



Radioactive waste is radioactive material that cannot presently be re-used. Once produced, radioactive waste must be managed in a safe way for human health and for the environment.

WHERE DOES RADIOACTIVE WASTE COME FROM?

- > Nuclear Power Generation
- > Research
- > Defence
- > Other industries, e.g.: water & food treatment, chemical manufacturing, measurement and monitoring equipment, medical imaging, tests and therapies.

In most countries, the main stream of radioactive waste comes from nuclear power generation.

HOW IS RADIOACTIVE WASTE MANAGED?

Radioactive waste must be managed safely under varying conditions, taking into consideration concentration levels and decay characteristics, such as type of radiation and decay time. Research and studies are coordinated to define sustainable and safe management solutions for all radioactive waste awaiting an industrial solution. Ultimately, waste is disposed of in engineered facilities.

WHO IS IN CHARGE OF RADIOACTIVE WASTE?

Public or private waste management organizations are in charge of the long-term management of radioactive waste produced in their country. Their mission is governed by laws, regulatory provisions, and control processes.

Mandates that they fulfill in whole or in part include:

- > Siting, design construction, operation, closure and monitoring of storage or disposal facilities.
- > Collection of waste from small-scale nuclear producers or owners, and clean-up and rehabilitation of polluted sites.
- > R & D in view of long-term disposal solutions.
- > Information and an active policy of dialogue with stakeholders on national, regional and local levels.

THE VALUES THAT GOVERN OUR WORK

Experience shows that radioactive waste managers must rely on and develop essential values such as **transparency, openness, dialogue, respect, challenge, progress, continued learning, and a continual commitment to :**

- > **Safety for people and the environment**
- > **International cooperation**
- > **Developing proportionate solutions that respect the rights of the present and future generations.**

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HOW ABOUT WORKING IN RADIOACTIVE WASTE MANAGEMENT?

An Environmental Profession with a Future... for Men and Women

Radioactive waste management is a valued activity carried out in the public interest throughout the world.

It is an enhancing and innovative activity, with continued R&D. It gathers rewarding and challenging professions with various missions within an international context. Rewards and opportunities for long-term employment are ample.

Training and hiring needs will be particularly strong in the coming years in a global market. This brochure explains the professions and the needs.

Nuclear technology is widely used to generate electricity but also for medical or industrial applications as well as for research.

As in any other industry, nuclear activities generate waste, both conventional and radioactive.

All nations that utilise the benefits of the atom are committed to developing a clear policy for managing the wastes that arise and to have in place the infrastructure and capabilities required to manage them safely. This offers a range of professional opportunities today and into the future.

Regardless of the future of nuclear power, the need to control and manage radioactive waste will persist for many decades.

Over the next decade the radioactive waste management sector will need a large number of engineers (in the areas of mining, nuclear or civil engineering), but also multiple other skills and complementary talents: physical, geological and natural scientists, policy makers and social scientists, as well as professionals and technicians of many other types...



ACTIVITIES

DECOMMISSIONING & DISMANTLING

At the end of a nuclear facility's lifetime it must be closed and dismantled, and the waste must be collected and managed.

ENVIRONMENTAL REMEDIATION

Past industrial activities may have left sites contaminated with radionuclides. These sites must be cleaned up.



CharacterisATIOn & WASTE CONDITIONING

For waste to be safely managed, its physical and chemical properties must first be Characterised; this understanding is necessary in order to ensure proper conditioning.

Transportation and disposal are performed only with stabilized waste forms ; after Characterisation, waste must therefore be processed (compaction, incineration, solidification...) and conditioned.

TRANSPORTATION

Once conditioned, waste is transported from producers to storage or disposal sites. Specific designated routes within a country may be impacted by this activity. It involves special road, rail or maritime arrangements and benefits from sophisticated tracking technology.

STORAGE & DISPOSAL

Storage is a temporary solution while preparing for waste disposal. Disposal in an engineered facility (close to the surface or deep underground for the more dangerous long-lived wastes) is the ultimate management solution for safely isolating radioactive waste from the biosphere and the environment. Storage and disposal each have their own technical and societal challenges. Activities include:

> Site investigation

Suitable sites must be identified and selected based on both technical and societal criteria.

> Facility design & construction

Facilities must be designed, developed and constructed with today's and future generations in mind.

OPERATION

From waste acceptance and emplacement through performance monitoring and closure, the safety and supervision of the waste management facility must be ensured. Specialized handling and control equipment must be designed and operated.

OPERATIONAL & LONG-TERM SAFETY

Radioactive waste management requires adherence to stringent standards of quality, safety and environmental protection.

Technicians, quality engineers, and safety experts play important roles in assessing, demonstrating, controlling and following-up the radioactive waste management facilities and their environment. Increasingly, local host communities are seeking a role in this vigilance as well.



PORTRAIT Kathryn Shaver NWMO

Kathryn Shaver is with the Nuclear Waste Management Organization (NWMO) in Canada, where she leads the process

of site selection for Canada's used nuclear fuel repository.

Kathryn has a Master's degree in Economics from Queen's University in Kingston, Canada. She works with a multi-disciplinary team of social scientists, geoscientists, and dialogue and communications specialists in engaging with interested communities and conducting feasibility studies of potential sites.

Kathryn travels abroad regularly to participate in international cooperative projects, study groups and other fora to enable progress in the field of waste management and to bring back valuable lessons and contacts to her organization and country.

REQUIRED PROFESSIONS

RESEARCH & DEVELOPMENT

Seeking innovative solutions, proposing tailored solutions for different types of waste, technological monitoring, mining exploration, development of new applications

Modeling and simulation

Research, design, technology and measuring tools, operating methodology

Performance assessment

Technical sciences, geosciences, geological field survey

ENGINEERING AND PROJECTS

Project management: contracting, solution integration, steering and supervision of industrial projects

Information technologies: industrial, management, software engineering

Governance, regulation, social sciences: research, analysis and program design

OPERATION OF EXISTING FACILITIES

Chemists, metrologists, radiation protection, management and a qualified workforce

ENVIRONMENT

Environmental management, monitoring

OPPORTUNITIES FOR DEVELOPMENT

To support expanding activities, organizations are implementing a dynamic human resources policy. Many opportunities are provided to build skills through training, professional development, mentoring, and special projects. After some years of experience, careers evolve to supervisory positions: Project Manager, Site Director, etc.

Career opportunities also exist at the local, regional, national or international level - for example, sharing industrial know-how and promoting scientific and technological culture abroad.

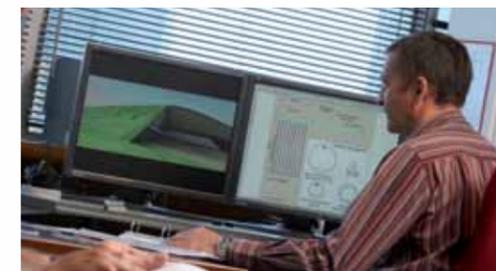
- > Waste management agencies
- > Industrial producers such as nuclear power companies
- > Nuclear safety authorities and their technical support organizations
- > Civil service
- > Universities, R&D institutes
- > International organizations: Nuclear Energy Agency (NEA), International Atomic Energy Agency (IAEA), European Union
- > Engineering companies
- > Consulting firms



PORTRAIT Patrice TORRES - ANDRA

Patrice Torres is the Director of Andra's waste disposal facilities located in the east of France. He has a Business Management degree from the Reims School of Management. At present he oversees an 80 person team and 120 subcontractors, covering all areas from technical issues to relationships with the local stakeholders. About 15,000 m³ of waste are disposed of every year safely in the public interest. Continued dialogue with the local people is one of his major commitments in order to maintain the current good levels of understanding and acceptance of the two disposal facilities that he manages.

On joining Andra in 2003, Patrice began as a purchase agent responsible for several major portfolios (services, computing, waste disposal projects) at the Agency headquarters. Before accepting his current position, Patrice was in charge of the "Technical Support" department responsible for facility maintenance, investment and general logistics for the various Agency sites.



SAFETY

Safety assessment, nuclear safety and industrial security, control of nuclear materials, quality assurance

SUPPORT FUNCTIONS

Purchasing engineers, project managers, public relations, human resources, accounting, finance, electronic data processing

EDUCATION & TRAINING

- > Physical sciences, geosciences and biosciences
- > Environmental sciences
- > Nuclear, chemical and civil engineering
- > Social sciences and humanities
- > Management
- > Communication

Typically, specific training for radioactive waste management will be provided, e.g. through courses organized by the International Atomic Energy Agency.