



ARC-Nucléart is both a conservation-restoration and a research laboratory, internationally recognized for its unique skills in safeguarding the cultural heritage. At the CEA* site in Grenoble, it is dedicated to the conservation and restoration of cultural heritage objects in organic materials.

Created in 1970, today ARC-Nucléart is a Public interest grouping whose members are : the CEA, the ministry of culture, the municipality of Grenoble and the ProNucléart association.

(*) CEA : *French atomic and alternative energy commission*

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Our **MAIN TASKS**

- Conservation-restoration of archaeological objects in organic materials: mainly wood, basketry, leather and skins, wood/metal composite objects, etc.
- Disinfestation of heritage assets by exposure to gamma radiation (archives, mummies, sculptures, art works, taxidermy specimens, etc.)
- Consolidation and restoration of polychrome or plain wood sculptures
- Research and development (R&D) to improve conservation treatment of ancient and modern wood
- Disseminate knowledge in the field of conservation



What **WE DO**

- **On archaeological sites** in an advisory capacity and/or in the extraction of large dimension waterlogged wooden vestiges
- **Disinfection and disinfestation by gamma irradiation** of polychrome or plain wooden sculptures, craft and industrial heritage, ethnographic collections, musical instruments, etc.
- **Conservation and restoration treatment** of wet or dry polychrome or plain organic materials
- **Consolidation** of modern wood components
- **Analyses:** physico-chemical, polychromy
- **Design and production** of special transport and storage packaging, and of museum display products

ARCHAEOLOGICAL OBJECTS

Consolidation treatment

- The most common is **impregnation** of the object in a bath of water and **polyethylene glycol** (PEG), a soluble consolidating product, for 8 months, followed by drying by freeze drying (freezing followed by sublimation of the ice under vacuum, i.e. passing directly from the solid to the gaseous state), which takes around 3 weeks.
- In certain cases, ARC-Nucléart offers a treatment unique in the world : the "**Nucléart mixte**" **process**. After initial treatment with PEG followed by drying, the objects are thoroughly impregnated by a vacuum-pressure process with a styrene-polyester resin that is cured under gamma radiation.

Restoration

This begins with procedures for cleaning, and removing excess resin, and is followed by assembly, filling and colour retouching. ARC-Nucléart designs and produces supporting bases when needed.



Degradation of materials

When discovered in the sea, in lakes, in rivers, or in wetlands, waterlogged wooden items have a much altered internal structure. To save them, their structure must first be consolidated in order to be able to dry them with minimum risks of deformation.

Sculptures and **HISTORIC WOOD**

Conservation

- **sanitary treatment :**

To disinfest wooden objects, ARC-Nucléart makes use of the biocide properties of gamma radiation : ethnographic works or objects are treated on arrival in the workshops to eradicate insects and any fungus or mold.

- **Consolidation :**

The wood is consolidated by infiltrating various acrylic resins, and in the case of extreme degradation, by the "Nucléart" process : impregnating dry wood with a radiation-cured resin.

Restoration

Restoration may involve numerous operations : fixing layers of paint, cleaning, consolidation, assembling, filling and colour retouching.

Polychromy studies

Generally, restoration is preceded by a study of polychromy. The underlying layer is often covered with several levels of overpainting. The results of the study form the basis of a fruitful dialogue between the owner of the work and the restorers to determine the best restoration choice.



Damage

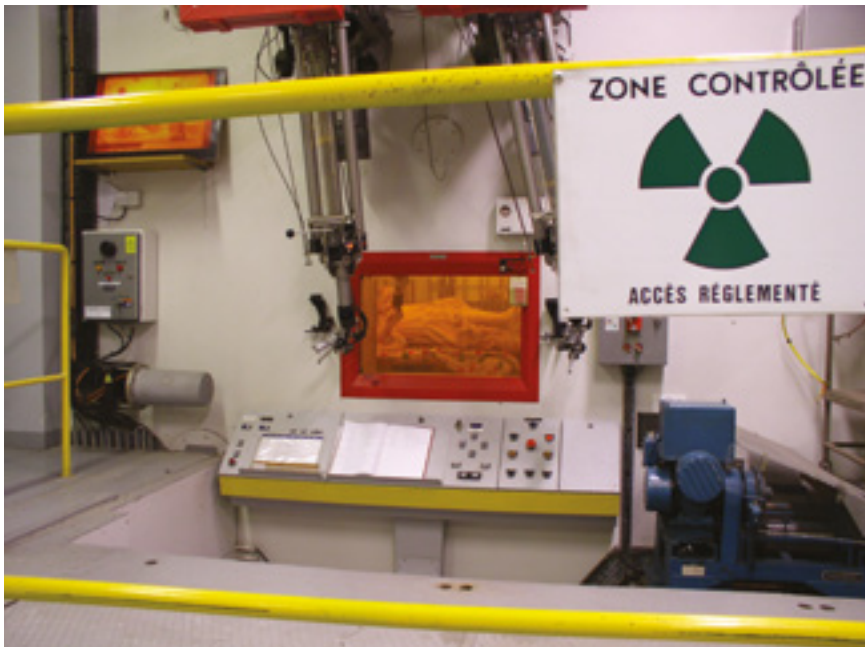
"Dry wood" suffers above all from attacks by xylophage insects that bore galleries, fragilising the strength of the wood. Similarly, fungi and rot are highly damaging agents.

Gamma **IRRADIATION**

Biocide treatments :

Biocide treatments by exposure to gamma radiation have been successfully used by ARC-Nucléart for over fifty years. From the furniture of private clients to prestigious museum collections, several tens of thousands of objects have benefited from this method, which has the advantage of being able to treat sets of objects without contact, without temperature effects and with no persistent effects or residue.

The method is effective against pests, pathogenic bacteria, fungi (including rot, dry rot and moulds) and has widely proven reliability on collections of various types: furniture, polychrome sculptures, paintings, contemporary art works, mummies, archive collections, libraries and taxidermy specimens.



"Nucléart" consolidation and its applications:

Apart from archaeological wood and polychrome statues, "Nucléart" consolidation by radiation-cured resins can be carried out on modern or ancient wood when it is wished to restore or retain the use of the object or its mechanical strength. For example, ARC-Nucléart uses this process for furniture or wood floors.

"Customised" irradiation:

The ARC-Nucléart irradiation facility can also be used for so-called "customised" irradiation for research and development (R&D) or for qualifying equipment for various industrial fields such as nuclear, medical and space.

Our team, **OUR FACILITIES**

A **multi-disciplinary team** serving the cultural heritage: engineers and technicians in chemistry, biology, entomology, physico-chemistry and nuclear physics, cultural heritage curators, restorers, collection administrators, photographers, administrative personnel.

The largest facilities in France for the treatment of organic materials: 3,000 m² of facilities comprising a gamma irradiator, treatment tanks and baths, large scale freeze drying equipment, physico-chemical analysis facilities, restoration workshops, air conditioned storage.



Research and **DEVELOPMENT**

A **research team** specialised in improving conservation treatments: improvements in wood consolidation, formulation of new reversibly radiation-induced polymerisation resins, extraction or neutralisation processes for pyrite (compound causing wood to acidify after drying), development of new biosourced resins to improve certain properties of modern wood.

Coordination and/or participation in European, French and industrial **R&D projects**.

Our vision? *Mobilising science in the service of the cultural heritage*

Our work? *Conserving and restoring heritage at an acceptable cost to those in charge of collections (museums, communities, archaeological services, etc.) to pass on the artefacts of our history to future generations.*

Would you like to help maintain skills and facilities unique in France in the service of cultural heritage?
Become an ARC-Nucléart patron by making a donation:

- Directly from our internet site: www.arc-nucléart.fr - section "support us"
- Or by contacting us on +33(0)4 38 78 35 52 or at the address nucleart@cea.fr

Become an ARC-Nucléart patron!

By becoming an ARC-Nucléart patron, you'll enjoy exclusive privileges :

- Exceptional visibility on our communication media (social networks, publications, etc.)
- Promotion of the social responsibility of your brand (ARC-Nucléart logo and photos available for your communications, etc.)
- The involvement of your staff and partners (private visits, organisation of conferences, invitation to our events, etc.)

Advantageous fiscal benefits :

ARC-Nucléart is an organisation of public interest, and our patrons benefit from a **tax reduction** equivalent to :

- **60% of the amount of the donation for companies paying french income tax** (within a limit of 0.5% of turn-over)

Examples of donations	5,000 €	20,000 €	50,000 €	100,000 €
Actual cost after 60 % tax reduction	2,000 €	8,000 €	20,000 €	40,000 €

- **66% of the amount of the donation for private sponsors paying french income tax** (within a limit of 20% of the imposable tax)

Examples of donations	100 €	500 €	1,000 €	5,000 €
Actual cost after 60 % tax reduction	34 €	170 €	340 €	1,700 €

ARC-Nucléart patrons :



The contest **CEA-AMF**

The contest "Save the cultural heritage of your town", the fruit of a partnership between the CEA and AMF*, has made ARC-Nucléart's skills available to French towns for the restoration of local heritage objects in organic materials. For example, thanks to this contest, in 23 years, 95 objects and works have been restored.

(*) AMF: Association of Mayors of France and Presidents of inter-municipal communities.



Members of ARC-Nucléart



With the support of