

# Present and future challenges in radiation protection by the young generation

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# *The road to radiation protection*

Master in Physics: 2002-2006

Job? Practical, still a lot of challenges:

→ MaNaMa Medical physics (radiology): 2006-2008

Evident step:

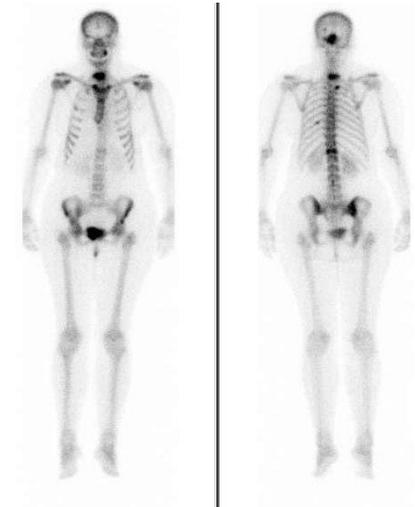
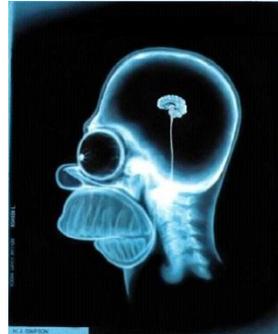
AV Controlatom: 2008 – now

- Medical physics expert
  - » *Radiology*
  - » *Nuclear medicine*
- Health physics
  - » *Megaports*

# Medical physics

## Radiological protection of the patient

- *Quality control*
  - *Acceptance test*
  - *Yearly QC*
- *Patient dosimetry*
  - *Studies*
  - *Pregnancy*
- *Optimization*
- *Education/training*



# *Medical physics*

## Dose optimization

Goal: Lower the dose and improve image quality

- Yearly QC
- Patient dosimetry

Cooperation with people from different departments

**Still a lot of work to be done**



# *Medical physics*

## How can it be done?

- Simple changes often make a big difference
- Adapt protocols
- New techniques (ex: iterative reconstruction)
- New equipment

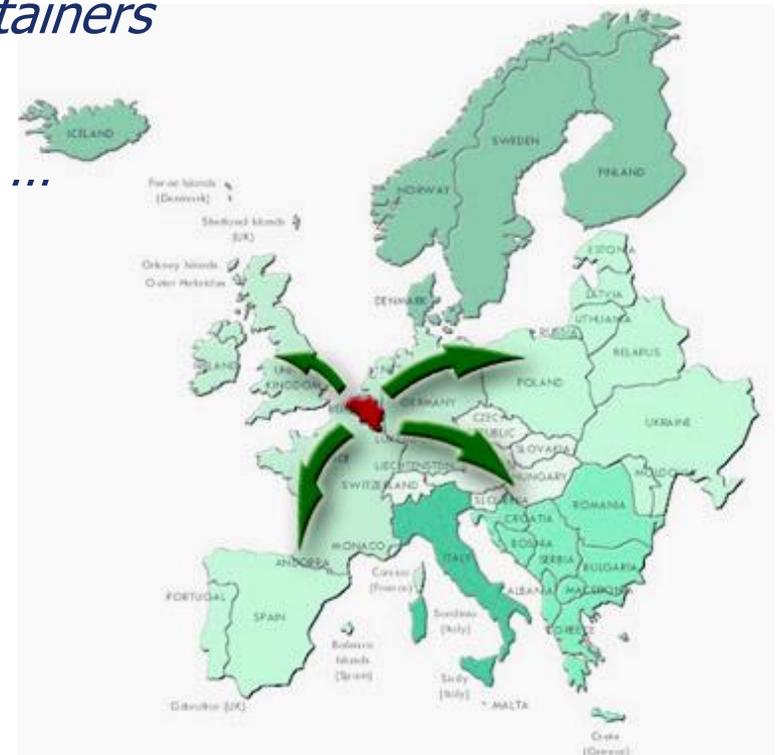
# Megaports

Detect radioactive materials in shipping containers

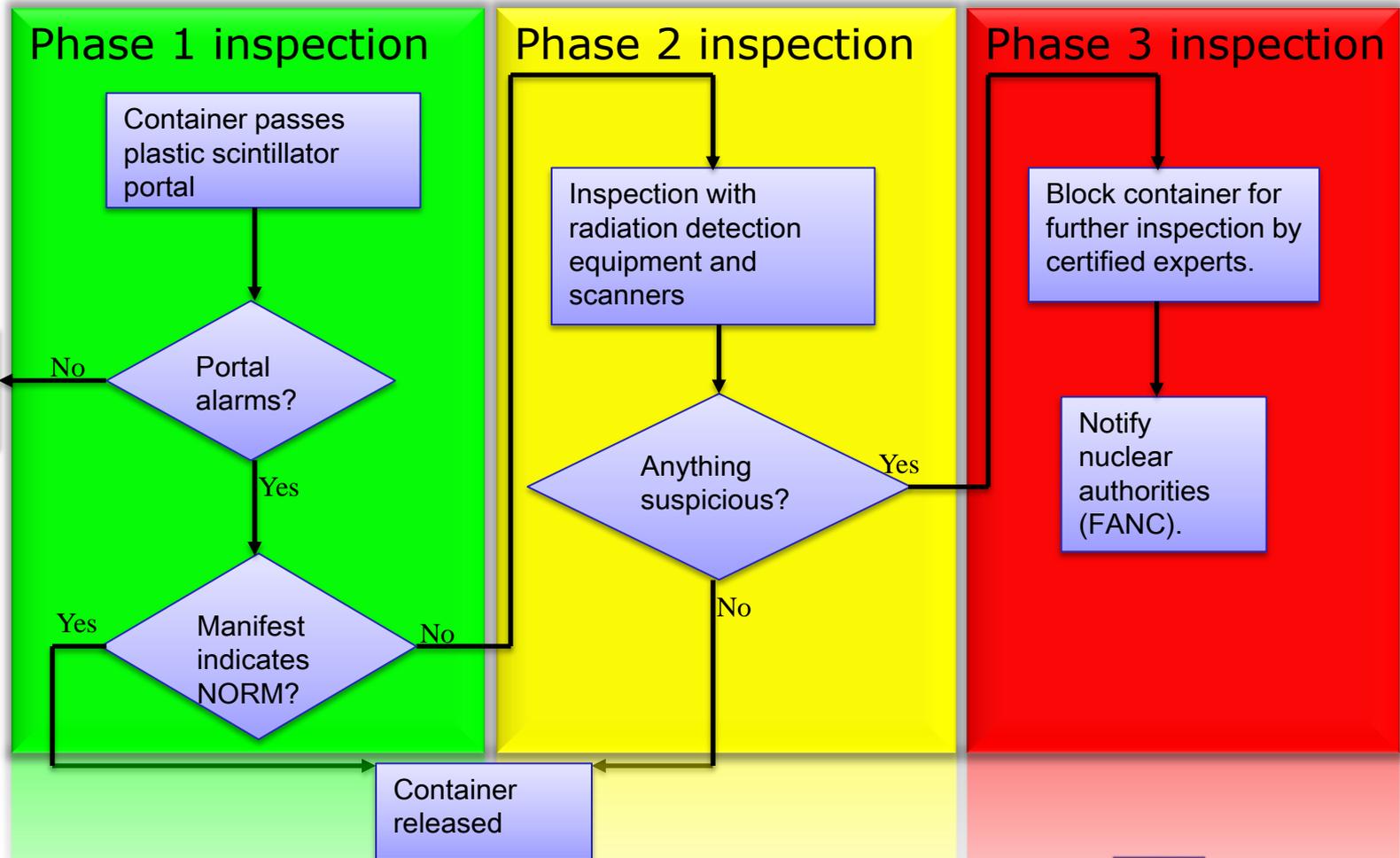
- ***Anti-terrorism/Non-proliferation:***  
*Detection of nuclear smuggling in containers*
- ***Public health:***  
*Contaminated goods, orphan sources, ...*

*Radiation expert for customs*

- Antwerpen
- Zeebrugge

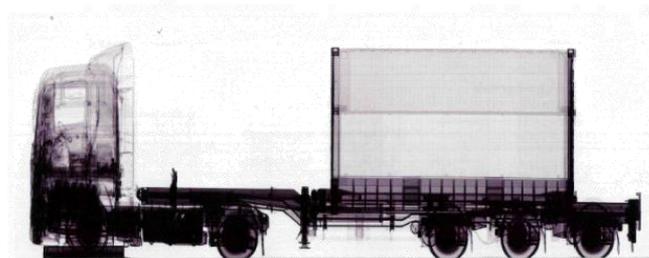


# Megaports



# Megaports Equipment

- *Radiation portal monitors (plastic scintillator)*
- *Advanced spectroscopic portals (NaI & Ge)*
- *Portable detectors (Ge, Plastic scintillator,...)*
- *X-ray scanners*



# Megaports

## Tasks

### *Support*

- *Maintenance*
- *Purchase new equipment*
- *Communication FANC*

### *Training*

- *Introduction course*
- *Use of equipment*
- *Refresher course*

*Phase 3 inspections (when we find irregularities)*

*Supervision (prevent/correct mistakes)*

*Quality control*

# Megaports

## How to handle NORM

### High alarm rates

- 99,9% NORM
- No list of NORM products available

+ We created our own NORM database



Material	Limiet	To Do	Gemiddeld	Stddev	Aantal	Synoniemen
aardewerk	56		22	11	642	earthen ware
abragrit	54		32	7	377	
absorptiekorrels	45		11	11	19	
acrylpolymeren	29		9	7	14	Laquasorb, Hydrosorb, Polymethylacrylaat
Actieve kool	40		12	9	525	Norit, Activated Carbon/Charcoal
Alumina	227	altijd bedrijf en docnummer toevoegen	110	39	69	
Aluminiumcement	115	altijd bedrijf en docnummer toevoegen	48	22	12	Alumina brick, Alumina cement, alumina bricks, kellundite (soort plasterwanden)
Aluminiumerts	239	altijd bedrijf en docnummer toevoegen	55	61	14	aluminates, aluminate, aluminaat
aluminiumoxide	213	altijd bedrijf en docnummer toevoegen	69	48	213	Aluminium oxide
amaril	103		32	24	48	
Ansilex	28		17	4	36	
Aquagel	34	indien mogelijk bedrijf toevoegen	13	7	31	
arduin	44		17	9	25	
Asfalt	32		10	7	37	bitumen, asphalt
Assen en residuen	891	altijd bedrijf en docnummer toevoegen	119	257	8	
Assen en slakken	67	altijd bedrijf en docnummer toevoegen	27	13	11	
Auto onderdelen	31	detail opvragen: over welke onderdelen gaat	10	7	24	
baddeleyiet	486	altijd bedrijf en docnummer toevoegen	164	107	20	Baddeleyite
bauxiet	321	altijd bedrijf en docnummer toevoegen	91	77	103	Bauxite
beef extract	14		8	2	26	Rund extract
bentoniet	44		19	8	588	Bentonite, hydrocol
bereide bindmiddelen voor gietvormen	74		24	17	350	Bindmiddelen gietvormen

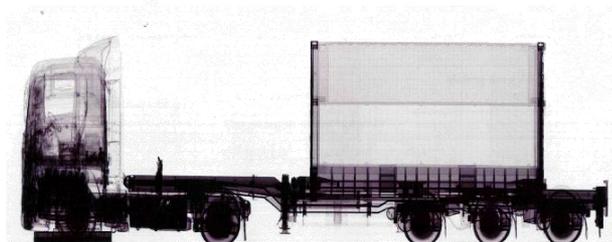
# Megaports

## How to handle NORM

### NORM or NOT NORM

#### Interesting cases

- Brazil nuts
- Eye shadow
- Clothing
- Wash balls
- Empty container
- Leather whips
- ...



# Megaports

## Challenges

### Working in a seaport

- Opening containers is not always possible
    - Measurements performed on the outside
    - Risk estimates more difficult (shielded source?)
  - Good communication is VERY important
    - People have little or no knowledge of radioactivity and are suspicious towards radioactivity
    - Ex: Dock workers refusing further work
  - What to do with radioactive goods in a container
    - Sent back or accepted by recipient
    - Getting license or permission by FANC
    - Refusal of foreign governments to accept containers.
- + Good cooperation with FANC



# Megaports

## Some interesting cases

- Cockpit of an airplane
- Black tea
- Blueberries
- Jet engine
- Helicopter
- Possible smuggling case
- Japanese plants
- Contaminated containers (Fukushima)



# *Why I like my job*

Radiation protection is not a boring desk job

- Working with and testing new equipment
- Meeting new and interesting people
- Working in different environments
- Facing new challenges every day



# Questions?



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