

FEEDBACK EXPERIENCE ON NEW PERSONNAL CONTAMINATION MONITORS AT THE EXIT OF THE RCA IN THE EDF NPPs

2010 ISOE International Symposium

N. VALENDRU / EDF DPN - UNIE GPRE

J. FAZILEABASSE / EDF R&D



CHANGER L'ÉNERGIE ENSEMBLE

Content

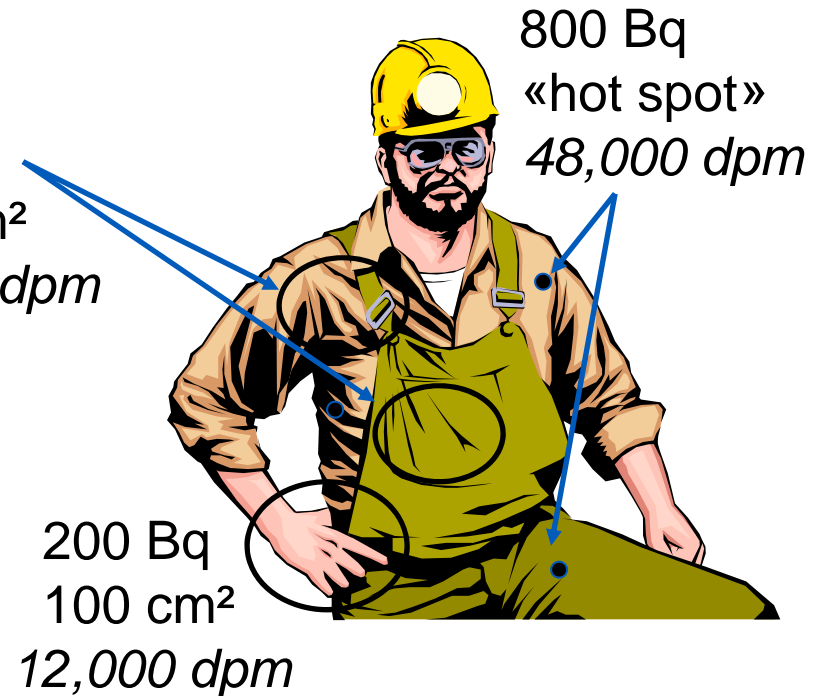
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Introduction : EDF specifications

- Values of contamination to be detected at the exit of the RCA :

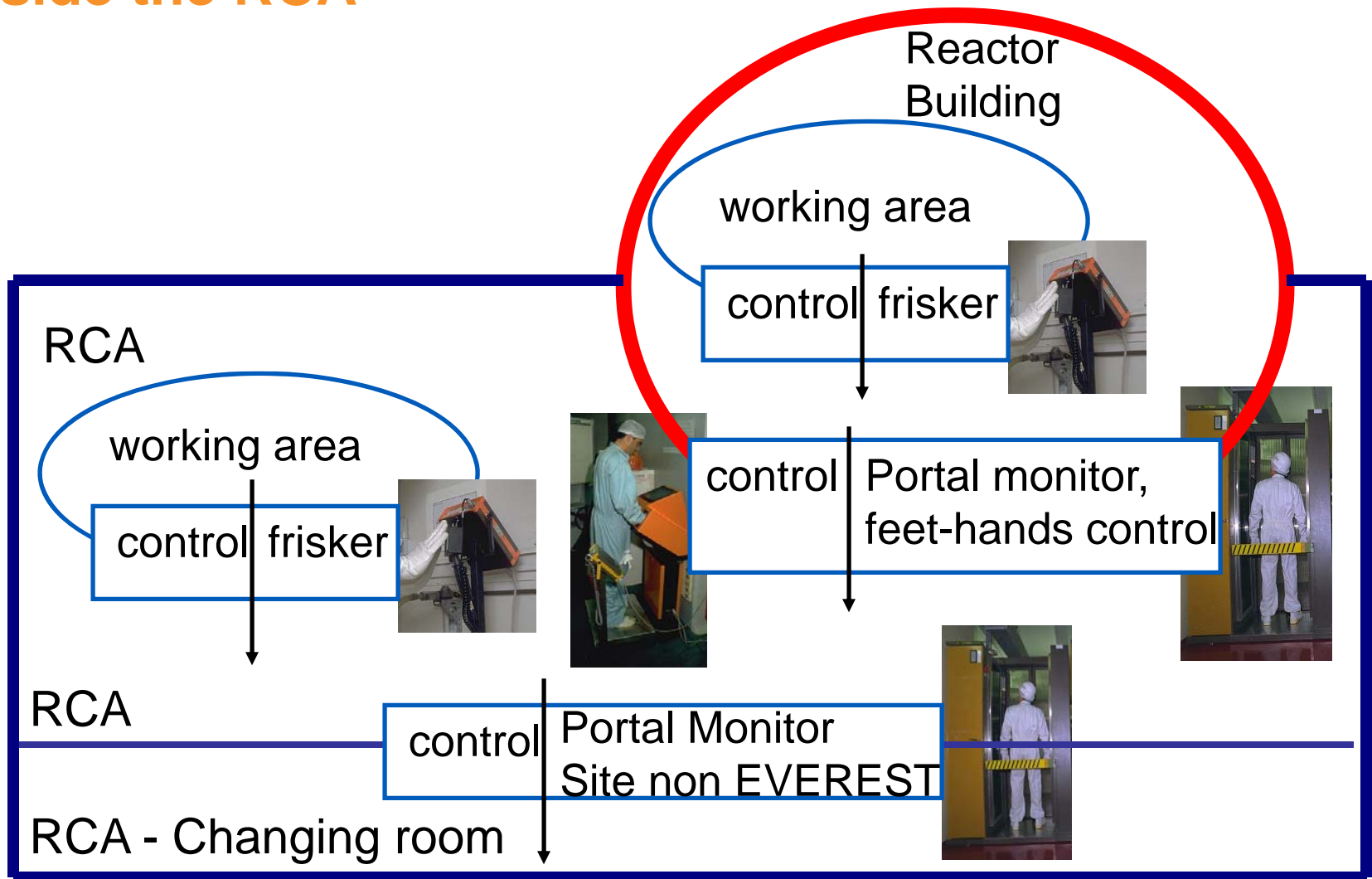
400 Bq
100 cm²
24,000 dpm

Nota Bene : Bq equivalent Co-60,
calibration contact for hands, 5 cm
for body (2 inches)

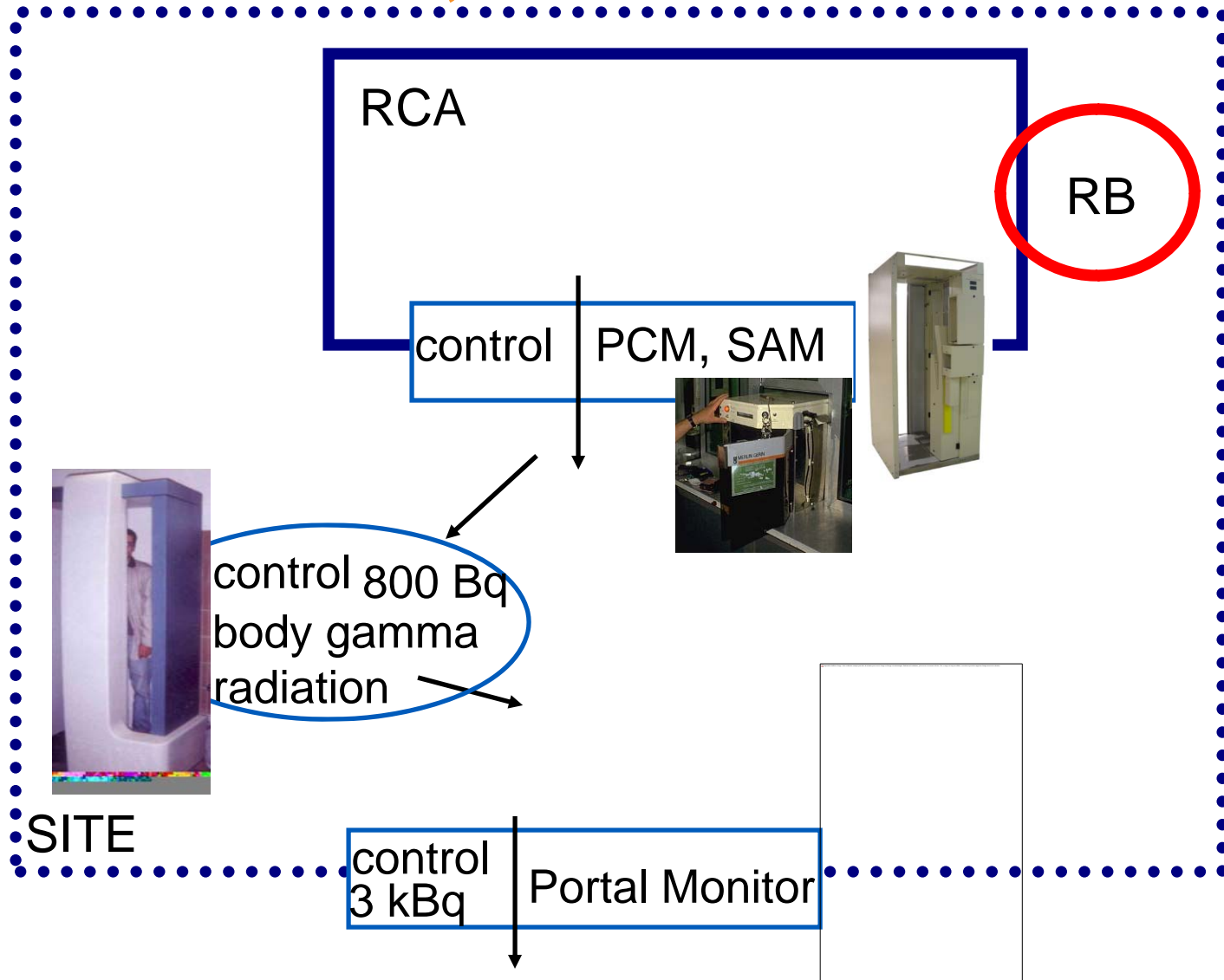


- Localisation of the contamination
- Separating the outer surface contamination and the inner one
- For each control, 2 thresholds are used :
 - The first one corresponds to « Routine » contamination → alert level (see above)
 - The second one corresponds to a high contamination → alarm level (3kBq), immediate RP action (decon + dose assessment)

Chain of radiological control for workers : inside the RCA



Chain of radiological control for workers : at the exit of the RCA, at the exit of the site



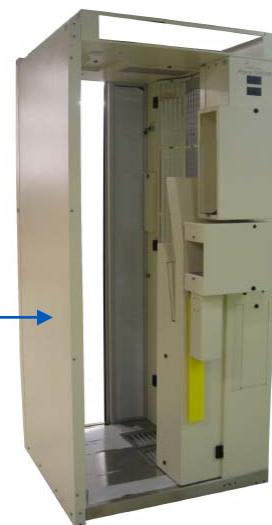
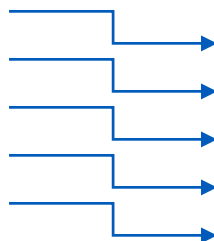
Characteristics of new PCM / exit RCA (1/2)

▶ Former PCM designed in 1980's : beta detector, many zones not checked like workers sides and arms

▶ new PCM

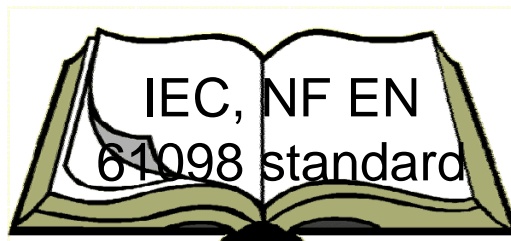
- control in 2 steps
- beta and gamma detectors
- specific treatments for the γ detector which is very sensitive to the γ background :
 - ✓ Compensation of the attenuation by the worker (until 300 Bq)
 - ✓ Fluctuation of the γ background (± 100 nGy/h)
 - ✓ High level of γ background (200 nGy/h)

Back ground
200 nG/y

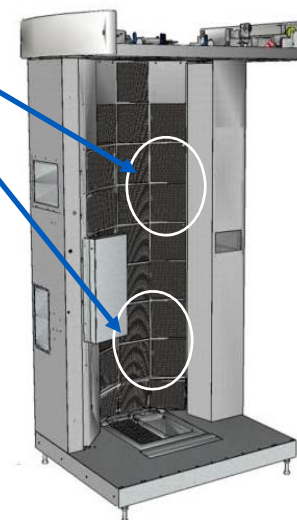
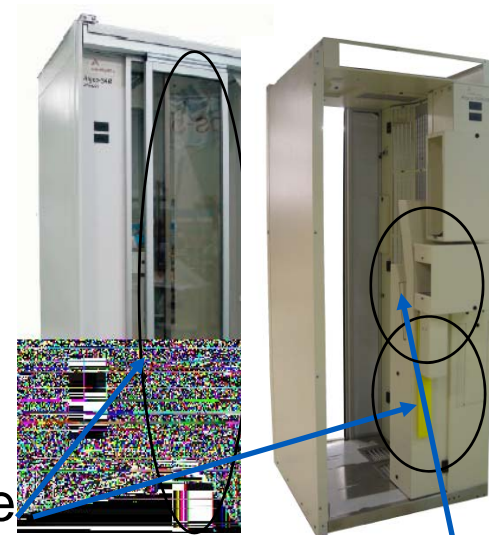
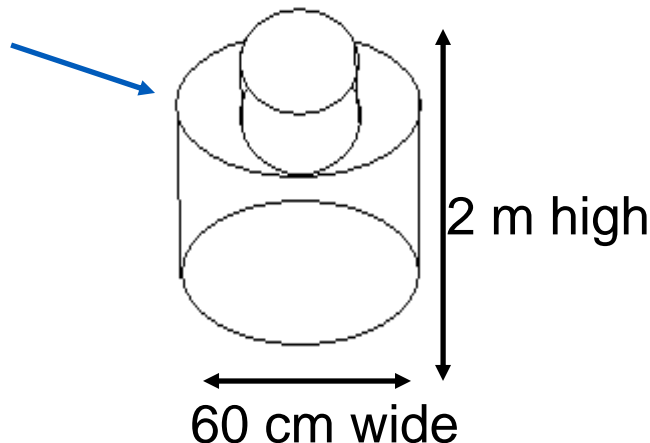


Characteristics of new PCM / exit RCA (2/2)

- Specifics EDF needs, in addition of IEC, NF EN 61098 standard



- Automatic door at the exit and a barrier at the entrance
- Door pocket to control small personnel items
- Sum zones alarms with double, triple, quad detectors, front side and back side to create virtual bigger detector
- Elliptical and bigger phantom



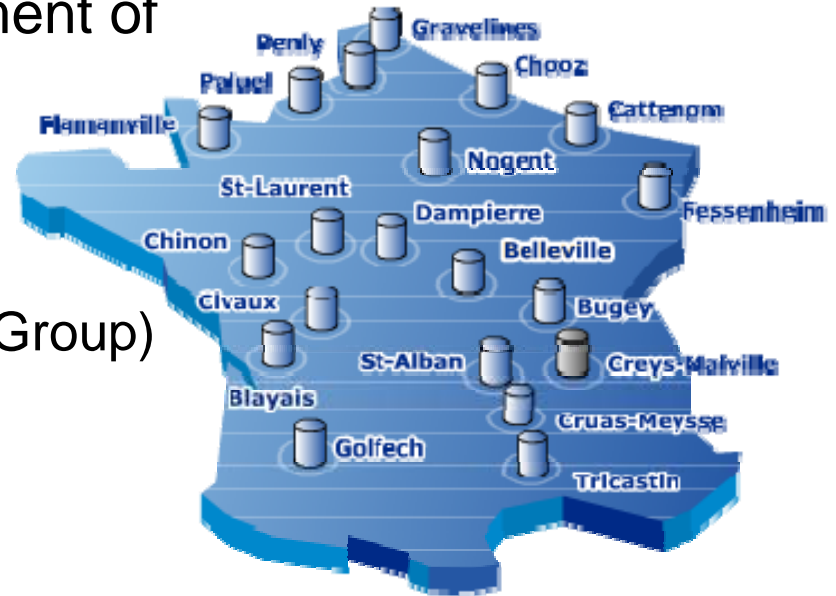
EDF equipment from 2006

- ▶ 150 PCM purchased for the equipment of 9 NPPs 26 Units (10 M€)

EDF = 19 NPPs 58 units

- ▶ 3 models of PCM :

- RTM 860 TS from RADOS (MIRION Group)
- TSE from RADOS (MIRION Group)
- ARGOS 5 with gamma option from CANBERRA



RTM 860 TS



TSE



ARGOS 5 with γ option

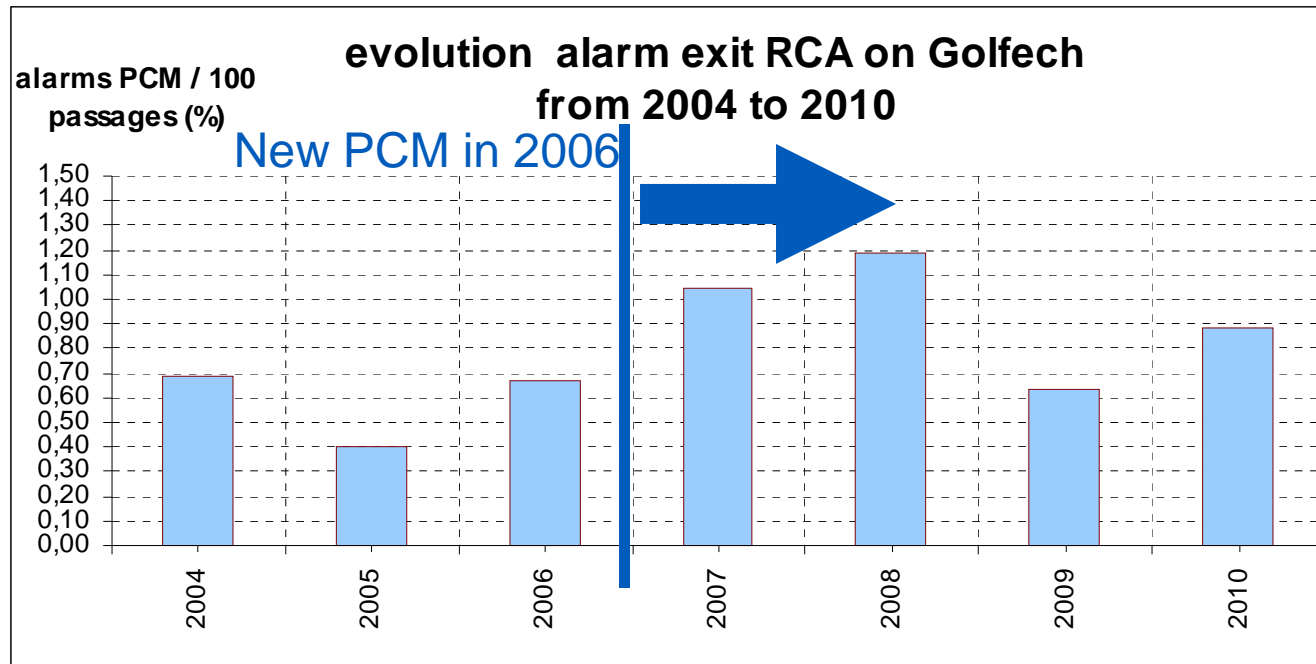
EDF equipment in the future

- ▶ 2 NPPs + EPR (5 units) will be equipped in 2011 : call for tender at the moment for 43 PCM
- ▶ The last 8 NPPs (28 units) will be equipped between 2012 and 2014 with 160 or 180 PCM (10 M€)



Feedback experience from the first years : alarms

- First, an increase in the number of alarms at the exit of the RCA and then a stability



- Reasons :**
- Lower threshold and statistics setting 97.5% detection probability and 0.15% false alarms
 - Control covering the whole body (no more unchecked zones)
- Decrease in the number of alarms at the exit of the site

Feedback experience from the first years : γ detectors

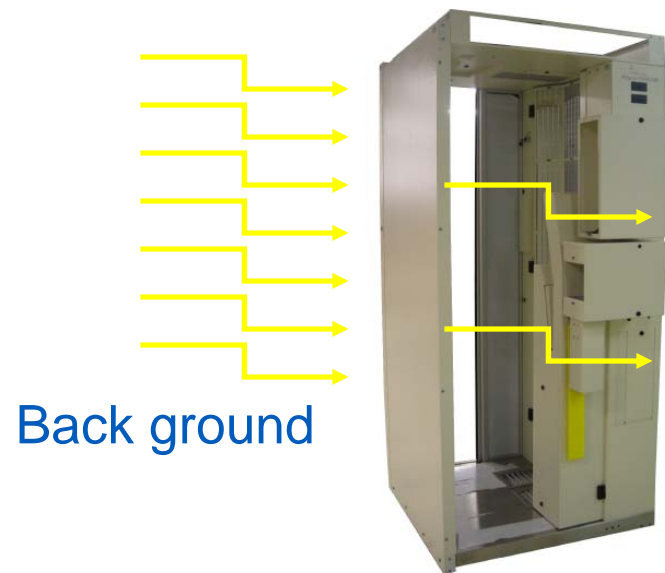
gamma detectors very sensitive to the surrounding disturbances

► Some precautions concerning the installation and the organisation are needed :

- Shielding γ detector by lead wall
- Maximum weight at ground level ($< 1.200 \text{ kg/m}^2$ for EDF)



$< 1.200 \text{ kg/m}^2$

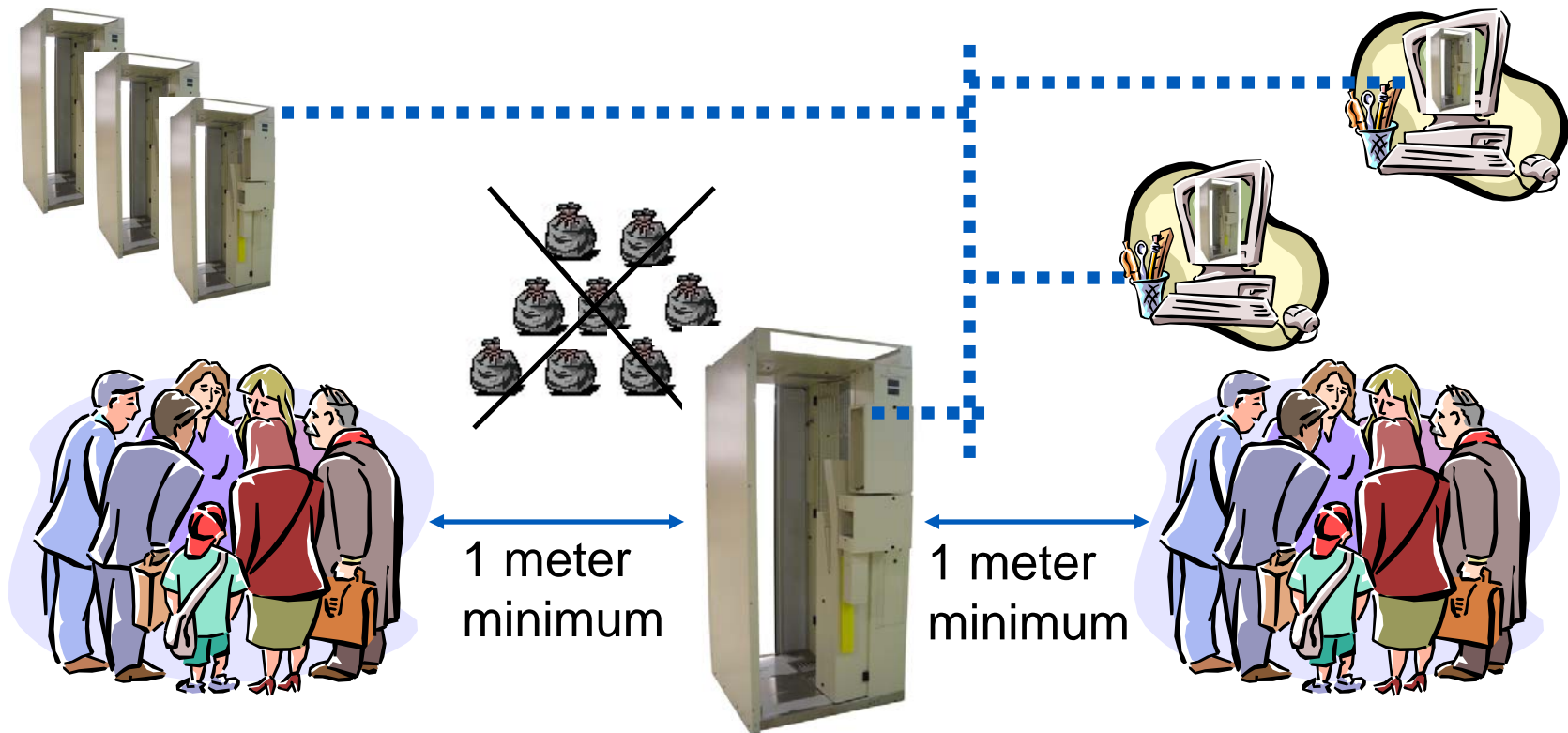


Feedback experience from the first years

(continuation with gamma detectors)

- Eliminate storage of irradiated stuff nearby
- Ensure that workers are waiting 1 meter in front of and behind the PCM (mass effect)

An other point : Supervision of PCM to have overall vision



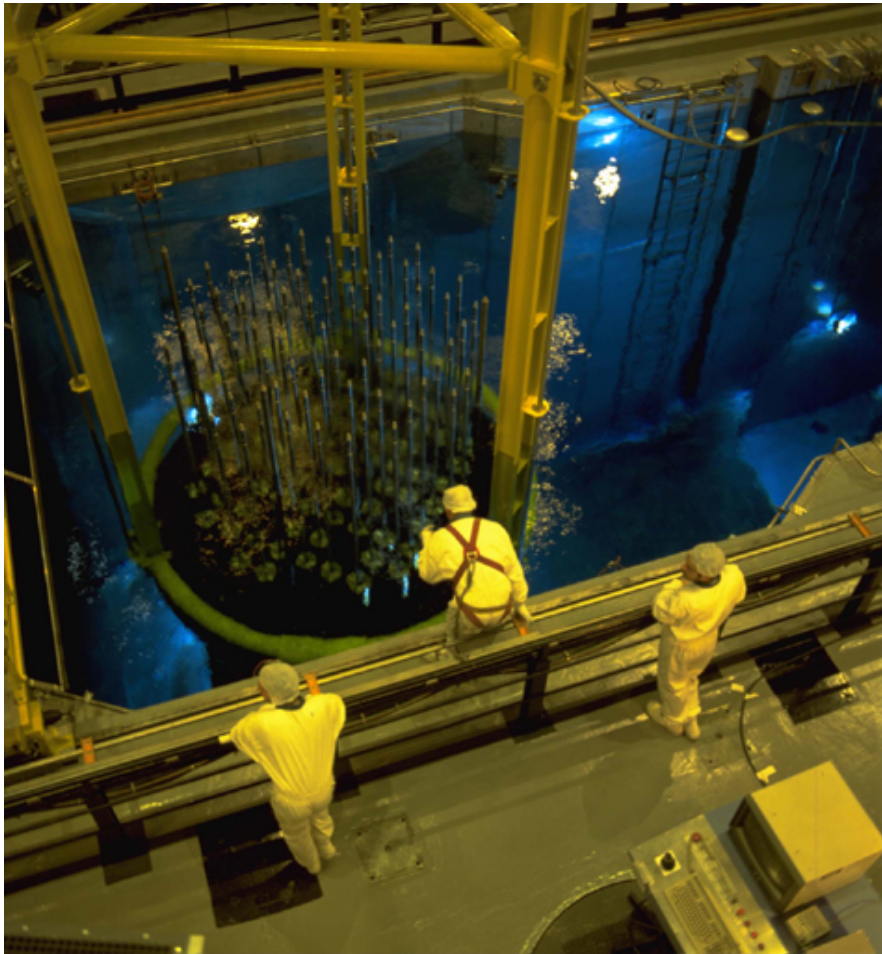
Conclusions

Hardware point of view :

- ▶ Existing PCM with beta-gamma detection need to be improved and to be better adapted to the background in PWR NPP
- ▶ Adjustment on the plant to respect control in 2 x 20 s maximum
- ▶ Qualification of monitors must be performed with physical sources in addition to the conformity with the IEC, NF EN standard

User's point of view :

- ▶ New PCM at the exit of the RCA essential to have a reliable control
- ▶ Performance of PCM together with a strict organisation make possible to improve and control radiological cleanliness



Thank you for your
attention

