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# Reduction of Radioactive Waste Production at Gentilly–2 NPP

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**Abstract**

This paper describes the strategy used at Gentilly-2 NPP to reduce the radioactive waste generation. The objective of this project is to ensure that the in-operation radioactive waste storage area availability would be enough until the new radioactive waste facility is built and commissioned.

## 1.0 Introduction

Gentilly-2 NPP commissioned in 1982, it consists of one CANDU Pressurized Heavy Water reactor that has a licensed capacity to produce 600 megawatts of electricity. Its owner, Hydro-Québec plans to extend the useful life of this reactor, which involves mainly: to build a new radioactive waste storage area and to increase the storage capacity of the irradiated fuel dry storage area, besides the main refurbishment of the plant. Enlargement or construction of radioactive waste storage facilities is subject to approval by the Government of Québec Ministry of Environment and the Canadian Nuclear Safety Commission, including public review.

However, the actual storage radioactive waste area availability is not enough to meet the operational requirements until the authorization and construction of the new storage area will be done. So, a decision was made in June 2002, by Gentilly-2 management, to prepare a programme with the aim to reduce the radioactive waste production and to optimize the utilisation of the existing radioactive waste storage capacity. This paper describes the strategy used at Gentilly-2 NPP to reduce the radioactive waste generation, and gives some results obtained until now.

## 2.0 Strategy used to reduce the radioactive waste generation

Obviously, the strategy must firstly ensure environmental and public protection and secondly to ensure the in-operation storage radioactive waste area availability is sufficient to cover the period until the new radioactive waste facility is built and commissioned.

The radioactive wastes are generated mainly in the "controlled areas", where the radioactive contamination is possible. Also, the non-radioactive waste were generated in "zone 1" which includes offices and service areas and where the radioactive contamination is very unlikely. These two areas are physically separated and the spread of radioactive contamination is strictly controlled.

The first step was to separate the flow stream of waste generated in these two areas: zone 1 and controlled areas. Because the station started operation in 1982, this very simple action involved a change of mentality and acceptance by all levels of the plant staff. Once accepted, it allowed the introduction of the strategy it self.

A review of the radioactive waste management processes was done in order to identify the critical key elements of the strategy. The identified key element was to reduce the quantity of low level radioactive waste produced in the controlled areas. In order to do this, the following main directions of strategy were enunciated:

- reduce the volume of material entering in the controlled areas
- segregate at the source the radioactive wastes produced in the controlled areas
- reduce the volume of radioactive wastes
- review release criteria
- optimize of the existing radioactive waste storage capacity.

## 2.1 Reduce the volume of material entering in the controlled areas

In order to reduce the quantity of material that are going to be used in the controlled areas several initiatives were undertaken:

- introduce criteria for purchasing goods which have the smallest impacts on the human health and environment
- identify and unpack the material which is going to be used in controlled areas
- reduce the volume of new material stored in controlled areas
- reduce by planning the material which is going to be used in work areas
- optimize the control of contamination between controlled areas.

## 2.2 Segregation at the source

The segregation of radioactive waste is based on the point of origin and on the potential to be contaminated. A review and optimization of the waste collection points was done.

The master document for the waste management will be issue this year. This document will ensure the coherence of the existing documentation and the strategy key elements for further developments.

Also, a database was developed in order to track the waste from origin to the final destination. We are now in the commissioning and training stage of the bar-coding tracking system. This system will allow us to better identify where the efforts should be emphasised to reduce the production of radioactive waste.

## 2.3 Volume reduction of radioactive waste

Gentilly-2 has the followings equipments used to reduce the volume of radioactive waste:

- very efficient system to remove the radioactive contamination in the oils
- system to decontaminate aqueous solutions
- segregation tables (in commissioning)
- compactor.

## 2.4 Review release criteria

Ambiguous regulation, potential public position, lack of technology, timid communication within the industry and economical reasons make the verification of waste prior to release a subject hard to manage. Any way, the IAEA Safety Standard RS-G-1.7 “Application of the

Concepts of Exclusion, Exemption and Clearance" published in 2004 will probably open the discussions on this subject. The implementation of these IAEA recommendations could have important economical impact on the choice of monitoring equipments.

Historically, a large portion of the waste generated in the controlled areas was not contaminated, but was routinely handled as low level radioactive waste. The regulatory body approval of the unconditional release limits based on the IAEA-TECDOC-855 "Clearance levels for radionuclides in solid materials" was an important milestone for radioactive waste management at Gentilly –2.

Currently, the approved regulatory body criteria to release oils are based on the detection limits. These very low levels are hard to achieve and require the use of chemicals, for this reason we intend to review release criteria.

In order to promote staff motivation and ownership, activities regarding radioactive waste management are assigned to a single working group. This further simplifies the implementation of the track system since only few individuals are concerned.

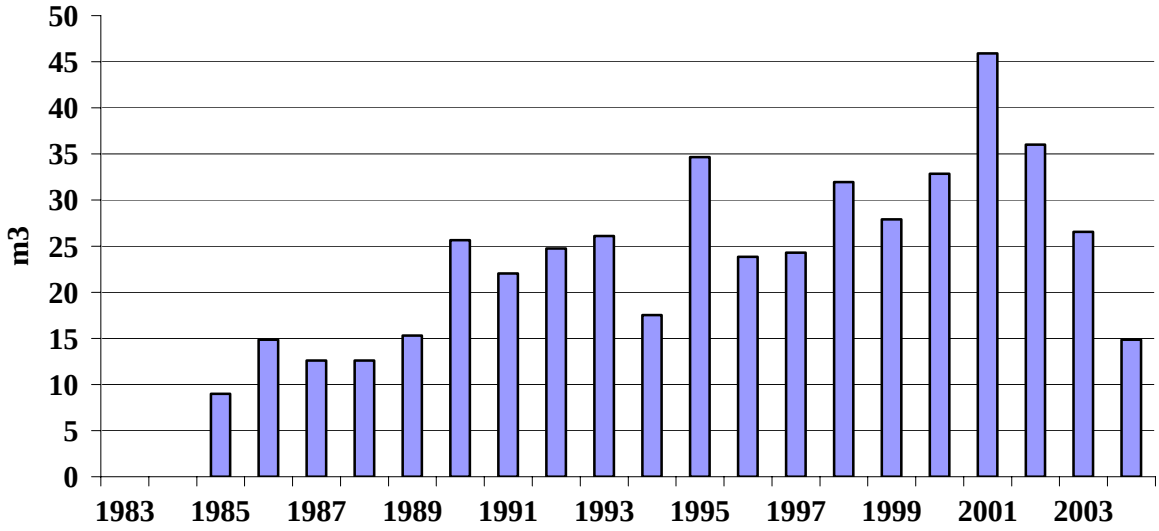
### 2.5 Optimization of the existing radioactive waste storage capacity

During the summer 2003, Hydro-Québec reviewed the radioactive solid waste inventory and the storage structure status. Some transfers were done to optimize the utilisation capacity of the existing storage facility.

## 3.0 Results obtained by application of the strategy

The reduction of the solid radioactive waste transfer to the storage facility due to the implementation of the strategy is described in the following figure. The upward trend has been reversed in the last 3 years.

**Figure: Radioactive compacted waste transfered in the storage facility**



## Conclusion

The most important is that the plant staff is responding well to new requirements regarding the waste management. A continuous effort was made to promote the staff initiatives and to keep this subject in the focus.

Through the use the strategy implemented, the reduction of radioactive waste to the storage facility was successful. All the efforts should be maintained in order to ensure that the in-operation radioactive waste storage area availability will be enough until the new radioactive waste facility is built and commissioned.