Problem Statement **Worksheet** (Hypothesis Formation)

<What is the business problem you are investigating? (Use SMART principles)>

What spending activities for Monalco Mining can reduce operating and maintenance costs by at least 20% within the OEM operational limit through streamlining of Ore Crush Maintenance Expenditure?

1. Context

<Why are you working on this problem?>

With the increased market supply, which is rapidly overtaking demand, prices have now shifted downwards, averaging $55/ton. In response to worsening market conditions, the management team at Monalco has decided to focus on streamlining costs, particularly maintenance expenditure, to limit the impact this has on the business' profitability. The Original Equipment Manufacturer (OEM) guide states that the equipment are to be maintained every three (3) years and not every year.

Work Orders for the last year indicate we spent $30M for 2018 on ore crusher maintenance with this forecast to rise to $45M for 2019

Maintenance logs are indicating 'excess wear' is responsible for at least 80% of work requests.

2. Criteria for Success

<What is the key criteria that will deem this work successful?>

Reduce at least %20 worth of costs over the year w.r.t ore crusher maintenance, creating a buffer enough to weather future downward shifts in pricing.

3. Scope of Solution Space

<What is the focus of this business initiative? I.e. What are your specific items will you focus on exclusively?>

Can't cut more than the recommended OEM limit of one maintenance event at every 50,000 tons of iron ore processed.

4. Constraints within solution Space
<What is the focus of this business initiative? I.e. What are your specific items will you focus on exclusively?>

Resistance from the reliability engineering team.

A breakeven of $50/ton is not a sustainable price level.

5. Stakeholders to provide key insight
<What is the focus of this business initiative? I.e. What are your specific items will you focus on exclusively?>

Chanel Adams – Reliability Engineer
Jonas Richards – Asset Integrity Manager
Bruce Banner – Maintenance SME
Jane Steere - Principal Maintenance
Fargo Williams – Change Manager
Tara Starr - Maintenance SME

6. Key data sources
<What are the key pieces of data you need to answer the questions related to the problem you are trying to solve?>

1. Data Historian-This includes information on how many tonnes of Iron Ore have been processed with the ore crushers.

2. Ellipse-This includes information on the old work orders that used to be raised for our equipment, before the upgrade to SAP.

3. SAP-This is the most up-to-date information source on our equipment logs and work order requests that have been raised for maintenance work for our ore crushers and other pieces of equipment

4. T3000DCS–Sends raw streaming data on vibrations, temperature, and the humidity of the ore crushed to Data Historian

5. Ore Crusher System-This includes a high-level process map outlining how the Ore Crusher System works for individual ore crusher models.