

20 years of ALARA Management, Research and Development at the Belgian Nuclear Research Centre SCK•CEN

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- **Introduction:**
 - The Belgian Nuclear Research Centre SCK•CEN
- **The ALARA policy**
 - The ALARA procedure
 - The major actors
 - The accompanying measures
- **Some examples**
 - Dismantling of the BR3 reactor
 - The VISIPLAN 3D ALARA Planning Tool
- **Conclusions and perspectives**

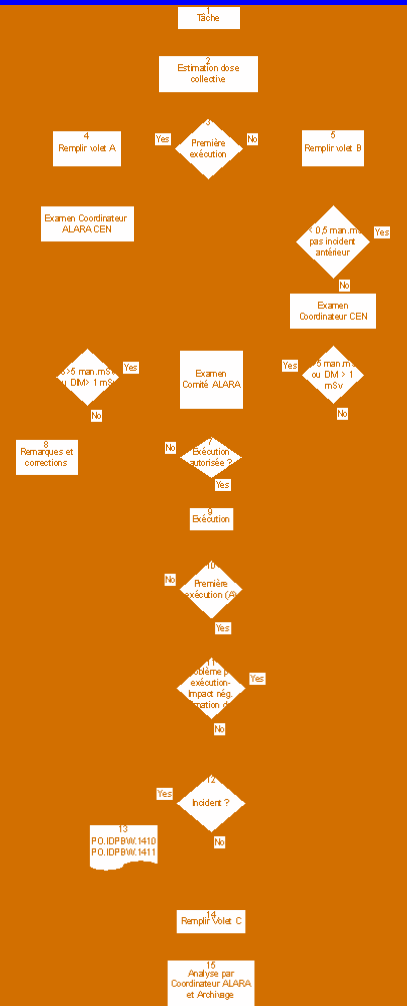
Introduction: the Belgian Nuclear Research Centre SCK•CEN

- A respectable lady of **60 years old**
- Major **infrastructure**:
 - Research Reactors
 - Hot laboratories
 - Radiochemistry laboratories
 - Radiation Protection related laboratories
 - (Underground) laboratories for geological waste disposal research
- Many **activities**
 - Research (Radiation protection, nuclear materials, innovative reactors)
 - Services (including medical isotope production and Silicon doping)
 - A mix of unique, innovative tasks and routine tasks running the facilities
 - Design projects, striving for innovation – Long term operation of facilities – dismantling of experiments and old facilities
- Major reorganisation in early '90s
- 10% of staff are **PhD researchers**;
- International staff, **~35 nationalities**

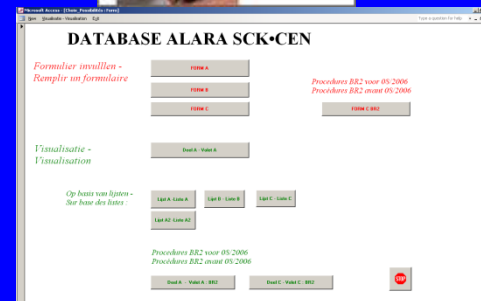


- **Till end of the '80s**
 - Focus on nuclear safety
 - Radiation protection based on respect of limits
- **Major reorganisation late '80s, early '90s**
 - Shut-down of the BR3 reactor
 - Waste management activities → Belgoproces
 - Non nuclear activities → VITO
 - Experienced staff → (very early) retirement
- **New management, ~100 new recruits in 1990-1991**
 - **Openness and awareness** for new approaches in safety
 - International evolutions in radiation protection
 - **Redesign** of many activities and processes

- Use of 3 forms
 - **Application** form: **new** application
 - **Application** form: **repetition** of previously approved
 - Check of feedback of experience (incident, dose)
 - Check of changed circumstances
 - Form for **feedback** (dose records etc.)
- Demand: by **applicant with Local ALARA Coordinator**
- Approval: **by Health Physics Department**
 - estimated collective dose $< 0,5 \text{ man.mSv}$
 - Approval by local Health Physic agent **if repetition**
 - $0,5 \text{ man.mSv} < \text{est. coll. dose} < 5 \text{ man.mSv}$ AND no individual doses $> 1 \text{ mSv}$
 - Approval by Health Physics Coordinator
 - Dose $> 5 \text{ man.mSv}$ or indiv. dose $> 1 \text{ mSv}$
 - Debate in ALARA Committee
- **Potentially**: other approvals needed (e.g. modifications to installations; technical approval of experiments)

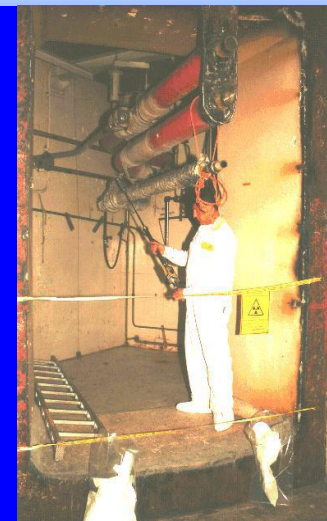


- **Organisation**
 - Selection of key persons in all facilities
 - Dedicated training at CEPN (France)
 - A formal ALARA committee
 - Harmonisation of approach
 - Exchange of information, feedback of experience
 - A role in approval for important cases
- Upgrade of the **electronic dosimetry system**
 - Follow-up per task and individual
 - Immediate feedback
- An **ALARA database**
 - Information on all activities dealing with radioactivity, *including the remarks of Health Physics*
 - Allows follow-up, reporting, intervention



A first test case: the dismantling of BR3

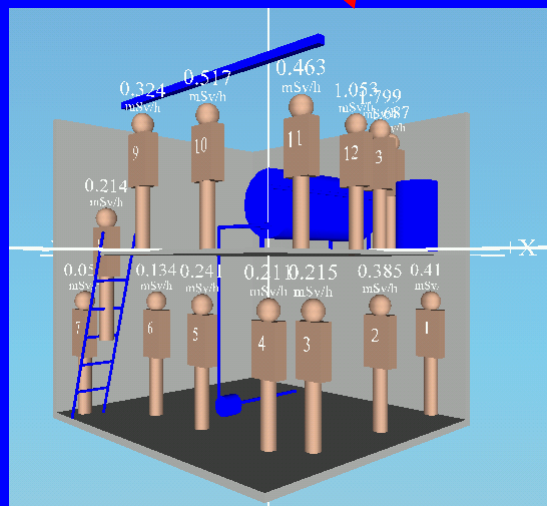
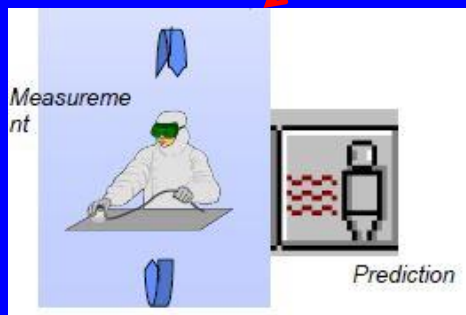
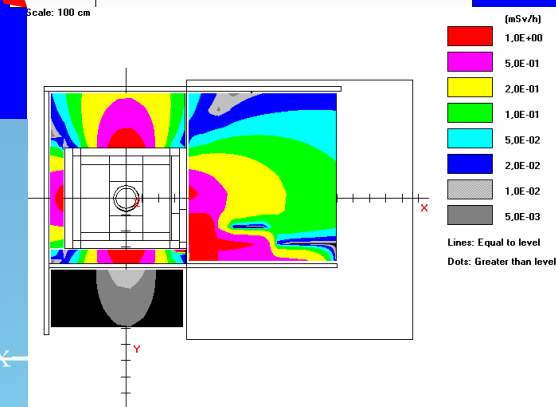
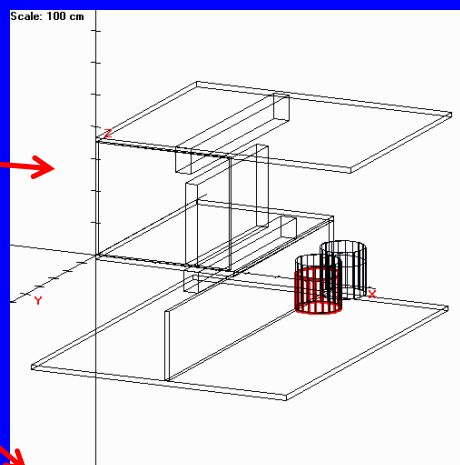
- **Specific problems with dismantling**
 - Changing environment
 - Equipment
 - Radioactivity
 - Poor accessibility
 - Often shielding also to be dismantled
 - Including thermal shielding containing asbestos
 - Storage of dedicated equipment
 - Temporary storage of cut pieces
- **Lessons learnt**
 - ALARA as part of holistic safety approach
 - Adequate relations with all actors including authorities
 - Adequate training and preparation of (external) workforce
 - Room for some flexibility needed



A major tool for operational ALARA planning: the **VISIPLAN 3D** ALARA planning tool



- Modelling
- Analysis
- Planning
- Follow-up



- **ALARA** has become **a part of daily life** at SCK•CEN
 - Please keep the concept and acronym ALARA alive
- Despite increase in services, ageing facilities and new staff:
 - The collective dose stabilises at around 100 man.mSv/year
 - Minor incidents (internal contamination, spills,....) hardly occur
- **New challenges and perspectives**
 - Integration of ALARA in **a holistic safety management** system
 - Including enhanced security and environmental requirements,....
 - With attention for the CULTURAL dimension
 - Integration of radiation protection into **design**
 - Till now: only for experiments *or manipulations* of variable size
 - The future: a completely new, innovative facility called MYRRHA