
# Bulk Test Yields Very High Purity 99.95% Manganese Metal

## Highlights

- High Purity Electrolytic Manganese Metal ("HPEMM") produced at a purity of 99.95% manganese from Butcherbird Ore.
- All impurities were below acceptable limits for the production of metal.
- Leach test work utilising Butcherbird ore produced approximately 270 litres of leach solution containing approximately 44 g/L manganese.
- Element 25 proprietary process further confirmed as a pathway to high purity manganese production at Butcherbird.
- PQ Diamond Drilling underway to source approximately 6 tonnes of drill core for next stage of scale up test work.

Element 25 Limited ("E25" or "Company") is pleased to advise that bulk metallurgical test work conducted on four representative PQ diamond drill hole core samples from the Butcherbird High Purity Manganese Project has successfully produced High Purity Electrolytic Manganese Metal ("HPEMM") using the proprietary E25 flowsheet.

The tests were completed as part of a progressive scale up of the processing flowsheet developed in conjunction with the CSIRO for the purposes of extracting manganese from Butcherbird ores to produce high purity manganese ("HPM") including battery grade manganese sulphate and HPEMM. The work was completed as part of the ongoing Pre-Feasibility Study scheduled for completion in 2019.

Figure 1: High purity EMM flake.

## Company Snapshot

| | | | | |
|---|---|---|---|---|
| ASX Code: | E25 | Board of Directors: | | |
| Shares on Issue: | 84M | Seamus Cornelius | Chairman | |
| Share Price: | $0.17 | Justin Brown | ED | |
| Market Capitalisation: | $14.3M | John Ribbons | NED | |

Element 25 Limited is developing the world class Butcherbird manganese project in Western Australia to produce high purity manganese sulphate for lithium ion batteries and electrolytic manganese metal.

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The leaching and purification of the first bulk sample from Butcherbird ore is a key milestone in proving the viability of this industry leading processing methodology. In terms of purity, 99.95% Mn is well above the industry standard for EMM of 99.7% Mn.

Executive Director Justin Brown said "*These results are outstanding. To achieve such a high purity on our first attempt to scale up the flowsheet is remarkable and bodes well for the project's future*".

The success of the test work carried out to date further confirms the process flowsheet which is a key enabling technology for the Company's strategy of producing high value, high purity. Sustainably produced manganese products from the 100% owned Butcherbird Project.

The hydrometallurgical leach processing and purification was conducted on representative PQ diamond core from drill hole BBDD013, BBDD014 BBDD017 and BBDD018 from within the Yanneri Ridge resource area. The work was undertaken by Simulus Laboratories under the supervision of PPM Global Senior Metallurgist Mr Tim Porter.

Work will now turn to multiple large scale batch tests from approximately 6 tonnes of PQ diamond core currently being drilled to further optimise the process and to gain an understanding of any localised geometallurgical considerations that should be taken into account during process plant design.

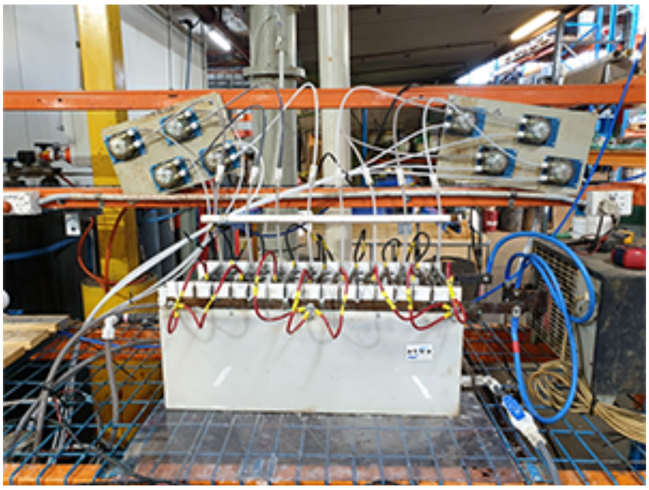

Figure 2: Electrowinning test rig at Simulus Laboratories.

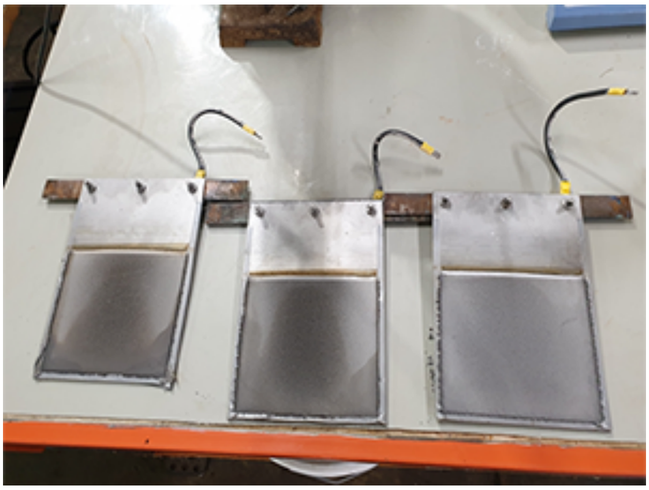

Figure 3: High Purity EMM plated onto the cathodes.

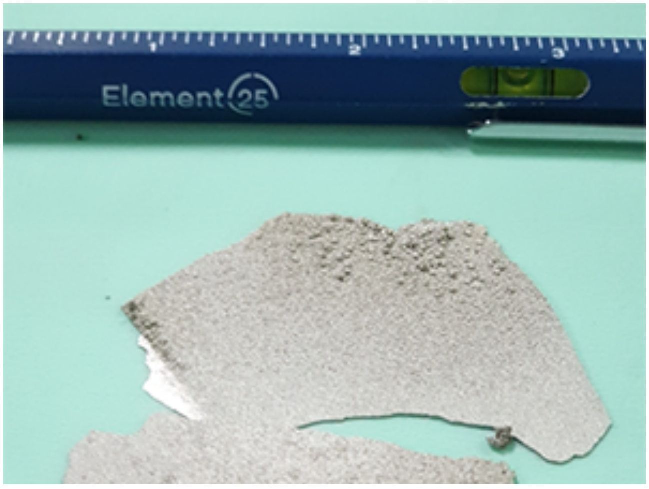


Figure 4: High Purity EMM flakes. 99.95% Mn.

The chemical composition of the produced EMM is shown in Table 1 and is based on impurity analysis.

| Element (ppm) | Beryllium | Boron | Sodium | Magnesium | Aluminium | Silicon | Phosphorous | Sulfur | Potassium | Calcium | Scandium |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Day 1** | < 0.01 | < 4.3 | 6.06 | 14.0 | < 7.9 | 266 | < 5.8 | 43.7 | 25.9 | < 7.4 | 0.700 |
| **Day 2** | < 0.01 | < 4.3 | 8.90 | 24.6 | < 7.9 | 284 | < 5.8 | 47.8 | 22.4 | < 7.4 | 0.577 |
| **Limit of Reporting** | 0.01 | 4.3 | 3.7 | 0.92 | 7.9 | 7.2 | 5.8 | 22 | 7.7 | 7.4 | 0.51 |
| **Element (ppm)** | **Titanium** | **Vanadium** | **Chromium** | **Manganese** | **Iron** | **Cobalt** | **Nickel** | **Copper** | **Zinc** | **Gallium** | **Germanium** |
| **Day 1** | < 0.85 | < 0.81 | 36.9 | n.d. | 7.94 | 7.99 | 9.75 | 5.53 | 5.11 | 0.054 | 0.168 |
| **Day 2** | < 0.85 | < 0.81 | 19.8 | n.d. | 4.33 | 6.76 | 5.64 | 2.54 | 2.76 | 0.041 | 0.388 |
| **Limit of Reporting** | 0.85 | 0.81 | 0.01 | 0.01 | 4.1 | 0.1 | 0.01 | 0.11 | 0.04 | 0.01 | 0.01 |
| **Element (ppm)** | **Arsenic** | **Selenium** | **Rubidium** | **Strontium** | **Yttrium** | **Zirconium** | **Niobium** | **Molybdenum** | **Cadmium** | **Indium** | **Tin** |
| **Day 1** | 2.68 | 20.4 | < 0.01 | < 0.01 | 0.079 | 0.364 | < 0.01 | 0.420 | 0.418 | < 0.01 | 0.062 |
| **Day 2** | 2.93 | 82.2 | < 0.01 | < 0.01 | 0.054 | 0.340 | < 0.01 | 0.292 | 0.377 | < 0.01 | 0.050 |
| **Limit of Reporting** | 0.04 | 0.16 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Element (ppm)** | **Antimony** | **Caesium** | **Barium** | **Lanthanum** | **Cerium** | **Praseodymium** | **Neodymium** | **Samarium** | **Europium** | **Gadolinium** | **Terbium** |
| **Day 1** | 0.134 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **Day 2** | 0.090 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| **Limit of Reporting** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Element (ppm)** | **Dysprosium** | **Holmium** | **Erbium** | **Thulium** | **Ytterbium** | **Lutetium** | **Hafnium** | **Tantalum** | **Mercury** | **Thallium** | **Lead** |
| **Day 1** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.033 | < 0.01 | 0.378 |
| **Day 2** | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | 0.014 | 0.164 |
| **Limit of Reporting** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **Element (ppm)** | **Bismuth** | **Thorium** | **Uranium** | | **TOTAL (ppm)** | **Mn (%)** | | | | | |
| **Day 1** | < 0.01 | < 0.01 | < 0.01 | | **455** | **99.95** | | | | | |
| **Day 2** | < 0.01 | < 0.01 | < 0.01 | | **517** | **99.95** | | | | | |
| **Limit of Reporting** | 0.01 | 0.01 | 0.01 | | | | | | | | |

Table 1: High Purity Electrolytic Manganese Metal composition. Plating was conducted over a two-day test programme with the metal composition from each day reported separately. Elements are reported in parts per million. Key impurities analysed by ICP-MS and manganese content is calculated (see Appendix 1 for details).

## About the Butcherbird High Purity Manganese Project

The Butcherbird High Purity Manganese Deposit is a world class manganese resource with current JORC resources in excess of 180Mt of manganese ore[1]. The Company has completed a positive scoping study with respect to developing the deposit to produce high purity manganese sulphate for lithium ion battery cathodes as well as High Purity Electrolytic Manganese Metal ("HPEMM") for use in certain specialty steels. A PFS is currently being completed and is expected to further confirm the commercial potential of the project.

The Butcherbird Project straddles the Great Northern Highway and the Goldfields Gas Pipeline providing turnkey logistics and energy solutions. The Company is also intending to integrate significant renewable energy into the power solution to minimise the carbon intensity of the project as well as further reducing energy costs.

## Mineral Resources

| Classification | Tonnes (Mt) | Grade Mn (%) |
|---|---|---|
| Indicated | 22.5 | 12.0 |
| Inferred | 158.3 | 10.6 |
| TOTAL | 180.8 | 10.8 |

Notes:

• Reported at 8% Mn cut-off

• All figures rounded to reflect the appropriate level of confidence (apparent differences may occur due to rounding)

Justin Brown

**Executive Director**

Company information, ASX announcements, investor presentations, corporate videos and other investor material in the Company's projects can be viewed at: http://www.element25.com.au.

[1] Reference: Company ASX release dated 12 October 2017 (released under the Company's previous ticker MZM)

## Competent Persons Statement

The information in this report that relates to Exploration Results, Exploration Targets, Mineral Resources and Mineral Reserves is based on information compiled by Mr Justin Brown who is a member of the Australasian Institute of Mining and Metallurgy. At the time that the Exploration Results, Exploration Targets, Mineral Resources and Mineral Reserves were compiled, Mr Brown was an employee of Element 25 Limited. Mr Brown is a geologist and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Brown consents to the inclusion of this information in the form and context in which it appears in this report

Please note with regard to exploration targets, the potential quantity and grade is conceptual in nature, that there has been insufficient exploration to define a Mineral Resource and that it is uncertain if further exploration will result in the determination of a Mineral Resource.

The information in this report that relates to Mineral Resources is based on information announced to the ASX on 12 October 2017. Element 25 Limited confirms that it is not aware of any new information or data that materially affects the information included in the relevant market announcements, and that all material assumptions and technical parameters underpinning the estimates in the relevant market announcements continue to apply and have not materially changed.

# Appendix 1 - JORC Code, 2012 Edition – Table 1 – Butcherbird Project Hydrometallurgical Test Work

## Section 1 Sampling Techniques and Data

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| ***Sampling techniques*** | • *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.*<br>• *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.*<br>• *Aspects of the determination of mineralisation that are Material to the Public Report.*<br>• *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems.* | • The samples for metallurgical test work were selected from contiguous lengths of core in drillholes BBDD013, BBDD014 BBDD017 and BBDD018 that were considered to be typical in character to the bulk of the ore zones at Yanneri Ridge.<br>• Whole PQ diamond core was used to maximise the volume of sample.<br>• The samples were then beneficiated using a rotary drum scrubber. |
| ***Drilling techniques*** | • *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).* | • A Diamond Drill Rig was used for the metallurgical program with PQ sized core (85mm diameter).<br>• Drilling was triple tube. |
| ***Drill sample recovery*** | • *Method of recording and assessing core and chip sample recoveries and results assessed.*<br>• *Measures taken to maximise sample recovery and ensure representative nature of the samples.*<br>• *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.* | • Recoveries are noted at the time of drilling and recorded in the MZM database.<br>• Triple tubing was used to maximise ore recovery.<br>• Close to 100% of core was recovered. |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| ***Logging*** | • *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.*<br>• *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.*<br>• *The total length and percentage of the relevant intersections logged.* | • All samples have been logged to a level of detail to support the mineral resource estimations.<br>• Qualitative: Lithology, alteration, mineralisation.<br>• The entire length of the hole is geologically logged.<br>• All drill core is photographed. |
| ***Sub-sampling techniques and sample preparation*** | • *If core, whether cut or sawn and whether quarter, half or all core taken.*<br>• *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.*<br>• *For all sample types, the nature, quality and appropriateness of the sample preparation technique.*<br>• *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.*<br>• *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.*<br>• *Whether sample sizes are appropriate to the grain size of the material being sampled.* | • All hydro-metallurgy samples are prepared at the Simulus Engineers' laboratory located in Welshpool W.A..<br>• The initial beneficiated ore sample material is further prepared using simple physical separation techniques including size reduction an scrubbing.<br>• Sample sizes are considered appropriate for the nature of the test work. |
| ***Quality of assay data and laboratory tests*** | • *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.*<br>• *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.*<br>• *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.* | • The EMM samples were assayed at the TSW Analytical Pty Ltd laboratory.<br>• The sample (0.25g) was accurately weighed into Teflon beakers then digested in hydrochloric acid solution (2mL, 32%wt), once the metal had dissolved the digestate was taken to incipient dryness. The residue was then dissolved in a nitric acid solution (25mL, 5%v/v), then suitably diluted for ICP-AES and ICP-MS analysis<br>• The samples have been assayed for Beryllium, Boron, Sodium, Magnesium, Aluminium, Silicon, Phosphorous, Sulfur, Potassium, Calcium, Scandium, Titanium, Vanadium, Chromium, Manganese, Iron, Cobalt, Nickel, Copper, Zinc, Gallium, Germanium, Arsenic, Selenium, Rubidium, Strontium, Yttrium, Zirconium, Niobium, Molybdenum, Cadmium, Indium, Tin, Antinomy, Caesium, Barium, Lanthanum, Cerium, Praseodymium, Neodymium, Samarium, Europium, Gadolinium, Terbium, |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| | | Dysprosium, Holmium, Erbium, Thulium, Ytterbium, Lutetium, Hafnium, Tantalum, Mercury, Thallium, Lead, Bismuth, Thorium, Uranium |
| ***Verification of sampling and assaying*** | • *The verification of significant intersections by either independent or alternative company personnel.*<br>• *The use of twinned holes.*<br>• *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* | • All data has been checked for accuracy by TSW Analytical staff.<br>• No adjustments have been made to assay data. |
| ***Location of data points*** | • *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.*<br>• *Specification of the grid system used.*<br>• *Quality and adequacy of topographic control.* | • All collar coordinates were collected using differential GPS in MGA 94 – Zone 51. |
| ***Data spacing and distribution*** | • *Data spacing for reporting of Exploration Results.*<br>• *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.*<br>• *Whether sample compositing has been applied.* | • The metallurgical test work drill holes were selected based on representivity of the Yanneri Ridge Orebody.<br>• The samples were composited to produce a bulk sample. |
| ***Orientation of data in relation to geological structure*** | • *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.*<br>• *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.* | • All drill holes are drilled vertically as the stratigraphy is generally sub-horizontal.<br>• There is no known sample biasing. |
| ***Sample security*** | • *The measures taken to ensure sample security.* | • NA |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| ***Audits or reviews*** | • *The results of any audits or reviews of sampling techniques and data.* | • The data and sampling techniques are reviewed internally. |

## Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| ***Mineral tenement and land tenure status*** | • *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.*<br>• *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.* | • The Butcherbird Project consists of granted exploration license E52/2350 and Mining Lease Application M52/1074.<br>• The tenure is 100% owned by Element 25 Ltd. |
| ***Exploration done by other parties*** | • *Acknowledgment and appraisal of exploration by other parties.* | • The historical exploration data has been collected by Element 25 Limited and has been reported to high standards.<br>• The methods of exploration and techniques used are considered appropriate for the deposit types sought (Mn) |
| ***Geology*** | • *Deposit type, geological setting and style of mineralisation.* | • Butcherbird is a stratiform sedimentary manganese deposit.<br>• The deposits are hosted within the Ilgarari Formation which is generally flat lying with gentle open folding in places.<br>• The manganese mineralisation within the ore zones is divided into three |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| | | distinctive units – a high grade manganiferous cap, supergene enriched manganiferous laterite and basal shale. |
| ***Drill hole Information*** | • *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:*<br>○ *easting and northing of the drill hole collar*<br>○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar*<br>○ *dip and azimuth of the hole*<br>○ *down hole length and interception depth*<br>○ *hole length.* | • See historical ASX releases regarding the Butcherbird Mineral Resources. |
| ***Data aggregation methods*** | • *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.*<br>• *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.*<br>• *The assumptions used for any reporting of metal equivalent values should be clearly stated.* | • NA |
| ***Relationship between mineralisatio n widths and*** | • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.*<br>• *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').* | • The mineralisation is flat lying, the drilling is vertical and the intersections are true width. |

| Criteria | JORC Code explanation | Commentary |
|---|---|---|
| ***intercept lengths*** | | |
| ***Diagrams*** | • *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.* | • NA |
| ***Balanced reporting*** | • *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.* | • NA |
| ***Other substantive exploration data*** | • *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.* | • NA |
| ***Further work*** | • *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).*<br>• *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.* | • The next phase of work will focus on finalising a processing flowsheet, and potential pilot plant and mining feasibility studies. |