ASX Announcement
13 October 2021

PFS METALLURGICAL TESTWORK UPDATE

Highlights

- Results obtained to date from current metallurgical testwork program are consistent with the process inputs adopted in the Walford Creek Scoping Study (June 2021).
- Firming up of process operating conditions has allowed equipment selection decisions to be made in conjunction with preliminary plant layouts.
- More detailed estimation of capital and operating costs is currently underway.
- Walford Creek PFS remains on track for completion in Q1 CY2022.

Aeon Metals Limited (ASX: AML) (**Aeon** or the **Company**) is pleased to provide an update on the progress of the metallurgical and process workstreams of the Pre-Feasibility Study (**PFS**) being undertaken on its Walford Creek Copper-Cobalt Project (**Walford Creek Project**) in northwest Queensland.

On 30 June 2021, Aeon announced the completion of a Scoping Study on the Walford Creek Project which highlighted the potential to develop a long life, major mining project focussed on producing a portfolio of battery metals headed by copper and cobalt. In the period since this announcement, Aeon has substantially advanced the metallurgical testwork confirming the proposed flowsheet consisting of bulk sulphide flotation followed by pressure oxidative leaching.

Central to the goal of completing a major metallurgical testwork program was the requirement to collect further samples representative of the feed types that would be treated by the new flowsheet. This drilling program, using larger diameter HQ core, is now nearing completion. A total of six new feed composites, in conjunction with two previously available ones, are set to form the basis of the final metallurgical testwork program.

The metallurgical testwork has focussed broadly on five key areas initially. These are:

1. Optimisation of primary grinding to achieve adequate metal sulphides liberation.
2. Optimisation of the bulk sulphide flotation to maximise metal sulphides recovery.
3. Optimisation of bulk sulphide concentrate leaching conditions to maximise metal extractions into the pregnant leach solution.
4. Sighter testwork to identify the preferred process option for undertaking solid/liquid separation of the leach residue solids from the pregnant leach solution.

The primary grind and flotation testwork has been undertaken at ALS Burnie Laboratory under the direction of Dr Greg Harbort from Geometecon.

The hydrometallurgy testwork has been undertaken in the ALS Perth laboratory under the direction of Mr Bruce Wedderburn from Malachite Consulting.

The majority of the preliminary testwork has been undertaken using two feed composites representing the previously identified major feed types:

- Copper-cobalt rich; and
- Zinc-lead rich.

The copper-cobalt rich composite was sourced predominantly from samples within the Marley Py3 area of the deposit and assayed 1.9% Cu, 0.3% Co, 0.26% Zn, 30 g/t Ag and 25% S. The zinc-lead rich composite was also predominantly sourced from samples within the Marley Py3 area of the deposit and assayed 0.5% Cu, 0.1% Co, 1.5% Zn, 41 g/t Ag and 25% S. These composites represent the assay extremes for the range of all feed types.

Oxide and Transitional Ore

The initial open cut mining consists of both oxide and transitional (partially oxidised) feed types. As is generally the case, the flotation performance of these types is both variable and limited, typically yielding lower metal recoveries than unoxidised ore. Given their substantial presence in the initial plant feed and their limited abundance overall, it is simpler and more convenient to bypass the flotation upgrading step and to send this material directly to the leach circuit. This approach delivers the maximum metal recoveries from these feed types since, while they float poorly, they leach readily. Also, because this material is essentially the first plant feed mined, it allows the circuit commissioning to be simplified and ensures that the initial flotation circuit optimisation during commissioning can be undertaken on material that will perform appropriately.

The new flowsheet provides a significant metallurgical benefit in this instance. Flowsheets relying on flotation as the final upgrading step typically experience recovery challenges when treating these feed types. Since the final upgrading step at Walford Creek Project is leaching, this risk can be largely circumvented by bypassing flotation and undertaking a direct whole-of-ore leach.

Primary Grinding

This flowsheet section remains materially the same as that previously proposed – a conventional grinding circuit consisting of a SAG mill followed by a ball mill. Under a selective flotation approach, the optimum grind size was determined to be 50 µm. Under a bulk flotation approach, the optimum flotation feed is much coarser at 150 µm. The coarser grind size reflects the requirement only to liberate metal sulphides from non-sulphide gangue, rather than the more demanding objective of separating individual metal sulphides from each other as well as the non-sulphide gangue. This simplification results in substantially reduced capital and operating costs in the grinding process.

Bulk Sulphide Flotation Optimisation

This flowsheet section also remains materially the same as that previously proposed – a conventional flotation circuit consisting of rougher and scavenger stages, a regrind circuit for grinding of scavenger concentrate, and a cleaner circuit to upgrade the ground scavenger concentrate.

The objective of the flotation circuit is to maximise the recovery of metal sulphides while rejecting as much non-sulphide gangue as possible. As a result, longer flotation residence times and a stronger collector have proved more effective.

Compared to selective flotation, the pilot plant rougher flotation residence time was increased to approximately 90 minutes to accommodate slightly slower kinetics arising from the coarser flotation feed. To maximise performance, a scavenging stage of approximately 120 minutes residence time was incorporated followed by a cleaner stage to upgrade scavenger concentrate. Regrinding of scavenger concentrate to nominally 20 µm resulted in a 5% reduction in mass produced at equivalent recoveries without regrind.

The bulk flotation circuit was optimised using potassium amyl xanthate. Copper sulphate was used to activate pyrite.

Flotation recoveries achieved were typically in the range:

- Copper 95 to 97%
- Zinc 93 to 95%
- Lead 94 to 96%
- Cobalt 85 to 88%
- Nickel 86 to 89%
- Silver 89 to 91%
- Sulphur 92 to 94%

Sulphide Concentrate Leaching Optimisation

The polymetallic Walford Creek bulk sulphide concentrate exhibits a high pyrite content, typically ranging between 50% and 60%. In autoclave leaching, this bulk sulphide concentrate is oxidised in order to extract the payable metals into solution. Leaching optimisation involves maximising valuable metal extractions while minimising the level of oxidation required.

The pressure oxidative leach in an autoclave involves the addition of oxygen to the bulk sulphide concentrate slurry under elevated pressure and temperature. The oxygen oxidises the sulphide minerals, thus releasing the payable metals, namely copper, zinc, cobalt and nickel into the pregnant leach solution.

In addition to the oxidation of payable metal sulphides, a substantial portion of the oxygen is consumed in pyrite oxidation (FeS_2) which produces ferrous sulphate and sulphuric acid:

$$2\ FeS_2(s) + 7\ O_2(g) + 2\ H_2O(l) <=> 2\ FeSO_4(aq) + 2\ H_2SO_4(aq)$$

The oxidation of pyrite is exothermic and will result in large quantities of sulphuric acid and iron sulphate being formed if not controlled. The metallurgical testwork has focussed on minimising pyrite oxidation into a range between 25% and 35%. Any reactive gangue minerals present, such as magnesium carbonates, will also consume the acid formed. In the target range of partial oxidation, the sulphide oxidation reactions generate sufficient acid to leach a substantial portion of the payable metals and react with the reactive gangue minerals. As a result, there is no need to add acid to leach the payable metals.

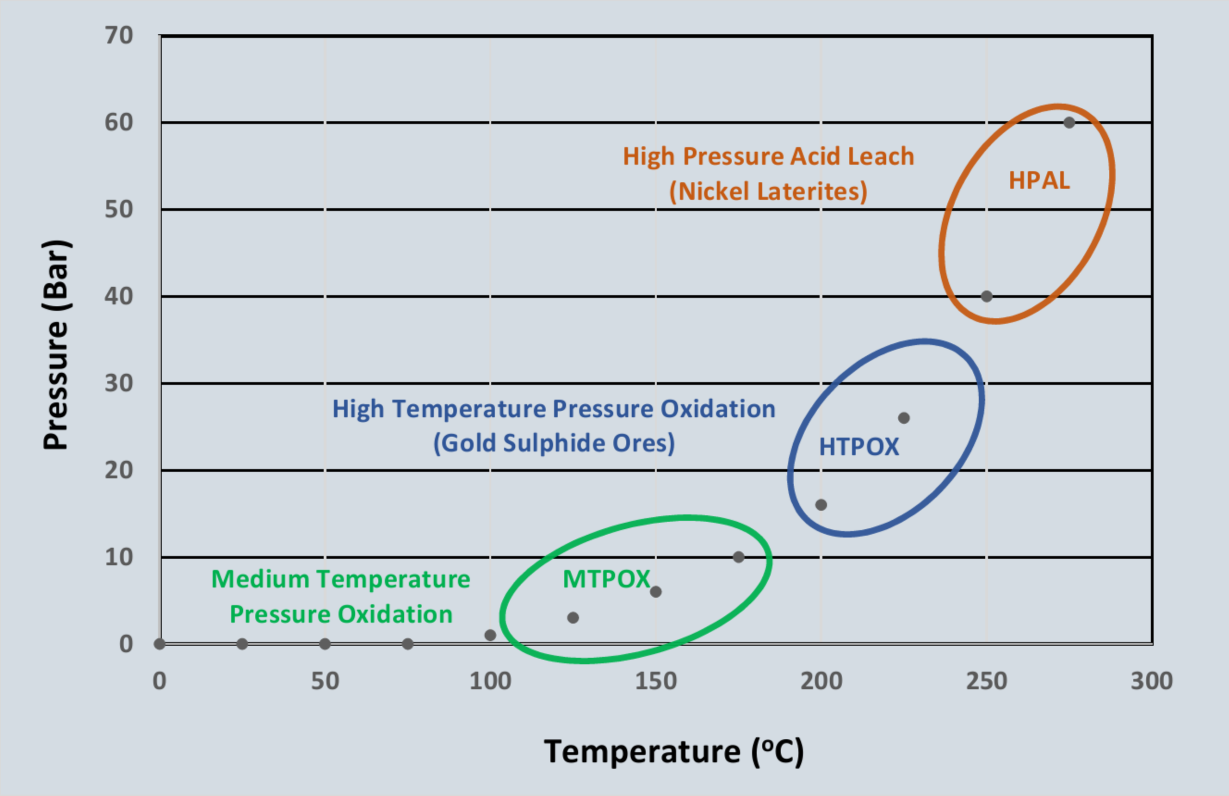
The pre-leaching of gangue minerals in an atmospheric leach process, prior to pressure oxidation, removes most of the carbonates. If this were to occur within the autoclave, the build-up of CO_2 in the vapour space would result in high vent losses, which would adversely impact oxygen utilisation efficiency.

The process for pressure oxidation leaching of the sulphide concentrates, as being developed for Walford Creek, is at the low-end range for autoclave temperature and pressure used across industry. Both gold sulphide ore pressure leaching and nickel laterite ore high pressure acid leaching (HPAL) require significantly higher temperatures and pressures to achieve acceptable payable metal extractions. This lower operating pressure for Walford Creek concentrate oxidation significantly reduces the pressure autoclave engineering and maintenance requirements compared toother applications.

The Walford Creek bulk sulphide concentrates are not typical since they possess such a high pyrite content. The leach optimisation testwork has therefore delivered some impressive results that might have potential for wider industry application. Key elements of the results include:

- a relatively coarse feed grind size;
- an atmospheric pre-leach to remove reactive carbonates;
- the selection of a medium temperature pressure leaching process (MTPox); and
- only partial oxidation of the pyrite present.

Figure 1: Indicative pressure and temperature requirements for various leaching processes



The testwork completed to date comprises 6 atmospheric leach tests, 30 batch sighter pressure oxidation tests and 7 batch continuous pressure oxidation tests. These tests have been undertaken on two bulk concentrates, comprising a copper-cobalt rich and a lead-zinc rich concentrate.

A further six bulk concentrates which have been sourced from samples collected during the recent site drilling program are currently under preparation at ALS in Burnie, Tasmania. It is anticipated that pressure oxidation leach testwork on these concentrates will commence in November 2021. The aim of this extensive suite of tests is to confirm the optimum conditions which were derived from the initial composites that represented the expected extremes in composition for autoclave feed, and to generate sufficient leach residue and pregnant leach solution for downstream testwork.

The most significant outcome of the testwork completed to date is the ability to achieve high payable metal recoveries whilst minimising pyrite oxidation to between 25% and 35%. This has significantly reduced the oxygen and limestone (used for acid neutralisation post leach) requirements and therefore operating costs.

The payable metal extractions achieved were typically in the range:

- Copper 95 to 97%
- Zinc 97 to 99%
- Cobalt 80 to 85%
- Nickel 80 to 85%

Opportunities for further increasing cobalt and nickel extraction have been identified and the next round of testwork will explore these.

The testwork has also achieved a clean separation of the lead and silver. Both metals report overwhelmingly to the leach solids residue. The testwork to explore extraction of these metals is expected to commence in November 2021 once sufficient quantities of autoclave residue are accumulated.

Downstream Processing

Following pressure oxidation, several options for processing the autoclave discharge slurry are currently being evaluated:

a) Iron, arsenic and other minor impurity element removal;

b) Solid liquid separation using pressure filtration;

c) Thickening testwork for a conventional Counter Current Decantation (CCD) process for solid liquid separation and washing of the solids; and

d) Resin-in-pulp process for the extraction of the payable metals from the slurry.

Leach Solids Residue Treatment

Following the recovery of the copper, zinc, cobalt and nickel from the autoclave discharge slurry, the solids residue containing mainly unreacted pyrite, elemental sulphur, lead and silver is to be subjected to a testwork program to evaluate the potential for recovery of either a lead-silver flotation concentrate or silver-only via leaching.

After the testwork for the recovery of the lead and silver, the neutralised tailings are to be tested to establish their suitability for generating paste backfill for the mining operations. The balance of the tailings would be sent to the tailings dam.

Testwork on the tailings plus lead and silver recovery is scheduled to commence in October 2021.

Metals Refining

The testwork on the recovery and purification of copper, zinc, nickel and cobalt, prior to saleable product production, is scheduled to commence in November 2021.

Pre-Feasibility Study (PFS) Engineering

The PFS engineering and equipment costing is underway and is focussed on sections of the process plant where the process design parameters have been defined, including:

a) Comminution and flotation circuits.

b) The atmospheric pre-leach and pressure oxidation circuit, together with the associated process equipment.

c) The copper electrowinning and materials handling system.

d) The crystalliser design packages for:

   a. Zinc sulphate hexahydrate (possible alternative to producing zinc ingots);

   b. Cobalt sulphate heptahydrate; and

   c. Nickel sulphate hexahydrate.

e) The oxygen plant selection and design, including options for oxygen supply.

Based on the initial testwork and process modelling using SysCad software, the preliminary autoclave sizing has been completed. The process is expected to require two autoclaves operating in parallel, approximately 30m in length and 5.2m in diameter. This compares favourably with the nickel laterite HPAL autoclaves which are typically much larger, up to 37m in length and 5.7m in diameter.

The autoclave productivity in terms of tonnes processed is similar to nickel laterite HPAL operations, however the payable metal content in the bulk sulphide feed is typically up to 300% higher. The payable metal throughput per autoclave is therefore significantly higher than for nickel laterite ores.

As the testwork advances and additional sections of the process flowsheet are firmed up, further PFS engineering is planned to be undertaken.

Conclusions

Results obtained to date from the current metallurgical testwork program are consistent with the process inputs adopted in the Walford Creek Scoping Study (June 2021). The firming up of process operating conditions has allowed equipment selection decisions to be made in conjunction with preliminary plant layouts. The more detailed estimation of capital and operating costs is currently underway.

The PFS remains on track for completion in Q1 CY2022.

Next Steps

Following the initial sighter testwork for the entire process flowsheet, a pilot plant will be set up to further establish the process at a larger scale. The pilot plant trials are scheduled to commence in H1 CY2022 once the process operating parameters and detailed process flowsheet have been defined.

This ASX release has been authorised by the Aeon Board:

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ABOUT AEON METALS

Aeon Metals Limited (**Aeon**) is an Australian based mineral exploration and development company listed on the Australian Securities Exchange (ASX: AML). Aeon holds a 100% ownership interest in the Walford Creek Copper-Cobalt Project (**Walford Creek Project**) located in north-west Queensland, approximately 340km to the north north-west of Mount Isa.

A Pre-Feasibility Study on the Walford Creek Project is targeted for completion in Q1 2022.