



International Atomic Energy Agency
International Society of Tracers and Radiation Applications

TRAINING AND CERTIFICATION SYSTEM
FOR
RADIOISOTOPES AND RADIATION
APPLICATIONS IN INDUSTRY

Patrick BRISSET

RADIOISOTOPE APPLICATIONS IN INDUSTRY

RADIOTRACERS > Diagnostic, troubleshooting, optimization

- Residence time distribution analysis
- Flow rate measurements
- Leak detection in buried pipelines, heat exchanger, etc.
- Mixing/blending studies
- Corrosion/wear monitoring
- Environmental pollution investigation
- Sediment movement on river and sea bed
- Inter-well tracer test in oil fields
- Material inventory, Emission tomography, etc.

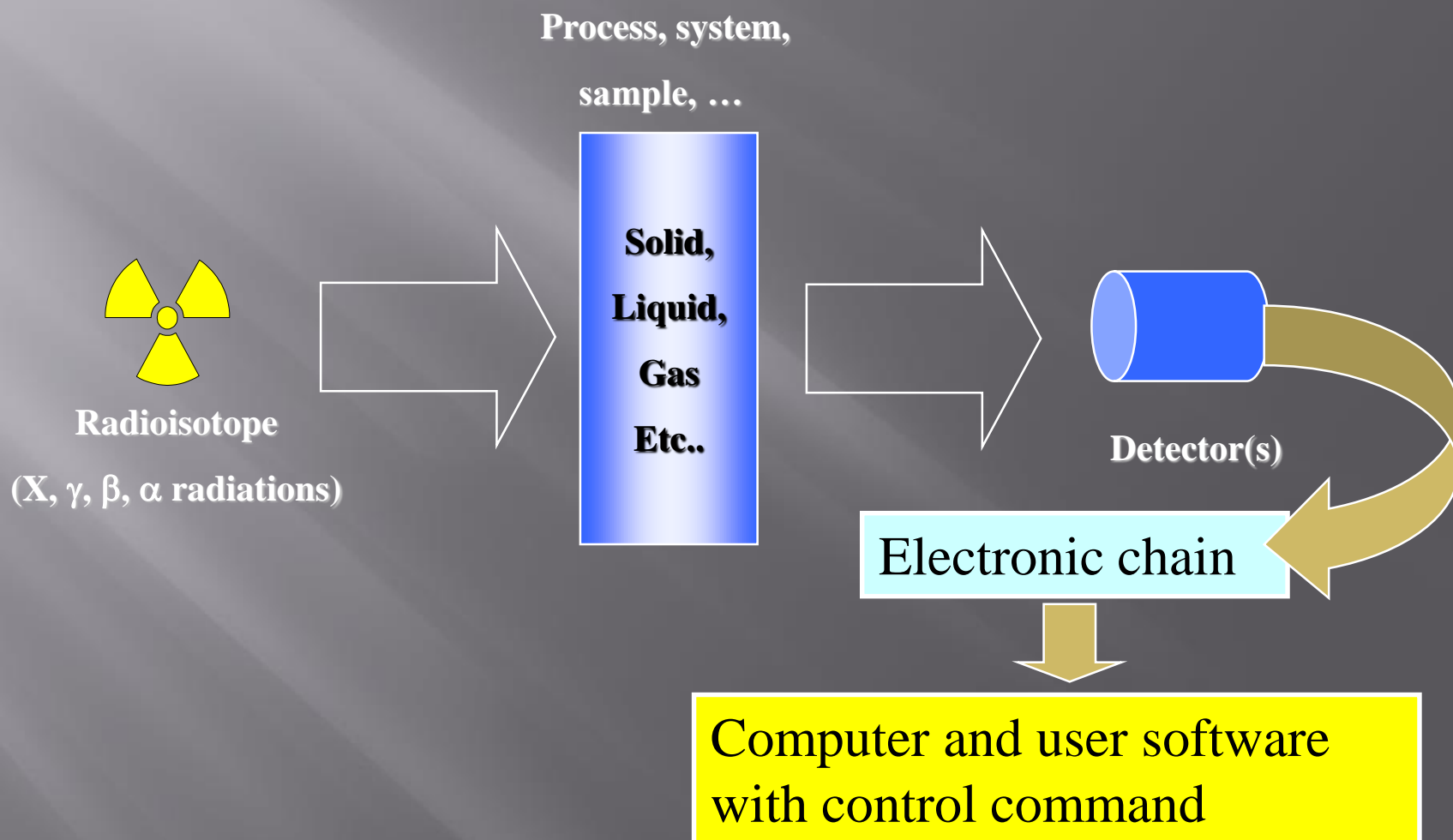
SEALED SOURCES > Diagnostic, preventive maintenance

- Gamma scanning for columns and pipes
- Neutron backscattering for level/interface detection
- Blockage location, Transmission tomography, etc.

NUCLEONIC CONTROL SYSTEM (NCS) > quality control

- Thickness gauge
- Density , concentration gauge
- Level gauge
- Moisture gauge

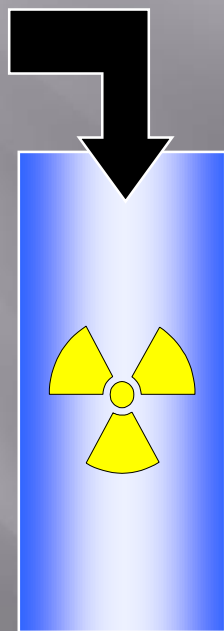
NCS : general principle



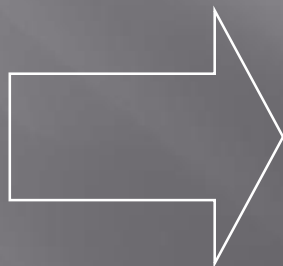
Radiotracers and Residence Time Distribution Approach

General principle

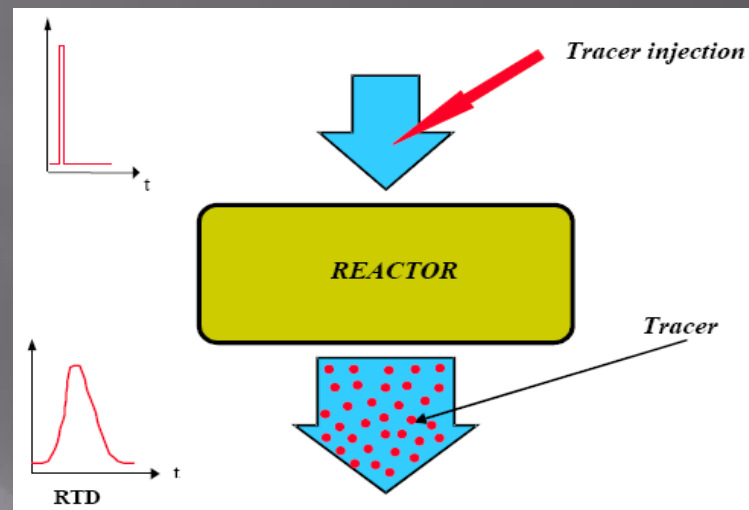
Radioisotope
(γ radiation)



Process, system,
sample, ...



Detector(s)



IAEA activities regarding training



Through TC projects:

- National projects: Fellowships, Scientific visits, Expert missions
- Regional projects: Expert missions, Regional Training Courses

- Fellowship (FE) : trainee is going to a lab (abroad) for on-job training - 1 to 3 months
- Scientific visit (SV) : visitor is going to a high level lab for visiting facilities, discussion with local team, exchange of information,... – 1 or 2 weeks
- Expert mission (EM) : 1 expert is going to the country for on-site training: to help local team in a specific work, for group training, to support seminar,... – 1 or 2 weeks
- Regional Training Course : a group of trainees (approx. 20) from different MSs are going to a lab organizing the course with the help of 1-2 expert – 1 or 2 weeks

- Training material is available :
 - IAEA documents : training course series, TECDOC, Radiation technology Series, brochures, leaflets
 - Some powerpoints
 - Some pictures
- The training is performed without any structure : FE hosts, RTC organizers, experts are doing their best, providing a good work but they do what and how they wish, think, can...
- RTCs are too short to cover a full topic and to allow practical work for the trainees
- Fes are subject to real work ordered to local team: in most cases trainees are doing only paper work, or a few lab. Work. Only in few cases real field work is possible

The project is :

- To create syllabuses on different Rad. Tech. methods
- To create an international society to become (beside IAEA):
 - The federation of tracers/NCS teams
 - Opened to other methods (to be discussed)
 - the certification Body for training and good practices:
 - Recognition of syllabus
 - Validation of training system (level 1, 2, 3)
 - Recognition of training center(s)
 - Validation of good practices > to become ISO standards
- To create a training center in Seibersdorf **in a 1st step**.
- To create e-learning system complying with the general training
- and certification system to help trainees in their preparation,
- Practical work (lab scale) and examination in training center

Syllabus and training scheme

1. Common part : nuclear physics, detection, statistics, radiation protection, Monte Carlo simulation > Examination 40 questions
2. Specific part for RTD > Examination 20 questions
 - general knowledge, planning and execution of experiment
 - Calibration of detectors
 - RTD acquisition, treatment and modelling
 - Practical work around a physical model of chemical reactor
3. Specific part for SCT > Examination 20 questions
 - general knowledge, planning and execution of experiment
 - Calibration of detectors
 - RTD acquisition, treatment and modelling
 - Practical work around a physical model of column
4. Specific part for STE > Examination 20 questions
 - planning and execution of experiment
 - Calibration of detectors
 - data acquisition, treatment and modelling

Achievements

- Training syllabuses and e-learning systems have been created for
- Radiotracer Method – Residence Time Distribution Approach
 - Sealed sources Method –Scanning techniques (SCT)
 - Sediment transport Studies – radiotracers and NCS
- Trainings have been held :
- 2014 : Seibersdorf for RTD 10 people
 - 2015 : Seibersdorf for SCT 13 people
 - 2016 : Morocco (CNESTEN): SCT 10 people
Seibersdorf in 2016 : RTD and SCT 9 people
Peru (IPEN) : RTD 15 people



Seibersdorf 2014



2016



Morocco



Peru



Seibersdorf 2015



Seibersdorf

CEA-INSTN (France) has been recognized as Collaborating Center for training in radiation technologies industrial applications (radiotracers and sealed sources) and radiopharmaceuticals production.



Projects

- 2017 : trainings within RAF and RLA projects (with exam)
 - RTD + SCT : Saclay (INSTN – CC) 19 June-7 July
 - RTD: Morocco 1 month October
 - STE- Nucleonic gauge: Morocco 11-15 September
 - STE- RadNat: Egypt 1-5 October
 - SCT : Peru 16-20 October
 - RTD + SCT : Seibersdorf 27 November-22 December
- Recognition of Level 3, trainers and examiners
- Finalisation of the Question Banks : contributions are welcome

THANK YOU !

