

NOTICE OF FILING

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Registry: NEW SOUTH WALES REGISTRY - FEDERAL COURT OF AUSTRALIA



Sia Lagos

Registrar

Important Information

This Notice has been inserted as the first page of the document which has been accepted for electronic filing. It is now taken to be part of that document for the purposes of the proceeding in the Court and contains important information for all parties to that proceeding. It must be included in the document served on each of those parties.

The date of the filing of the document is determined pursuant to the Court's Rules.



Form 59
Rule 29.02(1)

Affidavit

NSD 527 of 2024

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants

ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

Respondents

Affidavit of: **Mr Nicolas Marrast**
Address: [REDACTED] Beaconsfield WA 6162
Occupation: Operations Manager and Engineer
Date: 8 May 2024

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Filed on behalf of (name & role of party) Fortescue Limited and others, the Applicants
Prepared by (name of person/lawyer) Paul Alexander Dewar, Principal Lawyer
Law firm (if applicable) Davies Collison Cave Law
Tel (02) 9293 1000 Fax (02) 9262 1080
Email PDewar@dcc.com

Address for service Level 4, 7 Macquarie Place, Sydney NSW 2000
(include state and postcode)

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I NICOLAS MARRAST, [REDACTED] Beaconsfield WA 6162, Operations Manager and Engineer, affirm:

1. I am employed by the Third Applicant, FMG Personnel Services Pty Ltd, in the position of Operations and Fabrication Manager for the Fortescue Project (defined below at paragraph 17). I set out my qualifications and experience in this regard at **Part A**, below.
2. In this affidavit I refer to the Applicants collectively as **Fortescue**.
3. I am authorised to make this affidavit on Fortescue's behalf.
4. The evidence I give in this affidavit is based on my personal knowledge, unless stated otherwise, or the business records of Fortescue to which I have had access in the course of my employment, in which case I have annexed them to this affidavit. Where my evidence is provided on information and belief, I identify the source of that information and I believe it to be true and correct. My expert opinions set out in this affidavit are wholly or substantially based on my specialised knowledge and experience gained from the training, study and experience set out in **Part A**, below.
5. In this affidavit, I refer to documents in each case by a reference based on my initials, for example **Annexure "NM-1"**, **"NM-2"**, and so on. In each case, the particular document or item is produced and shown to me and marked as I have described at the time of making my affidavit.
6. My affidavit adopts the following structure:

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A. My Background and Expertise

7. My curriculum vitae, which is current as at April 2024, is annexed and marked **Annexure NM-1**.

A.1 Education

8. In 2000, I graduated with a Diplôme Universitaire de Technologie (DUT) from University of Toulon & Var, France.

9. In 2002, I graduated with a Bachelor of Engineering (Hons) degree, majoring in motorcycle engineering technology, from Kingston University, London, UK.

A.2 Relevant experience

10. From May 2006 until August 2010, I was employed as a Project Engineer at United Group Resources Ltd, where I was based in Kwinana, WA. Among other things, my responsibilities in this role included training and supervising project teams to comply with workflows and procedures; procurement of materials required for projects; subcontractor management; and project delivery.

11. From October 2010 until May 2011, I was employed as a Project Engineer at Goodline, which is an Australian company that provides construction and maintenance services to Australia's major resource companies. For the whole duration of that role, I worked on the Christmas Creek stockyard facility, which is where finished products which have undergone processing are stored before they are loaded onto a train and transported to their final destination. Among other things, I was responsible for overseeing construction; liaising with offsite steel fabricators to organise deliveries; and assisting in the commissioning phase of the project.

12. From May 2011 until December 2011, I was employed as a Project Engineer at Worley Parsons, where I was based in Brisbane, QLD and worked on the WICET coal export




terminal project in Gladstone, QLD. My responsibilities included liaising with project designers on mechanical and structural issues, and preparing and resolving technical queries for the entire project.

13. From February 2012 until March 2013, I was employed as a Project Engineer at Goodline, based in Port Hedland, WA. As part of that role, I worked on the Christmas Creek stockyard facility for Fortescue in the Pilbara region from February 2012 until October 2012. Among other things, I was responsible for reporting to management regarding process and financial status of the project; organising and reviewing detail drawing phase with an off-site subcontractor; and assisting in the commissioning phase of the project.
14. From January 2013 until March 2014, I was employed as a Senior Project Manager at ECM Australia, based in Canning Vale, WA. As part of that role, I worked on the Chandala Rutile Sand processing plant from November 2013 until March 2014. Among other things, I was responsible for tender preparation and revision from site visit to award; procurement of all materials required for shutdown works; and subcontractor management from pricing to delivery of materials required for shutdown works.
15. From January 2014 until present, I have been employed by Fortescue in the following roles:
 - (a) From January 2014 until March 2018, I was employed as a Structural, Mechanical & Piping (**SMP**) Project Engineer, which is a site-based role. From February 2015 until present, I have worked on the Cloudbreak mine, which is a Fortescue-owned iron ore mine located in the Pilbara region. Among other things, my role includes tender preparation and revision from site visit to award; procurement of all materials required for shutdown works; and providing engineering support to operations teams.
 - (b) From March 2018 until September 2021, I was employed as an SMP Project Manager, which is a role based in Perth, WA. Among other things, I am responsible for business case preparation and evaluation; budget estimation for projects valued up to AU\$10 million; tender preparation and revision from site visit to award; and procurement of all materials required for shutdown works.
 - (c) From September 2021 until present, I have been employed by Fortescue as a Fabrication and Operations Manager, which is a role based in Perth, WA. Among other things, I am responsible for drafting and reviewing operational documents for prototype operations; managing procurement of all required components of prototype operations; and managing commissioning and operations of all prototypes.

B. My early involvement in the Fortescue Project

B.1 Conversations with Mr James Herring and Dr Bartlomiej Piotr Kolodziejczyk

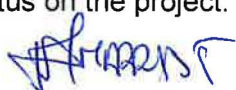
16. In August 2021, I recall having an oral conversation with Mr James Herring, who was the Head of Green Industry at Fortescue Future Industries Pty Ltd (FFI) at the time. I had previously worked with Mr Herring, and we knew each other professionally.
17. During that conversation, Mr Herring asked me if I would like to work for FFI. He stated that there were two opportunities for me at FFI, one of which was in relation to the development of a pilot plant to implement electrochemical reduction of iron ore (**Fortescue Project**). In relation to the Fortescue Project, Mr Herring stated words to the effect that:
- (a) It was being overseen by Dr Bartlomiej Piotr Kolodziejczyk, who was the Chief Scientist of FFI;
 - (b) the project had not progressed as expected by management and was well behind schedule;
 - (c) no one working on the Fortescue Project at that time had my level of project management experience; and
 - (d) he wanted me to step in as a project manager to ensure delivery of the pilot plant in a timely manner.
18. I understood from my conversation with Mr Herring that he was offering me a new position in which I would be responsible for project managing the Fortescue Project towards the present goal of constructing a functioning pilot plant.
19. Subsequently, in the last week of August 2021, I received a telephone call from Dr Kolodziejczyk, who was the Chief Scientist of FFI and the leader of the Fortescue Project. From this call, I understood there were two teams working on the Fortescue Project, being the engineers (**Engineering Team**) and electrochemists (**Chemistry Team**). I recall Dr Kolodziejczyk offering me the position of Engineering Manager, which I understood as being a role where I would manage the Engineering Team only.

B.2 Joining the Fortescue Project as Engineering Manager

20. On 1 October 2021, I joined the Fortescue Project team in the position of Engineering Manager. In this position I answered directly to Dr Kolodziejczyk.

B.3 Requesting information from the Engineering team

21. When I joined the Fortescue Project team on or around 1 October 2021, I tried to 'get up to speed' on the status on the project.



22. In order to do this, I asked for information or documents about the status and objectives of the Fortescue Project from various members of the Engineering team working on the Fortescue Project, including:
- (a) Andrew Sorbello (Process Engineer);
 - (b) David Arnall (Principal Mechanical Engineer);
 - (c) Benjamin Janssen (Senior Mechanical Engineer); and
 - (d) Pierre Pouchol (Senior Electrical & Controls Engineer).
23. Each person directed me to search for documents in the SharePoint folder for the Fortescue Project (**SharePoint Folder**), where the Fortescue Project team was expected to store their work output such as reports and notes. Based on my own experience using SharePoint at Fortescue, I understand that SharePoint is a Microsoft software application that allows organisations to store and organise content, including documents.

B.4 Lack of resources in SharePoint Folder

24. Following the above conversations during my first week in the Fortescue Project team, I searched for relevant documents in the SharePoint Folder.
25. Examples of documents which I was expecting to find, and documents which would have been helpful for me, are:
- (a) Basic engineering drawings in relation to the pilot plant. These would include a process flow diagram (**PFD**). I would also expect documents outlining, for example, the operating conditions of the rig, such as temperature, flows, concentrations, iron ore feeds, and expected output of iron.
 - (b) Data and drawings in relation the test rig for the Fortescue Project (**Test Rig**).
 - (c) Documents outlining the basic services to the pilot plant, such as air.
26. The basis for the abovementioned examples is my experience in project managing the construction of pilot plants. I know from that experience that the following things would happen when constructing a pilot plant:
- (a) Process engineer drafts a PFD which provides information in relation to how the liquids, gases and solids move in the system and the flow of the process.
 - (b) Mechanical engineer designs the tanks, size of pumps, size of piping, and the organisation of the valving. This transforms into the piping and instrumentation diagram (**P&ID**) which has detailed information about the various components of the plant, such as electrical instruments, pumps, sensors for temperature, and control loops (for maintaining certain temperatures).

- (c) Structural engineer ensures that the above system can be supported correctly and built in a way that it will support itself.
 - (d) At the same time, an engineer would also conduct hazard identification and determine how to safely operate the test rig. For example, the Test Rig operated with sodium hydroxide (which can cause severe burns if it makes contact with human skin) and created hydrogen gas (which is highly flammable).
 - (e) Any further changes must be recorded and assessed to ensure the rig remains safe to use.
 - (f) After this, commissioning the pilot rig begins.
27. I did not expect that documents to the same level of detail would have been prepared for the Test Rig. I expected that similar documents (though less complex and detailed) would have been prepared. I held this expectation primarily due to safety reasons. A Test Rig is a less complex scaled down versions of pilot rig, however it can still be dangerous. Accordingly, construction of the Test Rig should be approached in a systematic manner to address any possible hazards.
28. Following my review of the SharePoint Folder in the week after I commenced with Fortescue, I located almost no helpful documents to guide me in the SharePoint Folder.
29. One helpful document I do recall finding in the SharePoint Folder is a block diagram for the Fortescue Project that was prepared by Messrs Janssen and Arnall. Shown to me and marked **Annexure NM-2** is a copy of the block diagram.
30. There were no helpful documents on PIMS, which is another document control platform used by Fortescue.
31. Approximately 1 week after joining the Fortescue Project team, I spoke with Mr Herring and expressed my deep concern about the state of the project. I informed Mr Herring that there is no clear scope, schedule or budget for the Fortescue Project in place.

C. Pilot Plant Technical Workshop

32. As discussed above at **Part B**, as at October 2021, the Fortescue Project was lagging significantly behind expected targets.
33. On 6 October 2021, a workshop was held for the Fortescue Project team called the Pilot Plant Technical Workshop (**Workshop**). I attended the Workshop.
34. The purpose of the Workshop was to provide a 'refresher course' on the Fortescue Project, including the objectives and an overview of what steps are required to be completed. I note this Workshop, covering foundational concepts which I would expect to




cover in the very early stages of a project, took place approximately eight months after the Fortescue Project began in February 2021.

35. Shown to me and marked **Annexure NM-3** is a copy of an email dated 5 October 2021 from Emily Zlatnik, Project Coordinator – R&D Technology, and a copy of its attachment which is a Microsoft PowerPoint slide pack for the Workshop titled “Pilot Plant Technical Workshop_06102021.pptx”.

D. Dr Kolodziejczyk’s lack of collaboration during the Relevant Period

36. I refer to the period between me joining the Fortescue Project team and Dr Kolodziejczyk’s last day at Fortescue, being 5 November 2021, as the **Relevant Period**.
37. I estimate that I met with Dr Kolodziejczyk less than 10 times during the Relevant Period. The longest meeting I had with Dr Kolodziejczyk would have been around 2 hours.
38. During the Relevant Period, I repeatedly asked Dr Kolodziejczyk about the objectives of the Fortescue Project and what was promised to management in terms of deliverables. Most of my requests to Dr Kolodziejczyk were verbal, although I have found one written example of my requests. Annexed and marked **Annexure NM-4** is a copy of an email dated 7 October 2021 from me to Dr Kolodziejczyk, in which I asked “*Have we got any reporting schedule or KPIs agreed with Jim?*” In this email, “Jim” refers to Mr Herring.
39. Dr Kolodziejczyk refused to provide me with the information I requested, in reply to my email mentioned above or in general to my other repeated requests for information about the communications made by Dr Kolodziejczyk to management about the Fortescue Project, including promises about deliverables.
40. Given that Dr Kolodziejczyk would not directly provide me with the requested information or documents, I repeatedly suggested to him that he provide weekly updates or reports on the status of the Fortescue Project to Julie Shuttleworth, who was the Chief Executive Officer of FFI during the Relevant Period.
41. Dr Kolodziejczyk refused to provide weekly updates or reports to Ms Shuttleworth.
42. There was pressure on me from Mr Herring to provide a project schedule and dates of key milestones, as well as regular updates on progress. Shown to me and marked **Annexure NM-5** is a copy of an email chain dated 12 October 2021 in which Mr Herring states he wants to see my project “*schedule and key dates/mile stones. Once I have that I want regular updates on progress.*”
43. In or around November 2021, I recall having a lengthy conversation with Mr Herring, to whom Dr Kolodziejczyk directly reported, where I let him know my frustrations with Dr Kolodziejczyk’s lack of cooperation and the lack of resources available to guide me.

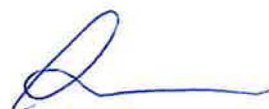
E. Visits to UWA Laboratory during the Relevant Period

44. During the Relevant Period, I visited the laboratory at the University of Western Australia (**UWA Laboratory**), where Drs Kolodziejczyk, Bjorn Winther-Jensen, Robert Kerr, Aabhash Shrestha, and Sienna Mohammadzadehmoghadam were supervising and/or conducting experiments for the Fortescue Project.
45. During my first visit to the UWA Laboratory, Drs Kolodziejczyk and Winther-Jensen were not there. I requested Drs Kerr, Shrestha, and Mohammadzadehmoghadam to show me the bench-scale Test Rig which they were working on and give me a demonstration, if possible.
46. They showed me the Test Rig. My impression of the Test Rig was that it was very rudimentary. The Test Rig was not operational at that time. They could not demonstrate the Test Rig working.
47. On 22 October 2021, after my first visit to the UWA Laboratory, Dr Kolodziejczyk resigned.
48. Around this time, I was very concerned about the progress of the Fortescue Project.

F. Dr Winther-Jensen's lack of collaboration during the Relevant Period

49. Due to my concern at the rudimentary state of the Test Rig and the overall lack of work product in relation to the Fortescue Project, during the Relevant Period, I tried to obtain information from Dr Winther-Jensen about the Fortescue Project.
50. My experience of working with Dr Winther-Jensen was that he did not share requested details about the Fortescue Project in a manner which was helpful in project scheduling and management.
51. Shown to me and marked **Annexure NM-6** is a copy of an email chain dated 20 October 2021 between Dr Winther-Jensen and me, and a copy of an attachment to Dr Winther-Jensen's email dated 19 October 2021 titled 'Deliverables_ (002).docx'.
52. The attachment sets out the deliverables for Fortescue's work at the UWA Laboratory. In my view, the document sets out this information in a rough manner, and not in a manner which can be considered a formal report.
53. In his email dated 19 October 2021, in response to my offer to put his information regarding deliverables in a project schedule, Dr Winther-Jensen said:

"I don't need you to project schedule me."



G. Email from Dr Kolodziejczyk to Dr Winther-Jensen about withholding research & development plans

- 54. I have been informed by Davies Collison Cave Law Pty Ltd (DCCL), solicitors for the Applicants, that in January 2024, Dr Anand Indravadan Bhatt reviewed Dr Kolodziejczyk’s Fortescue email inbox and outbox for emails which are relevant to these proceedings.
- 55. DCCL have shared with me an email chain found by Dr Bhatt and have instructed me to provide my comments, which I have done below.
- 56. Shown to me and marked **Annexure NM-7** is a copy of an email chain. The first email in that chain is from Dr Kolodziejczyk to Dr Winther-Jensen dated 15 August 2021. In this email, Dr Kolodziejczyk advises Dr Winther-Jensen that “*You don’t need to explain various plans to Julie. Let’s just explore it as part of our R&D.*” I understand that “Julie” is a reference to Ms Shuttleworth; I cannot think of another Julie to whom Dr Kolodziejczyk would have been referring.
- 57. Dr Kolodziejczyk’s email was in response to Dr Winther-Jensen’s email which suggested an agreement to pursue alternative research plans as part of the Fortescue Project.
- 58. Dr Kolodziejczyk’s statement in his email that the alternative research plans should not be shared with Ms Shuttleworth, a key member of upper management at Fortescue, is consistent with the impression I got from working with him during the Relevant Period, that is, he did not collaborate or share resources in a manner conducive to the success of the Fortescue Project.

Affirmed by Nicolas Marrast
 at Balcatta
 in Western Australia
 on 8 May 2024
 Before me:

)
)
)
)
)

Signature of Nicolas Marrast

Signature of witness

An Australian legal practitioner within
 the meaning of the Legal Profession
 Uniform Law (WA)

No. NSD 527 of 2024

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants


ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

Respondents

ANNEXURE NM-1

This is the annexure marked **NM-1** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me:



Nicolas MARRAST

Beaconsfield

6162 WA, Australia

Mobile: +61 (0)449 111

nicolas.marrast@fortescue.com

45, French

Australian permanent resident.

Fabrication and Operations Manager

PROFESSIONAL EXPERIENCE

Fabrication and Operations manager, Fortescue, Perth based 09/21 – Present

○ Science and Technology, minerals team, Perth Innovation Centre, Balcatta 09/21 – Present

Location: Perth CBD

- Set up and manage fabrication and operations team
- Set up and review operational document for prototype operations
- Manage package preparation from engineering team for Fabrication purposes
- Overview procurement of all required components
- Manage fabrication and assembly of all prototypes
- Manage QA of all prototypes
- Manage Commissioning of all prototypes
- Manage operations of all prototypes

SMP Project manager, FMG, Perth based 03/18 – 09/21

○ Operational Projects team , Perth based 03/18 – Present

Location: Perth CBD

- Business case preparation and evaluation
- Budget estimation for project up to \$10M
- Tender preparation and revision from site visit to award.
- Commercial dealings with tenderer as principal representative
- Work pack preparation for supervisors
- Procurement of all materials required for shutdown works
- QA duties: QA matrix set up and ITP review.

SMP Project engineer, FMG, Site Based 02/18 – present

○ OPF Engineering team , Cloudbreak 02/15 – Present

Location: FIFO Pilbara

- Tender preparation and revision from site visit to award.
- Work pack preparation for supervisors
- Procurement of all materials required for shutdown works
- QA duties: QA matrix set up and ITP review.
- Shutdown area coordinator: Provide support for contractor team and report to shutdown manager on progress and expected delivery time.
- Engineering support to operations teams.

- Operational project team , Christmas creek and Cloudbreak sites 01/14 – 02/15
Location: FIFO Pilbara

- Tender preparation and revision from site visit to award.
- Work pack preparation for supervisors
- Procurement of all materials required for shutdown works
- QA duties: QA matrix set up and ITP review.

Senior project engineer, ECM, Canning Vale (WA) 01/13 – 03/14

- Chandala Rutile Sand processing plant SR2014 major shutdown, Tronox 11/13 – 03/14
Location: Muchea, Brand highway (WA)

- Tender preparation and revision from site visit to award.
- Work pack preparation for supervisors
- Procurement of all materials required for shutdown works
- Schedule preparation and review with client
- Subcontractor management from pricing to delivery, includes Belt splicing, rubber lining, blasting, painting and off site fabrication.
- QA duties: QA matrix set up and ITP review.
- Technical query submission and resolution.

- McArthur River mine power station, EDL 09/13 – 11/13
Location: FIFO position, McArthur River mine (NT)

- Installation of new gas skid and feed line (underground and overground) to new power station.
- Gas skid commissioning.
- QA duties: MDR preparation and submission.
- Technical query submission and resolution.

- Yurralyi power station unit 8 installation, Rio Tinto 01/13 – 08/13
Location: FIFO position, Karratha

- Overview construction of Gas turbine unit and all ancillaries.
- Lift studies preparation for items over 20t including a 125t switchroom.
- Installation and commissioning of Gas skid and Gas line to turbine.
- Regular reporting to both client and upper management including progress report and financial report.
- Technical query submission and resolution from both client and subcontractor.
- Variation submission and cost tracking.
- Actively assisting commissioning phase.
- QA duties: ITP compilation and submission, MDR preparation and submission.

Project engineer, Goodline, Port Hedland (WA) 02/12 – 01/13

- Solomon Stockyard facility, Thyssen Krupp 10/12 – 01/13

Location: FIFO position, Solomon Hub, FMG Pilbara region.

- Erection and assembly of 2 off Stacker and 1 off reclaimer.
- Regular reporting to both client and upper management including progress report and financial report.
- QA duties: MDR preparation and submission, NCR resolution.
- Technical query submission and resolution.

○ Christmas creek Stockyard facility, FMG

02/12 – 10/12

Location: FIFO position, Christmas Creek mine , FMG Pilbara region.

- Overview construction of CV801 extension to accommodate new OPF output to stockyard.
- Regular reporting to both client and upper management including progress report and financial report.
- Organise and review detail drawing phase with off-site subcontractor.
- Award and manage steel fabrication package.
- Technical query submission and resolution from both client and subcontractor.
- Variation submission and cost tracking.
- Actively assisting commissioning phase.
- QA duties: MDR preparation and submission, NCR resolution.

Project engineer, Worley Parsons - Brisbane (QLD)

05/11 – 12/11

○ WICET coal export terminal, Gladstone (QLD)

05/11 – 12/11

Location: FIFO position, Brisbane office.

- Pre tender and tendering phase.
- Technical Queries preparation and resolutions for the entire project.
- Constructability review.
- Tender evaluations.
- Liaise with project designers on mechanical and structural issues.
- Scope of work reviews prior to invitation to tender.

Project engineer, Goodline - ECM Joint Venture, Perth (WA)

10/10 – 05/11

○ Christmas creek Stockyard facility

10/10 – 05/11

Location: FIFO position, Cloudbreak mine, FMG Pilbara region.

- Overview construction of 4 conveyors and associated mechanical items (pulleys, chutes, hoppers, Drive assemblies).
- Overview erection of structures such as drive station, and transfer station, sample station.
- Liaise with offsite steel fabricator to organize priorities in deliveries.
- Technical query submission and resolution from both client and subcontractor.
- Variation submission and cost tracking.
- Actively assisting commissioning phase.
- Quality duties to ensure continuity with offsite quality officer (including work pack compilation, punch listing and MDR preparation).

Project Engineer, United group Resources ltd, Kwinana (WA)

05/06 – 08/10

- Fourth project: Lynas rare earth project 06/09 – 08/10

Location: Office based, Perth CBD

- MTO compiling and maintaining throughout.
- Mechanical equipment documentation including datasheet and scope of work.
- Pumps data sheet checking for several services, work including calculation for head and pressure from P&ID.
- ECN management.
- Tender package preparation.
- Mechanical equipment vendor information review.

- Third project: Boddington Gold mine extension 03/08 - 06/09

Location: Workshop Based, United group resources workshop, Kwinana.

- Training and Supervision of project team to ensure the following of established workflow and procedures.
- Engineering supervision and preparation of work packs for workshop fabrication,
- Material issue resolution,
- Weekly progress report meeting with client,
- Engineering hold resolution and spool rework supervision,
- TQ raising,
- Subcontract supervision.

- Second project: ALCOA Pinjarra MESC 03/07 - 03/08

Location: Site Based, Alcoa Pinjarra

- Establish Alcoa engineer client base,
- Job estimation from scope of work and site visit,
- Schedule preparation and submission,
- Budget allocation and control on both Target Budget Estimate contract and Lump Sum jobs,
- Procurement,
- Project delivery,
- Constant interaction with supervisors and tradesmen,
- MDR preparation and submission,
- Subcontract management,

CAD engineer, Mouchel Parkman, London 02/06 - 04/06

CAD engineer, Emico Rail, Site based, London 08/04 - 02/06

Salesman, BMG scooters, Fulham, London 09/03 - 08/04
general sales

EDUCATION

2000-2002

BEng (hons) Motorcycle engineering technology, Kingston university second year direct entry, grade: 2.1

1998-2000

DUT Mechanical engineering, University of Toulon & Var

1996

Scientific Baccalaureat (A-Level equivalent) option: Math.

COMPUTER SKILLS

Solidworks

NAVISWORK

AutoCAD 2009

Microstation 2008

Microsoft office package

PRONTO

SAP

CATIA

OTHER SKILLS

French (native language)

Fluent English

Italian read, write, talk

Able to operate on own initiative

Quick adaptation to work situation and environment.

Able and looking forward to work as a team member.

REFERENCES

Clinton Holland, shutdown superintendant, FMG, 0404 478 ■■■

Fabio Brandao, engineer and project superintendant, Solomon mine, FMG 0407 780 ■■■

Tristan Gray, operational projects construction manager, FMG, 0403 565 ■■■

Dwayne Finch, General Manager, Goodline, 0408 765 ■■■

Brian Gibson, Construction Manager, ECM, 0448 009 ■■■

Ashkan Shahmir, Shutdown and engineering superintendant, FMG Cloudbreak 0427 200 ■■■

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants

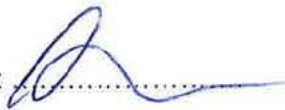
ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

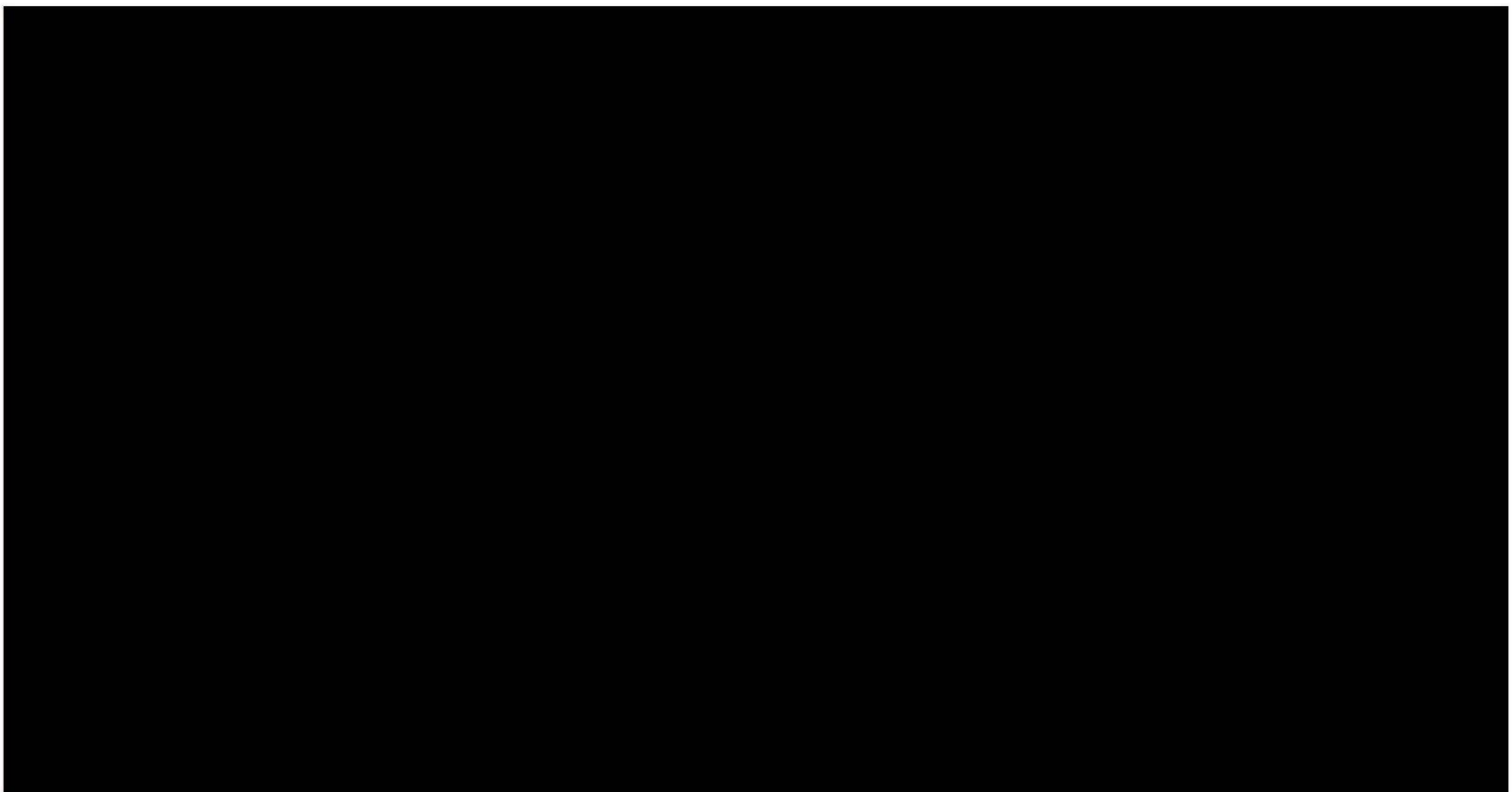
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ANNEXURE NM-2

This is the annexure marked **NM-2** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me:





No. NSD 527 of 2024

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants

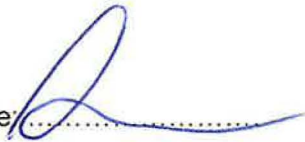
ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

Respondents

ANNEXURE NM-3

This is the annexure marked **NM-3** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me



Rohit Dighe

From: Emily Zlatnik <ezlatnik@fmgl.com.au>
Sent: Tuesday, 5 October 2021 10:02 PM
To: Bart Kolodziejczyk; Bjorn Winther-jensen; David Arnall; David White; Nicolas Marrast; Andrew Sorbello; Benjamin Janssen; Carl Carcione; David Sloan; Pierre Pouchol
Subject: Pilot Plant Technical Workshop 6th October 2021
Attachments: Pilot Plant Technical Workshop_06102021.pptx

Hi all,

Please find attached the PowerPoint presentation for tomorrow's workshop.

Kind regards,

Emily Zlatnik
Project Coordinator – R&D Technology

Fortescue Future Industries Pty Ltd
Level 1, 6 Bennett Street, East Perth WA 6004

M: 0438 088 360

E: ezlatnik@fmgl.com.au

Twitter: @FortescueNews | www.ffi.com.au | www.fmgl.com.au





FFI Innovation Centre

Pilot Plant Technical Work Shop

Thriving communities | Global force

6th October 2021

FFI-0010-TE-DC-0006_3



Our Purpose

THRIVING COMMUNITIES
GLOBAL FORCE

Our Values

Safety

Family

Empowerment

Frugality

Stretch
targets

Integrity

Enthusiasm

Courage and
determination

Generating
ideas

Humility

House Keeping

Duration

Breaks

Mobile Phone

Question Time



Agenda



David Sloan

Achieving Stretch Targets

Project Charter - The “How”

Project Objectives

27

1. Construct a pilot plant achieving 1 t/h production at 3.6MW
2. Produce high purity iron concentrate (95% to 97+% Fe) from an electrolytic process.
3. Process waste streams to produce saleable products.
4. Develop the process flow and equipment definition for the pilot plant.
5. Prove scalability of technology.
6. Obtain data outputs from a continuous flow system.

Project Boundaries

Exercise: Completed as Group

Q. What is included in the scope?

Q. What is out of scope?

In Scope	Out of scope
Example: Pilot plant design	Example: Demineralisation plant design & construction

Project Assumptions

Process Inputs

Demineralised/ RO Plant

- [REDACTED] site process water
- [REDACTED] site raw water

Sodium Hydroxide

- [REDACTED] % wt
- [REDACTED] % wt

Iron Ore fines

- [REDACTED]

Power

- 4.0 MW rectifier

Chloro-Alkali Plant

Process Outputs

Iron Ore Concentrate

- (96 – 98% Fe)
- Transportable briquette

Oxygen gas

- *Vented at atmospheric pressure*

Leach Waste Stream (Effluent)

Al, Si NaOH rich

- [REDACTED]
 - [REDACTED]
 - [REDACTED]
- [REDACTED]
- Recovered NaOH

Feed Streams

Available (test work basis)

- [REDACTED]
- Combined product from [REDACTED]*
Moisture content < 10%

Alternative

- [REDACTED] Filter Belt Filtrate
- [REDACTED] Concentrate
- [REDACTED] Tailings
- [REDACTED] Final Tailings

Feed Presentation

Grinding Circuit Feed Size

- [REDACTED]
- [REDACTED]

Leach Circuit Feed Size

- 20 micron
- Current test work basis for leaching*

Electrolyte Feed Size

- 20 micron

Leaching Process Conditions

Leaching Reagent

- [REDACTED] wt NaOH

NaOH is consumed. Advantage for [REDACTED] solution as this can come directly from a chloro-alkali plant without further concentration.

pH

- 14 – 15

Ore Content

- [REDACTED] iron ore

Temperature

- 90 – 110C

Electrolyte Process Conditions

Electrolyte

- [REDACTED] wt NaOH

NaOH is not consumed in the electrolytic reaction

pH

- 15

Ore content

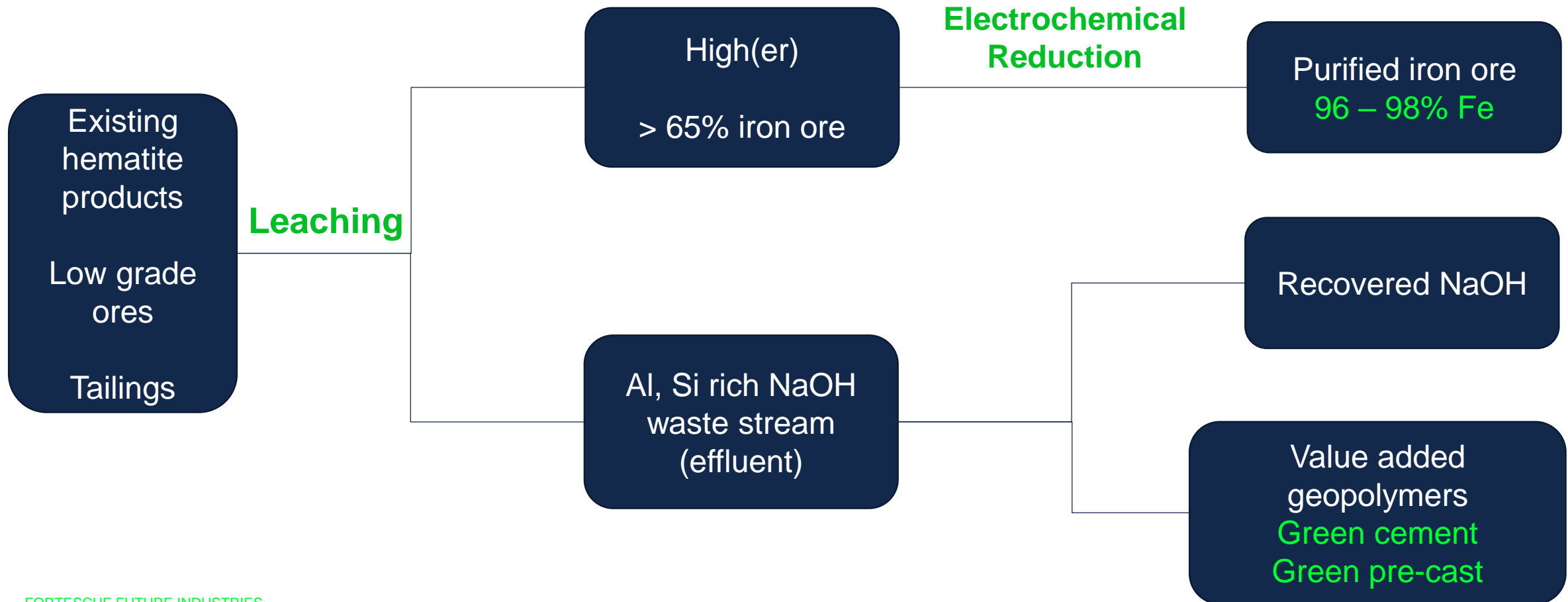
- [REDACTED] wt

Temperature

- 90 – 110C

Can be lowered during start-up

Process Flow



Morning Tea

Pilot Plant in Detail

Let's Break it Down

1. Grinding Circuit
2. Leaching
3. Leach By-product
4. Catholyte
5. Anolyte
6. Inline Separation
7. Product Refining
8. Packaging
9. Ancillary Services

Key Questions

1. What is required?
2. What do we know?
3. What don't we know?
4. What are we doing to find the answer?

Grinding Circuit

Feed Option

Batch feed railable

What is required?

- Reclaim from

Feed Option

Continuous or batch feed slurry streams

What is required?

- Slurry feed storage tank
- vs
- Selection of module

Grinding Circuit

Equipment Selection – Vendor Package

What is required?

- [Redacted]
- [Redacted]
- [Redacted]
 - [Redacted]
- [Redacted]

Leach Circuit

Process Criteria

What is required?

- Ore concentration [REDACTED] wt
- Caustic concentration [REDACTED] wt NaOH
- Residence time
- [REDACTED]
 - [REDACTED]
- Atmospheric system

Process Criteria

What is required?

- Process temperature 100°C
- Materials of construction
- Bunding containment

Leach By-Product

Process Criteria

What is required?

- Al, Si rich NaOH waste stream
- Value added geopolymers
- Green cement
- Green pre-cast

Catholyte

Process Criteria

What is required?

- High concentration feed from leach circuit
- Caustic concentration 50% wt NaOH
- Closed tank
 - Reduce dissolution of CO₂
- Process temperature 100°C

Process Criteria

What is required?

- Catholyte slurry → gravity feed to electrolyser header tank
- Demineralised make up water
- Materials of construction
- Bunding containment
- Return slurry via inline separation

Anolyte

Process Criteria

What is required?

- Preparation of anolyte solution
- Anolyte concentration ██████ wt NaOH
- Process temperature 100°C
- Tank Design
 - Atmospheric
 - Closed

Process Criteria

What is required?

- Anolyte solution → gravity feed to electrolyser header tank
- Materials of construction
- Bunding containment
- Electrolyser return solution → anolyte tank
- Oxygen ventilation line

Inline Separation

Process Criteria

What is required?

- Slurry discharge from electrolyser
- Extract solid iron particles from Fe-NaOH slurry
- Iron ore slurry is returned to catholyte tank

Technology options

- Magnetic flocculation
- Gravity spiral
- Centrifuge
- Reflux Classifier
- Magnetic Separation
- Electrostatic Separation
- Dense Media Separation
- Gravimetric

Packaging

Process Criteria

What is required?

- Carbon addition ([REDACTED])
- Binder addition
- Mixing
- Compression mould into briquette

Process Criteria

What is required?

- Containerising iron slurry / paste
- Evacuated / vacuum containers for iron bars
- Additional stabilising additives
- Transport loading

Ancillary Services

What is required?

- **Demineralisation Plant**
- **Chloro-Alkaline Plant**
- **Sodium Hydroxide Storage**

Lunch



Project Requirements

Project Requirements

- **Physical**
- **Electrical**
- **Safety**

Key Questions

1. What is required?
2. What do we know?
3. What don't we know?
4. What are we doing to find the answer?

Physical Aspects

What is required?

- **Site location**
- **Dry commissioning extent and location**
- **Mobilisation plan**
- **Site agreements**

Electrical Services

What is required?

- Rectifier and infeed power
- Instrumentation, Control systems and safety shutdown
- Cell monitoring systems and diagnostics inputs ([REDACTED]

Safety Aspects

What is required?

- Hazops
- SOP
- PPE/Area Exclusions
- Other

Project Scope

Major Deliverables

- Q. What is the feed and product tonnage rates?
- Q. What material characterisation test work is required?
- Q. Which aspects of the pilot plant will be vendor packages?
- Q. What is the footprint of the pilot plant?
- Q. Where is the location?
- Q. What site utilities will be required?
- Q. How will the pilot plant will be assembled?
- Q. What is the date of delivery?

Coffee Break

Project Plan

Project Package Breakdown

Project Package Name	What do we need to do?	By When?	Effort (high/ med/ low)	By Whom?
Grinding	<ol style="list-style-type: none"> List Item List Item List Item 	FY21		X Person
Leaching & Leach by-product	<ol style="list-style-type: none"> List Item List Item List Item 	FY21		X Person
Catholyte & Anolyte	<ol style="list-style-type: none"> List Item List Item List Item 	FY21		X Person
Inline Separation	<ol style="list-style-type: none"> List Item List Item List Item 	FY21		X Person

Reflection

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants

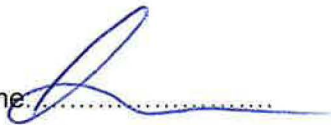
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ANNEXURE NM-4

This is the annexure marked **NM-4** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me



Rohit Dighe

From: Nicolas Marrast <nicolas.marrast@fortescue.com>
Sent: Friday, 8 October 2021 12:57 PM
To: Bart Kolodziejczyk
Subject: RE: reporting

Bart,

Sorry I can be physically present at the interview, I will call in though

From: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Sent: Friday, 8 October 2021 08:57
To: Nicolas Marrast <nmarrast@fmgl.com.au>
Subject: RE: reporting

Sounds good. Are you coming to Bennett Street for this interview? We can discuss everything before or after the interview.

Bart

From: Nicolas Marrast <nmarrast@fmgl.com.au>
Sent: Friday, 8 October 2021 8:47 AM
To: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: RE: reporting

OK, I think it would help at our team level if we could articulate a report on our work. I will introduce the idea slowly and see what can of input the different teams are willing to report on.

From: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Sent: Friday, 8 October 2021 08:41
To: Nicolas Marrast <nmarrast@fmgl.com.au>
Subject: RE: reporting

Yes, internally we are fine to talk about it, as long as information was covered in the patent.

From: Nicolas Marrast <nmarrast@fmgl.com.au>
Sent: Friday, 8 October 2021 8:40 AM
To: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: RE: reporting

Even internally? I would have though the NDA everybody signs covers for all FFI work?

From: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Sent: Friday, 8 October 2021 08:36
To: Nicolas Marrast <nmarrast@fmgl.com.au>
Subject: RE: reporting

Hi Nico,

We don't really promote our work. Everything is confidential. We make sure that everything we share openly was previously covered in our patent applications. As such, what we share is very limited.

Bart

From: Nicolas Marrast <nmarrast@fmgl.com.au>
Sent: Thursday, 7 October 2021 5:13 PM
To: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: reporting

Bart,

Have we got any reporting schedule or KPIs agreed with Jim?

Are we promoting the work we do in here to the broader FFI?

Thank you

Nico MARRAST

Project manager

Operational projects, Chichester OPF

Tel: 0449 111 [REDACTED]

Mail: nmarrast@fmgl.com.au

No. NSD 527 of 2024

Federal Court of Australia
District Registry: New South Wales
Division: General

FORTESCUE LIMITED (ACN 002 594 872) and others

Applicants

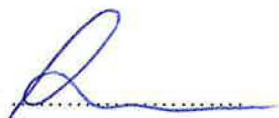
ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

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ANNEXURE NM-5

This is the annexure marked **NM-5** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me:

A handwritten signature in blue ink, consisting of a large, stylized initial 'L' followed by a horizontal line that tapers off to the right.

Rohit Dighe

From: Nicolas Marrast <nicolas.marrast@fortescue.com>
Sent: Tuesday, 12 October 2021 8:21 PM
To: James Herring
Subject: RE: Thanks Dave for your Wednesday talk. Brief and to the point.

Jim,

I know you do, I have tried to call a couple of time to discuss this.

I will get a report together and send it to you for comments.

Full disclosure though our schedule currently looks like one milestone on June 30 2022.

I'm working on it.

Thank you

Nico MARRAST

Project manager

Operational projects, Chichester OPF

Tel: 0449 111 [REDACTED]

Mail: nmarrast@fmgl.com.au

From: James Herring <jherring@fmgl.com.au>
Sent: Tuesday, 12 October 2021 16:53
To: Nicolas Marrast <nmarrast@fmgl.com.au>; David Sloan <dsloan@fmgl.com.au>
Cc: Emily Zlatnik <ezlatnik@fmgl.com.au>
Subject: Re: Thanks Dave for your Wednesday talk. Brief and to the point.

Nicco

Dave doesn't need it , but I do.

I want to see is your schedule and key dates/mile stones.

Once I have that I want regular updates on progress.

Jim Herring

Fortescue Future Industries

Level 2, 87 Adelaide Terrace East Perth WA 6004

Mobile – 0459 171 206

Email _jherring@fmgl.com.au

From: Nicolas Marrast <nmarrast@fmgl.com.au>
Sent: Tuesday, October 12, 2021 4:47:06 PM
To: James Herring <_jherring@fmgl.com.au>; David Sloan <dsloan@fmgl.com.au>
Cc: Emily Zlatnik <ezlatnik@fmgl.com.au>
Subject: FW: Thanks Dave for your Wednesday talk. Brief and to the point.

Jim, David,

We do have a weekly meeting on Tuesdays. You are more than welcome to join us in that meeting if you can make time.

I know Stephanie includes project update on her monthly report, I will make sure that one is accurate to start with. I will push for a more regular one from the team.

Is there a template you need it in?

From: Emily Zlatnik <ezlatnik@fmgl.com.au>
Sent: Tuesday, 12 October 2021 15:24
To: Nicolas Marrast <nmarrast@fmgl.com.au>
Subject: FW: Thanks Dave for your Wednesday talk. Brief and to the point.

FYI

From: James Herring <jherring@fmgl.com.au>
Sent: Friday, 8 October 2021 8:43 AM
To: David Arnall <david.arnall@fmgl.com.au>; David Sloan <dsloan@fmgl.com.au>
Cc: Emily Zlatnik <ezlatnik@fmgl.com.au>
Subject: RE: Thanks Dave for your Wednesday talk. Brief and to the point.

Good feedback.

Do you guys have a weekly schedule/progress update that you can send me so I can stay on top of your progress?

From: David Arnall <david.arnall@fmgl.com.au>
Sent: Friday, 8 October 2021 8:23 AM
To: David Sloan <dsloan@fmgl.com.au>
Cc: James Herring <jherring@fmgl.com.au>; Emily Zlatnik <ezlatnik@fmgl.com.au>
Subject: Thanks Dave for your Wednesday talk. Brief and to the point.

I think it set the scene for our workshop quite well.

I hope the media event back at home base went well.

Have a great w/e.

David Arnall

Principal Mechanical Engineer

Fortescue Future Industries Pty Ltd

Ground Floor, 6 Bennett Street, East Perth WA 6004

P: +61 8 6235 9708

E: david.arnall@fmgl.com.au

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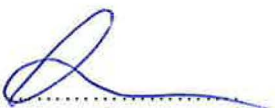
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Respondents

ANNEXURE NM-6

This is the annexure marked **NM-6** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me:

A handwritten signature in blue ink, consisting of a large, stylized initial 'N' followed by a long, horizontal, wavy line extending to the right.

Adrian Huber

Sent: Wednesday, 20 October 2021 9:44 AM
To: Bjorn Winther-jensen
Cc: Bart Kolodziejczyk
Subject: RE: Lab deliverables

Bjorn,

Nothing personal Bjorn, I am trying to have a single document that shows our collected efforts to get to the same target.

I am happy to work with you to make sure it doesn't restrict you, or your team, in any way or make you feel monitored.

I'm always available to discuss if you feel this doesn't suit.

Thank you

Nico MARRAST
Project manager
Operational projects, Chichester OPF
Tel: 0449 111 [REDACTED]
Mail: nmarrast@fmgl.com.au

From: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>
Sent: Tuesday, 19 October 2021 21:13
To: Nicolas Marrast <nmarrast@fmgl.com.au>
Cc: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: RE: Lab deliverables

Nico,

I am happy with the document as it is.
I don't need you to project schedule me.
Thanks.

BWJ

From: Nicolas Marrast <nmarrast@fmgl.com.au>
Sent: Tuesday, 19 October 2021 7:22 PM
To: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>; David Arnall <david.arnall@fmgl.com.au>; Benjamin Janssen <benjamin.janssen@fmgl.com.au>; Pierre Pouchol <ppouchol@fmgl.com.au>; Emily Zlatnik <ezlatnik@fmgl.com.au>; David White <david.white@fmgl.com.au>
Cc: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: RE: Lab deliverables

Bjorn,

Thanks for the input.
I will transfer the information into a project schedule and send it back for your review/approval.
When you are happy with it I will attempt to merge it to the overall project schedule.

Nico MARRAST

Project manager

Operational projects, Chichester OPF

Tel: 0449 111 [REDACTED]

Mail: nmarrast@fmgl.com.au

From: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>**Sent:** Tuesday, 19 October 2021 15:20**To:** David Arnall <david.arnall@fmgl.com.au>; Benjamin Janssen <benjamin.janssen@fmgl.com.au>; Pierre Pouchol <ppouchol@fmgl.com.au>; Nicolas Marrast <nmarrast@fmgl.com.au>; Emily Zlatnik <ezlatnik@fmgl.com.au>; David White <david.white@fmgl.com.au>**Cc:** Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>**Subject:** Lab deliverables

Hi All,

Sorry for the abrupt exit from the meeting – my battery ran out.

Please find attached the “deliverables” that the lab is working.

You may consider that some items are missing from the list. They are not forgotten, just not in a proper plan/schedule at the moment.

Supporting activities, like setting up an analytical lab, are not on the list either, as they are seen as “internal” for the Lab.

Best regards

Bjorn

Bjorn Winther-Jensen**Technology Development Lead**

Fortescue Future Industries Pty Ltd

Level 1, 6 Bennett Street, East Perth WA 6004

Twitter: @FortescueNews | www.ffi.com.au | www.fmgl.com.au

Deliverables. Iron ore reduction. Lab effort.**BWJ 18/10/2021**

Five deliverables defined:

- 1) Specialized cathode material
- 2) Anode/zero gap design
- 3) Flow-cell design and setup duplication
- 4) Iron ore leaching for green reduction
- 5) IP

- 1) Specialized cathode material. Required for eliminating deposition of reduced iron particles and to prevent hydrogen evolution as parasitic reaction.

Personnel	Sienna and Rob	
Status		√
Ongoing work		2-3 weeks
		3-4 weeks
		3-4 weeks
		1-2 weeks
		√
Upscale to BB		7-9 weeks

- 2) Anode/zero gap design. Needed for facilitating design freedom for the slurry flow on the cathode side of the cell.

Personnel	Rob, Lee, David A (BWJ)	
Status		√
Ongoing work		√
		√
		√
		1-4 weeks
		3-6 weeks
Upscale to BB		?

- 3) Flow-cell design and setup duplication.

Personnel	Rob, Lee, David A and BWJ	
Status		√
		√
		√
		√
		1-2 weeks
		√
		√
		Retail
Ongoing work		2-6 weeks
		12-15 weeks
Upscale to BB		?

- 4) Iron ore leaching for green reduction. Including leaching to remove soluble impurities that may otherwise dissolve during the electrochemical reduction procedure. Not including sodium hydroxide recovery or downstream products.

Personnel	Aabhash and BWJ (Rob)	
Status	Leaching in ████ NaOH is removing soluble oxides at elevated temperature.	√
Ongoing work	Determine optimal leaching parameters (3-4 iterations)	9-15 weeks
	Determine realistic purity of leached ore	12-16 weeks
	Develop method for facile separation of leached ore from leaching solution	2-5 weeks
	Upscale leaching to facilitate flow-cell testing with leached ore	√
Upscale to BB	Require BB-size gear	?

- 5) IP

Personnel	Bart, Aabhash, Rob and BWJ	
Status	Provisional patent on flow-reactor reduction of iron ore submitted	√
	Invention disclosure submitted for leaching products (downstream) and leached ore (upstream). Patenting in discussion.	√
Ongoing work	Invention disclosure in preparation for:	
	Cathode material	1-2 weeks
	Anode design and membrane fixation	1 week
	Method for facile separation of leached ore from leaching solution	1-2 weeks
Note	IP for flow-pass, design, control, operation etc. in/of upscaled equipment is considered outside the scope of the lab.	

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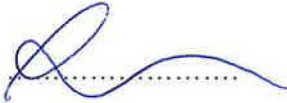
ELEMENT ZERO PTY LIMITED (ACN 664 342 081) and others

Respondents

ANNEXURE NM-7

This is the annexure marked **NM-7** produced and shown to **NICOLAS MARRAST** at the time of affirming his affidavit on 8 May 2024.

Before me:



Rohit Dighe

From: Bart Kolodziejczyk
Sent: Sunday, 15 August 2021 7:42 PM
To: Bjorn Winther-jensen
Subject: RE: Mitigating risk/stress/pressure

Hi Bjorn,

Sounds good. Take a leave until Wednesday. It works well for you.

You don't need to explain various plans to Julie. Let's just explore it as part of our R&D. She is aware of this being a big moonshoot and I think Andrew is finally understanding it too, although he is excited about the progress.

I will give you a call tomorrow.

From: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>
Sent: Sunday, 15 August 2021 2:36 PM
To: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: RE: Mitigating risk/stress/pressure

Hi Bartek,

Thanks for agreeing to pursue various plan-As in parallel.

There are two issues labelling leaching beneficiation as plan B. One is obviously that it will not produce any green iron (!), the other is the – I guess – “wobbly” economical perspectives for leaching beneficiation/downstream products without feeding into electrostatically reduction of ore. Presume that the upcoming estimator can cast more light on the costing.

Surely, the leaching beneficiation/downstream products must be developed independent of which electrochemical process we can get to work – but I cannot see that they can substitute a green iron route. I do agree that getting ahead with the leaching beneficiation/downstream products might buy us some time for developing the green iron part.

I am not too excited by high-temp electrochemistry either...

I agree that traditional dissolution routes are not going to do the trick. There are a couple of ideas involving mediated reduction of ore (in solution or from ore) that I believe would be worth pursuing if we can agree to use a solvent based system like NMP. We would need a person like Orawan to do the initial work.

There are a few possible layouts for deposition of particles on a moving cathode. The main problem may be H₂ production as parasitic reaction – which we could choose to be a valuable side product 😊
 For this bit, the mechanical development will be the major task.

I am well aware that Aabhash is realizing that he has signed up to a job-title dissimilar to his main experience and that he is (therefore) feeling very challenged by the research task. I also understand that he is seeking the lowest possible energy pass for himself – ideally he would like to make LiFePO_x as a downstream product, seeing the funding possibility in FFI that his previous company had/have serious problems to find.

Personally I don't mind that he is doing leaching beneficiation/downstream products; the company will presumably get more for its money that way. I don't see him as the leader of the leaching beneficiation/downstream product team – some mining size experience is needed...

Aabhash has hands-on experience with XRD and particle-size measurements and is also trained Izamill user. I am keen that he keeps being in charge for setting up the analytical lab (including XRF and Izamill).

I will work on a more detailed plan for different plan-As (!), including manpower and possible equipment needed. Hopefully, we can get something together before your training week. 😊 I will talk to David Tuesday about this expansion.

Should I try to set up a meeting with Julie to explain expansion as a way to mitigate risks (in light of no plan B) ?

I will presumably work from home tomorrow (Monday). On the new plans and on ordering stuff and equipment for multiplying the flowcells.

Cheers
Bjorn

From: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Sent: Saturday, 14 August 2021 6:30 AM
To: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>
Subject: RE: Mitigating risk/stress/pressure

Hi Bjorn,

Plan B would be to do leeching beneficiation and abandon the second part. This part is straight forward and there's no magic in it. Also, having only this part still allows us to make zeolites, geopolymer, recover alumina, etc. Let's work on all three aspects simultaneously. If leeching was a problem that would be really unfortunate, but it is not so, we are lucky.

If we want to have plan C let's buy induction ovens and do the lithium chloride (I think it was chloride) route. We can also reinvent Boston Metal type of reduction, but high temperature and exotic materials are probably something we would like to avoid. This lithium chloride can be quite quick. Although, I don't know how to remove impurities dissolved in the electrolyte.

I think starting with deposition is also a good way to do things. We can try dissolution, but it will require nasty chemicals time, hazardous waste processing, etc. I think it will elevate the costs, but let's try it. We've got plenty of money and soon large place to accommodate growing personnel needs.

Aabash called me yesterday. He was quite stressed out and asked me if he could do leeching. It is more along his skills and interests. While he has done electrochemistry, it was mainly for simple electrode testing and comparison. He would feel much knowledgeable in beneficiation. I told him I will talk to you, but if we finally want someone to start on leeching full time, Aabash could be the one.

Have a good weekend,
Bart

From: Bjorn Winther-jensen <bjorn.wintherjensen@fmgl.com.au>
Sent: Friday, 13 August 2021 6:03 PM
To: Bart Kolodziejczyk <bkolodziejcz@fmgl.com.au>
Subject: Mitigating risk/stress/pressure

Hi Bartek,

apologies up front; this is not a very well-structured text, nor dealing with all aspects of our "situation".

I went for a walk today up at Walyunga National Park along a Swan River in full and vigorous flow. Actually, the path was closed due to flooding, but I took the chance and didn't even get wet feeds. 😊
Gradually my thinking is becoming more constructive, but not sure about the real outcome.

One obvious issue that we have (at least on R&D level, and one that is magnifying the pressure) is that we have no Plan B. Where plan B is understood as the safe fallback option from a target/stretched target. And we cannot make up any plan B under this definition with electrochemical green iron coming out in the other end. We can come up with a Plan A, a PlanA2 etc. but no Plan B.

To mitigate the risk, we must work on all A-plans in parallel. This is the Manhattan Project approach. One consequence of this is that the Manhattan Project famously ended up producing two different designs of atomic bombs, that both worked – some evil minds have even suggested that this was the real reason that Japan go hit with two nuclear bombs (!...).

Giving the leaching/downstream processing its own “life” is a step in this direction. In similar way we could/should start groups working on other plan A options. Like a system, A2, with iron (particle) deposition on the (moving ?) cathode; a system, A3, which contain a corrosion inhibitor; a system, A4, that is co-depositing a tiny bit of e.g. nickel on the iron particles to prevent corrosion until separation from the electrolyte (and could be a starting point for R&D in electrodeposition of higher value iron alloys) – - etc. etc. Maybe even a plan Ax that is revisiting dissolution/deposition in organic solvent blends. - !

In other words: we don't have the luxury to be able to predict the best or even possible solution at this point in time, so all reasonable options have to be pursued simultaneously.

If this is a “correct” analysis, then some structural changes are obviously required. Most obvious we need to form groups that works in parallel. i.e. (quite) a few more people both in the lab and in the mechanical “workshop”.

What do you think ? Am I getting totally of track here ?

Cheers
Bjorn

Bjorn Winther-Jensen
Technology Development Lead
Fortescue Future Industries Pty Ltd
Level 1, 6 Bennett Street, East Perth WA 6004

Twitter: @FortescueNews | www.ffi.com.au | www.fmgl.com.au

