

WWW.SAXUM.US



# LITHIUM QUALIFICATIONS

*PROJECTS & EXPERIENCE*

## MISSION & VISION

**SAXUM** is a multi-disciplinary engineering and project management services enterprise specializing in the mineral processing, oil and gas, and infrastructure industries. It includes 4 (four) companies in the USA, Brazil, Australia and Argentina, and 6 (six) offices, in Tucuman and Buenos Aires, Argentina; Irving, TX, USA; Belo Horizonte, MG, Brazil; and Perth, WA, Australia.

### MISSION

Provide high-quality, accurate and cost-effective engineering and project/construction management services to the industry through the continuous improvement of our professionals until excellence is achieved.

### VISION

To enhance our clients' bottom-line results through efficient engineered solutions and management, and accurate cost estimates and planning for their industrial projects, everytime, everywhere.

*Providing multidisciplinary technical assistance with excellence since 1996*



## ENGINEERING AND EPCM CAPABILITIES ALL AROUND THE WORLD



**ARGENTINA**  
TUCUMAN  
BUENOS AIRES

**BRAZIL**  
BELO HORIZONTE

**UNITED STATES**  
DALLAS, TX

**AUSTRALIA**  
PERTH



*SAXUM in its continuous improvement process has adapted all the procedures to the highest international requirements with the ISO 9001:2015 quality certification.*

## SERVICES

We differentiate ourselves from other engineering companies by offering strong expertise and knowledge in Engineering, Procurement, and Construction Management (EPCM) services for mineral processing industries (cement, lime, mining), as well as the Oil & Gas and infrastructure industries.

Our services are characterized by high level project management and engineering teams which allow our clients to rely on our way to execute their projects with a focus on delivering either refurbished or new facilities within realistic schedules and budgets as well as optimal technical solutions.

- AUDITING
- CONSULTING SERVICES
- FEASIBILITY STUDIES
- EPCM SERVICES
- PLANNING AND PROJECT CONTROL
- PROCUREMENT
- LOGISTIC & EXPEDITING
- COMMISSIONING
- SITE SUPERVISION
- MULTIDISCIPLINARY ENGINEERING
- CAPEX/OPEX EVALUATIONS
- CONCEPTUAL, BASIC & DETAILED DESIGNS
- TRADE OFF STUDIES



# CLIENTS

## NORTH AMERICA

VCNA Charlevoix	Martin Marietta
St Marys Cement Inc	FLSmidth
Cementos Fortaleza.	BUZZI UNICEM
CEMEX	GCC
Drake Cement	Votorantim Metals NA Inc.
Nelson Brothers	TKS Group
LAFARGE - HOLCIM	HEIDELBERG CEMENT
Lattimore Materials Corp.	GIANT CEMENT
Panamerican Silver	RECON
Fortuna Silver Mines Ltd.	Intrepid Mines Ltd.
Lattimore Materials	Elementia S.A.B. de C.V.
Barrick Gold Corp	Titan Cement
FMC Corp	Orvana Minerals Corp.

## EUROPE

LAFARGE - HOLCIM	CEMEX
Italcementi	Thyssenkrupp AG
CIMPOR	FL Smidth
Cementos Molins	Bilfinger
Fives FCB	Cementos Portland
Hochtief AG	Valderribas
Siemens AG	Calucem

## ASIA

LAFARGE-HOLCIM
Inter cement
SINOMA
Taiwan HS Rail Corp.
Bilfinger

## MIDDLE EAST & AFRICA

Bilfinger & Berger
QN Cement Company
Inter cement
VOTORANTIM
Sotacib, Grupo Molins
Kuwait Cement Co.

## DOMINICAN REPUBLIC

Grupo Estrella

## SOUTH AMERICA

▶ See next page

## AUSTRALIA

Ernest Henry Mining (GlencoreXstrata)
Adbri Cement
Cockburn Cement Ltd

# CLIENTS

COLOMBIA	
Grupo ARGOS	Cerro Matoso
CEMEX	BHP
Ultracem	

BOLIVIA	
CEMEB	Liongold
SOBOCE	Itacamba
Votorantim	

ECUADOR	
FCT Internacional	
Cemento Chimborazo	
EPCE	
UCEM	

BRAZIL	
CSN	Zamil Steel
Camargo Corrêa	Itambé
Holcim	CIBAHIA
Votorantim	Atec Greco
Cimentos Liz	Votorantim Metais
Cimpor	Monsanto
Inter cement	Vale do Rio Doce
Cimentos da Bahia	Rio Tinto
ICON	Fives FCB
Cemengal	Klavin

PERÚ	
Anglo American	ARPL
UNACEM	GlencoreXstrata
Cementos Yura	Buenaventura
Cementos Otorongo	Minera IRL
Cemento Pacasmayo	Southern Peru Copper Corp.
Panamerican Silver	
Calcesur	Hochschild

URUGUAY	
Cementos del Plata	
Cementos Artigas	

CHILE	
Cementos Bio Bio	Barrick Gold
Minera Cal Norte	Southamerican Gold
Cemento Polpaico	Anglo American
Procter & Gamble	Minera Esperanza
GlencoreXstrata	Teck Chile



ARGENTINA	
SINOMA	Yamana Gold
Loma Negra	AngloGold Ashanti
Minetti (Holcim)	Minera IRL
Cementos Avellaneda	Intrepid Mines
UCEM	Goldrock Resources
ULTRACEM	Eramet Ingeniería
Grupo Cartellone	FMC Lithium
Camargo Corrêa	Goldcorp
FLSmith	Exeter Resources
Barrick Gold	Panamerican Silver
GlencoreXstrata	Silver Standard
Molinos Rio de la Plata	Minera Aguilar
Aceitera Gral Deheza	Lithium Americas Corp.
Monsanto	Hochschild Mine
Pluspetrol	Aluar
Procter & Gamble	Buenaventura
Minera Alumbrera	YMAD
Galaxy Lithium	LIEX
AbraSilver	Imeris
Orocobre	Newmont Goldcorp.
Borax Argentina SA	Sales de Jujuy

## **PROCESS ENGINEERING & PLANT OPTIMIZATION**



PROCESS AUDITING, CAPACITY UPGRADES

TROUBLESHOOTING

OPERATIONS ANALYSIS

MASS AND ENERGY BALANCES

PROCESS CALCULATIONS AND FLOW DIAGRAMS

ANALYSIS OF OPTIMUM MATERIAL STORAGE REQUIREMENTS

DEVELOPMENT OF COST-EFFECTIVE ENGINEERING SOLUTIONS

COMMISSIONING

## ENGINEERING

### MECHANICAL ENGINEERING & PLANT DESIGN



SYSTEMS INTEGRATION WITH MULTIPLE VENDORS

PLANT LAYOUTS

GENERAL ARRANGEMENTS

FULL 3D MODELLING

EQUIPMENT TECHNICAL EVALUATIONS

EQUIPMENT SIZING AND CAPACITY DETERMINATION

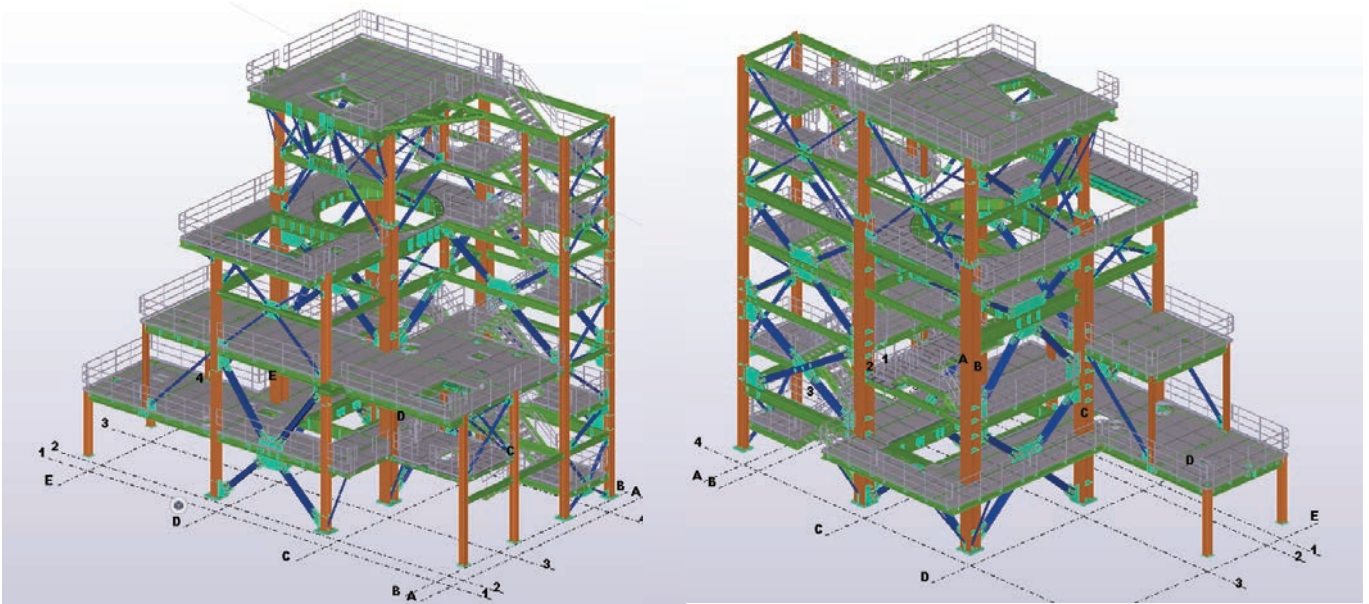
EQUIPMENT AND INSTALLATION SPECIFICATIONS

DUCTWORKS

ENGINEERING DESIGN: PIPING SYSTEMS - MATERIAL HANDLING SYSTEMS  
PROCESS EQUIPMENT LAYOUTS



## **CIVIL & STRUCTURAL ENGINEERING**



STRUCTURAL ANALYSIS & DESIGNS (INCLUDING HIGH SEISMIC & HURRICANE ZONES) FOR INDUSTRIAL PLANTS

EVALUATION AND IMPLEMENTATION OF GEOTECHNICAL REPORTS

STRUCTURAL DESIGN BASED ON VIBRATION MITIGATION

DYNAMIC FOUNDATION ANALYSIS

DESIGN OF REINFORCED CONCRETE AND STEEL STRUCTURES

CONCRETE SILOS AND BUNKERS

STEEL BINS AND HOPPERS

TUNNELS AND UNDERGROUND STRUCTURES

DESIGN OF ROADS, EARTHWORKS, AND SLOPES.

DESIGN OF PONDS AND TAILING DAMS.

STABILITY ASSESSMENT OF SOIL/ROCK SLOPES.

## **ELECTRICAL ENGINEERING**



POWER DISTRIBUTION SYSTEMS

INSTRUMENTATION AND CONTROLS

HMI INTERFACE COORDINATION

PLC PROGRAMMING

MOTORS (MEDIUM VOLTAGE AND LOW VOLTAGE)

MEDIUM VOLTAGE STARTERS AND BREAKERS

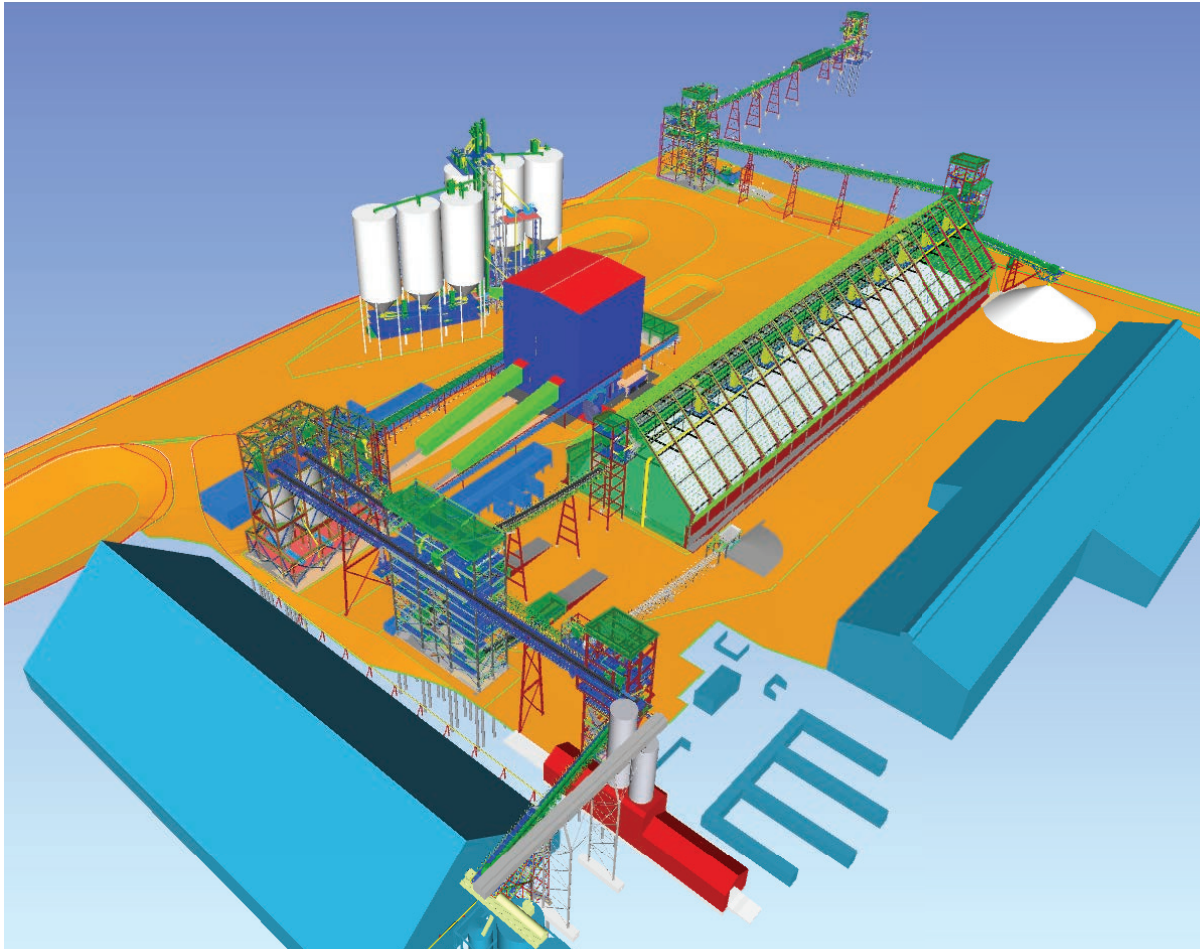
TRANSFORMERS

MOTOR CONTROL CENTERS

SHORT CIRCUIT ANALYSIS

POWER STUDIES

## 3D MODELLING FOR FULL PROJECT INTEGRATION



INTEGRATION OF EQUIPMENT ENGINEERING WITH THE CIVIL, MECHANICAL FABRICATION AND ELECTRICAL ENGINEERING

SHOP DRAWING REVIEWS

FABRICATION SHOP INSPECTIONS

COORDINATION OF MATERIALS FABRICATION FOR CONSTRUCTION AND DELIVERIES TO THE JOB SITES

## PROJECT MANAGEMENT

SAXUM has a strong and highly experienced team of Project and Construction Managers with deep knowledge of the involved complexities and required procedures for managing EPCM services related to the mineral processing industries. Our services include, among others, the following:

DEVELOP OF PROJECT EXECUTION PLAN

DEFINE AND FOLLOW UP PROJECT SCHEDULE

ESTABLISH MOST APPROPRIATE ORGANIZATION CHART TO ACCOMPLISH PROJECT OBJECTIVES REGARDING QUALITY, COST AND SCHEDULE

DEVELOP CONTRACTUAL TERMS AND CONDITIONS REGARDING WITH ALL PROJECT PROVIDERS

CONTRACTS FOLLOW-UP

MANAGEMENT OF CONSTRUCTION, ENGINEERING; PROCUREMENT AND COST CONTROL TEAMS

COORDINATE COMMUNICATIONS BETWEEN ALL PARTIES INVOLVED IN THE PROJECT

ISSUING OF WEEKLY AND MONTHLY PROJECT REPORTS WITH DETAILED PROJECT STATUS ANALYSIS, EARLY WARNING OF CONFLICTS/ISSUES IN PROJECT SCHEDULE AND ACTION PLAN FOR THEIR SOLUTIONS



## CONSTRUCTION MANAGEMENT

SAXUM's Construction Management is the core of the company's services. It involves the direction, regulation and supervision of a project from early development to its completion and is responsible for planning work schedules, coordinating the most efficient method and construction strategies and budgeting.

The team is composed of multidisciplinary professionals that allow us to administer the different disciplines, such as: Civil/Structural, Mechanical, Electrical and Instrumentation, Safety, Contracts, Administration, Commissioning, etc.

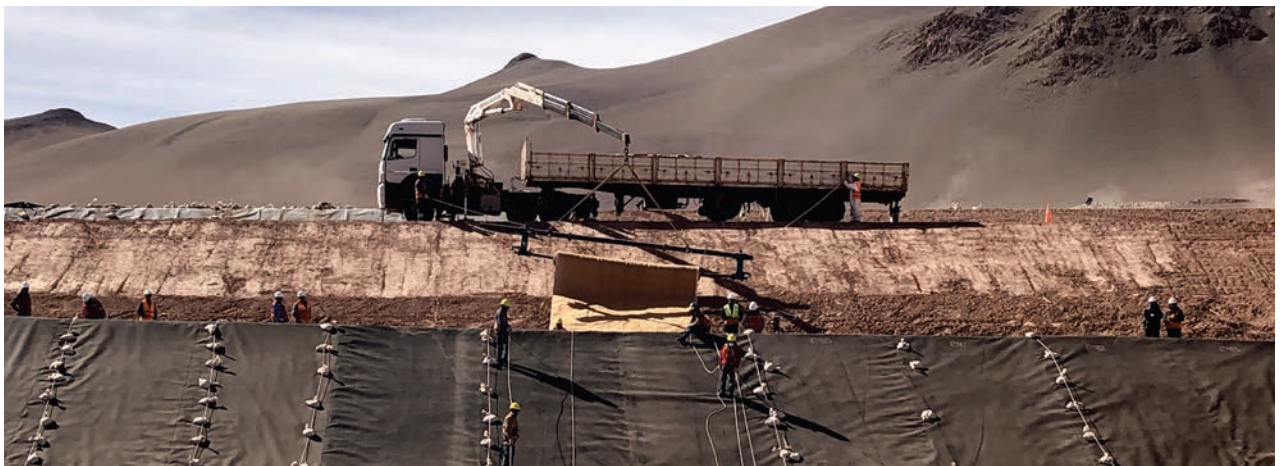
Our experience, strong focus to project objectives, and the mutually reinforcing joint-work between our professionals of all different departments, allows us to be the tailor-made solution for our customers' EPCM projects.

### PROJECT SUCCESS

SAXUM's Construction Management team knows that Project Success is all about organization, planning and follow-up work to achieve the results that comply with client requirements and design criterias. These are all challenging tasks, particularly in the mining industry at high altitudes, where we find sensitive environments that include special local communities and cultures, harsh weather, and strong technical and logistics difficulties.

### RESOURCES

To achieve a succesful project under these tough conditions, SAXUM has all the necessary resources to be strongly focused in safety and environmental control, strong planning in advance (FEL – PDRI), excellent Project Control, field supervision and administration management. The key word for SAXUM, as EPCM and project integrator, is Team Work, that include all project's stakeholders: client, EPCM, contractors, consultants, vendors, local authorities and communities, unions, etc.



## PROCUREMENT

SAXUM's team of multidisciplinary professionals has extensive experience in procurement services supported by our first class engineering team which covers all technical disciplines. Our procurement services are based on proven procedures and cover a wide range of activities, from the preparation of bidder lists and contractual terms, to expediting, logistics and QA/QC.

SAXUM's procurement team provides our client an integral and detailed service to assure the fulfilment of projects objectives regarding quality, cost and schedule. Our team has proven ability to complete the acquisition of all items and close all contracts of highly complex industrial projects within short time-frames, and in the framework of project budget and quality.

### SUPPLY CHAIN ACTIVITIES

- HIGHLY EXPERIENCED PROFESSIONALS
- PURCHASING & ACQUISITIONS
- VENDOR DEVELOPMENT & AUDITS
- CONSULTING SERVICES
- PROCESSES AND PROCEDURES
- INTERNATIONAL IMPORTS & EXPORTS
- CUSTOMS CLEARANCE CONSULTING SERVICES
- LOGISTICS - DOMESTIC & INTERNATIONAL
- CONTRACTING & OUTSOURCING
- CONTRACT MANAGEMENT & ADMINISTRATION
- COSTS AND BUDGETING PROJECTS
- MATERIALS MANAGEMENT
- KPI'S



## PROJECT CONTROL

SAXUM manages all aspects of the construction process, from the initial design phase to the end. Throughout, we maintain constant communication between all parties, while satisfying the interests and needs of the owner. SAXUM's Project Control Teams offer their clients a wide range of project management services. The services are adapted to each project to meet the needs and wishes of the owner. The following list represents a general description of our project management services:

### PROGRAMMING

Project Control has extensive experience in selecting and directing programming consultants. This experience in working with programmers will insure that the owner's facility needs are clearly determined and defined.

### SCHEDULING

Our experience in managing the entire process, not just any segment, allows us to prepare reliable project schedules for both the design and construction phases early in the project development stage.

### CONSULTANT SELECTION

Project Control assists the owner in selecting the most qualified consultants for various projects by preparing requests for proposals, evaluating the proposals and making recommendations to the owner.

### MONITORING

To finish a project on time, within budget and with the desired quality, professional monitoring on a daily basis is necessary.

### EARNED VALUE

SAXUM works constantly with the owner and design team during the completion of documents to review savings opportunities while the project design is being developed. SAXUM uses the Earned Value Management System Technique.

### REPORTING

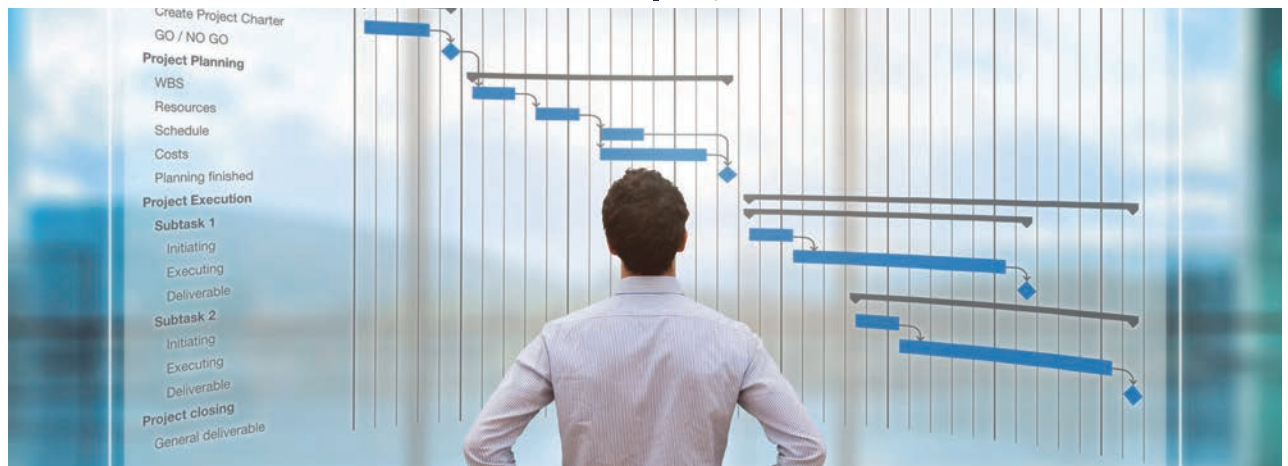
SAXUM prepares written monthly status reports for distribution to the appropriate parties. The reports address the current status of each individual project.

### CONTRACTING

Project Control has prepared and negotiated hundreds of contracts for owners on over 100 projects with an aggregate value of over millions dollars. Our contracts have been developed from the owner's perspective for the benefit of the project.

### CLOSE OUT

During the final stages of project completion, Project Control closely monitors the activities of the contractor to make certain that punch list items are promptly completed.



## ADVANTAGES OF WORKING WITH US

TOTAL RESOURCES IN HOUSE

KNOW-HOW AND EXPERIENCE IN MINING SOLUTIONS

LEADERSHIP IN DETAILED ENGINEERING SOLUTIONS

DEEP KNOWLEDGE OF STANDARDS AND CONSTRUCTIVE PROCEDURES

ENGINEERING MANAGEMENT ORIENTED TO SATISFY CLIENT TECHNICAL NEEDS

EXTENSIVE EXPERIENCE IN VALUE ENGINEERING FOR INDUSTRIAL PROJECTS

ACCURATE BUDGETS, SCHEDULES AND COST CONTROL

PROVEN PROCEDURES FOR PROCUREMENT, CONSTRUCTION  
MANAGEMENT & PROJECT CONTROL.





## PROJECT EXECUTION EXPERIENCE IN ARGENTINA

**SAXUM** has most of its engineering resources in the Tucuman office, located in the Northwestern region of Argentina, close to the lithium area in this country. Most of our engineers are registered in the professional associations of Salta, Jujuy and Catamarca, where all lithium projects of Argentina are located. Moreover, they are very familiar with the engineering standards of Argentina and, particularly, with the construction practices of the Northwestern region of this country.

**SAXUM is, without question the engineering company with the largest and most extensive experience in engineering designs for the mining industry in the Northwestern region of Argentina.** Since 1996, **SAXUM** has continuously participated in the design of many different mining projects and mining plants in this region, including Minera Alumbraera Ltd., Mina Pirquitas, Agua Rica, Cerro Casposo, Lindero, FMC, Mina Aguilar, YMAD, Exar, Eramet (Minera Bolera), Galaxy. **SAXUM's** experience in engineering designs for the mineral processing industries located in the Northwestern region of Argentina includes also relevant clients of the cement and lime industries such as Loma Negra and its plant in Catamarca, Lafarge-Holcim and its plants in Jujuy and Cordoba, among others.

**SAXUM** is also the Argentinean company and staff with the largest experience in international projects for the mineral processing industries. Our professionals and staff in Argentina have participated since 1996 in relevant and large industrial projects developed by our company in most of the countries of South America, of the USA, Mexico and the Caribbean zone, as well as from Europe and Africa. Among others, **our list of international clients for which our Argentinean staff has developed engineering services includes Lafarge-Holcim (France, Switzerland, Brazil, USA, Mexico); Fives FCB (France, Qatar, Brazil), Xstrata-Glencore (Australia, Peru, Chile); Votorantin**



## PROJECT EXECUTION EXPERIENCE IN ARGENTINA

(Brazil, USA, Bolivia, Peru); CSN (Brazil); Argos (Colombia, USA); Grupo Yura (Bolivia, Peru, Ecuador); Italcementi (Italy, USA); Anglo American (Chile, Peru); etc.

Our **extensive experience with international clients and large projects** of the mineral processing industries has provided our staff and professionals with outstanding capabilities and knowledge. These skills and experience that strongly contribute for the quality and effectiveness of our designs and project management procedures, make of SAXUM a unique and different engineering company in Argentina. Another particularity of SAXUM is its strong focus to the mineral processing industries (mining, cement and lime), which represents over 95% of our revenues every year, since 1996.

Regarding **construction and erection works for industrial projects in the Northwestern region of Argentina**, and particularly in the Argentinean Puna, we deeply know the most qualified and capable construction, erection and soil movement companies in the region as we have been working continuously with them in many different projects since the very beginning of the mining revival in Argentina that started during the second half of the 90'. We do know who is who in this region.

SAXUM has recently completed the development of the **full EPCM services for the Lindero Project of Mansfield Minera S.A.**, a gold mine project in the Puna region of the province of Salta, Argentina, involving a total CapEx of over US\$ 200 M. SAXUM services include the full involvement in the procurement of services, constructions and materials for the project, the basic and detailed engineering, the contracts development and follow up, and the overall site supervision and quality assurance. This is the largest mining project under development in Argentina, in 2018.

**Our international experience** has also provided us deep knowledge of procurement procedures, supported by very clear and detailed technical specifications, equipment sizing and descriptions, guarantee condition, start-up specifications, etc. SAXUM has also proven Project Management Procedures and its staff of Project Managers have demonstrated strong capabilities and knowledge to coordinate extensive project teams composed by professionals of different companies and countries. Our procedures allow effective communications with our clients and facilities their remote follow up of the engineering and construction evolution.

## PROJECT EXECUTION EXPERIENCE IN HARSH ENVIRONMENT AREAS OF ARGENTINA

### SCOPING STUDIES (MOST RELEVANT):

- YMAD Plant Expansion Project (public mining company). Lot of different projects developed by SAXUM starting from the Scoping Study for the plant expansion from 750 MTn to 1.200 MTn. Catamarca Province, Argentina.

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- Cerro Casposo Mining Project. Intrepid Mines Ltd. Greenfield mining project in San Juan Province, Argentina.

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- Minera Aguilar Ltd. Project expansion of tunnels for underground mining of zinc, silver and secondary minerals. Jujuy Province, Argentina.

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- Neptuno (Agua Rica) Project. Transport system predesigns and CapEx study. Trade off analysis for different tunneling options. Argentina.

### PRE-FEASIBILITY STUDIES (MOST RELEVANT):

- Don Nicolas Project. Gold mining project of IRL located in Santa Cruz Province, Patagonia, Argentina. Project CapEx: USD 85 M

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- YMAD's Plant Expansion: Gold mining project in Catamarca Province, Argentina. Project CapEx: USD 45 M.

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- Neptuno Project (Agua Rica first PF Study): Copper mining project of MIM, Australia, located in Catamarca Province, Argentina. Project CapEx: USD 570 M.

## PROJECT EXECUTION EXPERIENCE IN HARSH ENVIRONMENT AREAS OF ARGENTINA

### FEASIBILITY STUDIES (MOST RELEVANT):

- Don Nicolas Project. Gold mining project of IRL located in the province of Santa Cruz, Patagonia. Project CapEx: USD 85 M

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- Cerro Casposo Project. Green field gold mining project. CapEx: USD 70 M

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- Cerro Casposo Project. Due Diligence performed for Buenaventura Mines, Peru.

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- Salar del Hombre Muerto, FMC. Brown field lithium expansion project in Salta. CapEx USD 25 M.

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- Lithium Americas. Green field lithium project in Jujuy. CapEx: USD 260 M.

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- Lithium One – Galaxy. Green field lithium project in Salta. CapEx: USD 130 M.

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- Capdeville Project, Holcim Argentina. Brown field expansion project for cement grinding in Mendoza. CapEx USD 35 M.

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- Agua Rica, Glencore (Xstrata Copper). Brown field copper mining project in Catamarca. CapEx USD 1.800 M.

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- Loma Negra, Catamarca Cement Plant. Cement grinding capacity upgrade. Conceptual engineering and CapEx/OpEx estimates.

## PROJECT EXECUTION EXPERIENCE IN HARSH ENVIRONMENT AREAS OF ARGENTINA

### ENGINEERING AND PROCUREMENT SERVICES (MOST RELEVANT):

- Cerro Casposo Project. Argentina. CapEx USD 70 M.

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- YMAD Expansion Project. Argentina. CapEx USD 45M.

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- Don Nicolas Project. Argentina. CapEx 80 M.

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- Cerro Vanguardia, Heap Leach Project. Argentina. CapEx 35 M.

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- Lindero project of Goldrock Ltd. Argentina. CapEx USD 250 M.

### EPCM SERVICES (MOST RELEVANT):

- Cerro Casposo Project. Argentina. CapEx USD 70 M.

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- Lamali Project, Loma Negra. Argentina. CapEx USD 345M.

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- 4th Grinding Line, Minera Alumbreira Ltd. Argentina. CapEx 35 M.

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- Manantial Espejo Project, Panamerican Silver (joint venture with Ausenco). Argentina. CapEx 270 M.

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- Lindero Project, Mansfield Mineral S.A. (Fortuna Silver Ltd), gold mine project, Argentina. CapEx 250 M.

## EPCM PROJECTS EXPERIENCE

**SAXUM** main business is the development and management of Engineering for the mineral processing industries, as well as the management or assistance for the Procurement of the main and secondary equipments. Our technical and managerial services in engineering and procurement cover all specialties, from process, piping and mechanical, to electrical, instrumentation, control, civil and structural engineering. Our procurement and engineering services include also the support of highly qualified legal and administrative assistances for purchase contract development/review, tax evaluations, cost controls, and for the definitions of expediting procedures and warranties conditions.

In the framework of our extensive experience in Engineering and Procurement services to the industry SAXUM was recurrently involved in EPCM services, however, the Construction Management does not belong to SAXUM's core business and list of its main activities. Actually, in most of the relevant projects developed by SAXUM to the mineral processing industries in the Americas, we provided extensive support to the Construction Management by means of Site Supervision (in all engineering specialties), Scheduling, Engineering support for RFI, Document Controlling, Contractor progress certificate review, and Start-up. In these cases the Construction Management was by the Owner or by other.

In the following, SAXUM experience in full EPCM services is detailed. SAXUM experience in services related to EP & CM-Support covers most of the projects developed by our company in the last decade:

**Lamali Project, Loma Negra, for green field clinker and cement production - Argentina.** CapEx USD 345M. SAXUM has performed EPCM services from basic to detailed engineering (civil, structural, electrical and mechanical), excluding process engineering, as well as procurement services for secondary equipments and, finally, Construction Management services during construction phase.

**New Clinker Production Line of CSN (Compania Siderurgica Nacional), in Arcos, Mina Gerais, Brazil.** CapEx USD 1.070M. SAXUM has performed full Engineering and Procurement Services, as well as assistance to Construction Management. Our services included site supervision, RFI support and scheduling.

**4th Grinding Line, Minera Alumbrera Ltd. Argentina.**

CapEx 35 M. SAXUM services in this project included all areas of the EPCM assistance, excluding the procurement of the main equipment (SAG Mill).

## EPCM PROJECTS EXPERIENCE

**New Clinker and Cement Production Line of Cementos ARGOS in Cartagena, Colombia.** SAXUM services include engineering and procurement of secondary equipment. During construction phase, SAXUM performed the support to the Construction Management through site supervisors, schedulers, engineering support and document controller.

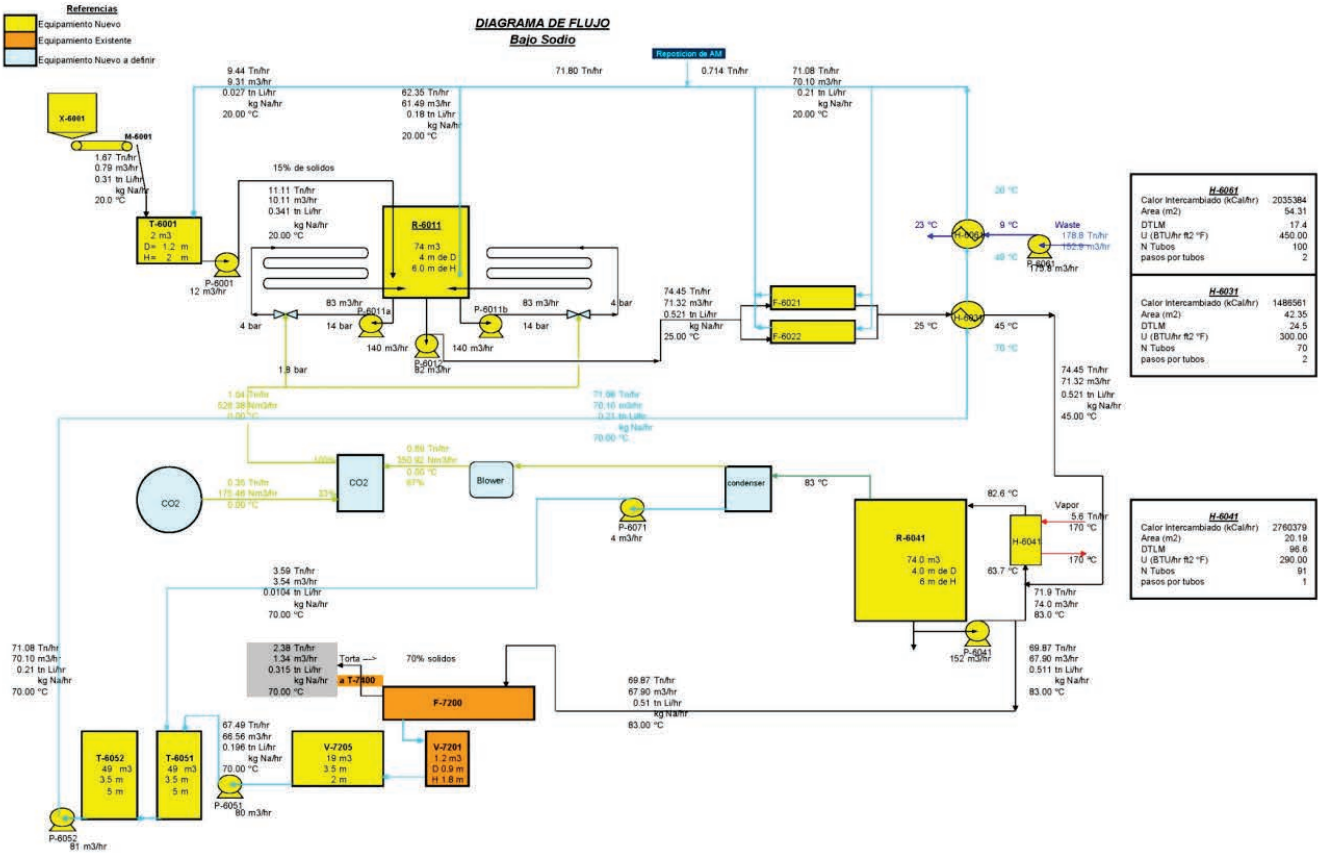
**Cerro Casposo Project. Argentina.** CapEx USD 70 M. SAXUM was awarded by Intrepid Mines Ltd for the EPCM of this project. During the first phase of the Construction Management service, and once the Detailed Engineering of the project and the Procurement of main equipments were completed, project was sold to Troy Resources.

**Cementos San Juan, Chile.** SAXUM has performed full EPCM services for the design and construction of the new cement grinding plant of Cementos San Juan in Chile. CapEx USD 38M.

**Lindero Project, Mansfield Minera S.A., Argentina.** Gold mine project in the Puna region of the province of Salta, Argentina, involving a total CapEx of over US\$ 200 M. SAXUM services include the full involvement in the procurement of services, constructions and materials for the project, the basic and detailed engineering, the contracts development and follow up, and the overall site supervision and quality assurance. This is the largest mining project under development in Argentina, in 2018.



# LITHIUM PROJECTS



## FMC Lithium - Argentina - Salar del Hombre Muerto

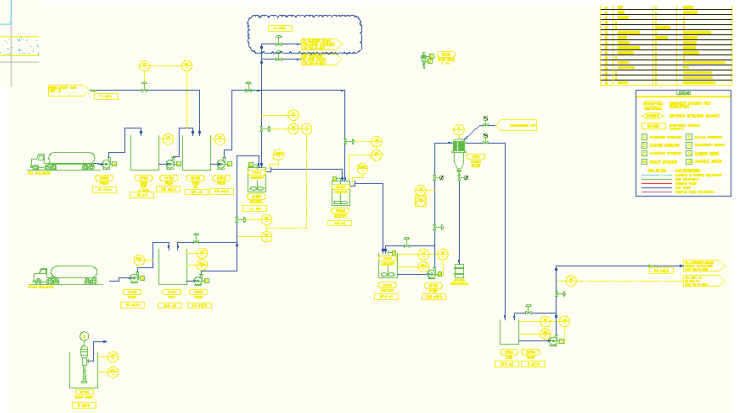
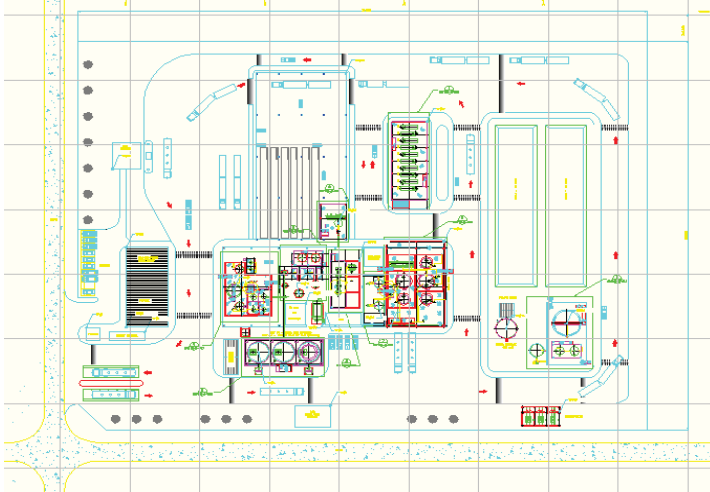
**Project Budget: US\$ 25 M.**

**SAXUM scope of work:** Complete conceptual and basic engineering for low sodium lithium chloride brine plant. Process, Civil & Structural, Mechanical & Piping, Electrical, Instrumentation & Control Engineering.

Project related to the extension of the salts and lithium production in the FMC plant in Salar del Hombre Muerto, Salta province, Argentina.



## LITHIUM PROJECTS

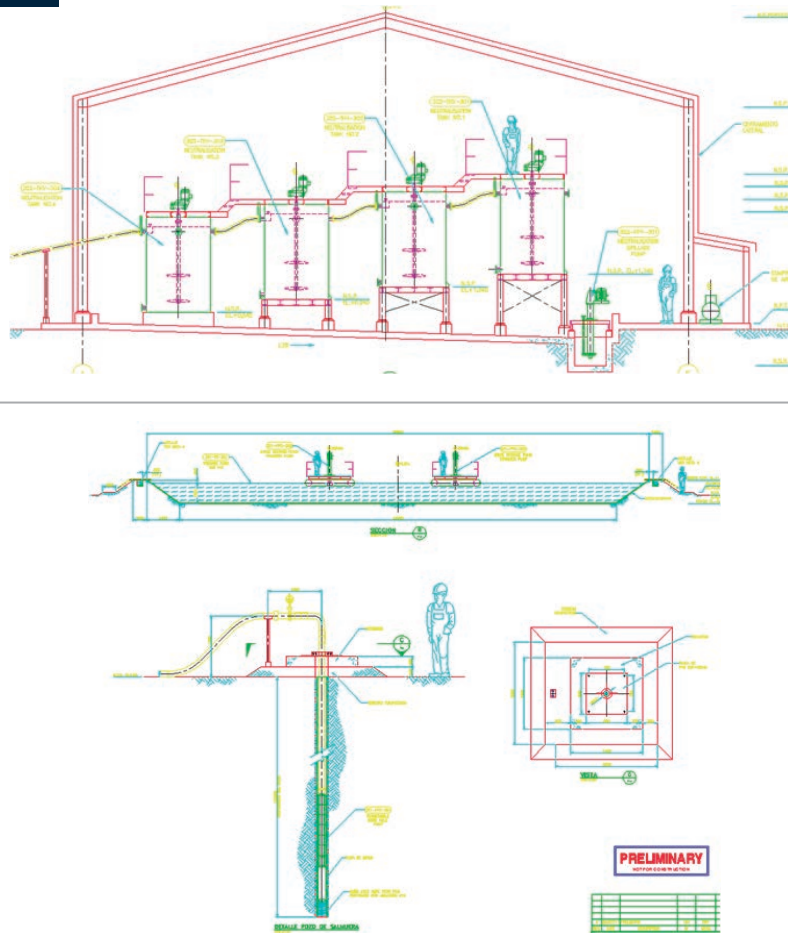


## Eramet Ingenierie- Argentina - Salinas Grandes

**Project Budget: US\$ 160 M**

**SAXUM scope of work:** Complete conceptual and basic engineering (including process, civil/structural, mechanical/piping, and electrical, I/C) for CapEx and OpEx evaluation. Lithium carbonate and potassium chloride plants in the province of Salta, Argentina.

## LITHIUM PROJECTS



## Bolera Minera (Eramet Ingenierie)- Argentina - Salinas Grandes

**Project Budget: US\$ 250 MM**

**SAXUM scope of work:** Basic engineering for the Pilot Plant for Lithium Brine Evaporation. CapEx an OpEx update. Development of technical specifications and equipment data sheets

## LITHIUM PROJECTS



### Sales de Jujuy S.A. - Argentina - Olaroz Project

**Project Budget:** US\$ 240 M

**SAXUM scope of work:**

**DEVELOPMENT OF CONCEPTUAL AND DETAILED ENGINEERING FOR CO<sub>2</sub> RECOVERY:** Complete engineering for gas recovery and re-injection. Dimensioning of all involved equipment. Evaluation of gas consumption.

**STEAM SYSTEM OPTIMIZATION:** Definition of the thermal energy balance. Evaluation of the most appropriate procedure for incorporating the new steam generator to the system.

## LITHIUM PROJECTS



### Minera EXAR S.A. - Argentina - Salar de Cauchari Project

**Project Budget: US\$ 250 M**

**SAXUM scope of work:** Local technical office for a lithium project to be situated in northern Argentina. Technical support, revision and adaptation to Argentinean standards of all engineering documents and services and materials bid packages, done by an overseas engineering company. Contracts management and Bidding processes support. Engineering Services and Procurement . Feasibility phase : Revision of Basic Engineering . Total HHs by SAXUM: 3,500 hs

## LITHIUM PROJECTS



### **GALAXY Resources Ltd. - Argentina - Sal de Vida Project**

**Project Budget: US\$ 150 M**

**SAXUM scope of work:** SAXUM was responsible for the development of the P&IDs of the greenfield lithium project Galaxy in the province of Salta, Argentina. Also SAXUM made the cost estimate of the portion of that project related to the P&IDs. Total HHs by SAXUM 6.280.

## LITHIUM PROJECTS

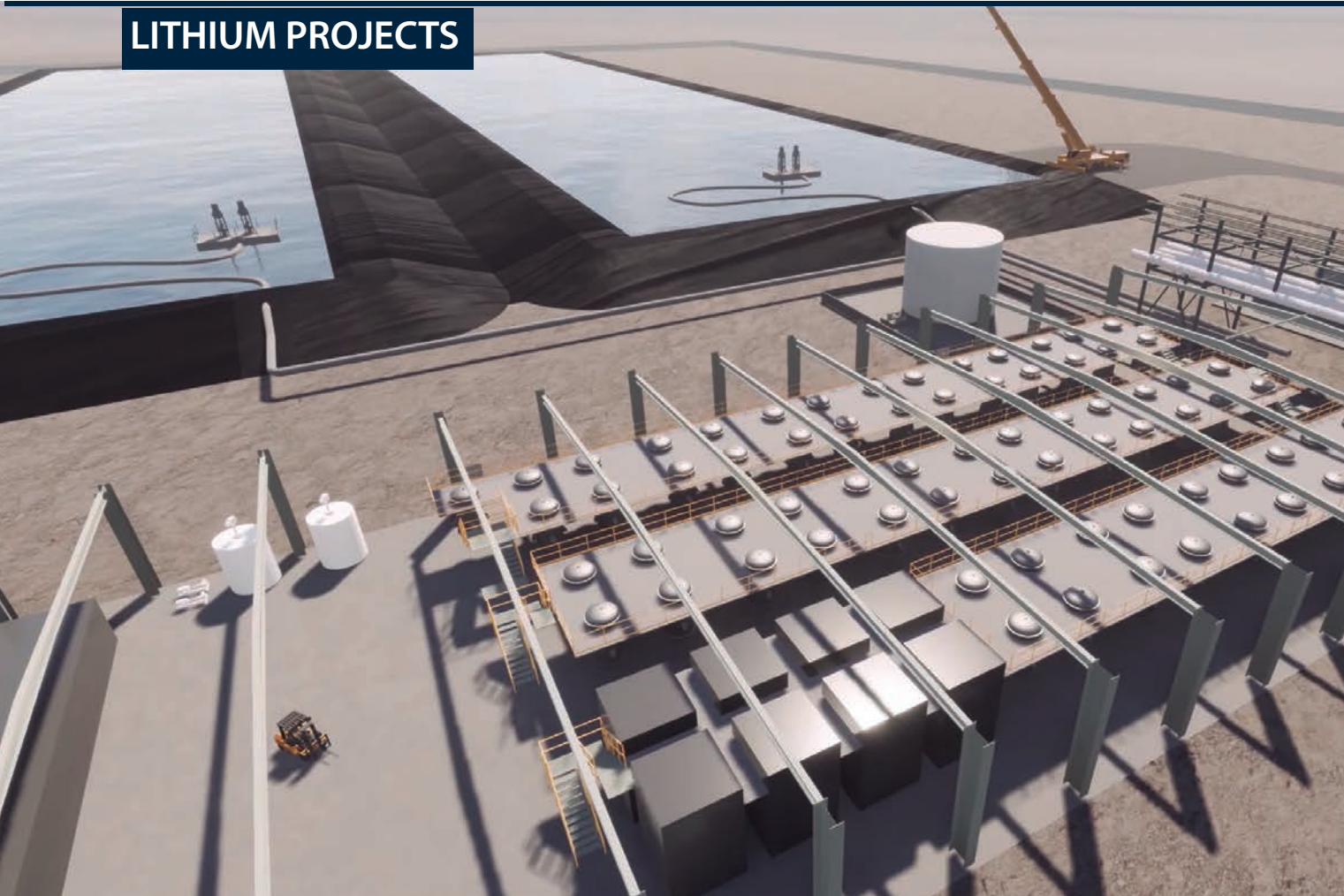


### Zijin Mining / LIEX S.A. – Tres Quebrada Lithium Carbonate Project

**Project Budget: US\$ 525 M**

**SAXUM scope of work:** Development of detailed engineering and procurement services for phase I 25 ktons per year for both operations at the Salar and Fiambala. Technical support and adaption of process/piping engineering developed in mainland China to Argentinean codes and standards. Development of feasibility study for phase II 25 ktons per year expansion project, including process design, multidisciplinary FEED engineering, and study management services. Total HHs by SAXUM: 49,000hs

## LITHIUM PROJECTS



### Lake Resources / Morena del Valle Minerals – Kachi Lithium Carbonate Project

**Project Budget: US\$ 544 M**

**SAXUM scope of work:** SAXUM represented owner's engineering team for the development of a definitive feasibility study, reviewing lithium carbonation process and multidisciplinary FEED engineering. Also contributing to the DFS by providing a full report on operation logistics and strategies, access roads, ports availability, customs and schedules.

## Most Relevant Projects

COMPANY	OBJECTIVES	LOCATION	PERIOD	BUDGET
<b>FMC - Minera del Altiplano- Argentina.</b>	Production Expansion Project Plant Sales in Salar del Hombre Muerto. M/H Saxum = 14,300 hr	Salar del Hombre Muerto. SaltaArgentina	2004/2005	25 MM USD
<b>Eramet Ingenierie</b>	Basic Engineering for Evaluation CapEx and OpEx of new lithium carbonate plant - Salinas Grandes . M/H Saxum = 9,400 hr	Salta Argentina	2012/2012	160 MM USD
<b>Eramet Ingenierie</b>	Feasibility study for a Lithium Carbonate and a Potassium Chloride Plant. M/ H Saxum = 35,000 hr	Salta Argentina	2011/2011	165 MM USD
<b>Minera EXAR S. A.</b>	Lithium Project Salar de Cauchari.Engineering Services and Procurement . Feasibility phase : Revision of Basic Engineering . M/ H Saxum = 3,500 hr	Jujuy Argentina	2011/2012	250 MM USD
<b>Bolera Minera SRL</b>	Feasibility studies and detailed engineering for a lithium evaporation pilot plant. M/ H Saxum = 4,600 hr	Salta Argentina	2011/2012	250 MM USD
<b>GALAXY Resources Ltd.</b>	<b>P&amp;IDs of the greenfield lithium. M/H SAXUM= 6.280 hr</b>	Salta Argentina	2013	150 MM USD



# CLIENTS





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