



# Training and Qualification of RP Technicians and Radiation Workers at Nuclear Power Plant

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IRPA 13<sup>th</sup> Congress  
16 May 2012, Glasgow - Scotland

## Twentieth Anniversary of Global ISOE Programme: 1992-2012

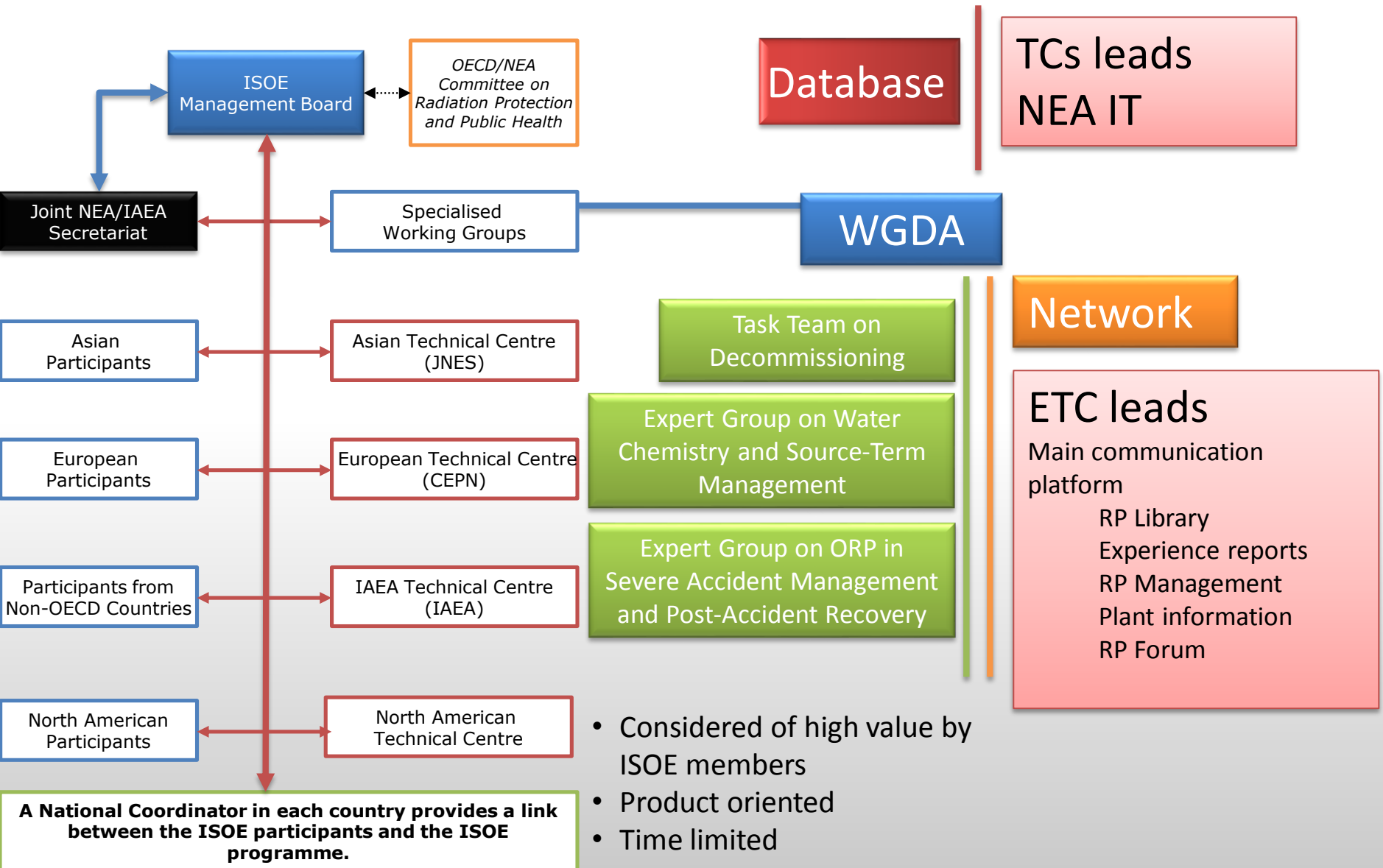
“... the **exchange and analysis of information on collective radiation doses** to the personnel of nuclear installations and to the employees of contractors, as well as on **dose-reduction techniques**, is essential to implement effective dose-control programmes and to apply the ALARA principle...”

*(ISOE Terms and Conditions, 2012-2015)*

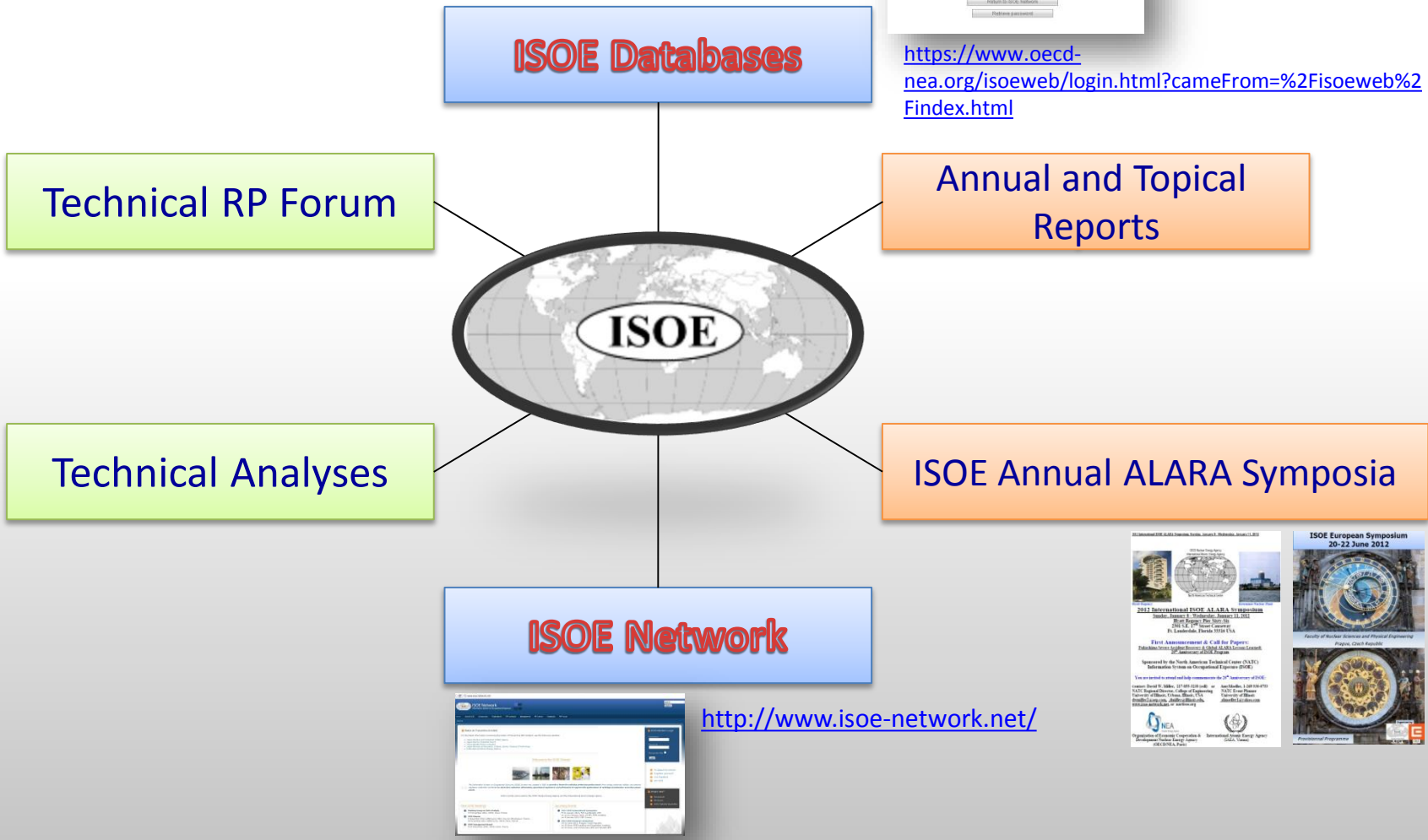
- Created in 1992 by OECD/NEA as a forum for RP experts from **utilities** and **regulatory authorities** world-wide to share amongst participants dose reduction information & coordinate projects to improve optimisation of worker radiological protection at NPPs
  - *Promoted and sponsored by NEA and IAEA*

ISOE facilitates occupational exposure management at NPPs through the operation of a system for **exchanging, storing, and analysing operational information and experience** on optimising occupational radiological protection in response to user needs:

- **World’s largest occupational exposure database for commercial NPPs**
- **An information exchange programme for sharing dose reduction information and experience**
- **Four ISOE technical centres support local members (Asia, Europe, North America and IAEA)**



## ISOE Products



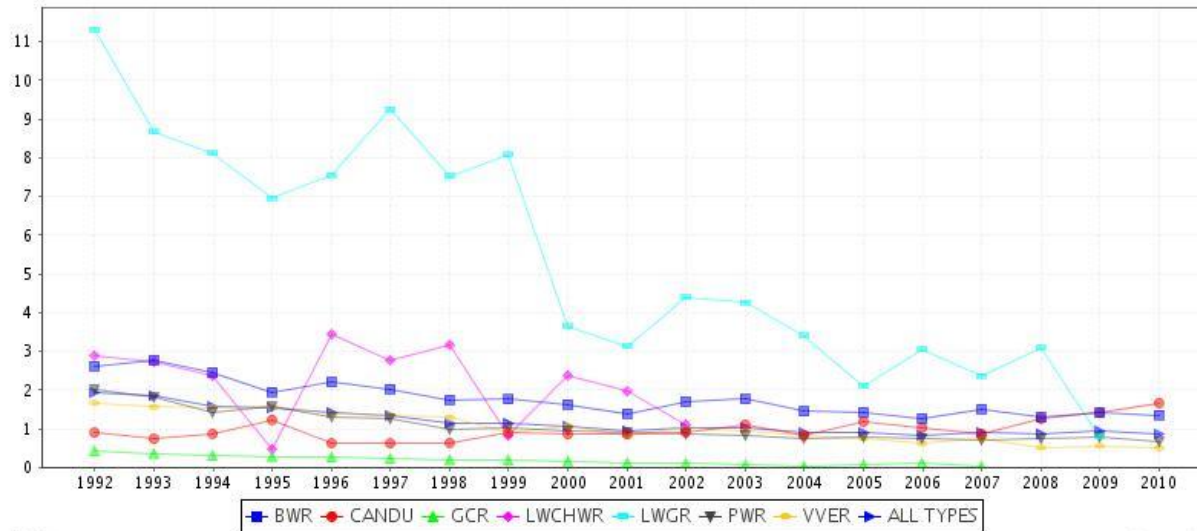
<https://www.oecd-nea.org/isoeweb/login.html?cameFrom=%2Fisoeweb%2Findex.html>



<http://www.isoe-network.net/>



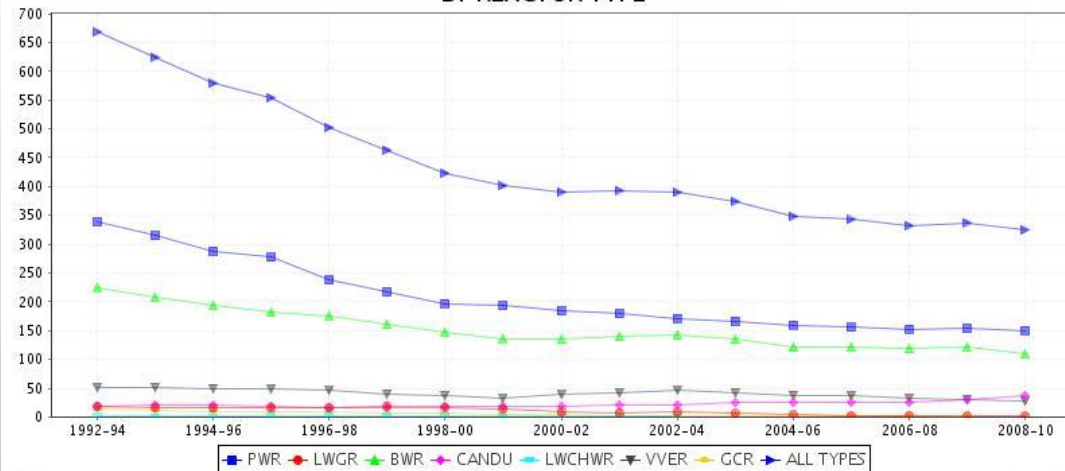
EVOLUTION OF THE AVERAGE ANNUAL COLLECTIVE DOSE PER REACTOR (in man.Sv)  
BY REACTOR TYPE



#6-f2

Source: ISOE

EVOLUTION OF THE TOTAL ANNUAL COLLECTIVE DOSE (in man.Sv)  
BY REACTOR TYPE



#4-fy

Source: ISOE

**Rolling average  
collective dose  
benchmarking  
by reactor type**

## Training and Qualification of RP Technicians

- Radiation Protection Technicians at US power plant are trained and qualified in accordance with guidelines developed by the National Academy for Nuclear Training (training is similar for other countries)
- National Academy for Nuclear Training accredits all Operations, Technical (Maintenance, RP, and Chemistry), and Engineering training programs at US power plants

# Training and Qualification of RP Technicians

- Expectations relative to RP Technician Initial Training:
  - Provide trainees with an understanding of station policy, procedures, and task performance standards
  - Develop trainees' understanding of the fundamental scientific principles
  - Provide trainees with an understanding of the operating and radiological protection principles of specific equipment and components.
  - Evaluate trainees via written, oral, and practical examinations and key knowledge, skills, and tasks needed for job performance.
  - Qualify individuals to perform their jobs correctly and in a safe, reliable, and efficient manner.

## Training and Qualification of RP Technicians

- Expectations relative to RP Technician Continued Training:
  - Maintain high performance level
  - Improve knowledge and skills
  - Increase knowledge of selected applied fundamentals
  - Maintain awareness of responsibilities for safe operation of the plant



## RP Initial Training Processes

- Fundamentals / Theoretical Training: Performed in a Classroom Environment
  - Instructor Facilitated Lectures
  - Self-Study
- Fundamentals / Theoretical Training includes:
  - Industrial Safety at the worksite
  - Administrative: RP and Station Procedures, Plant Drawings, Work Order System
  - Fundamentals: Mathematics, Physics, Electrical Science, Basic Atomic Structure, Chemistry
  - Plant Systems and Components
  - Radiation Detection Equipment / Theory of Operation
  - Radiological Protection Theory and Techniques: Radioactive Decay, Interactions with Matter, Biological Effects, External / Internal Dose Control, Contamination Control, Monitoring of radiological work
  - Specialized Skills: example, Radwaste Packaging and Shipping

## RP Initial Training Processes

- Initial Training Schedule:
  - Trainees attend training for approximately 40 hours/week
  - Duration of initial training is generally six to nine months
- On the Job Training (OJT) and Task Performance Evaluations (TPE):
  - Following initial classroom training, trainees participate in OJT and TPE at the plant
  - OJT and TPE focus of qualifying RP technicians on specific tasks, examples include:
    - Use of radiation detection instruments
    - Personnel decontamination
    - Air sampling
    - Generating radiation work permits

## RP Initial Training Processes

- RP Programs generally have 30 to 50 tasks
- Senior RP technicians generally provide the OJT with the trainees in the plant
- RP supervisors generally conduct the TPEs
  - If the trainee successfully demonstrates the necessary level of competency during the TPE, the trainee is designated as ‘qualified’ to independently perform the task
- Trainees generally require nine to twelve months to complete all necessary task qualifications
- Total qualification is 2 to 3 years

## RP Continued Training Processes

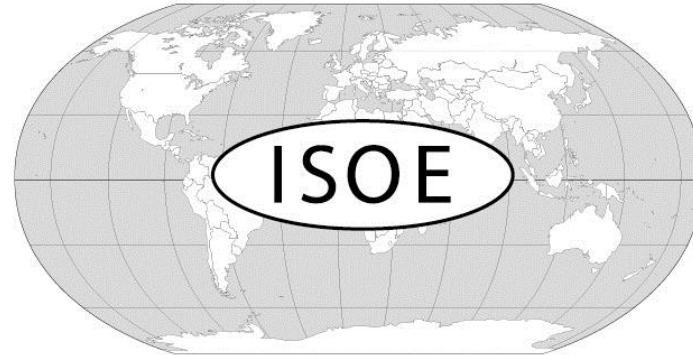
- Refresher training may include:
  - Instrument theory / operation / calibration
  - Effective methods for conducting radiological briefings
  - Use of remote monitoring equipment
  - Biological Effects of Radiation
  - Review of new RP procedures
- Operating Experience Training:
  - Prevention of unplanned exposure
  - Inadvertently release of radioactive material from the radiological controlled area
  - Causes and Contributors associated with industry alpha and airborne contamination events
- Duration and Frequency of RP continued training:
  - Approximately 24 to 32 hours each calendar quarter

## Radworker Training Processes

- Radiation working training provides the knowledge and skills necessary to work safely within a radiologically controlled area (RCA)
- Radiological respirator training provides training for use of respiratory protection equipment to limit internal radiation dose
- Radworker Training include the following topics:
  - Sources of radiation
  - Types and measurement of radiation
  - Biological effects of radiation and risks
  - Exposure limits and guidelines
  - ALARA principles; dose and contamination control
  - Use of dosimetry
  - Radiation work permit processes and radiological postings

## Radworker Training Processes

- Radworker's must demonstrate their understanding of the training material by completing a written exam
- In addition to the classroom training and examinations workers must demonstrate their abilities:
  - to wear Anti-C clothing,
  - select and follow the instruction of a radiation work permit,
  - use effective ALARA principles, and
  - control the spread of contamination at the jobsite
- RP supervisor and senior technicians generally provide the training and evaluations of worker competence in the dynamic learning environments
- Duration of Radworker Training (classroom and dynamic activity):
  - Eight to twelve hours



INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE

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RPRWM

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Division of Radiation, Transport  
& Waste Safety

<http://www.oecd-nea.org/jointproj/iso.html>

<http://www.isoe-network.net>