



**orano**

**CIME**

**Innovation Center for  
Extractive Metallurgy**

6th PROMETIA Annual Seminar

[www.orano.group/cime/en](http://www.orano.group/cime/en)



# 01

## CIME

# Presentation





# Bessines-sur-Gartempe - France site



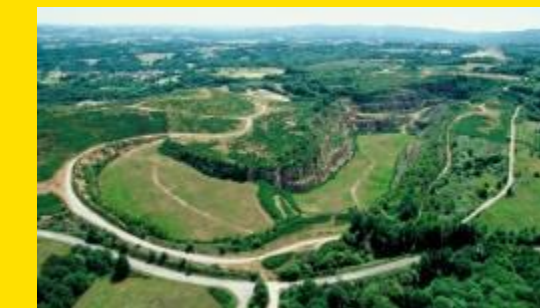
Orano Med



Geosciences



AMF



CIME



140 people





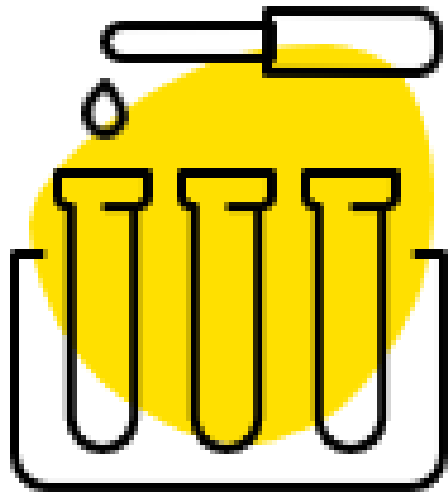
Studies Section

R&D investigations on technological developments and innovation.

Valorization of metals associated with radioactivity

Investigations on project and production support.

Investigation on the new processes



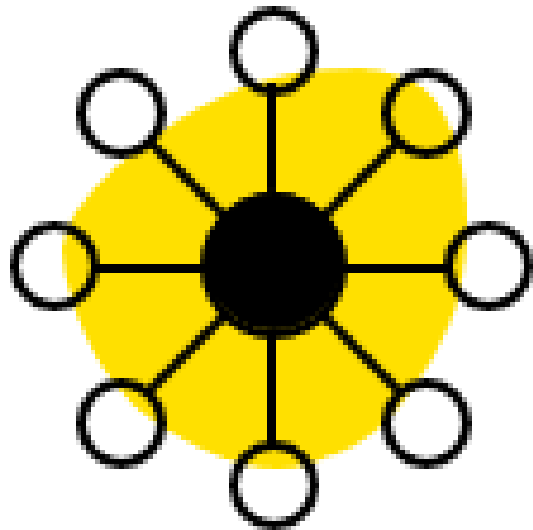
Test Laboratory

Development of new processes for the treatment of nuclear material (U, Ra, Th...) at laboratory scale.

Physical and chemical process improvement.

Assistance to operators in the management of factories.

Missions on production sites.



Industrial Pilot

Plan and realize pilot unity (to Bessines or on sites).

Establish links with engineering and OEMs

Participate in startups and industrial developments.



Analytical Laboratory

Analysis

- followed process (physical, chemical and radioactive elements)
- environmental
- waste
- organic matrices
- ores.

Development of new analytical techniques.

Support to the operating laboratories.

Participation in standardization.

Realization of technical audits and Quality.

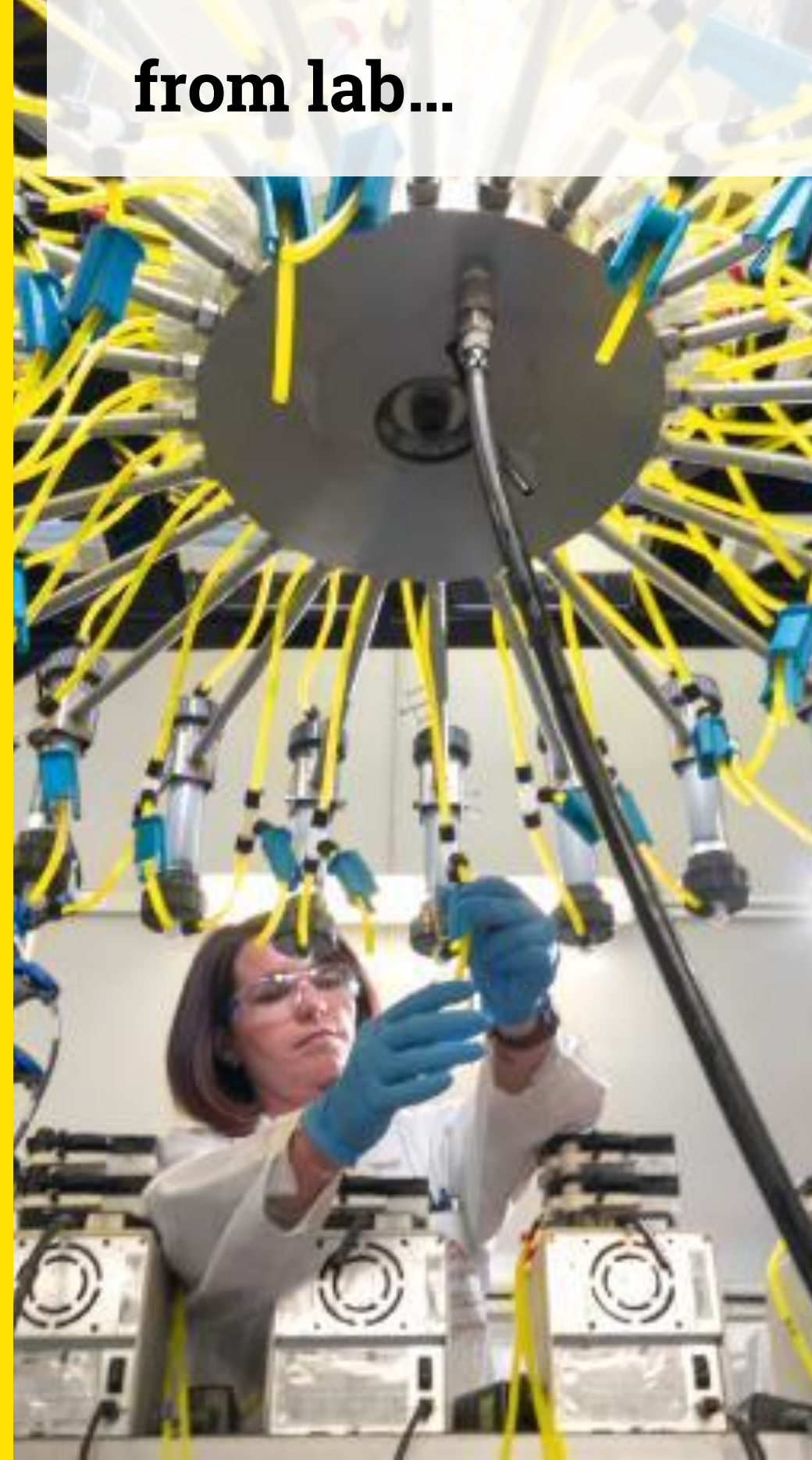




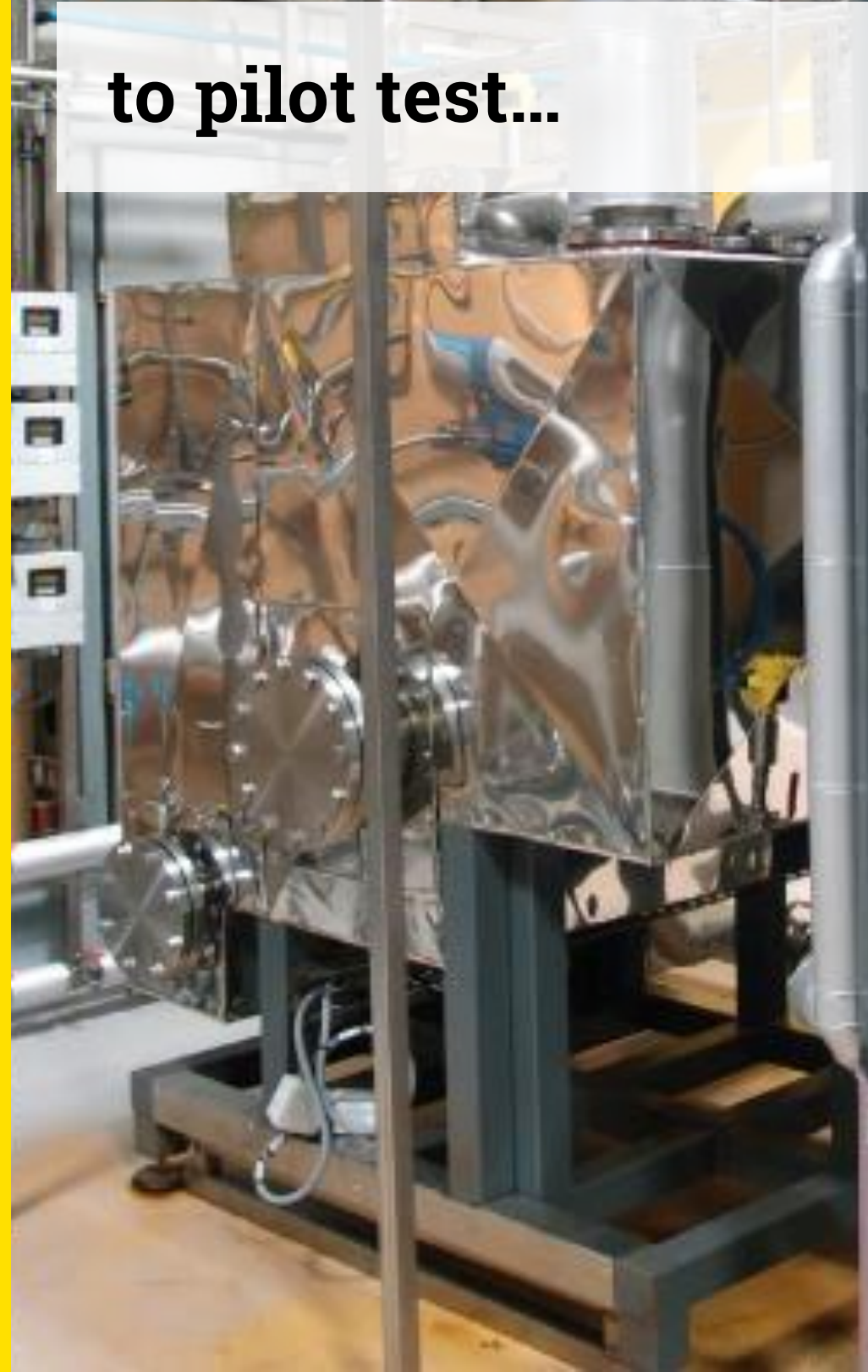
**Studies**



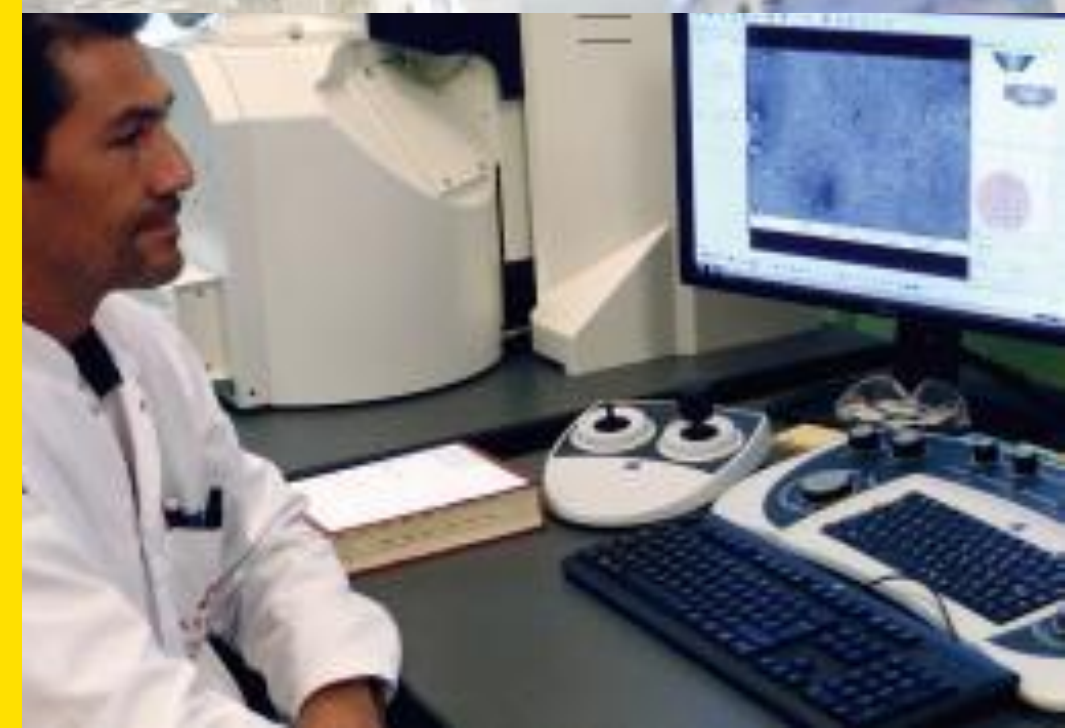
**from lab...**



**to pilot test...**



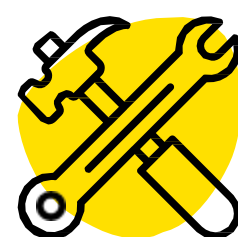
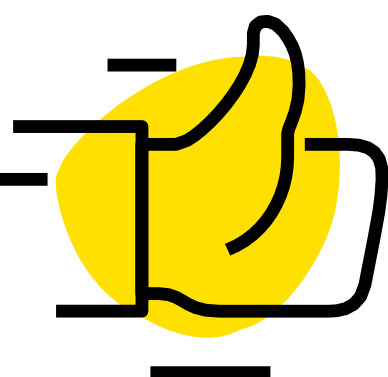
**together with  
comprehensive  
analytical capacities  
for process custom  
monitoring.**







# Advantages of CIME



## SKILLS

- + Ability to develop / upgrade physical and chemical processes
- + Wide analysis abilities
- + Possibility of carrying out tests on the entire nuclear cycle with radionuclides
- + Development of processes for the valuation of metals of interest



## CONTROLS

- + Euratom Under control
- + ICPE Sunder regime
- + Orano Technical Center authorized to work on significant quantities of natural nuclear material (10 t Uranium / 1 t Thorium / 800 g Uranium 235 enriched to 5%)
- + Authorizations to transport dangerous or radioactive materials (air, road, rail and maritime)



## ORGANIZATIONAL

- + Expertise and versatility of internal skills (engineers, experts and technicians)
- + Quality assurance tests : ISO/CEI 17025, ISO 9001, ISO 140001, OHSAS 18001
- + Optimization of operating costs and amenities
- + Several partnerships : Chimie Paris, BRGM, CEA, CREGU, Université de Lorraine, ...



# CIME Expertises



## EVALUATION RESOURCE

- + Specimen preparation, chemical and radiological analyzes



## EXTRACTIVE METALLURGY

- + Physical preparation and enrichment of the ore (grinding, crushing, separation by density, flotation, sieving ...)
- + Solid / liquid separation (filtration, decantation ...)
- + Leaching (in situ, static, dynamic, pressurized, biohydrometallurgy)
- + Analysis of specific phenomena (H<sub>2</sub> emanation, clogging, ...)



## PURIFICATION

- + Purification with selective resins
- + Selective solvent extraction
- + Selective precipitation





# CIME Expertises



## PRODUCTION OF CONCENTRATE

- + Precipitation
- + Fluidized bed process
- + Drying processes, calcination



## ENVIRONMENTAL ISSUES

- + Analysis of natural waters, mud and sediments
- + Treatment processes for mine drainage
- + Fixation on resin
- + Waste cementing
- + Membrane separation



## VARIOUS

- + Training of operating personnel / Audits
- + Design, construction, pilot plant startup
- + Piloting and testing for external customers





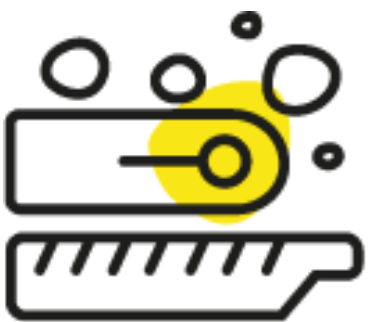
# Our activities



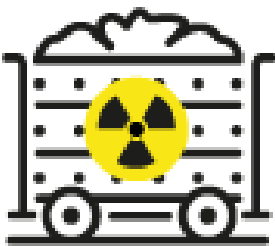
Nuclear Industry:  
Study and Control of Processes



Mining sector:  
Design and Improvement of Mining Processes



Non-nuclear domain:  
Study and control of processes



Recovery of metals associated with radioactivity



Medical research:  
Study and production of radioisotopes



Environment:  
Decontamination and depollution of water,  
effluents and soils



Sampling







# CIME through the world







# Key Numbers

**40** YEARS OF EXPERIENCE

**70** PERMANENTS,  
including **20** ENGINEERS  
ET **6** ORANO EXPERTS

AUTHORIZATION OF DETENTION  
OF MATERIALS :

**10 T**  
Uranium

**1 T**  
Thorium

**800 g**  
U<sup>235</sup> enriched to 5 %

**>100** PUBLICATIONS AND  
CERTIFICATE

**>10** ANNUAL  
PILOTES

**ISO/CEI 17025** COFRAC  
LABORATORY  
ACCREDITATIONS

**ISO : 9001, 14001  
OHSAS : 18001** CERTIFICATIONS





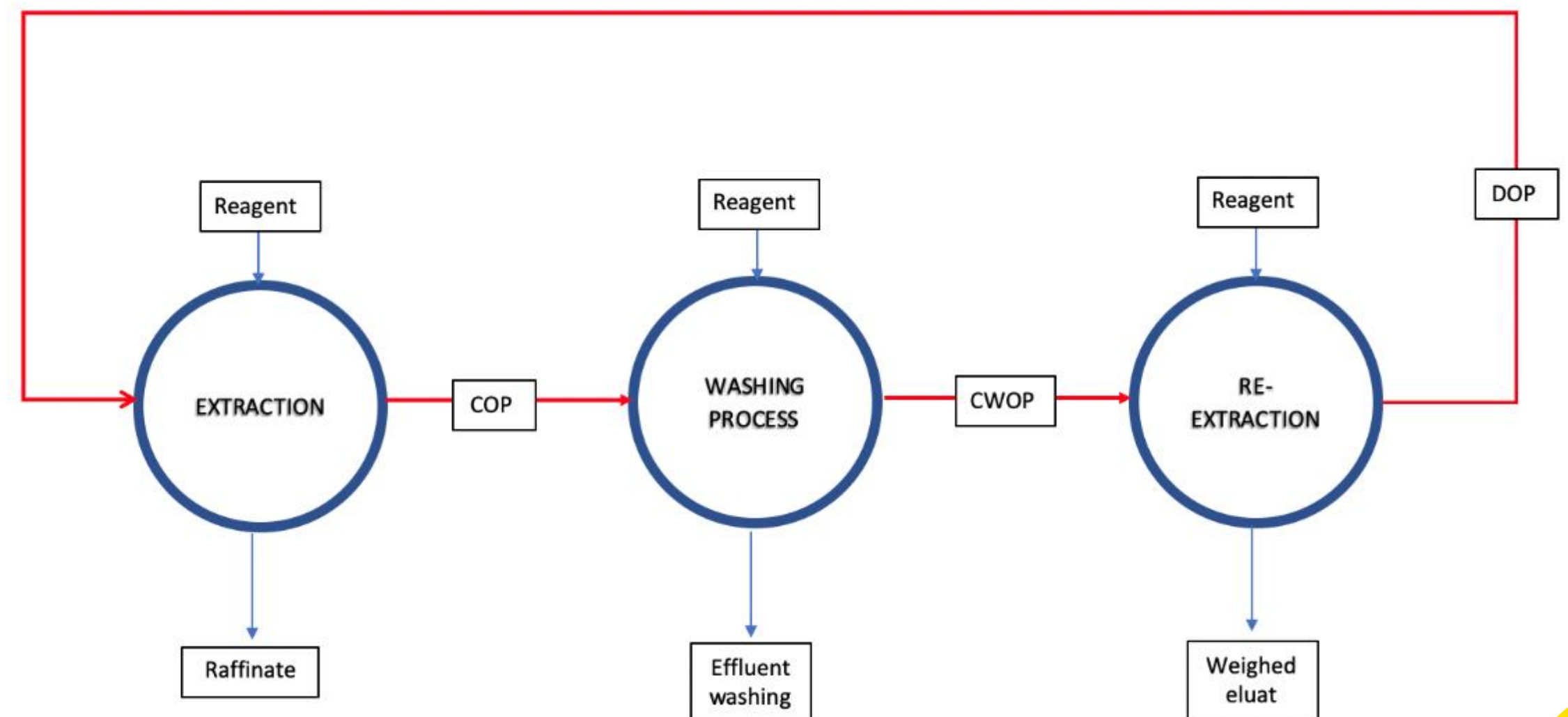
02

# Our Realizations



# Development of a Vanadium extraction process (COMINAK - Niger)

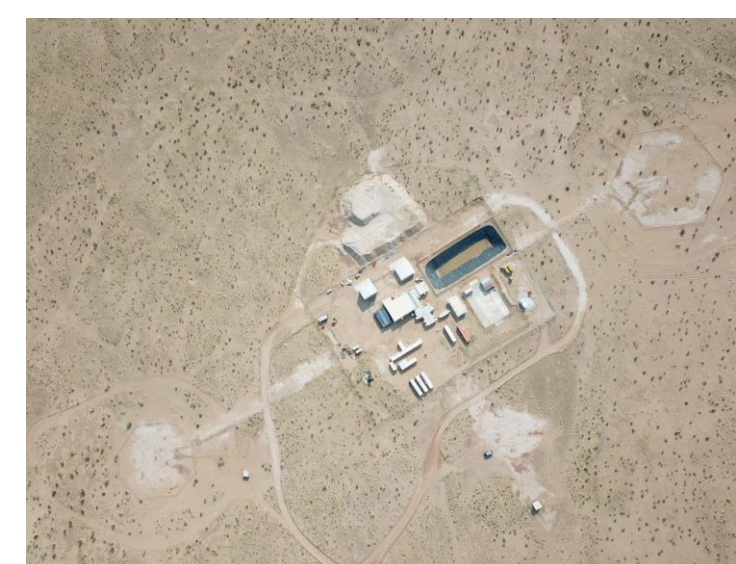
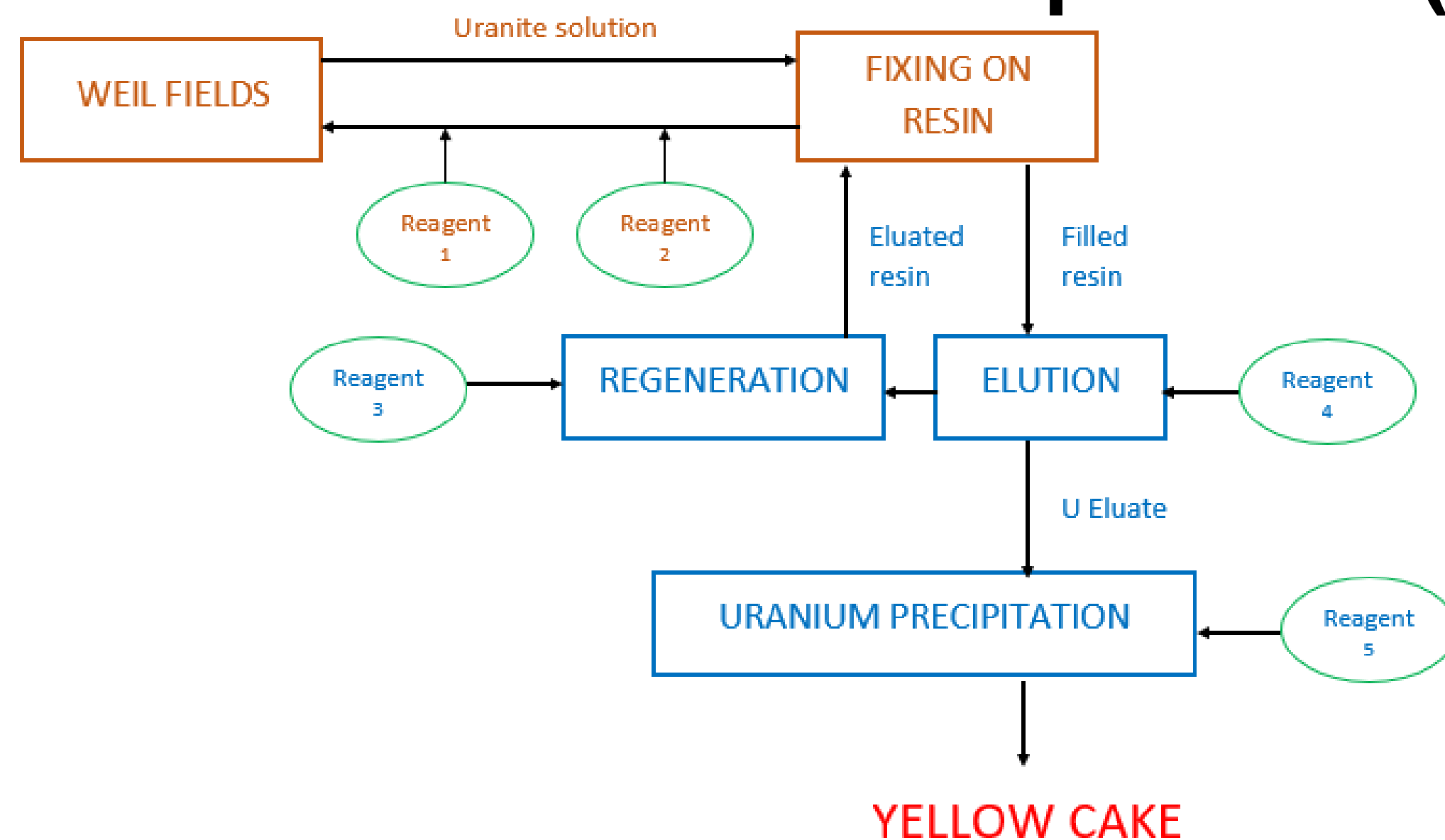
- Process robustness test (passage of synthetic solution → factory effluent) : process validation
- Improve V/U selectivity in the eluate
- Identify critical points to be improved in on-site piloting
- Acquire confirmation data for CAPEX/OPEX
- Obtain eluates for back-end testing







# Development of a Uranium extraction process (MONGOLIA)







03

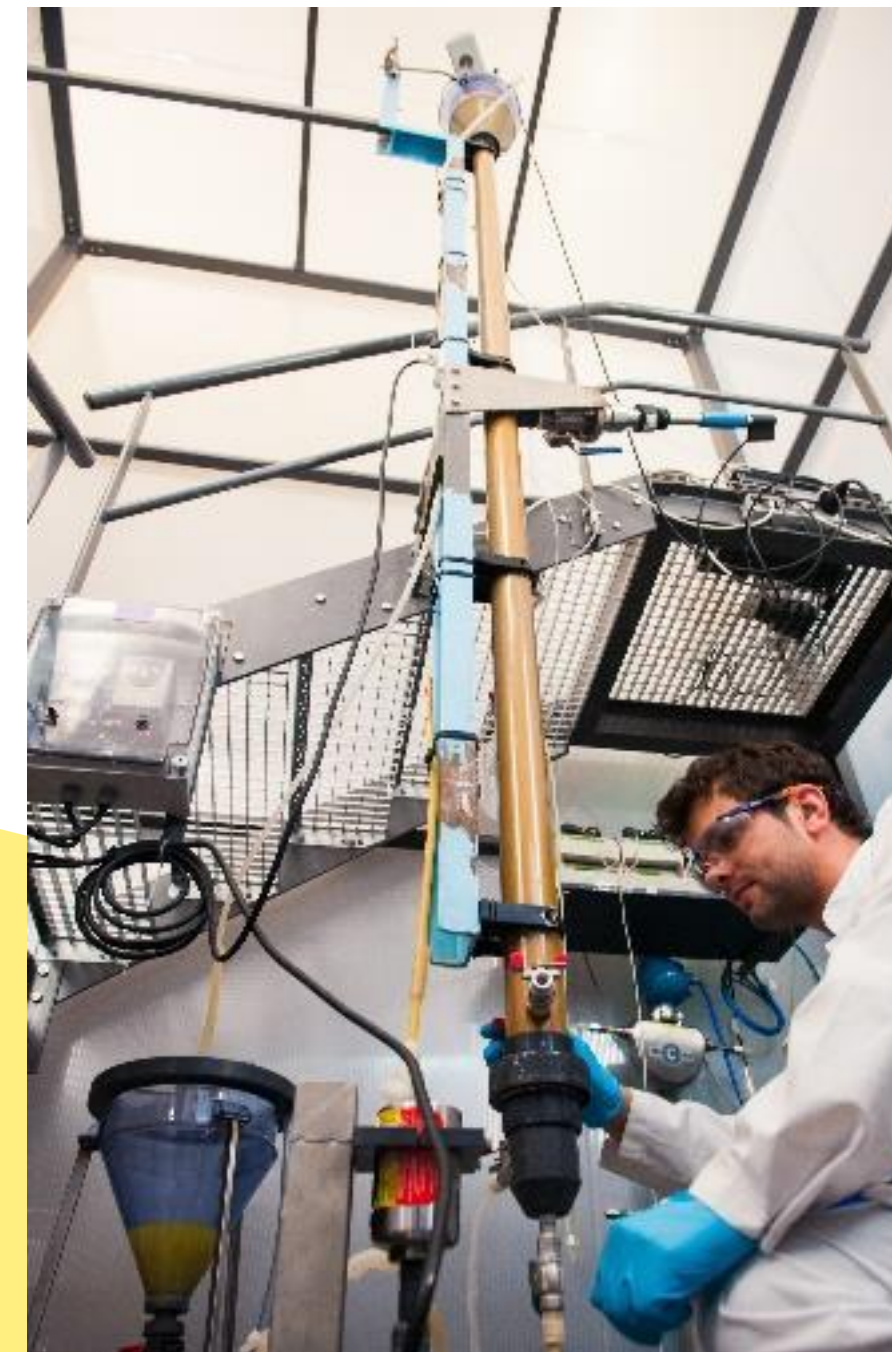
# **Example of Industrial pilot and equipment at the CIME**



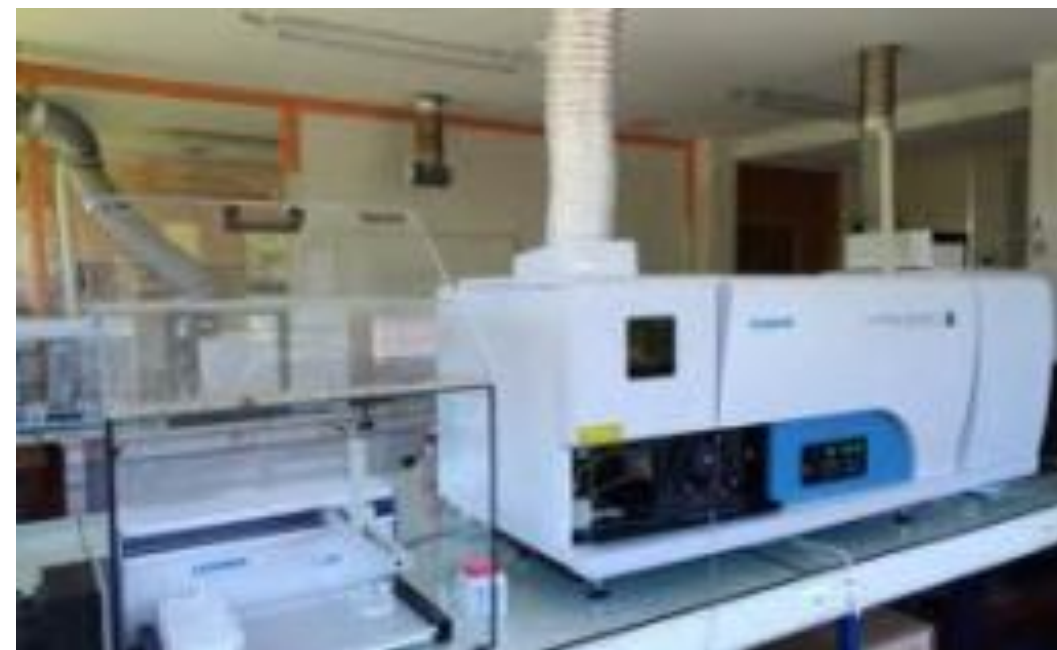
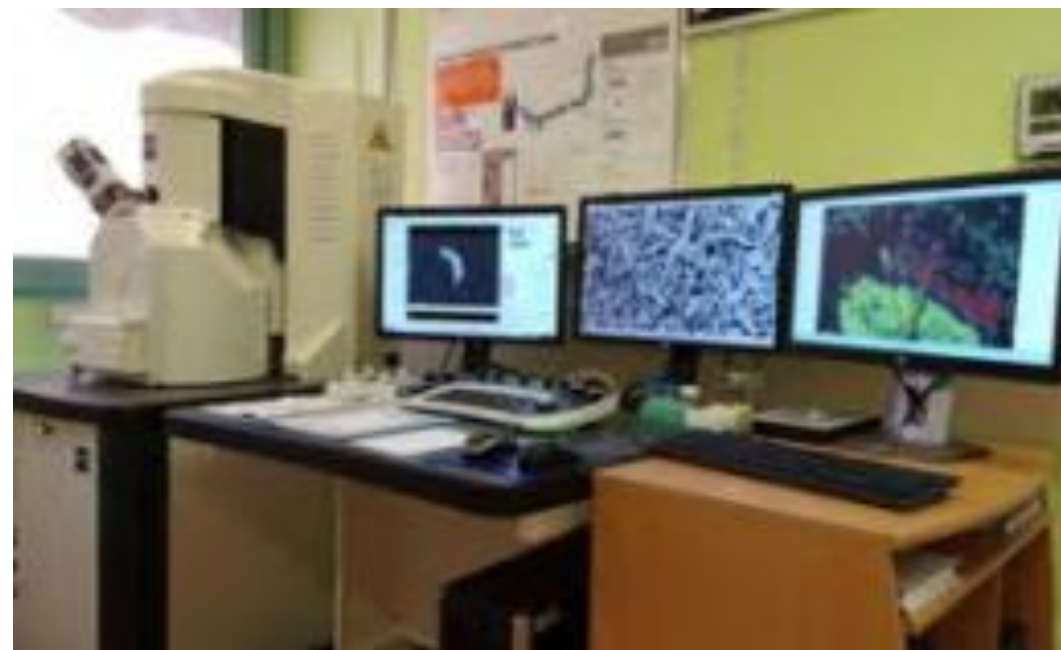
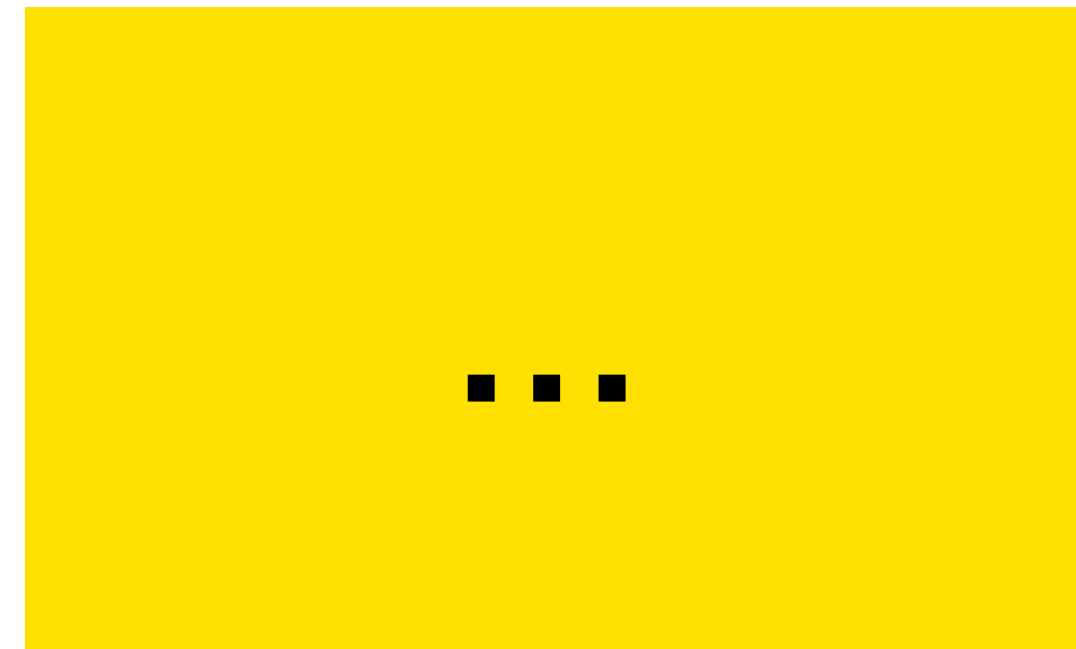














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**Thank you for your attention !**

**Orano Mining/CIME**

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