



Orano transforms nuclear materials so that they can be used to support the development of society, first and foremost in the field of energy.

The group offers products and services with high added value throughout the entire nuclear fuel cycle, from raw materials to waste treatment. Its activities, from mining to dismantling, as well as in conversion, enrichment, recycling, logistics and engineering, contribute to the production of low carbon electricity.

Orano and its 16,000 employees bring to bear their expertise and their mastery of cutting-edge technology, as well as their permanent search for innovation and unwavering dedication to safety, to serve their customers in France and abroad.

Orano, giving nuclear energy its full value.

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Energy is our future, don't waste it !

Orano Malvési Communications - June 2018 - Photos and illustrations : © Orano

DEFACTO

  
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# Orano Malvési



# Orano Malvési & the nuclear fuel cycle

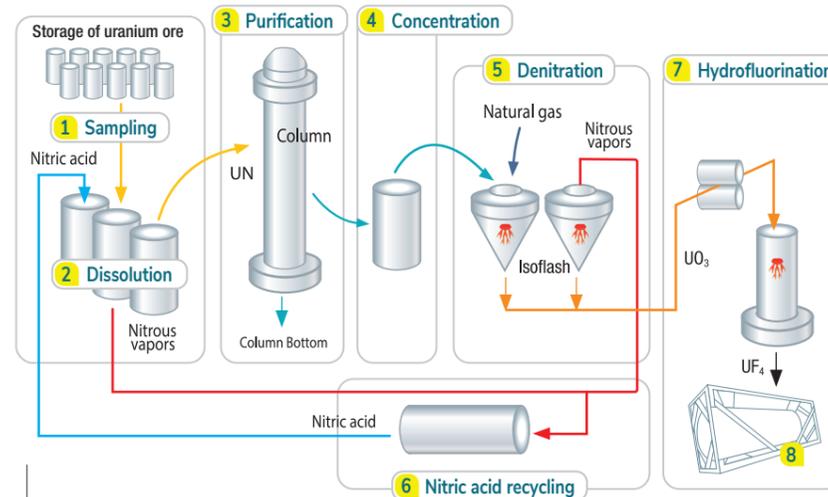


Nuclear fuel manufacturing includes several steps: extraction of the uranium ore from the mines, conversion of the uranium into UF<sub>4</sub>, then into UF<sub>6</sub>, enrichment of uranium and nuclear fuel manufacturing. After being used in the power plants, the fuel is reprocessed and recycled in specialized facilities.

Within the Orano group, the Conversion activity takes place in two sites in the south of France:

the **Malvési plant (Aude)** which purifies the natural uranium and converts it into uranium tetrafluoride (UF<sub>4</sub>) and the **Tricastin plant (Drôme)** which converts it into uranium hexafluoride (UF<sub>6</sub>).

## The UF<sub>4</sub> manufacturing process



**1** The natural uranium concentrates are received and sampled on the Malvési site.

**2** They are then dissolved by nitric acid.

**3** Purification is a key step: it is at this stage that the uranium obtains the « nuclear-grade » purity required for the fabrication of the nuclear fuel.

**4** Once concentrated, the pure uranyl nitrate obtained is transferred into the Isoflash workshop.

**5** The uranyl nitrate undergoes a thermal denitration reaction by means of a natural gas combustion system which leads to the instantaneous formation of Uranium Oxide powder (UO<sub>3</sub>).

**6** The nitrous vapors are recovered, processed then recycled into nitric acid, which is re-used in the dissolution workshop.

**7** Hydrofluorination, the last step in the process, adds 4 atoms of fluorine to the natural uranium. The uranium tetrafluoride (UF<sub>4</sub>) obtained is a green granulate, stable, with low radioactivity level.

**8** The uranium is then carried out by rail to the Tricastin site for further processing.

## Nuclear & occupational safety and environmental protection: **our DNA**

Thanks to an ambitious, on-going investment policy, Orano Malvési uses the best available technologies.

Safety drills are performed several times a year, with local firemen and the national gendarmerie based in the Aude department.



Throughout the operation of its industrial facilities, the Malvési site implements a preventive and corrective maintenance policy including lessons learned from the other industrial sites.

This means that the highest nuclear & occupational safety standards are implemented in its facilities.

The site is regularly inspected by Safety authorities and internal inspections are performed by Orano group H&S Division.

On a day to day basis, the personnel working on the Malvési site enforce the nuclear and occupational safety measures to ensure their safety and that of the local community.

**+** With more than 50 years' experience, the Orano group's conversion units convert natural uranium for its customers worldwide, with a capacity of almost 15,000 tU per year.

The facilities of the Malvési plant are classified ICPE (Environmental Protection Classified Facility) SEVESO high level. The Malvési site also Basic Nuclear Facility No 175 or « ECRIN », through the two former settling ponds shut down in 2004.

**1959**  
Construction of the site

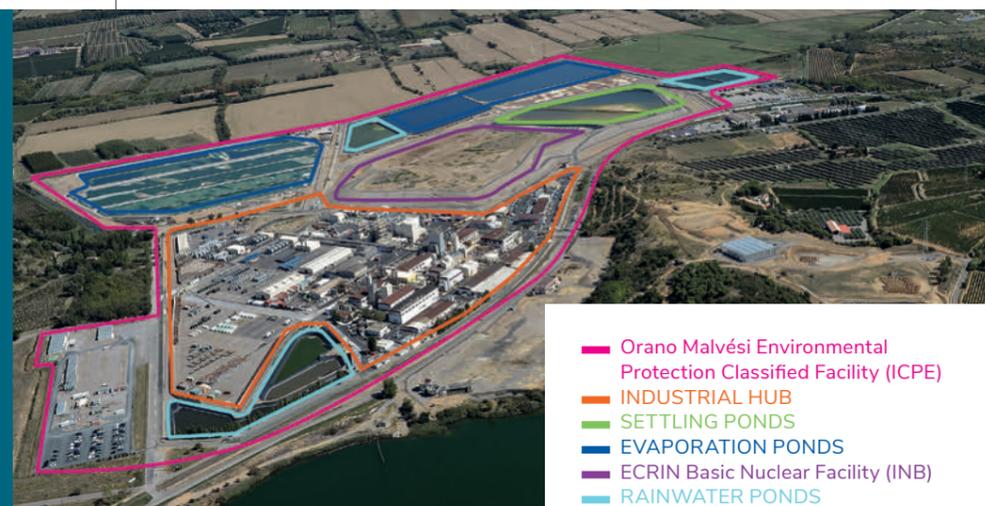
**100ha**  
Site surface area  
(including 20 ha of industrial hub)

**15000 tU**  
Annual production capacity

**2** local Commissions  
Site Control Commission (CSS) for the ICPE and Local Information Commission (CLI) for Basic Nuclear Facility No 175 « ECRIN »

**★★★★**  
**Triple certification**  
ISO 9001, ISO 14001, OHSAS 18001

**2016**  
Commissioning of the new modernized facilities



Orano Malvési Environmental Protection Classified Facility (ICPE)  
INDUSTRIAL HUB  
SETTLING PONDS  
EVAPORATION PONDS  
ECRIN Basic Nuclear Facility (INB)  
RAINWATER PONDS

All the liquid waste generated during the process is treated within the uranium recovery facilities before being transferred to settling then evaporation ponds. The site also collects rainwater which is temporarily stored on site in rainwater ponds, tested and treated (osmosis and evaporation) before being released to the Tauran canal.



The site performs more than 23,000 analyses each year on nearly 5,000 samples taken at 100 geographical points on the site, in the close vicinity and as far as the Bages pond.

An extract from the results is presented in the annual site report, available (only in French) within the Media Library section of the web site [www.orano.group](http://www.orano.group) and all data are available on the website of the National Environmental Radioactivity Measurement Network: [www.mesure-radioactive.fr](http://www.mesure-radioactive.fr)