Opportunities and challenges facing Mining Supply

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Finance Vice presidency
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1. AMSA highlights
2. AMSA Business Strategy
3. AMSA Mine Sites
4. AMSA Projects
5. AMSA Corporate Supply Structure
6. AMSA Supply Platform and Systems
7. AMSA Corporate Supply Ecosystem
8. AMSA Supply Role and Message to Suppliers
Highlights

**Results 2017:**
- AMSA achieved its main objectives, the most important **zero fatal accidents**.
- Production and costs were in line with the AMSA’s expectation, production of **704,300 tons** of copper and net cash cost of **US $ 1.25 per pound**.

**Target 2018:**
- AMSA’s goal for 2018 is to produce between **705,000 and 740,000 tons** of copper, with a net cash cost of **US $ 1.35 per pound**.

**Projects:**
- Completed Oxide Encuentro and Moly projects in Centinela 5% under budget
- Approved Environmental Impact Study (EIA) of the Complementary Infrastructure Project of Los Pelambres (INCO).
- Mining Development (DMC)
- Recovery of secondary sulfides (CMZ)
- Twin Metals Project (recovered two key mining licenses for its development)

**Business vision:**
- Innovation and technology road map, Digital collaboration Platform establishment with employees, contractors and suppliers to reduce costs and improve productivity. Example: Potential Autonomous trucks in Esperanza pit.
Our Strategy

STRATEGY

In order to achieve its mission, the Group has a business strategy based on strengthening its current operations and using these as a platform for growth.

OBJECTIVES

1. CORE BUSINESS
   To optimise and improve existing operations.

2. ORGANIC AND SUSTAINABLE GROWTH OF THE CORE BUSINESS
   To achieve sustainable, organic growth, from further developing the areas around the Group’s existing asset base in Chile.

3. GROWTH BEYOND THE CORE BUSINESS
   To seek growth beyond the Group’s existing operations both in Chile and internationally.

OPERATIONS AND PROJECTS

Los Pelambres, Centinela, Antucoya and Zaldivar.

Incremental Expansion Project at Los Pelambres.
Centinela Second Concentrator.
Encuentro Oxides and the Molybdenum Plant projects at Centinela.

Chile: Exploration.
United States: Twin Metals Minnesota.
Mine Sites

**MINERA ANTUCOYA**
- Founded: 2016
- Life of Mine: 2038
- Production 2017: 80,522 Copper Tons
- Antofagasta Minerals Property: 70%

**MINERA ZALDÍVAR**
- Operation start: 1995
- Life of Mine: 2029
- Production 2017: 103,302 Copper Tons
- Antofagasta Minerals Property: 50%

**MINERA CENTINELA**
- Founded: 2014
- Life of Mine: 2067
- Production 2017: 228,319 Copper Tons
- Antofagasta Minerals property: 70%

**LOS PELAMBRES**
- Operation start: 1999
- Life of Mine: 2050
- Production 2017: 343,758 Copper Tons
- Antofagasta Minerals property: 60%
Location:
Los Vilos, Salamanca and Illapel; Region Coquimbo

Property:
60% Antofagasta Minerals

Project Type:
Processing to sustain LOM extensión (rock Hardness)

Treatment capacity:
15 ktpd in Phase I and 10 ktpd in Phase II, of sulphide ore

Investment:
US $ 1,100 million (Phase I)

Environmental processing:
EIA Phase I approved and Phase II in preparation

Current state:
Construction Phase I Start expected in 2019

The project contemplates the reinforcement of the capacity of mineral processing by installing a new “grinding line” and a new “water line” in the current Chacay plant. Also, the project considers the construction of a “desalination plant” to maintain the production of fine copper around 400,000 tons per year. The plant capacity to generate up to 400 liters per second of industrial water, which will support the requirements of the operation in case of drought. The project Considers “4 EPC work package” and a “Power line “23Kv (7 kms). Multiple goods and services required by the main contractors.
Centinela - DMC Project

Location:
Municipality of Sierra Gorda, Region Antofagasta

Property:
70% Antofagasta Minerals, 30% Marubeni corporation

Project Type:
Extension until year 2067

Treatment capacity:
90,000 tpd in a 1st Phase and 2nd Phase move to 150,000 tpd (130 – 200 ktCu/year)

Investment:
US $ 2,700 million (1st Phase) + US $ 1,650 million (2nd Phase)

Environmental processing:
RCA approved (December 2016)

Current state: In evaluation. It is estimated that the start-up of the first stage of the project would be during the next decade

This project increase its capacity of ore processing to exceed 400,000 ton of fine copper per year in the next decade. The initiative add two new sites (Esperanza Sur and Encuentro Sulfuros), a new “concentrator plant”, a new “water line system” of sea (145km) and a new “deposit of thickened tailings”. The company is evaluating the options for the development during this year. Multiple goods and services required by the main contractors.
Zaldívar -Secondary Sulfides Recovery Project

**Location:**
Region Antofagasta, Chile

**Property:**
50% Antofagasta Minerals, 50% Barrick Gold

**Project Type:**
Extension until year 2029

**Treatment capacity:**
110 – 140 ktCu/year

**Investment:**
US $ 150 million

**Environmental processing:**
Pertinency to SEA in progress (expected approval Q2 2018)

**Current state:**
Feasibility study under completion during Q4 2018

This project increase copper recovery by the introduction of Chloride leaching (Cuprochlor technology). This initiative consider to modify the current SX plant to introduce new stages of washing. Also its considered the addition of the new reagent system and some modifications to improve the corrosion resistance of the plant.
Corporate Supply Structure

Finance VP (CFO)
Alfredo Atucha

Corporate Supply (CPO)
Karl Jockel

Supply Planning and Controlling

Supply Planning

Corporate Categories

Materials & Purchasing Manager
Patricio Diaz

Logistics Manager
Andres Cortes

Logistics Specialist
Sebastian Garderes

Demand Planners
Sergio Acevedo
Johan Peña
Mario Ramos
Paulina Leiva

Procurement Specialists
Marco García
Patricio Torti
Dayan Mandiola
Raul Parraguez
Lev Ayca
Ximena Martínez
Patricia Adriazola

Operation Categories

Supply Manager (CMZ)
Claudio Icaza

Supply Manager (ANT)
Carlos Mella

Supply Manager (CEN)
Rodrigo Medel

Supply Manager (MLP)
Samuel Mendoza

Contract Services Manager
Mario Suarez

Contract Specialist
Alejandra Norero

Contract Specialist
Victor Cancino
Christian Diaz

Contract Specialist
Gabriel Flores
José Cifuentes

Contract Specialist
Max Núñez
1 #

Strategic Sourcing Manager (Opex)
Pablo Hamame

Strategic Sourcing Manager EME/EMT
Marco Zumarán

Project Supply Manager
Carlos Machuca

Project Contract Specialist
Alejandra Norero

Strategic Sourcing Manager
Karl Jockel

Corporate Categories

Santiago

Mine sites
## Platforms, Systems and Advisors to Supply

<table>
<thead>
<tr>
<th>Company</th>
<th>Purpose</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Ariba</td>
<td>e-commerce Platform and Ariba Network</td>
<td>Auditable, transparent and efficient sourcing processes</td>
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<tr>
<td>regic empowered by Achilles</td>
<td>Supplier Database</td>
<td>Supplier registered and available to bidding process</td>
</tr>
<tr>
<td>artikos</td>
<td>Payment system to suppliers</td>
<td>Centralized payment process for all sites</td>
</tr>
<tr>
<td>SICEP</td>
<td>Supplier Database</td>
<td>Supplier registered and available to bidding process</td>
</tr>
<tr>
<td>SIGA</td>
<td>Integrated System of Accreditation Management and Access Control</td>
<td>Standardized, efficient &amp; Online accreditation</td>
</tr>
<tr>
<td>MIQ</td>
<td>MIQ Logistics International Freight Forwarding services export and import.</td>
<td>Improvement in shipments consolidation</td>
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<tr>
<td>SITRANS</td>
<td>Scheduling process in Sitrans GTS platform for delivery of materials to AMSA´s sites</td>
<td>Improvement in consolidation and control efficiency</td>
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<tr>
<td>BCG</td>
<td>Consultancy to improve costs and productivity in contracts at Centinela, Antucoya and Zaldivar sites</td>
<td>Contracts optimization</td>
</tr>
<tr>
<td>BAIN &amp; COMPANY</td>
<td>Consultancy to improve costs and productivity in contracts at Los Pelambres´ site</td>
<td>Contracts optimization</td>
</tr>
<tr>
<td>TRIPONTIS</td>
<td>Service Contract Administration Model</td>
<td>Controlled and Improved contractor performance</td>
</tr>
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<td></td>
<td>Power6 Supply Program</td>
<td>Defined Supply team priorities focused on 6 working areas</td>
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Corporate Supply Ecosystem

**EX: LINERS SAG TEST**
Tender process during 2017 considers test protocol, performance and several suppliers to have different technologies opportunities to measure performance during the contract life.

**EX: 3” BALL TEST**
Tender process consider performance analysis and cost element structure analysis for ball test done for mine sites and validated by corporate Technical team.

**TECHNICAL PLANT & MINE PROCESS**
Define the corporate technical guidelines for the mine sites and fundamental role in the interrelation with Supply chain in the elaboration of the strategy for the categories.

- Delivery support in the elaboration, standardization and validation of the technical specification at corporate level
- Support for Test Protocols
- Validation of tests in plant and mine.
- Sponsor at corporate events and workshops
EX: TCO ANALYSIS FOR EQUIPMENTS:
TCO consider productivity analyses during the equipment life, where cost element structure analyses was essential to identify **25% cost difference**.

**5 main cost elements for equipments:**
- Capex: capital cost.
- Spare part: cost of replacing parts and components.
- Fuel & Lubes: consumes
- Labor: maintenance and operation labor cost.
- Tires: tires consumes.

MARKET INTELLIGENCE
Handles relevant information through public and private sources for in-depth analysis of the different categories
- Determination of cost structure.
- Interpretation of income statements, Memoirs of suppliers
- Analysis of readjustment formulas.
- Analysis of imports to the region.
- Support in negotiations with strategic suppliers.
Focus for Compliance:
- 20.393 Law
- Uk Bribery act
- Untitrust
- UK Modern Slavery Act
- Ethics in business
- (Invitations - gifts - complaint line - supply role)

AMSA AWARDED “GENERACION EMPRESARIAL”
Amsa is recognized for doing ethical business and awarded by “financial” newspaper in 2017.

COMPLIANCE
Define the guidelines for compliance with company policies and procedures.
- Supplier risk analysis and business risk matrix.
- Part of the process of review and approval of suppliers in the group Tender processes
- Review of PEP situations (Politically exposed persons).
**LEGAL**

Defines the legal corporate guidelines according to current regulations for the companies of the group which plays a fundamental role in the interrelationship with Supply in the preparation and review of contracts.

- Support in revision of the clauses of contracts in negotiation
- Standardization of clauses at the corporate level

**EX: SUPPLIER ANALYSIS PLATFORM IN PROGRESS**

The finance area is working on developing a platform for supplier analysis workflow

- Financial Analysis
- Risk Analysis

**Benefits expected**

- Simplify daily tasks by automating the movement of data Risk Analysis.
- Create and deploy customized workflow processes for SAP processes.
- Reduce the time on manual SAP processes by using workflow processes.
- Improve data quality and security.
- Better performance and traceability data for audits.

**FINANCE AND INSURANCE**

Defines the company's Financial and Insurance guidelines.

- Define financial ratios
- Part of the evaluation process of financial ratios of the EEFF suppliers
- Insurance analysis
OPERATIONAL EXCELLENCE

Identification of key value drivers, bottleneck and root causes to boost the corresponding initiatives with the objective of supporting the owners of an improvement initiative in identifying, evaluating, designing and implementing their actions.

EXAMPLE: SUCCESSFUL DOSAGE OF REAGENT CASE:
The identification process obtained benefits of 52% variability dosage control and 10% g/ton reduction product.

- Pump automatization
- Control of variability dosage
- Normalize dosaje equipment.
Corporate Supply Ecosystem

4 Strategic principles for Innovation:
- Strategic Initiatives: Primary Sulphide Leaching and Tailings Management
- Internal initiative: Implementation of Platform Innovaminerals
- External Initiatives: Capture innovation from other industries, research centers, universities
- Technological Adoption: Road map technologic

6 main areas of focus for Innovation:
- Automation And Robotics
- Energy Efficiency
- Movement Of Large Volumes Of Material
- Impact On Social Contribution On Communities
- Tailings Deposit
- Low Grade Minerals

INNOVATION
Raise potential innovation opportunities to finance that require development and that have real potential to generate value in the processes, people or communities that surround us.
CHALLENGES FOR MINING
- Early adoption of technologies and innovation from others industries
- Productivity and low grade ore.
- Validation of supplier technologies, Pilot tests and Industrial tests
- Expert capabilities and high specialization to the operations
- Diversity and inclusion
- Market opportunities analysis (China, India, etc.)
- Electromobility, big data, integrated operations.

SUPPLY CHAIN ROLE
Key area to create value as part of the Ecosystem
- Identify opportunities to be "partnerships" and become preferred customers
- Safety and Sustainable, Communities, Corporate Social Responsibility (RSE)
- Develop should cost models, Total Cost of Ownership methodology
- Develop suppliers, Technologies and Innovation
- Implement supplier relationship management
- Cost reduction and supply assurance
- Develop market knowledge

OPPORTUNITIES FOR SUPPLIERS
- Empowerment of innovation and entrepreneurship ecosystem
- Product and Services differentiation (TCO analysis)
- Help to make viable new construction projects (know how)
- Offer products with better performance, lead time and TCO.
- Offer services with greater productivity, well designed and planned processes. (optimized staffing, KPI commitments, improvement of indicators during the contract, continuous improvement agreed between the parties), integrated businesses (partnership)
- Contribution to the production process
- Reverse Logistic (recycling, scrap management)
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