

# Selected Mining Case Studies

River Logic



# Case Studies

1. Top 3 Nickel Mining Company
2. Top 3 Iron Ore Mining Company
3. Top 3 Coal Mining Company

# Top 3 Nickel Miner

## **Project Overview**

- This company is one of the world's largest mining companies. It is Australia's fourth largest company (by revenue), formerly the largest.
- The client is a multistage integrated business incorporating mining, concentrating, smelting, and refining with multiple logistics routes between operations and for transporting products to market.
- The client needed to update tools for short-term, medium-term, and life-of-asset production planning that existed as separate spreadsheet systems for each time horizon and has no integration between physicals and cash flows.

## **Solution**

- River Logic's Partner chose to do a six-week MVP to prove the model's capability and value opportunity.
- The result of the MVP was a fully working model of one plant with operational and financial data for a 12-week time horizon.
- Five scenarios for comparison:
  - Impacts on operations by increasing the foreign exchange rate
  - Impacts on operations by decreasing the foreign exchange rate
  - 1A down—notional cash flow impact by removing 1A
  - Half cliffs —notional cash flow impact of halving the volume of cliffs
  - Change the concentration and recovery requirements for nickel
- Objective functions: notional cash flow, revenue, volume, grade, and cost

## **Impact**

A **3% increase** resulting from the optimization for notional cash flow by affecting grade and product

Optimized for revenue with the **assessment of the foreign exchange effect**

Optimized to **maximize nickel content and revenue**

A **cost reduction of 6%** by the standardization of concentrator flow

# Top 3 Iron Ore Miner

## *Planning and Scheduling*

### **Project Overview**

- One of the world's largest mining companies
- Australia's fourth-largest company (by revenue), formerly the largest
- \$65B in revenues, over 240M tons of iron ore
- Looking to replace their short- and medium-term planning systems for mine, rail, and port to move from the current state of utilizing multiple tools to a future state of a single integrated system
- Planning/scheduling was highly time-consuming; used over 60 spreadsheets
- Minimal integration across the supply chain and time horizons
- Manual processes were used to gather data from multiple sources

### **Solution**

- The minimal viable product was completed within three weeks to deliver a port model in a single tool (Enterprise Optimizer) to validate the approach, business case, and project timing.
- The MVP proved that the tool could replace all current processes and cater to multiple time horizons; it would extend across the supply chain from mine to port and includes operational, financial, and variable data.
- The new logistics planning tool:
  - Integrated the supply chain
  - Reduced the size of the planning team, thus reallocated to the "insight" role
  - Reduced the total planning time for short and medium term
  - Included operational, financial, and maintenance data with weather events
  - Offered real-time "what if" capability

### **Impact**

Development of a single integrated system for mine, port, and rail which **replaced 60 spreadsheets**

Solution accessible to multiple business areas with single portal user experience

Ability to **optimize on multiple objective functions** (e.g., volume, cost, revenue) evolved

Automation of the transfer of production data into integrated planning systems for mine, port, and rail

Capability of **handling multiple grade requirements** (e.g., vessel product configurations, lump fine splits, etc.)

Expected impact of **4–5% net margin improvement**

# Top 3 Coal Miner

*Maximize profit through optimization of mining assets using a transparent and integrated system across the coal chain*

## Problem Statement

- ✓ Within CMJV there is no integrated system in place to integrate mine schedules, washing strategies, blend plans and shipping schedules that is intuitive and empowers users to make optimal planning decisions
- ✓ Stop gap solutions in place with Spreadsheets for short and long term planning
- ✓ Move from multiple spreadsheets to single integrated model for optimisation of supply chain with a strong cloud based user interface for multiple users to analyse and view

## Model characteristics

- ✓ ROM to Ship model for CMJV, including ROM stockpiles, CHPP, Product stockpiles, Rail & Port
- ✓ 18 month model horizon, with Daily, Weekly and Monthly time periods as required (minimum first 4 months as weekly time periods)
- ✓ Inputs by pit/strip/block with quality parameters
- ✓ Up to 4 density cut options at CHPP with associated yields
- ✓ Max stockpile capacities for all stockpiles (ROM & product)
- ✓ Quality parameters of Ash, VM, Phos, TS & FL
- ✓ Quality parameters associated with each product
- ✓ Max train capacity for each distinct route
- ✓ Base currency AUD with USD prices
- ✓ 24/7 operations with downtime factors and planned maintenance hours

## Scope

Deliver an integrated long term (12 month) and short term (60 days) planning tool that takes the following inputs:

- ✓ Mining schedule
- ✓ Multi-density yield and product quality model
- ✓ CHPP time utilisation and feed rates
- ✓ Stockpile capacities
- ✓ Starting stock position and quality
- ✓ Shipping schedules and customer qualities

Based on the inputs above, the optimiser for a given objective will generate an optimal processing and blending solution:

- ✓ Maximise sales volume
- ✓ Maximise margin
- ✓ Maximise cash

## Early Insights delivered

- ✓ Greater visibility and clarity across organisation through planning with integrated operational and financial data (what data is being used to drive solution and drill down into outputs)
- ✓ Ability to have robust conversations with organisational teams on objective functions (Revenue vs cash flow vs throughput etc.)
- ✓ Alignment of operational and financial trade offs by having a truly data driven optimised rationale behind view points (wash density vs yield)
- ✓ Agility and speed of scenario generation (20 min vs 3 days)
- ✓ Removal of subjectivity and manual manipulation of key operational and financial decisions
- ✓ Standardisation and centralisation of ongoing planning processes
- ✓ Additional use cases being identified that will deliver business value based on the success of the platform implementation to date and results being generated

# Top 3 Coal Miner: What was achieved?

The company required an integrated planning platform that provides a single source of truth for planning decisions relating to the ROM stockpile to Ship loading process. In addition, this platform is required to provide optimisation capability for multiple objective functions, including profit, cash flow, and throughput.

Value created:

- Early identification of uncommitted sales opportunity to increase revenue by 5%\_within a 16 week plan
- Reducing avoidable demurrage costs through model solutions that optimise shipping nominations
- Greater visibility and clarity across organisation through planning with integrated operational and financial data
- Delivery of wash and blending plans for tighter control of product specifications, avoiding losses on products over specifications, and penalties on shipments under contract specifications

## Impact

**A 5% increase in revenue within a 16-week plan** due to early identification of uncommitted sales opportunities

A reduction in avoidable demurrage costs through model solutions that optimize shipping nominations

**Greater visibility and clarity across the organization** through planning with integrated operational and financial data

The delivery of wash and blending plans **for tighter control of product specifications**, thus avoiding losses on products over specifications and penalties on shipments under contract specifications