MINERARIA GERREI

REJUVENATING THE SILIUS FLUORSPAR MINE

Silius fluorspar ore
Sardinia, Italy

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Mineraria Gerrei

FLUORINE FORUM 2023
Pullman Cannes Mandelieu
16-18 October 2023

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- SPV established in 2018
- Registered seat at Silius Mine, Sardinia, Italy
- Public tender winner for Silius mine takeover
- Core business fluorspar mining & processing
- Extensive experience in mining operation

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WHY FLUORSPAR ?

DEMAND GROWTH

- Fluorspar classified as strategic mineral in EU, USA, China and other
- EU strategy for CRM reshoring
- No large scale commercial alternative
- Need for safe and reliable procurement (ore mining in stable areas)

RESERVES SHORTAGE

- Limited number and size of new ores
- Environmental restrictions and mine closings
- China's declining exports
- Long period required for new mines exploration and setup

INCREASING PRODUCTION OF VALUE ADDED FLUORSPAR DERIVATIVES

- Hydrogen fluorides for chemical industry
- Inorganic fluorides for steel/alum. industry
- Fluoropolymers in energy storage, aerospace, construction, automotive, electrics, electronics and packaging industries
- HFO as zero-ODP refrigerants

COMPANY TRADITION

- Active in fluorspar market since 1997
- Former operator of Torgola and Ester fluorspar mines (Italian Alps)
- Owner of fluorspar exploration licenses in Italy

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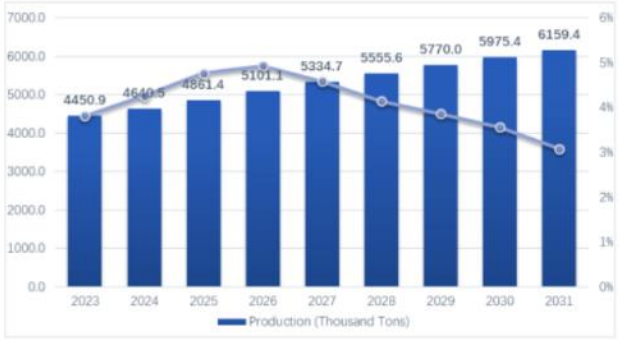
STRATEGY

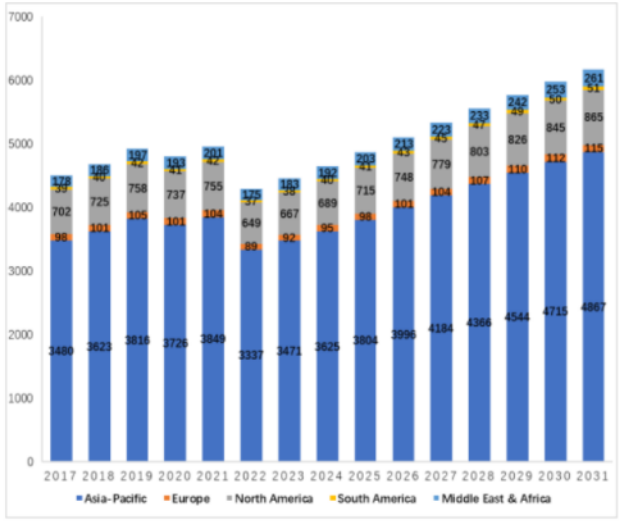
WHY ACIDSPAR ?

Figure Global Acid Grade Fluorspar Production (Thousand Tons) and Growth Rate Forecast (2023-2031)



Source: Professionals Interview, Secondary Information and MAResearch, Mar 2023

Figure Global Acid Grade Fluorspar Production (Thousand Tons) Comparison by Region (2017-2031)



Source: Professionals Interview, Secondary Information and MAResearch, Mar 2023

AAGR 2023-2031

- Global fluorspar market +2.9% yearly
- Global acidspar market +4,1% yearly
- Global metspar market +2% yearly
- Non feedstock fluorocarbons +2% yearly
- Feedstock PVDF +2% yearly
- Feedstock PTFE +4% yearly
- LFP batteries +119% in 2022 and growing

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WHICH VIEW?

Short term revenues through restart of Silius mine

55 yrs track record, extensive ore data, certified reserves, developed infrastructures, huge unexploited potential

Long term view in developing sustainable fluorspar projects

Up-to-date technologies, environmental friendly solutions, circular economy approach, energy supply from RES sources

Building strategic partnership with large fluorspar consumers

to support long term operation strategies

Extensive exploration plans

Assessment of new fluorspar mining sites in/out of Italy

Developing reliable position on the global fluorspar market

Regular supplies in stable political and social environments

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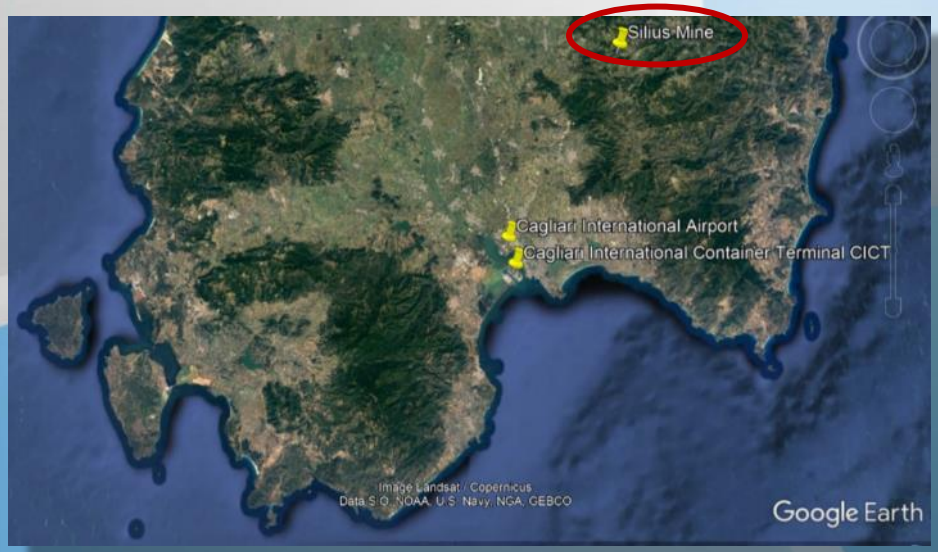
SILIUS MINE

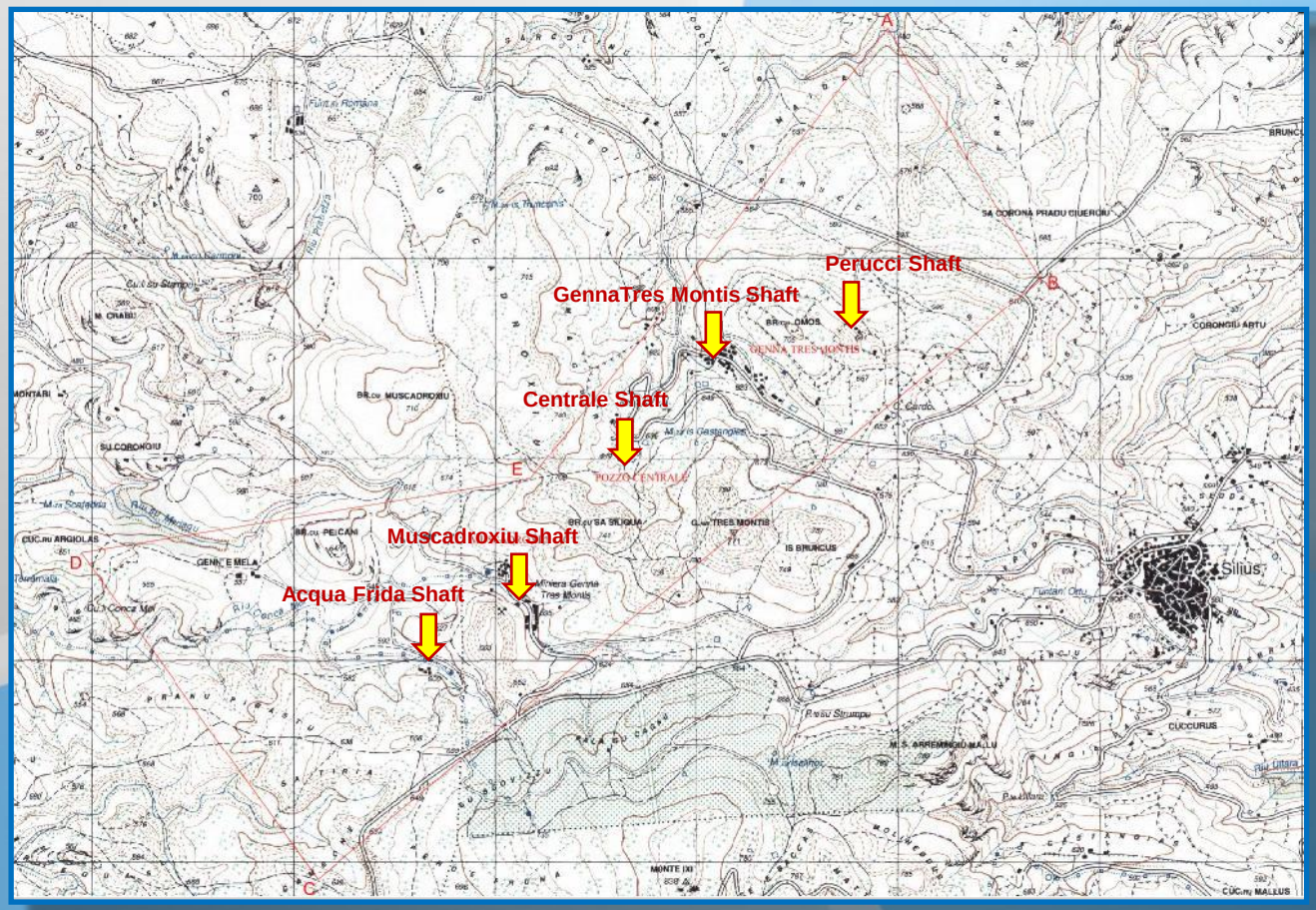
MINE LOCATION



- South Sardinia, Italy
- 50 km NE of Cagliari Intl Airport and Cagliari Intl Container Terminal
- In the heart of Mediterranean Sea

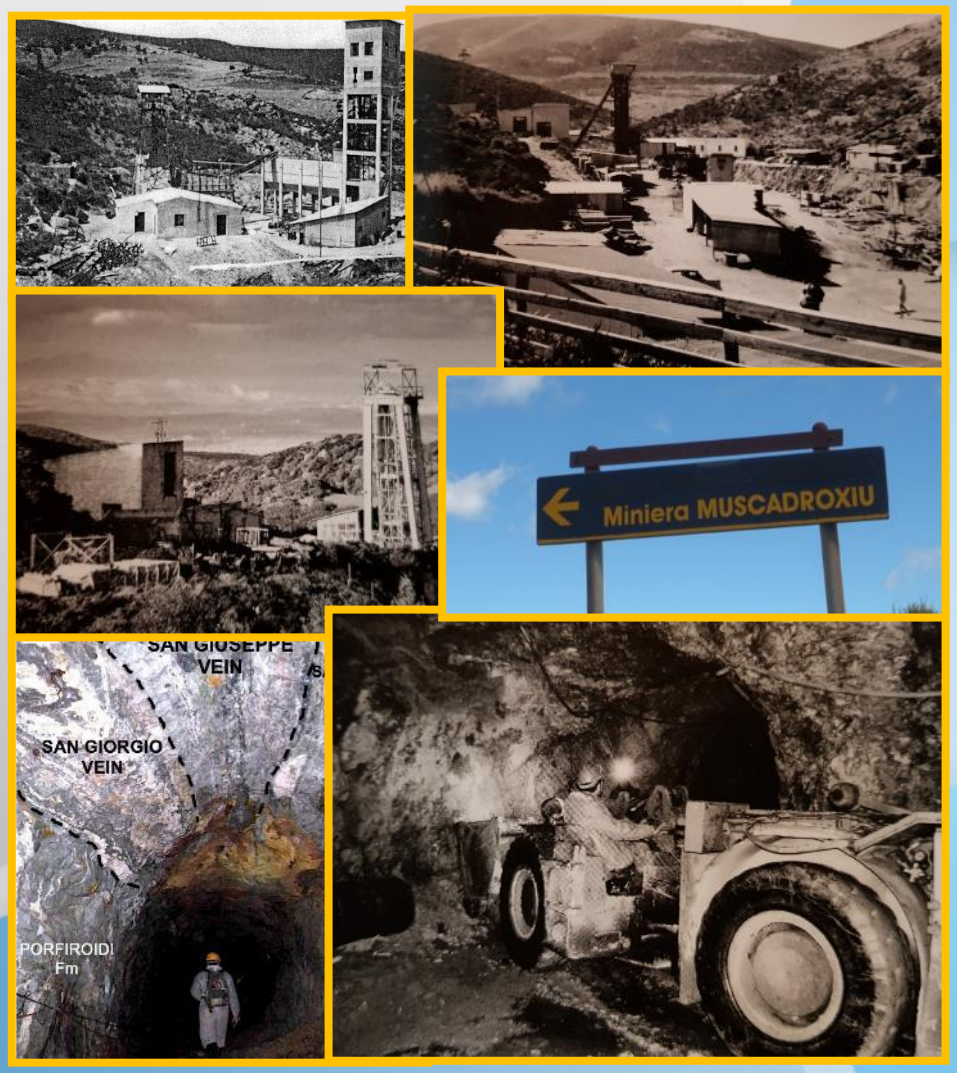
MINE SITE

- Existing mine, open, accessible, held under mantainance, with ore panels exposed
- Mining claim area 500 hectars
- 3 km East of Silius village, average elevation 600 m a.s.l.
- Mining sites easily interconnected with main roads



ENVIRONMENT

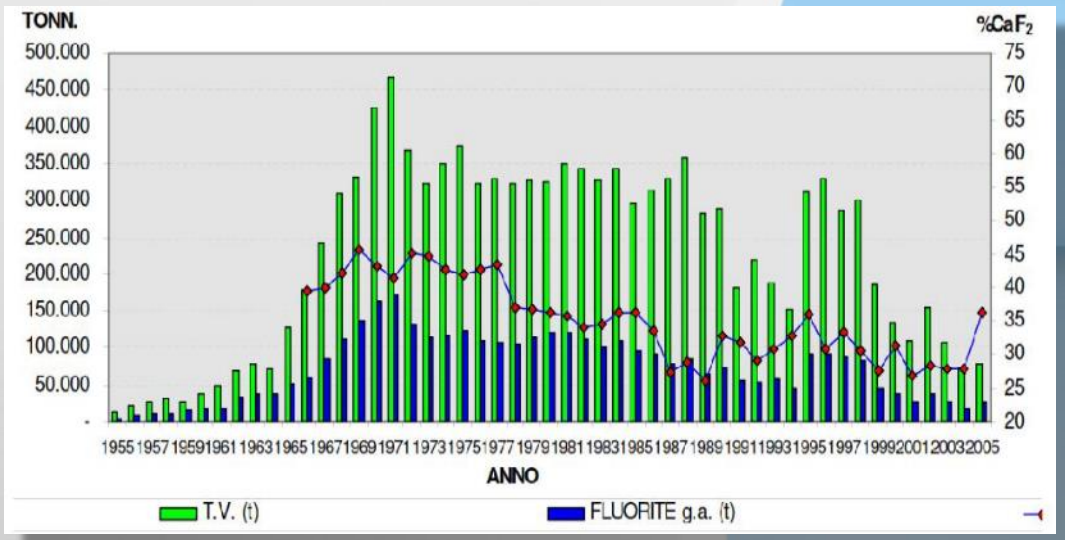
- Strategic location in the middle of Mediterranean Sea (Gibraltar-Suez route)
- Availability of skilled workers, mining schools, extensive mining culture and experience (Sardinia has been representing one of the european leading mining areas for over 150 years)
- Low density population and no need for structures or people relocation
- Existing underground mine with no need for new land occupation
- Effective infrastructures (safe roads, 50 km to Cagliari CICT and int'l airport, 80 km from Oristano industrial port, reliable power network, etc.)
- Owned land rights according to national mining laws
- Strong support from local communities

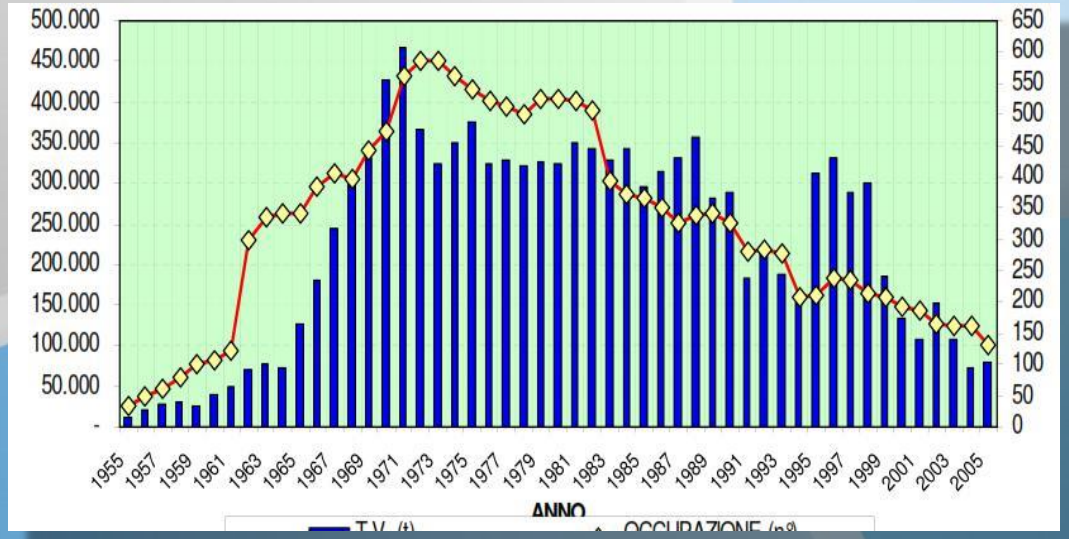


MINE HISTORY

- Explorations since 1870's
- First mining claim dates back to 1915
- Originally licensed for lead and silver surface mining
- Underground extensive fluorspar mining since 1952
- 1954 - 1991 operated by private investor Mineraria Silius, reaching remarkable levels of CaF_2 production (up to 450.000 t/y TV)
- 1992 – 2007 operated by public companies owned by Sardinia Region
- Operation stopped in 2007, after Sardinia decision for mine privatization
- Privatization process delayed by EU rules tender claim and complex enviromental impact assessment
- New mining license awarded to Mineraria Gerrei in 2023

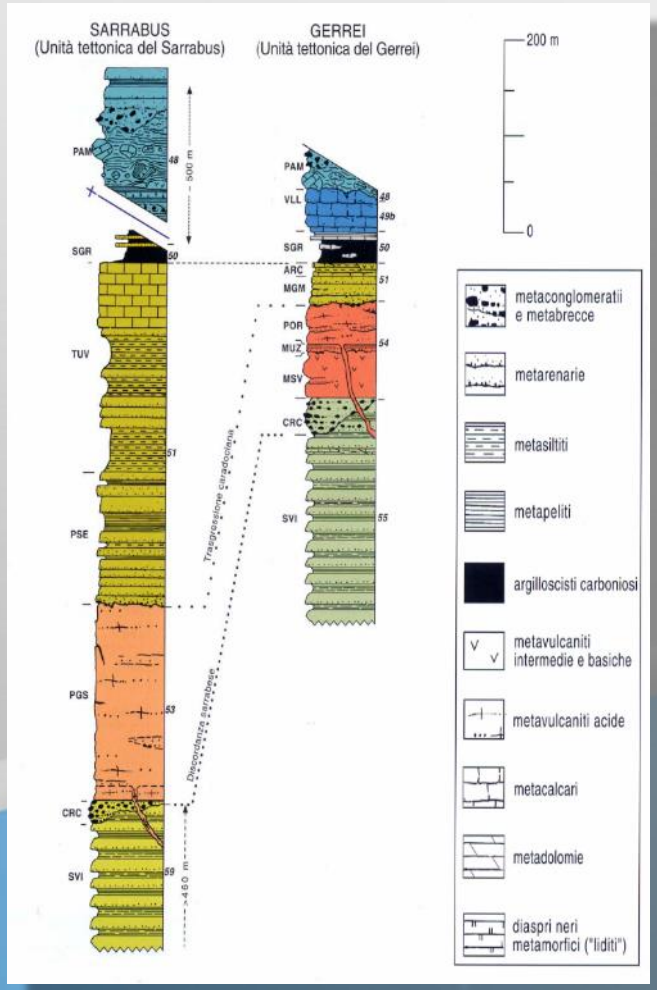
MINE HISTORY

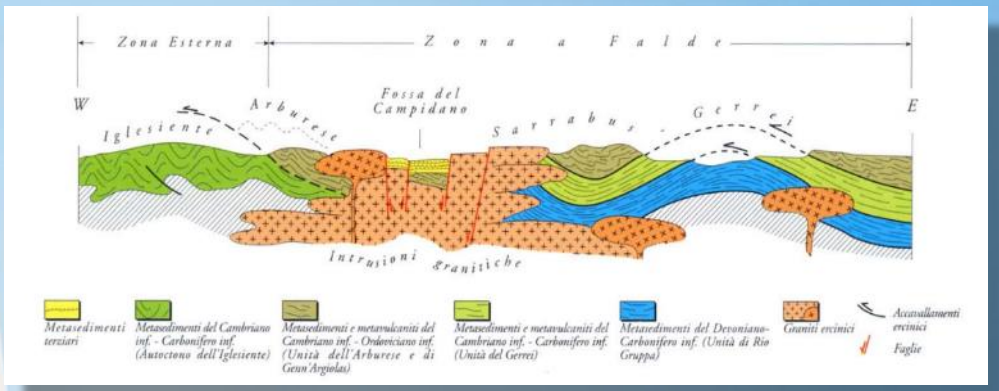




- Over 11 mln tons of TV extracted and nearly 4 mln tons of acidspar produced in 50 yrs operation
- Maximum historical production reached in 1971 (> 450.000 tons TV)
- Up to 600 employees in the 1970's
- Average historical fluorspar grade 35%

REGIONAL GEOLOGY





- Gerrei Hercynian range featuring thrust tectonics
- Silius ore and mine located within Gerrei Tectonic Unit
- Hydrothermal veins developed after thrusts stacking and during late extensional phase of Hercynian orogenesis
- Main tectonic structures and ore veins finally dislocated by Alpine tectonics

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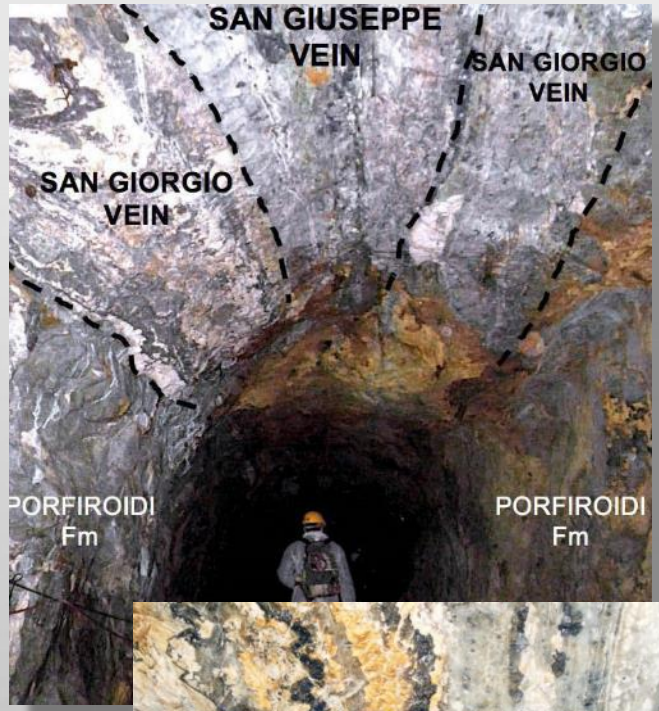
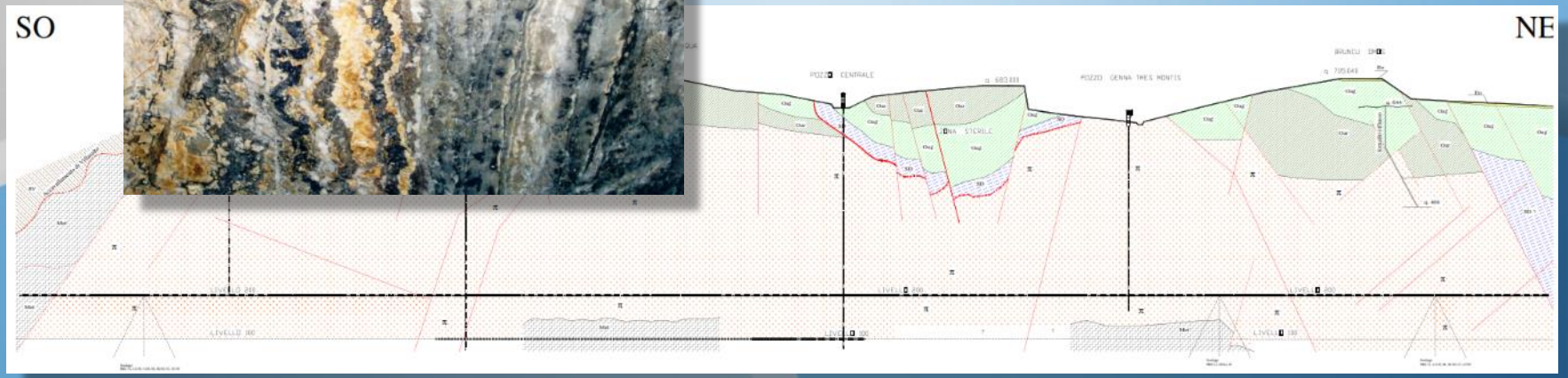
SILIUS ORE

ORE GEOLOGY



- Fluorspar veins typically 3-6 mts wide (up to 18 mts)
- Extraordinary ore persistence (vein system > 500 m deep, still without relevant CaF_2 % decrease)
- Typical paragenesis includes fluorspar, quartz, calcite, galena, marcasite, baryte, pyrite and zinc sulfide
- Fluorspar veins swarm directed N55 and plunging SSE with 70°-80° inclination angle
- Porfiroids qualify as most common embedding rocks (stable walls, preserving joints opening)
- Mineralization boundaries marked out by regional tectonic structures and/or plastic rocks outcropping (joints closing)
- Gangue carbonates carry relevant REE amounts



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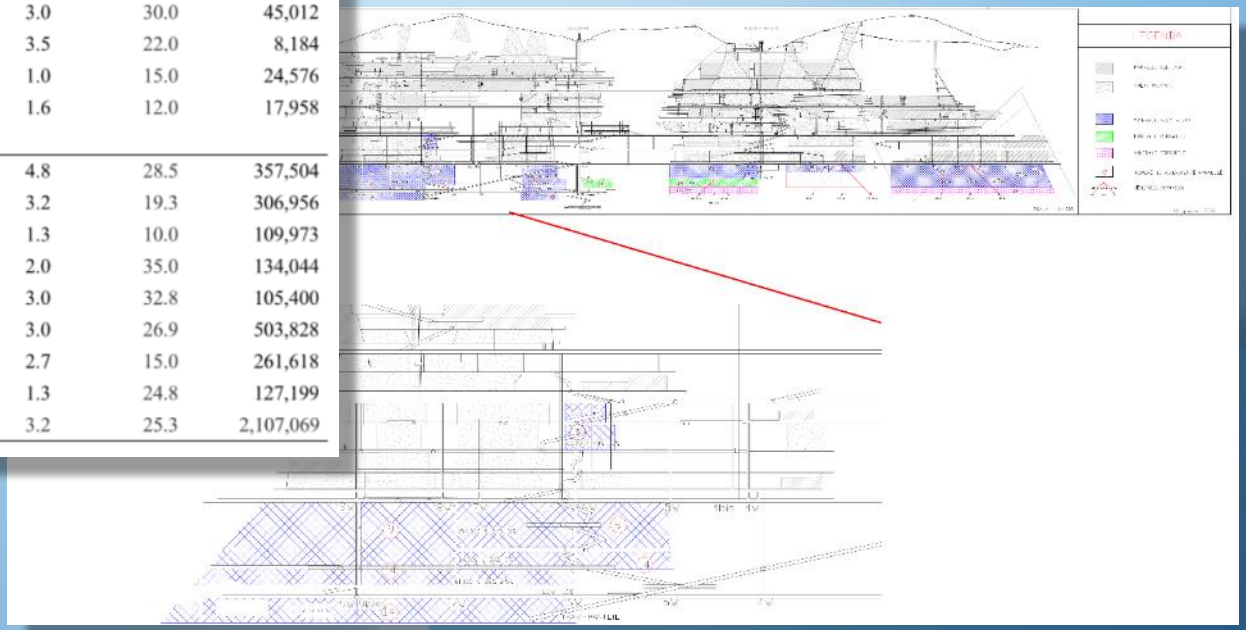
SILIUS ORE

FLUORSPAR ASSESSED RESERVES

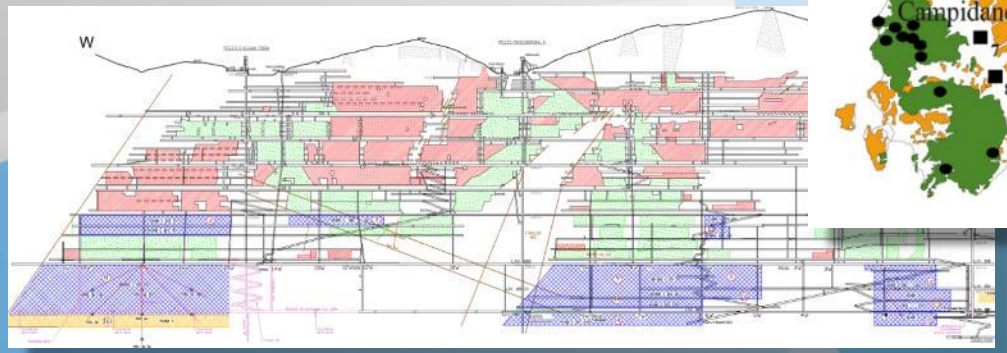
- Certified resources (independent audit)
- 2.100.000 tons measured resources (average grade 32% CaF_2, 3% PbS)
- 1.200.000 tons from unexploited upper mine panels (review of previous 30% cutoff grade)
- Data from systematic sampling on accessible fluorspar panels and boreholes

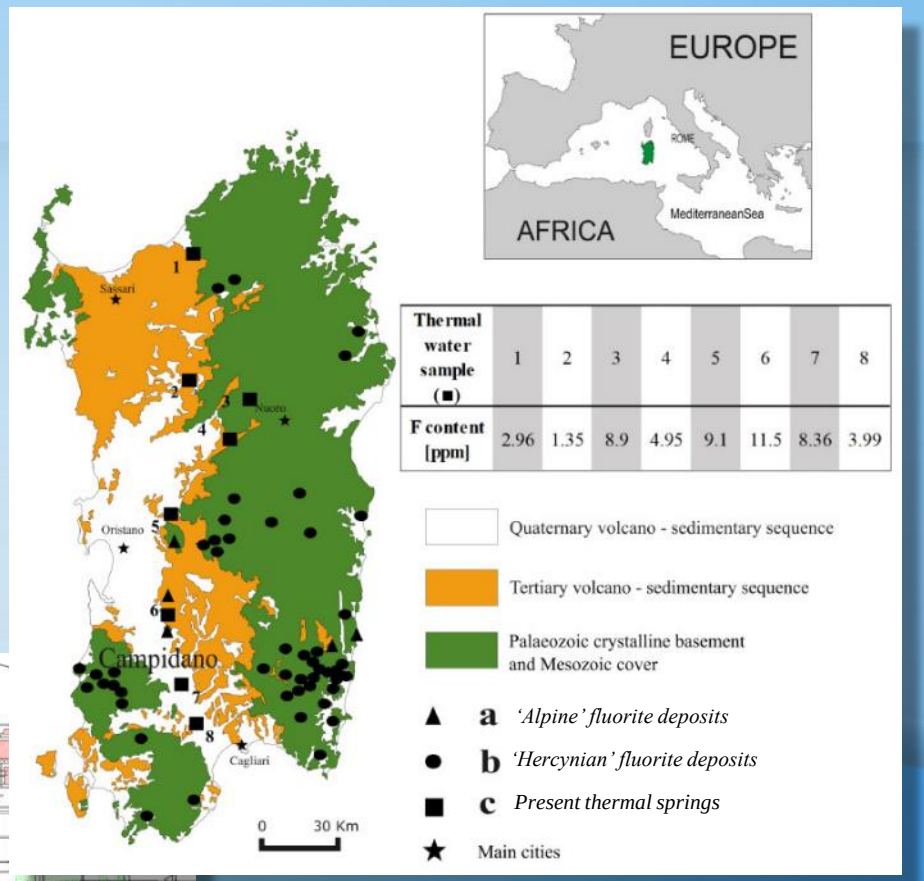
	Commodity (%)		Carbonate Gangue (%)	Measured Resources
Site	CaF_2	Pb		Tons
above +200 m level				
Acqua Frida shaft west	30.5	7.0	36.0	104,819
Acqua Frida shaft east	38.0	3.0	30.0	45,012
Muscadroxiu shaft west	35.0	3.5	22.0	8,184
Muscadroxiu shaft east	38.6	1.0	15.0	24,576
Centrale shaft west	35.7	1.6	12.0	17,958
below +200 m level				
Acqua Frida shaft west	34.7	4.8	28.5	357,504
Muscadroxiu shaft east	36.8	3.2	19.3	306,956
Centrale shaft west	35.0	1.3	10.0	109,973
Genna Tres Montis west	30.0	2.0	35.0	134,044
Genna Tres Montis east/1	30.0	3.0	32.8	105,400
Genna Tres Montis east/2	36.9	3.0	26.9	503,828
Muscadroxiu shaft east	33.3	2.7	15.0	261,618
Centrale shaft west	30.9	1.3	24.8	127,199
Total	34.5	3.2	25.3	2,107,069



FLUORSPAR ADDITIONAL POTENTIAL

- **Ore prosecution under +100 level**
  - **Geochemical evidence of downward ore rejuvenation**
  - **Progressive increase of CaF_2 and PbS grade, especially on the western side**
- **Unexplored veins system prosecution over Eastern ore boundary fault**
  - **Nearly 400 m downward dislocation with southward component**
  - **No systematic exploration in the past, due to richness of the exploited ore**
- **Extensive exploration plan focused on SE Sardinian fluorine anomaly area**





Thermal water sample (■)	1	2	3	4	5	6	7	8
F content [ppm]	2.96	1.35	8.9	4.95	9.1	11.5	8.36	3.99

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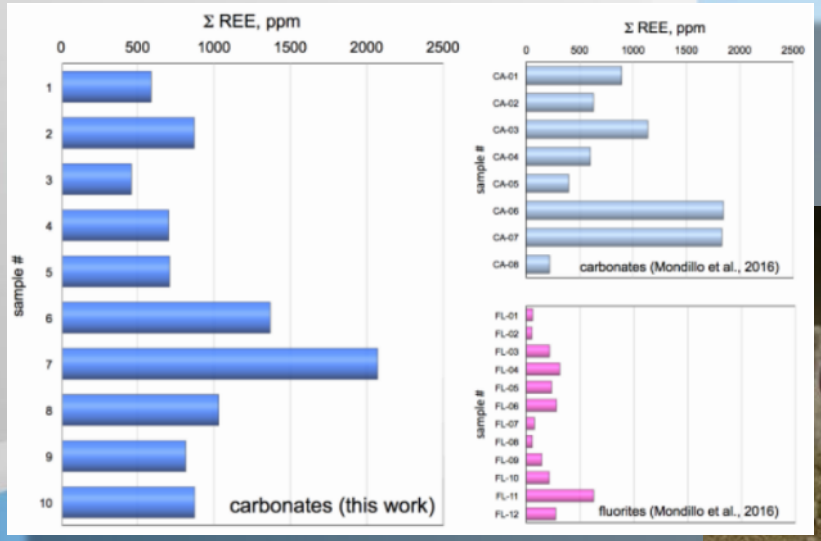
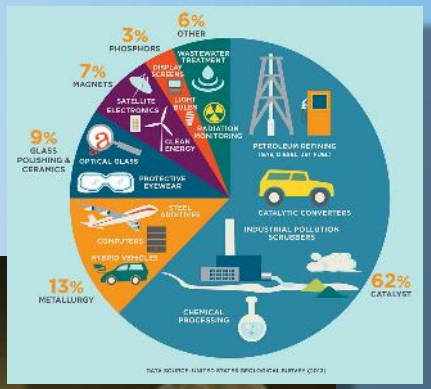
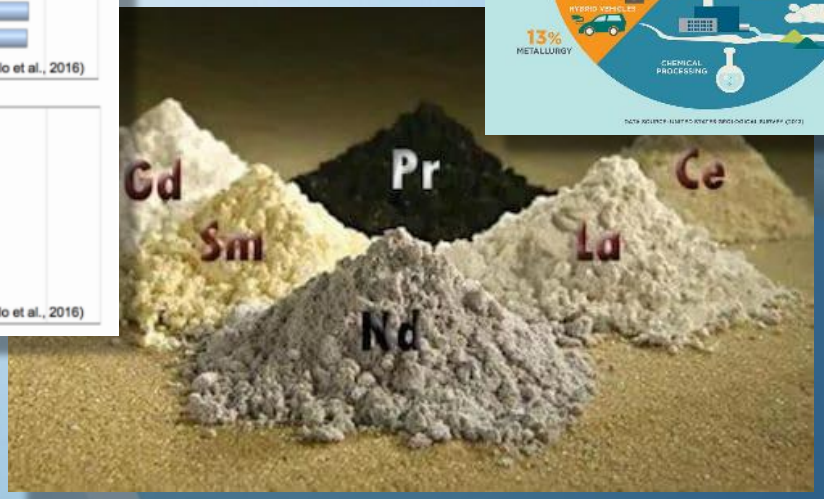
SILIUS ORE

REE ASSESSED RESERVES

- Extensive studies and analysis performed by University of Naples over the last 10 years
- Vein gangue carbonates (calcite and ankerite) contain REE-minerals synchysite-(Ce) and xenotime
- Concentrations range between 462 and 2,071 ppm (951 ppm on average), mainly consisting of LREE
- REE in fluorspar process tailings (added value, additional treatment line under analysis)







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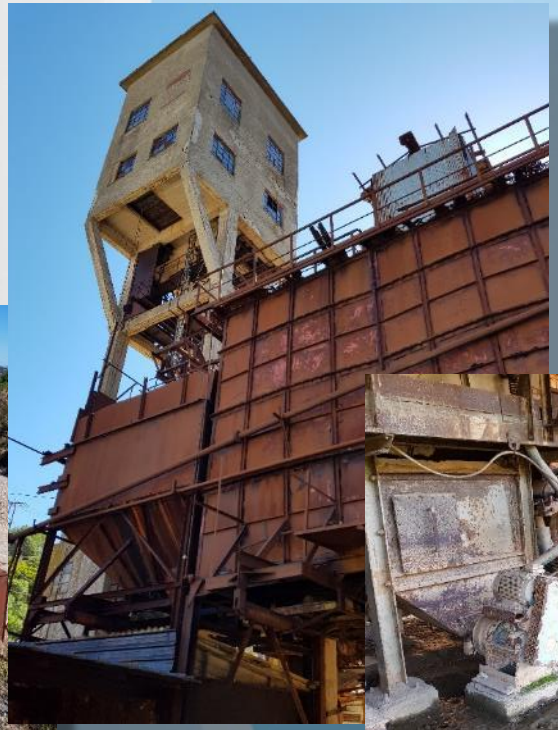
WHAT WE FOUND

Mostly scrap !!

During maintenance period (2007-2023), just ordinary maintenance of dewatering system, lifting equipments and tunnel reinforcement has been performed, keeping the mine accessible and focusing on main haulage tunnels



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THE OLD MINE

WHERE WE STARTED FROM ?

Demolition...

Full demolition of 2 former treatment plants, sets of conveyor belts, 3 mine shaft towers, 3 lifting equipments, several service buildings, concrete basements and structures, old storages, old power lines, etc.

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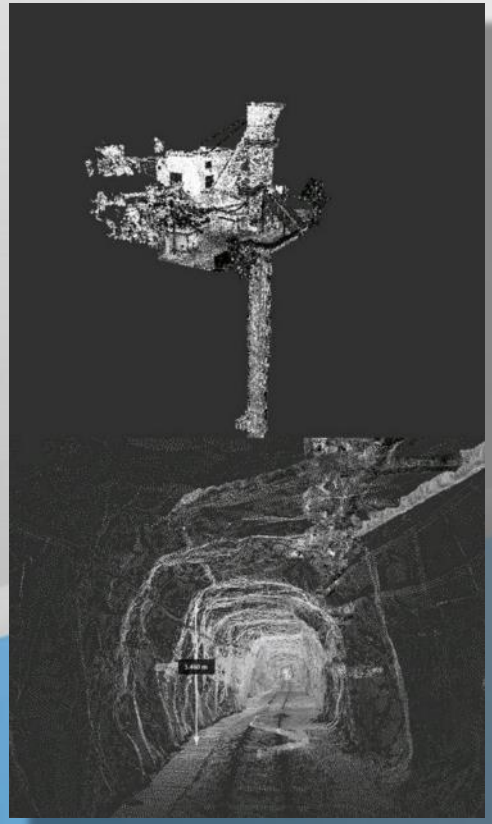
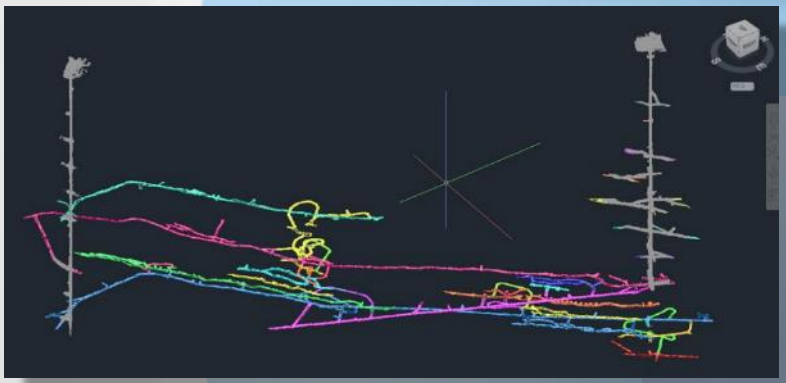
THE OLD MINE

WHERE WE STARTED FROM ?

… and surveys …

Up-to-date 3D survey of underground shafts/tunnels and surface mining areas and structures, with Lidar drones, laser-scanners with gyroscopic sensors, video inspection tools and specialized softwares

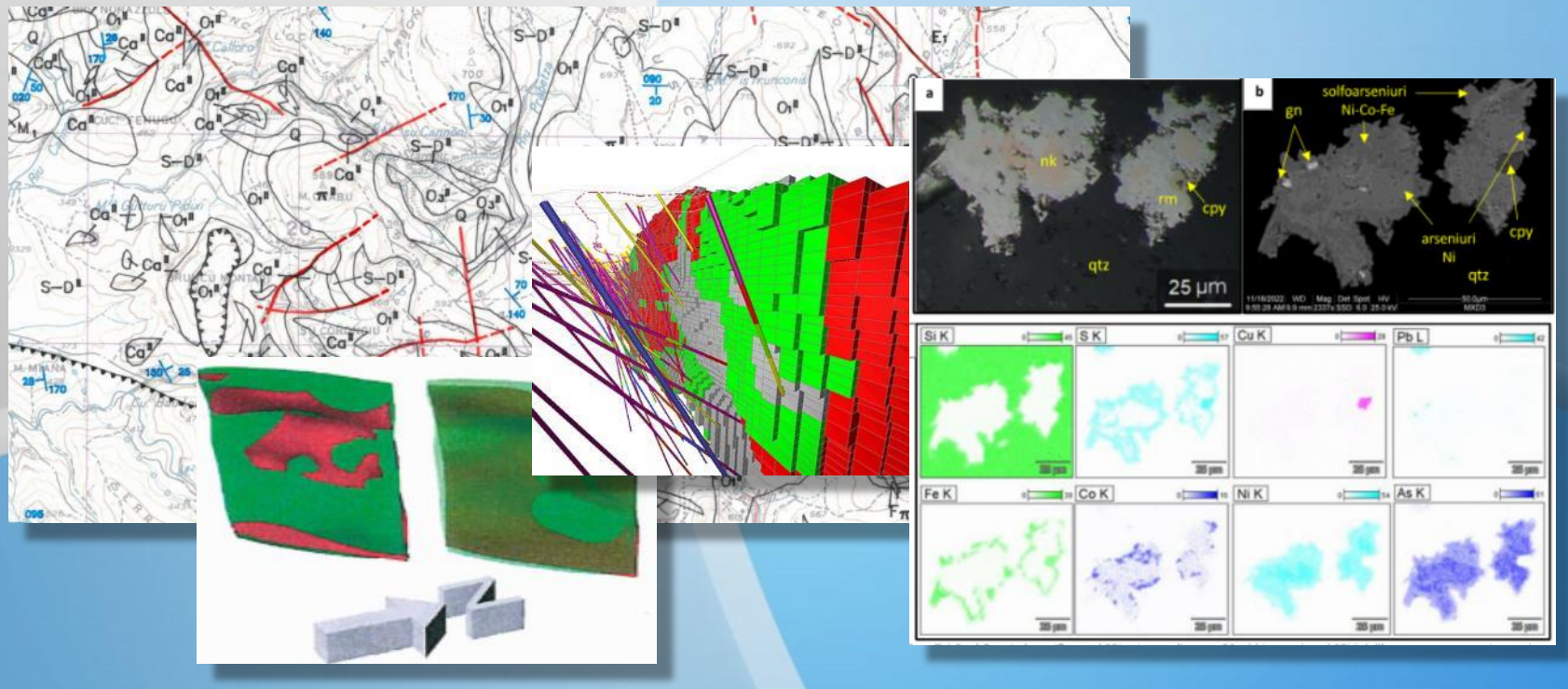




WHERE WE STARTED FROM ?

… and update of orebody model

- Review of structural setting finalized to new exploration (vein system layout controlled by structures)
- Upgrade of geochemical model (complex mineralization process, several phases, rejuvenation)
- Analysis of geomechanical framework (review of reinforcement solutions)
- Ongoing cooperation agreements with Universities of Cagliari and Naples



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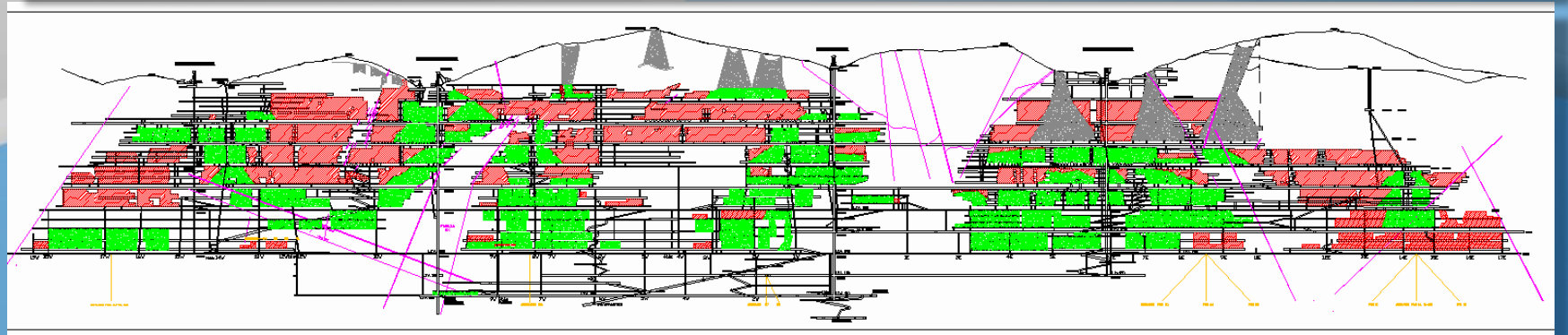
THE OLD MINE

WHERE WE STARTED FROM ?

Existing mine infrastructure

- **Underground mine, 4.5 km E-W development**
- **> 120 km tunnels, 15 m^2 average section**
- **5 shafts up to 550 mts deep**
- **Main haulage levels each 100 m depth**
- **Sublevels each 20 m depth**
- **Stable rock mass and relatively dry context**
- **Steady natural ventilation**



WHERE WE STARTED FROM ?

Existing mine facilities

- **5000 m^2 of (battered) offices, labs, archives, warehouses, personnel facilities c/o Muscadroxiu, Genna Tres Montis and Centrale shafts**

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WHAT'S NEW?

A circular economy approach

- **FULL RE-USE OF BENEFICIATION PROCESS BYPRODUCTS FOR UNDERGROUND BACKFILLING**
  - Automatized mixing plant for inertization and stabilization, no tailing basins
- **FULL RICYCLE OF PROCESS WATER (CLOSED LOOP BENEFICIATON PLANT) FROM MINE DRAINAGE CIRCUIT**
  - Nearly 70% water savings with respect to former treatment plant (water is precious in Sardinia!!)
- **FULL ELECTRIFICATION OF MINING MACHINES FLEET**
  - Battery powered LHD loaders, dumpers, drilling jumbos, dth borers, rock bolting rigs, haulage railways
  - Facing market unreadyness for battery powered, CE certified machines for small size tunnels
- **ENERGY SELF-CONSUMTPION FROM COMPANY-OWNED RENEWABLE ENERGY PLANTS**
  - 12 MW wind and solar installations
- **REFORESTATION PLAN APPROVED BY LOCAL AUTHORITIES**
  - Renaturalization of areas previously affected by mining subsidences

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Safety first !!

WHAT'S NEW?

- **SHAFT LIFTING EQUIPMENT SUBSTITUTION OR RENEWAL**
  - Two fully new lifting infrastructures and safety upgrare of a third one
- **COMPLETE REHAB OF ELECTRICAL INSTALLATIONS**
  - Full new cabling of underground work sites, full new cabling of shafts and haulage tunnels, renewal of underground substations, upgrade of existing surface network
- **COMPLETE REHAB OF VENTILATION NETWORK**
  - New coaxial fans in shafts, rehab of existing shaft fans for emergency backup
- **ENVIRONMENTAL SENSORING AT SURFACE AND UNDERGROUND**
  - Full set of new measuring devices for ventilation, radon and other poisonous gases, dust, temperature, noise, etc.
- **NEW COMMUNICATION FRAMEWORK**
  - Shafts, haulage tunnels and production tunnels equipped with redundant fiber and wifi networks (for machinery remote control, remote sensors, cameras, etc.)
- **NEW WORKERS DETECTION SYSTEM**
  - New access points located in building, shafts and tunnels, man down detection systems, etc.

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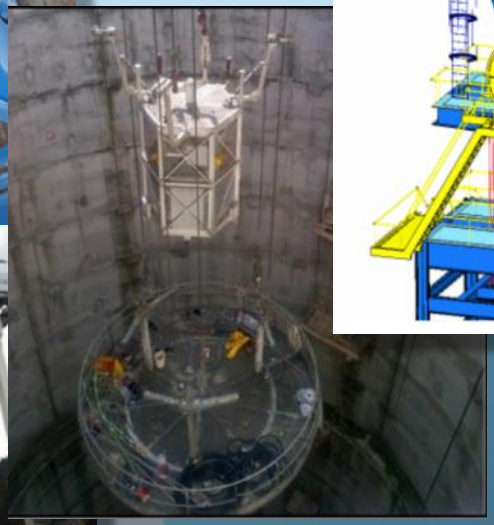
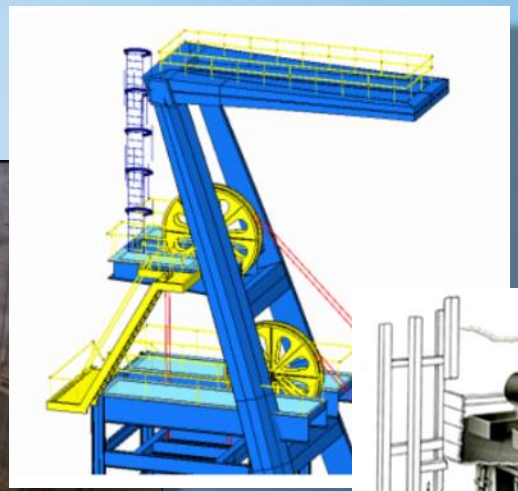
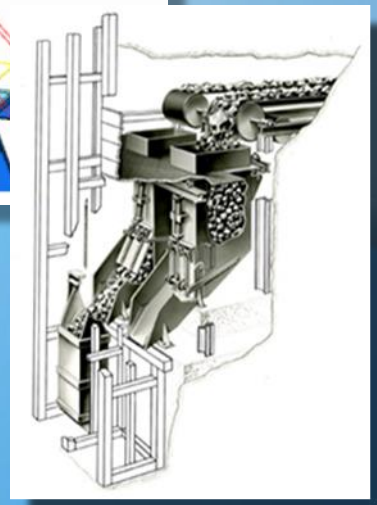
WHAT'S NEW?

New extraction shaft

- **Old shafts unreliable for high capacity/high speed lifting equipment (2x6 tons/skip, 8 m/s)**
- **Fully new shaft with raise boring technology, 600 m deep, 4.8 m gross diameter, fully lined**
- **Cable guided lifting equipment, automatized loading/unloading systems**



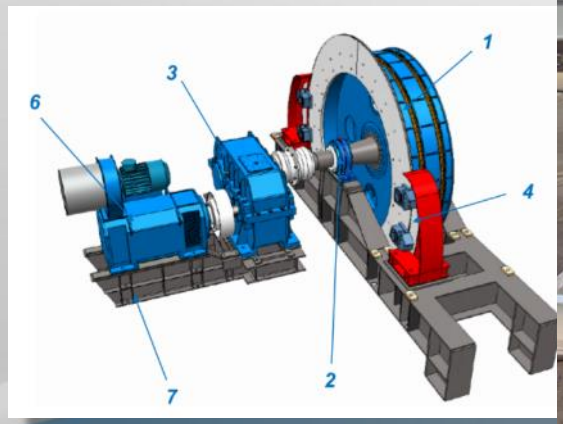




WHAT'S NEW?

Rehab of existing shafts

- **Fully new lifting equipment and shaft tower at Acqua Frida shaft (for heavy machinery/equipment)**
- **Upgraded lifting equipment at Muscadroxiu shaft (for personnel exclusive use)**
- **Fully new lifting equipment at shaft tower at Centrale shaft (dedicated to maintenance of service lines and backfilling system)**
- **Demolition of GTM shaft tower and shaft rearrangement for ventilation purpose**



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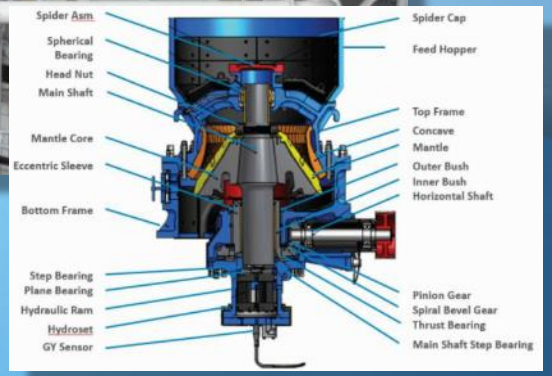
WHAT'S NEW?

New fluorspar beneficiation plant

- **NEW PRECONCENTRATION SINK-FLOAT PLANT AT CENTRALE SHAFT**
  - **125 t/h TV feeding**
  - **Primary jaw crushing (underground) and secondary/tertiary cone crushing**
  - **Gravity separation by air pulsed jet jigging technology**
  - **Dewatering of concentrate and rejects**



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WHAT'S NEW?

New fluorspar beneficiation plant

- **NEW FLOTATION PLANT AT CENTRALE SHAFT**
  - **Ball milling with hydrocyclone classifier**
  - **Blower supported rougher flotation (1 stage each for lead and fluorspar circuits)**
  - **Pneumatic cleaner flotation (3 stages for lead circuit, 6 stages for fluorspar circuit)**
  - **Dewatering systems (thickeners, vacuum drum and disc filtering, filterpressing)**

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WHAT'S NEW?

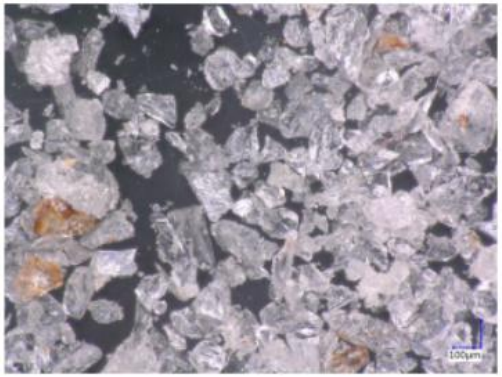
New fluorspar beneficiation plant

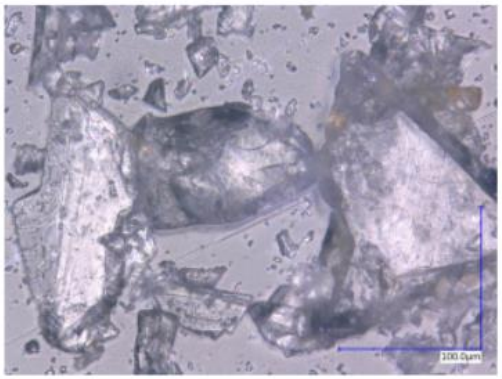
- **EXTENSIVE SINK-FLOAT AND FLOTATION PREPARATORY TEST WORK**
  - **Extensive sampling from different Silius ore sectors (mineralized veins and mine waters)**
  - **Full textwork package**
    - **Mineralogical and liberation analyses of feed sample**
    - **Crushing and grinding test work**
    - **Float-sink and gravity test work**
    - **Complex flotation test work**
    - **Material balance and flowsheet**

FINAL PRODUCT FEATURES

❑ HIGH QUALITY FLUORITE CONCENTRATE (ACIDSPAR)

- ✓ 97%-98% CaF_2 concentrate
- ✓ Low impurities content (av. 0.67% SiO_2, 0.01% P_2O_5, 0.11% SO_3, 0.13% Fe_2O_3, <1% $CaCO_3$, no As)
- ✓ CaF_2 recovery further improveable for special uses



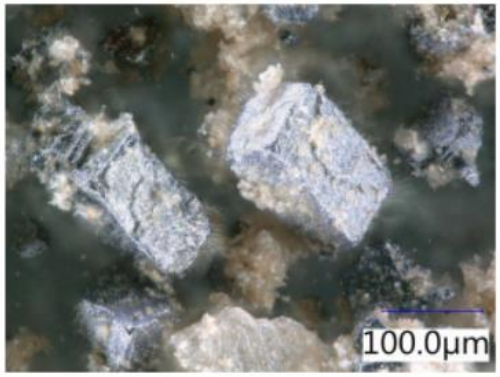


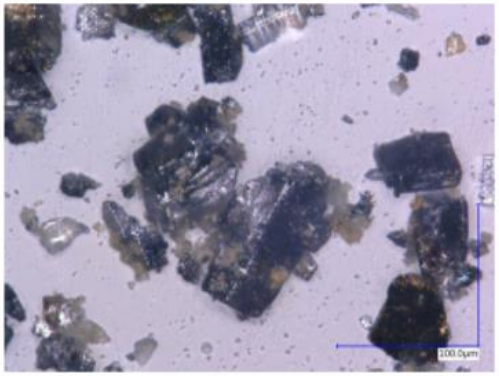
Parameter	Einheit	*	Verfahren / Aufbereitung	Messwert	Grenzwert
SiO2	MA.-%	1	DIN EN ISO 12677 2013-02	0,67	-
Al2O3	MA.-%	1	DIN EN ISO 12677 2013-02	0,08	-
Fe2O3	MA.-%	1	DIN EN ISO 12677 2013-02	0,13	-
TiO2	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
K2O	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
Na2O	MA.-%	1	DIN EN ISO 12677 2013-02	0,03	-
MgO	MA.-%	1	DIN EN ISO 12677 2013-02	0,16	-
PbO	MA.-%	1	DIN EN ISO 12677 2013-02	0,02	-
BaO	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
SO3	MA.-%	1	DIN EN ISO 12677 2013-02	0,11	-
MnO	MA.-%	1	DIN EN ISO 12677 2013-02	0,02	-
P2O5	MA.-%	1	DIN EN ISO 12677 2013-02	0,01	-
ZrO2	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
GV/LOI 1025 °C	MA.-%	2	DIN 51081 2002-12	0,9	-
Feuchtigkeit/Moisture 105°C	MA.-%	1	DIN ISO 11465 1996-12	0,1	-
ZnO	MA.-%	1	DIN EN ISO 12677 2013-02	0,01	-
CaO (ohne Ca aus CaF2)	MA.-%	1	DIN EN ISO 12677 2013-02	0,85	-
CuO	MA.-%	1	DIN EN ISO 12677 2013-02	0,02	-
F	MA.-%	1	DIN EN ISO 10304-1 2009-07/ DIN 51084:2008-11 (8.1.2 Sinterextraktion)	47,2	-

FINAL PRODUCT FEATURES

❑ HIGH QUALITY LEAD CONCENTRATE

- ✓ **Up to 72% PbS concentrate**
- ✓ **Up to 11% ZnO content**
- ✓ **Minor quantities of chalcopyrite and secondary copper sulphidic minerals**
- ✓ **Low impurities content**





Parameter	Einheit	*	Verfahren / Aufbereitung	Messwert	Grenzwert
SiO2	MA.-%	1	DIN EN ISO 12677 2013-02	1,16	-
Al2O3	MA.-%	1	DIN EN ISO 12677 2013-02	0,14	-
Fe2O3	MA.-%	1	DIN EN ISO 12677 2013-02	5,12	-
TiO2	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
K2O	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
Na2O	MA.-%	1	DIN EN ISO 12677 2013-02	0,02	-
MgO	MA.-%	1	DIN EN ISO 12677 2013-02	0,25	-
PbO	MA.-%	1	DIN EN ISO 12677 2013-02	67,3	-
BaO	MA.-%	1	DIN EN ISO 12677 2013-02	0,18	-
SO3	MA.-%	1	DIN EN ISO 12677 2013-02	1,28	-
MnO	MA.-%	1	DIN EN ISO 12677 2013-02	0,04	-
P2O5	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
ZrO2	MA.-%	1	DIN EN ISO 12677 2013-02	< 0,01	-
GV/LOI 1025 °C	MA.-%	2	DIN 51081 2002-12	8,3	-
Feuchtigkeit/Moisture 105°C	MA.-%	1	DIN ISO 11465 1996-12	< 0,1	-
CuO	MA.-%	1	DIN EN ISO 12677 2013-02	0,04	-
ZnO	MA.-%	1	DIN EN ISO 12677 2013-02	9,62	-
CaO (ohne Ca aus CaF2)	MA.-%	1	DIN EN ISO 12677 2013-02	0,710	-
F	MA.-%	1	DIN EN ISO 10304-1 2009-07/ DIN 51084:2008-11 (8.1.2 Sinterextraktion)	3,56	-

MINERARIA GERREI

SILIUS MINE IN NUMBERS

- 220.000 TONS/YEAR TOUT VENANT
- 70.000 TONS/YEAR FLUORSPAR ACID GRADE
- 7.000 TONS/YEAR LEAD CONCENTRATE
- +20% THORETICAL CAPACITY FOR HIGHER DEMAND
- 12 YEARS MINING LICENSE, RENEWABLE
- 45 MLN € INVESTMENT
- +100 NEW HIRINGS
- 100% OF NATIONAL FLUORSPAR PRODUCTION

MINERARIA GERREI

LAST BUT NOT LEAST…

- ⇨ SILIUS MINE TENDER ISSUED EARLY 2012 BY SARDINIA REGIONAL GOVERNMENT
- ⇨ NO PROTECTED AREAS WITHIN THE MINING CLAIM PERIMETER
- ⇨ STRONG SUPPORT FROM LOCAL COMMUNITIES
- ⇨ ITALIAN GOVERNMENT STRATEGY FOR CRM RESHORING
- ⇨ MINE MAINTENANCE COSTS SUPPORTED BY PUBLIC FUNDS TILL NEW MINING LICENSE AWARDING

DESPITE ALL THIS…

MINING LICENSE HAS BEEN AWARDED ON MAY 2023
AFTER MORE THAN 11 YEARS FROM TENDER PUBLICATION

NO CHANCE FOR RELEVANT EU CRM RESHORING
WITHOUT CRYSTAL CLEAR RULES, TIGHT EIA PROCESS AND FAST TRACK FOR NEW MINING PERMITS

MINERARIA GERREI

THANK YOU FOR YOUR ATTENTION AND KEEP MINING FLUORSPAR!

FLUORINE FORUM 2023
Pullman Cannes Mandelieu
16-18 October 2023