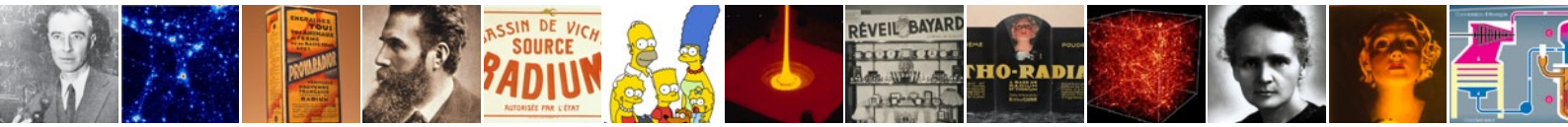
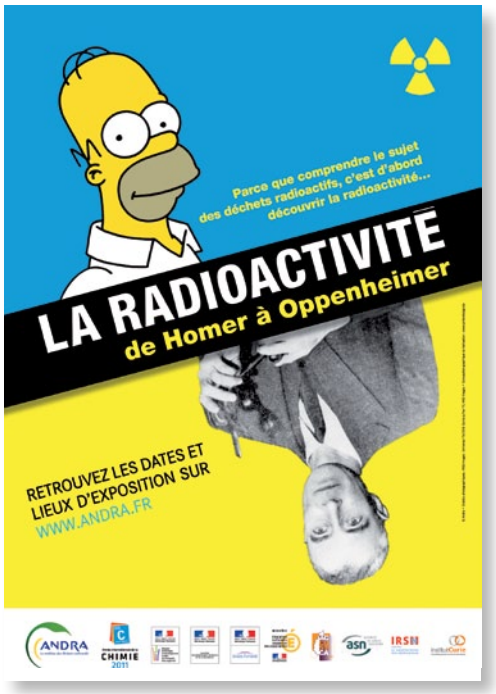


Radioactivity from Homer to Oppenheimer

A TRAVELLING EXHIBITION PROPOSED BY ANDRA



«An exhibition covering all aspects of radioactivity, because we are all concerned by it.»

François-Michel Gonnot, President of Andra (French radioactive waste management agency)

LUDIC AND DIDACTIC, THE AIM OF THE TRAVELLING EXHIBITION ENTITLED «RADIOACTIVITY FROM HOMER TO OPPENHEIMER» IS TO A GIVE THE GENERAL PUBLIC THE KEYS TO BETTER UNDERSTANDING THIS PHENOMENON, A SOURCE OF BOTH INTERROGATION AND FEAR.

By declaring its aim from the very outset to cover all aspects, from the most dramatic events to cartoon characters, **the exhibition offers visitors a complete itinerary ranging from the science of radioactivity** (How does it work?) **to its uses** (What uses are made of it?) **while exploring its dangers** (What are the risks?) **and the history of the phenomenon of radioactivity** (How was it discovered?). The exhibition begins with a video of **«Tom the atom»,** who explains his radioactive make up. Radiation and natural radioactivity are then explained by means of manipulations and animations. Then the public is invited to discover **the incredible history of radioactivity,** between the first scientific discoveries and the **radium «boom» years,** during which it was considered good for one's health to drink radioactive water! **The risks linked to radioactivity** and its applications are then explored, as is **the management of radioactive waste,** Andra's core business.
The final pole is devoted to **applications of radioactivity,** whether for military, energy, medical or industrial purposes.

IN KEEPING WITH ITS OBJECTIVE OF INFORMATION, EXPLANATION AND DIALOGUE, ANDRA PROPOSES IN THIS EXHIBIT A FACTUAL YET ACCESSIBLE SCIENTIFIC APPROACH, WHICH IS BOTH PEDAGOGIC AND FREE OF ANY EULOGY.

This exhibition, **labelled by the CNC (French National Chemistry Committee) in 2011,** forms part of a wider public information initiative, which includes in particular **Regular Open Days** (next date: 24 September 2011), and the **web site www.dechets-radioactifs.com.**

Andra is supported in this exhibit by the Institut Curie, IRSN (French Institute for Radiological Protection and Nuclear Safety), ACCUSTICA (Reims Centre for Disseminating Technical and Scientific Culture), ASN (French Nuclear Safety Authority), and by several French government ministries: Ministry for Research, Ministry for Ecology, Ministry for Industry and Ministry for National Education.

After going through an access chamber portraying questions frequently posed by the general public, visitors are invited to discover four poles dealing with radioactivity:

- How does it work?
- How was it discovered?
- What are the risks?
- What uses are made of it?

Pole 1 / **How does it work?**

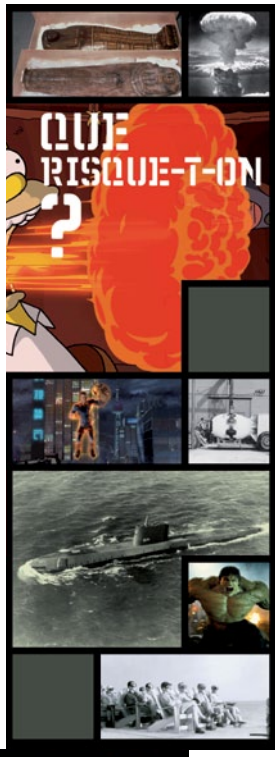
Meet **Tom the atom.** He's just the right person to explain why and how he is the source of all the radioactivity that surrounds us. Tom the atom welcomes visitors and introduces them to his **«Odd family»,** radioactive atoms and their emissions of **alpha, beta and gamma rays,** some of which reach us from the **cosmos.**

These atoms are naturally present in nature and are behind what is known as natural radioactivity. Even more surprising, they are also present INSIDE us! Members of the public can also measure their own radiation levels at the section **«How much do you radiate?»,** then have fun measuring the emissions of several everyday objects using the **«Becquerel meter»,** a fictive Geiger counter to manipulate in front of the display cabinets, and a good way to become familiar with the Becquerel, the unit for measuring radioactivity, and its orders of magnitude.

Pole 2 / **How was it discovered?**

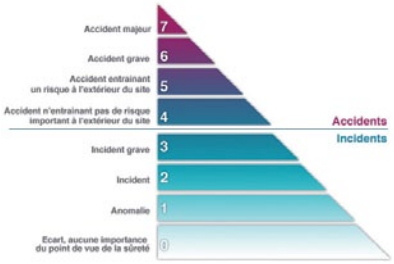
Did you know that the discovery of radioactivity owes a lot to French scientists? Among the ten leading **«Magicians of the atom»** there are no fewer than five French scientists! First Henri Becquerel, who discovered the «radiant activity of uranium» in 1896, but above all the Curie family: Pierre and Marie, who discovered radium and polonium and also invented tools for measuring radioactivity, then their daughter Irène and her husband Frédéric Joliot, the first to create artificial radioactivity.

The exhibition devotes considerable space to the **«Radium boom years»,** the period between 1920 and the end of the 1950s, when radioactivity became modern and its virtues extolled. It was associated with all sorts of benefits and burgeoning advertising extolled the merits of radioactive creams, mineral water containing thorium... and even «radium fountains» in order to benefit from a good radioactive inhalation, the promise of eternal youth!



Pole 3 / **What are the risks?**

Persons exposed to radiation from fallout from Chernobyl, radioactive waste, nuclear accidents such as Fukushima, cancers..., all subjects of concern linked to radioactivity. This pole deals not just with the risks linked to the uses made of radioactivity, with a particular focus on nuclear power plant accidents, but also the measures put in place in France and elsewhere in the world to manage these risks as efficiently as possible.
The «Risks in question» section allows the public to discover how and why radioactivity can be dangerous to health and in what ways we can be exposed to it. Then the «Three shields» present the measures that make it possible to protect ourselves from radiation hazards.



The risks linked to nuclear energy are also discussed without taboo. «Level 7», the highest rank on the INES (International Nuclear Event Scale) scale, applies to the 3 biggest nuclear accidents in human history: Three Mile Island (1979), Chernobyl (1986, related in a short film) and Fukushima (2011), and the means put in place to improve safety and deal with such emergency situations are explored.

Finally, the subject of radioactive waste, from its production to its definitive disposal, is presented in the form of a model.

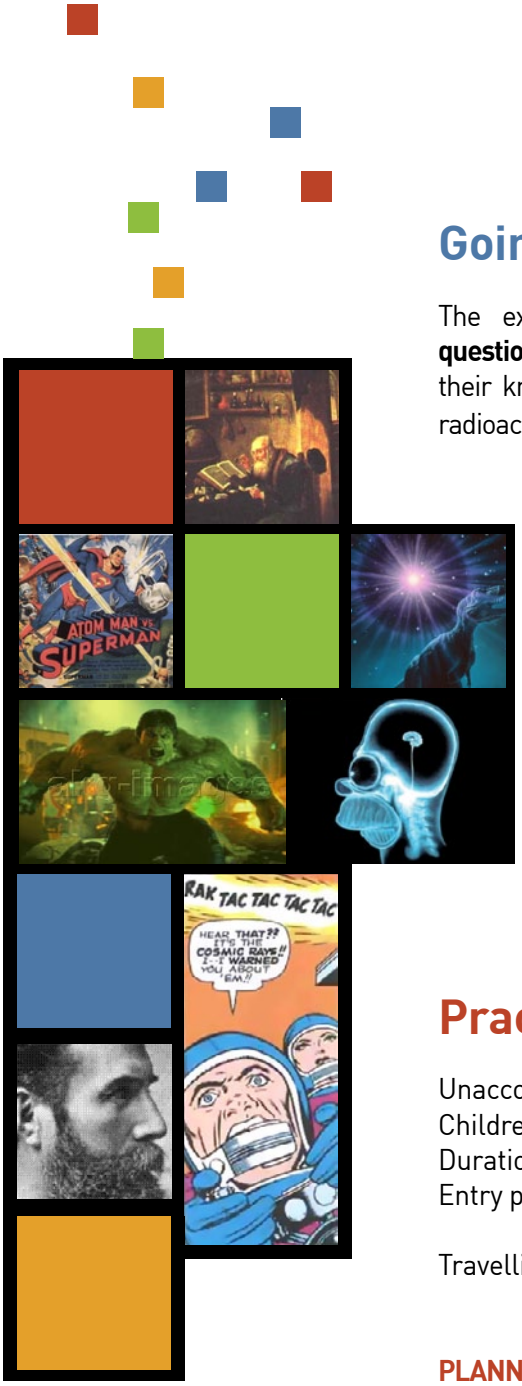
Pole 4 / **What uses are made of it?**

«City lights» is a video presentation of how a nuclear power plant operates, from the fission reaction up to the process of generating electricity.

The atomic bomb and international politico-strategic events associated with it are also explored in **«The atom files»,** a section that retraces recent major historical events linked to radioactivity: the Cold War, the Arms Race, scientific opponents, international treaties and, obviously, espionage! **«France and the bomb»** presents the history of the French military nuclear arsenal on land, sea and in the air.

Medical uses are also spotlighted in **«Operation rays»,** where the public is invited to put themselves in the shoes of a doctor.

But visitors will be shown even more surprising and unexpected applications, even though they are right **«Under our noses»** on a daily basis. Did you know that potatoes germinate less when they have been radio-sterilised with gamma rays? That mummies undergo the same fate to be conserved several thousand years? That playing cards and the wooden floors of the Château de Versailles are covered with a varnish or a resin that is «radio-hardenable» or instead that it is possible to measure the density of a river using a radiometric gauge?



Going even further...

The exhibition ends with a **wall of questions,** where visitors can check their knowledge on the phenomenon of radioactivity.

A children-friendly itinerary

A **specific itinerary** is proposed for **children aged 8 and above, with «Tom the Atom» as guide.** The ludic design, which includes manipulations («Becquerel meter), objects, artwork, models, photos, films, interactive animations, quizzes, etc. employs simple notions and **characters appreciated by children** (Homer Simpson, the Incredible Hulk, the Fantastic Four, etc). The children are given free information and games pack.

Practical information

Unaccompanied visits or visits accompanied by a scientific mediator.
Children and school group itinerary.
Duration of the guided visit: 1h (Unaccompanied visits 1.5h)
Entry price: free

Travelling exhibition.

PLANNING

- From **25 September 2011 to the 23 November 2011** in the Salle des Fêtes in Brienne-la-Vieille (Aube), 15 km from Andra's Soulaines-Dhuys waste repository.
- Telephone contact for school visits: +33 (0)3 25 92 33 04
- From **January 2012 to August 2012** in the Espace Technologique in Saudron (Haute- Marne), very near to Andra's research laboratory in Bure (Meuse).

▶ Opening hours and access plan on www.andra.fr

INTERVIEW
Marie-claude Dupuis

GENERAL DIRECTOR OF ANDRA

Why have an exhibition on radioactivity in general when Andra only deals with radioactive waste?

Radioactive waste and radioactive waste management are not very well known and raise legitimate questions in each and every one of us. The answers to these questions necessitate good understanding of the phenomenon of radioactivity. For example, few people know that natural radioactivity exists and that they themselves «radiate» a little! This exhibition is in line with a wider approach of communication and exchanges with the public that we have been pursuing for several years.

It is not a way of promoting nuclear energy?

It is not Andra's job to be for or against nuclear energy. Radioactive waste, whatever its origin, exists and Andra's remit is to conceive, propose and implement solutions to manage this waste in a safe manner. Our remit extends not just to the present generation but also to future generations on whom we must not leave the burden of our own waste. It is a real societal issue and we want the public to rely on facts for their understanding of it and especially to fully participate in the 2013 public debate on the disposal of radioactive waste in deep underground repositories.

What itinerary will this travelling exhibition take?

The inauguration will take place in Brienne-la-Vieille, near to our Aube waste disposal facility. We will then set up the exhibition in our technological information space, near to our Bure underground laboratory in the Meuse department. Following that, it will be on the road up to 2014, as a function of demand.

We hope that local communities, in particular those the most concerned by radioactivity, whether natural or artificial, will wish to welcome the exhibition and we invite them to contact us for details.

ANDRA (FRENCH RADIOACTIVE WASTE MANAGEMENT AGENCY)

ANDRA, PLACED UNDER THE SUPERVISION OF THE FRENCH MINISTRIES FOR ENERGY, ECOLOGY AND RESEARCH, CELEBRATED ITS 20TH BIRTHDAY IN 2011.

Andra's remit, set out in law, covers several aspects:

1. To examine and conceive solutions for managing all French radioactive waste.
2. To operate and monitor existing waste repositories.
3. To collect non-electronuclear waste (from hospitals, research laboratories, universities, etc) and radioactive objects, for the most part dating from between the two World Wars, held by private individuals.
4. To clean up former sites polluted by radioactivity, when those responsible have failed to do so, at the request of public authorities or owners.
5. To make an inventory of all radioactive materials and waste produced in France.
6. To inform the public of radioactive waste and its management.
7. To share its know how in France and abroad.

Key figures (as of 31/12/2010)

- More than 500 staff.
- 6 sites, including 2 in operation in the Aube Department, a facility «under surveillance» in the Manche Department, a research laboratory 500 m underground in the Meuse Department and a technological space in the Haute-Marne Department.
- 1.152.533 m^3 of radioactive waste counted in the 2009 national inventory of radioactive materials and waste. Today, nearly one million m^3 of waste has already been disposed of in Andra's repositories.