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# Regulatory Aspects of ALARA

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# Regulatory Aspects of ALARA

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- **Introduction – General Principles**
- **ALARA Programme in Regulatory demand**
- **Practical Implementation : some examples**
- **Future**
- **Conclusion**

# Introduction

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ALARA is a **general concept**

- **Aiming to reduce radiological hazards to**
  - Workers
  - Public
  - Environment
- **Taking into account other considerations like**
  - Economic
  - Technical & Practical
  - Social

- **Integral part of overall safety programme and safety culture**



Not easily translated into  
« regulatory text »

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# Regulatory Approach demands for ALARA Programme

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- **ALARA Programme to be implemented on-site**
  - Commitment of all staff (Top-Down)
  - Dedicated staff
  - ALARA Manual or Procedures
  - Education & Training
  - ALARA Organisation
  - Health Physics Service which reports to upper management
  - Regular review of ALARA programme
- **Elements of this ALARA programme are imposed by**
  - Royal Decree (20th July 2001)
  - Specific requirements in licence

# General Principles

(Royal Decree 20th July 2001 Chapter III, Art. 20 : General Protection)

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- **Royal Decree of 20th July 2001**
  - General Regulation for the Protection of the Population, the Workers and the Environment against the Danger of Ionising Radiation
- **Justification** of each activity
  - Before licensing : part of license application
  - Review by FANC: possible exclusion of activities
- **Optimisation** as low as reasonably achievable
  - FANC can impose dose constraints for each source, activity or manipulation
- **Limitation** of effective doses
  - For workers
  - For public

# Elements of ALARA Programme in Royal Decree (1)

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- **Commitment of staff (art. 26)**
  - Comply to regulations
  - No unnecessary exposure
  - Notify problems
- **Dedicated Staff**
  - Health Physics (art. 23)
    - Internal department for class I utilities
  - “Aangestelde voor bewaking”/“Préposé à la surveillance” (art. 30.4)
    - Deputy health physics
    - For each controlled area
    - Assure safety and protection measures

# Elements of ALARA Programme in Royal Decree (2)

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- **Education & Training for all staff (Art. 25)**
  - Renewed 1x/year, job change, new technology,...
- **Education & Training for specific persons/tasks**
  - Aangestelde voor bewaking/Préposé à la surveillance (Art. 30.4)
  - Experts medical radio physics (Art 51.7)
    - Initial training
    - Permanent education
  - Permanent education for medical doctors, dentists, veterinary doctors (Art 53.1)
  - Training for medical assistant personnel (Art 53.2)
    - Initial training
    - Permanent education
  - Experts health physics
    - Class I
    - Class II

# Elements of ALARA Programme in Royal Decree (3)

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- **ALARA Manual & Procedures**
  - Safety Factor (Art. 27)
    - Distance
    - Shielding of sources :  $< 0.02$  mSv/h at contact
    - Shielding of workspace
    - Avoiding contamination
      - Sealed sources
      - Lowest possible radio toxicity
      - Minimise activity
      - Avoid spread of radioactive substances
      - Avoid loss/theft of radioactive substances
      - Retrieval of radioactive substances
      - Exact account of radioactive substances
      - Workspace in accordance with activity, toxicity, physical and chemical properties
      - Non-sealed sources only in appropriate workspace
      - Methodology to avoid contamination of personnel
  - Limit time of exposure



# Elements of ALARA Programme in Royal Decree (4)

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- **ALARA Manual & Procedures**
  - Protection of Workspace (Art. 29)
    - Controlled areas designed to cope with external hazards (fire, explosion, water)
    - Easy evacuation
    - Clear separation with other spaces
  - Individual protection of personnel (Art. 30)
    - Controlled access (Art. 30.1)
    - Prohibition for food, drinks, smoking, cosmetics, ... (Art. 30.2)
    - Adapted (personal) protective equipment (Art. 30.3)
    - Individual adapted dosimetry (Art. 30.6)
      - Nominal (legal) dosimeter
      - Extremity dosimeters
      - Alarm dosimeters
    - Same protection for external workers (Art. 37 ter-quinquies)

# Elements of ALARA Programme in Royal Decree (5)

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- **Health Physics Department (Art. 23)**
  - Responsible for the application of and control over the regulatory demands
  - Head of Health Physics department : Expert Class I or Class II
- **ALARA Organisation and review for Class I facilities**
  - Specific demand in license
  - To be managed and controlled by Internal Health Physics department
  - Supervised and reviewed by Authorised Inspection Organisation
- **ALARA Organisation and review for Class II facilities**
  - To be managed by Health Physics

# Practical Implementation of ALARA by FANC

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- **During Licensing**
    - Examination of justification principle
    - Examination of protection measures
      - Workspaces
      - Waste treatment
      - Etc...
    - Specific requirements in issued license
  - **During Facility operation : Control & Surveillance**
    - Periodic inspections by Authorised Inspection Organisations
      - Control of elements of ALARA programme
    - Specific inspection campaigns by FANC such as
      - Hospital campaign (education & training of medical assistant personnel)
      - Class II facilities with large sources and cyclotrons
      - Industrial radiography with gamma sources
    - Periodic contacts with major facilities
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# Practical Implementation of ALARA by FANC : licensing examples

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- **Private collection of radioactive sources : no justification**
  - **Hospitals**
    - Maximum allowed activity per isotope
    - Exact inventory of sources
    - Construction materials in hot lab : smooth materials for easy decontamination
    - Maximum allowed energy for accelerators
  - **Cyclotrons for production of medical isotopes**
    - Maximum allowed energy
    - Exact inventory of sources
    - Storage and treatment methods of isotopes
    - Control of induced radioactivity
    - Release limits
  - **Industrial radiography with gamma-sources**
    - Specific conditions to avoid loss/theft of sources
    - Specific procedures in case of malfunctioning device
    - Highly Active Sealed Source Record sheet
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# Practical Implementation of ALARA by FANC : control & surveillance examples

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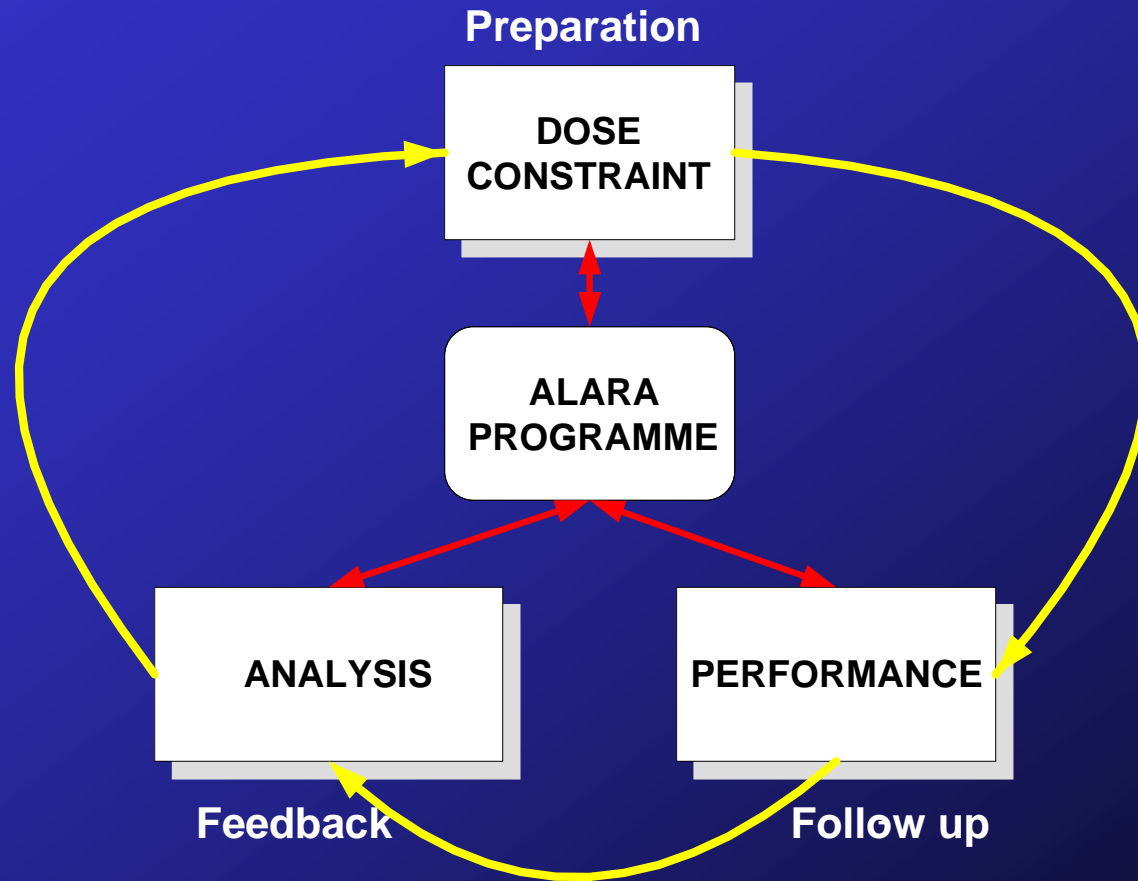
- **Hospitals : Systematic inspection campaign with specific attention to**
  - Individual user's license
  - Education & training of medical assistant personnel
  - Exact inventory of sources
  - Procedures for storage and treatment of waste
- **Class II facilities with large sources and Cyclotrons : systematic inspection campaign to increase safety measures**
  - Protection measures
  - Access control
  - Testing of safety related equipment
  - Content and update of safety analysis report
- **Industrial radiography with gamma-sources : intensive consultation with industry and in the field inspections**
  - Increase operational safety of radiography by
    - Optimisation of dose constraints (preparation)
    - Management of doses (performance)
    - Analysis of doses (feedback and improvement)

# Future Approach of FANC

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- **More attention to Dose Constraints**
  - Per type of application
  - Risk and safety analysis
- **Dosimetry Survey**
  - Identify activities with high exposures
  - Develop – together with the industry – an ALARA programme to reduce doses
  - Evaluate the programme and provide feedback to the industry (lessons learned)
  - Develop specific training programmes for particular groups/activities
- **Example of this new approach**
  - Industrial radiography

# Example of new approach : Industrial Radiography



# Industrial Radiography : 10-points plan

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- **Dose constraints : ALARA**
- **Risk analysis – safety analysis for each type of equipment**
- **Two operators: 1 for surveillance**
- **Procedures for normal operation and in case of accidents**
- **Inventory of sources in use**
- **Internal safety audit**
- **Education & Training of operators**
- **Specific training for surveillance**
- **Feedback to operators**
- **Replace – where possible- radiation techniques by others**



# Conclusion

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- **ALARA = concept/philosophy and not easily to be put in regulations**
- **REGULATOR can stimulate ALARA by**
  - Including the ALARA concept, principles and approaches in its regulatory texts.
  - Including specific points of attention and specific requirements in the facilities license.
  - Drawing attention to ALARA related aspects during their inspections.
  - Consulting and collaborating with the licensees to further enhance the application of ALARA in the field