2.6 | 9.7 | 18.3 | 10.5 | 5.0 | 17.7 |
| SG3 Cyclone O/F | 10.8 | 0.5 | 0.78 | 1.68 | 52.0 | 20.1 | 2.79 | 1.30 | 0.31 | 0.49 | 0.18 | 0.14 | 15.1 | 0.6 | 0.3 | 0.6 | 0.5 | 0.2 | 0.9 | 1.2 | 0.8 | 0.5 | 3.5 |
| SG4 Cyclone O/F | 32.0 | 1.4 | 1.11 | 2.39 | 66.6 | 20.1 | 2.91 | 2.45 | 0.23 | 0.24 | 0.18 | 0.17 | 2.35 | 2.7 | 1.3 | 1.7 | 1.7 | 1.0 | 2.0 | 1.7 | 2.4 | 1.8 | 1.6 |
| Head (calc.) | 2,265 | 100 | 0.58 | 1.26 | 70.8 | 16.7 | 2.47 | 3.42 | 0.16 | 0.20 | 0.11 | 0.13 | 2.07 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Calc. 4 samples) | | | 0.63 | 1.35 | 71.3 | 16.6 | 2.44 | 3.41 | 0.14 | 0.17 | 0.10 | 0.14 | 1.84 | | | | | | | | | | |
| Mica Flotation Feed | 1,862 | 82.2 | 0.62 | 1.34 | 74.3 | 15.6 | 2.37 | 3.72 | 0.11 | 0.10 | 0.05 | 0.11 | 0.57 | 87.4 | 86.3 | 77.0 | 78.8 | 89.5 | 57.6 | 40.55 | 36.2 | 67.1 | 22.4 |
| Spodumene Flot Feed | 1,736 | 76.6 | 0.63 | 1.36 | 75.6 | 15.0 | 2.09 | 3.85 | 0.10 | 0.08 | 0.04 | 0.11 | 0.45 | 82.9 | 81.7 | 68.6 | 64.8 | 86.4 | 47.7 | 31.57 | 27.8 | 62.5 | 16.8 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | | Stage R. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li |
| F7 Li 2nd Cl Conc. | 298 | 13.2 | 2.82 | 6.07 | 65.1 | 23.9 | 0.35 | 0.48 | 0.34 | 0.07 | 0.11 | 0.24 | 0.81 | 63.5 | 12.1 | 18.8 | 1.9 | 1.8 | 27.8 | 4.6 | 13.7 | 24.2 | 5.1 | 76.6 |
| F7 Li 1st Cl Conc. | 343 | 15.1 | 2.67 | 5.75 | 66.0 | 23.2 | 0.45 | 0.62 | 0.31 | 0.07 | 0.11 | 0.22 | 0.83 | 69.2 | 14.1 | 21.1 | 2.8 | 2.8 | 29.3 | 5.5 | 15.4 | 25.4 | 6.1 | 83.5 |
| F7 Li Ro. Conc. | 420 | 18.6 | 2.34 | 5.03 | 67.7 | 21.8 | 0.71 | 1.03 | 0.28 | 0.08 | 0.10 | 0.20 | 0.80 | 74.3 | 17.7 | 24.2 | 5.3 | 5.6 | 31.8 | 7.0 | 17.3 | 27.8 | 7.2 | 89.5 |
| F7 Li Ro & Scav Conc | 552 | 24.4 | 1.93 | 4.16 | 67.7 | 21.3 | 1.46 | 1.36 | 0.23 | 0.09 | 0.10 | 0.16 | 0.87 | 80.5 | 23.3 | 31.1 | 14.4 | 9.7 | 34.7 | 10.8 | 22.8 | 30.4 | 10.2 | 97.1 |
| F7 Li Ro Tail | 1315 | 58.0 | 0.09 | 0.19 | 78.1 | 12.8 | 2.54 | 4.75 | 0.04 | 0.08 | 0.02 | 0.08 | 0.34 | 8.7 | 64.0 | 44.4 | 59.5 | 80.8 | 15.9 | 24.6 | 10.4 | 34.7 | 9.6 | |
| F7 Li Ro Scav Tail | 1184 | 52.2 | 0.03 | 0.06 | 79.2 | 12.0 | 2.39 | 5.01 | 0.04 | 0.08 | 0.01 | 0.08 | 0.26 | 2.4 | 58.4 | 37.6 | 50.5 | 76.7 | 13.0 | 20.8 | 4.9 | 32.0 | 6.6 | |
| F7 Mica Conc. | 102.4 | 4.5 | 0.46 | 1.00 | 55.9 | 26.4 | 7.00 | 1.62 | 0.17 | 0.31 | 0.17 | 0.10 | 2.20 | 3.6 | 3.6 | 7.1 | 12.8 | 2.1 | 4.8 | 7.0 | 7.3 | 3.5 | 4.8 | |
| F7 Mag Conc | 134.0 | 5.9 | 0.48 | 1.04 | 49.4 | 19.1 | 2.66 | 1.51 | 0.55 | 0.93 | 0.73 | 0.42 | 15.9 | 4.9 | 4.1 | 6.8 | 6.4 | 2.6 | 20.2 | 27.4 | 40.9 | 18.9 | 45.2 | |
| F7 Total Slimes | 294 | 13.0 | 0.39 | 0.84 | 57.7 | 22.5 | 3.06 | 2.34 | 0.34 | 0.53 | 0.20 | 0.15 | 5.31 | 8.6 | 10.6 | 17.4 | 16.0 | 8.9 | 27.3 | 34.0 | 24.0 | 15.2 | 33.2 | |
| | 2,265 | 100 | | | | | | | | | | | | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |

**Test: F8** 19680-01 Tech: Tracey **Date:** MaY 2,2023

**Purpose:** **Based on F7 but with no Mica Flotation**
Mag Sep on the Head 8, 10 KG

Fines/Middling ratio for K-dump= 5/1

**Procedure:** As outlined below, Using Tap Water
**Feed:** **2.1 Kg of Combined Composite Sample**

**Grind:**
**Regrind:** None
**Collector** 100% FA/2

| | Reagents added, g/t | | | | | | | | Time, minutes | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stage** | **EDA** | **Armac T** | **NaOH** | **Na2CO3** | **Silicate N** | **W55** | **F220** | **FA-2** | **Cond.** | **Froth** | **pH** | **Pulp Density** | **Temp** | **Cell size** |
| | **1%** | **1%** | **5%** | **5%** | **1%** | | **5%** | **100%** | | | | | **°C** | |
| Scrubbing | | | | | | | | | 3 | | | 50.0 | | |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 6 min decant at 3L, Repeat at 5 min decant at 3L* | | | | | | | | | | | | 21 | |
| Perform Mag Separation at 10 and 13 KG on the head sample (split into 8 parts) | | | | | | | | | | | | | | 2Kg |
| High Density Scrubbing | | | 150 | | | | 250 | | 10 | | 11.0 | | 22 | 2Kg |
| Deslime | *Use 16 L acrylic cylinder fill to 12L settle 5 min, Repeat at 5 min* | | | | | | | | | | | | | |
| High Density Condition, about 60% | | ~2950 g of the pulp | | | | | | | | | | ~60-65 | | |
| High Density Condition 1 | | | | | | | | | 1 | | 8.6 | | 22 | 2Kg |
| High Density Condition 2 | | | | | | | | 450 | 10 | | 6.6 | | 22 | 2Kg |
| Li Rougher, continue until froth dies | | | | 40 | | | | | | **2.5** | 8.5 | 38% | 22 | 2Kg |
| High Density Condition 3 | | | | | | | | 150 | 3 | | 7.2 | | 22 | 2 Kg |
| Li Rougher Scav. | | | | 30 | | | | | | **1** | 8.5 | | 22 | 2 Kg |
| Set aside Scav. Conc | | | | | | | | | | | | | | |
| Clean Flot | | | | | | | | | | | | | | |
| Li 1st Cleaner | | | | 15 | | | | 25 | 1 | **2** | 8.5 | | 22 | 500g |
| Li 2nd Cleaner | | | | 15 | | | | 10 | 1 | **1** | 8.5 | | 22 | 500g. |
| Total | 0 | 0 | 150 | 100 | 0 | | 250 | 635 | 29 | 6 | . | | | |

**Metallurgical Balance**

| Product | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F8 Li 2nd Cl Conc | 351 | 15.5 | 2.49 | 5.36 | 65.1 | 23.5 | 0.89 | 0.60 | 0.32 | 0.07 | 0.11 | 0.22 | 0.79 | 67.6 | 14.3 | 21.8 | 5.6 | 2.7 | 30.7 | 5.6 | 15.0 | 27.0 | 5.9 |
| F8 Li 2nd Cl Tail | 59.2 | 2.6 | 1.05 | 2.26 | 71.1 | 19.8 | 2.79 | 1.94 | 0.10 | 0.14 | 0.10 | 0.07 | 1.10 | 4.8 | 2.6 | 3.1 | 2.9 | 1.5 | 1.6 | 1.9 | 2.3 | 1.5 | 1.4 |
| F8 Li 1st Cl Tail | 98.6 | 4.4 | 0.62 | 1.33 | 72.4 | 16.9 | 2.98 | 2.90 | 0.08 | 0.13 | 0.07 | 0.07 | 0.83 | 4.7 | 4.5 | 4.4 | 5.2 | 3.7 | 2.2 | 2.9 | 2.7 | 2.4 | 1.7 |
| F8 Li Ro Scav Conc | 104.2 | 4.6 | 0.64 | 1.38 | 65.2 | 21.5 | 4.55 | 2.17 | 0.07 | 0.14 | 0.11 | 0.05 | 1.24 | 5.2 | 4.2 | 5.9 | 8.5 | 2.9 | 2.0 | 3.3 | 4.5 | 1.8 | 2.7 |
| F8 Li Ro Scav Tail | 1222 | 54.0 | 0.04 | 0.09 | 78.3 | 12.5 | 2.52 | 4.90 | 0.05 | 0.08 | 0.03 | 0.07 | 0.35 | 4.0 | 59.7 | 40.3 | 55.0 | 77.7 | 16.7 | 22.2 | 14.3 | 29.9 | 9.1 |
| F8 Slime 2 | 30.0 | 1.3 | 0.47 | 1.01 | 64.2 | 20.7 | 3.47 | 3.01 | 0.30 | 0.34 | 0.11 | 0.14 | 1.72 | 1.1 | 1.2 | 1.6 | 1.9 | 1.2 | 2.5 | 2.3 | 1.3 | 1.5 | 1.1 |
| F8 10kG Mag | 92.0 | 4.1 | 0.45 | 0.97 | 47.4 | 19.0 | 2.36 | 1.48 | 0.57 | 0.95 | 0.84 | 0.43 | 17.7 | 3.2 | 2.7 | 4.6 | 3.9 | 1.8 | 14.3 | 19.8 | 30.0 | 13.8 | 34.5 |
| F8 13kG Mag | 47.2 | 2.1 | 0.54 | 1.16 | 53.3 | 19.7 | 3.23 | 1.55 | 0.67 | 0.91 | 0.51 | 0.47 | 12.0 | 2.0 | 1.6 | 2.5 | 2.7 | 0.9 | 8.6 | 9.7 | 9.4 | 7.8 | 12.0 |
| F8 Slime 1 | 95.4 | 4.2 | 0.39 | 0.84 | 61.5 | 20.8 | 3.33 | 2.88 | 0.30 | 0.44 | 0.19 | 0.18 | 4.1 | 2.9 | 3.7 | 5.2 | 5.7 | 3.6 | 7.8 | 9.5 | 7.0 | 6.0 | 8.2 |
| SG1 Cyclone O/F | 8.0 | 0.4 | 0.22 | 0.47 | 54.6 | 25.0 | 3.35 | 2.00 | 0.43 | 0.55 | 0.26 | 0.21 | 4.0 | 0.1 | 0.3 | 0.5 | 0.5 | 0.2 | 0.9 | 1.0 | 0.8 | 0.6 | 0.7 |
| SG2 Cyclone O/F | 114.3 | 5.0 | 0.13 | 0.28 | 51.1 | 25.5 | 2.94 | 1.76 | 0.31 | 0.73 | 0.22 | 0.13 | 7.3 | 1.1 | 3.6 | 7.7 | 6.0 | 2.6 | 9.7 | 18.9 | 9.8 | 5.2 | 17.7 |
| SG3 Cyclone O/F | 10.8 | 0.5 | 0.78 | 1.68 | 52.0 | 20.1 | 2.79 | 1.30 | 0.31 | 0.49 | 0.18 | 0.14 | 15.1 | 0.6 | 0.3 | 0.6 | 0.5 | 0.2 | 0.9 | 1.2 | 0.8 | 0.5 | 3.4 |
| SG4 Cyclone O/F | 32.0 | 1.4 | 1.11 | 2.39 | 66.6 | 20.1 | 2.91 | 2.45 | 0.23 | 0.24 | 0.18 | 0.17 | 2.4 | 2.7 | 1.3 | 1.7 | 1.7 | 1.0 | 2.0 | 1.7 | 2.2 | 1.9 | 1.6 |
| Head (calc.) | 2,265 | 100 | 0.57 | 1.23 | 70.8 | 16.7 | 2.47 | 3.40 | 0.16 | 0.19 | 0.11 | 0.13 | 2.08 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Head (Calc. 4 samples) | | | 0.63 | 1.35 | 71.3 | 16.6 | 2.44 | 3.41 | 0.14 | 0.17 | 0.10 | 0.14 | 1.84 | | | | | | | | | | |
| Spodumene Flot Feed | 1,836 | 19.7 | 2.02 | 4.34 | 56.8 | 20.6 | 1.04 | .64 | 0.32 | 0.15 | 0.14 | 0.22 | 1.89 | 69.5 | 15.8 | 24.2 | 8.3 | 3.7 | 39.4 | 15.30 | 24.4 | 34.8 | 17.9 |

| Combined | Weight | | Assays % | | | | | | | | | | | Distribution % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product | g | % | Li | $Li_2O$ | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ | Li | $SiO_2$ | $Al_2O_3$ | $K_2O$ | $Na_2O$ | CaO | MgO | MnO | $P_2O_5$ | $Fe_2O_3$ |
| F8 Li 2nd Cl Conc. | 351 | 15.5 | 2.49 | 5.36 | 65.1 | 23.5 | 0.89 | 0.60 | 0.32 | 0.07 | 0.11 | 0.22 | 0.79 | 67.6 | 14.3 | 21.8 | 5.6 | 2.7 | 30.7 | 5.6 | 15.0 | 27.0 | 5.9 |
| F8 Li 1st Cl Conc. | 410 | 18.1 | 2.28 | 4.91 | 66.0 | 23.0 | 1.16 | 0.79 | 0.29 | 0.08 | 0.11 | 0.20 | 0.83 | 72.4 | 16.9 | 24.9 | 8.5 | 4.2 | 32.3 | 7.4 | 17.3 | 28.5 | 7.3 |
| F8 Li Ro. Conc. | 509 | 22.5 | 1.96 | 4.22 | 67.2 | 21.8 | 1.52 | 1.20 | 0.25 | 0.09 | 0.10 | 0.17 | 0.83 | 77.1 | 21.3 | 29.3 | 13.8 | 7.9 | 34.5 | 10.4 | 20.0 | 30.9 | 9.0 |
| F8 Li Ro & Scav Conc | 613 | 27.1 | 1.74 | 3.74 | 66.9 | 21.7 | 2.03 | 1.37 | 0.22 | 0.10 | 0.10 | 0.15 | 0.90 | 82.2 | 25.6 | 35.2 | 22.2 | 10.9 | 36.5 | 13.7 | 24.5 | 32.7 | 11.7 |
| F8 Li Ro Tail | 1327 | 58.6 | 0.09 | 0.19 | 77.3 | 13.2 | 2.68 | 4.69 | 0.05 | 0.08 | 0.04 | 0.07 | 0.42 | 9.1 | 63.9 | 46.3 | 63.4 | 80.6 | 18.7 | 25.5 | 18.7 | 31.8 | 11.8 |
| F8 Li Ro Scav Tail | 1222 | 54.0 | 0.04 | 0.09 | 78.3 | 12.5 | 2.52 | 4.90 | 0.05 | 0.08 | 0.03 | 0.07 | 0.35 | 4.0 | 59.7 | 40.3 | 55.0 | 77.7 | 16.7 | 22.2 | 14.3 | 29.9 | 9.1 |
| F8 Mag Conc | 139 | 6.1 | 0.48 | 1.03 | 49.4 | 19.2 | 2.66 | 1.50 | 0.60 | 0.94 | 0.73 | 0.44 | 15.8 | 5.2 | 4.3 | 7.1 | 6.6 | 2.7 | 23.0 | 29.5 | 39.4 | 21.6 | 46.5 |
| F8 Total Slimes | 290 | 12.8 | 0.39 | 0.83 | 57.7 | 22.7 | 3.13 | 2.32 | 0.30 | 0.53 | 0.19 | 0.15 | 5.31 | 8.6 | 10.5 | 17.4 | 16.2 | 8.7 | 23.8 | 34.7 | 21.9 | 15.7 | 32.7 |
| | 2,265 | 100 | 0.57 | 1.23 | 70.8 | 16.7 | 2.47 | 3.40 | 0.16 | 0.19 | 0.11 | 0.13 | 2.08 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

# Appendix B – Material Safety Data Sheets

# MATERIAL SAFETY DATA SHEET

**FLOTIGAM EDA**



Substance key: SXR094488
Version : 2 - 1 / USA

Revision Date: 04/20/2011
Date of printing :06/29/2011

## Section 01 - Product Information

| | |
|---|---|
| **Identification of the company:** | Clariant Corporation<br>4000 Monroe Road<br>Charlotte, NC, 28205<br>Telephone No.: +1 704 331 7000<br><br>**Information of the substance/preparation:**<br>Product Safety 1-704-331-7710<br><br>**Emergency tel. number:** +1 800-424-9300 CHEMTREC |

**Trade name:** FLOTIGAM EDA

**Primary product use:** Ore processing

**Chemical family:** Based on an isodecyl ether propylene amine/amino acetate.

## Section 02 - Composition information on hazardous ingredients

**Hazardous ingredients:**

| Component | CAS-no. (Trade secret no.) | Concentration |
|---|---|---|
| 3-(Isodecyloxy)propylamine | 30113-45-2 | 40 - 60 % |
| 3-(Isodecyloxy)propylammonium acetate | 28701-67-9 | 40 - 60 % |

## Section 03 - Hazards identification

**Emergency overview:**
Clear, colorless to pale yellow liquid; slight amine odor.
Corrosive
Harmful if swallowed.
Toxic to aquatic organisms

**Expected Route of entry:**

**Inhalation:** Vapors and/or mists are probably corrosive to respiratory passages, and may cause ulcerations of the nose, throat, and larynx.

**Skin contact:** Corrosive to the skin.

**Eye contact:** Corrosive to the eye.

**Ingestion:** This material will probably cause chemical burns of the mouth , pharynx, esophagus, and stomach in humans following ingestion.

**Skin absorption:** yes

**Known effects on other illnesses:** Pre-existing skin and eye disorders may be aggravated by exposure to this product.

**Listed carcinogen:** IARC: No

NTP: No
OSHA: No
Other: No

**HMIS:**

Health: 3 Flammability: 1 Reactivity: 0 Personal protection: X

## Section 04 - First aid measures

**After inhalation:**
Get victim to fresh air. Give artificial respiration or oxygen if breathing has stopped. Get prompt medical attention. Do not give fluids if victim is unconscious.

**After contact with skin:**
Immediately wash skin with soap and plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Seek medical attention if pain or irritation occurs.

**After contact with eyes:**
Flush thoroughly with water for 15 minutes. Get immediate medical help.

**After ingestion:**
Get immediate medical help.

**Advice to doctor / Treatment:**
None known.

## Section 05 - Fire fighting measures

| | |
|---|---|
| **Flashpoint:** | > 212 °F<br>Method: ASTM D 93 (closed cup) |
| **Lower explosion limit:** | Not applicable for Liquids with Flash Point > 70 °C. |
| **Upper explosion limit:** | Not applicable for Liquids with Flash Point > 70 °C. |
| **Ignition temperature:** | Not applicable for Liquids with Flash Point > 70 °C. |

**Hazardous combustion products:**
In case of fires, hazardous combustion gases are formed:
Nitrous gases (NOx)

**Extinguishing media:**
water spray jet
foam
sand
carbon dioxide
dry powder

**Special fire fighting procedure:**
Use self-contained breathing apparatus and full protective clothing.
Use water spray to cool drums in fire area.
Avoid breathing vapors and keep upwind.

## Section 06 - Accidental release measures

**Steps to be taken in case of spill or leak:**
Contain spill. Ensure adequate ventilation and wear appropriate personal protective equipment. Collect onto inert absorbent. Place in sealable container. Do not allow to contaminate water sources or sewers.

## Section 07 - Handling and storage

**Advice on safe handling:**
Keep away from heat, sparks and open flames. - Avoid breathing vapors or contact with skin, eyes, and clothing.- Use only with adequate ventilation and proper protective eyewear, face shield, gloves and clothing. Wash thoroughly after handling. Keep container closed.

**Further info on storage conditions:**
Store in original container.
Keep from freezing.

## Section 08 - Exposure controls / personal protection

No level has been established by OSHA, NIOSH, ACGIH.

| | |
|---|---|
| **Respiratory protection:** | If airborne concentrations pose a health hazard, become irritating, or exceed recommended limits, use a NIOSH approved respirator in accordance with OSHA respiratory protection requirements under 29CFR1910.134. |
| **Hand protection:** | Nitrile Gloves. |
| **Eye protection:** | Safety glasses or chemical splash goggles. |
| **Other protective equipment:** | Clothing suitable to prevent skin contact. |

**IDLH:**

Not Determined

## Section 09 - Physical and chemical properties

| | |
|---|---|
| **Form:** | Liquid |
| **Color:** | colourless to pale colour |
| **Odor:** | slightly ammonia-alkali like |
| **pH:** | approx. 9 (20 °C, 10 g/l)<br>Method: ASTM E 70 |
| **Solubility in water:** | Method: OECD Guide-line 105<br>emulsifiable |
| **Density:** | 0.9 g/cm3 (20 °C)<br>Method: DIN 51757 |
| **Freezing point :** | < -4 °F<br>Method: OECD Guide-line 102 |

| | |
|---|---|
| **Starts to boil :** | approx. 482 °F<br>Method: OECD Guide-line 103 |
| **Viscosity / (dynamic):** | 110 mPa.s (20 °C)<br>Method: DIN 53015 |

**Further information:**
Ionic Characteristic: Cationic

## Section 10 - Stability and reactivity

| | |
|---|---|
| **Thermal decomposition:** | > 200 °C<br>Method: ASTMD 3417 |
| **Chemical stability:** | Stable. |
| **Hazardous Polymerization:** | Will not occur. |

## Section 11 - Toxicological information

**Product information:**

| | |
|---|---|
| **Acute oral toxicity:** | LD50 ca. 500 mg/kg (rat)<br>Method: OECD 423 |
| **Acute inhalation toxicity:** | No data available. No information on acute inhalation toxicity was found in the specialised literature. |
| **Acute dermal toxicity:** | No data available. No information on acute dermal toxicity was found in the specialised literature. |
| **Skin irritation:** | corrosive (rabbit)<br>By analogy with a similar product. |
| **Eye irritation:** | corrosive<br>Information derived from the corrosive effect on skin |

## Section 12 - Ecological information

**Product information:**

| | |
|---|---|
| **Biodegradation:** | > 95 % (28 d)<br>readily degradable<br>By analogy with a similar product. |
| **Fish toxicity:** | LC50 7.81 mg/l (96 h, Brachydanio rerio)<br>Method: OECD 203 |
| **Bacteria toxicity:** | EC50 49.35 mg/l (3 h, activated sludge)<br>By analogy with a similar product. |
| **Chemical oxygen demand (COD):** | > 2,000.000 mg/l<br>By analogy with a similar product. |

**Remarks:**
Do not dispose of in the environment.

## Section 13 - Disposal considerations

**Waste disposal information:**
Consult local, state, and federal regulations.
Recommended disposal is by incineration in approved facilities.

**RCRA hazardous waste:**
No -- Not as sold.
RCRA number: NONE

## Section 14 - Transport information

**DOT Regulation:**

| | |
|---|---|
| Proper shipping name: | Amines, liquid, corrosive, n.o.s. |
| Hazard class: | 8 |
| Packing group: | II |
| UN/NA-number: | UN 2735 |
| Primary hazard class: | 8 |
| Technical Name: | Alkyletheramine |

**IATA**

| | |
|---|---|
| Proper shipping name: | Amines, liquid, corrosive, n.o.s. |
| Class: | 8 |
| Packing group: | II |
| UN/ID number: | UN 2735 |
| Primary risk: | 8 |
| Remarks: | Shipment permitted |
| Hazard inducer(s): | Alkyletheramine |

**IMDG**

| | |
|---|---|
| Proper shipping name: | Amines, liquid, corrosive, n.o.s. |
| Class: | 8 |
| Packing group: | II |
| UN no.: | UN 2735 |
| Primary risk: | 8 |
| Hazard inducer(s): | Alkyletheramine |
| Marine pollutant: | Marine Pollutant |
| EmS: | F-A S-B |

## Section 15 - Regulatory information

**TSCA Status:**
All components of this product are listed on the TSCA Inventory.

**SARA (section 311/312):**

| | |
|---|---|
| Reactive hazard: | no |
| Pressure hazard: | no |
| Fire hazard: | yes |
| Immediate/acute: | yes |

Delayed/chronic: no

**SARA 313 information:**

This product does not contain any toxic chemical listed under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986.

**Clean Water Act:**

Contains no known priority pollutants at concentrations greater than 0.1%.

## Section 16 - Other information

**Label information:**

DANGER!

CORROSIVE TO SKIN AND EYES CAUSES BURNS HARMFUL IF SWALLOWED
THIS MATERIAL IS TOXIC TO AQUATIC ORGANISMS.

Avoid breathing vapor or mist. Avoid contact with skin and eyes. Avoid mist formation. Keep container closed when not in use. Keep away from heat, sparks and flame. Use ventilation and/or respiratory protection to keep exposure to a minimum.

Eye contact: flush with water for at least 15 minutes while holding eyelids open. Seek immediate medical attention. Skin contact: wash thoroughly with soap and water for 15 minutes. If skin irritation occurs, seek medical attention. Wash contaminated clothing before reuse. Ingestion: seek medical attention immediately. Inhalation: remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.

---

# Material Safety Data Sheet

AKZO NOBEL

MSDS# 15-08

## Section 1. Chemical Product and Company Identification

**Product name** ARMAC® T

**Material Uses** : Surfactant.

**Supplier/ Manufacturer**

AKZO NOBEL SURFACE CHEMISTRY LLC
525 West Van Buren
Chicago, IL 60607-3823
www.surfactants.akzonobel.com

AKZO NOBEL CHEMICALS LTD.
1 City Centre Drive, Suite 318
Mississauga, Ontario L5B 1M2
Canada

**In Case of Emergency**

| | |
|---|---|
| CHEMTREC: | 800-424-9300 |
| CANUTEC: | 613-996-6666 |
| Medical/Handling: | 914-693-6946 |
| Product/Technical: | 800-906-9977 |

## Section 2. Hazards Identification

**Physical State** Solid.

**Color** Yellow.

**Odor** Acetic acid. (Slight.)

**Emergency Overview**

DANGER!
CAUSES EYE AND SKIN BURNS.
HARMFUL TO AQUATIC ORGANISMS.
MAY BE HARMFUL TO ENVIRONMENT IF RELEASED IN LARGE AMOUNTS.

TOXIC TO FISH. TOXIC TO AQUATIC ORGANISIMS. DO NOT RELEASE TO WATER.
Do not get in eyes, on skin or on clothing. Avoid breathing dust/vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Avoid contact of spilled material and runoff with soil and surface waterways.

**Possible Carcinogenic Effects**

**Amines, tallow alkyl, acetates**: IARC, NTP, OSHA, ACGIH: Not listed.
**Amines, ditallow alkyl, acetates**: IARC, NTP, OSHA, ACGIH: Not listed.
**Amines, tallow alkyl**: IARC, NTP, OSHA, ACGIH: Not listed.

**Routes of Entry** Absorbed through skin. Dermal contact. Eye contact.

See Toxicological Information (section 11)

## Section 3. Composition/ Information on Ingredients

| Name | CAS # | % by Weight |
|---|---|---|
| Amines, tallow alkyl, acetates | 61790-60-1 | 95-100 |
| Di(tallowalkyl) amine acetates | 71011-03-5 | 0.001-2 |
| Amines, tallow alkyl | 61790-33-8 | 0.001-2 |

## Section 4. First Aid Measures

**Eye Contact** Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

*Continued on Next Page*

**Inhalation** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Ingestion** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Medical Conditions Aggravated by Overexposure** Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

## Section 5. Fire Fighting Measures

**Flammability of the Product** May be combustible at high temperature.

**Flash Points** Closed cup: 149°C (300.2°F). (Pensky-Martens.)

**Products of Combustion** These products are carbon oxides ($CO$, $CO_2$), nitrogen oxides ($NO$, $NO_2$...).

**Fire Fighting Media and Instructions** SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Protective Clothing (Fire)** Be sure to use an approved/certified respirator or equivalent.

## Section 6. Accidental Release Measures

**Small Spill and Leak** Use appropriate tools to put the spilled solid in a convenient waste disposal container.

**Large Spill and Leak** Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal.

**Other Special Considerations**

## Section 7. Handling and Storage

**Handling** Avoid breathing dust/vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Avoid contact of spilled material and runoff with soil and surface waterways.

**Storage** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8. Exposure Controls/ Personal Protection

**Engineering Controls** Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection**

- **Eyes** Splash goggles.
- **Body** Synthetic apron.
- **Respiratory** Respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
- **Hands** Gloves.
- **Feet** Not applicable.

**Protective Clothing (Pictograms)**

*Continued on Next Page*

| | |
|---|---|
| **Personal Protection in Case of a Large Spill** | Splash goggles. Full suit. Respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. |

| Ingredient Name | Exposure Limits United States |
|---|---|
| Amines, tallow alkyl, acetates | Not available. |
| Di(tallowalkyl) amine acetates | Not available. |
| Amines, tallow alkyl | Not available. |

## Section 9. Physical and Chemical Properties

| | |
|---|---|
| **Physical State** | Solid. |
| **Color** | Yellow. |
| **Odor** | Acetic acid. (Slight.) |
| **pH** | Not determined. |
| **Boiling/Condensation Point** | Not determined. |
| **Melting/Freezing Point** | 55°C (131°F) |
| **Pour Point** | 65°C |
| **Vapor Pressure** | <0.01 kPa (<0.1 mmHg) (at 20°C) |
| **Evaporation Rate** | <1 compared to Butyl acetate. |
| **Solubility** | Soluble in cold water. |

## Section 10. Stability and Reactivity

| | |
|---|---|
| **Stability and Reactivity** | The product is stable. |
| **Incompatibility with Various Substances** | Reactive with OXIDIZING AGENTS, acids, alkalis. |
| **Hazardous Polymerization** | Will not occur. |

## Section 11. Toxicological Information

### Toxicity to Animals

| Ingredient Name or Product name | Test | Result | Route | Species |
|---|---|---|---|---|
| ARMAC® T | LD50 | >2000 mg/kg | Oral | Rat |

| | |
|---|---|
| **Special Remarks on Toxicity to Animals** | **Amines, tallow alkyl**: INHALATION > 0.033 mg/L 1 hour(s) Rat; highest concentration tested. |
| **Chronic Effects on Humans** | **MUTAGENIC EFFECTS**: Classified None. for human [Amines, tallow alkyl]. Non-mutagenic for bacteria and/or yeast. [Amines, tallow alkyl]. |
| **Special Remarks on Chronic Effects on Humans** | **Amines, tallow alkyl**: Chromosomal (DNA) abnormalities will not occur in CHO mammalian cell assay, the In Vivo Cytogenetics Assay in mice, the CHO/HGPRT mammalian cell assay and the Mouse Lymphoma Assay; based on a similar material. |
| **Acute Effects Skin** | Corrosive to the skin. |
| **Acute Effects Eyes** | Corrosive to the eyes. |

*Continued on Next Page*

## Section 12. Ecological Information

### Ecotoxicity

| Ingredient Name or Product name | Species | Period | Result |
|---|---|---|---|
| Amines, tallow alkyl, acetates | Fish based on data for: (similar material) (LC50) | 96 hour(s) | 12.6 mg/l |

**Biodegradability and Ecotoxicity Remarks** **Amines, tallow alkyl**: 55% @ 28 day(s) CBT. 72% @ 42 day(s) CBT

**Products of Degradation** These products are carbon oxides (CO, $CO_2$) and water, nitrogen oxides (NO, $NO_2$...).

## Section 13. Disposal Considerations

**Waste Information** Waste must be disposed of in accordance with federal, state and local environmental control regulations.

**Consult your local or regional authorities.**

## Section 14. Transport Information

| Regulatory Information | UN number | Proper shipping name | Class | Packing Group | Label | Additional information |
|---|---|---|---|---|---|---|
| **DOT Classification** | UN 3259 | AMINES, SOLID, CORROSIVE, N.O.S. (Fatty amine acetates) | 8<br>- | III |  | - |
| **TDG Classification** | UN 3259 | AMINES, SOLID, CORROSIVE, N.O.S. (Fatty amine acetates) | 8<br>- | III |  | - |
| **IMDG Class** | UN 3259 | AMINES, SOLID, CORROSIVE, N.O.S. (Fatty amine acetates) | 8<br>- | III |  | - |
| **IATA-DGR Class** | UN 3259 | AMINES, SOLID, CORROSIVE, N.O.S. (Fatty amine acetates) | 8<br>- | III |  | - |

## Section 15. Regulatory Information

**HCS Classification** Corrosive Material

**U.S. Federal Regulations** TSCA: All intentionally present components are listed on the TSCA inventory.

DSL: All intentionally present components are listed on the DSL.

CERCLA: Hazardous substances.: No products were found.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: ARMAC® T
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: ARMAC® T: Immediate (Acute) Health Hazard

Continued on Next Page

SARA 313 Form R Reporting Requirements
No products were found.

SARA 313 Supplier Notification
No products were found.

**State Regulations** No products were found.

California prop. 65: No products were found.

**WHMIS (Canada)** Class E: Corrosive solid.

CEPA DSL: Amines, tallow alkyl, acetates; Amines, ditallow alkyl, acetates; Amines, tallow alkyl

| | Component | EC Number | EC Status | EC Annex |
|---|---|---|---|---|
| **European Union** | Amines, tallow alkyl, acetates | 263-150-8 | Not available. | Not available. |
| | Di(tallowalkyl) amine acetates | Not available. | Not available. | Not available. |
| | Amines, tallow alkyl | 263-125-1 | Not available. | Not available. |

**Other International Lists** Australia (NICNAS): Amines, tallow alkyl, acetates; Amines, tallow alkyl

Japan (MITI): Amines, tallow alkyl, acetates; Amines, tallow alkyl

Korea (TCCL): Amines, tallow alkyl, acetates; Amines, tallow alkyl

Philippines (RA6969): Amines, tallow alkyl, acetates; Amines, tallow alkyl

## Section 16. Other Information

**Hazardous Material Information System (U.S.A.)**

| | |
|---|---|
| Health | 3 |
| Fire Hazard | 1 |
| Reactivity | 0 |
| Personal Protection | |

**National Fire Protection Association (U.S.A.)**


**Other Information** Armac® is a registered trademark of Akzo Nobel or affiliated companies and is registered in one or more countries including the United States.

| | | | |
|---|---|---|---|
| **Validation Date** | **12/5/2005.** | **Validated by** | **Gabrielle Brite** |
| **Previous Validation Date** | No Previous Validation. | **Print Date** | 5/29/2007. |
| | | **Phone Number** | **312-544-7038** |

### *Notice to Reader*

**The information in the material safety data sheet should be provided to all who will use, handle, store, transport or otherwise be exposed to this product. All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable as of the date of publication. However, no warranty is made as to the accuracy of and/or sufficiency of such information and/or suggestions or as to the product's merchantability or fitness for any particular purpose, or that any suggested use will not infringe any patent. Nothing contained herein shall be construed as granting or extending any license under any patent. Buyer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes, including mixing with other products. The information contained herein supersedes all previously issued bulletins on the subject matter covered. If the date on this document is more than three years old, call to make certain that this sheet is current.**

# Safety Data Sheet
## PIONERA F-220 - POWDER

## SECTION 1: Identification of the substance/preparation and of the company/undertaking

### 1.1. Product identifier

**Trade name:** PIONERA F-220 - POWDER

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Recommended uses:**
Flotation depressant with selectivity for Calcite, Barite, etc

### 1.3. Details of the supplier of the safety data sheet

**Supplier**

**Company:** Borregaard North America, Inc.

**Address:** 100 Grand Avenue
Rothchild, WI 54474-1198

**Zip code:**

**Country:** UNITED STATES

**Phone:** 715-355-3699

### 1.4. Emergency Telephone Number

+1(715)359-6544 (Emergency phone)
+1(800)424-9300 (Chemtrec phone) (24h)

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

**HazCom-classification - other information:** The product does not have to be classified.

### 2.2. Label elements

**Signal word:** Warning

### 2.3. Other hazards

Nuisance dust.
OSHA Hazard Category: Combustible Dust. Warning. May form combustible dust concentrations in air.

## SECTION 3: Composition/information on ingredients

### 3.2. Mixtures

| Substance | CAS number | Concentration | Notes |
|---|---|---|---|
| Chemically modified natural polymer. | Trade Secret. | ≥ 92% | |
| Water | 7732-18-5 | ≤ 8% | |

 

# Safety Data Sheet
## PIONERA F-220 - POWDER

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

| | |
|---|---|
| **Inhalation:** | Seek fresh air. |
| **Ingestion:** | Wash out mouth thoroughly and drink 1-2 glasses of water in small sips. |
| **Skin contact:** | Wash the skin with water. Remove contaminated clothing. |
| **Eye contact:** | Flush with water (preferably using eyewash equipment) until irritation subsides. Seek medical advice if symptoms persist. |

### 4.2. Most important symptoms and effects, both acute and delayed

Nuisance dust.

### 4.3. Indication of any immediate medical attention and special treatment needed

None.

## SECTION 5: Fire-fighting measures

### 5.1. Extinguishing media

| | |
|---|---|
| **Suitable extinguishing media:** | Extinguish with powder, foam, carbon dioxide or water mist. |
| **Unsuitable extinguishing media:** | Do not use a jet of water, as it may spread the fire. |

### 5.2. Special hazards arising from the substance or mixture

Note the risk of dust explosion.

### 5.3. Advice for fire-fighters

Wear Self-Contained Breathing Apparatus with a chemical protection suit.

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel:** Avoid formation of dust. Provide good ventilation.

### 6.2. Environmental precautions

Avoid unnecessary release to the environment. Prevent spillage from entering drains and/or surface water.

### 6.3. Methods and material for containment and cleaning up

Sweep up/collect spills for possible reuse or transfer to suitable waste containers.

### 6.4. Reference to other sections

See section 8 for type of protective equipment.
See section 13 for instructions on disposal.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

 

# Safety Data Sheet
## PIONERA F-220 - POWDER

Work under effective process ventilation (e.g. local exhaust ventilation).

### 7.2. Conditions for safe storage, including any incompatibilities

Store in a dry, cool, well-ventilated area. Avoid accumulation of dust.

### 7.3. Specific end use(s)

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### Occupational exposure limit

| Substance name | Time period | ppm | mg/m3 | Comment | Remarks |
|---|---|---|---|---|---|
| Nuisance dust (OSHA PELV) | OSHA | | 15 | (total) and 5 mg/m3 respirable | |

**Biological threshold values:** Avoid formation of dust.

### 8.2. Exposure controls

**Appropriate engineering controls:** Provide good ventilation.

**Personal protective equipment, eye/face protection:** Wear safety goggles if there is a risk of dust contact with eyes.

**Personal protective equipment, skin protection:** In the event of direct skin contact, wear protective gloves:

**Personal protective equipment, respiratory protection:** Wear respiratory protective equipment with P2 filter when performing dusty work. NIOSH approved dust mask recommended.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| Parameter | Value/unit |
|---|---|
| State | Powder |
| Colour | Brown |
| Odour | Mild |
| Solubility | Water soluble. |
| Explosive properties | |
| Oxidising properties | |

| Parameter | Value/unit | Remarks |
|---|---|---|
| pH (solution for use) | 3.5 - 5.5 | |
| pH (concentrate) | | Not applicable. |
| Melting point | °C | Not applicable. |
| Freezing point | °C | Not applicable. |
| Initial boiling point and boiling range | °C | Not applicable. |
| Flash Point | °C | Not applicable. |
| Evaporation rate | | Not applicable. |
| Flammability (solid, gas) | | Not applicable. |
| Flammability limits | | Not applicable. |
| Explosion limits | vol% | LEL: 0.2 oz./cu.ft. UEL: 3.5 oz./cu.ft. |
| Vapour pressure | kPa | Not applicable. |

 

# Safety Data Sheet
## PIONERA F-220 - POWDER

| | | |
|---|---|---|
| Vapour density | | Not applicable. |
| Relative density | | Not applicable. |
| Partition coefficient n-octonol/water | | 100% Water. |
| Auto-ignition temperature | > 400 °C | |
| Decomposition temperature | > 200 °C | |
| Viscosity | cSt | Not applicable. |
| Odour threshold | ppm | Not applicable. |

### 9.2 Other information

| Parameter | Value/unit | Remarks |
|---|---|---|
| Density | 0.37 - 0.56 g/ml (bulk density) | |
| Combustible Dust Characteristics | | MIE: 1130 mJoule; Kst: St1 (0-200 bar*m/s); Part size: 100% < 150 micron. |

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Not reactive.

### 10.2. Chemical stability

Stable.

### 10.3. Possibility of hazardous reactions

None known.

### 10.4. Conditions to avoid

Avoid formation of dust. Avoid spark due to static electricity.

### 10.5. Incompatible materials

Strong oxidisers.

### 10.6. Hazardous decomposition products

Typical combustion products.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

**Acute toxicity - oral**

**Chemically modified natural polymer.**

| Organism | Test Type | Exposure time | Value | Conclusion | Test method | Source |
|---|---|---|---|---|---|---|
| Rat | LD50 | | > 5000mg/kg | | | |

Based on available data, the classification criteria are not met.

**Acute toxicity - inhalation:** The product does not have to be classified.

**Skin corrosion/irritation:** The product does not have to be classified.

 

# Safety Data Sheet
## PIONERA F-220 - POWDER

| | |
|---|---|
| **Serious eye damage/eye irritation:** | The product does not have to be classified. |
| **Respiratory sensitisation or skin sensitisation:** | None known. |
| **Germ cell mutagenicity:** | None known. |
| **Carcinogenic properties:** | The product does not have to be classified. |
| **Other toxicological effects:** | Sensitization to Material: May cause allergic reaction in rare cases. |

## SECTION 12: Ecological information

### 12.1. Toxicity

No effect on the environment. Based on available data, the classification criteria are not met.

### 12.2. Persistence and degradability

Partially biodegradable COD: 3300 mg 02/L (0.25% solution)

### 12.3. Bioaccumulative potential

No bioaccumulation expected.

### 12.4. Mobility in soil

Solubility in water: Completely miscible

### 12.5. Results of PBT and vPvB assessment

None known.

### 12.6. Other adverse effects

None known.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Dispose of in accordance with Local Authority requirements.

## SECTION 14: Transport information

| | | | |
|---|---|---|---|
| **14.1. UN-No.:** | Not applicable. | **14.4. Packing group:** | Not applicable. |
| **14.2. UN proper shipping name:** | Not applicable. | **14.5. Environmental hazards:** | Not applicable. |
| **14.3. Transport hazard class(es):** | Not applicable. | | |

### 14.6. Special precautions for user

None.

# Safety Data Sheet
## PIONERA F-220 - POWDER

### 14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC code

Not applicable.

**Other Information:** DOT Class 55 - Harmonized Tariff Code for US:3804.00.1000-0

## SECTION 15: Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

**Special Provisions:** ADR/RID (2007) ECHA FAQ 7.7. GHS / CLP (EC NO1272/2008) GHS USA June, 2015.

**Authorisations / limitations:** Global inventory status:
Australia: On AICS Australian Inventory of Chemical Substances, June 1996 Ed
Canada: On DSL Supplement to Canada Gazette, Part I, January 26, 1991
China: On IECSC Inventory of Existing Chemical Substances in China, 2013
Japan: On ENCS Unlisted chemical name. For ENCS chemical class or category name, refer to ENCS No. 8-209.
Korea: On ECL Korean Existing Chemicals List, January 1997, ECL Serial No.: KE-04572
Mexico: On INSQ National Inventory of Chemical Substances in Mexico, 2012
New Zealand: On NZIoC New Zealand Inventory of Chemicals, 2006 May be used as a single component chemical under an appropriate group standard.
Philippines: On PICCS Philippines Inventory of Chemicals and Chemical Substances, 2000
Switzerland: On SWISS Giftliste 1 (List of Toxic Substances 1), 31 May 1999, SWISS No.: G-44534
USA: On TSCA Inventory January 2015 TSCA Inventory EPA Flags: XU Exempt from Update Rule

**TSCA:** All ingredients are on the inventory or exempt from listing.

**CERCLA:** None of the ingredients are on the inventory.

### NFPA ratings

**Health hazard:** 1

**Flammability:** 1

**Instability:** 0

### 15.2. Chemical Safety Assessment

**Other Information:** The product does not have to be classified.

## SECTION 16: Other information

**Vendor notes:** Information given in this safety data sheet is in accordance with our information, and to the best of our knowledge, was correct on the last revision date. Information given is intented to present guidelines for safe handling, use, processing, storage, transport, disposal and discharge; it is not intended to be a guarantee or quality specification. It is the responsibility of the recipient of this safety data sheet to ensure that information given here is read and understood by all who use, handle, dispose of or in any way come in contact with the product.

**Revision date:** 12/5/2015

# Safety Data Sheet
## PIONERA F-220 - POWDER

**Document language:** US

 

# SAFETY DATA SHEET



## 1. Identification

**Product identifier** **SYLFAT™ FA2**

**Other means of identification**

- **SDS number** 8719
- **Product Code** 200000000258

**Recommended use** Industrial uses: Uses of substances as such or in preparations at industrial sites. Formulation [mixing] of preparations and/or re-packaging (excluding alloys).

**Recommended restrictions** None known.

**Manufacturer/Importer/Supplier/Distributor information**

**Manufacturer**

| | |
|---|---|
| **Company** | Arizona Chemical Company LLC |
| **Address** | Building 100<br>4600 Touchton Road East, Suite 1200 |
| **City/State** | Jacksonville, FL |
| **Zip** | 32246 |
| **Country** | USA |
| **Phone Number** | 904-928-8700 |
| **Alternate Phone Number** | 800-526-5294 |
| **Fax Number** | 904-928-8780 |
| **Emergency-US** | CHEMTREC 800-424-9300 |

## 2. Hazard(s) identification

**Physical hazards** Not classified.

**Health hazards** Not classified.

**OSHA defined hazards** Not classified.

**Label elements**

- **Hazard symbol** None.
- **Signal word** None.
- **Hazard statement** The substance does not meet the criteria for classification.
- **Precautionary statement**
  - **Prevention** Observe good industrial hygiene practices.
  - **Response** Wash hands after handling.
  - **Storage** Store away from incompatible materials.
  - **Disposal** Dispose of waste and residues in accordance with local authority requirements.

**Hazard(s) not otherwise classified (HNOC)** After prolonged contact with highly porous materials, this product may spontaneously combust.

**Supplemental information** None.

## 3. Composition/information on ingredients

**Substances**

| Chemical name | Common name and synonyms | CAS number | % |
|---|---|---|---|
| Tall Oil Fatty Acids | | 61790-12-3 | 100 |

## 4. First-aid measures



| | |
|---|---|
| **Inhalation** | Move to fresh air. Call a physician if symptoms develop or persist. |
| **Skin contact** | Wash off with soap and water. Get medical attention if irritation develops and persists. |
| **Eye contact** | Rinse with water. Get medical attention if irritation develops and persists. |
| **Ingestion** | Rinse mouth. Get medical attention if symptoms occur. |
| **Most important symptoms/effects, acute and delayed** | Direct contact with eyes may cause temporary irritation. |
| **Indication of immediate medical attention and special treatment needed** | Treat symptomatically. |
| **General information** | Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. |

## 5. Fire-fighting measures

| | |
|---|---|
| **Suitable extinguishing media** | Water fog. Water spray, dry chemical, carbon dioxide. Foam. |
| **Unsuitable extinguishing media** | Do not use water jet as an extinguisher, as this will spread the fire. |
| **Specific hazards arising from the chemical** | Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons. |
| **Special protective equipment and precautions for firefighters** | Self-contained breathing apparatus and full protective clothing must be worn in case of fire. |
| **Fire fighting equipment/instructions** | Wear suitable protective equipment. Move containers from fire area if you can do so without risk. |
| **Specific methods** | Use standard firefighting procedures and consider the hazards of other involved materials. |
| **General fire hazards** | Porous material such as rags, paper, insulation, or organic clay may spontaneously combust when wetted with this material. |

## 6. Accidental release measures

| | |
|---|---|
| **Personal precautions, protective equipment and emergency procedures** | Keep unnecessary personnel away. For personal protection, see section 8 of the SDS. |
| **Methods and materials for containment and cleaning up** | Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.<br><br>Small Spills: Absorb in vermiculite, dry sand or earth and place into containers. Clean surface thoroughly to remove residual contamination.<br><br>Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS. |
| **Environmental precautions** | Avoid discharge into drains, water courses or onto the ground. |

## 7. Handling and storage

| | |
|---|---|
| **Precautions for safe handling** | Porous material such as rags, paper, insulation, or organic clay may spontaneously combust when wetted with this material. May auto-oxidize with sufficient heat generation to ignite if spread (as a thin film) or absorbed on porous or fibrous material. Contaminated rags and cloths must be put in fireproof containers for disposal. Avoid prolonged exposure. Avoid release to the environment. Observe good industrial hygiene practices. Follow all SDS/label precautions even after container is emptied because they may retain product residues. |
| **Conditions for safe storage, including any incompatibilities** | Do not store in direct sunlight. Store in original tightly closed container. Keep containers closed when not in use. Store at ambient temperature and atmospheric pressure. Store away from incompatible materials (see Section 10 of the SDS). |

## 8. Exposure controls/personal protection



**Occupational exposure limits**

**U.S. - OSHA**

| Components | Type | Value | Form |
|---|---|---|---|
| Tall Oil Fatty Acids (CAS 61790-12-3) | TWA | 5 mg/m3 | Oil Mist; Respirable |

**ACGIH**

| Components | Type | Value | Form |
|---|---|---|---|
| Tall Oil Fatty Acids (CAS 61790-12-3) | STEL | 10 mg/m3 | Oil Mist; Respirable |
| | TWA | 5 mg/m3 | Oil Mist; Respirable |

**Biological limit values** No biological exposure limits noted for the ingredient(s).

**Appropriate engineering controls** Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

**Individual protection measures, such as personal protective equipment**

**Eye/face protection** Wear safety glasses with side shields (or goggles).

**Skin protection**

**Hand protection** Wear appropriate chemical resistant gloves.

**Other** Wear suitable protective clothing.

**Respiratory protection** In case of insufficient ventilation, wear suitable respiratory equipment.

**Thermal hazards** Wear appropriate thermal protective clothing, when necessary.

**General hygiene considerations** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Eye wash fountain and emergency showers are recommended.

## 9. Physical and chemical properties

**Appearance** Liquid.

**Physical state** Liquid.

**Form** Liquid.

**Color** Yellow.

**Odor** Mild.

**Odor threshold** Not available.

**pH** Not available.

**Melting point/freezing point** 41 °F (5 °C)

**Initial boiling point and boiling range** > 392 °F (> 200 °C)

**Flash point** 399.2 °F (204.0 °C) Cleveland Open Cup

**Evaporation rate** 0 (n-BuAc=1) estimated

**Flammability (solid, gas)** Not available.

**Upper/lower flammability or explosive limits**

**Flammability limit - lower (%)** Not available.

**Flammability limit - upper (%)** Not available.

**Explosive limit - lower (%)** Not available.

**Explosive limit - upper (%)** Not available.

**Vapor pressure** < 0.001 mm Hg at 20°C

**Vapor density** Not available.

**Relative density** 0.9 at 25°C/25°C; (water=1)

**Solubility(ies)**

| | |
|---|---|
| **Solubility (water)** | 12.6 mg/L at 20ºC; Data is for similar product. |
| **Partition coefficient (n-octanol/water)** | 4.9 - 6 at 30ºC; Data is for similar product. |
| **Auto-ignition temperature** | 494.6 °F (257 °C) Data is for similar product. |
| **Decomposition temperature** | Not available. |
| **Viscosity** | 20 cP at 25°C |

**Other information**

| | |
|---|---|
| **Chemical family** | Tall Oil Fatty Acids |
| **Density** | 898.00 kg/m³ at 20°C |
| **Percent volatile** | 0 % estimated |

## 10. Stability and reactivity

| | |
|---|---|
| **Reactivity** | The product is stable and non-reactive under normal conditions of use, storage and transport. |
| **Chemical stability** | Material is stable under normal conditions. |
| **Possibility of hazardous reactions** | No dangerous reaction known under conditions of normal use. |
| **Conditions to avoid** | Strong oxidizing agents. Porous material such as rags, paper, insulation, or organic clay may spontaneously combust when wetted with this material. Contact with incompatible materials. |
| **Incompatible materials** | Strong oxidizing agents. |
| **Hazardous decomposition products** | Upon decomposition this product emits acrid dense smoke with carbon dioxide, carbon monoxide, water and other products of combustion. |

## 11. Toxicological information

**Information on likely routes of exposure**

| | |
|---|---|
| **Inhalation** | Prolonged inhalation may be harmful. |
| **Skin contact** | No adverse effects due to skin contact are expected. |
| **Eye contact** | Direct contact with eyes may cause temporary irritation. |

Tall Oil Fatty Acids

Draize Test, No eye irritation.
Result: Negative
Species: Albino rabbit
Organ: Eye
Test Duration: 7 days
Observation Period: 7 days

| | |
|---|---|
| **Ingestion** | Expected to be a low ingestion hazard. |
| **Symptoms related to the physical, chemical and toxicological characteristics** | Direct contact with eyes may cause temporary irritation. |

**Information on toxicological effects**

| | |
|---|---|
| **Acute toxicity** | Based on available data, the classification criteria are not met. |

| **Components** | **Species** | **Test Results** |
|---|---|---|
| Tall Oil Fatty Acids (CAS 61790-12-3) | | |
| **Acute** | | |
| *Dermal* | | |
| LD50 | Albino rabbit | > 2000 mg/kg, 14 days At this dose no death occurred. |
| *Oral* | | |
| LD50 | Albino Sprague-Dawley rat | > 10000 mg/kg, 14 days At this dose no death occurred. |

* Estimates for product may be based on additional component data not shown.

| | |
|---|---|
| **Skin corrosion/irritation** | Prolonged skin contact may cause temporary irritation. |
| **Serious eye damage/eye irritation** | Direct contact with eyes may cause temporary irritation. |

**Eye Contact**

Tall Oil Fatty Acids

Draize Test, No eye irritation.
Result: Negative
Species: Albino rabbit
Organ: Eye
Test Duration: 7 days
Observation Period: 7 days

**Respiratory or skin sensitization**

**Respiratory sensitization** Not available.

**Skin sensitization** This product is not expected to cause skin sensitization.

**Skin sensitization**

Tall Oil Fatty Acids

Buehler Test, Not a skin sensitizer.
Result: Negative
Species: Guinea pig
Organ: Skin
Notes: OECD 406
Maximisation Assay (Magnusson and Kligman), Not a skin sensitizer.
Result: Negative
Species: Guinea pig
Organ: Skin
Notes: OECD 406

**Germ cell mutagenicity** No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Mutagenicity**

Tall Oil Fatty Acids

Germ Cell Mutagenicity: Ames, No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Result: Negative
Species: Salmonella typhimurium
Notes: OECD 471

**Carcinogenicity** This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

**OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Not listed.

**Reproductive toxicity** This product is not expected to cause reproductive or developmental effects.

**Specific target organ toxicity - single exposure** Not classified.

**Specific target organ toxicity - repeated exposure** Not classified.

**Aspiration hazard** Not available.

**Chronic effects** Prolonged inhalation may be harmful.

## 12. Ecological information

**Ecotoxicity** The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

| Product | | Species | Test Results |
|---|---|---|---|
| SYLFAT™ FA2 | | | |
| **Aquatic** | | | |
| Fish | LL100 | Zebra danio (Danio rerio) | > 10000 mg/l, 96 hr |

| Components | | Species | Test Results |
|---|---|---|---|
| Tall Oil Fatty Acids (CAS 61790-12-3) | | | |
| | EC50 | Bacteria (Pseudomonas putida) | > 10000 mg/l, 16 hr |
| **Aquatic** | | | |
| Algae | EL50 | Green algae (Selenastrum capricornutum) | > 1000 mg/l, 72 hr Growth rate; OECD 201 |
| Crustacea | EL50 | Water flea (Daphnia magna) | > 1000 mg/l, 48 hr OECD 202 |

| Components | | Species | Test Results |
|---|---|---|---|
| Fish | LL50 | Zebra danio (Danio rerio) | > 10000 mg/l, 96 hr |

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* Estimates for product may be based on additional component data not shown.

**Persistence and degradability** The product is biodegradable.

**Biodegradability**

**Percent degradation (Aerobic biodegradation)**

Tall Oil Fatty Acids — 88 - 100 % $CO_2$ Evolution Test
Species: Activated sewage sludge
Test Duration: 28 d

**Bioaccumulative potential**

**Partition coefficient n-octanol / water (log Kow)**

SYLFAT™ FA2 — 4.9 - 6 LogKow, at 30ºC; Data is for similar product.

**Mobility in soil** No data available.

**Other adverse effects** No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

## 13. Disposal considerations

**Disposal instructions** Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations** Dispose in accordance with all applicable regulations.

**Hazardous waste code** The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products** Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging** Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

## 14. Transport information

**DOT**

Not regulated as dangerous goods.

**IATA**

Not regulated as dangerous goods.

**IMDG**

Not regulated as dangerous goods.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not available.

## 15. Regulatory information

**US federal regulations** This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.
Use as animal feed is prohibited in the United States. Similar regulations may restrict such use in other locations.

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

Not regulated.

**CERCLA Hazardous Substance List (40 CFR 302.4)**

Not listed.

**SARA 304 Emergency release notification**

Not regulated.

**OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

Not listed.

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

**Hazard categories**
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

**SARA 302 Extremely hazardous substance**
Not listed.

**SARA 311/312 Hazardous chemical** No

**SARA 313 (TRI reporting)**
Not regulated.

**Other federal regulations**

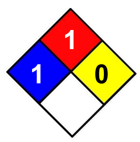
**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**
Not regulated.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
Not regulated.

**Safe Drinking Water Act (SDWA)** Not regulated.

**NFPA ratings**
Health: 1
Flammability: 1
Instability: 0

**NFPA ratings**




**US state regulations**

**US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)**
Not listed.

**US. Massachusetts RTK - Substance List**
Not regulated.

**US. New Jersey Worker and Community Right-to-Know Act**
Not listed.

**US. Pennsylvania Worker and Community Right-to-Know Law**
Not listed.

**US. Rhode Island RTK**
Not regulated.

## 16. Other information, including date of preparation or last revision

**Issue date** 02-23-2015

**Revision date** 07-07-2015

**Version #** 1.1

**Disclaimer** The information contained herein is based on data believed to be reliable and the manufacturer disclaims any liability incurred from the use or reliance upon the same. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. This safety information is not a license to use this material as claimed by any patents of third parties. The user alone must finally determine whether a contemplated use of this material will infringe any such patents, and for obtaining any required licenses.

**Revision Information** This document has undergone significant changes and should be reviewed in its entirety.

# Appendix D: CAPEX and Basis of Estimate

Project Development & Management

# Estimate

| | | | |
|---|---|---|---|
| Title: | **CAPEX Estimate** | Rev.: | **00** |
| Doc. No.: | **CX1208-001** | Date: | **8-Jun-2023** |

**TANTALEX LITHIUM RESOURCES** Manono Tailings PEA

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| | |
|---|---|
| Prepared by: | **Peyman Sayyadi** |
| Reviewed by: | **Abbas Mahmoodi** |
| Approved by: | **Mazi Rejaee** |

**REVISION INDEX**

| Rev. | Date | By | Rev'd | App. | Client | Revision Details |
|---|---|---|---|---|---|---|
| PA | 27-Apr-2023 | PS | AW | MR | | Internal Review |
| PB | 3-May-2023 | PS | AW | MR | | Client Review |
| PC | 18-May-2023 | PS | AW | MR | | Client Review (In the office) |
| PD | 19-May-2023 | PS | AW | MR | | Client Review |
| 00 | 8-Jun-2023 | P.S | AM | | | For Project Use |

## Change Log

| Item No. | Rev. | Change Description | Date | Remarks |
|---|---|---|---|---|
| 1 | PA | Internal Review Meeting | 27-Apr-2023 | |
| 2 | PB | Client Review | 3-May-2023 | |
| 3 | PC | Flotation Plant Costs added | 18-May-2023 | |
| 4 | PD | Adjustments to the estimate percentages. | 19-May-2023 | |
| 5 | 00 | No comments received from the Client. | 8-Jun-2023 | |
| | | | | |

## Sum Discipline

| Item No. | Area | Total | Remarks |
|---|---|---|---|
| **A** | **DIRECT COSTS** | **$ 80,611,000** | |
| A.1 | Civil | $ 10,073,000 | Refer to Detailed Estimate |
| A.2 | Concrete | $ 4,829,000 | 15% of Mech |
| A.3 | Structural | $ 5,794,000 | 18% of Mech |
| A.4 | Architectural | $ 2,547,000 | Refer to Detailed Estimate |
| A.5 | Mechanical | $ 32,191,000 | Refer to Detailed Estimate |
| A.5 | Mobile Equipment | $ 4,254,000 | Refer to Detailed Estimate |
| A.6 | Piping | $ 9,657,000 | 30% of Mech |
| A.8 | Electrical | $ 6,438,000 | 20% of Mech |
| A.9 | Instrumentation & Telecommunication | $ 4,829,000 | 15% of Mech |
| **B** | **INDIRECT COSTS** | **$ 34,157,000** | |
| B.1 | Construction indirects | $ 4,031,000 | 5% of Directs |
| B.2 | Freight, handling, and logistics | $ 9,673,000 | 12% of Directs |
| B.3 | Commissioning & (1) year operational & capital spare | $ 1,612,000 | 2% of Directs |
| B.4 | First fill | $ 2,429,000 | 1.3% of Mechanical+FeSi |
| B.5 | Vendor Representative | $ 290,000 | 1% of Mechanical |
| B.6 | EPCM Services | $ 9,673,000 | 12% of Directs |
| B.7 | Owner's costs | $ 6,449,000 | 8% of Directs |
| **A+B** | **Total Before Contingency** | **$ 114,769,000** | |
| **C** | **Contingency** | **$ 22,954,000** | |
| C.1 | Project Recommended Contingency | $ 22,954,000 | 20% of (Directs + Indirect) |
| **A+B+C** | **Total Costs** | **$ 137,722,000** | |
| **D** | **Road Rehabilitation Allowance** | **$ 10,000,000** | |
| **A+B+C+D** | **Total Project Budget** | **$ 147,722,000** | **USD** |

***Notes:***

1. The estimate base currency is the USD reflecting current market pricing as of 2nd quarter 2023.
2. The estimate (parts A, B& C) is considered a scoping level estimate per AACE Class 5 with an average overall accuracy of +/-35%.
3. For more clarification and backup, refer to the Basis of Estimate (BoE) file EB1208-001.
4. No project development costs (FS, ESIA) are included in this estimate
5. Item D is considered an allowance

## Detailed Estimate

| Item No. | WBS | Area | Cost Year | Cost Type | Drawing/MTO No. | Tag No | Discipline | Description | Qty | UoM | Unit Lab Cost | Unit Mat Cost | Currency | Total Lab Cost | Total Mat Cost | Freight | Spare Parts | Grand Total | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 18% of Mat | | | $ 12,978,135 | $ 33,119,951 | | | $ 49,064,543 | |
| 100 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Clearing and Grubbing, Clearing vegetation and removing from area | 665,500.00 | m2 | $ 0 | included in Bag filler | USD | $ 79,860 | $ - | $ - | $ - | $ 92,791 | |
| 101 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Top soil Removal, TSF Area top soil removal (top 200 mm) | 133,100.00 | m3 | $ 3 | included in Bag filler | USD | $ 393,976 | $ - | $ - | $ - | $ 457,767 | |
| 102 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Stockpiling of Top soil, Average cut of 200 mm | 133,100.00 | m3 | $ 3 | included in Bag filler | USD | $ 393,976 | $ - | $ - | $ - | $ 457,767 | |
| 103 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Cut and Fill and levelling the site, Average cut of 200 mm | 500,000.00 | m2 | $ 0 | included in Bag filler | USD | $ 60,000 | $ - | $ - | $ - | $ 69,715 | |
| 104 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Berm Fill Construction, 15% Additional material due to compaction | 216,343.75 | m3 | $ 8 | included in Bag filler | USD | $ 1,774,019 | $ - | $ - | $ - | $ 2,061,259 | |
| 105 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Excavation, | 6,250.00 | m3 | $ 3 | included in Bag filler | USD | $ 18,500 | $ - | $ - | $ - | $ 21,495 | |
| 106 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Woven geotextile Fabric, 10m/m of fabric (1 m overlap) | 12,500.00 | m2 | $ 3 | included in Bag filler | USD | $ 34,300 | $ - | $ - | $ - | $ 39,854 | |
| 107 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Sand bed, 150 mm x 2m sand bed | 375.00 | m3 | $ 12 | included in Bag filler | USD | $ 4,560 | $ - | $ - | $ - | $ 5,298 | |
| 108 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | 450 mm HDPE Corrugated Perforated Pipe, Perforated & Corrugated | 1,250.00 | m | $ 151 | included in Bag filler | USD | $ 188,184 | $ - | $ - | $ - | $ 218,654 | |
| 109 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Crushed Stones/Gravel Fill, Size 50 to 100 mm(Fines less than 50mm @! | 5,676.20 | m3 | $ 3 | included in Bag filler | USD | $ 15,099 | $ - | $ - | $ - | $ 17,543 | |
| 110 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Excavation, | 6,250.00 | m3 | $ 3 | included in Bag filler | USD | $ 18,500 | $ - | $ - | $ - | $ 21,495 | |
| 111 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Woven geotextile Fabric, 10m/m of fabric (1 m overlap) | 9,000.00 | m2 | $ 3 | included in Bag filler | USD | $ 24,696 | $ - | $ - | $ - | $ 28,695 | |
| 112 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Sand bed, 150 mm x 2m sand bed | 270.00 | m3 | $ 12 | included in Bag filler | USD | $ 3,283 | $ - | $ - | $ - | $ 3,815 | |
| 113 | 6000 | TAILING MANAGEMENT SYSTEM | 2020 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | 1000 mm HDPE Corrugated Perforated Pipe, Perforated & Corrugated | 900.00 | m | $ 927 | included in Bag filler | USD | $ 834,300 | $ - | $ - | $ - | $ 1,037,243 | |
| 114 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Crushed Stones/Gravel Fill, Size 50 to 100 mm(Fines less than 50mm @! | 3,523.14 | m3 | $ 3 | included in Bag filler | USD | $ 9,372 | $ - | $ - | $ - | $ 10,889 | |
| 115 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | 200 HDPE Pipe Return Line, Solid HDPE Pipeline | 1,350.00 | m | $ 128 | included in Bag filler | USD | $ 172,409 | $ - | $ - | $ - | $ 200,324 | |
| 116 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Sand bed, 150 mm by 600 mm sand bed | 121.50 | m3 | $ 12 | included in Bag filler | USD | $ 1,477 | $ - | $ - | $ - | $ 1,717 | |
| 117 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Anchor Points, 1 M3 every 30M | 45.00 | m3 | $ 317 | included in Bag filler | USD | $ 14,265 | $ - | $ - | $ - | $ 16,575 | |
| 118 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Service Road Levelling and Compaction, Width 5M | 6,750.00 | m2 | $ 3 | included in Bag filler | USD | $ 17,955 | $ - | $ - | $ - | $ 20,862 | |
| 119 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Service Road Fill Construction, Add 200 mm selected excavated materia | 1,350.00 | m3 | $ 8 | included in Bag filler | USD | $ 11,070 | $ - | $ - | $ - | $ 12,862 | |
| 120 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Excavation, 18.1m x 18.1m x4m deep | 1,310.44 | m3 | $ 3 | included in Bag filler | USD | $ 3,879 | $ - | $ - | $ - | $ 4,507 | |
| 121 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Concrete Foundation Base, Reinforced Concrete | 88.00 | m3 | $ 317 | included in Bag filler | USD | $ 27,896 | $ - | $ - | $ - | $ 32,413 | |
| 122 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Concrete Walls, Reinforced Concrete - 4 walls | 81.00 | m3 | $ 317 | included in Bag filler | USD | $ 25,677 | $ - | $ - | $ - | $ 29,834 | |
| 123 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Concrete Columns, Reinforced Concrete - 2 columns | 2.00 | m3 | $ 317 | included in Bag filler | USD | $ 634 | $ - | $ - | $ - | $ 737 | |
| 124 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Backfilling, Backfill up to concrete walls | 826.44 | m3 | $ 8 | included in Bag filler | USD | $ 6,777 | $ - | $ - | $ - | $ 7,874 | |
| 125 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Galvanized Steel H-beams (H200) 1,035 kg, Weight 50 kg/m (3.45Mx6) | 1.04 | mt | $ 6,084 | included in Bag filler | USD | $ 6,297 | $ - | $ - | $ - | $ 7,317 | |
| 126 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Galvanized Steel Gratings (25x50mm) 1,370 kg, Weight 90 kg/m2 (15M2 | 15.21 | m2 | $ 269 | included in Bag filler | USD | $ 4,084 | $ - | $ - | $ - | $ 4,745 | |
| 127 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Galvanized Steel Handrails (1100 H x 3000 L mm), (10.4M L) | 0.52 | mt | $ 6,084 | included in Bag filler | USD | $ 3,148 | $ - | $ - | $ - | $ 3,658 | |
| 128 | 6000 | TAILING MANAGEMENT SYSTEM | 2020 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | 1000 mm HDPE Corrugated pipe under the Berm, Corrugated Outside, S | 35.00 | m | $ 927 | included in Bag filler | USD | $ 32,445 | $ - | $ - | $ - | $ 40,337 | |
| 129 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Excavation, 2m x 2m excavation | 140.00 | m3 | $ 3 | included in Bag filler | USD | $ 414 | $ - | $ - | $ - | $ 481 | |
| 130 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Sand bed, 200 mm x 2 m sand bed | 14.00 | m3 | $ 12 | included in Bag filler | USD | $ 170 | $ - | $ - | $ - | $ 198 | |
| 131 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Backfilling, | 41.49 | m3 | $ 8 | included in Bag filler | USD | $ 340 | $ - | $ - | $ - | $ 395 | |
| 132 | 6000 | TAILING MANAGEMENT SYSTEM | 2020 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | 1000 mm HDPE Corrugated Pipe Overflow, Corrugated Outside, Smooth | 100.00 | m | $ 927 | included in Bag filler | USD | $ 92,700 | $ - | $ - | $ - | $ 115,249 | |
| 133 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Excavation, 2m x 2m excavation | 400.00 | m3 | $ 3 | included in Bag filler | USD | $ 1,184 | $ - | $ - | $ - | $ 1,376 | |
| 134 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Sandbed, 200 mm x 2 m sand bed | 40.00 | m3 | $ 12 | included in Bag filler | USD | $ 486 | $ - | $ - | $ - | $ 565 | |
| 135 | 6000 | TAILING MANAGEMENT SYSTEM | 2021 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Backfilling, | 118.54 | m3 | $ 8 | included in Bag filler | USD | $ 972 | $ - | $ - | $ - | $ 1,129 | |
| 136 | 6000 | TAILING MANAGEMENT SYSTEM | 2020 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | TSF Liner, EPDM Material | 494,057 | m2 | $ 8 | included in Bag filler | USD | $ 3,995,335 | $ - | $ - | $ - | $ 4,967,197 | |
| 137 | 5000 | UTILITIES | 2023 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Storm Water Pond, | 1,444.00 | m2 | $ 20 | included in Bag filler | USD | $ 29,227 | $ - | $ - | $ - | $ 29,227 | |
| 138 | 5000 | UTILITIES | 2023 | Inhouse | 1208-0000-CIDF-002 | N/A | Civil | Process Water Pond, | 1,444.00 | m2 | $ 20 | included in Bag filler | USD | $ 29,227 | $ - | $ - | $ - | $ 29,227 | |
| 139 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Tailings Dumps Dozer , Purpose: Move material at Dumps | 1.00 | ea | $ - | $ 332,340 | USD | $ - | $ 332,340 | $ - | $ - | $ 332,340 | |
| 140 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | TSF Dozer , Purpose: Move material at TSF | 1.00 | ea | $ - | $ 332,340 | USD | $ - | $ 332,340 | $ - | $ - | $ 332,340 | |
| 141 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Excavator , Purpose: Load dump material into dump trucks | 3.00 | ea | $ - | $ 304,268 | USD | $ - | $ 912,804 | $ - | $ - | $ 912,804 | |
| 142 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Dump truck , Purpose: Transport dump material from piles to overland c | 4.00 | ea | $ - | $ 126,588 | USD | $ - | $ 506,353 | $ - | $ - | $ 506,353 | |
| 143 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Front end Loader , Purpose: Reclaim material dumps and process plant | 2.00 | ea | $ - | $ 190,000 | USD | $ - | $ 380,000 | $ - | $ - | $ 380,000 | |
| 144 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Portable light towers, diesel-powered, Purpose: Illuminate work areas | 12.00 | ea | $ - | $ 16,740 | USD | $ - | $ 200,880 | $ - | $ - | $ 200,880 | |
| 145 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Light Passenger Vehicle, Purpose: Personnel and light equipment transp | 4.00 | ea | $ - | $ 50,000 | USD | $ - | $ 200,000 | $ - | $ - | $ 200,000 | |
| 146 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Telehandler, Purpose: Maintenance vehicle at site locations | 1.00 | ea | $ - | $ 257,884 | USD | $ - | $ 257,884 | $ - | $ - | $ 257,884 | |
| 147 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Mobile Crane, Purpose: Lifting for Maintenance operations | 1.00 | ea | $ - | $ 6,623 | USD | $ - | $ 6,623 | $ - | $ - | $ 6,623 | |
| 148 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Flat Bed Truck, Purpose: Transport of equipment between process plant | 1.00 | ea | $ - | $ 6,623 | USD | $ - | $ 6,623 | $ - | $ - | $ 6,623 | |
| 149 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Man cage, Purpose: Night Maintenance Lighting | 1.00 | ea | $ - | $ 7,000 | USD | $ - | $ 7,000 | $ - | $ - | $ 7,000 | |
| 150 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Grader , Purpose: Road Maintenance | 1.00 | ea | $ - | $ 335,700 | USD | $ - | $ 335,700 | $ - | $ - | $ 335,700 | |
| 151 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Drum Compactor, Purpose: Road Maintenance | 1.00 | ea | $ - | $ 46,693 | USD | $ - | $ 46,693 | $ - | $ - | $ 46,693 | |
| 152 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Fuel Tanker Truck, Purpose: Refuel mobile equipment fleet | 1.00 | ea | $ - | $ 148,000 | USD | $ - | $ 148,000 | $ - | $ - | $ 148,000 | |
| 153 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Water Tanker Truck, Purpose: Dedusting of roads | 1.00 | ea | $ - | $ 154,000 | USD | $ - | $ 154,000 | $ - | $ - | $ 154,000 | |
| 154 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Bobcat, Purpose: Maintenance support | 1.00 | ea | $ - | $ 56,000 | USD | $ - | $ 56,000 | $ - | $ - | $ 56,000 | |
| 155 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Welding Trailer, Purpose: Trailer-mounted Welding Machine | 1.00 | ea | $ - | $ 26,000 | USD | $ - | $ 26,000 | $ - | $ - | $ 26,000 | |
| 156 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Mobile Workshop and Maintenance Truck, Purpose: General service arc | 1.00 | ea | $ - | $ 85,000 | USD | $ - | $ 85,000 | $ - | $ - | $ 85,000 | |
| 157 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Forklift, Purpose: Loading bagged product onto outgoing transport truck | 3.00 | ea | $ - | $ 60,000 | USD | $ - | $ 180,000 | $ - | $ - | $ 180,000 | |
| 158 | 7000 | INFRASTRUCTURE | 2023 | Inhouse | 1208-0000-MELI-002 | N/A | Mobile Equipm | Scissor lift, Purpose: Maintenance vehicle at site locations | 1.00 | ea | $ - | $ 80,000 | USD | $ - | $ 80,000 | $ - | $ - | $ 80,000 | |
| 159 | 7000 | INFRASTRUCTURE | 2023 | inhouse | Guestimate | N/A | Mechanical | Lump sum water supply allowance (well) | 1.00 | ea | $ - | $ 500,000 | USD | $ - | $ 500,000 | $ - | $ - | $ 500,000 | |
| 160 | 7000 | INFRASTRUCTURE | 2023 | inhouse | 1208-0000-ARLI-001 | N/A | Architectural | Buildings surface area, Includes maintenance equipment | 1,498.00 | m2 | Included | $ 1,700 | USD | $ - | $ 2,546,600 | $ - | $ - | $ 2,546,600 | |
| 161 | 1100 | Grizzly Screen | 2023 | Inhouse | 1208-0000-MELI-001 | 1100-SN-001 | Mechanical | STATIC GRIZZLY, Capacity: 288.0 mtph, Model/Type: ,Static Grizzly, kW: | 1.00 | ea | $ 6,063 | $ 33,685 | USD | $ 6,063 | $ 33,685 | $ - | $ - | $ 39,749 | |
| 162 | 1100 | Grizzly Screen | 2023 | Quote | 1208-0000-MELI-001 | 1100-CR-001 | Mechanical | OVERSIZE FEED CONE CRUSHER, Model/Type: ,Cone Crusher, kW: 30.0, | 1.00 | ea | $ 4,986 | $ 27,700 | USD | $ 4,986 | $ 27,700 | $ - | $ - | $ 32,686 | |

## Detailed Estimate

18% of Mat — Total Lab Cost: $ 12,978,135 — Total Mat Cost: $ 33,119,951 — Grand Total: $ 49,064,543

| Item No. | WBS | Area | Cost Year | Cost Type | Drawing/MTO No. | Tag No | Discipline | Description | Qty | UoM | Unit Lab Cost | Unit Mat Cost | Currency | Total Lab Cost | Total Mat Cost | Freight | Spare Parts | Grand Total | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163 | 1100 | Grizzly Screen | 2022 | Inhouse | 1208-0000-MELI-001 | 1100-CV-001 | Mechanical | CRUSHER OVERSIZE RETURN CONVEYOR, Model/Type: ,900 mm belt, kV | 1.00 | ea | $ 2,646 | $ 14,700 | USD | $ 2,646 | $ 14,700 | $ - | $ - | $ 18,473 | |
| 164 | 2100 | Overland Conveyors | 2022 | Quote | 1208-0000-MELI-001 | 2100-CV-001 | Mechanical | OVERLAND BELT CONVEYOR 1, Capacity: 288.0 mtph, Model/Type: ,900 | 1.00 | ea | $ 444,020 | $ 2,466,777 | USD | $ 444,020 | $ 2,466,777 | $ - | $ - | $ 3,099,999 | |
| 165 | 2100 | Overland Conveyors | 2022 | Quote | 1208-0000-MELI-001 | 2100-CV-002 | Mechanical | OVERLAND BELT CONVEYOR 2, Capacity: 288.0 mtph, Model/Type: ,900 | 1.00 | ea | $ 242,806 | $ 1,348,920 | USD | $ 242,806 | $ 1,348,920 | $ - | $ - | $ 1,695,188 | |
| 166 | 2100 | Overland Conveyors | 2022 | Quote | 1208-0000-MELI-001 | 2100-CV-003 | Mechanical | OVERLAND BELT CONVEYOR 3, Capacity: 288.0 mtph, Model/Type: ,Belt | 1.00 | ea | $ 182,183 | $ 1,012,128 | USD | $ 182,183 | $ 1,012,128 | $ - | $ - | $ 1,271,941 | |
| 167 | 3100 | Conveying | 2022 | Inhouse | 1208-0000-MELI-001 | 3100-CV-001 | Mechanical | STOCKPILE RECLAIM CONVEYOR, Capacity: 288.0 mtph, Model/Type: ,B | 1.00 | ea | $ 44,249 | $ 245,831 | USD | $ 44,249 | $ 245,831 | $ - | $ - | $ 308,935 | |
| 168 | 3100 | Conveying | 2023 | Quote | 1208-0000-MELI-001 | 3100-CR-001 | Mechanical | OVERSIZE FEED ROLLER CRUSHER, Capacity: 19.4 mtph, Model/Type: ,D | 1.00 | ea | $ 45,180 | $ 251,000 | USD | $ 45,180 | $ 251,000 | $ - | $ - | $ 296,180 | |
| 169 | 3100 | Conveying | 2022 | Inhouse | 1208-0000-MELI-001 | 3100-CV-002 | Mechanical | CRUSHED PRODUCT CONVEYOR, Capacity: 19.4 mtph, Model/Type: ,Bel | 1.00 | ea | $ 9,243 | $ 51,351 | USD | $ 9,243 | $ 51,351 | $ - | $ - | $ 64,533 | |
| 170 | 3100 | Conveying | 2022 | Inhouse | 1208-0000-MELI-001 | 3100-CV-003 | Mechanical | CRUSHED MATERIAL TRANSFER CONVEYOR, Capacity: 19.4 mtph, Mode | 1.00 | ea | $ 12,108 | $ 67,266 | USD | $ 12,108 | $ 67,266 | $ - | $ - | $ 84,533 | |
| 171 | 3100 | Conveying | 2023 | Quote | 1208-0000-MELI-001 | 3100-SN-001 | Mechanical | CRUSHER SIZING SCREEN, Capacity: 288.0 mtph, Model/Type: ,Vibrating | 1.00 | ea | $ 48,600 | $ 270,000 | USD | $ 48,600 | $ 270,000 | $ - | $ - | $ 318,600 | |
| 172 | 4100 | Wet Screening | 2023 | Inhouse | 1208-0000-MELI-001 | 4100-PP-001 | Mechanical | GRINDING FEED PUMP 1, Capacity: 801.6 m3/h, Model/Type: ,Centrifug | 1.00 | ea | $ 7,947 | $ 44,150 | USD | $ 7,947 | $ 44,150 | $ - | $ - | $ 52,097 | |
| 173 | 4100 | Wet Screening | 2023 | Inhouse | 1208-0000-MELI-001 | 4100-PP-002 | Mechanical | GRINDING FEED PUMP 2, Capacity: 801.6 m3/h, Model/Type: ,Centrifug | 1.00 | ea | $ 7,947 | $ 44,150 | USD | $ 7,947 | $ 44,150 | $ - | $ - | $ 52,097 | |
| 174 | 4100 | Wet Screening | 2023 | Quote | 1208-0000-MELI-001 | 4100-SN-001 | Mechanical | WET SCREEN, Capacity: 288.0 mtph, Model/Type: ,Vibrating Screen, kW | 1.00 | ea | $ 49,680 | $ 276,000 | USD | $ 49,680 | $ 276,000 | $ - | $ - | $ 325,680 | |
| 175 | 4100 | Wet Screening | 2014 | Inhouse | 1208-0000-MELI-001 | 4100-TK-001 | Mechanical | WET SCREEN PUMP BOX, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 176 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-CF-001 | Mechanical | DMS CONCENTRATE CENTRIFUGE, Capacity: 15.3 mtph, Model/Type: ,1 | 1.00 | ea | $ 141,300 | $ 785,000 | GBP | $ 176,394 | $ 979,966 | $ - | $ - | $ 1,156,359 | |
| 177 | 4200 | DMS | 2023 | Inhouse | 1208-0000-MELI-001 | 4200-CV-001 | Mechanical | DMS CENTRIFUGE PRODUCT CONVEYOR, Capacity: 15.0 mtph, Model/T | 1.00 | ea | $ 4,121 | $ 22,897 | USD | $ 4,121 | $ 22,897 | $ - | $ - | $ 27,018 | |
| 178 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-CY-001 | Mechanical | PRIMARY DMS CYCLONE 1, Capacity: 163.1 m3/h, Model/Type: , kW: NA | 1.00 | ea | $ 1,032 | $ 5,731 | USD | $ 1,032 | $ 5,731 | $ - | $ - | $ 6,762 | |
| 179 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-CY-002 | Mechanical | PRIMARY DMS CYCLONE 2, Capacity: 163.1 m3/h, Model/Type: , kW: NA | 1.00 | ea | $ 1,032 | $ 5,731 | USD | $ 1,032 | $ 5,731 | $ - | $ - | $ 6,762 | |
| 180 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-CY-003 | Mechanical | PRIMARY DMS CYCLONE 3, Capacity: 163.1 m3/h, Model/Type: , kW: NA | 1.00 | ea | $ 1,032 | $ 5,731 | USD | $ 1,032 | $ 5,731 | $ - | $ - | $ 6,762 | |
| 181 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-CY-004 | Mechanical | SECONDARY DMS CYCLONE, Capacity: 0.0 m3/h, Model/Type: , kW: NA, | 1.00 | ea | $ 1,032 | $ 5,731 | USD | $ 1,032 | $ 5,731 | $ - | $ - | $ 6,762 | |
| 182 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-001 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 1, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 183 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-002 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 2, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 184 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-003 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 3, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 185 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-004 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 4, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 186 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-005 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 5, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 187 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-006 | Mechanical | PRIMARY DMS MAGNETIC SEPARATOR 6, Model/Type: , kW: 0.8, ,CRM | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 188 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-007 | Mechanical | SECONDARY DMS MAGNETIC SEPARATOR 1, Model/Type: , kW: 0.8, ,CR | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 189 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-MS-008 | Mechanical | SECONDARY DMS MAGNETIC SEPARATOR 2, Model/Type: , kW: 0.8, ,CR | 1.00 | ea | $ 3,686 | $ 20,477 | USD | $ 3,686 | $ 20,477 | $ - | $ - | $ 24,163 | |
| 190 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-029 | Mechanical | EFFLUENT TANK PUMP 1, Capacity: 0.0 m3/h, Model/Type: , kW: 18.5, , | 1.00 | ea | $ 4,380 | $ 24,334 | USD | $ 4,380 | $ 24,334 | $ - | $ - | $ 28,714 | |
| 191 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-030S | Mechanical | EFFLUENT TANK PUMP 2 STANDBY, Capacity: 0.0 m3/h, Model/Type: , k | 1.00 | ea | $ 4,380 | $ 24,334 | USD | $ 4,380 | $ 24,334 | $ - | $ - | $ 28,714 | |
| 192 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-001 | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 1, Capacity: 0.0 m3/h, Model/Type | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 193 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-004S | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 2 STANDBY, Capacity: 0.0 m3/h, M | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 194 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-002 | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 3, Capacity: 0.0 m3/h, Model/Type | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 195 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-005S | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 4 STANDBY, Capacity: 0.0 m3/h, M | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 196 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-003 | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 5, Capacity: 0.0 m3/h, Model/Type | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 197 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-006S | Mechanical | PRIMARY DMS CYCLONE FEED PUMP 6 STANDBY, Capacity: 0.0 m3/h, M | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 198 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-019 | Mechanical | SECONDAY DMS CYCLONE FEED PUMP 1, Capacity: 0.0 m3/h, Model/Ty | 1.00 | ea | $ 4,545 | $ 25,251 | USD | $ 4,545 | $ 25,251 | $ - | $ - | $ 29,796 | |
| 199 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-020S | Mechanical | SECONDAY DMS CYCLONE FEED PUMP 2 STANDBY, Capacity: 0.0 m3/h, | 1.00 | ea | $ 4,545 | $ 25,251 | USD | $ 4,545 | $ 25,251 | $ - | $ - | $ 29,796 | |
| 200 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-007 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 1, Capacity: 0.0 m3/h | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 201 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-013S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 2 STANDBY, Capacity | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 202 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-008 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 3, Capacity: 0.0 m3/h | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 203 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-014S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 4 STANDBY, Capacity | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 204 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-009 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 5, Capacity: 0.0 m3/h | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 205 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-015S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 6 STANDBY, Capacity | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 206 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-010 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 7, Capacity: 0.0 m3/h | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 207 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-016S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 8 STANDBY, Capacity | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 208 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-011 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 9, Capacity: 0.0 m3/h | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 209 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-017S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 10 STANDBY, Capacit | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 210 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-012 | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 11, Capacity: 0.0 m3/ | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 211 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-018S | Mechanical | PRIMARY DMS CYCLONE MEDIUM RECYCLE PUMP 12 STANDBY, Capacit | 1.00 | ea | $ 1,380 | $ 7,666 | USD | $ 1,380 | $ 7,666 | $ - | $ - | $ 9,046 | |
| 212 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-021 | Mechanical | SECONDARY DMS CYCLONE MEDIUM RECYCLE PUMP 1, Capacity: 0.0 m | 1.00 | ea | $ 3,705 | $ 20,582 | USD | $ 3,705 | $ 20,582 | $ - | $ - | $ 24,286 | |
| 213 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-023S | Mechanical | SECONDARY DMS CYCLONE MEDIUM RECYCLE PUMP 2 STANDBY, Capa | 1.00 | ea | $ 3,705 | $ 20,582 | USD | $ 3,705 | $ 20,582 | $ - | $ - | $ 24,286 | |
| 214 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-022 | Mechanical | SECONDARY DMS CYCLONE MEDIUM RECYCLE PUMP 3, Capacity: 0.0 m | 1.00 | ea | $ 3,705 | $ 20,582 | USD | $ 3,705 | $ 20,582 | $ - | $ - | $ 24,286 | |
| 215 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-024S | Mechanical | SECONDARY DMS CYCLONE MEDIUM RECYCLE PUMP 4 STANDBY, Capa | 1.00 | ea | $ 3,705 | $ 20,582 | USD | $ 3,705 | $ 20,582 | $ - | $ - | $ 24,286 | |
| 216 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-025 | Mechanical | FeSi MAKE UP PUMP 1, Capacity: 0.0 m3/h, Model/Type: , kW: 75.0, ,W | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 217 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-PP-026S | Mechanical | FeSi MAKE UP PUMP 2 STANDBY, Capacity: 0.0 m3/h, Model/Type: , kW | 1.00 | ea | $ 4,043 | $ 22,463 | USD | $ 4,043 | $ 22,463 | $ - | $ - | $ 26,507 | |
| 218 | 4200 | DMS | 2022 | Inhouse | 1208-0000-MELI-001 | 4200-PP-031 | Mechanical | CENTRATE PUMP, Capacity: 2.0 m3/h, Model/Type: , kW: 0.2, | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 219 | 4200 | DMS | 2022 | Inhouse | 1208-0000-MELI-001 | 4200-PP-032s | Mechanical | CENTRATE PUMP STANDBY, Capacity: 2.0 m3/h, Model/Type: , kW: 0.2, | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 220 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-009 | Mechanical | PRIMARY DMS FLOATS SCREEN 1, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 221 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-010 | Mechanical | PRIMARY DMS FLOATS SCREEN 2, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 222 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-011 | Mechanical | PRIMARY DMS FLOATS SCREEN 3, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 223 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-012 | Mechanical | PRIMARY DMS FLOATS SCREEN 4, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 224 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-013 | Mechanical | PRIMARY DMS FLOATS SCREEN 5, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 225 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-014 | Mechanical | PRIMARY DMS FLOATS SCREEN 6, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |

## Detailed Estimate

| Item No. | WBS | Area | Cost Year | Cost Type | Drawing/MTO No. | Tag No | Discipline | Description | Qty | UoM | Unit Lab Cost | Unit Mat Cost | Currency | Total Lab Cost | Total Mat Cost | Freight | Spare Parts | Grand Total | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 18% of Mat | | | $ 12,978,135 | $ 33,119,951 | | | $ 49,064,543 | |
| 226 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-017 | Mechanical | SECONDARY DMS FLOATS SCREEN 1, Capacity: 0.0 mtph, Model/Type: , | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 227 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-018 | Mechanical | SECONDARY DMS FLOATS SCREEN 2, Capacity: 0.0 mtph, Model/Type: , | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 228 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-020 | Mechanical | SECONDARY DMS SINKS SCREEN, Capacity: 0.0 mtph, Model/Type: , kW | 1.00 | ea | $ 7,566 | $ 42,034 | USD | $ 7,566 | $ 42,034 | $ - | $ - | $ 49,600 | |
| 229 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-003 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 1, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 230 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-004 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 2, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 231 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-005 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 3, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 232 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-006 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 4, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 233 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-007 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 5, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 234 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-008 | Mechanical | PRIMARY DMS FLOATS SIEVE BEND 6, Capacity: 0.0 mtph, Model/Type: | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 235 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-015 | Mechanical | SECONDARY DMS FLOATS SIEVE BEND 1, Capacity: 0.0 mtph, Model/Typ | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 236 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-016 | Mechanical | SECONDARY DMS FLOATS SIEVE BEND 2, Capacity: 0.0 mtph, Model/Typ | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 237 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-SN-019 | Mechanical | SECONDAY DMS SINKS SIEVE BEND, Capacity: 0.0 mtph, Model/Type: , k | 1.00 | ea | $ 4,263 | $ 23,681 | USD | $ 4,263 | $ 23,681 | $ - | $ - | $ 27,944 | |
| 238 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-002 | Mechanical | DMS PLANT FEED TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, ,21m3 | 1.00 | ea | $ 4,654 | $ 25,855 | USD | $ 4,654 | $ 25,855 | $ - | $ - | $ 30,509 | |
| 239 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-003 | Mechanical | PRIMARY DMS MEDIA TANK 1, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 240 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-004 | Mechanical | PRIMARY DMS MEDIA TANK 2, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 241 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-005 | Mechanical | PRIMARY DMS MEDIA TANK 3, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 242 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-006 | Mechanical | PRIMARY DMS MEDIA TANK 4, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 243 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-007 | Mechanical | PRIMARY DMS MEDIA TANK 5, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 244 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-008 | Mechanical | PRIMARY DMS MEDIA TANK 6, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 800 | $ 4,447 | USD | $ 800 | $ 4,447 | $ - | $ - | $ 5,247 | |
| 245 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-010 | Mechanical | SECONDARY DMS MEDIA TANK 1, Capacity: 0.0 m3, Model/Type: , kW: I | 1.00 | ea | $ 1,523 | $ 8,458 | USD | $ 1,523 | $ 8,458 | $ - | $ - | $ 9,981 | |
| 246 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-011 | Mechanical | SECONDARY DMS MEDIA TANK 2, Capacity: 0.0 m3, Model/Type: , kW: I | 1.00 | ea | $ 1,523 | $ 8,458 | USD | $ 1,523 | $ 8,458 | $ - | $ - | $ 9,981 | |
| 247 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-009 | Mechanical | PRIMARY DMS SINKS TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, ,8 | 1.00 | ea | $ 2,569 | $ 14,272 | USD | $ 2,569 | $ 14,272 | $ - | $ - | $ 16,841 | |
| 248 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-012 | Mechanical | DMS EFFLUENT TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, ,12m3 | 1.00 | ea | $ 3,212 | $ 17,846 | USD | $ 3,212 | $ 17,846 | $ - | $ - | $ 21,058 | |
| 249 | 4200 | DMS | 2023 | Quote | 1208-0000-MELI-001 | 4200-TK-013 | Mechanical | FeSi MAKE UP TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, ,2m3 | 1.00 | ea | $ 955 | $ 5,304 | USD | $ 955 | $ 5,304 | $ - | $ - | $ 6,259 | |
| 250 | 4200 | DMS | 2014 | Inhouse | 1208-0000-MELI-001 | 4200-TK-014 | Mechanical | CENTRATE PUM BOX, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 251 | 4300 | Grinding | 2023 | Inhouse | 1208-0000-MELI-001 | 4300-BK-001 | Mechanical | TRAMP BUNKER, Model/Type: , kW: NA, | 1.00 | ea | $ 1,080 | $ 6,000 | USD | $ 1,080 | $ 6,000 | $ - | $ - | $ 7,080 | |
| 252 | 4300 | Grinding | 2023 | Quote | 1208-0000-MELI-001 | 4300-HY-001 | Mechanical | HYDROCYCLONE, Model/Type: , kW: NA, | 1.00 | ea | $ 15,120 | $ 84,000 | EUR | $ 16,727 | $ 92,926 | $ - | $ - | $ 109,653 | |
| 253 | 4300 | Grinding | 2023 | Quote | 1208-0000-MELI-001 | 4300-ML-001 | Mechanical | BALL MILL, Capacity: 126.2 mtph, Model/Type: , kW: 500.0, | 1.00 | ea | $ 128,700 | $ 715,000 | EUR | $ 142,376 | $ 790,978 | $ - | $ - | $ 933,354 | |
| 254 | 4300 | Grinding | 2023 | Quote | 1208-0000-MELI-001 | 4300-PP-001 | Mechanical | HYDROCYCLONE FEED PUMP, Capacity: 0.0 m3/h, Model/Type: , kW: 11 | 1.00 | ea | $ 6,894 | $ 38,300 | EUR | $ 7,627 | $ 42,370 | $ - | $ - | $ 49,996 | |
| 255 | 4300 | Grinding | 2023 | Quote | 1208-0000-MELI-001 | 4300-PP-002 | Mechanical | HYDROCYCLONE FEED PUMP STANDBY, Capacity: 0.0 m3/h, Model/Type | 1.00 | ea | $ 6,894 | $ 38,300 | EUR | $ 7,627 | $ 42,370 | $ - | $ - | $ 49,996 | |
| 256 | 4300 | Grinding | 2014 | Inhouse | 1208-0000-MELI-001 | 4300-TK-001 | Mechanical | HYDROCYCLONE PUMP BOX, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 257 | 4400 | Flotation | 2023 | Inhouse | 1208-0000-MELI-001 | 4400-CV-001 | Mechanical | FLOTATION CENTRIFUGE PRODUCT CONVEYOR, Capacity: 15.0 mtph, M | 1.00 | ea | $ 4,121 | $ 22,897 | USD | $ 4,121 | $ 22,897 | $ - | $ - | $ 27,018 | |
| 258 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FA-001 | Mechanical | FLOTATION CELLS BLOWER, Model/Type: , kW: 50.0, ,4247.5 m3/h @ 27 | 1.00 | ea | $ 27,519 | $ 152,885 | USD | $ 27,519 | $ 152,885 | $ - | $ - | $ 180,404 | |
| 259 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-001,002 | Mechanical | MICA ROUGHER FLOTATION CELLS BANK, Capacity: 0.0 m3, Model/Type | 1.00 | ea | $ 106,859 | $ 593,663 | USD | $ 106,859 | $ 593,663 | $ - | $ - | $ 700,522 | |
| 260 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-003-008 | Mechanical | MICA SCAVENGER FLOTATION CELLS BANK, Capacity: 0.0 m3, Model/Ty | 1.00 | ea | $ 106,859 | $ 593,663 | USD | $ 106,859 | $ 593,663 | $ - | $ - | $ 700,522 | |
| 261 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-009,010 | Mechanical | SPODUMENE ROUGHER FLOTATION CELLS BANK, Capacity: 0.0 m3, Mod | 1.00 | ea | $ 43,792 | $ 243,290 | USD | $ 43,792 | $ 243,290 | $ - | $ - | $ 287,082 | |
| 262 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-011 | Mechanical | SPODUMENE SCAVENGER FOTATION CELLS BANK, Capacity: 0.0 m3, Mo | 1.00 | ea | $ 43,792 | $ 243,290 | USD | $ 43,792 | $ 243,290 | $ - | $ - | $ 287,082 | |
| 263 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-012 | Mechanical | SPODUMENE 1ST CLEANER FLOTATION CELLS BANK, Capacity: 0.0 m3, N | 1.00 | ea | $ 25,358 | $ 140,878 | USD | $ 25,358 | $ 140,878 | $ - | $ - | $ 166,235 | |
| 264 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-FC-013 | Mechanical | SPODUMENE 2ND CLEANER FLOTATION CELLS BANK, Capacity: 0.0 m3, | 1.00 | ea | $ 25,358 | $ 140,878 | USD | $ 25,358 | $ 140,878 | $ - | $ - | $ 166,235 | |
| 265 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-HY-001 | Mechanical | DE-SLIMING CYCLONES, Model/Type: , kW: NA, | 1.00 | ea | $ 20,354 | $ 113,078 | USD | $ 20,354 | $ 113,078 | $ - | $ - | $ 155,036 | |
| 266 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-HY-002 | Mechanical | DEWATERING CYCLONE, Model/Type: , kW: NA, | 1.00 | ea | $ 10,265 | $ 57,029 | USD | $ 10,265 | $ 57,029 | $ - | $ - | $ 78,190 | |
| 267 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-HY-003 | Mechanical | DE-SLIMING CYCLONES, Model/Type: , kW: NA, | 1.00 | ea | $ 6,523 | $ 36,241 | USD | $ 6,523 | $ 36,241 | $ - | $ - | $ 49,689 | |
| 268 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-MS-001 | Mechanical | HIGH INTENSITY MAGENETIC SEPARATION, Model/Type: , kW: 121.0, | 1.00 | ea | $ 145,674 | $ 809,300 | USD | $ 145,674 | $ 809,300 | $ - | $ - | $ 954,974 | |
| 269 | 4400 | Flotation | 2020 | Inhouse | 1208-0000-MELI-001 | 4400-PP-001 | Mechanical | DE-SLIMING CYCLONES FEED PUMP, Capacity: 847.2 m3/h, Model/Type | 1.00 | ea | $ 11,976 | $ 66,536 | USD | $ 11,976 | $ 66,536 | $ - | $ - | $ 97,610 | |
| 270 | 4400 | Flotation | 2020 | Inhouse | 1208-0000-MELI-001 | 4400-PP-002 | Mechanical | DE-SLIMING CYCLONES FEED PUMP STANDBY, Capacity: 847.2 m3/h, M | 1.00 | ea | $ 11,976 | $ 66,536 | USD | $ 11,976 | $ 66,536 | $ - | $ - | $ 97,610 | |
| 271 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-003 | Mechanical | MICA FLOTATION FEED PUMP, Capacity: 240.0 m3/h, Model/Type: , kW | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 272 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-004 | Mechanical | MICA FLOTATION FEED PUMP STANDBY, Capacity: 240.0 m3/h, Model/T | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 273 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-005 | Mechanical | MICA FLOTATION TAILING PUMP, Capacity: 230.4 m3/h, Model/Type: , | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 274 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-006 | Mechanical | MICA FLOTATION TAILING PUMP STANDBY, Capacity: 230.4 m3/h, Mod | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 275 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-007 | Mechanical | MICA FLOTATION CONCENTRATE PUMP, Capacity: 7.2 m3/h, Model/Typ | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 276 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-008 | Mechanical | MICA FLOTATION CONCENTRATE PUMP STANDBY, Capacity: 7.2 m3/h, I | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 277 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-009 | Mechanical | HIGH INTENSITY MAGNETIC SEPARATION CONCENTRATE PUMP, Capaci | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 278 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-010 | Mechanical | HIGH INTENSITY MAGNETIC SEPARATION CONCENTRATE PUMP STANDI | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 279 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-011 | Mechanical | SPODUMENE FLOTATION FEED PUMP, Capacity: 240.0 m3/h, Model/Typ | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 280 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-012 | Mechanical | SPODUMENE FLOTATION FEED PUMP STANDBY, Capacity: 240.0 m3/h, | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 281 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-013 | Mechanical | SPODUMENE CLEANER FLOTATION FEED PUMP, Capacity: 17.2 m3/h, M | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 282 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-014 | Mechanical | SPODUMENE CLEANER FLOTATION FEED PUMP STANDBY, Capacity: 17. | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 283 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-015 | Mechanical | SPODUMENE FLOTATION TAILING PUMP, Capacity: 5.6 m3/h, Model/Ty | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 284 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-016 | Mechanical | SPODUMENE FLOTATION TAILING PUMP STANDBY, Capacity: 5.6 m3/h, | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 285 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-017 | Mechanical | SPODUMENE SCAVENGER TAILING PUMP, Capacity: 237.7 m3/h, Model | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 286 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-PP-018 | Mechanical | SPODUMENE SCAVENGER TAILING PUMP STANDBY, Capacity: 237.7 m3 | 1.00 | ea | $ 11,079 | $ 61,550 | USD | $ 11,079 | $ 61,550 | $ - | $ - | $ 84,389 | |
| 287 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-019 | Mechanical | SPODUMENE FLOTATION 1ST CLEANER CONCENTRATE PUMP, Capacity: | 1.00 | ea | $ 7,342 | $ 40,791 | USD | $ 7,342 | $ 40,791 | $ - | $ - | $ 51,262 | |
| 288 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-020 | Mechanical | SPODUMENE FLOTATION 1ST CLEANER CONCENTRATE PUMP STANDBY | 1.00 | ea | $ 7,342 | $ 40,791 | USD | $ 7,342 | $ 40,791 | $ - | $ - | $ 51,262 | |

**Detailed Estimate**

| Item No. | WBS | Area | Cost Year | Cost Type | Drawing/MTO No. | Tag No | Discipline | Description | Qty | UoM | Unit Lab Cost | Unit Mat Cost | Currency | Total Lab Cost | Total Mat Cost | Freight | Spare Parts | Grand Total | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 18% of Mat | | | $ 12,978,135 | $ 33,119,951 | | | $ 49,064,543 | |
| 289 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-021 | Mechanical | DESLIMING CYCLONE FEED PUMP, Capacity: 118.4 m3/h, Model/Type: , | 1.00 | ea | $ 10,683 | $ 59,350 | USD | $ 10,683 | $ 59,350 | $ - | $ - | $ 74,585 | |
| 290 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-022 | Mechanical | DESLIMING CYCLONE FEED PUMP STANDBY, Capacity: 118.4 m3/h, Moc | 1.00 | ea | $ 10,683 | $ 59,350 | USD | $ 10,683 | $ 59,350 | $ - | $ - | $ 74,585 | |
| 291 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-023 | Mechanical | SPODUMENE 2ND CLEANER TAILING PUMP, Capacity: 2.4 m3/h, Model/ | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 292 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-024 | Mechanical | SPODUMENE 2ND CLEANER TAILING PUMP STANDBY, Capacity: 2.4 m3/ | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 293 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-025 | Mechanical | SPODUMENE 2ND CLEANER CONCENTRATE PUMP, Capacity: 2.4 m3/h, | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 294 | 4400 | Flotation | 2022 | Inhouse | 1208-0000-MELI-001 | 4400-PP-026 | Mechanical | SPODUMENE 2ND CLEANER CONCENTRATE PUMP STANDBY, Capacity: 2 | 1.00 | ea | $ 6,725 | $ 37,361 | USD | $ 6,725 | $ 37,361 | $ - | $ - | $ 46,952 | |
| 295 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-SB-001 | Mechanical | HIGH DENSITY SCRUBBER, Model/Type: , kW: 440.0, | 1.00 | ea | $ 79,560 | $ 442,000 | USD | $ 79,560 | $ 442,000 | $ - | $ - | $ 521,560 | |
| 296 | 4400 | Flotation | 2023 | Quote | 1208-0000-MELI-001 | 4400-SB-002 | Mechanical | SPODUMENE FLOTATION FEED HIGH DENSITY SCRUBBER, Model/Type: | 1.00 | ea | $ 96,444 | $ 535,800 | USD | $ 96,444 | $ 535,800 | $ - | $ - | $ 632,244 | |
| 297 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-TK-002 | Mechanical | MICA FLOTATION CONDITONING TANK WITH AGITATOR, Capacity: 0.0 r | 1.00 | ea | $ 9,581 | $ 53,230 | USD | $ 9,581 | $ 53,230 | $ - | $ - | $ 72,981 | |
| 298 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-003 | Mechanical | HIGH INTENSITY MAGNETIC SEPARATION PUMP BOX, Capacity: 0.0 m3, | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 299 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-004 | Mechanical | MICA FLOTATION CONCENTRATE PUMP BOX, Capacity: 0.0 m3, Model/T | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 300 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-005 | Mechanical | MICA FLOTATION TAILING PUMP BOX, Capacity: 0.0 m3, Model/Type: , | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 301 | 4400 | Flotation | 2021 | Inhouse | 1208-0000-MELI-001 | 4400-TK-006 | Mechanical | SPODUMENE FLOTATION CONDITONING TANK WITH AGITATOR, Capaci | 1.00 | ea | $ 9,581 | $ 53,230 | USD | $ 9,581 | $ 53,230 | $ - | $ - | $ 72,981 | |
| 302 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-007 | Mechanical | SPODUMENE CLEANER FLOTATION FEED PUMP BOX, Capacity: 0.0 m3, I | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 303 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-008 | Mechanical | SPODUMENE FLOTATION TAILING PUMP BOX, Capacity: 0.0 m3, Model/ | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 304 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-009 | Mechanical | SPODUMENE SCAVENGER TAILING PUMP BOX, Capacity: 0.0 m3, Model | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 305 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-010 | Mechanical | SPODUMENE 1ST CLEANER CONCENTRATE PUMP BOX, Capacity: 0.0 m3 | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 306 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-011 | Mechanical | SPODUMENE 2nd CLEANER TAILINGS PUMP BOX, Capacity: 0.0 m3, Moc | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 307 | 4400 | Flotation | 2014 | Inhouse | 1208-0000-MELI-001 | 4400-TK-012 | Mechanical | SPODUMENE 2nd CLEANER CONCENTRATE PUMP BOX, Capacity: 0.0 m3 | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 308 | 4600 | Flotation Product Dewatering | 2023 | Quote | 1208-0000-MELI-001 | 4600-CF-001 | Mechanical | FLOTATION CONCENTRATE CENTRIFUGE, Capacity: 0.0 mtph, Model/Ty | 1.00 | ea | $ 81,000 | $ 450,000 | GBP | $ 101,117 | $ 561,764 | $ - | $ - | $ 662,881 | |
| 309 | 4600 | Flotation Product Dewatering | 2022 | Inhouse | 1208-0000-MELI-001 | 4600-PP-001 | Mechanical | THICKENER UNDERFLOW PUMP, Capacity: 123.7 m3/h, Model/Type: , k | 1.00 | ea | $ 10,683 | $ 59,350 | USD | $ 10,683 | $ 59,350 | $ - | $ - | $ 74,585 | |
| 310 | 4600 | Flotation Product Dewatering | 2022 | Inhouse | 1208-0000-MELI-001 | 4600-PP-002 | Mechanical | THICKENER UNDERFLOW PUMP STANDBY, Capacity: 123.7 m3/h, Mode | 1.00 | ea | $ 10,683 | $ 59,350 | USD | $ 10,683 | $ 59,350 | $ - | $ - | $ 74,585 | |
| 311 | 4600 | Flotation Product Dewatering | 2020 | Inhouse | 1208-0000-MELI-001 | 4600-PP-003 | Mechanical | THICKENER OVERFLOW AND FILTRATE PUMP, Capacity: 1014.2 m3/h, M | 1.00 | ea | $ 21,344 | $ 118,580 | USD | $ 21,344 | $ 118,580 | $ - | $ - | $ 173,961 | |
| 312 | 4600 | Flotation Product Dewatering | 2020 | Inhouse | 1208-0000-MELI-001 | 4600-PP-004 | Mechanical | THICKENER OVERFLOW AND FILTRATE PUMP STANDBY, Capacity: 1014. | 1.00 | ea | $ 21,344 | $ 118,580 | USD | $ 21,344 | $ 118,580 | $ - | $ - | $ 173,961 | |
| 313 | 4600 | Flotation Product Dewatering | 2022 | Inhouse | 1208-0000-MELI-001 | 4600-PP-005 | Mechanical | CENTRIFUGE FILTRATE PUMP, Capacity: 19.8 m3/h, Model/Type: , kW: ( | 1.00 | ea | $ 7,342 | $ 40,791 | USD | $ 7,342 | $ 40,791 | $ - | $ - | $ 51,262 | |
| 314 | 4600 | Flotation Product Dewatering | 2022 | Inhouse | 1208-0000-MELI-001 | 4600-PP-006 | Mechanical | CENTRIFUGE FILTRATE PUMP STANDBY, Capacity: 19.8 m3/h, Model/Ty | 1.00 | ea | $ 7,342 | $ 40,791 | USD | $ 7,342 | $ 40,791 | $ - | $ - | $ 51,262 | |
| 315 | 4600 | Flotation Product Dewatering | 2023 | Quote | 1208-0000-MELI-001 | 4600-TH-001 | Mechanical | FLOTATION TAILINGS THICKENER, Capacity: 0.0 mtph, Model/Type: ,Hig | 1.00 | ea | $ 56,520 | $ 314,000 | USD | $ 56,520 | $ 314,000 | $ - | $ - | $ 370,520 | |
| 316 | 4600 | Flotation Product Dewatering | 2020 | Inhouse | 1208-0000-MELI-001 | 4600-TK-001 | Mechanical | THICKENER OVERFLOW TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, | 1.00 | ea | $ 12,204 | $ 67,800 | USD | $ 12,204 | $ 67,800 | $ - | $ - | $ 99,465 | |
| 317 | 4600 | Flotation Product Dewatering | 2014 | Inhouse | 1208-0000-MELI-001 | 4600-TK-002 | Mechanical | CENTRIFUGE FILTRATE PUMP BOX, Capacity: 0.0 m3, Model/Type: , kW: | 1.00 | ea | $ 1,757 | $ 9,759 | USD | $ 1,757 | $ 9,759 | $ - | $ - | $ 15,892 | |
| 318 | 4700 | Spodumene Product Bagging | 2023 | Quote | 1208-0000-MELI-001 | 4700-BF-001 | Mechanical | DMS PRODUCT BAG FILLER, Capacity: 11.3 mtph, Model/Type: , kW: 4.0 | 1.00 | ea | $ 30,870 | $ 171,500 | CAD | $ 22,672 | $ 125,958 | $ - | $ - | $ 148,630 | |
| 319 | 4700 | Spodumene Product Bagging | 2023 | Quote | 1208-0000-MELI-001 | 4700-BF-002 | Mechanical | FLOTATION PRODUCT BAG FILLER, Capacity: 17.6 mtph, Model/Type: , k | 1.00 | ea | $ 30,870 | $ 171,500 | USD | $ 30,870 | $ 171,500 | $ - | $ - | $ 202,370 | |
| 320 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-BN-001 | Mechanical | DMS PRODUCT STORAGE BIN, Capacity: 0.0 Tonnes, Model/Type: , kW: | 1.00 | ea | $ 15,527 | $ 86,259 | USD | $ 15,527 | $ 86,259 | $ - | $ - | $ 101,786 | |
| 321 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-BN-002 | Mechanical | FLOTATION PRODUCT STORAGE BIN, Capacity: 0.0 Tonnes, Model/Type | 1.00 | ea | $ 15,527 | $ 86,259 | USD | $ 15,527 | $ 86,259 | $ - | $ - | $ 101,786 | |
| 322 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-CV-001 | Mechanical | DMS PRODUCT CONVEYOR, Capacity: 15.0 mtph, Model/Type: ,Screw, k | 1.00 | ea | $ 4,121 | $ 22,897 | USD | $ 4,121 | $ 22,897 | $ - | $ - | $ 27,018 | |
| 323 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-CV-002 | Mechanical | DMS PRODUCT SCREW CONVEYOR, Capacity: 15.0 mtph, Model/Type: ,S | 1.00 | ea | $ 4,779 | $ 26,552 | USD | $ 4,779 | $ 26,552 | $ - | $ - | $ 31,331 | |
| 324 | 4700 | Spodumene Product Bagging | 2023 | Quote | 1208-0000-MELI-001 | 4700-CV-003 | Mechanical | DMS PRODUCT ACCUMULATING CONVEYOR, Capacity: 15.0 mtph, Mod | 1.00 | ea | $ - | Included | USD | $ - | $ - | $ - | $ - | $ - | |
| 325 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-CV-004 | Mechanical | FLOTATION PRODUCT CONVEYOR, Capacity: 15.0 mtph, Model/Type: ,S | 1.00 | ea | $ 4,121 | $ 22,897 | USD | $ 4,121 | $ 22,897 | $ - | $ - | $ 27,018 | |
| 326 | 4700 | Spodumene Product Bagging | 2023 | Inhouse | 1208-0000-MELI-001 | 4700-CV-005 | Mechanical | FLOTATION PRODUCT SCREW CONVEYOR, Capacity: 15.0 mtph, Model/T | 1.00 | ea | $ 4,779 | $ 26,552 | USD | $ 4,779 | $ 26,552 | $ - | $ - | $ 31,331 | |
| 327 | 4700 | Spodumene Product Bagging | 2023 | Quote | 1208-0000-MELI-001 | 4700-CV-006 | Mechanical | FLOTATION PRODUCT ACCUMULATING CONVEYOR, Capacity: 15.0 mtpl | 1.00 | ea | $ - | Included | USD | $ - | $ - | $ - | $ - | $ - | |
| 328 | 5000 | UTILITIES | 2023 | Inhouse | 1208-0000-MELI-001 | 5000-CP-001 | Mechanical | AIR COMPRESSOR SYSTEM, Capacity: 0.0 Nm3/h, Model/Type: , kW: 50. | 1.00 | ea | $ 81,000 | $ 450,000 | USD | $ 81,000 | $ 450,000 | $ - | $ - | $ 531,000 | |
| 329 | 5000 | UTILITIES | 2022 | Inhouse | 1208-0000-MELI-001 | 5000-GE-001 | Mechanical | DIESEL GENERATOR 1, Capacity: 0.0 MW, Model/Type: , kW: NA, | 1.00 | ea | $ 154,889 | $ 860,497 | USD | $ 154,889 | $ 860,497 | $ - | $ - | $ 1,081,387 | |
| 330 | 5000 | UTILITIES | 2022 | Inhouse | 1208-0000-MELI-001 | 5000-GE-002 | Mechanical | DIESEL GENERATOR 2, Capacity: 0.0 MW, Model/Type: , kW: NA, | 1.00 | ea | $ 154,889 | $ 860,497 | USD | $ 154,889 | $ 860,497 | $ - | $ - | $ 1,081,387 | |
| 331 | 5000 | UTILITIES | 2022 | Inhouse | 1208-0000-MELI-001 | 5000-GE-003 | Mechanical | DIESEL GENERATOR 3, Capacity: 0.0 MW, Model/Type: , kW: NA, | 1.00 | ea | $ 154,889 | $ 860,497 | USD | $ 154,889 | $ 860,497 | $ - | $ - | $ 1,081,387 | |
| 332 | 5000 | UTILITIES | 2014 | Inhouse | 1208-0000-MELI-001 | 5000-TK-001 | Mechanical | DIESEL STORAGE TANK, Capacity: 0.0 m3, Model/Type: , kW: NA, ,55,00( | 1.00 | ea | $ 9,044 | $ 50,246 | USD | $ 9,044 | $ 50,246 | $ - | $ - | $ 81,824 | |
| 333 | 5000 | UTILITIES | 2023 | Inhouse | 1208-0000-MELI-001 | 5000-FS-001 | Mechanical | DIESEL FUEL PUMP STATION, Capacity: 0.0 m3/h, Model/Type: , kW: 1.0 | 1.00 | ea | $ 17,036 | $ 94,644 | USD | $ 17,036 | $ 94,644 | $ - | $ - | $ 111,680 | |
| 334 | 5110 | Process Water | 2023 | Inhouse | 1208-0000-MELI-001 | 5110-PP-001 | Mechanical | PROCESS WATER PUMP 1, Capacity: 0.0 m3/h, Model/Type: , kW: 52.6, | 1.00 | ea | $ 7,342 | $ 40,790 | USD | $ 7,342 | $ 40,790 | $ - | $ - | $ 48,132 | |
| 335 | 5110 | Process Water | 2023 | Inhouse | 1208-0000-MELI-001 | 5110-PP-002 | Mechanical | PROCESS WATER PUMP 2, Capacity: 0.0 m3/h, Model/Type: , kW: 52.6, | 1.00 | ea | $ 7,342 | $ 40,790 | USD | $ 7,342 | $ 40,790 | $ - | $ - | $ 48,132 | |
| 336 | 5110 | Process Water | 2023 | Inhouse | 1208-0000-MELI-001 | 5110-PP-003 | Mechanical | PROCESS WATER PUMP STANDBY, Capacity: 0.0 m3/h, Model/Type: , kV | 1.00 | ea | $ 7,342 | $ 40,790 | USD | $ 7,342 | $ 40,790 | $ - | $ - | $ 48,132 | |
| 337 | 5110 | Process Water | 2019 | Inhouse | 1208-0000-MELI-001 | 5110-WT-001 | Mechanical | PROCESS WATER MAKE-UP TREATMENT PLANT 1, Capacity: 0.0 m3/h, M | 1.00 | ea | $ 36,000 | $ 200,000 | USD | $ 36,000 | $ 200,000 | $ - | $ - | $ 297,514 | |
| 338 | 5110 | Process Water | 2019 | Inhouse | 1208-0000-MELI-001 | 5110-WT-002 | Mechanical | PROCESS WATER MAKE-UP TREATMENT PLANT 2, Capacity: 0.0 m3/h, M | 1.00 | ea | $ 36,000 | $ 200,000 | USD | $ 36,000 | $ 200,000 | $ - | $ - | $ 297,514 | |
| 339 | 5110 | Process Water | 2019 | Inhouse | 1208-0000-MELI-001 | 5110-WT-003 | Mechanical | POTABLE WATER TREATMENT PLANT, Capacity: 0.0 m3/h, Model/Type: | 1.00 | ea | $ 7,200 | $ 40,000 | USD | $ 7,200 | $ 40,000 | $ - | $ - | $ 59,503 | |
| 340 | 5110 | Process Water | 2019 | Inhouse | 1208-0000-MELI-001 | 5110-WT-004 | Mechanical | OZONE GENERATOR FOR WATER TREATMENT, Capacity: 0.0 m3/h, Mod | 1.00 | ea | $ 9,000 | $ 50,000 | USD | $ 9,000 | $ 50,000 | $ - | $ - | $ 74,379 | |
| 341 | 5120 | Waste Water | 2019 | Inhouse | 1208-0000-MELI-001 | 5120-WT-001 | Mechanical | WASTE WATER TREATMENT PLANT, Capacity: 0.0 m3/h, Model/Type: , k | 1.00 | ea | $ 27,000 | $ 150,000 | USD | $ 27,000 | $ 150,000 | $ - | $ - | $ 223,136 | |
| 342 | 5130 | Fire Water | 2023 | Inhouse | 1208-0000-MELI-001 | 5130-FW-001 | Mechanical | FIRE WATER SYSTEM, Model/Type: , kW: 114.5, | 1.00 | ea | $ 172,620 | $ 959,000 | USD | $ 172,620 | $ 959,000 | $ - | $ - | $ 1,131,620 | |
| 343 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-001 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 1, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 344 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-002 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 2, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 345 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-003 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 3, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 346 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-004 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 4, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 347 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-005 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 5, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 348 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-006 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 6, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 349 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-007 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 7, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 350 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-008 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 8, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 351 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-009 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 9, Capacity: 0.0 mtph, Model/ | 1.00 | ea | $ 32,526 | $ 180,701 | USD | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |

## Detailed Estimate

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 18% of Mat | | | | $ 12,978,135 | $ 33,119,951 | | | $ 49,064,543 | |
| Item No. | WBS | Area | Cost Year | Cost Type | Drawing/MTO No. | Tag No | Discipline | Description | Qty | UoM | Unit Lab Cost | Unit Mat Cost | Currency | | Total Lab Cost | Total Mat Cost | Freight | Spare Parts | Grand Total | Remarks |
| 352 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-010 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 10, Capacity: 0.0 mtph, Mode | 1.00 | ea | $ 32,526 | $ 180,701 | USD | | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 353 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-011 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 11, Capacity: 0.0 mtph, Mode | 1.00 | ea | $ 32,526 | $ 180,701 | USD | | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 354 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-012 | Mechanical | DMS TAILINGS GRASSHOPPER CONVEYOR 12, Capacity: 0.0 mtph, Mode | 1.00 | ea | $ 32,526 | $ 180,701 | USD | | $ 32,526 | $ 180,701 | $ - | $ - | $ 213,227 | |
| 355 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-013 | Mechanical | DMS TAILINGS TRANSVERSE CONVEYOR, Capacity: 0.0 mtph, Model/Typ | 1.00 | ea | $ 31,026 | $ 172,366 | USD | | $ 31,026 | $ 172,366 | $ - | $ - | $ 203,391 | |
| 356 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-014 | Mechanical | DMS TAILINGS BRIDGE CONVEYOR, Capacity: 0.0 mtph, Model/Type: ,38 | 1.00 | ea | $ 88,386 | $ 491,035 | USD | | $ 88,386 | $ 491,035 | $ - | $ - | $ 579,421 | |
| 357 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Quote | 1208-0000-MELI-001 | 6000-CV-015 | Mechanical | DMS TAILINGS RADIAL STACKER CONVEYOR, Capacity: 0.0 mtph, Model | 1.00 | ea | $ 162,371 | $ 902,063 | USD | | $ 162,371 | $ 902,063 | $ - | $ - | $ 1,064,435 | |
| 358 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Inhouse | 1208-0000-MELI-001 | 6000-PP-001 | Mechanical | TSF WATER PUMP, Capacity: 0.0 m3/h, Model/Type: ,vertical trubine pu | 1.00 | ea | $ 5,505 | $ 30,583 | USD | | $ 5,505 | $ 30,583 | $ - | $ - | $ 36,088 | |
| 359 | 6000 | TAILING MANAGEMENT SYSTEM | 2023 | Inhouse | 1208-0000-MELI-001 | 6000-PP-002 | Mechanical | TSF WATER PUMP STANDBY, Capacity: 0.0 m3/h, Model/Type: ,vertical t | 1.00 | ea | $ 5,505 | $ 30,583 | USD | | $ 5,505 | $ 30,583 | $ - | $ - | $ 36,088 | |

## Inflation:

| Year | Inflation ra | Inflation +1 | Factor |
|---|---|---|---|
| | 1.6% | 1.02 | |
| 2010 | 3.1% | 1.03 | 1.481 |
| 2011 | 1.7% | 1.02 | 1.436 |
| 2012 | 1.5% | 1.01 | 1.412 |
| 2013 | 0.8% | 1.01 | 1.391 |
| 2014 | 0.7% | 1.01 | 1.380 |
| 2015 | 2.1% | 1.02 | 1.370 |
| 2016 | 2.1% | 1.02 | 1.342 |
| 2017 | 1.9% | 1.02 | 1.314 |
| 2018 | 2.3% | 1.02 | 1.290 |
| 2019 | 1.4% | 1.01 | 1.261 |
| 2020 | 7.0% | 1.07 | 1.243 |
| 2021 | 9.1% | 1.09 | 1.162 |
| 2022 | 6.5% | 1.07 | 1.065 |
| 2023 | 0.0% | 1.00 | 1.000 |

Source: https://www.usinflationcalculator.com/inflation/current-inflation-rates/

## Exchange Rates:

| From | To | Rate |
|---|---|---|
| USD | USD | 1.00 |
| CAD | USD | 0.73 |
| ZAR | USD | 0.05 |
| GBP | USD | 1.25 |
| EUR | USD | 1.11 |

Source: https://www.xe.com/ As of 3-May-2023

| Title: | **PEA Basis of Estimate** | Rev.: | **00** |
|---|---|---|---|
| Doc. No.: | **EB1208-001** | Date: | **8-Jun-2023** |

**TANTALEX LITHIUM RESOURCES** | Manono Lithium Tailings PEA

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Prepared by: **Peyman Sayyadi/Mitch McNall**
Reviewed by: **Abbas Mahmoodi**
Approved by: **Mazi Rejaee**

**REVISION INDEX**

| Rev. | Date | By | Rev'd | App. | Client | Revision Details |
|---|---|---|---|---|---|---|
| PA | 2-May-2023 | PS/MM | AW | MR | - | Internal Review |
| PB | 5-May-2023 | PS/MM | AW | MR | - | Client Review |
| 00 | 8-Jun-2023 | P.S MM | AM | | - | Project Use |
| | | | | | | |

## TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

# 1 INTRODUCTION

This document covers the assumptions and the results of the cost estimate for the project.

This estimate meets the minimum requirements of a Class 5 estimate as defined in AACE International (Association for the Advancement of Cost Engineering) recommended practice no. 18R-97.

The interim CAPEX estimate has an intended accuracy of ± 35%. Some individual elements of the estimate may not achieve the target level of accuracy; however, the sum of all estimation elements falls within the parameters of the intended accuracy.

The latest version of MTOs, Lists, Drawings, and Bid Evaluations were used as input to the estimate with drawings where available to support the quantities.

The project includes the following areas:

a) Mining the tailings dumps
b) Processing Plant
c) Tailings Storage Facility

It should be noted that the cost estimation described in this document includes mining, material handling, and the TSF that are sized to include both a DMS and a Flotation plant. Estimation for the DMS plant is included, while estimation for the Flotation plant is deferred to the Phase 2 PEA.

# 2 CAPEX

The total Direct CAPEX to bring the Project to operation was estimated to be $80,611,000 and a total of $34,157,000 is allocated for the Indirect costs.

An additional $10,000,000 allowance is allocated for the Roads Rehabilitation.

An estimated budget of $22,954,000 is allocated to Contingency, which brings the total CAPEX of the Project to $147,722,000.

No project development costs (FS, ESIA) are included in this estimate.

Table 2-1 details the total initial Capital Costs by major area.

**Table 2-1: Total Capital Cost by Major Area**

| Item No. | Area | Total | Remarks |
|---|---|---|---|
| **A** | **DIRECT COSTS** | **$ 80,611,346** | |
| A.1 | Civil | $ 10,073,087 | Refer to Detailed Estimate |
| A.2 | Concrete | $ 4,828,592 | 15% of Mech |
| A.3 | Structural | $ 5,794,311 | 18% of Mech |
| A.4 | Architectural | $ 2,546,600 | Refer to Detailed Estimate |
| A.5 | Mechanical | $ 32,190,616 | Refer to Detailed Estimate |
| A.5 | Mobile Equipment | $ 4,254,240 | Refer to Detailed Estimate |
| A.6 | Piping | $ 9,657,185 | 30% of Mech |
| A.8 | Electrical | $ 6,438,123 | 20% of Mech |
| A.9 | Instrumentation & Telecommunication | $ 4,828,592 | 15% of Mech |
| **B** | **INDIRECT COSTS** | **$ 34,157,234** | |
| B.1 | Construction indirects | $ 4,030,567 | 5% of Directs |
| B.2 | Freight, handling, and logistics | $ 9,673,362 | 12% of Directs |
| B.3 | Commissioning & (1) year operational & capital spare | $ 1,612,227 | 2% of Directs |
| B.4 | First fill | $ 2,429,094 | 1.3% of Mechanical+FeSi |
| B.5 | Vendor Representative | $ 289,716 | 1% of Mechanical |
| B.6 | EPCM Services | $ 9,673,362 | 12% of Directs |
| B.7 | Owner's costs | $ 6,448,908 | 8% of Directs |
| **A+B** | **Total Before Contingency** | **$ 114,768,581** | |
| **C** | **Contingency** | **$ 22,953,716** | |
| C.1 | Project Recommended Contingency | $ 22,953,716 | 20% of (Directs + Indirect) |
| **A+B+C** | **Total Costs** | **$ 137,722,297** | |
| **D** | **Road Rehabilitation Allowance** | **$ 10,000,000** | |
| **A+B+C+D** | **Total Project Budget** | **$ 147,722,297** | |

### 2.1 Estimate Development Process

The CAPEX estimate reflects a detailed "bottom-up" approach based on key engineering deliverables defining the Project scope being compiled into estimation packages.

The Estimators performed ongoing reviews of any data received and requested explanations for quantities or costs that raised any red flags in comparison to benchmark Unit Rate data or quantity variation from spot checks of the developed drawings, data and MTOs.

Once the first draft of the Direct Costs was complete, the quantities were directed back to the responsible Engineering discipline for review and confirmation, such that the quantities used in the estimate, including allowances added, were acceptable and covered the intended scope.

#### *2.1.1 Exclusions*

The following items were not included in the CAPEX estimate:

a) Development costs (FS, ESIA)
b) Working capital required during start of the project.
c) Cost changes due to currency fluctuation.
d) Force Majeure issues.
e) Scope changes.
f) Changes due to government legislation.
g) Project delays because of abnormal climatic conditions.
h) Lost time due to industrial disputes, strikes, or civil unrest.
i) Environmental, ecological, or cultural considerations other than those addressed in the current design.
j) Bridge Engineering, Front-End Engineering Design, or any other costs for development activities ahead of financial close.
k) The cost of producing any environmental related documents and studies related to obtaining permits, approvals, or variance agreements from governing authorities.
l) Closure Costs.

### 2.2 Direct Costs

MTO quantities were provided by Engineering, and the discipline Estimators were responsible for reviewing and validating them to ensure that the scope of work was covered entirely.

Scope definition, design, and quantities for all other areas was performed by Novopro.

Scope and quantity reviews were conducted to ensure that the estimate aligned with the key engineering deliverables, and that the Project scope was accurately covered. The reviews focus on quantity development for each discipline and were attended by the discipline leads from Engineering and Estimation.

#### *2.2.1 Civil and Earthwork*

The civil quantities for the TSF (Tailing Storage Area) specifically were developed by Engineering from engineering drawings and sketches, and design specifications.

The Estimator validated the quantities received and provided feedback to engineering for any adjustment before integrating into the estimate. These additions were considered minor, such as gates and structural excavation and backfill.

The mass earthworks estimates were based on preliminary topography and were based on certain assumptions but are considered adequate for the scoping level estimate.

Unit rates for each activity was estimated based on the previous similar projects in African context.

#### 2.2.2 *Concrete*

Since no detailed drawings/models were developed for Concrete, the overall cost was estimated based on the percentage of the mechanical discipline.

#### 2.2.3 *Structural Steel*

Since no detailed drawings/models were developed for Steel, the overall cost was estimated based on the percentage of the mechanical discipline.

#### 2.2.4 *Architectural*

A high-level building list was prepared by Engineering to calculate a floor area required for the non-process buildings.

A unit rate was estimated based on the previous similar projects in African context.

#### 2.2.5 *Mechanical*

The mechanical equipment number, descriptions, quantities, size, capacity, motor power, type and dimensions were derived from the Project Mechanical Equipment List.

Engineering was responsible for ensuring the completeness and accuracy of the equipment list.

For the major mechanical equipment, Novopro issued requests for bids to potential qualified vendors and obtained budget pricing. This accounts for 70% of the total mechanical equipment cost and 90% of the mobile equipment cost.

For the remaining equipment, the costs were sourced from in house available costs from previous similar projects.

To calculate the installation cost for the equipment, historical data from similar projects was used and applied as percentage.

##### 2.2.5.1 Equipment Supply Pricing

The equipment supply pricing are based on budget and informal supplier quotations, depending on the size of the capital for each package.

- Budget Quotes:
  - In general, budget quotations were sought for major equipment. The price request was based on general data sheets sent to multiple bidders. A selection was made for each package based on the technical and commercial analysis.
- Inhouse Pricing:
  - For the equipment and quantities for which no Budget or Informal quote was available, Novopro used the inhouse library data that contains pricing data for similar past projects. The inhouse estimates were all listed in a database and issued to estimation to be integrated into the main estimate.

#### *2.2.6 Mobile Equipment*

Mobile equipment was selected and listed in a dedicated list to help estimate the costs as well as diesel consumption.

#### *2.2.7 Piping*

Since no detailed drawings/models were developed for Piping, the overall cost was estimated based on the percentage of the mechanical discipline.

#### *2.2.8 Electrical*

Since no detailed drawings/models were developed for Electrical, the overall cost was estimated based on the percentage of the mechanical discipline.

#### *2.2.9 Instrumentation and Telecommunication*

Since no detailed drawings/models were developed for Instrumentation and Telecommunication, the overall cost was estimated based on the percentage of the mechanical discipline.

### 2.3 Indirect Costs

The indirect costs were estimated based on the percentages of mechanical, or direct costs. These costs will be assessed in more details in the next stages of the project.

#### *2.3.1 Construction indirects*

Construction indirect costs cover any construction cost like equipment, temporary facilities, site office expenses, site maintenance.

This cost is estimated as a percentage of the Direct costs.

#### *2.3.2 Freight, handling, and logistics*

These costs cover all the activities to bring the equipment from the Vendor location to the site warehouse.

Estimated as a percentage of the Direct costs.

#### *2.3.3 Commissioning & (1) year operational & capital spare*

Spare parts include first year initial spares and commissioning spares were estimated as a percentage of the Direct costs.

#### *2.3.4 First fill*

First fills include on-site diesel fuel tank fills, reagents, hydraulic fluids, oils, lubricants, glycol, and other fills. This cost was calculated using an allowance, as a percentage of direct costs.

Additionally, the costs associated with the FeSi were calculated directly in the estimate file and added to the first fill cost.

#### *2.3.5 Vendor Representative*

The cost of vendors' representatives included in the CAPEX was intended to be sufficient to bring the Project to mechanical completion.

Estimated as a percentage of the Mechanical costs.

#### *2.3.6 EPCM Services*

The cost for EPCM services includes all efforts required after full sanctioning of the Project, and which are required to bring the Project to a state of Construction and Mechanical completion.

Estimated as a percentage of the Direct costs.

#### *2.3.7 Owner's costs*

Owner's costs include the costs for the owner's Team to oversee the EPC and EPCM packages, as well as the early hiring of the operational crew and their training. This latter component is considered a major expenditure and contributes to the relatively high percentage due to the unavailability of skilled operational and maintenance personnel in the project location.

#### *2.3.8 Contingency*

Contingency is intended to cover items that are included in the scope of work as described in this report but cannot be accurately defined due to the normal range of variability of quantities, productivity, unit rates, the current level of Engineering and other factors that affect the accuracy of the expected final cost of the Project.

The total for Contingency calculated 20% of the total (direct + indirect) costs.

## 3 OPEX

#### *3.1.1 Basis of Estimate*

The project annual operational expenditures (OPEX) estimate covers the following costs:

a) Manpower;
b) Diesel;
c) Reagents and Consumables;
d) Maintenance Materials;
e) Insurances
f) General & Administration (Indirect Costs)
g) Community Development Fund

h) Product Transport (Included only in cash flow)
i) Marketing (Included only in cash flow)
j) Royalties (included only in cash flow)
k) Contingency (no contingency assumed)

The project OPEX was based on Process Flow Diagrams and Mass Balances, Load Lists and Layouts. Other supporting data includes vendor pricing and specifications, and historical data from previous projects.

The full-rate operating hours for the process plant used in the OPEX estimate was 7,600 hours per year. Annual spodumene production was 112,167 tonnes per year.

#### 3.1.1.1 Manpower

A manpower organogram was developed which includes estimates for operators, maintenance employees, office workers and management based on specific project requirements. The operation is assumed to be 24 hours per day, so some key operator roles will have three, 8-hour shifts with one spare crew, so that operations can be maintained. Office workers, and management will be day shift only working 8-hour shifts. A combination of local workforce and expatriates have been assumed for the operation as well. Specialized roles such as senior management will be performed by expatriates, which comes at a higher cost. Local wages have been assumed to range between $13,000 - $26,000 USD per year. Expatriate wages have been assumed to range between $60,000 - $330,000 USD per year.

In total 158 employees have been assumed to be required on payroll, with 11 expatriates and 147 locals.

#### 3.1.1.2 Diesel

Diesel is consumed by the mobile equipment fleet and by two 2.5 MW gensets to run the operational equipment. The mobile equipment fleet was estimated based on the operations and cycle time calculations and the consumption of diesel is found on equipment specification sheets. In total 1,420,000 L/yr of diesel is required for the mobile fleet. Each 2.5 MW genset have been assumed to consume 540L/h of diesel providing an annual consumption of 8,210,000 L/yr.

The price of diesel used in the OPEX estimate was taken as $2.40/L.

#### 3.1.1.3 Reagents and Consumables

The major reagent used within the DMS plant is FeSi and it is estimated that 413 tpy will be required. The price of FeSi reagent is $2,116/tonne.

A number of reagents are required for the flotation plant, consisting of various frothers, collectors and regulators. A combination of quotes and in-house data were used to determine the overall costs.

The comminution circuit consists of a ball mill which requires ongoing ball purchases. 228 tpy is estimated with a cost of $500/tonne.

The final product will also be bagged in 1 tonne bags, so 112,167 bags and pallets are required. The price of 1 tonne product bags is $10.00/bag and the price for pallets is $11.12/pallet.

#### 3.1.1.4 Maintenance Materials

Maintenance is estimated based on percentages of the CAPEX. For mobile equipment the maintenance budget is 15% of the mobile equipment CAPEX per year. The remaining maintenance budget is based on 5% of the remaining equipment direct CAPEX per year. The maintenance budget percentages are greater than what Novopro typically recommends due to the lack of a detailed sustaining capital estimate for the PEA.

#### 3.1.1.5 Insurances

Insurance is estimated as 1% of the gross revenue.

#### 3.1.1.6 General & Administration

An allowance of $1 million per year has been included for general and administration.

#### 3.1.1.7 Community Development Fund

The community development fund was provided by Tantalex to be 0.3% of the gross revenue.

#### 3.1.1.8 Contingency

No contingency has been considered for the project.

### *3.1.2 Project Annual Operating Costs*

Table 3-1 presents a summary of the Annual Operational Expenditures (OPEX) for the Project. For the complete OPEX report refer to Appendix J.

**Table 3-1: Project OPEX Summary**

| WBS / Item | Item Description | OPEX Summary 112,167 MTPA USD/yr | USD/MT | % of Total | Notes |
|---|---|---|---|---|---|
| A | DIRECT COSTS | | | | |
| 1.01 | Diesel - Generators | $ 19,700,000 | $ 176.00 | 44% | $ 2.40 USD/L |
| 1.02 | Diesel - Fleet | $ 3,408,000 | $ 30.50 | 8% | $ 2.40 USD/L |
| 1.03 | Reagents & Consumables | $ 7,074,000 | $ 63.50 | 16% | DMS, Flotation, Product Packaging, Comminution |
| 1.04 | Maintenance | $ 4,318,000 | $ 38.50 | 10% | 5% of Direct Costs |
| 1.05 | Mobile Equipment Maintenance | $ 639,000 | $ 6.00 | 1% | 15% of Mobile Equipment Direct Costs |
| 1.06 | Direct Manpower | $ 1,497,000 | $ 13.50 | 3% | 65 total on payroll |
| A | Total Direct Costs | $ 36,636,000 | $ 328.00 | 81% | |
| B | INDIRECT COSTS | | | | |
| 2.01 | Indirect Manpower | $ 3,413,000 | $ 30.50 | 8% | 93 total on payroll |
| 2.02 | Insurances | $ 3,141,000 | $ 28.50 | 7% | 1% of Gross Revenue |
| 2.03 | G&A | $ 1,000,000 | $ 9.00 | 2% | Allowance |
| 2.04 | Community Devleopment Fund | $ 943,000 | $ 8.50 | 2% | 0.3% of Gross Revenue |
| B | Total Indirect Costs | $ 8,497,000 | $ 76.50 | 19% | |
| A+B | Total Direct + Indirect Costs | $ 45,133,000 | $ 404.50 | 100% | |
| (A+B+C) | TOTAL OPEX incl. Contingency | $ 45,133,000 | $ 404.50 | 100% | |

*Assumptions, General Notes and Comments*

1. The OPEX figures included are for years after ramp-up and steady state has been achieved
2. The OPEX displays costs to mine gate; Product Transport, Marketing and Royalties are captured separetly in the cash flow.

The total estimated OPEX is $45.1 million USD per year or $404.5 per tonne lithium spodumene produced. Of this cost, $36.6 million USD per year or $328.00 per tonne are direct production costs (81%), $8.5 million USD per year or $76.5 per tonne are indirect production costs (19%).

# 4 CASH FLOW

## 4.1 CAPEX Expenditure

The implementation schedule currently estimates the construction timeline to be from March 2024 to October 2025 across 20 months. Each year contains 10 months of construction; thus the CAPEX is spent by 50% across 2024 and 50% across 2025.

## 4.2 Off Mine Gate Costs

### *4.2.1 Product Transport*

The product transport cost is based on a quote received from a local transport agency. The cost comes to $361.06/tonne and includes the manpower, the maintenance, the diesel and the tire replacements.

#### *4.2.2 Marketing*

The marketing fee was provided based on the Glencore Marketing agreement as follows:

a) Fixed Fee: $100/tonne for the first 200,000 tons produced and $50/tonne thereafter.

b) Variable Fee:

I. For the first 100,000 tons: 3% of the final invoice value

II. For the next 550,000 tons: 2% of the final invoice value

III. For any tonnage greater than 650,000 tons: 1% of the final invoice value

#### *4.2.3 Royalties*

Royalties have been calculated as 3.0% of the gross revenue.

### 4.3 Production and Sales Price

It was assumed that the project would begin generating product starting in 2026 at a 75% capacity. Years 2027 through 2031 would produce at 100% capacity and 2032 would see a ramp down to 25% capacity, providing 7 years of production.

A Spodumene sales price of $2,800 USD/tonne was used as this accounts for the current market price and the forecast for 2025 and 2026 and is based on FOB Africa.

### 4.4 Inflation Rate

A 3% annual inflation rate was assumed for all costs and revenues.

### 4.5 Cash Flows

The cash flows; CAPEX, OPEX and revenues can be seen summarized in Table 4-1.

**Table 4-1: Cash Flows**

| Sequential Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Actual Year | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
| Mine Year | Year -1 | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
| Inflation | 1.03 | 1.06 | 1.09 | 1.13 | 1.16 | 1.19 | 1.23 | 1.27 | 1.30 |
| Production Curve | 0% | 0% | 75% | 100% | 100% | 100% | 100% | 100% | 25% |
| Production | - | - | 84,125 | 112,167 | 112,167 | 112,167 | 112,167 | 112,167 | 28,042 |
| Cumulative Production | - | - | 84,125 | 196,292 | 308,459 | 420,626 | 532,793 | 644,960 | 673,002 |
| CAPEX | $76,076,982 | $78,359,292 | | | | | | | |
| Direct OPEX | $- | $- | $30,151,706 | $41,408,343 | $42,650,593 | $43,930,111 | $45,248,014 | $46,605,454 | $12,000,904 |
| Indirect OPEX | $- | $- | $9,284,901 | $9,563,448 | $9,850,352 | $10,145,862 | $10,450,238 | $10,763,745 | $11,086,658 |
| | $- | $- | $33,190,687 | $45,581,877 | $46,949,333 | $48,357,813 | $49,808,547 | $51,302,804 | $13,210,472 |
| | $- | $- | $7,721,778 | $10,604,576 | $10,922,713 | $11,250,394 | $11,587,906 | $11,935,543 | $3,073,402 |
| Marketing Fixed Cost | $- | $- | $9,192,593 | $12,624,495 | $6,716,530 | $6,696,663 | $6,897,563 | $7,104,490 | $1,829,406 |
| Marketing Variable Cost | $- | $- | $8,437,796 | $8,520,099 | $8,441,612 | $8,955,706 | $9,501,108 | $10,079,726 | $1,576,933 |
| OPEX Contingency | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Total OPEX | $- | $- | $97,979,461 | $128,302,837 | $125,531,132 | $129,336,549 | $133,493,377 | $137,791,763 | $42,777,776 |
| Gross Revenue | $- | $- | $257,392,610 | $353,485,851 | $364,090,426 | $375,013,139 | $386,263,533 | $397,851,439 | $102,446,746 |
| Net Revenue | $(76,076,982) | $(78,359,292) | $159,413,149 | $225,183,014 | $238,559,294 | $245,676,590 | $252,770,156 | $260,059,677 | $59,668,970 |
| Cumulative Cash Flow | $(76,076,982) | $(154,436,274) | $4,976,874 | $230,159,888 | $468,719,183 | $714,395,772 | $967,165,929 | $1,227,225,605 | $1,286,894,575 |

### 4.6 Cash Flow Results

The project Net Present Value (NPV) and Internal Rate of Return (IRR) are both figures which display the economic viability of a project. A discount rate of 12% has been assumed for the NPV calculation.

- **$NPV_{12}$: $1,284,749,993**
- **IRR: 88.0%**

### 4.7 Sensitivity

Three parameters were modified to test the sensitivity of the cash flow results; Product Sales Price, CAPEX and OPEX. Figure 4-1 and Figure 4-2 show the NPV and IRR sensitivities. Both NPV and IRR are most sensitive to Product Sales Price. The project NPV is least sensitive to CAPEX. The project IRR is least sensitive to OPEX.

**Figure 4-1: NPV Sensitivity**

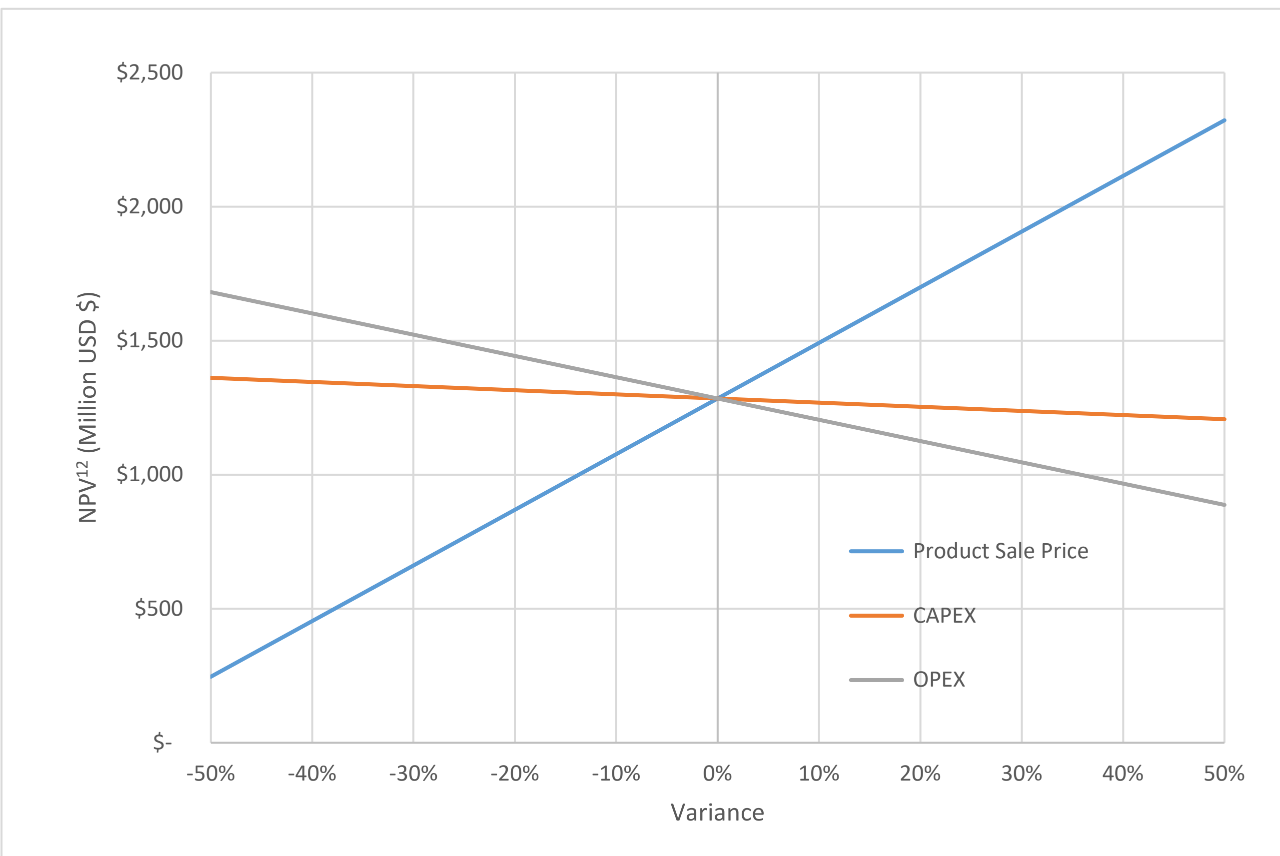
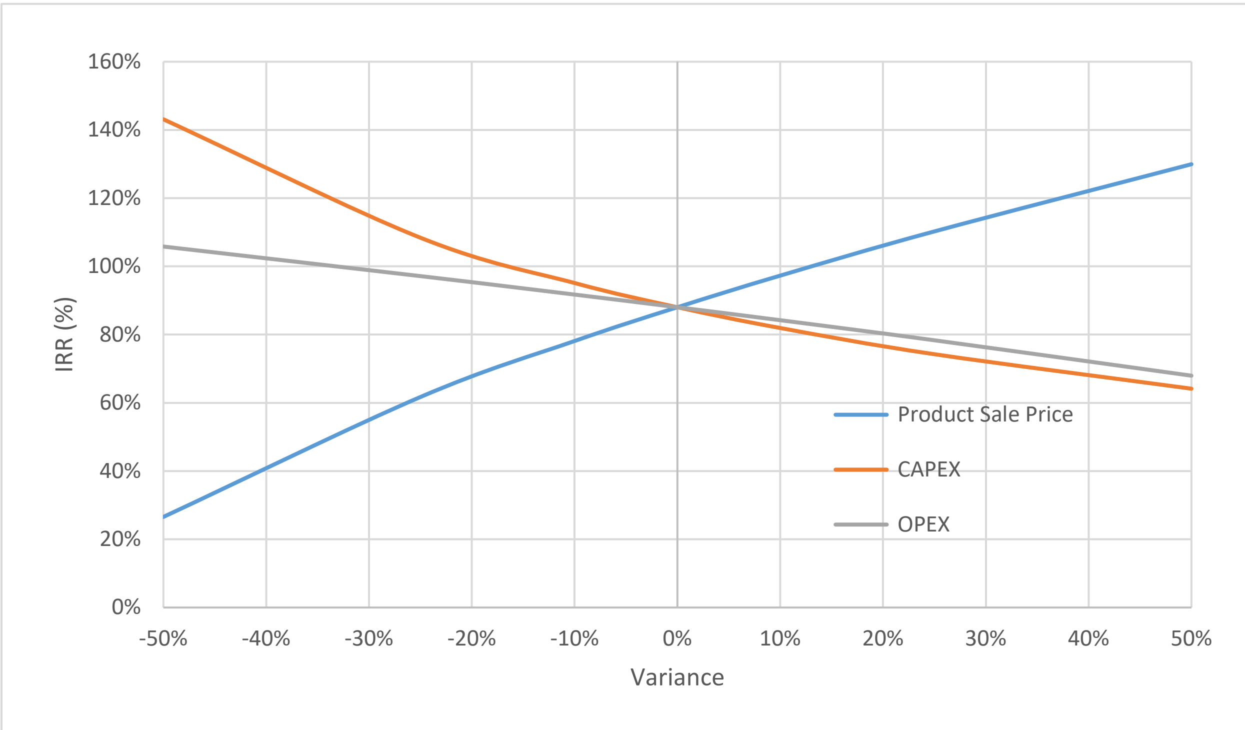


**Figure 4-2: IRR Sensitivity**




**END OF DOCUMENT**

# Appendix E: Cashflow and OPEX

SEDGMAN NOVOPRO

# Cash Flow

| | | | |
|---|---|---|---|
| Title: | **Cash Flow Model** | Rev.: | **02** |
| Doc. No.: | **CF1208-001** | Date: | **2-Oct-2023** |

## **TANTALEX LITHIUM RESOURCES** Manono Lithium Tailings PEA

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| | |
|---|---|
| Prepared by: | **Mitch McNall** |
| Reviewed by: | **Abbas Mahmoodi** |
| Approved by: | **Mazi Rejaee** |

**REVISION INDEX**

| Rev. | Date | By | Rev'd | App. | Client | Revision Details |
|---|---|---|---|---|---|---|
| PA | 12-Apr-23 | MM | AW | MR | - | Internal Review |
| PB | 18-May-23 | MM | AW | MR | - | Client Review |
| PC | 19-May-23 | MM | AW | MR | - | Client Review |
| 00 | 12-Jun-2023 | MM | AM | MR | - | Project Use |
| 01 | 14-Sep-2023 | MM | AM | MR | - | Project Use |
| 02 | 2-Oct-2023 | MM | AM | | | Project Use |

# Change Log

| Item No. | Rev. | Change Description | Date | Remarks |
|---|---|---|---|---|
| 1 | 00 | Issued PEA Cash Flow model to client | 15-Jun-23 | |
| 2 | 01 | Added correct moisture to final product (95% solids) for product transport calculations and bagging calculations<br>Fixed NPV calculation<br>Added a toggle for escalation to calculate financials in real and nominal terms<br>Added a toggle for discount rate to model 10% and 12%<br>Modified cash flow tab to summarize nominal/real NPV/IRR and 10% vs. 12% discount rate<br>Fixed F220 cost | 14-Sep-23 | |
| 3 | 02 | Removed 12% Discount Rate option | 2-Oct-23 | |

## Drivers

| Item | Value | Unit |
|---|---|---|
| Direct CAPEX excluding mobile eqiupment | $ 86,357,106 | USD $ |
| Mobile Equipment CAPEX | $ 4,254,240 | USD $ |
| Indirect Costs | $ 34,157,234 | USD $ |
| Contingency | $ 22,953,716 | USD $ |
| Total CAPEX | $ 147,722,296 | USD $ |
| OPEX Contingency | 0% | % |
| Product Sales Price | $ 2,800 | USD $/t |
| Production (Spodumene) - Dry Basis | 112,167 | tpy |
| Production (Spodumene) - Wet Basis | 118,071 | tpy |
| Gross Revenue | $ 314,067,600 | USD $/yr |
| G&A Allowance | $ 1,000,000 | USD $/yr |
| Diesel Generator Consumption | 8,208,000 | L |
| Fleet Diesel Consumption | 1,419,651 | L |
| Diesel Cost | $ 2.40 | USD $/L |
| FeSi Consumption | 413 | tpy |
| FeSi Cost | $ 2,116.44 | USD / t |
| Armac T 1% Consumption | 89 | tpy |
| Armac Cost | $ 5,000.00 | USD / t |
| NaOH 5% Consumption | 289 | tpy |
| NaOH Cost | $ 315.00 | USD / t |
| Na2CO3 5% Consumption | 60 | tpy |
| Na2CO3 Cost | $ 900.00 | USD / t |
| MIBC Consumption | 22 | tpy |
| MIBC Cost | $ 5,000.00 | USD / t |
| F220 5% Consumption | 186 | tpy |
| F220 Cost | $ 3,350.00 | USD / t |
| FA-2 100% Consumption | 398 | tpy |
| FA-2 Cost | $ 5,000.00 | USD / t |
| Product Bags | 118,071 | bags/yr |
| Product Bag Cost | $ 10.00 | USD $/bag |
| Wooden pallets | 118,071 | |
| Pallet Cost | $ 11.12 | USD $/pallet |
| Ball mill ball consumption | 228.0 | tpy |
| Ball mill ball cost | $ 500.00 | USD $/t |
| Reagent Cost | $ 6,795,345.58 | USD $/yr |
| Inflation Rate | 3% | |
| Royalties | 3% | |
| Community Fund | 0.3% | of gross revenue |
| Fixed Marketing Fee | $ 8,510,290 | Average $/yr |
| Variable Marketing Fee | $ 9,252,163 | Average $/yr |
| Discount Rate | 10% | Discount Rate |

## OPEX Summary

| WBS / Item | Item Description | OPEX Summary 112,167 MTPA | | | | | Notes |
|---|---|---|---|---|---|---|---|
| | | USD/yr | | USD/MT | | % of Total | |
| **A** | **D I R E C T   C O S T S** | | | | | | |
| 1.01 | Diesel - Generators | $ | 19,700,000 | $ | 176.00 | 44% | $ 2.40 USD/L |
| 1.02 | Diesel - Fleet | $ | 3,408,000 | $ | 30.50 | 8% | $ 2.40 USD/L |
| 1.03 | Reagents & Consumables | $ | 6,796,000 | $ | 61.00 | 15% | DMS, Flotation, Product Packaging, Comminution |
| 1.04 | Maintenance | $ | 4,318,000 | $ | 38.50 | 10% | 5% of Direct Costs |
| 1.05 | Mobile Equipment Maintenance | $ | 639,000 | $ | 6.00 | 1% | 15% of Mobile Equipment Direct Costs |
| 1.06 | Direct Manpower | $ | 1,497,000 | $ | 13.50 | 3% | 65 total on payroll |
| **A** | **Total Direct Costs** | **$** | **36,358,000** | **$** | **325.50** | **81%** | |
| **B** | **I N D I R E C T   C O S T S** | | | | | | |
| 2.01 | Indirect Manpower | $ | 3,413,000 | $ | 30.50 | 8% | 93 total on payroll |
| 2.02 | Insurances | $ | 3,141,000 | $ | 28.50 | 7% | 1% of Gross Revenue |
| 2.03 | G&A | $ | 1,000,000 | $ | 9.00 | 2% | Allowance |
| 2.04 | Community Devleopment Fund | $ | 943,000 | $ | 8.50 | 2% | 0.3% of Gross Revenue |
| **B** | **Total Indirect Costs** | **$** | **8,497,000** | **$** | **76.50** | **19%** | |
| **A+B** | **Total Direct + Indirect Costs** | **$** | **44,855,000** | **$** | **402.00** | **100%** | |
| **(A+B+C)** | **TOTAL OPEX incl. Contingency** | **$** | **44,855,000** | **$** | **402.00** | **100%** | |

***Assumptions, General Notes and Comments***

1 The OPEX figures included are for years after ramp-up and steady state has been achieved

2 The OPEX displays costs to mine gate; Product Transport, Marketing and Royalties are captured separetly in the cash flow.

## Manpower

| WBS Area | Position Description | Manpower Count | | | | | Peak Mineral Labor Rate Survey Positions | Employee Grade | Direct / Indirect | Hourly / Salary | Projected Salary / Rate | Shift Description | Hours Per Week | Week Per Year | Amount Per Position | Burden | Cost to Employer Per Position | Total Manpower Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Positions | Shifts | Staff in 24 hour Cycle | Spare Crew Size | Total on Payroll | | | | | | | | | | | | |
| 0000 | General Manager | 1 | 1 | 1 | 0 | 1 | Senior Manager | XVI | Indirect | Salary | $ 248,872 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 248,872 | 30% | $ 323,534 | $ 323,534 |
| 0000 | Administration/Payroll | 1 | 1 | 1 | 0 | 1 | Officer Level 1 | XII | Indirect | Salary | $ 18,153 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 18,153 | 30% | $ 23,599 | $ 23,599 |
| 0000 | Security | 1 | 3 | 3 | 1 | 4 | General Labor | II | Indirect | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 0000 | I.T | 1 | 1 | 1 | 0 | 1 | Senior officers and line managers | XIII | Indirect | Salary | $ 91,103 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 91,103 | 30% | $ 118,434 | $ 118,434 |
| 0000 | Janitorial | 2 | 1 | 2 | 0 | 2 | Unskilled Labor | I | Indirect | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 26,000 |
| 0000 | Purchasing and Maintenance Manager | 1 | 1 | 1 | 0 | 1 | Senior Manager | XVI | Indirect | Salary | $ 248,872 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 248,872 | 30% | $ 323,534 | $ 323,534 |
| 0000 | Projects Manager | 1 | 1 | 1 | 0 | 1 | Technical Specialist & Specialist Manager | XIV | Indirect | Salary | $ 186,097 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 186,097 | 30% | $ 241,926 | $ 241,926 |
| 0000 | Medic | 1 | 3 | 3 | 1 | 4 | Skilled Labor | VI | Indirect | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 0000 | Draftsman | 1 | 1 | 1 | 0 | 1 | Technician & Controls | XI | Indirect | Salary | $ 15,343 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 15,343 | 30% | $ 19,946 | $ 19,946 |
| 0000 | Health, Safety, Environment, and Community Specialist | 1 | 1 | 1 | 0 | 1 | Technical Specialist & Specialist Manager | XIV | Indirect | Salary | $ 186,097 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 186,097 | 30% | $ 241,926 | $ 241,926 |
| 0000 | Master Mechanic | 1 | 1 | 1 | 0 | 1 | Foremen | VIII | Indirect | Salary | $ 13,771 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 13,771 | 30% | $ 17,902 | $ 17,902 |
| 0000 | Mechanic | 2 | 3 | 6 | 1 | 7 | Technical Tradesmen & Foremen | VII | Indirect | Salary | $ 10,218 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,218 | 30% | $ 13,284 | $ 92,985 |
| 0000 | Warehouse Clerk | 1 | 1 | 1 | 0 | 1 | General Labor | II | Indirect | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 13,000 |
| 0000 | Warehouse | 2 | 1 | 2 | 0 | 2 | Unskilled Labor | I | Indirect | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 26,000 |
| 0000 | Geologist | 1 | 1 | 1 | 0 | 1 | Technical Specialist & Specialist Manager | XIV | Indirect | Salary | $ 186,097 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 186,097 | 30% | $ 241,926 | $ 241,926 |
| 0000 | De-Dusting Truck | 1 | 3 | 3 | 0 | 3 | General Labor | IV | Indirect | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 39,000 |
| 0000 | Process Plant Manager | 1 | 1 | 1 | 0 | 1 | Area Manager | XV | Indirect | Salary | $ 231,255 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 231,255 | 30% | $ 300,632 | $ 300,632 |
| 0000 | Planner | 1 | 1 | 1 | 0 | 1 | Technical Specialist & Specialist Manager | XIV | Indirect | Salary | $ 186,097 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 186,097 | 30% | $ 241,926 | $ 241,926 |
| 0000 | Chemist | 1 | 1 | 1 | 0 | 1 | Technical Specialist & Specialist Manager | XIV | Indirect | Salary | $ 186,097 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 186,097 | 30% | $ 241,926 | $ 241,926 |
| 0000 | Lab Technician | 2 | 1 | 2 | 0 | 2 | Technician & Controls | XI | Indirect | Salary | $ 15,343 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 15,343 | 30% | $ 19,946 | $ 39,892 |
| 0000 | Plant Supervisors | 1 | 3 | 3 | 1 | 4 | Specialty Skilled Admin | IX | Indirect | Salary | $ 15,214 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 15,214 | 30% | $ 19,778 | $ 79,113 |
| 0000 | Control Room | 1 | 3 | 3 | 1 | 4 | Technician & Controls | XI | Indirect | Salary | $ 15,343 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 15,343 | 30% | $ 19,946 | $ 79,783 |
| 0000 | Millwright | 2 | 3 | 6 | 1 | 7 | Technical Tradesmen & Foremen | VII | Indirect | Salary | $ 10,218 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,218 | 30% | $ 13,284 | $ 92,985 |
| 0000 | Instrumentation Tech | 1 | 3 | 3 | 1 | 4 | Technical Tradesmen & Foremen | VII | Indirect | Salary | $ 10,218 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,218 | 30% | $ 13,284 | $ 53,134 |
| 0000 | Welder | 1 | 3 | 3 | 0 | 3 | Technical Tradesmen & Foremen | VII | Indirect | Salary | $ 10,218 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,218 | 30% | $ 13,284 | $ 39,851 |
| 0000 | Electrical | 1 | 3 | 3 | 1 | 4 | Technical Tradesmen & Foremen | VII | Indirect | Salary | $ 10,218 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,218 | 30% | $ 13,284 | $ 53,134 |
| 0000 | Grader Operator | 1 | 1 | 1 | 0 | 1 | Skilled Labor | VI | Indirect | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 13,000 |
| 1000 | Mining Manager | 1 | 1 | 1 | 0 | 1 | Area Manager | XV | Direct | Salary | $ 231,255 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 231,255 | 30% | $ 300,632 | $ 300,632 |
| 1000 | Loader Operator | 1 | 3 | 3 | 1 | 4 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 1000 | Dump Truck Drivers | 3 | 3 | 9 | 3 | 12 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 156,000 |
| 1000 | Dozer Operator | 1 | 1 | 1 | 1 | 2 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 26,000 |
| 1000 | Excavator Operator | 3 | 3 | 9 | 3 | 12 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 156,000 |
| 3000 | Loader Operator | 1 | 3 | 3 | 1 | 4 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 3000 | Crushing and Screening Operator | 1 | 3 | 3 | 1 | 4 | General Operator | V | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 4200 | DMS Operator | 3 | 3 | 9 | 3 | 12 | General Operator | V | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 156,000 |
| 4400 | Flotation Operator | 3 | 3 | 9 | 3 | 12 | General Operator | V | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 156,000 |
| 4700 | Bagging Operator | 3 | 3 | 9 | 2 | 11 | General Operator | V | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 143,000 |
| 4700 | Forklift Driver | 4 | 3 | 12 | 2 | 14 | Skilled Labor | VI | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 182,000 |
| 4700 | Logistics Manager | 1 | 1 | 1 | 0 | 1 | Senior Manager | XVI | Indirect | Salary | $ 248,872 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 248,872 | 30% | $ 323,534 | $ 323,534 |
| 6000 | TSF Stacker Conveyors | 1 | 3 | 3 | 1 | 4 | General Operator | V | Direct | Salary | $ 10,000 | 3 crews / 8-hour shift rotation | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 52,000 |
| 6000 | TSF Dozer Operator | 1 | 1 | 1 | 0 | 1 | General Operator | V | Direct | Salary | $ 10,000 | 8-hour 5d/w, Day-shift only | 40 | 52 | $ 10,000 | 30% | $ 13,000 | $ 13,000 |
| | **GRAND TOTAL** | **59** | **81** | **129** | **29** | **158** | | | | | | | | | | | | **$ 4,909,252** |

**NOTES:**

Potable water consumption Calc @0.1m3/person/24hr 12.9 m3/day

## Product Transport

| Item No. | Item | 118,071 MTPA | | Unit |
|---|---|---|---|---|
| **1.0** | **DIRECT COSTS** | | | |
| | | | | |
| **1.1** | **Product Transport Basis** | | | |
| 1.1.1 | Manono to Mitwaba Cost | $ | 85.00 | USD/ton |
| 1.1.2 | Manono to Mitwaba payload | | 20.0 | tons |
| 1.1.3 | Mitwaba to Lubumbashi Cost | $ | 35.00 | USD/ton |
| 1.1.4 | Mitwaba to Lubumbashi payload | | 20.0 | tons |
| 1.1.5 | Lubumbashi to Dar es Salaam Cost | $ | 220.00 | USD/ton |
| 1.1.6 | Lubumbashi to Dar es Salaam payload | | 26.0 | tons |
| 1.1.7 | Manono to Lubumbashi qty trucks | | 5,904 | Trucks |
| 1.1.8 | Manono to Lubumbashi annual cost | $ | 14,169,600.00 | USD/yr |
| 1.1.9 | Lubumbashi to Dar es Salaam qty trucks | | 4,542 | Trucks |
| 1.1.10 | Lubumbashi to Dar es Salaam annual cost | $ | 25,980,240.00 | USD/yr |
| 1.1.11 | Lubumbashi handling cost | $ | 21.00 | USD/ton |
| 1.1.12 | Lubumbashi handling annual cost | $ | 2,479,481.05 | USD/yr |
| **1.1.28** | **Total Transport Cost** | **$** | **42,629,321** | **USD/yr** |
| | **Transport Tonnage Cost** | **$** | **361.05** | **USD/tonne** |

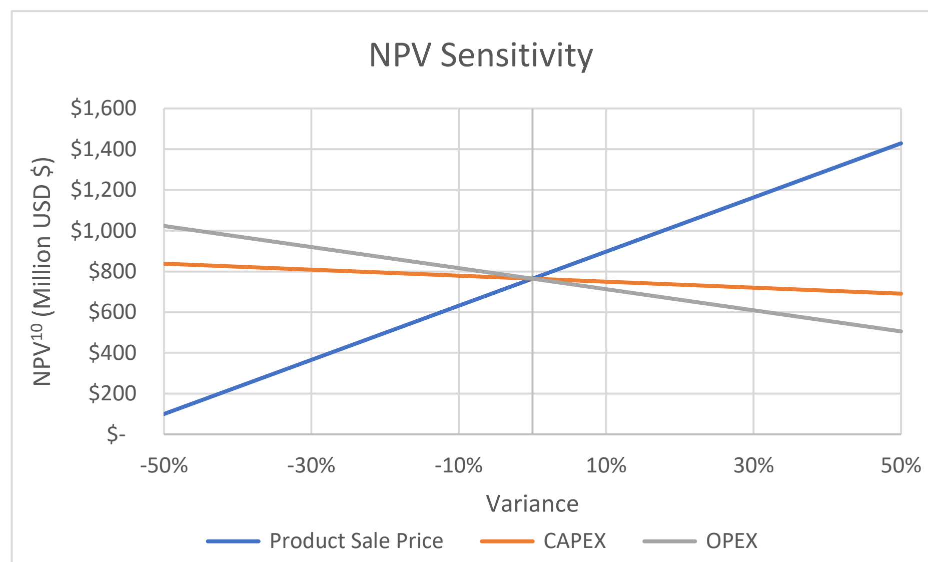
## Salary Scale Sum

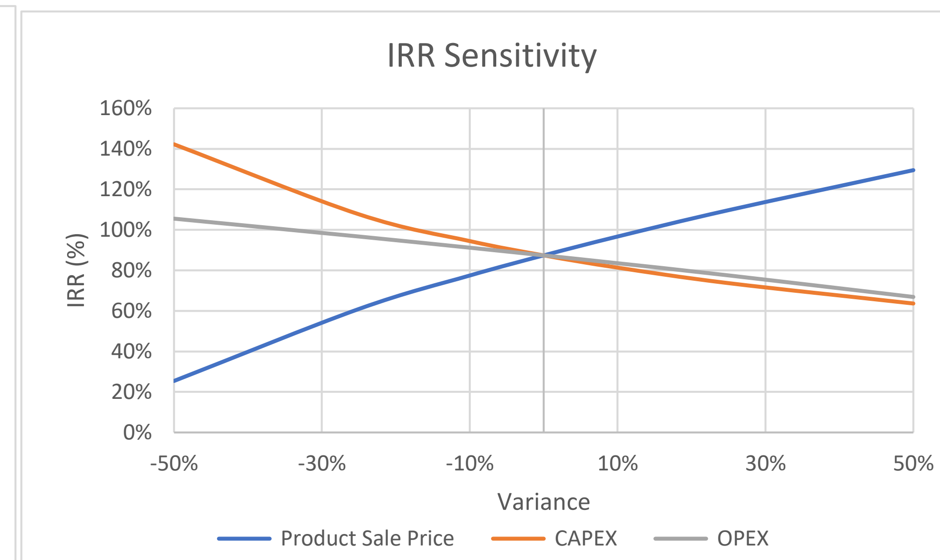
| Grade | Position | Examples | Annual CTC inc GPA per position in USD |
|---|---|---|---|
| I | Unskilled Labor | Helper, Cleaners and messangers | $ 10,000 |
| II | General Labor | Guard, Patrol,Stores Clerk | $ 10,000 |
| III | General Labor | General Drivers (Pickups and Minibus) | $ 10,000 |
| IV | General Labor | General Drivers (Service Bus, Trucks) | $ 10,000 |
| V | General Operator | Pump & Weir Operators, Shipping / Receiving , Fire Chief | $ 10,000 |
| VI | Skilled Labor | Operator, Skilled Mobile Equipment, Pipe Fitter, Nurse | $ 10,000 |
| VII | Technical Tradesmen & Foremen | Electrician, Machinist, Painter, Welder, Payroll, Accounting | $ 10,218 |
| VIII | Foremen | Foreman | $ 13,771 |
| IX | Specialty Skilled Admin | Translator ,Plant Foreman | $ 15,214 |
| X | Drilling Team | Workover Crew & Operators, Wireline Loggers, Brine Field Operators | $ 13,882 |
| XI | Technician & Controls | Lab Technician, Quality Control, Control Room Monitor | $ 15,343 |
| XII | Officer Level 1 | Security Officer, Local Procurement Officer, Customs Officer, Safety officers, Hr Specialists | $ 18,153 |
| XIII | Senior officers and line managers | IT Manager, Telecom/Network Specialist, Doctor (GP), Senior Accountants, | $ 91,103 |
| XIV | Technical Specialist & Specialist Manager | Int'l Procurement Officer, Bio-Diversity Specialist, Geologist, Planner, Product Logistics Manager, Safety Managers | $ 186,097 |
| XV | Area Manager | Pond Manager, Vehicle Training Manager | $ 231,255 |
| XVI | Senior Manager | Procurement Manager, Finanace Manager, HR Manager, Camp Manager | $ 248,872 |
| XVII | Speciality | Doctor Speciality | $ 65,273 |

| Actual Year | 1/1/2024 | 1/1/2025 | 1/1/2026 | 1/1/2027 | 1/1/2028 | 1/1/2029 | 1/1/2030 | 1/1/2031 | 1/1/2032 |
|---|---|---|---|---|---|---|---|---|---|
| Sequential Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Actual Year | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 |
| Mine Year | Year -1 | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 |
| Inflation | 1.03 | 1.06 | 1.09 | 1.13 | 1.16 | 1.19 | 1.23 | 1.27 | 1.30 |
| Production Curve | 0% | 0% | 75% | 100% | 100% | 100% | 100% | 100% | 25% |
| Production Dry Basis | - | - | 84,125 | 112,167 | 112,167 | 112,167 | 112,167 | 112,167 | 28,042 |
| Cumulative Production Dry Basis | - | - | 84,125 | 196,292 | 308,459 | 420,626 | 532,793 | 644,960 | 673,002 |
| Production Wet Basis | - | - | 88,553 | 118,071 | 118,071 | 118,071 | 118,071 | 118,071 | 29,518 |
| CAPEX | $ 76,076,982 | $ 78,359,292 | | | | | | | |
| Direct OPEX | $ - | $ - | $ 29,921,891 | $ 41,092,730 | $ 42,325,512 | $ 43,595,277 | $ 44,903,136 | $ 46,250,230 | $ 11,909,434 |
| Indirect OPEX | $ - | $ - | $ 9,284,901 | $ 9,563,448 | $ 9,850,352 | $ 10,145,862 | $ 10,450,238 | $ 10,763,745 | $ 11,086,658 |
| Product Transport | $ - | $ - | $ 34,936,658 | $ 47,979,676 | $ 49,419,067 | $ 50,901,639 | $ 52,428,688 | $ 54,001,548 | $ 13,905,399 |
| Royalties | $ - | $ - | $ 7,721,778 | $ 10,604,576 | $ 10,922,713 | $ 11,250,394 | $ 11,587,906 | $ 11,935,543 | $ 3,073,402 |
| Marketing Fixed Cost | $ - | $ - | $ 9,192,593 | $ 12,624,495 | $ 6,716,530 | $ 6,696,663 | $ 6,897,563 | $ 7,104,490 | $ 1,829,406 |
| Marketing Variable Cost | $ - | $ - | $ 8,437,796 | $ 8,520,099 | $ 8,441,612 | $ 8,955,706 | $ 9,501,108 | $ 10,079,726 | $ 1,576,933 |
| OPEX Contingency | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Total OPEX | $ - | $ - | $ 99,495,617 | $ 130,385,024 | $ 127,675,785 | $ 131,545,542 | $ 135,768,639 | $ 140,135,283 | $ 43,381,232 |
| Gross Revenue | $ - | $ - | $ 257,392,610 | $ 353,485,851 | $ 364,090,426 | $ 375,013,139 | $ 386,263,533 | $ 397,851,439 | $ 102,446,746 |
| Net Revenue | $ (76,076,982) | $ (78,359,292) | $ 157,896,993 | $ 223,100,826 | $ 236,414,641 | $ 243,467,597 | $ 250,494,894 | $ 257,716,156 | $ 59,065,513 |
| Cumulative Cash Flow | $ (76,076,982) | $ (154,436,274) | $ 3,460,718 | $ 226,561,545 | $ 462,976,186 | $ 706,443,783 | $ 956,938,677 | $ 1,214,654,834 | $ 1,273,720,347 |

| Nominal/Real | Discount Rate | 10% |
|---|---|---|
| Nominal | NPV | $ 764,312,125 |
| | IRR | 87.4% |
| Real | NPV | $ 637,861,291 |
| | IRR | 82.3% |

Note: Nominal case assumes a 3% inflation rate and real assumes no inflation

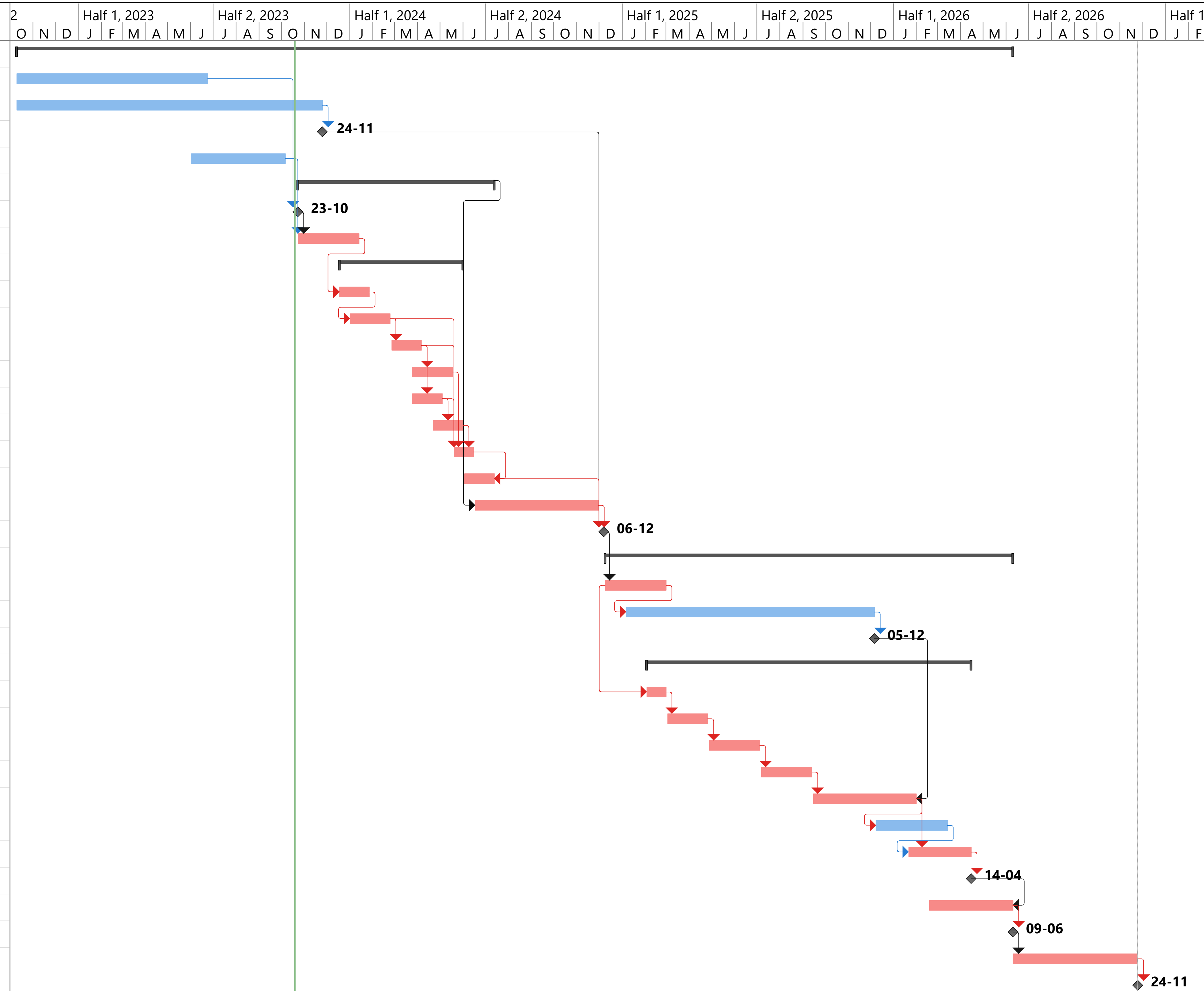


## Appendix F: Project Implementation Schedule

# Manono Lithium Tailings Project Implementation Schedule

| ID | Task Mode | Task Name | Duration |
|---|---|---|---|
| 1 | | **Manono Tailings Processing Project** | **47.6 mons** |
| 2 | | Preliminary Economic Assessment | 9 mons |
| 3 | | ESIA & Permitting | 14.5 mons |
| 4 | | Permit to Build issued | 0 mons |
| 5 | | Package and Ship Representative Samples | 18 wks |
| 6 | | **Feasbility Study** | **9.5 mons** |
| 7 | | FS Kick off | 0 mons |
| 8 | | FS Test Work | 12 wks |
| 9 | | **Engineering** | **6 mons** |
| 10 | | Process | 6 wks |
| 11 | | Mechanical | 8 wks |
| 12 | | Issue RFP for vendors | 6 wks |
| 13 | | Structural & Civil | 8 wks |
| 14 | | Piping | 6 wks |
| 15 | | Electrical & Instrumentation | 6 wks |
| 16 | | Cost Estimation | 4 wks |
| 17 | | Final Report | 6 wks |
| 18 | | Financing Completion | 6 mons |
| 19 | | Decision to Proceed | 1 wk |
| 20 | | **Project Implementation** | **19.6 mons** |
| 21 | | Detailed Engineeing | 3 mons |
| 22 | | Equipment Fabrication & Delivery | 48 wks |
| 23 | | Equipment Delivered to Site | 0 mons |
| 24 | | **Construction** | **15.6 mons** |
| 25 | | Early Works | 4 wks |
| 26 | | Earthworks | 8 wks |
| 27 | | Concrete | 10 wks |
| 28 | | Structural (Pre-Equipment) | 10 wks |
| 29 | | Mechanical Installation | 20 wks |
| 30 | | Piping | 14 wks |
| 31 | | Electrical & Instrumentation | 12 wks |
| 32 | | Mechanical Completion | 0 mons |
| 33 | | Commissioning | 4 mons |
| 34 | | First Production | 0 mons |
| 35 | | Ramp up to Full Production | 6 mons |
| 36 | | Full Production | 0 days |



# Appendix G: Risk Register

# Risk Register

| | | | |
|---|---|---|---|
| Title: | **Risk Register** | Rev.: | **02** |
| Doc. No.: | **RA1208-001** | Date: | **19-Oct-2023** |

**TANTALEX LITHIUM RESOURCES** Manono Lithium Tailings PEA



Prepared by: **Abbas Mahmoodi**
Reviewed by: **Jim Brebner**
Approved by: **Mazi Rejaee**

**REVISION INDEX**

| Rev. | Date | By | Rev'd | App. | Client | Revision Details |
|---|---|---|---|---|---|---|
| PA | 26-Apr-2023 | AW | MR | MR | - | Internal Review |
| PB | 3-May-2023 | AW | MR | MR | - | For Risk Session |
| 00 | 4-May-2023 | AW | MR | MR | - | For Use |
| 01 | 18-May-2023 | AW | MR | MR | - | For Use |
| 02 | 19-Oct-2023 | AM | JB | | - | For Use |

## Assessment Guide

**Table 1. Assessment of Risk Probability**

| Label | Probability | Definition |
|---|---|---|
| Very High | >70% | Will probably occur in most circumstances |
| High | 50-70% | Might occur under most circumstances |
| Medium | 30-50% | Might occur at some time |
| Low | 10-30% | Could occur at some time |
| Very Low | <10% | May occur in exceptional circumstances |
| *If the probability of an event is >80% it should be assumed it will happen and be included in the Project scope.* | | |

**Table 2. Assessment of Risk Consequence**

| Label | Consequence | Schedule | Human Impact | Environmental Impact |
|---|---|---|---|---|
| Very High | > $10 Million | Over 16 weeks | Loss of life | Permanent detrimental effect |
| High | $5 - 10 Million | 8 - 16 weeks | Life threatening injuries / Disability | Major public concern/major clean up |
| Medium | $2.5 - 5 Million | 4 - 8 weeks | Hospitalization / Loss of time +3 days | Major non-conformity with regulation |
| Low | $0.5- 2.5 Million | 1 - 4 weeks | Loss of time +1 days | Minor non-conformity with regulation |
| Very Low | <$0.5 Million | < 1 week | At site first aid | Locally contained spill |

**Table 3. Determination of Risk Level**

| Risk Level | | Consequence | | | | |
|---|---|---|---|---|---|---|
| | | Very low | Low | Medium | High | Very high |
| Probability | Very high | Low | Medium | High | Very high | Very high |
| | High | Low | Medium | High | High | Very high |
| | Medium | Low | Low | Medium | High | High |
| | Low | Very low | Low | Low | Medium | Medium |
| | Very low | Very low | Very low | Low | Low | Low |

## Risk Register

| Risk No. | Risk Area | Risk / Opportunity | Description | Timing | Impact | Action | Probability | Consequence | Risk | Mitigation Measure | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Processing | Risk | Li feed grade to plant is ~25% lower than Bulk samples tested. | Pre-Execution | Cost | Reduce/Control | Low | High | Medium | Collect representative samples based on Novopro memo (PM1208-004) for FS testing. | Approximately 1.5 tonnes collected, shipment to South Africa planned to leave site on May 11, 2023. |
| 2 | Operations | Opportunity | Using dump trucks to transport dump material to process plant instead of overland conveyors. | Pre-Execution | Cost | Capture | Low | High | Medium | | Potentially reduce CAPEX of project. |
| 3 | Plant Design | Opportunity | Mica removal with upflow classifier instead of reverse flotation | Pre-Execution | Cost | Capture | Medium | Medium | Medium | Additional test work for upflow classifier with representative samples in FS. | Using an upflow classifier would reduce the cost and operational complexity of the process. |
| 4 | Plant Design | Opportunity | Eliminate the need of the liner in TSF design | Pre-Execution | Cost | Capture | Medium | Medium | Medium | Additional works by Transfields is ongoing. | Preliminary rock drainage tests indicate that no acid leaching occurs. |
| 5 | Processing | Opportunity | Change size fraction split between DMS and Flotation (currently 500µm) | Pre-Execution | Cost | Capture | Medium | Very High | High | Include optimized size fraction split in FS test works. | Feedback from DMS laboratories indicate that a higher bottom cut point (i.e. >500µm) will increase the dense media recovery in the circuit. |
| 6 | Political/Permitting | Risk | Nationalization of resource | Pre-Execution | Cost | Reduce/Control | Very Low | Very High | Low | Agreement in place with DRC government already. | Royalty costs included in OPEX estimate. |
| 7 | Logistics | Risk | Equipment Delivery takes longer than quoted | Construction | Schedule | Reduce/Control | Medium | Medium | Medium | Issue purchase order with sufficient lag time built in.<br>Expedite delivery after delay is known. | |
| 8 | Construction | Risk | Construction delays due to rainy season weather events | Construction | Schedule | Reduce/Control | Medium | Medium | Medium | account weather conditions into construction planning. | |
| 9 | Utilities | Risk | Process water make up supplied by well | Pre-Execution | Cost | Reduce/Control | Low | Low | Low | Design process water make up supply during FS | The PEA has assumed an on site well will supply process water make up. |
| 10 | Processing | Opportunity | Production of Tin and Tantalum concentrate | Pre-Execution | Cost | Capture | High | High | High | Include test work and process design during FS | Test work results for fine size fraction (<500µm) indicate the presence of tin and tantalum minerals. |
| 11 | Logistics | Risk | Delay in diesel delivery due to rain events. | Operations | Cost | Reduce/Control | Low | Medium | Low | Increase on site Diesel storage. | 55,000L (2 weeks) of on site storage included in PEA. Inreased Diesel storage could result in higher insurance costs. |
| 12 | Plant Design | Opportunity | Alternate site location - closer to dumps | Pre-Execution | Cost | Capture | Low | High | Medium | | This could reduce material transport costs, and earthworks costs during construction. |
| 13 | Processing | Opportunity | Alternate production phasing scenario by processing only K dump first | Pre-Execution | Cost | Capture | Medium | High | High | Include a trade-off study during FS. | This could reduce construction time and generate revenue sooner. |
| 14 | Construction | Risk | Inability to mobilize competent construction contractors | Construction | Schedule | Reduce/Control | Very Low | Medium | Low | Early engagement with potential construction partners during the FS. | |
| 15 | Marketing | Risk | Difficulties/inability to secure an offtake/marketing agreement. | Pre-Execution | Schedule | Reduce/Control | Very Low | High | Low | Early engagement with potential offtakers. | |
| 16 | Construction | Risk | Project timeline impacted by improper planning and scheduling of Pre-Execution and Execution | Construction | Schedule | Reduce/Control | Low | High | Medium | Properly evaluate schedules accordingly, including respective contractors to perform constructability review of project<br>Proper team in place | |
| 17 | Marketing | Risk | Lithium Spodumene price drops | Operations | Cost | Accept | Medium | High | High | Tantalex has engaged a third party to complete a market study for long term spodumene prices that will be used in the PEA OPEX. | |
| 18 | Political/Permitting | Risk | Major project scope changes result in difficulties to update government permits. | Pre-Execution | Schedule | Reduce/Control | Very Low | Very High | Low | Engage government entities as early as possible if a major scope change may occur. | Once a mining licence is issued, it is guided by the mining law. |
| 19 | Political/Permitting | Risk | ESIA not approved. | Pre-Execution | Schedule | Reduce/Control | Very Low | Very High | Low | Tantalex subcontracted third party (SRK) to secure timely process and ESIA content up to international standards and best practices | |
| 20 | Plant Design | Risk | Final product grade falls below 5wt% Li2O. | Operations | Cost | Reduce/Control | Low | Medium | Low | Additional test work planned in FS stage to confirm product specifications. | |
| 21 | Construction | Risk | Commissioning takes longer than scheduled | Construction | Schedule | Reduce/Control | Low | Low | Low | Commission planning during project development stages, prior to implementation. | |
| 22 | Operations | Risk | Plant start up takes longer than scheduled. | Operations | Schedule | Reduce/Control | Low | Medium | Low | Sart up planning during project development stages, prior to implementation. | |
| 23 | Plant Design | Risk | Water volume reclaimed by TSF pumps less than designed. | Operations | Cost | Reduce/Control | Low | Very Low | Very Low | There is plenty of accessible water at the project area. | |
| 24 | Mining | Risk | Around half (46%) of the mineral resources in K, Gc and Ic Dumps are categorized as "Inferred" which need to be improved to "Indicated". Conversion to Reserve. The grade in this area could be different from the indicated material. | Pre-Execution | Cost | Reduce/Control | High | High | High | implement additional drilling on K Coarse, Gc and Ic dumps | Discussions required with MSA. Revisit this item. |
| 25 | Processing | Risk | Secondary DMS assumptions need to be confirmed by testing on 2.85 cut SG | Pre-Execution | Cost | Reduce/Control | Medium | Medium | Medium | Test work results to be applied in phase 2 of PEA report | Pesco to complete the current test works on cut SG 2.65 and 2.85 for primary and secondary DMS respectively |
| 26 | Mining | Risk | Different characterization (granulometry & Li2O%) of K coarse and K fines material has not considered in current mining schedule | Pre-Execution | Cost | Reduce/Control | Low | High | Medium | Representative samples are being prepared.<br>Plan for additional drilling of the K coarse dump. | Bulk samples used in completed testing are from K fines, not K coarse.<br>Tantalex is preparing representative samples from both K fines and K coarse. |

## Risk Register

| Risk No. | Risk Area | Risk / Opportunity | Description | Timing | Impact | Action | Probability | Consequence | Risk | Mitigation Measure | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | Processing | Opportunity | Crushing and Tertiery DMS operation on the DMS Middlings | Pre-Execution | Cost | Capture | Medium | Medium | Medium | Include additional test works on DMS Middlings during FS. | |
| 28 | Mining | Opportunity | Optimising the Mining Schedule based on Geo-Metallurgical characterization (Li2O&Fe%, PSD, mineralogy,...) | Pre-Execution | Cost | Capture | Low | Medium | Low | A mine planning/design optimization can be added in MSA scope of services for FS | |
| 29 | Utilities | Opportunity | Using solar power to supplement some of the diesel requirements. | Operations | Cost | Capture | Low | Medium | Low | Investigate this option during next project stages. | Site climate conditions are overcast half the year and a solar system would not be efficient. |
| 30 | Logistics | Risk | Delay in shipping product due to rain events. | Operations | Cost | Reduce/Control | Low | Low | Low | Tantalex to upgrade road prior to plant operation. | Include 4 weeks of covered product storage on site. |
| 31 | Construction | Risk | Delay in importation of mechanical equipment to site. | Construction | Schedule | Reduce/Control | Low | Medium | Low | Early planning of import paperwork from point of origin. | |
| 32 | Construction | Risk | Hiring and training of local labour force. | Pre-Execution | Schedule | Reduce/Control | Medium | Medium | Medium | Select and work with a construction partner with experience in setting up local hiring and training to set up these programs in early stages. | |
| 33 | Construction | Risk | Dimension and mass limits for transport to site. (20 tonnes and 6m length). | Construction | Cost | Reduce/Control | Low | Low | Low | Trial build items before disassmbly for shipping and then reassemble at site. | |
| 34 | Mining | Opportunity | Include material from A to F dumps into the processing plant. | Operations | Cost | Capture | High | Very High | Very High | Additional drilling activities independent of FS. | Dump C, D & F has been drilled by MSA and is included in the MRE. |
| 35 | Processing | Opportunity | Pre-concentrate lower grade dump material before processing. | Operations | Cost | Capture | Medium | Medium | Medium | | |
| 36 | Mining | Risk | Dumps are located above Roche Dure resource. | Operations | Cost | Capture | Low | Very High | Medium | Mine plan starts on K dump and moving away from Roche Dure. | |
| 37 | Political/Permitting | Risk | Royalties increase to 6.5% | Operations | Cost | Accept | Medium | Very High | High | | |
| 38 | Logistics | Opportunity | The planned road upgrades between Lubumbashi and Manono will decrease transport costs. | Operations | Cost | Capture | Very High | Very High | Very High | A road survey to determine costs and scope of these upgrades is ongoing. Tantalex plans to implement these upgrades. | |
| 39 | Construction | Opportunity | Construction of the "DMS only option" to speed up time to first production | Construction | Cost | Capture | Very High | Very High | Very High | Include an investigation of this option in the FS. | |
| 40 | Construction | Opportunity | Due to increased activity in the Manono area, a much more cost-effective export route may become available in the next years. | Construction | Cost | Capture | High | Medium | High | Include an investigation of this option in the FS. | |
| 41 | Processing | Opportunity | Recent Pesco testwork show better results than were used for PEA calculation | Pre-Execution | Cost | Capture | High | High | High | Include an investigation of this option in the FS. | |
| 42 | Processing | Opportunity | Availibity of a second-hand DMS plant in DRC can speed up the plant construction | Construction | Cost | Capture | High | High | High | Include an investigation of this option in the FS. | |
| 43 | Processing | Opportunity | More cost-effective export route may become available in the next years, due to increased activity in the Manono area | Operations | Cost | Capture | High | Medium | High | Include an investigation of this option in the FS. | |
| 44 | Processing | Opportunity | Using Reflex Classifier for Mica removal instead of flotation | Pre-Execution | Cost | Capture | High | Medium | High | Include an investigation of this option in the FS. | |