



## QUARTERLY REPORT TO 30 JUNE 2016

### HIGHLIGHTS

- The Newcastle Zinc & Iron Recovery Plant (NZIRP) is designed to recycle the by-products from the steel and galvanising industries in the Sydney region (EAF dust, mill scale and iron- and zinc- rich chloride liquors) and recover pig iron, hydrochloric acid (HCl) and zinc. An in-depth due diligence review of the chloride-based zinc recovery process being considered indicated there would be challenges and significant costs involved in its commercialisation. Therefore during the current quarter Austpac closely examined alternative processes and has now incorporated proven and commercially-used zinc recovery technology into a modified NZIRP flowsheet. This removes technical risk and will improve the reliability and viability of the Plant.
- Costs for the additional equipment required for the zinc recovery section of the NZIRP have been obtained from both local and offshore suppliers, and overall capital and operating costs of the Plant are being refined. The modified plant, which predominantly uses EAFD as feedstock together with mill scale and SPL, will produce 6,300 tpa of zinc, 6,150 tpa of pig iron, and 9,500 tpa of HCl in an economically robust project.
- During the quarter, Austpac continued to advance negotiations with a group of influential companies in the USA who recognise that Austpac's technologies create an immediate opportunity to recycle some of the hundreds of thousands of tonnes of EAF dust produced each year by the US steel industry. Over 60% of the 87 million tonnes of steel produced in the country is from electric furnaces. The parties intend to sign an agreement to exploit Austpac's technology in the USA, which will provide funding for a testwork and engineering program at Newcastle and lead to a feasibility study for commercial zinc-iron-HCl recovery plant in North America. The group has been awaiting confirmation from Austpac that the zinc recovery technology is viable, and we now plan to jointly develop a preliminary economic model for plants sited in the steel producing areas of the north-east of the country.
- During the quarter, negotiations were progressed and a licence and investment agreement is nearing completion to enable a company with a significant heavy mineral resource in Asia to use the ERMS SR synrutile process. The company plans to beneficiate the heavy minerals and produce ilmenite, rutile and zircon. It also plans to add value to the ilmenite by producing high grade synrutile which it proposes to sell as feedstock for the titanium sponge industry.
- Austpac continued the assessment of alternative sources of project capital for the NZIRP, which includes negotiations entered into with both Australian and US finance houses.
- In June 2016, Austpac was awarded a grant by the Department of Energy and Earth Resources under the Victorian Government's TARGET initiative to co-fund a geophysical and drilling program at Nhill (EL 5291). This work will be undertaken during the second half of 2016 and the first half of 2017.

## **NEWCASTLE ZINC & IRON RECOVERY PLANT**

Primary steel is produced from iron ore by using a blast furnace (BF) and basic oxygen furnace (BOF). The fine dust emitted from these furnaces contains predominantly iron oxide with some minor contaminants, including zinc. The Newcastle Iron Recovery Plant (NIRP) was originally designed to process these dusts by combining them with mill scale from steel milling and spent pickle liquor (SPL) from steel pickling operations. Prior to 2010, Austpac undertook extensive testwork on BF and BOF dusts and produced iron pellets with very low contaminants and strong HCl. The zinc was removed from the iron during the final reduction stage of the process and captured as zinc oxide.

Steel can also be produced by melting iron scrap or direct reduced iron in an electric arc furnace (EAF). Iron scrap generally contains other metals, including between 15% and 40% Zn. The zinc is derived from galvanised iron and occurs as zinc oxides and other zinc minerals in the dust. EAF dust (EAFD) is classified as a hazardous waste, which is difficult to recycle, and is often disposed of in landfills. Austpac also tested high-zinc EAFD in the pilot plant at Newcastle, and while zinc was removed during the reduction stage and a marketable iron pellet was produced, it was not possible to separate the zinc oxide from the carbon in the reduction roaster off-gas stream and produce a saleable product. Hence while recognising that EAFD was a significant zinc resource, as it could not be economically recovered Austpac focused on using mill scale and BF and BOF dusts as feed for the NIRP.

In mid-2015, Austpac was introduced to a membrane/electrolysis process that produced zinc metal and HCl from zinc chloride solutions (e.g. spent galvanising pickle liquor). Austpac's process regenerates HCl from iron chloride-rich SPL, and as the second fluid bed reduction stage in the NIRP was being replaced with an induction furnace, it would be possible to capture the zinc oxide in the furnace off-gas by scrubbing with HCl to produce zinc chloride liquor. It was therefore decided to investigate the feasibility of integrating the membrane/electrolysis process with Austpac's process so that a modified Newcastle plant could process EAFD and produce zinc metal, pig iron and strong HCl (the Newcastle Zinc & Iron Recovery Plant, or "NZIRP").

During the latter half of 2015, Austpac modified the flowsheet and then developed a mass and energy balance to derive inputs and outputs for the NZIRP, and it was clear that the production of zinc significantly improved the economics of the Plant. During the first quarter of 2016, Austpac undertook detailed due diligence and consulted with recognised hydrometallurgical experts regarding the use of the membrane/electrolysis process. It was concluded that the additional equipment required to simultaneously produce zinc and HCl added significantly to the capital cost, and the risk involved in pioneering a new technology was high. While it is technically feasible to recover zinc metal from zinc chloride liquors using electrolysis, it has never been undertaken commercially and therefore has scale-up risk. Zinc is currently produced in refineries worldwide using electrolysis of zinc sulfate liquors.

During the current quarter, Austpac decided to modify existing and proven technology to recover zinc and incorporate this into the NZIRP flowsheet. The additional equipment required for this modification is significantly less than that required for chloride electrolysis, and as costs had been obtained for the liquor purification and electrolysis sections, they are being used to estimate preliminary costs for the modified NZIRP. Assuming that modified plant predominantly uses EAFD as feedstock together with SPL from the steel pickling operations, preliminary estimates indicate the Plant will produce 6,300 tpa of zinc, 6,150 tpa of pig iron, and 9,500 tpa of HCl in an economically robust project.

The latest Plant modifications which use proven technology to recover iron zinc and HCl reduces the process risk and improves Plant reliability. Consideration is being given to patenting the new concept developed to process EAFD at the NZIRP, because the use of pyrometallurgy to produce iron and HCl together with hydrometallurgy to recover zinc in a novel, purpose-designed plant is unique.

## **ONGOING DEVELOPMENTS IN THE USA**

During the quarter, Austpac continued to advance negotiations with a group of influential companies in the USA who recognise that Austpac's technologies create an immediate opportunity to recycle some of the hundreds of thousands of tonnes of EAFD produced each year by the US steel industry. Over 60% of the 87 million tonnes of steel produced in the country is from electric furnaces. The parties intend to sign an agreement to exploit Austpac's technology in the USA, which will provide funding for a testwork and engineering program at

Newcastle and lead to a feasibility study for commercial zinc-iron-HCl recovery plant in North America. The group has been awaiting confirmation from Austpac that the zinc recovery technology is viable, and we now plan to jointly develop a preliminary economic model for plants sited in the steel producing areas of the north-east of the country.

Austpac believes this initiative is an important advance for the Company and the potential for a novel technology to process EAFD and recover zinc, iron and HCl from steel industry wastes in the USA is significant.

### **ERMS SR SYNRTILE TECHNOLOGY LICENCE**

Austpac reported in the last Quarterly that it had been approached by a company with a significant heavy mineral resource in Asia regarding the ERMS SR synrutile process and was discussing terms for the use of Austpac's technology.

During the current quarter discussions have significantly advanced. The company plans to develop a mine and a mineral separation plant to produce ilmenite, rutile and zircon, and is seeking technology to add value to the ilmenite. Negotiations are nearing completion on the terms of a licence to use the ERMS SR process in a plant to beneficiate the ilmenite and produce high grade synrutile. The company proposes to sell the synrutile for use as feedstock for the production of titanium sponge, an intermediate process in the manufacture of titanium metal. On conclusion of the agreement the company plans to undertake a scoping study followed by a bankable feasibility study, and it will establish an entity to manage the construction and operation of an ERMS SR Plant.

The licence agreement is awaiting the final approval from the company's board and until the agreement is signed the commercial terms of the licence remain confidential.

### **EL 5291 NHILL**

Austpac has been awarded a grant by the Department of Energy and Earth Resources under the Victorian Government's TARGET initiative to co-fund a geophysical and drilling program at Nhill (EL 5291). The first stage of the program comprises magnetic and gravity surveys to define a target generated during Austpac's earlier work at Nhill. This will be followed with a deep drill hole through over 100 metres of younger Murray Basin sediments to obtain core from deep within the basement to test for porphyry copper-gold and volcanic-hosted massive sulphide systems.

The work will be undertaken during the second half of 2016 and the first half of 2017.

### **Mining Exploration Entities:**

EL 5291 (Nhill); Located between Nhill and Dimboola, Victoria; 100% Austpac Resources N.L.

### **For further information please contact:**

Mike Turbott

Managing Director - Tel (+61 2) 9252 2599

*NOTE: This report is based on and accurately reflects information compiled by M.J. Turbott who is a Fellow of the Australasian Institute of Mining and Metallurgy and a Fellow of the Australian Institute of Geoscientists and is a competent person as defined in the Australian Code for Reporting of Identified Mineral Resources and Ore Reserves.*

### **About Austpac Resources N.L. (ASX code: APG)**

Austpac Resources N.L. [[www.austpacresources.com](http://www.austpacresources.com)] is a minerals technology company currently focused on recycling waste chloride solutions and iron oxides produced by steelmaking to recover hydrochloric acid and iron metal. Austpac's technologies also transform ilmenite into high grade synthetic rutile, a preferred feedstock for titanium metal and titanium dioxide pigment production. The Company has been listed on the Australian Stock Exchange since 1986.