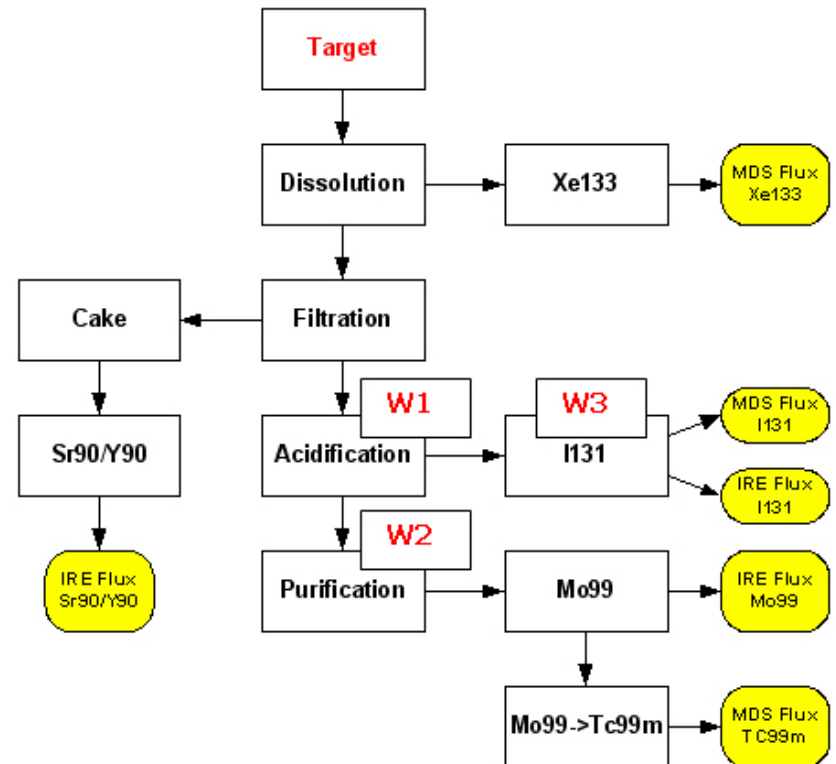


Radiological incident at IRE August 2008

IRE activities



- Production of radioisotopes for medical applications
- Main production: Mo, Xe, I
 - Dissolution of HEU irradiated targets
 - Recuperation of Mo, Xe, I
 - Purification of I (distillation)



IRE activities - waste

- Dissolution of the HEU targets and Mo production: labo XeMo1
 - Acid and basic liquid wastes
 - Acid wastes: collected in 2 small acid tanks, under the XeMo-cells, and alternatively used
- Purification of I: labo “Procel”
 - Acid and basic liquid wastes
 - Acid wastes collected in 1 small tank under the Procel-cells
- Collection of the small tanks in large tanks in the basement of the building

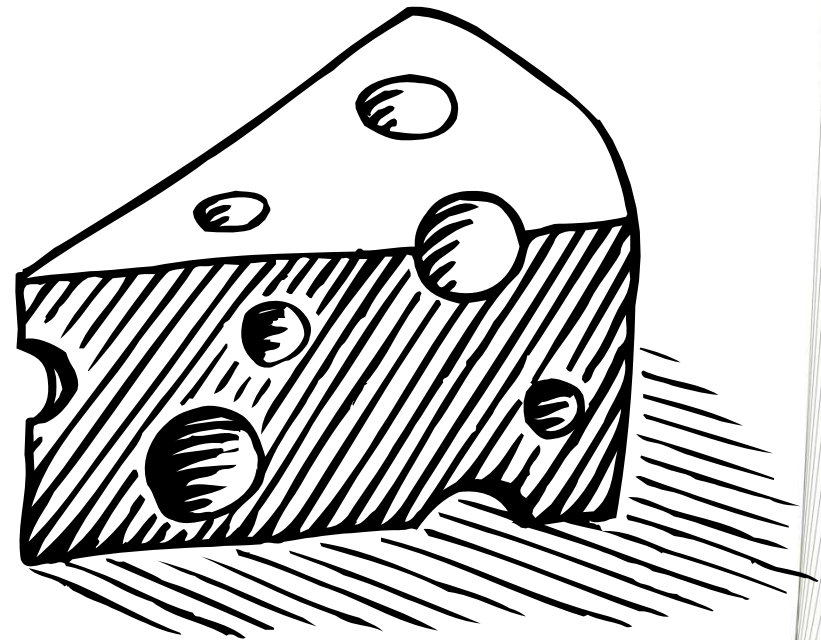
IRE incident

- Friday 22/08/08:
 - the contents of three tanks of 50 l, filled with high activity waste from different production units, were transferred to a larger tank of 2700 l, partly filled.
 - exothermal chemical reaction started in the 2700 l tank leading to the release of I-131 to the stack through filter batteries. The release lasted for several days.
 - The increase of I-131 release was not properly noticed by the operators and did not lead to immediate countermeasures by the IRE
 - On Monday the 25th of August in the morning, a safety engineer identified the problem

Primary cause

- IRE analysis
- Liquid wastes:
XeMo: I^- Procel: IO_3^- H_2O_2
- Several chemical reactions are possible: did it occur before?
- Specific circumstances:
 - 3 small tanks collected in the large tank, at the same time
 - Large tank quasi empty
 - “Fresh” liquid wastes

Secondary causes

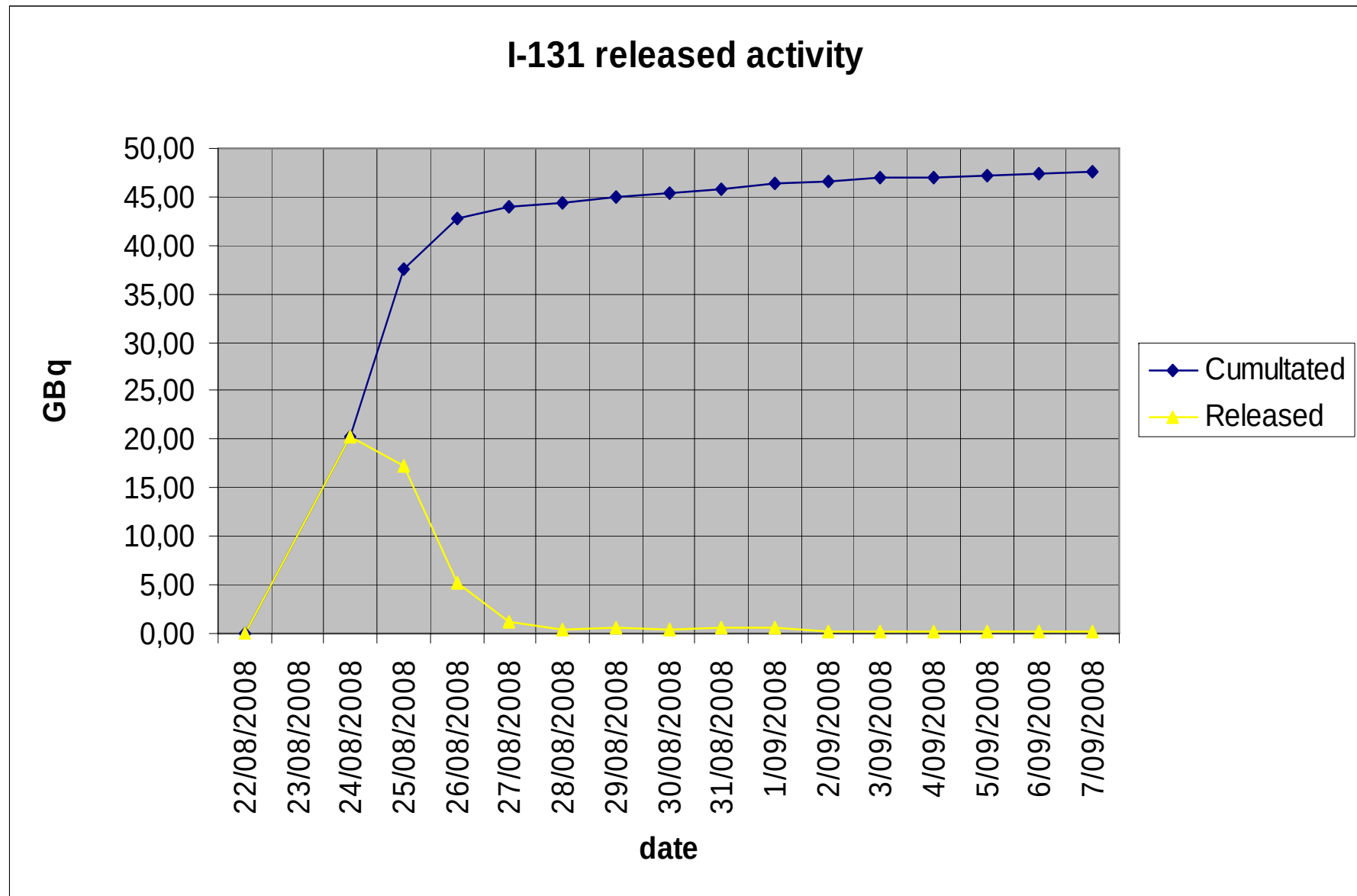


Incident

- Friday 22/08/08 am: transfer of 3 acid-waste tanks to the large acid-waste tank (basement)
- Operator noticed some high level dose for the vacuum-pump → hyp.: technical problem
- Alarming system : partially deficient (to Sunday morning)
- Sunday: alarming system restart – apparition of “iodine alarm” → hyp.: related with a test & a technical problem

Incident

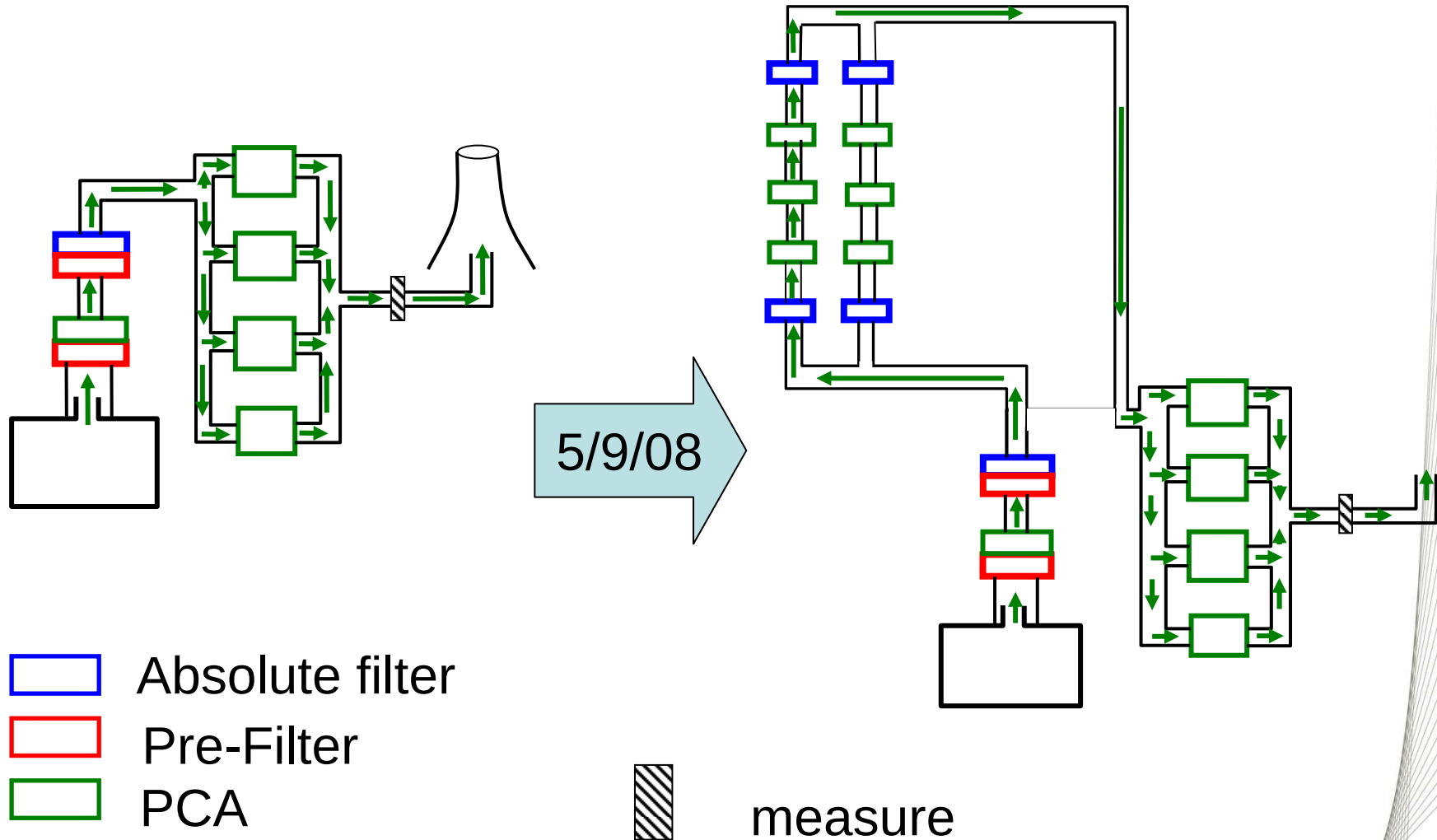
- Monday 25/08/08 - early
 - Alarm still present
 - Verification of the production cells: no problem
 - Production started
- From 8h00
 - Interpretation of the alarm as a true alarm
 - Identification of the origin of the release :
ventilation of the waste-tanks, in the basement
 - First estimation: $\frac{1}{2}$ of the annual release limit



Incident

- Monday 25/08/08 pm: contact Bel V and FANC
- Short term actions to reduce the releases (Monday-Thursday)
 - Switch to reserve filters
 - Attempt to dry the ventilation circuit
 - Modification of the last filters: PCA instead of absolute filters
- Long term actions: (1-2 weeks after the incident)
 - Deviation of the ventilation of the tanks to the another circuit with 3 PCA and 2 Absolute filters in series
 - Replacement of the PCA in the stack

Ventilation



FANC/Bel V actions

- 26/08/08:
 - Interdiction to produce for IRE and Nordion
 - Deployment of TELERAD mobile air monitoring stations at IRE
- 27/08/08:
 - Grass sampling
- 28/08/08:
 - Results → activation of National Emergency Plan: level U2

National Emergency Plan

- 28/08/08: level U2
 - Grass & milk sampling
- 01-02/09/08: Thyroid examination for the local population
- 06/09/08: level U1
 - New results
 - Installation of the ventilation deviation
- 12/09/08:
 - Replacement of the PCA of the last filtration stage
 - Iodine releases small enough (~10-20 MBq/day)

Conditions to restart

- Restoring adequate monitoring system
- Identification of the primary cause of the incident & implementation of preventive actions
- Minimum improvement for the alarming system
- Minimum improvement for the ventilation system (filters)

Long term: additional improvements

For more information: see www.fanc.fgov.be

Lessons learned

- Primary cause:
 - Concept / modification: lack of knowledge/lack of risk analysis
- Secondary causes:
 - Lack of ... ?!? Safety culture

History

- Inspections FANC / AVN 2005
- Action plan 2005 – 2006
- International audit 2007 (ASN – IRSN – AVN – FANC)
- ...