



WASTE MANAGEMENT AT IRE

ALLIANCE Webinar 2nd June 2022
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EXCELLENCE DEDICATED TO NUCLEAR
MEDICINE, HEALTHCARE &
ENVIRONMENT



IRE & IRE Elit, Leadership in Nuclear Medicine

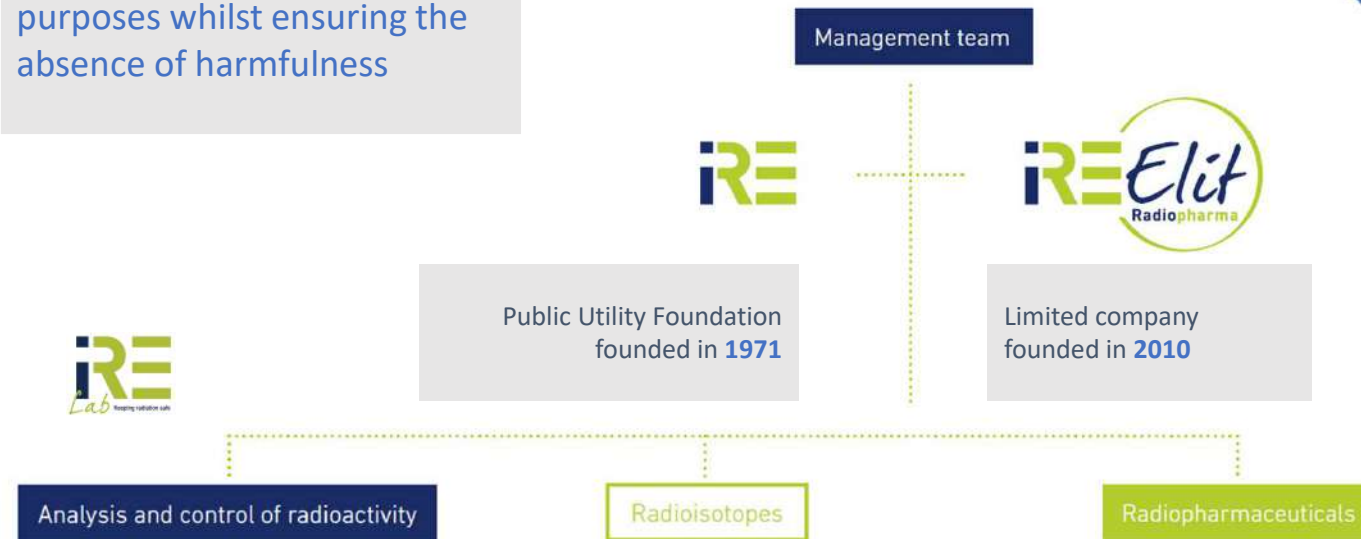


2 entities, 3 business lines

Our priority?

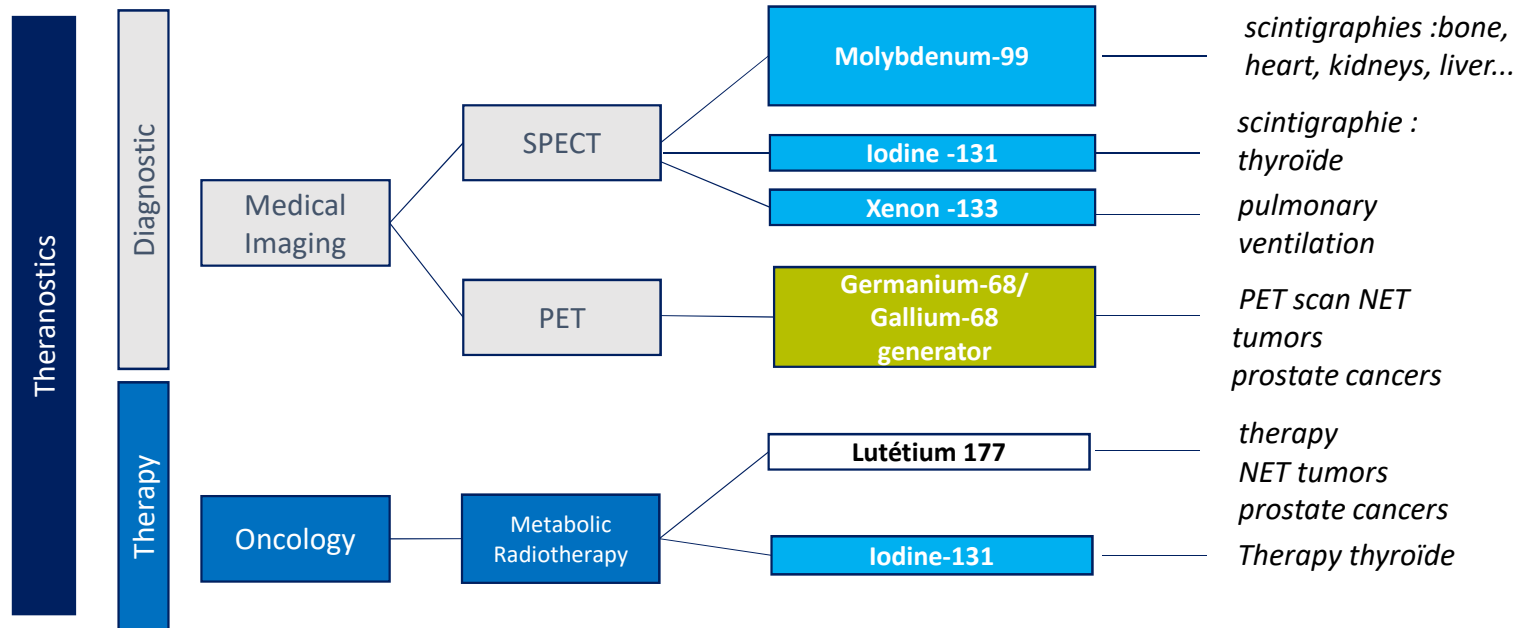
Promoting the beneficial use of radioisotopes for medical purposes whilst ensuring the absence of harmfulness

Currently more than **250** employees

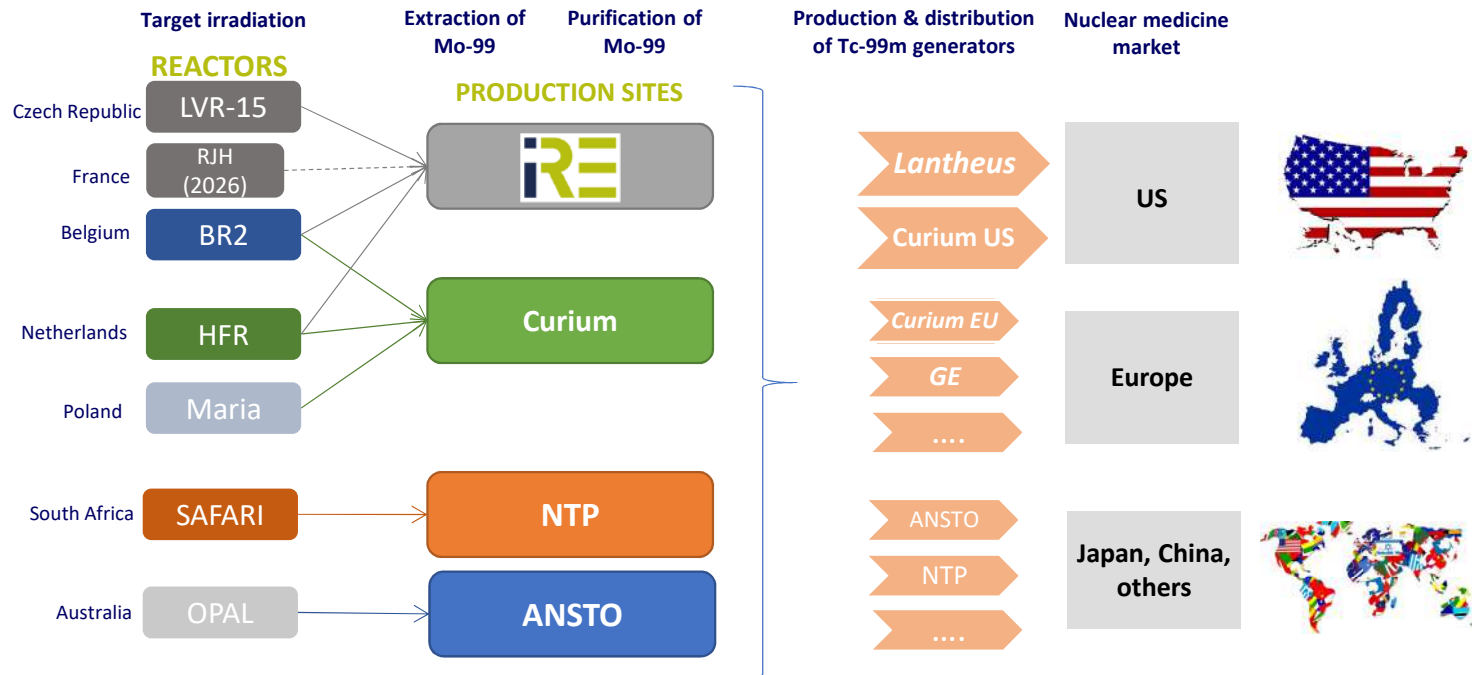


Our product portfolio - IRE & IRE ELiT

World leader in the production of radioisotopes

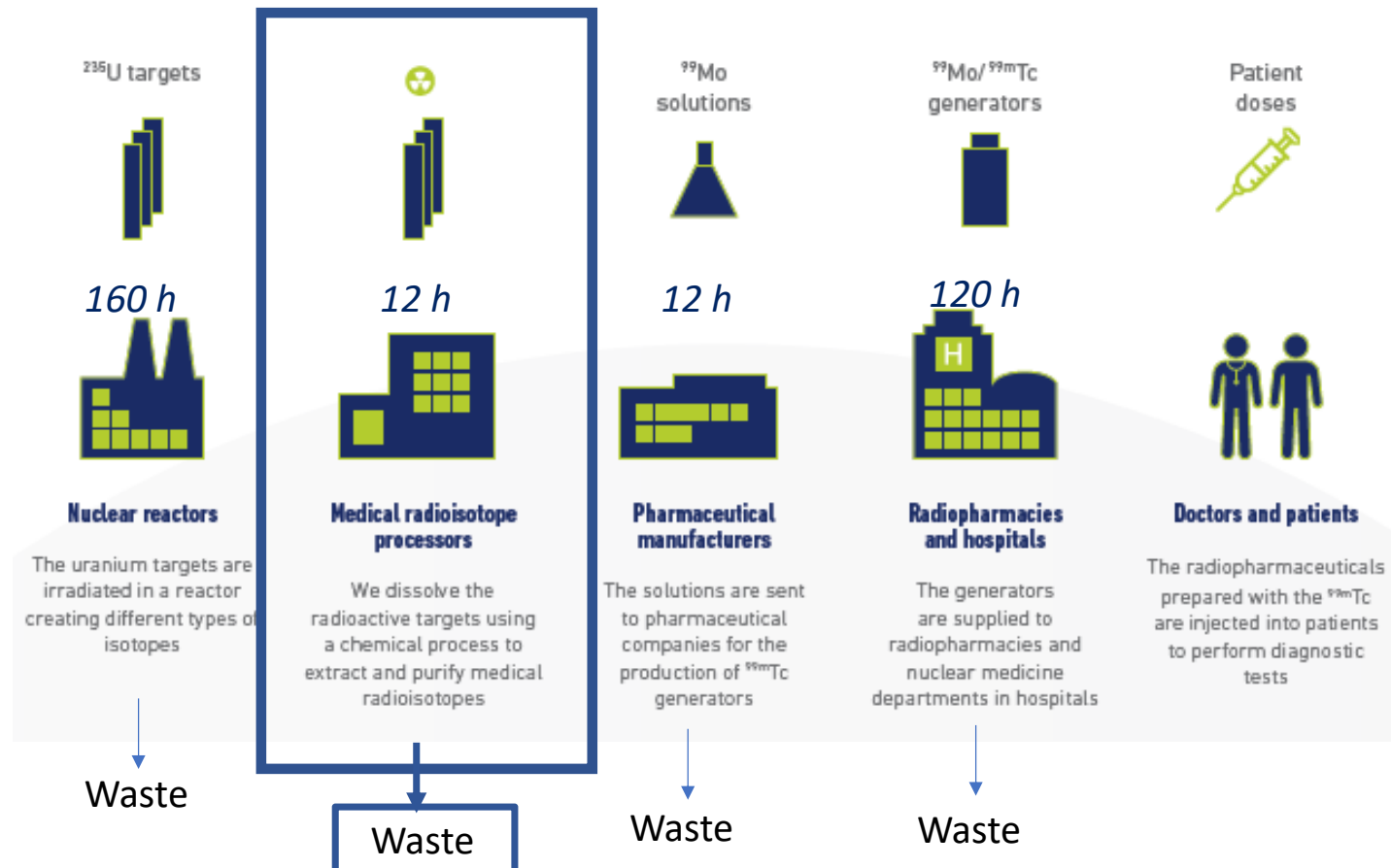


Major players in the ^{99}Mo – $^{99\text{m}}\text{Tc}$



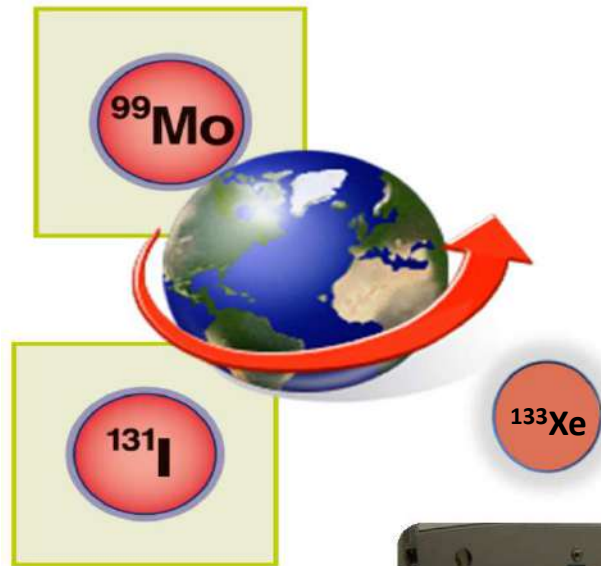
Production ^{99}Mo – $^{99\text{m}}\text{Tc}$ and waste streams

The current ^{99}Mo Supply Chain



Mo-99 supply chain

Radiochemical production



Only 3 products are used of the "300 produced" → the rest is waste !

Waste Management

• IRE Management of radioactive waste

- Avoid and reduce Waste
- Sorting
 - Identify the waste producer/isotopical composition
 - Facilitate characterization
 - Reducing the cost
 - Facilitate clearance and evacuation
- Waste treatment
- Measurement and characterization

Full traceability



- Clearance process
- (Conditional) evacuation

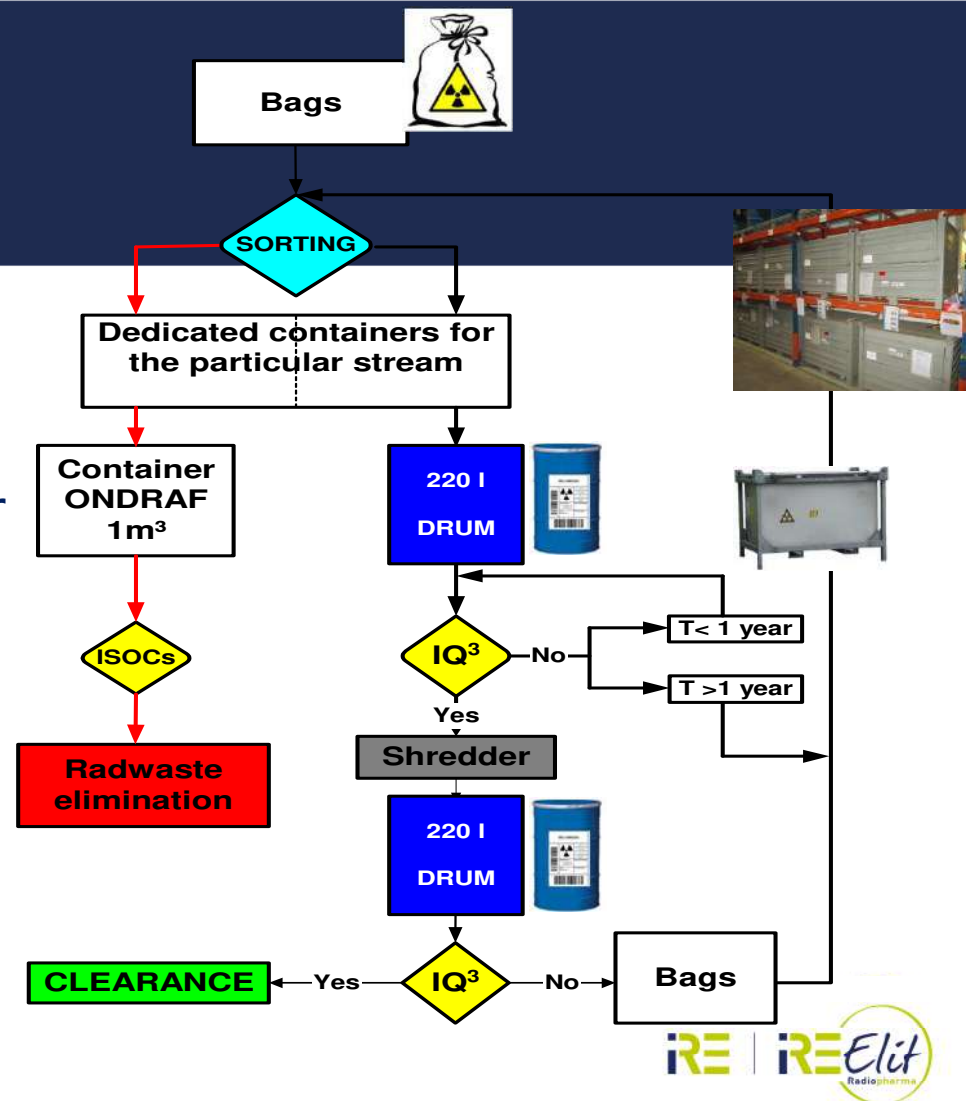
- Preconditioning for transportation
- Transfer to NIRAS (National Institute of Radioactive waste) storage site

Sorting and treatment : the path to minimize the nuclear waste and ensure evacuation.

- **Ecological concerns** : minimize the waste quantities and try to recycle a maximum or evacuate as « non radioactive waste »
- For the **disposal** of nuclear waste, NIRAS has specified in procedures (ACRIA) how the **waste must be conditioned** for final storage or treatment. In case of non-compliance the waste will no longer be removed.
- Accommodate **specific waste streams** that are **not foreseen by NIRAS**.
- The volume of waste that can be stored on site is limited and monitored by the FANC
- **IRE developed** several processes to **dismantle, decontaminate** and **treat** material in order to be able to **reach the release limits** and release **conditions** as defined by the Nuclear authorities.
- **Economical concerns**, by dismantling and decontamination huge costs are avoided.
 - Released waste : 1 €/kg
 - Metal to be recycled : 10€/kg
 - Radioactive waste : 100€/kg
- Last but not least : **Safety and radiation protection** : well-conditioned waste must not be treated (Doses – risk of injury ...)

The waste management process : combustible

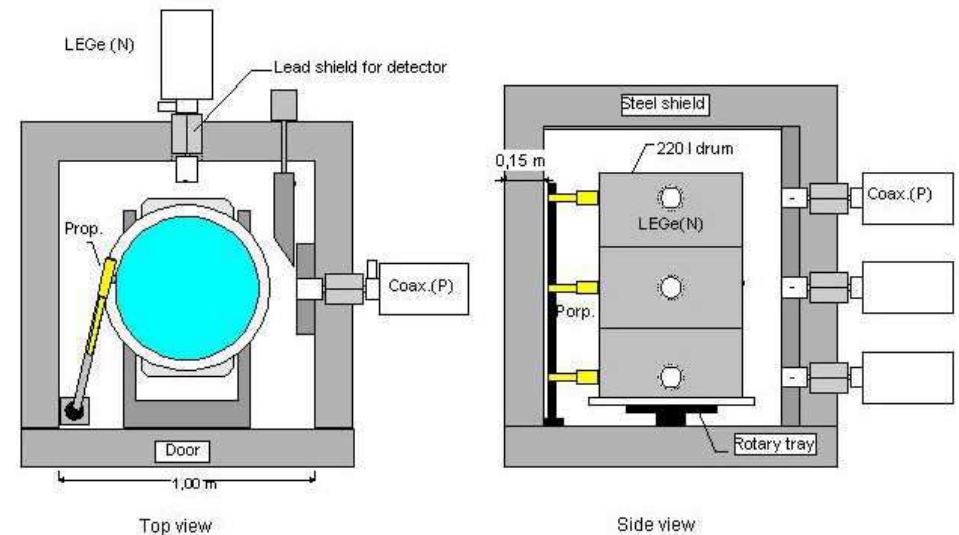
- All evacuated bags are characterized
- A measurement is done to determine if the product can possibly be cleared within the year and the different streams splitted
- Both streams have a different path
 - **Clearance :**
 - Homogenization and 2 measurements
 - Dismantling - decontamination - chemical treatment
 - For every different waste stream a specific procedure approved by the Nuclear authorities
 - **Evacuation :** nothing is cleared without at least 2 measurements that confirm the activity to be below the release limits.



Measurement and characterization, a process optimized by IRE

IRE has several measurement installations both fixed and mobile

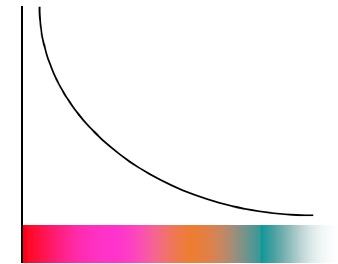
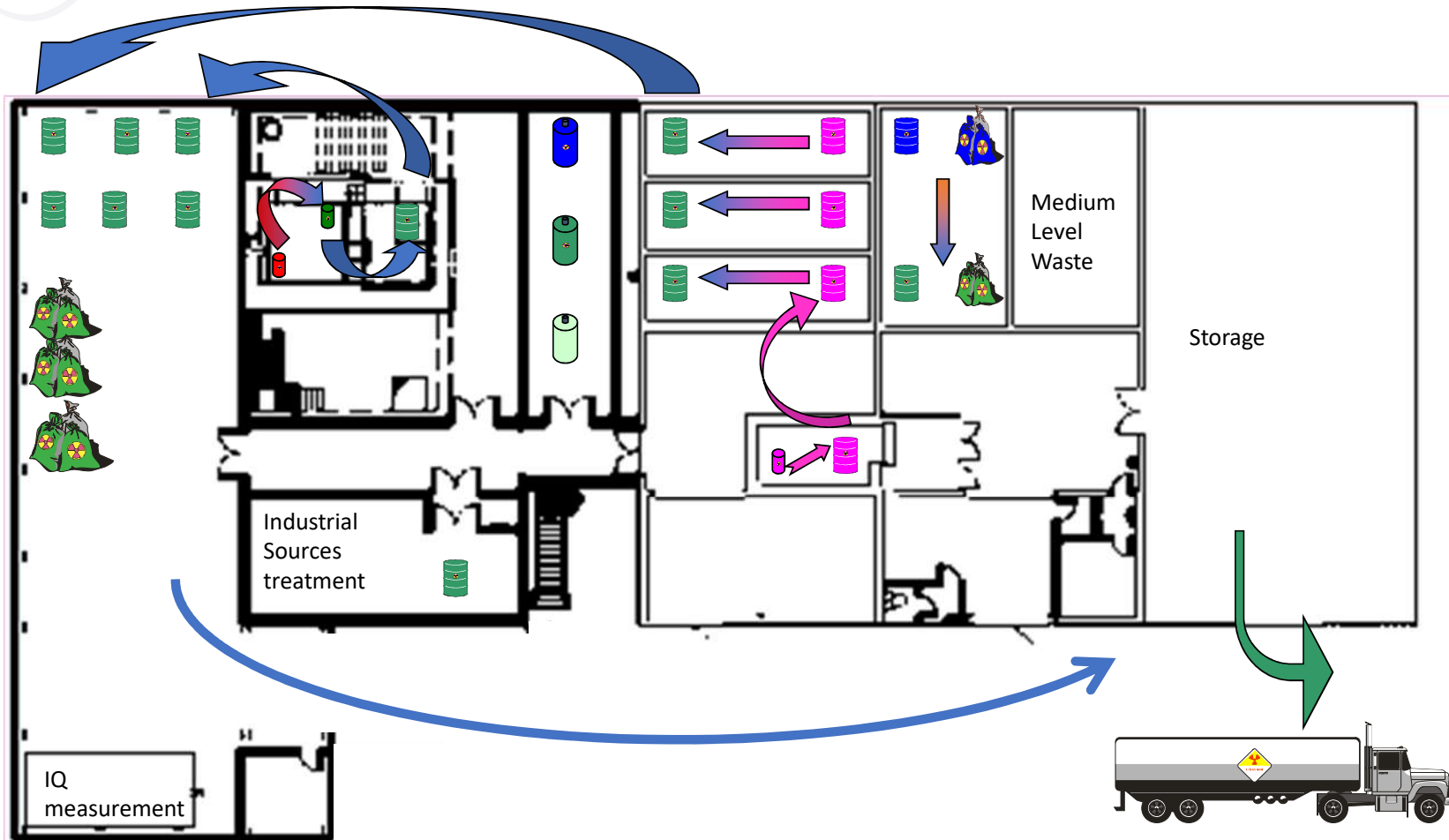
In situ measurement : Stand alone HPGe detectors for waste characterization



IQ3 : Automatic measurement system with 3 HPGe detectors for drum characterization and clearance

Pre-conditioning for transportation

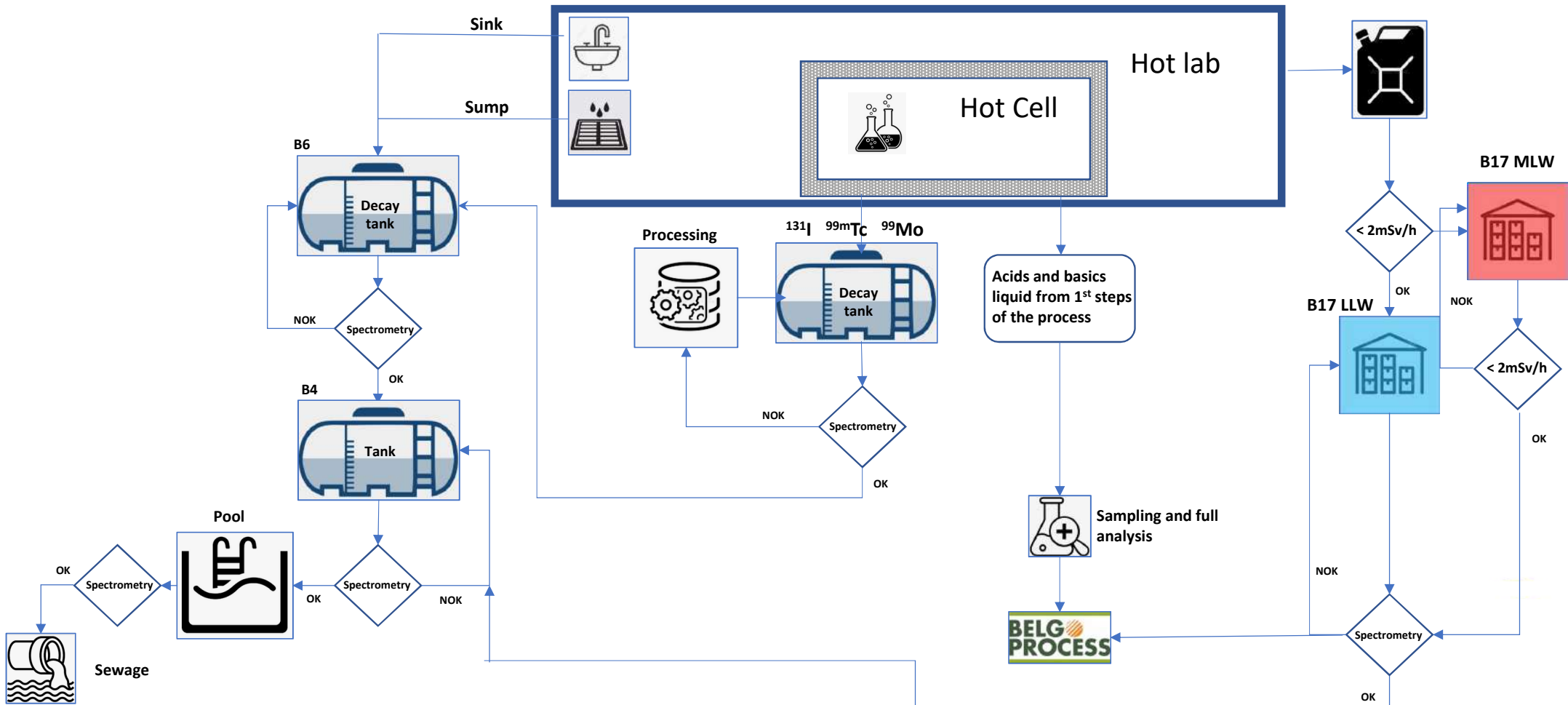
A building fully dedicated for waste management before evacuation



Dose Rate

Waste treatment

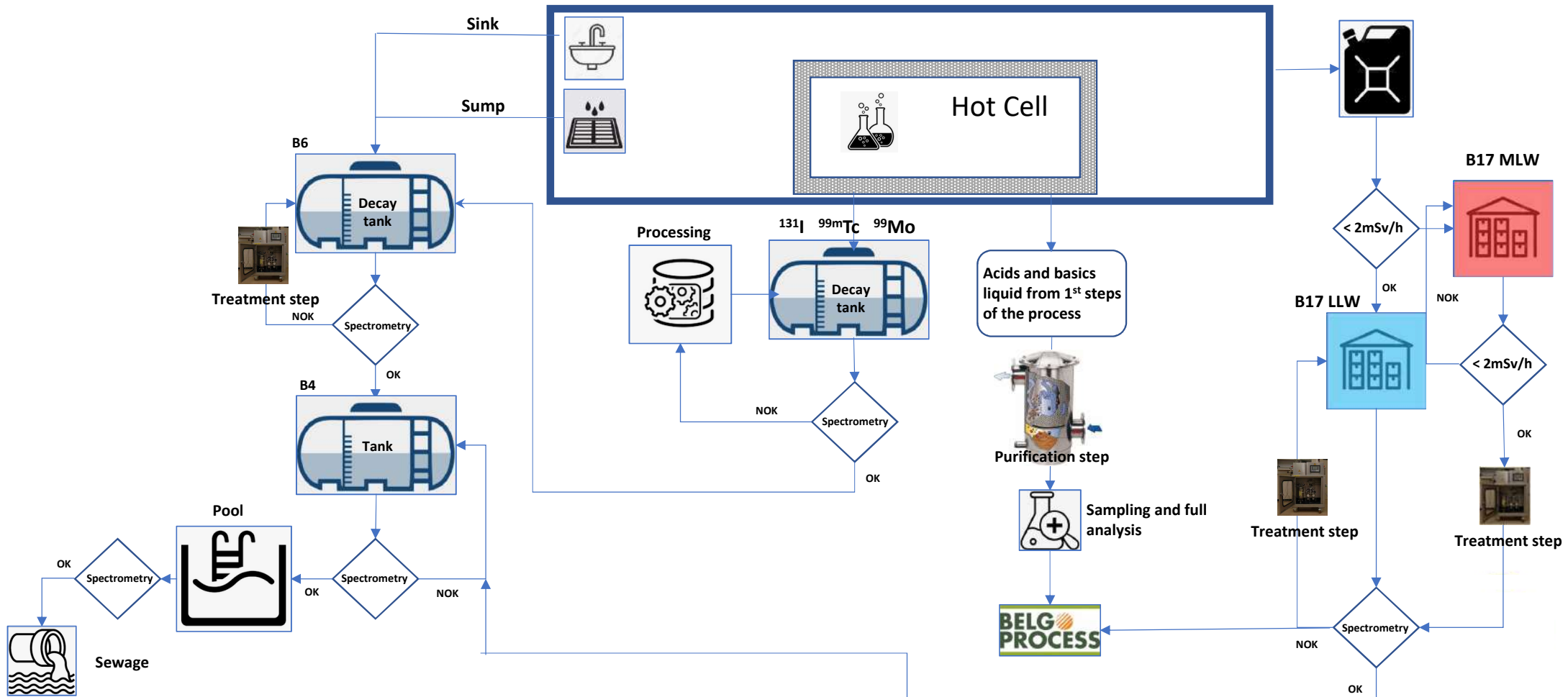
Liquid waste management



Waste treatment

Liquid waste management

Hot lab



Liquid treatment : treatment and evacuation

- Evacuation of liquids is complicated from a point of view of transport and evacuation requirements.
- IRE disposes of a Waste chemical lab for analyses
- IRE developed a movable and a fixed system to purify liquids or to eliminate long lived isotopes of small vessels and containers to either
 - Filtration
 - Ion exchange
 - Concentrate certain isotopes on a column to be evacuated as solids
 - For smaller volumes (10 l – 1000 l)
- IRE developed a process to eliminate long lived isotopes from big storage tanks so we can manage the transport ourselves.
 - Implementation of an installation is ongoing



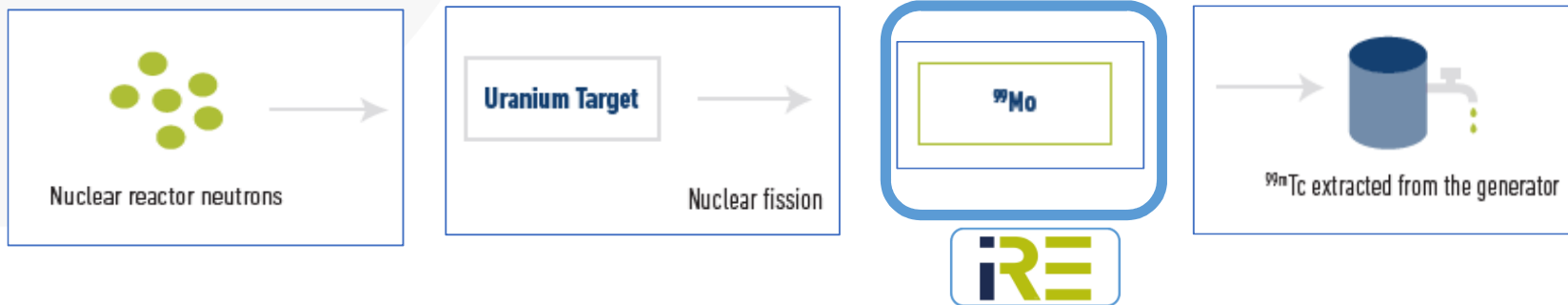
A flavor of the volumes evacuated per year

Ton	Solid Waste	Liquid waste	Potential contaminated liquids
Evacuation	9	5.1	
Recycling of Metals	8.4		
Cleared Material	37	4	5600
Total Volumes	54.4	9.1	5600

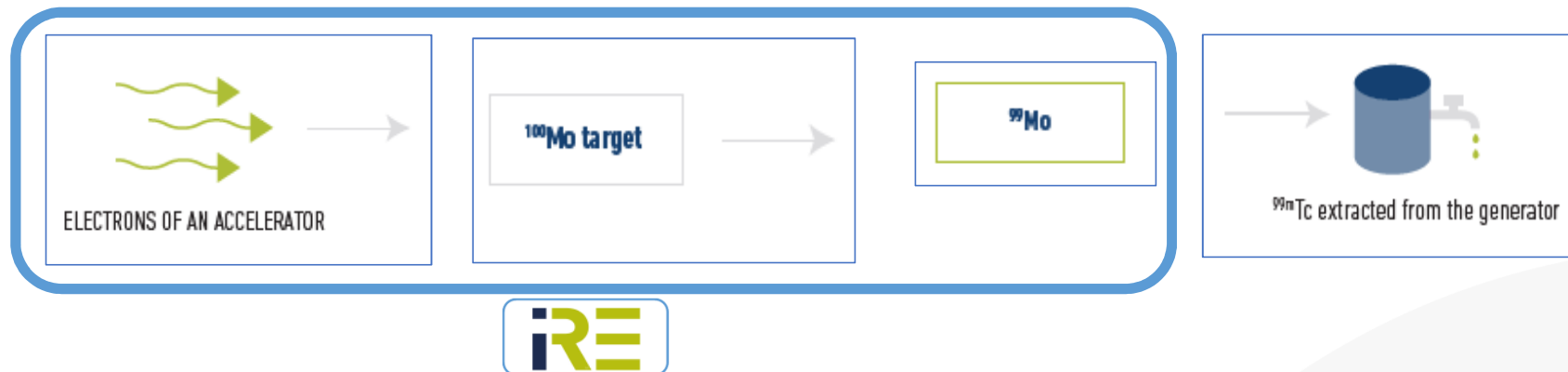
- IRE put a lot of effort and resources to reduce the waste impact of the nuclear waste or to ensure that a timely evacuation takes place.
- IRE is working on another way to reduce the waste, the SMART project

- **SMART Project: a sustainable method for ^{99}Mo production**
the process will create less waste and avoid long lived production waste

CURRENT METHOD USING THE NUCLEAR REACTORS



LIGHTHOUSE METHOD USING AN ELECTRON ACCELERATOR





**THANKS FOR THE
ATTENTION**

