

Decommissioning of radioactive lightning rods in France

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ASN requests a swifter and mandatory removal of the 40,000 radioactive lightning rods which are still in existence in France and which present radiation protection risks.

From patent to ban

1914 Radioactive lightning rods are patented. The addition of radionuclides to lightning rods is supposed to increase the electrical conductivity of air and thus establish a preferred route for lightning.

1930s - 1980s Lightning rods are widely marketed in France and mainly installed on churches, public buildings and certain industrial facilities.

1987 Manufacture, marketing and import of radioactive lightning rods are banned, since the use of radionuclides is not justified with regard to its actual performance.

The various lightning rods installed currently are mainly: single rod, meshed cage, catenary wire, early streamer emission.



Removing and processing the lightning rods

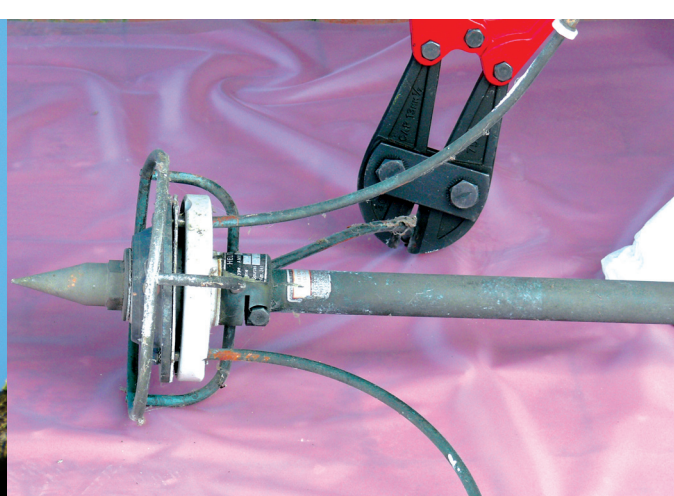
- The removal of radioactive lightning rods is not mandatory, excepted in certain facilities. They are therefore only removed when buildings undergo maintenance or are demolished (around 500 per year).
- Once the removal professionals have cut up the radioactive lightning rod, it is placed in drums and transported to a

temporary storage area whilst awaiting removal by the French National Radioactive Waste Management Agency (ANDRA), which is responsible for processing the lightning rods once they have been removed.

- Drums are then stored temporarily in a specific facility with limited space.



Access to the lightning rod



Radioactive parts cutting



Placing in drums

Risks associated with radioactive lightning rods

Lightning rods are directly exposed to the elements for several years. The materials containing radioactive sources are thus likely to be damaged: the containment of radioactivity can not be guaranteed.

The risk of devices falling and exposing members of the public to radiological risks increases over time.

→ potential external exposure and risks associated with contamination and internal exposure.



Radium-226

- White, shiny metal
- α , γ transmitter
- $T_{1/2} = 1600$ years
- Lightning rod unitary activity: 3.7 to 74 MBq
- Dose equivalent rate for 74 MBq at a distance of 30 cm: 207 μ Sv/h
- Effective dose of 20mSv achieved with 3200 Bq inhaled.



Americium-241

- Silver metal
- α , γ transmitter
- $T_{1/2} = 432$ years
- Lightning rod unitary activity: 6 to 33 MBq
- Dose equivalent rate for 33 MBq at a distance of 30 cm: 5 μ Sv/h
- Effective dose of 20mSv achieved with 512 Bq inhaled.

Actions carried out by ASN

ASN has adopted for several years a global approach for managing the decommissioning of radioactive lightning rods in accordance with radiation protection regulations:

- Awareness-raising campaigns and regulatory reminders for all stake-holders.
- Licences issued to 11 companies.
- Measurements campaign led by the French Institute for

Radiological Protection and Nuclear Safety (IRSN) in collaboration with the licensed companies. The protection measures required during the removal of radioactive lightning rods will be defined as a result of the campaign. ASN will publish a guide for licensed companies.

- Requests to ANDRA for increasing its recovery and storage capabilities.

At the current rate of removal, it would take several decades to remove all lightning rods. ASN is therefore drawing up a legislative text which will require the decommissioning of all radioactive lightning rods within a reasonable timescale.

Exhaustive identification of radioactive lightning rod locations is a prerequisite. ASN welcomes in this respect the initiative of the website: www.pardonneres-radioactifs.fr. ASN points out that the accelerated removal of lightning rods must not be carried out too hastily to ensure that it takes place with sound radioprotection measures in place.