



## IMPACT OF THE TOKAI REPROCESSING PLANT ON THE WORKERS AND ON THE SURROUNDING ENVIRONMENT

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### Abstract

The Tokai reprocessing plant began operation in September 1977 to establish oxide fuel reprocessing technology in Japan. Its designed capacity is about 0.7 metric tons of uranium per day. This report gives an example of the evaluation of the health and environmental aspects of a reprocessing plant.

### 1. Introduction

The Tokai reprocessing plant began its operation in September 1977 to establish oxide fuel reprocessing technology in Japan. Its designed capacity is about 0.7 metric tons of uranium per day, and it has been reprocessing 70 - 80 tons per year in recent years, which amounts to 717 tons in total by the end of March 1994.

### 2. Occupational Exposure

When we measure the occupational exposure of the workers in the reprocessing plant, external exposure by  $\gamma$ -rays and neutrons is usually important in normal operation, but internal exposure by inhalation and/or ingestion of radioactive nuclides must be carefully considered in maintenance works or accidental cases.

According to data collected over the past 5 years, the number of monitored workers is around 2,500 per year and the annual collective effective dose is around 0.5 to 1.5 man Sv, which doesn't depend on the amount of reprocessed fuels but on the kind of maintenance work carried out.

The average annual effective dose per monitored worker is around 0.5 mSv and normalized collective effective dose is around 0.2 man Sv per GWa.

### 3. Environmental Impact

In the Tokai reprocessing plant, authorized limits for annual discharge are as follows:

Authorized Annual Discharge Limits			
Airborne Effluents (GBq/a)		Liquid effluents (G Bq/a)	
Kr 85	$8.9 \times 10^7$	Gross $\beta$ (except for H)	$9.6 \times 10^2$
H 3	$5.6 \times 10^5$	H 3	$1.9 \times 10^6$
C 14	$9.7 \times 10^3$	Sr 90	$3.2 \times 10$
I 129	1.7	Cs 137	$5.5 \times 10$
I 131	$1.6 \times 10$	I 129	$2.7 \times 10$
		Pu	2.3

Measured annual discharge in 1993 is as follows:

Measured annual discharge (1993)			
Airborne effluents (G Bq/a)		Liquid effluents (G Bq/a)	
Kr 85	$5.2 \times 10^6$	H 3	$1.6 \times 10^5$
H 3	$2.1 \times 10^3$	Sr 90	$2.2 \times 10^{-3}$
C 14	$3.2 \times 10^2$	Cs 137	$1.1 \times 10^{-2}$
I 129	$1.3 \times 10^{-1}$	I 129	$5.5 \times 10^{-2}$
I 131	ND	Pu	$3.0 \times 10^{-3}$

Annual effective dose for the public around the plant site is estimated for potential pathways with site-specific parameters such as food consumption, concentration factors of marine organisms, and meteorological conditions. Based on the above measured discharge, maximum annual effective dose for the public is estimated to be around  $1 \mu\text{Sv}$  per year, which corresponds to 0.1% of the annual dose limit for the public.

Extensive radiation monitoring has been conducted in the environment around the plant site, and no significant environmental effect from the plant operation has been found.

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