

# STAX system at IRE

## Background and comparison with other noble gas detectors

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### Introduction

As a fission-based medical radioisotope production site, IRE emits radionuclides into the environment. Such discharges need to be measured to meet regulatory requirements. In addition to these legal aspects, measuring radionuclides emissions enables production processes to be monitored. Finally, the third application is participation in the STAX project in the context of treaty monitoring. The 1<sup>st</sup> STAX system was installed at IRE in 2018.

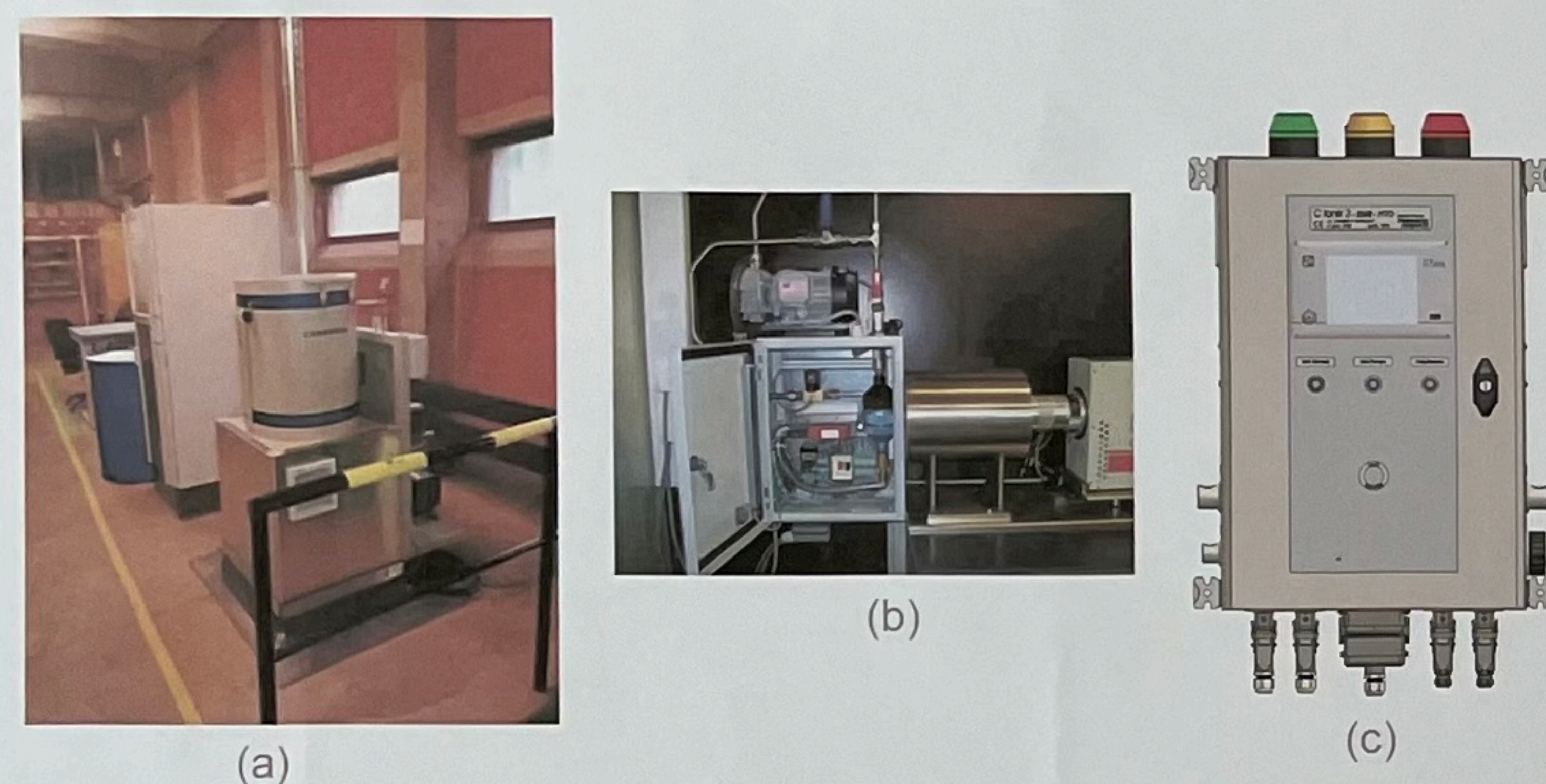


Figure 1 – Technologies used to measure radionuclide emissions at IRE.

- (a) STAX system, using HPGe detector measuring a Marinelli sample chamber continuously filled with stack gas.
- (b) IRE's official monitoring, using HPGe detector measuring a charcoal cartridge put in stack effluents. This technology is used for legal accounting
- (c) Ionization chamber – the stack gas passes through a calibrated xenon ionization chamber. This technology provides a faster response and thus allows production processes to be monitored.

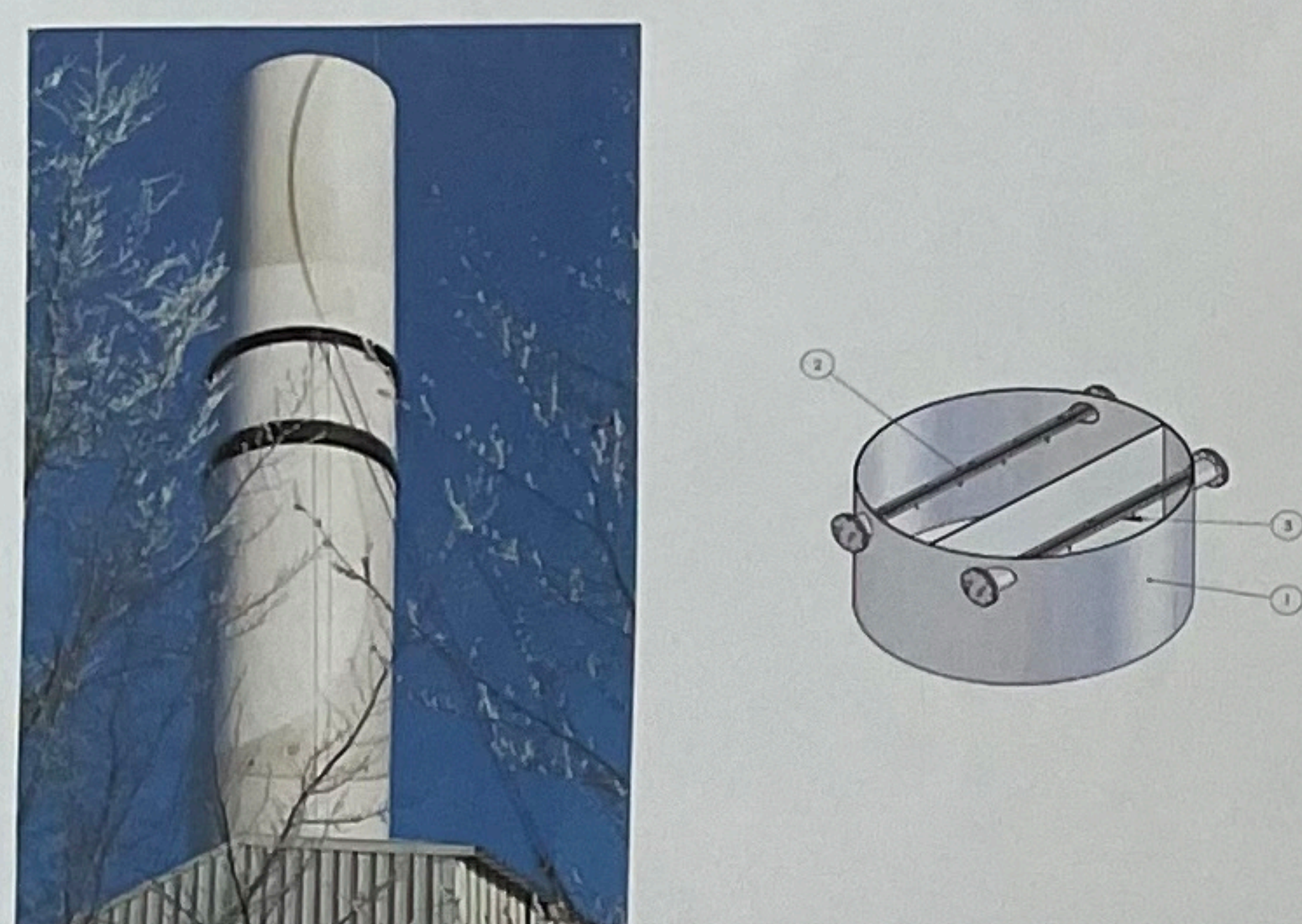


Figure 2 – IRE's main stack (left) and stack sampling nozzles (b).

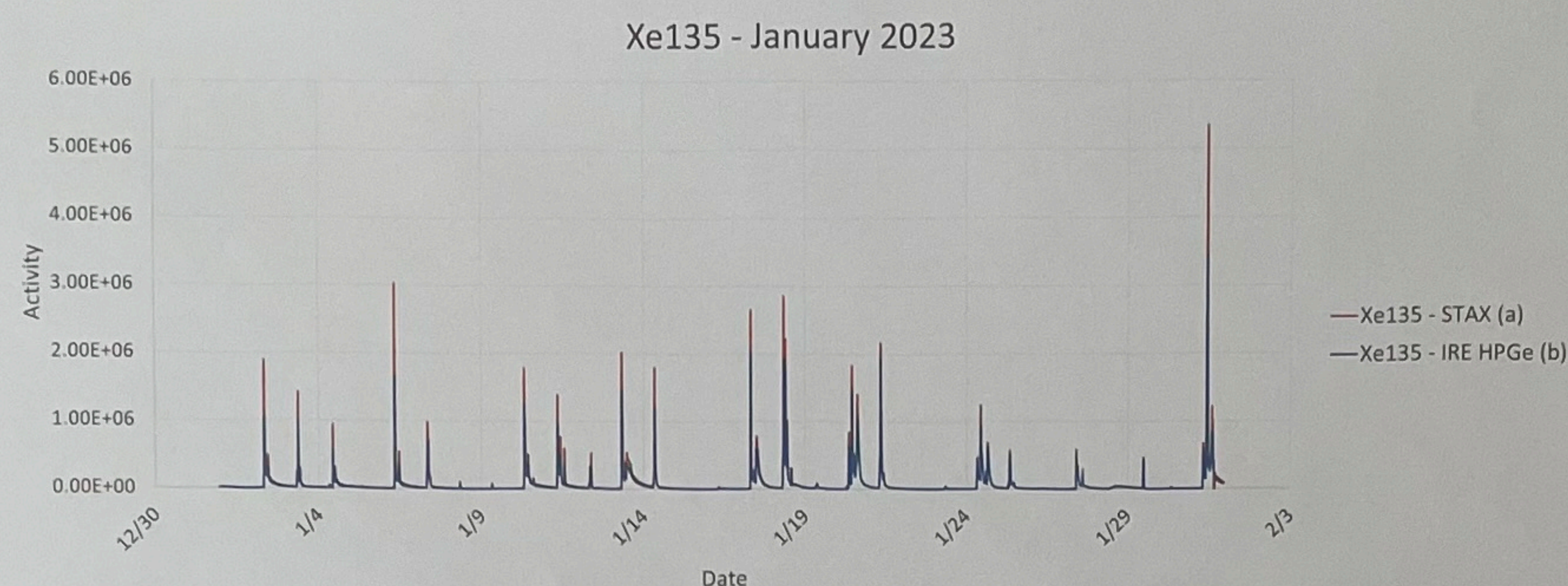


Figure 3 (top) – Comparison between the official discharge measurement system and STAX for xenon 135 during January 2023.

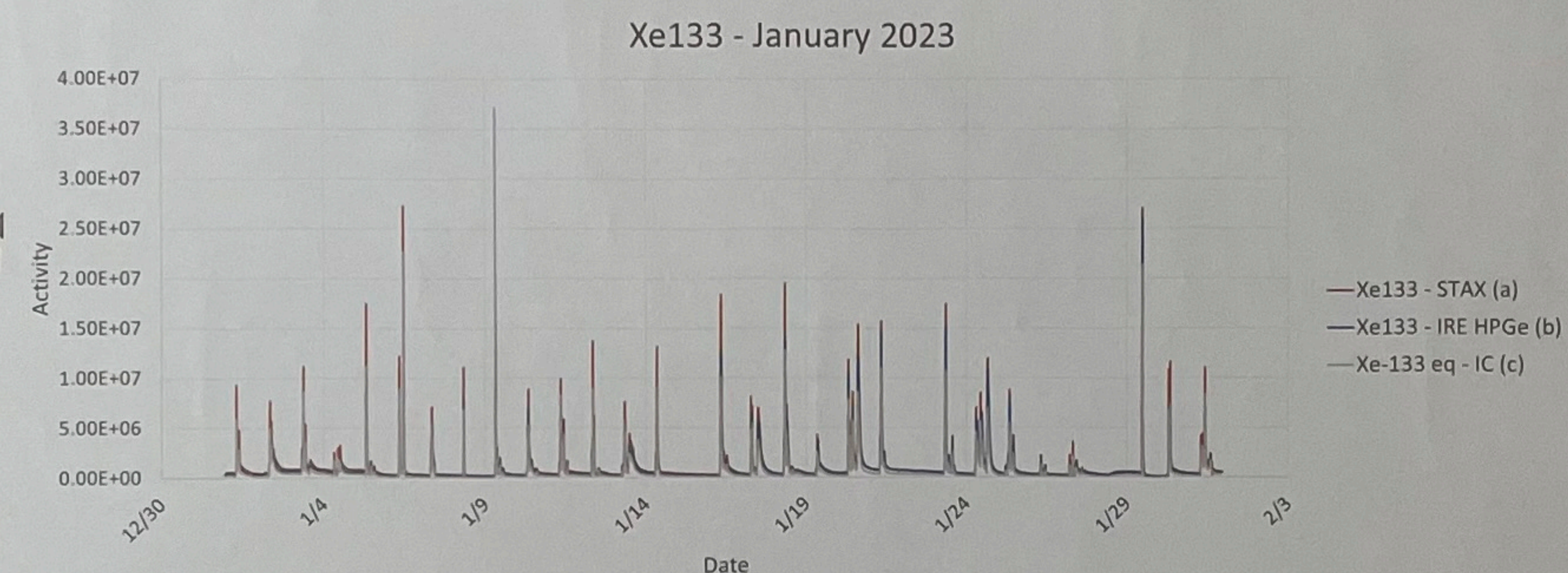
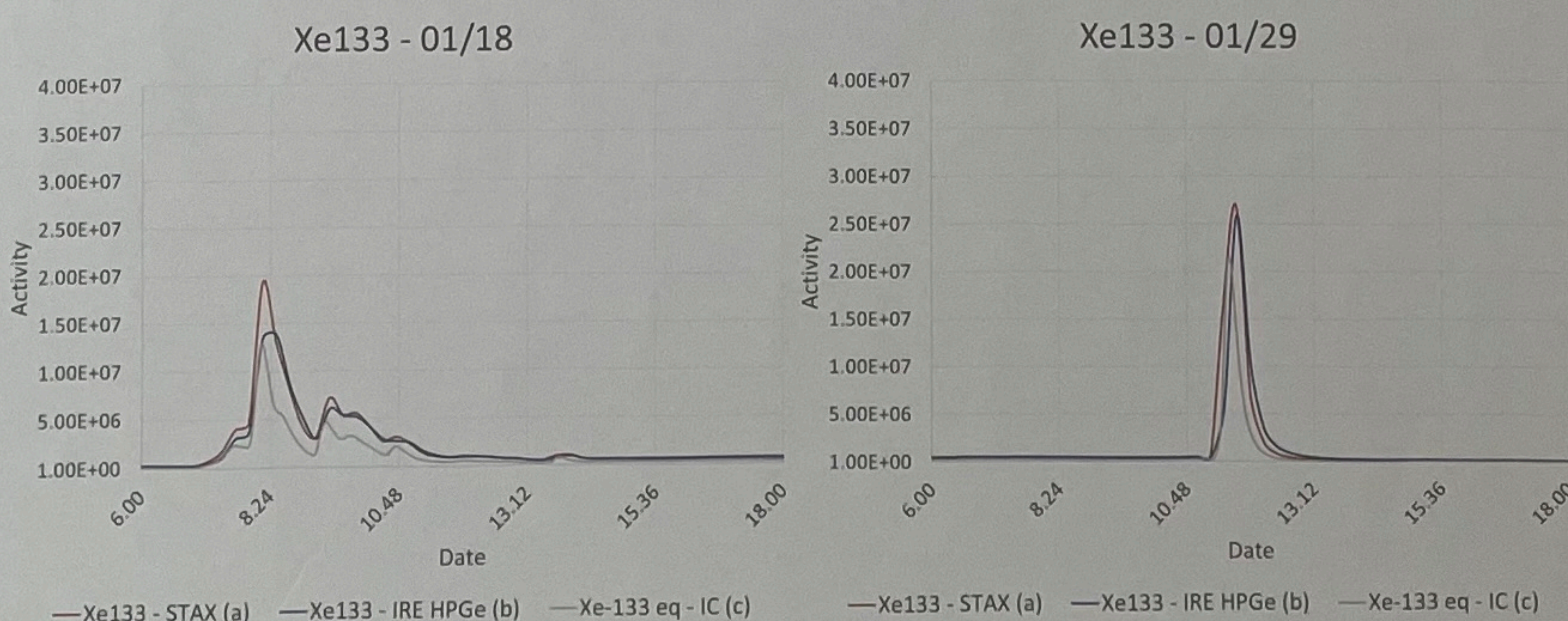


Figure 4 (top) – Comparison between the official discharge measurement system and STAX for xenon 133 during January 2023.

Figure 5 (bottom) – Comparison between the official discharge measurement system and STAX for xenon 135 during two specific days in January 2023.



	IRE	STAX	Difference %
Xe133	2.54E+09	3.14E+09	23.56%
Xe135	1.76E+08	2.30E+08	30.80%

Table 1 – Difference in % between the STAX system and IRE official monitoring system for two xenons.

### A few words about IRE

The Institute for RadioElements (IRE) is a Belgian-based company whose promoting the beneficial use of radioisotopes for medical purposes whilst ensuring the absence of harmfulness.

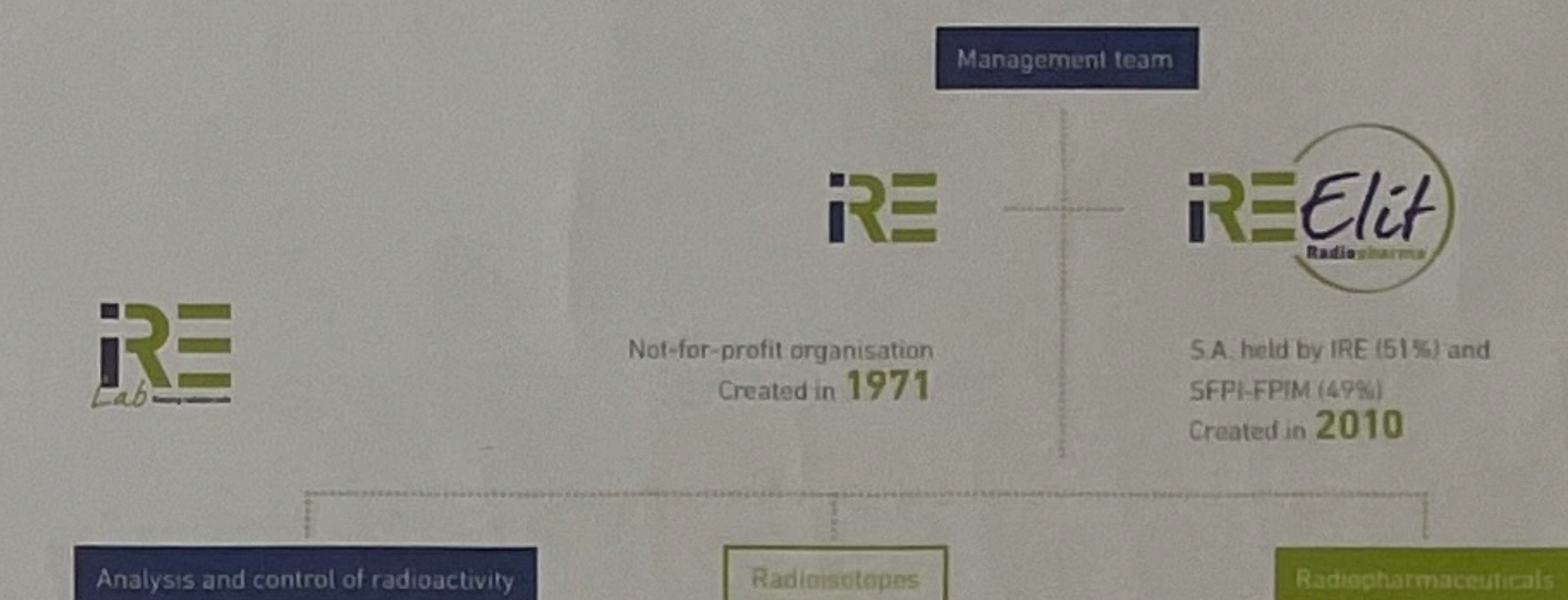


Figure 6 – IRE's 3 business lines.

### IRE's preventive branch : IRE Lab

IRE's preventive branch, IRE Lab contributes to protecting the environment, workers and the population Through its personalized support and recognized industrial experience, IRE Lab is the reference partner for global consultancy and customized solutions for the analysis and monitoring of radioactivity.



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