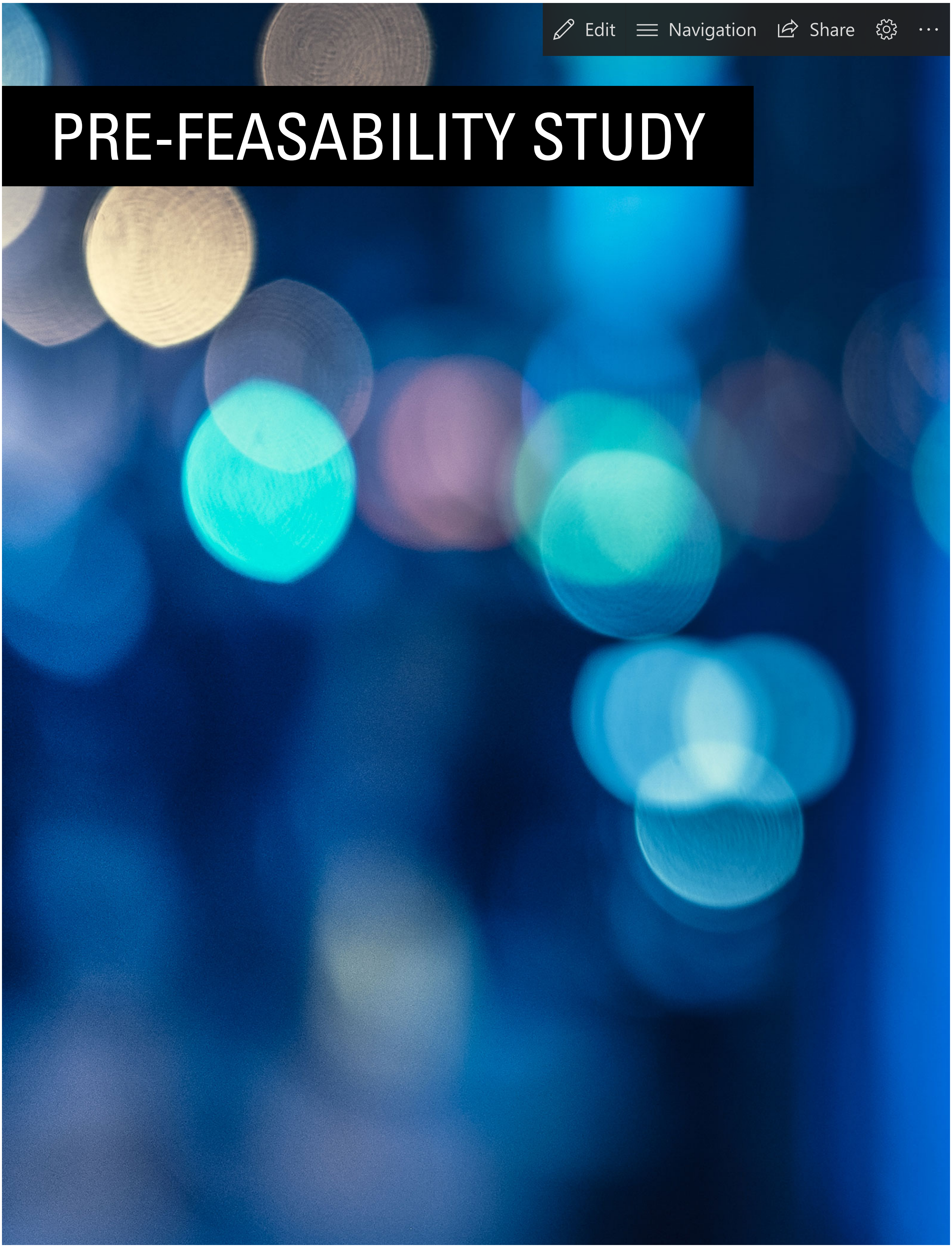

PRE-FEASABILITY STUDY

Glossary of Terms

AHT: Anchor-Handling Tug

AHV: Anchor Handling Vessel

BFS: Bankable Feasibility Study

BML: Below Mud Line

CAPEX: Capital Expenditure

CD: Constant Density

CMA: Crown`s Minerals Act 1991

CMS: Cleaner Magnetic Separation

DEME: Dredging, Environmental and Marine Engineering Limited

DTM: Decision to Mine

DTR/DTC: Davis Tube Recovery

DTW: Davis Tube Wash

EEZA: Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012

FMP: Flow Moisture Point

FOOS: First Ore on Ship

FPSO: Floating Production, Storage and Offloading Vessel

FSO: Floating Storage and Offloading Vessel

HAZOP: Hazard and Operability Study

HFO: Heavy Fuel Oil

HPF: Hyperbaric Pressure Filter

IMS: Intermediate Magnetic Separation

IMS: Intermediate Magnetic Separators

ITP: Inspection and Test Plan

JORC: Joint Ore Reserves Committee Code

LARS: Launch and Recovery System (for SMT)

LIMS: Low Intensity Magnetic Separator

MIMS: Medium Intensity Magnetic Separator

MCC: Motor Control Centre

NPV: Net Present Value

NZDS: New Zealand Diving and Salvage Limited

OGV: Ocean Going Vessel

OPEX: Operating Expenditure

PFD: Process Flow Diagram

PFS: Preliminary Feasibility Study

PID: Piping and Instrumentation Diagram

PSD: Particle Size Distribution

QEMSCAN: Quantitative Evaluation of Minerals by Scanning Electron Microscopy

RAS: Replenishment at Sea

RFQ: Request for Quotation

RMA: Resource Management Act 1991

RMS: Rougher Magnetic Separation

RO: Reverse Osmosis

ROM: Run Of Mine

RORO: Roll on roll off

SAL: Single Anchor Leg

SMT: Seafloor Mining Tool

SOLAS: Safety of Life at Sea

SONAR: Sound Navigation and Ranging

SOP`s: Standard Operating Procedures

SSED: Submerged Sediment Extraction Device or Crawler

TSHD: Trailer Suction Hopper Dredge

TTRL: Trans-Tasman Resources Limited

VTM: Vanadium Titano-magnetite

VTS: Vertical Transport System (ROM Hoses to SMT)

WBS: Work Breakdown Structure

STB: South Taranaki Bight

SSC: Suspended Sand Concentration

SSED: Submerged Sediment Extraction Device

The technical and financial evaluation in this Preliminary Feasibility Study ("PFS") has concluded, based on the information currently available, that the project is economically viable and robust and that further project development is justified. The current set of current productivity assumptions, (Module 1), deliver a project post-tax Net Present Value ("NPV") of US$339 million at a 10% discount rate, based on a discounted cash flow model.

TTRL is currently working with its technology provider IHC to improve these assumptions and take new higher productivity assumptions as the basis of design for the Bankable feasibility Study (BFS). Should these assumptions be realised the NPV could increase to US$582-632 million for module 1.

The project is potentially highly profitable with a discounted payback (based on NPV) in approximately 6.5 years.

The financial analysis, (Module 1), of the projects yields the following[1] :

- Project capital cost of US$576 million;
- Operating costs estimated at approximately US$35/t (rounded, excluding freight costs) on average over first 10 years of operations;
- Total revenue estimated at US$3.1 billion (rounded) in the first 10 years;
- Total direct operating costs (including overheads but excluding marketing costs, royalties and freight costs) are estimated at US$1.2 billion(rounded) in the first 10 years;
- EBITDA estimated at US$1.38 billion (rounded) in the first 10 years; and
- Net Profit after Tax estimated at US$519 million (rounded) in the first 10 years.

The financial outcomes detailed above reflect the results of the implementation of a single integrated vessel. The project solution detailed within this PFS has the potential to be scaled by adding additional integrated vessels.

[1] The PFS results are based on existing resource estimates, broker consensus, mid-point iron ore pricing (Section 15) and market conditions and consequently, market fluctuations, varied logistics or production costs or recovery rates may render the results of past and future project studies uneconomic and may ultimately result in a future study being very different.

This Pre-Feasibility Report has been compiled by a select TTRL team presenting a viable option for a project accomplishing the extraction and processing of iron ore deposits in tenements located off the West coast of New Zealand's North Island. This report details the technical and economic evaluation of an integrated mining solution over the existing multiple vessel solution as presented by Technip in an earlier report. In order to maintain continuity and consistency this report uses and refers to information within the submitted Technip PFS report.

1. Purpose of the report

In April 2013 TTRL, after the receipt of increased indicative Capex and Opex costs, concluded that the multi vessel solution as presented by Technip did not constitute a viable project. It became apparent that an integrated solution whereby the mining or extraction component together with the tailings management solution had to be incorporated into a single processing platform. TTRL then embarked on an intense, focussed assessment of mature feasible extraction technologies and after a structured evaluation procedure decided on the IHC crawler technology as employed by De Beers Mining off the coast of Namibia.

This report has been prepared to outline the key technical and economic findings of the Pre-Feasibility Study work (PFS) undertaken directly by TTRL in the evaluation of the integrated vessel solution. The PFS report has been prepared in recognition of the Australasian Code for reporting of Exploration Results, Mineral resources and Ore Reserves, The JORC Code 2012 Edition. In addition, the relevant requirements of the listing rules of the ASX and Regulatory Guidelines of the Australian Securities and Investments Commission (ASIC) require mining companies comply with JORC.

2. Sources of information

The sources for the information contained within this report have been extracted from equipment designers and manufacturers, internationally recognised independent consulting and local engineering groups as engaged by TTRL. The integrity and quality of the previous Technip study is recognised and as such relevant, verified information has also been retained and used from the previous Technip PFS report.

A full listing of the principal sources of information used in both this version and previous versions of the PFS report is available and a summary of the sources is provided below:

- DEME
- MTI – Dredging and Tailings Management
- Golders Associates – Mineral Resource and Geology
- Seabulk – Transhipment, Warehousing and De-watering
- ASR – Environmental Study and Opinion letter
- Amdel-Bureau Veritas Australia – Metallurgical laboratory test work
- Fugro – Aeromagnetic Survey

- Principia – Mooring Stability Study (Contracted directly by TPM)
- Beca – Engineering Design and Verification Services.
- Transfield Worley- Risk Management and
- IHC Merwede – Mining Technology Design Support
- Technip – Previous PFS Report
- Canadian Shipping Lines (CSL) – Trans-Shipping Proposal
- Tennant Metals Pty. Ltd. – Marketing Report
- Sea Transport – Naval Architects - Engineering Design and Verification Services.

TTRL has made all reasonable effort to verify and establish the completeness, accuracy and authenticity of the information provided and where appropriate identify potential risks or uncertainties that would affect either technical or economic models.

All resource estimates and statements have been prepared by employees of Golder Associates Pty Ltd., who are totally independent of Trans-Tasman Resources Ltd.

1. Qualification and Experience

For this study, which crosses several technological areas including subsea engineering, vessel mooring systems and beneficiation, subject matter experts and experienced resources from various consultants have been integrated to form the study team.

The key members were:

- Tim Crossley, CEO TTRL,
- Andrew Stewart, CFO TTRL,
- Shawn Thompson, Project Director TTRL,
- Matt Brown, General Manager Exploration TTRL,
- Andy Sommerville, General Manager - Environment and Approvals TTRL,
- Rhys Thomas, Offshore Operations Manager TTRL,
- Andre Mouton, Process Metallurgist TTRL,
- Dr. John Feenan, Director IHC Mining,
- Laurens de Jonge, Manager IHC Mining,

- Ross Ballantyne, Manager Naval Architect Sea Transport,
- Albert Sedlmeyer, Senior Naval Architect Sea Transport
- Dave Debney, Capital Risk Specialist Transfield Worley,
- Chris Lee, Senior Process Engineer Beca,
- Alvin Hung, Juniper Capital Partners,
- Mahesh Khupse, Project Research Assistant TTRL,

1. Key Findings

The following key findings have been identified; these findings are subject to the stated risks and assumptions:

- The proposed integrated mining methodology and technical aspects of the project are technically sound and appropriate for the project,
- The CAPEX and OPEX estimates (within +/-30% accuracy) are based on appropriate and reasonable assumptions,
- It is reasonable to expect that the proposed mining method is suitable for the geological characteristics of the resource (as reported by Golders Associates),
- It is reasonable to expect that the stated metallurgical yield can be achieved using the proposed mining method and process,
- It is reasonable to expect that if implemented, the proposed mining method has the capability of mining 39Mtpa of sediment (dry basis),
- It is reasonable to assume that if expected yields are achieved, the proposed processing facility is expected to produce 4Mtpa of iron ore concentrate, taking into account mining losses and dilutions,
- The basic schedule covering further studies and development of the project as outlined is reasonable,
- Results of the metallurgical test work undertaken by Amdel Bureau Veritas appear to be reasonable and have been prepared using appropriate techniques and in accordance with applicable industry standards, and
- For the base case of approximately 4Mtpa production of concentrate grading 56% to 57% Fe, the estimated NPV is US$339 million for a Capex of US$576 million. The projected average FOB cash cost average over the first 10 years is estimated at approximately US$35/t of concentrate.

1. Project Description

Trans-Tasman Resources Limited (TTRL) is a privately owned New Zealand company, established in September 2007 to explore assess and uncover the potential of the rich offshore iron ore deposits off the west coast of the North Island of New Zealand. TTRL's ambition is to provide Asian markets with a reliable supply of low cost iron ore and build mutually beneficial strategic long term partnerships with steel manufacturers. TTRL is committed to conduct all its activities in a safe and environmentally sustainable manner and to proactively engage with the local communities on all relevant economic, environmental and social issues.

The aim of this pre-feasibility study is to estimate and economically evaluate selected techniques and methods for:

- The mining and processing of the offshore iron ore which could feed multiple blast furnaces to produce a Vanadium Titano-magnetite (VTM) concentrate at 56-57% Fe.
- The shipment to world markets of this VTM concentrate.
- Provision of a Capex estimate at +/- 30% accuracy.

2. Option Overview

Different extraction/mining system options were evaluated during the later IHC workshop in order to identify the most suitable solution for TTRL's activities. Mining systems were weighted on a system level not on specific included equipment. Mining systems evaluated include: crawler, trailer suction hopper dredge (TSHD), drill, Ro-Ro, and point suction dredge and measured against mining efficiency, depth from 30-45 m, capacity, mining flexibility, logistic complexity, and tailings dispersal parameters.

Table 31 Option Decision Analysis

Results from the structured decision analysis indicated that the drill, Ro-Ro, and PSD were not viable options.

The TSHD, as detailed within the initial version of the PFS report and the integrated crawler as detailed within this latest version of the PFS were found to be the best two options for TTRL's mining operations. Main differences between the two systems include: scalability, tailing dispersal, operation logistics, and mineral processing. The TSHD is easily scalable, whereas, the crawler is reaching its limits with regards to operational size. In regards to tailings dispersal, a TSHD system cannot control the tailings dispersion and has the ability to generate large plumes. On the other hand, crawlers, by their intensive extraction will allow the return of the tailings material back to the original location in a controlled way. Operation logistics between the two systems are also different; the TSHD system must have the processing plant located on another vessel, whereas, the crawler can be incorporated into an integrated production vessel.

It is TTRL's conclusion that an integrated sediment extraction device, i.e. a SSED (crawler system), provides the best overall mining solution particularly because it facilitates an acceptable tailings management strategy.

An integrated sediment extraction system such as the assessed seabed crawler will be lowered to the seabed and controlled remotely from the surface support vessel. The crawler is typically fitted with highly accurate acoustic seabed navigation and imaging system, and extracts sediment by systematically advancing along a pre-determined 'lane'. Unconsolidated surface sediment is pumped to the vessel for further processing or beneficiation. These extraction devices are capable of achieving a more thorough coverage of the target area, thus avoiding the need for re-mining. The integrated mining vessel will employ a dynamic mooring system, i.e. using multi-anchor systems to locate itself precisely over a specified extraction area.

3. Project Geology

Titano-magnetite ironsand forms Quaternary[2] onshore beach and dune deposits and offshore marine deposits along 480 km of coastline from Kaipara Harbour south to Wanganui on the west coast of the North Island, New Zealand. The onshore deposits include the present beach and dune sand, and older coastal sand deposits that have been preserved by uplift due to faulting and/or lowering of sea level.

The titano-magnetite mineral is sourced from the Quaternary volcanic rocks of western Taranaki and the volcanic rocks of the Taupo Volcanic Zone, transported to the coast by rivers, along the coast by shallow marine long shore currents, and subsequently concentrated by wave and wind action into beach and dune lag deposits.

From the interpretation of the exploration information, the geological model of the offshore iron sand deposits can be represented as areas, consisting of remnant coastal dunes that were constructed at a time of lower sea level. These paleo-dune features where part of an ancient river system in which dunes formed contemporaneous at the mouth of the river(s) and the coast line. The rivers are locally controlled by active faulting with the ironsands within the river channels and dunes partially reworked by currents and long shore drift and are re-deposited along the shore lines of the transgressing sea.

[2] The Quaternary Period is the most recent of the three periods of the Cenozoic Era in the geologic time scale, and spans from 2.588 ± 0.005 million years ago to the present. This relatively short period is characterized by a series of glaciations.

4. Exploration Summary

TTR have undertaken extensive exploration activities within its tenement areas, and in particular within the identified mining area. Exploration activities included, aeromagnetic surveying, 2D seismic surveying, multiple programmes of shallow and deep drilling, and bulk metallurgical sampling. From these exploration activities TTR has been able to delineate a JORC compliant resource, using drilling methods that have been independently technically verified to enable representative sampling at depth of the titano-magnetite resource.

Edit Navigation Share

Table 32

Figure 31Drilling Locations

5. Mineral Resource Definition

Golder Associates Pty Ltd (Golder) was initially commissioned by Trans-Tasman Resources Ltd (TTRL) to assist with the development of TTRL's ironsand project in New Zealand in 2009. In November 2009 an in-situ maiden resource of 1040 Mt at 5.88% Fe was defined. Golder (2009) In July 2011, after additional drilling, the resource was updated to 2121 Mt at 5.64% Fe (Golder, 2011).

The TTR resource estimates were classified in accordance with the Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves (JORC, 2012) as Indicated and Inferred based on drill holes available as of 20 November 2012 and:

- The physical recovery has been applied to the models;
- Head grades and tonnages are for all material less than 2 mm in diameter;
- Concentrate grades are for the magnetically recoverable portion of the sample;
- Concentrate tonnage is calculated from the head tonnage and DTR;

- The insitu resource model has been reported at a 3.5% DTR cut-off grade where DTR analyses are available within the proposed mining area. Outside this area a cut-off grade of 7.5% Fe2O3 has been used based on the statistical relationship between Fe2O3 and DTR.

TTRL's Mineral Resource estimate is presented below in Table 33. The Mineral Resource is not believed to be materially affected by any known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors.

Table 33 Summary of the JORC insitu mineral resource at a cut-off grade of 3.5% DTR for the resource inside and outside the 12 nautical mile boundary

At time of the PFS write up a review of the "insitu" bulk density[3] was undertaken. TTR believes that the "insitu" bulk density used to estimate the mineral resource has potentially under estimated the bulk density by approximately 8% to 10%. This updated assumption on density will be assessed and if ascertained will be corrected and reported in late Q3 as part of the company releasing a new JORC compliant Resource Statement and Ore Reserve.

[3] Bulk density implies the density of extractable volumes of sediment inclusive of voids. The in-situ density includes the void and grain boundary water present in the sediment in its natural state. Whilst the latter is important for estimation of the tonnage of material to be moved during mining, for resource estimates, however, dry bulk density is required, Lipton, I. T. 2001, Measuring of Bulk Density for Resource Estimation, AusMIM

1. Metallurgical Test work

The metallurgical test work was conducted in two phases:

• Stage 1 – Preliminary test work

• Stage 2 – Pilot plant test work

The purpose of the preliminary test work was to investigate the viability of upgrading the ore using conventional mineral sands processing methods and to determine the base parameters required for the design of the process flow sheet. The purpose of the test work was to design a process flow sheet that is capable of producing a saleable iron ore concentrate whilst maximising recovery of the valuable component in the ore.

Initial test work focused on gravity separation as is commonly used at many existing mineral and iron sands operations. This initial test work proved that this approach was not viable and steered the process flow sheet design towards conventional magnetite processing which is based primarily on magnetic separation.

The pilot plant test work concentrated on investigating the beneficiation of the ore using this magnetic separation approach. This report will focus on the test work conducted on the pilot plant.

2. Operational Description

1. Integrated System

The selected integrated solution is based on a single FPSO, (Floating, Production, Storage and Offloading vessel) that will contain the mining, processing and tailings deposition mechanisms and a single Floating Storage and Offloading Vessel (FSO) that will trans-ship the concentrate from the FPSO onto standard commercial bulk capesize vessels for delivery to end users.

Figure 32 Offshore Operations

2. Sediment Extraction

A mobile subsea sediment extraction device (SSED) was selected as the preferred sediment extraction methodology to be integrated into the FPSO vessel.

Figure 33 Subsea Sediment Extraction Device

During extraction operations the SSED is lowered onto the seabed by the launch and recovery system (LARS), together with the discharge hose and umbilical. Around 2-3 sections of the discharge hose will be floating on the water allowing for flexibility in the movement of the subsea device.

To accommodate the deposition of the tailings into an already depleted area, because of the location of the tailings deposition pipe on the bow of the vessel, the length of each extraction run will be a function of the vessel length, e.g. 300m. At the end of each run the SSED will turn 180° and work the adjacent run, see Figure 34 below. The total width of the planned run of the SSED boom is 10 meter wide allowing for a 1 meter overlap on both sides of the run to minimize spill (losses).

Figure 34 Typical SSED Run

The FPSO will follow the SSED at the advance rate of 70m/hr, a 300x300m block will typically be depleted in around 5 days, and thus the mooring system will normally span a 600x300m area, see Figure 35, allowing a period of approximately 10 days between each mooring move.

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Figure 35 Mooring Layout

3. Processing Module

The metallurgical test work programmes demonstrated that the TTRL Project deposits are required to be beneficiated using conventional classification, i.e. magnetic separation followed by grinding and a final magnetic separation to produce a 56-57%Fe product (typically 75μm) with mass yields in the order of 10%.

A summary of the proposed processing facility is detailed in the Process Flow Diagram detailed at the end of this report and is broadly described as follows:

- Extracted sediment will be delivered to the FPSO via an 800 mm ID rubber hose connected to the SSED. The current engineering design delivery rate of the SSED is 6,500 t/h solids, however the proposed design ROM production rate is 8000tph which IHC Merwede have confirmed. The run of mine, (ROM) ore will be directed into a boil box from where it will be directed into two intermediate distribution sumps. Process water will then be added to reduce the slurry density to approximately 31.5% solids by weight before the slurry is fed to 10 trommel screens at main deck level. The screen aperture will be 4 mm such that the effective screen size of the ROM will be ~2 mm.

Spray water on the screens will reduce the slurry density further to approximately 30% solids. The screen undersize is fed under gravity to 10 water agitated storage tanks directly below the screen area. The oversize will be fed via a chute to the tailings handling area.

- The -2 mm ore will then be pumped from the agitated storage tanks to the first stages of magnetic separation. The purpose of the rougher magnetic separation (RMS) will be to capture both the liberated and locked magnetic particles whilst rejecting the majority of the gangue[4] .
- First Stage Grinding. The feed to the first stage (~1,420 t/h) will be ground to a P80 of nominally 130 µm, requiring a grinding energy of 15 kWh/t. It is envisaged that the first stage grinding duty will be accomplished using six 3 MW IsaMill™s™.
- Intermediate Magnetic Separation (IMS). The IMS section will comprise of 12 units arranged into two clusters of six separators each. Approximately 30% of the IMS feed will be rejected to tailings. The IMS concentrate will be gravity fed to the second stage grind feed tanks and the tailings will be gravity fed via a chute to the tailings handling area.
- Second Stage Grinding. In the second stage grind the feed to the IsaMill™s™ will be ground from 130 µm to 75 µm in order to liberate the titano-magnetite sufficiently to achieve the final product specification on a consistent basis.
- Cleaner Magnetic Separation. The cleaner magnetic separation (CMS) section will consist of eight triple drum co-current magnetic separators at an intensity of 950 gauss, arranged in two clusters of four each. The CMS concentrate will then be gravity fed to a set of dewatering drum magnets to reduce the concentrate moisture to ~10%.
- Final Concentrate Handling. The dewatered concentrate will be stored in two hoppers. The hoppers were sized for a buffer capacity of 40h or approximately 32,000 t. This will allow enough time for the FSO to sail a distance of maximum 70 nautical miles to a sheltered area (if required by weather conditions), offload its entire load of 60,000 t concentrate and return to the FPSO. Once the FSO is on station, it will connect to the FPSO via a floating slurry line.
- On-board the FPSO dewatered concentrate will be extracted from the bottom of the storage hoppers onto a conveyor belt. It will be elevated to the top of a constant density (CD) agitator tank with a sandwich conveyor. In the CD tank the concentrate will be slurried with fresh water from the desalination plant (from two intermediate fresh water tanks) to form a 50% by solids slurry. The fresh water is required to wash the concentrate, i.e. to reduce the chloride level of the product. The slurry will then be pumped to the FSO and filtered to a low moisture content of less than 6.5% using four hyperbaric pressure filters.

- During offloading of concentrate the process plant will continue to operate to produce the balance of the 60,000 t FSO cargo. Offloading to the FSO therefore will occur at double the production rate of the process plant (~1600 t/h).

- Tailings Handling. In order to minimise the environmental impact of the tailings, it will be dewatered before disposal via a set of hydro-cyclones. The coarse and fine tailings will be dewatered separately to approximately 75 to 80% solids before being discharged under gravity via the tailings deposition pipe. The deposition pipe will be controlled using sonar such that the discharge occurs at a constant height from the seabed. The tailings waste water will be discharged via a second pipe along the tailings deposition pipe slightly higher than the solids discharge.

Table 34 Process Description

[4] Gangue is the commercially worthless material that surrounds, or is closely mixed with, a wanted mineral.

1. Auxiliary Services

1. Power Generation

The TTRL project has specified four (4) Siemens SGT-500 gas turbine generator sets for a total installed power capability of 80MW.

The SGT-500 set was selected because of its multi fuel capability on a range of gas and liquid fuels specifically that of Heavy Fuel Oil (HFO).

The units also have:

- The Ability to accept a wide range of load application / rejection
- The Ability to accept a 6 MW step load increase in a single step
- The Ability to shed load from 11 MW to zero in a single step

- The Ability to shed load from full load to 2 MW in a single step

- The Ability for on-line turbine washing
- Low NOx emissions – 350 ppmv without water injection, 50 ppmv with water injection
- Low noise emissions – 85 dB(A) @ 1m
- Low lube oil consumption
- Low footprint and weight

Figure 36 FPSO Example

This vessel shown above in Figure 3-9 is a typical oil and gas FPSO (Floating Production, Storage and Offloading) vessel. The power on board is provided by two SGT-500 gas turbines.

The SGT-500 is regarded in industry as a light-weight, high-efficiency, heavy-duty industrial gas turbine. Its special design features are high reliability and fuel flexibility. It is also designed for single lift, which makes the unit suitable for all offshore applications.

The modular, compact design of the units also facilitates onsite modular exchange. (Source: Siemens Westinghouse)

1. Sea Water Desalination

The TTRL project has specified ten (10) separate containerized Reverse Osmosis plants, each with a production capacity of three thousand (3000) cubic meters per day.

Splitting the plant up in this way reduces risk as in the case of a breakdown in one plant, nine others are still available. It is also advantageous from a maintenance downtime perspective: with only ten percent (10%) capacity offline at any one time, production is hardly interrupted for scheduled servicing. Spare parts are common across all plants, further reducing costs of stocking critical parts and components.

2. Environmental

Before TTRL can remove any material for any of its activities it will require authorisation from both the relevant legislation i.e. EEZ and Crown Minerals Act. TTRL has exploration permits (as at the time of writing, one granted and three under application) to give it access to iron-sand within NZ's territorial waters and one licence to prospect in NZ's exclusive economic zone (EEZ). These are all now managed under the Crown Minerals Act.

TTRL's initial proposed mining area straddles the 12nm territorial boundary.

Any party wishing to undertake an activity within the territorial boundary requires environmental 'consents' under the Resource Management Act (**RMA**); and for activities outside the territorial boundary will require 'marine consents' under the Exclusive Economic and Continental Shelf (Environmental Effects) Act (**EEZA**). It is probable that initially TTRL will only obtain environmental consents for activities in the EEZ. In that case there will be no activities within NZ's territory so there will be no requirement for RMA consents.

Both the RMA and EEZA are 'effects based' pieces of legislation. Effects based legislation requires that applicants for consents demonstrate that the activities will have low level of effect on the environment.

In order to be able to predict the effects of TTRL's initial mining activities on the environment, it has had the environment in the South Taranaki Bight extensively studied. This work was designed to fill in the gaps of the existing knowledge. This work has entailed benthic, pore water chemistry, beach profile, noise, marine mammal aerial and visual sediment plume studies and also wave, current and sediment transport measurement. In order to establish the actual effects computer models of sediment plumes and waves have been built. Put together these will enable appropriate experts to determine the effects of the proposed activities on waves, shoreline erosion and the area's ecology, and determine the visual effects.

The timeframe for the consenting processes includes approximately 2 years of field work and reporting, of which the majority is already complete, followed by 7 to 12 months of consent processing work depending on the pathway followed.

3. Capital Costs

Capital costs were estimated by TTRL supported by various technical consultants and equipment providers. The estimates are summarised and should be considered to be ±30% order of accuracy current at the second quarter of 2013.

Opportunities to reduce TTRL's capital outlay through contracting with third parties to provide key elements of the project include potentially the project water supply and power infrastructure and auxiliary services will be evaluated during the BFS phase.

The following key assumptions have been made in regards to the capital cost.

- Contracted transfer and marine support operations;
- Owner processing;
- No capital allowance has been made for on-shore facilities as these are assumed to be covered by the respective entities providing services to the project as an operating cost; and
- The processing plant capital estimate has been based on suitable equipment sized from preliminary metallurgical test-work and flow sheet development. The processing plant is also based on a modularised construction strategy allowing (where practical) assembly and testing off site with reduced on-site construction effort.

4. Operational Costs

Operating costs have been estimated on the basis that all primary mining operations will be carried out by TTRL. All transfer and support operation will be contracted out to third parties. Average operating cost (excluding freight) is estimated to be approximately US$35 per tonne to produce 57% Fe saleable product delivered FOB. A summary of operating costs elements are shown below under section 15.

5. Project Schedule

It is estimated that the project duration will be 22 months from project decision to mine (DTM). The major key elements of the project schedule are tabled below.

Table 35 Project Schedule

6. Financial Analysis

The evaluation of the TTRL Offshore Project was completed using discounted cash flow analysis with a discount rate of 10%.

The base-case key economic outcomes were:

- A NPV estimate of US$339 million;
- Total operating costs of approximately US$35/tonne (excluding freight costs) of product grading 57% Fe delivered free on board ("FOB"); and
- Capital discounted payback of approximately 6.5 years.

The financial outcomes from the studies of the TTRL Offshore Project are shown below under section 15.

1. Pre-Feasibility Assumptions

In the frame of this Preliminary Feasibility Study, the following main assumptions have been made in order to determine the most appropriate offshore scheme with regards to the logistical aspects:

- All equipment cost estimate accuracy is +/-30%.
- The FSO sizing has been based on a 60kt "Panamax" sized vessel.
- Flow-sheet has been compiled from laboratory test data and shall be confirmed by pilot plant testing in the BFS phase,
- Assumed that the target specification for residual moisture of the final product is minimum 9%, to be confirmed by filtration test and FMP (Flow Moisture Point) for transportation of the iron concentrate.
- Preliminary grinding test results have to be confirmed by additional tests especially for the closed circuit mill control (future consideration) and Isa mill designs.
- IsaMil™l grinding media assumption 330 g/t.

2. Forward Work Program

There are several areas that will require additional focus during the next phase (BFS) of the Project. These works are summarised below:

1. Bulk Test Works

A larger representative bulk sample in the order of 1500kg is required to undertake additional test works to confirm process equipment and PFDs and evaluate the concentrate product's sintering and pelletizing properties.

A total of approximately 20 t bulk sample is available for further test work. Supervised trials will be conducted on the pilot plant with sample analysis carried out in local laboratories and in Australia. The following test work is planned for the BFS phase:

2. Minerals Processing Test Works

In addition to the minor recommendations contained within each of the PFS verification reports the following activities will be included within the next phase test work:

- Confirmation of optimum grind size for each grinding stage;
- Grinding circuit optimisation: The potential for reduction of the grinding duty by closing the grinding circuit and having material at the target product size bypass the grinding will be investigated. This will include both laboratory sighter test work and pilot plant trials. The impact on product grade will be closely monitored. Also included under this program will be further grindability test work in order to provide accurate data for grinding mill sizing and Project power consumption;
- Once the grinding and magnetic separation circuits are optimised, the balance of the bulk samples will be processed according to the final flow sheet. A pilot scale IsaMill™ will be used for this purpose. The final concentrate produced will be provided to potential customers for sintering pot test work.
- Magnetic separation circuit optimisation: The potential to reduce the number of MIMS units will be investigated. The impact on overall Fe recovery, Mag Fe recovery and product grade will be closely monitored;
- A mathematical concentrate grade from the Davis tube recovery on each sample should be done and then compared to the DTR of the sample and also compare this with actual pilot run results; and
- A continuous pilot run with representative ore and a pilot plant configuration similar to the proposed flow-sheet will be scheduled, including the use of seawater that will be used throughout the process plant.

In order to optimize the current flow-sheet TTRL will:

- Evaluate options to determine if it will be viable to install separation equipment on the LIMS 1 concentrate to remove the target size material in the feed to the first grinding stage and similarly on LIMS 2 concentrate. This could have a positive impact on the grinding circuit by removing feed tonnage to the mills;

- Evaluate the merits of installing a screen to scalp out the oversize (+300 µm) material from the IsaMill™ feed;
- Investigate different separation options for removing of the +2mm fraction;
- Materials handling test work: Samples will be collected at various stages of the pilot flow sheet for materials handling test work (TUNRA test work), including hydraulic conveying testing (slurry parameters), and material flow property and related tests. This work is needed to determine the key slurry parameters such as settling velocity, yield stress and viscosity. Wear rate of slurry pipeline materials will also be determined. The material flow properties of the final concentrate at the moisture level stored on the FPSO as well as the FSO will be tested to provide critical data for bin and conveyor design. The transportable moisture limit will also be determined;
- Seawater trial: All pilot plant test work to date has been carried out using potable water. A trial will be conducted to compare the pilot plant operation with seawater as opposed to freshwater to determine the extent of the influence of seawater on the process;
- Determine the dilution method, factor and effect of the process water (e.g. sea water);
- Develop a water management strategy that includes possible recycling of the filtrate from the FSO system helping in the dilution of the high TDS and other elements in the concentrator plant;
- In addition to the test work above, a continuous pilot plant run will be considered in order to de-risk the final process flow sheet. Additional bulk sample will be required for a continuous run. This material could potentially be collected during tests to determine the free flowing properties of the in situ ore; and
- TTRL has engaged LFJ Consulting to undertake a “Value in use Model” for the concentrate produced from the bulk sampling test works.

FPSO General Arrangement Diagrams

1. FPSO Manning Assessment