

# The Information System on Occupational Exposure and the ISOE Occupational Exposure Database

**Brian Ahier** (OECD Nuclear Energy Agency, ISOE Joint Secretariat)  
**Caroline Schieber; Lucie D'Ascenzo** (ISOE European Technical Centre, CEPN)

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## ISOE Context

*“... the exchange and analysis of information on individual and 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, 2008-2011)*

## ISOE Background and Objective

- 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
  - Current ISOE Terms and Conditions : 2008-2011

### ISOE Official Participants under ISOE Terms and Conditions (Oct 2009)

60 Participating Utilities in 26 countries	277 operating units; 36 shutdown units	Participating Regulators of 22 countries
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- IAEA supports participation of 11 non-OECD countries

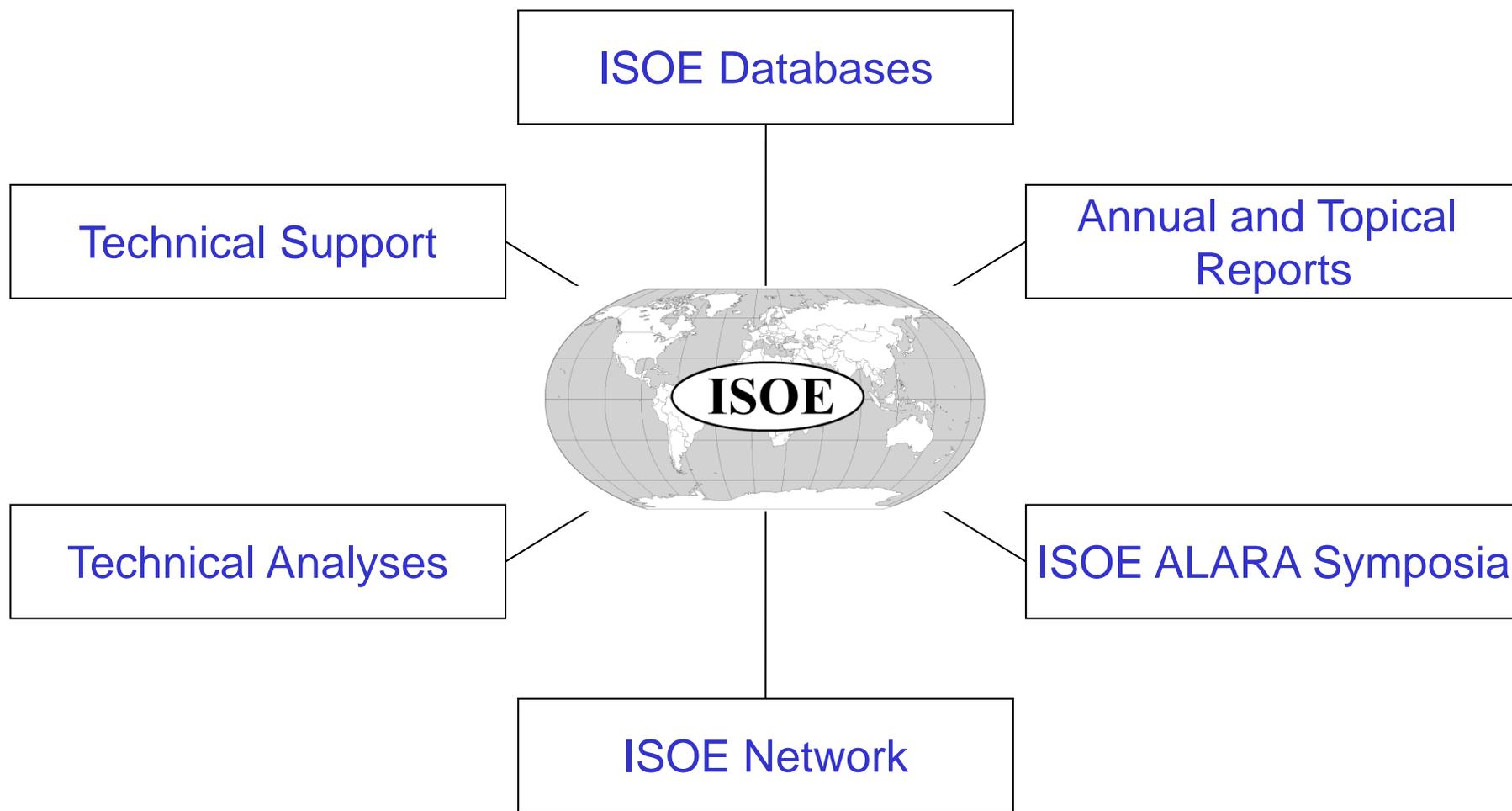


*If you have not yet renewed, contact the ISOE Secretariat*

## ISOE Programme

- 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, IAEA)

## ISOE Products



ISOE products support dose trend analyses, benchmarking, technique comparisons; application of ALARA and good work management in local RP programmes

# ISOE Database

*World's largest database on occupational exposure at commercial NPPs*

## ISOEDAT occupational exposure database

471 reactor units

395 operating units;  
76 shutdown units

Database covers of ~ 91% of total power reactors (439) in commercial operation

- Includes data for participants & some non-participants (UK, US)
- Covers period from 1957-present
  - Source of earlier data: EC ORP programme, ISOE participants
- Data Input: Annual collection of **operational dose data from Participating Utilities** at the site, unit, job and task level
  - Collected using ISOE Questionnaire: i) local, ii) **on-line (2010)**

## What is in the ISOEDAT Database?

- **ISOE 1:** Dosimetric information from commercial NPPs in operation, shut down or in some stage of decommissioning, including:
  - annual collective dose for normal operation
  - maintenance/refuelling outage
  - unplanned outage periods
  - annual collective dose for certain tasks and worker categories
- **ISOE 2:** Plant-specific information relevant to dose reduction, such as materials, water chemistry, start-up/shutdown procedures, cobalt reduction programme, etc.
- **ISOE 3:** Radiation protection related information for specific operations, jobs, procedures, equipment or tasks (radiological lessons learned):
  - effective dose reduction
  - effective decontamination
  - implementation of work management principles

## Who Can Access the Database?

- **ISOE Participants** can access the DB on-line (ISOE website) and on CD-ROM (Microsoft ACCESS)
  - Web version is routinely updated
  - CD-ROM is distributed annually after all data received
  - A set of pre-defined data queries facilitates trend analysis, benchmarking between plants, sister units, etc.
- **Participating Utilities:**
  - Full access to global database (ISOE 1, 2, 3)
- **Participating Authorities:**
  - Full access to ISOE 1 data from national licensees
  - Limited access to ISOE 1 data from other countries
    - General information, annual dose statistics, information about external and internal dose

## Database Analyses and Benchmarking

- The extensive data in ISOEDAT provides a solid basis for analyses on issues in operational RP such as dose trends, doses related to certain jobs and tasks, identification of good performance, etc
- Several ways to use the database:
  - a) MADRAS analysis package : Main trends in occupational exposure
  - b) Direct access to ISOE 1 questionnaires, including contact information and complementary data
  - c) For more complex analyses: Direct access to DB, requests to the technical centres, RP forum, ...

# MADRAS Data Analysis Package

- A set of pre-defined data queries to facilitate analysis of main trends in occupational exposure, benchmarking between plants, sister units, etc.
  - Benchmarking at unit level
  - Annual average collective dose per reactor
  - Annual total collective dose
  - Annual collective dose per TWh
  - Contribution of outside personnel and outages to total collective dose
  - Evolution of the number of reactor units
  - 3-yr rolling average collective dose per reactor
  - Miscellaneous queries
  - *New for 2010!* A set of new queries to improve outage benchmarking

# Using ISOEDAT as a Benchmarking Tool

- Analyses at **country or regional level**:

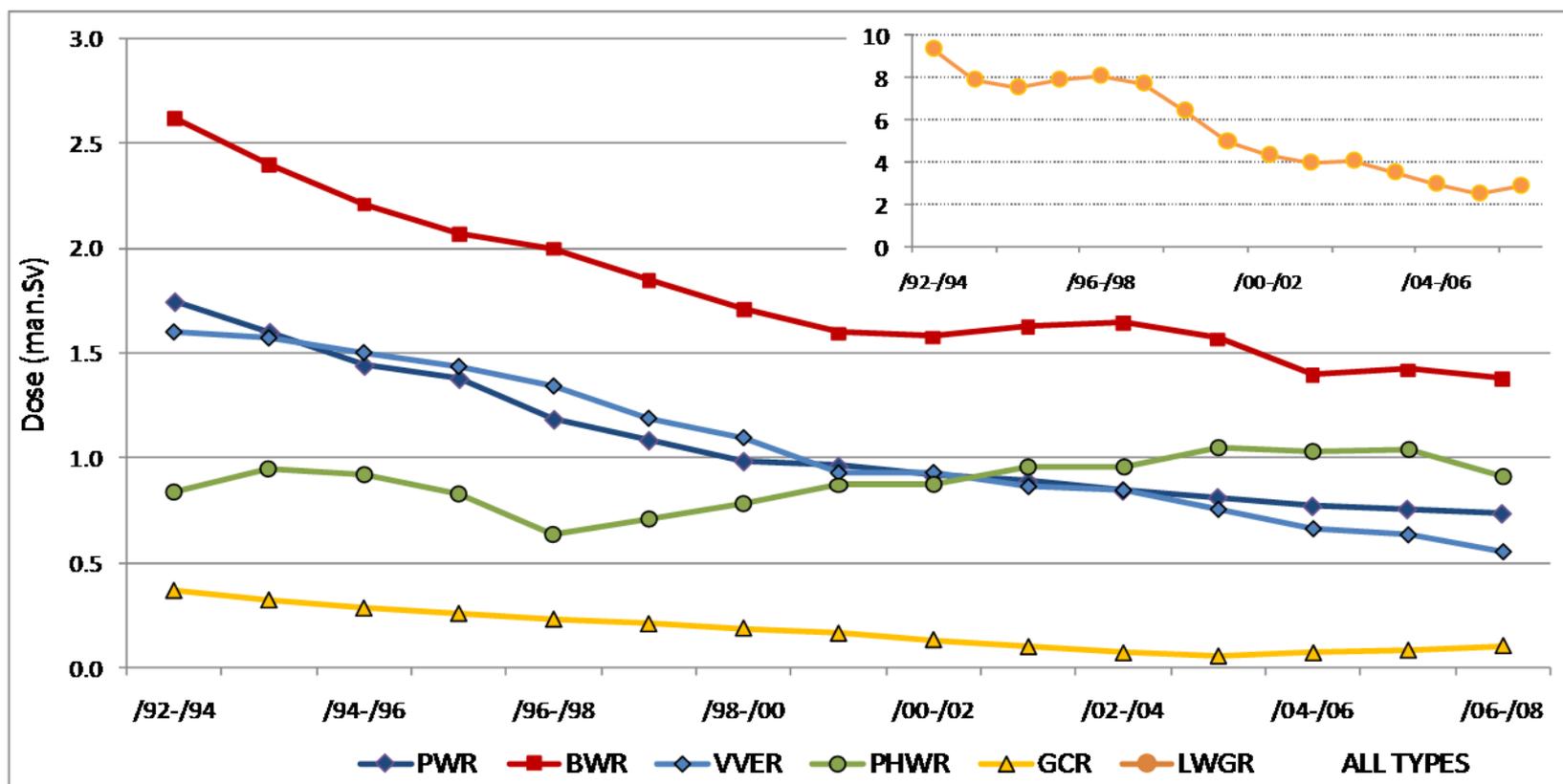
*Trends in Annual average collective dose per reactor /  
Annual total collective dose*

- Between countries or regions: by country/region for a given reactor type, or all reactors, including 3-yr rolling average
  - Within a country: Specific unit against another unit or by type of reactor
- Analyses at **utility level**: benchmarking of reactors within a utility
    - Specific unit against another unit
    - Specific unit against its sister group / reactor type
  - Analyses at **unit level**
    - Specific unit against another unit / sister group / reactor type
    - Benchmarking at the job and task level

# Example 1

## Global dose trends by reactor type

- For most reactor types, the annual average collective dose per operating reactor has consistently decreased over the time period covered in by ISOE

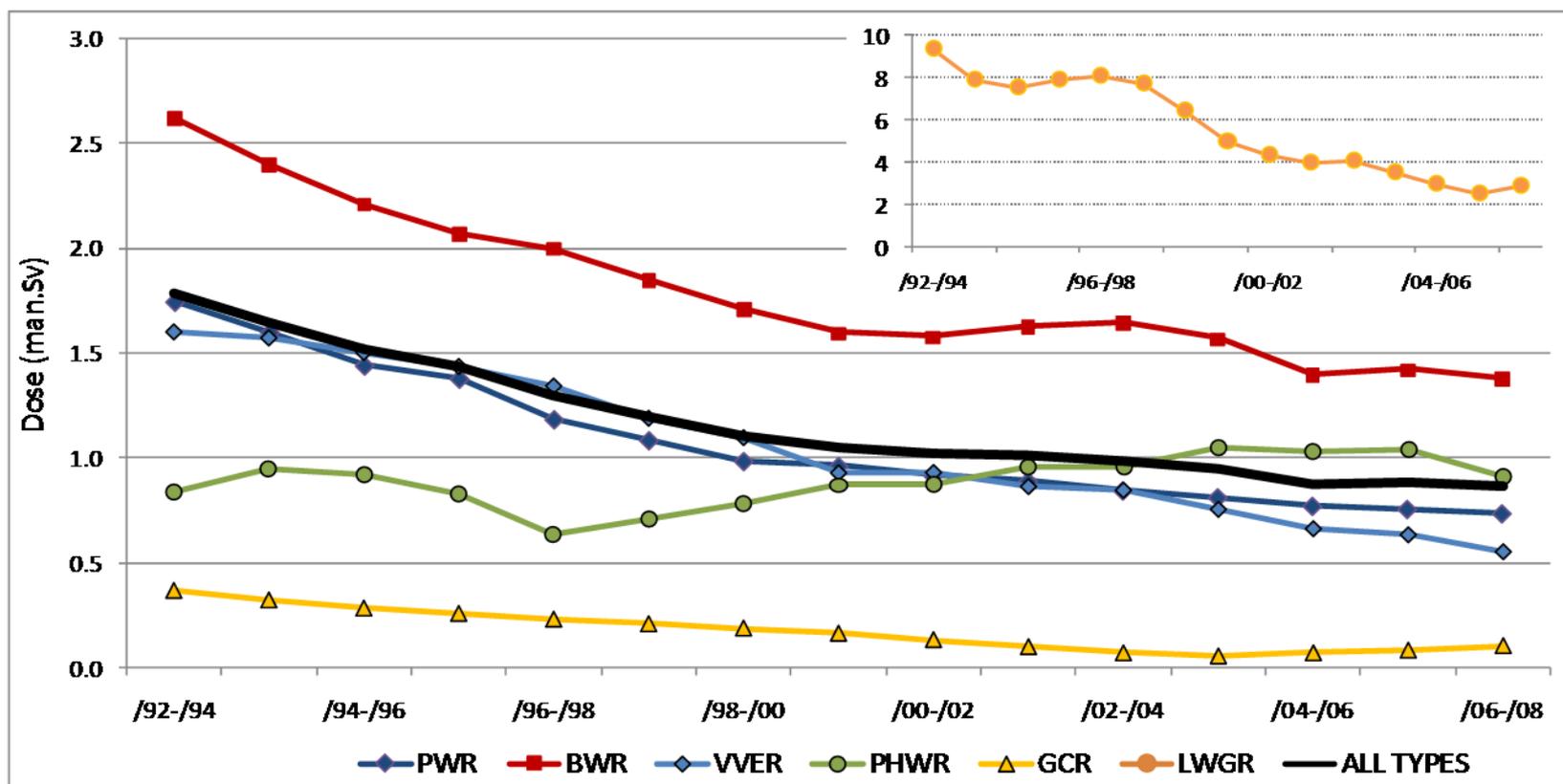


3-year rolling average/reactor for all operating reactors in ISOE by reactor type, 1992-2008 (man.Sv)

# Example 1

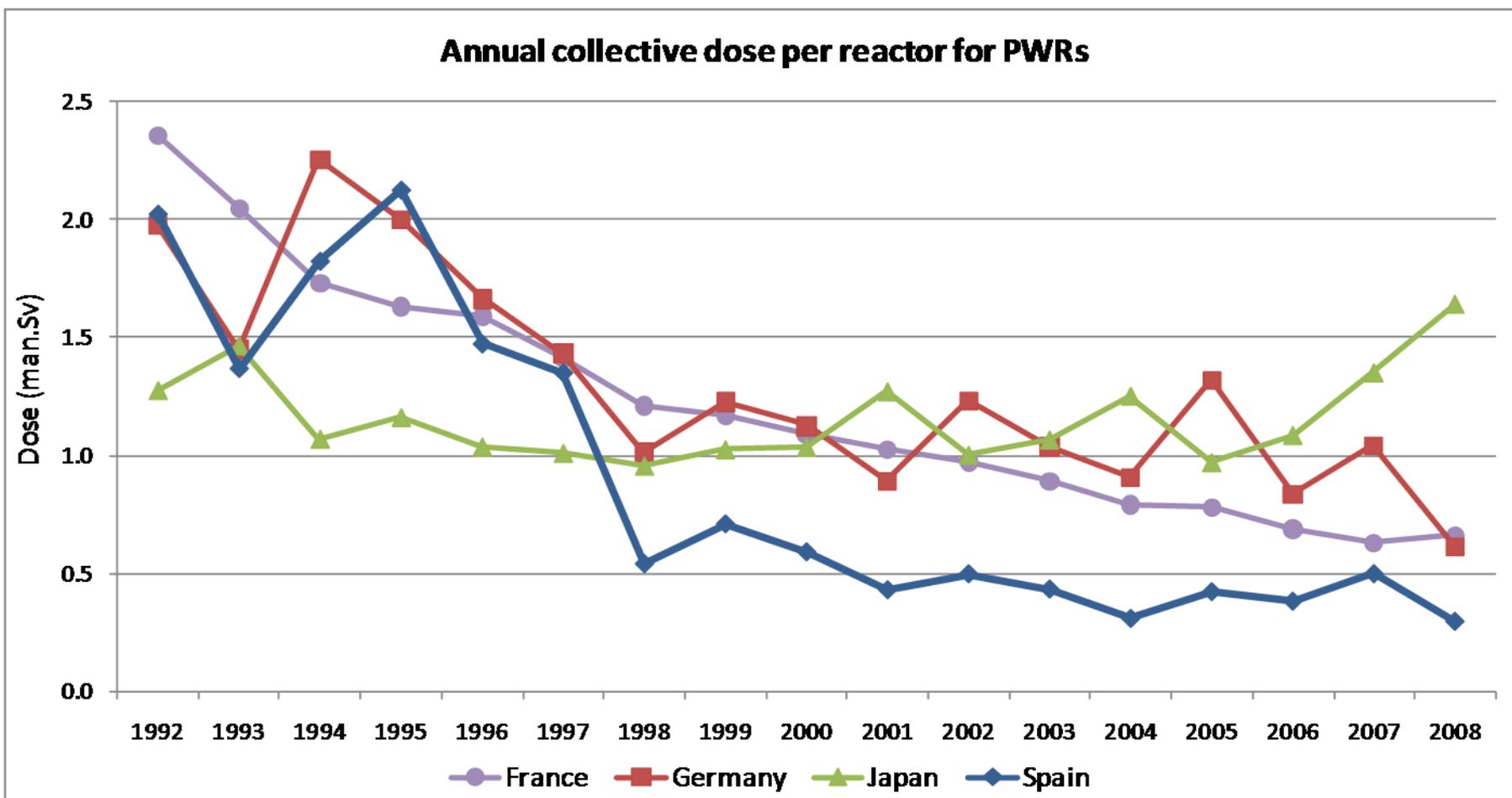
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3-year rolling average/reactor for all operating reactors in ISOE by reactor type, 1992-2008 (man.Sv)

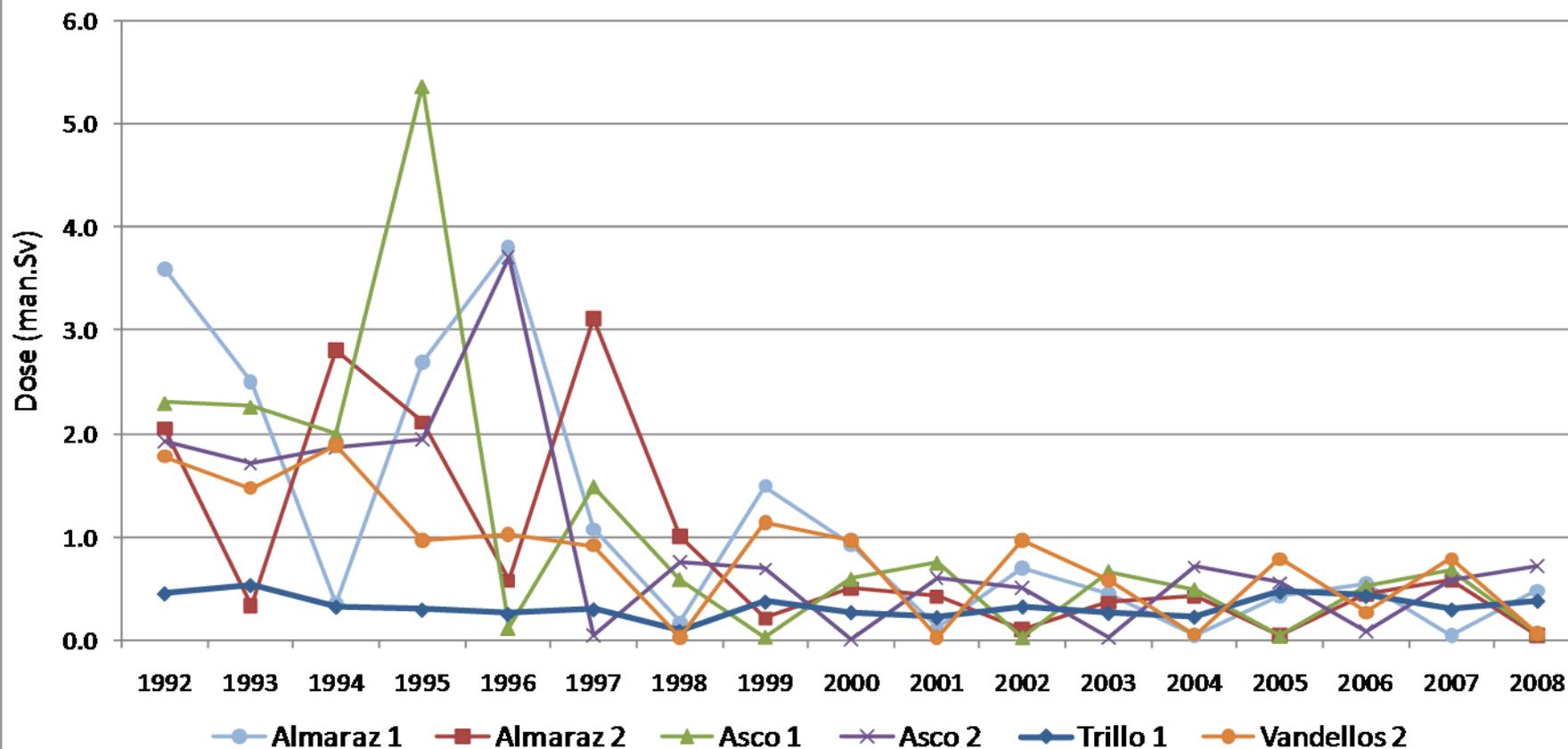
## Example 2 Country dose trends by reactor type (PWRs)



# Example 3

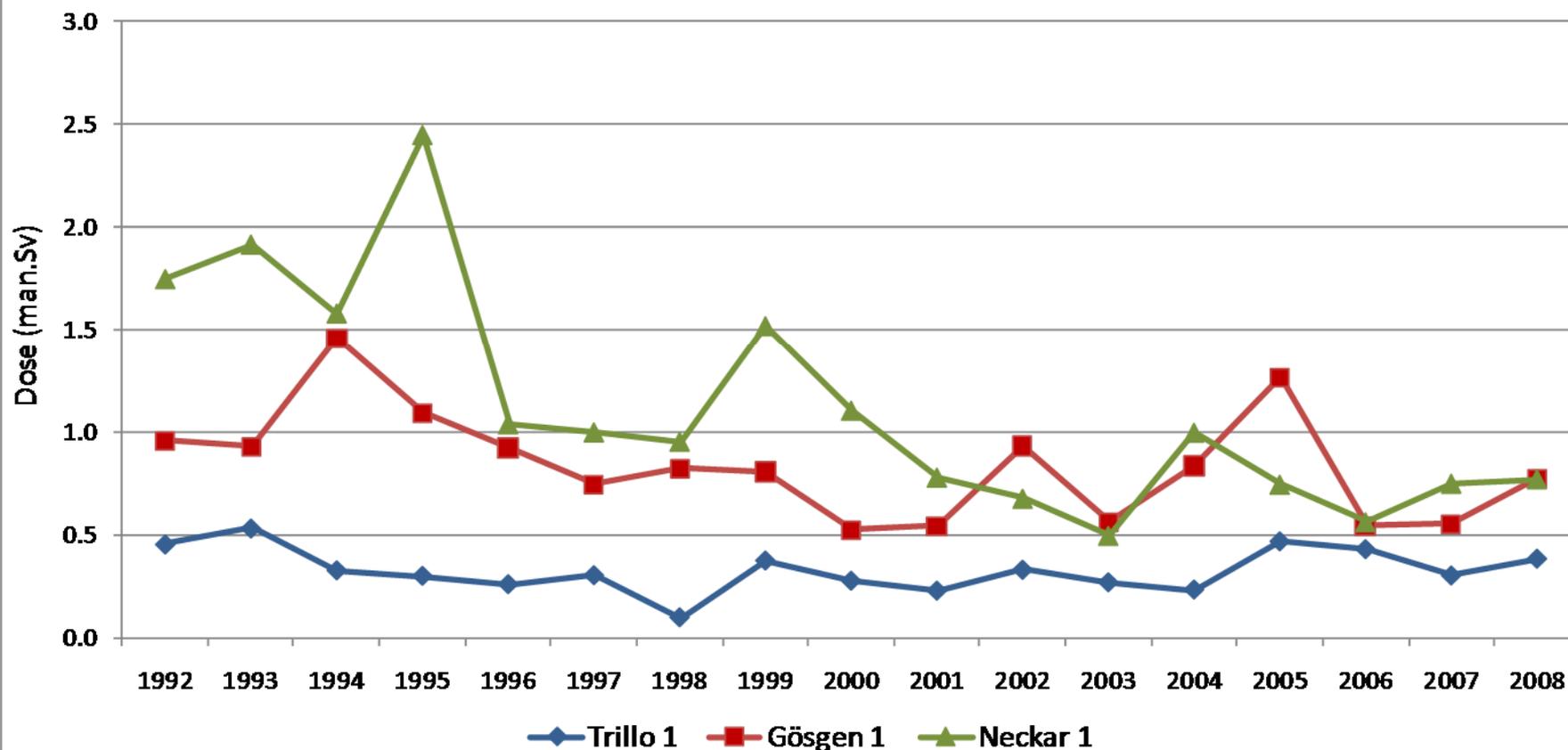
## Dose trends for 1 country by reactor type (Spain-PWRs)

**Annual collective dose per reactor for Spanish PWRs**



## Example 4 Dose trends for 1 sister unit group (S32)

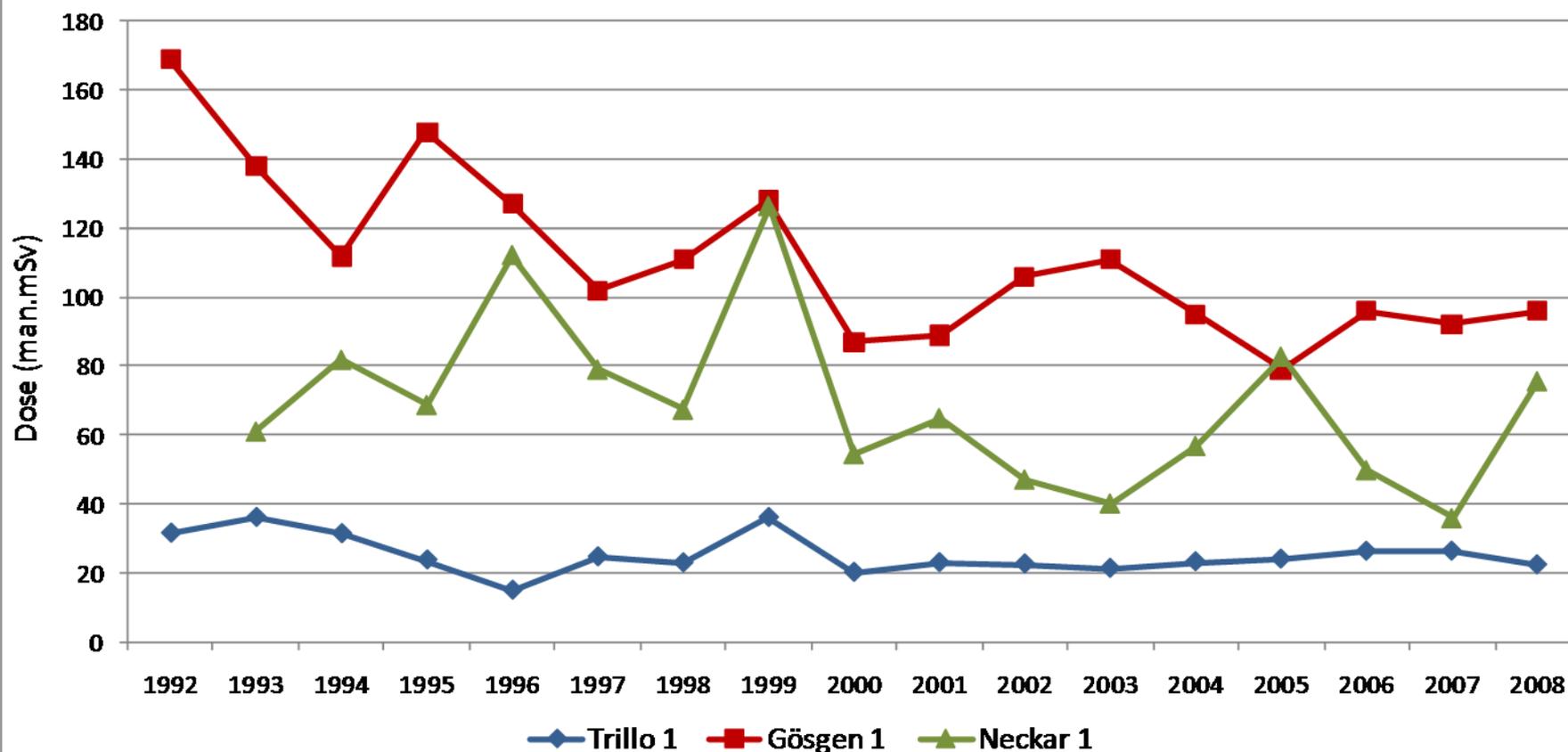
**Annual collective dose per reactor for sister unit group S32**



# Example 5

## Dose trends for sister group and job (S32-refueling)

**Collective dose for sister unit group S32 and job Refueling**



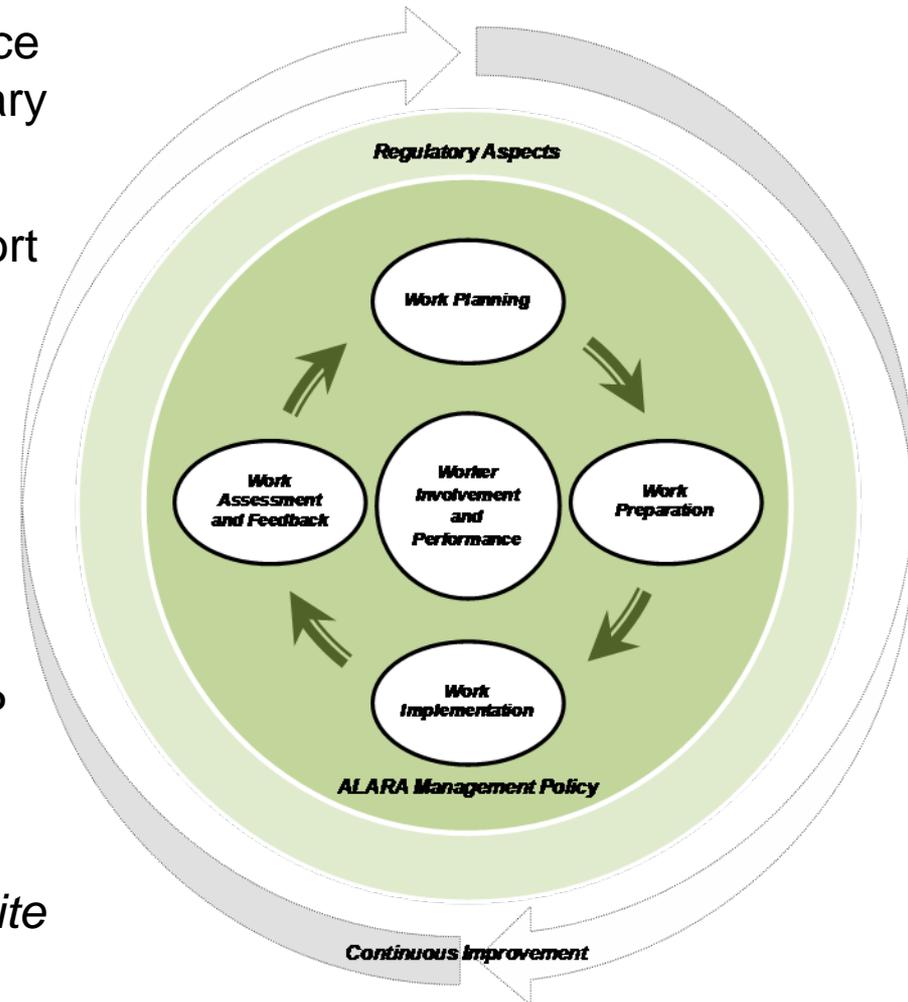
## Identifying and Sharing Good Performance/Experience

- A *starting* point, not an end point: The ISOE database helps users benchmark doses and identify possible improvements
  - Look into full database for additional information
- Users can then *exchange* information with other identified plants to share lessons and experience.
- ISOE facilitates this through several **communication channels**:
  - Contact information in the database for each plant
  - RP Forum on the ISOE Network website
  - Requests to the technical centers on issues in operational RP
  - ISOE ALARA Symposium
  - Voluntary site benchmark visits for exchange of good RP practice, dose reduction information among Participants

# Identifying and Sharing Good Performance/Experience:

## *Work Management to Optimise Occupational Radiological Protection in Nuclear Power Plants*

- *Work management* stresses the importance of approaching jobs from a multi-disciplinary view and of following work completely
- Since publication of the 1<sup>st</sup> ISOE WM report (1997), this approach has been broadly implemented and proven effective in reducing worker doses, operational costs
- Continued efforts are needed to maintain good outcomes in the face of challenges
- The new ISOE report (2009) presents the key WM aspects to be considered by NPP management and workers to save time, dose and money, with practical examples
- **Download it** from the ISOE Network website



# ISOE Network website (www.isoe-network.net)

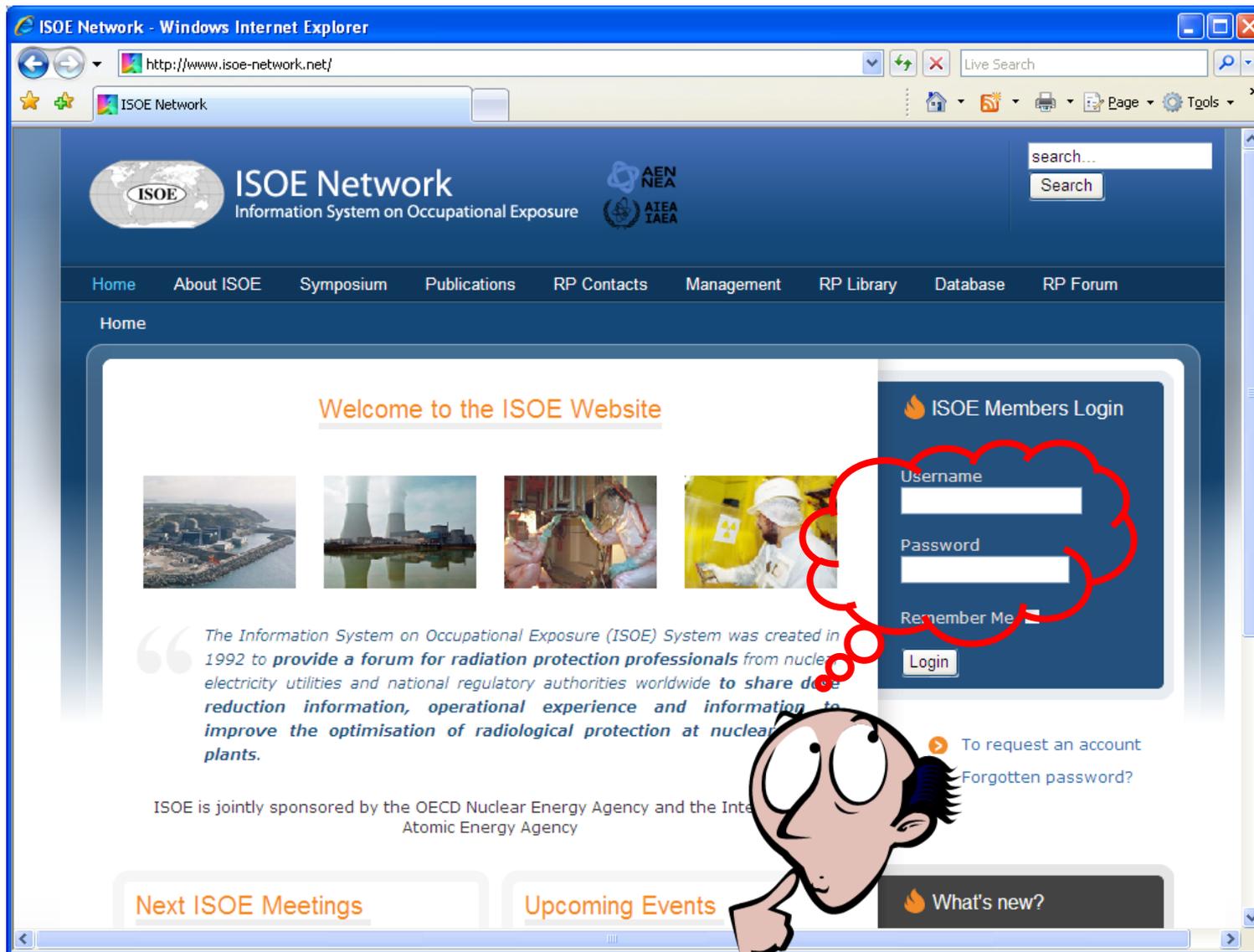
## Web-based ALARA resource for ISOE members

- Web portal for practical ALARA resources for **ISOE Participants**:

- ISOE database: Data entry, analysis
- ISOE products, resources: Annual reports, info sheets, work management report, ISOE News, etc
- Symposium Proceedings
- RP Contacts
- RP forum
- List of events, etc

- A global approach to ALARA management





ISOE Network - Windows Internet Explorer

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

ISOE Network

ISOE Network  
Information System on Occupational Exposure

AEN  
NEA  
AIEA  
IAEA

search...  
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Home

### Welcome to the ISOE Website



*The Information System on Occupational Exposure (ISOE) System was created in 1992 to provide a forum for radiation protection professionals from nuclear electricity utilities and national regulatory authorities worldwide to share dose reduction information, operational experience and information to improve the optimisation of radiological protection at nuclear plants.*

ISOE is jointly sponsored by the OECD Nuclear Energy Agency and the International Atomic Energy Agency

Next ISOE Meetings

Upcoming Events

What's new?

ISOE Members Login

Username

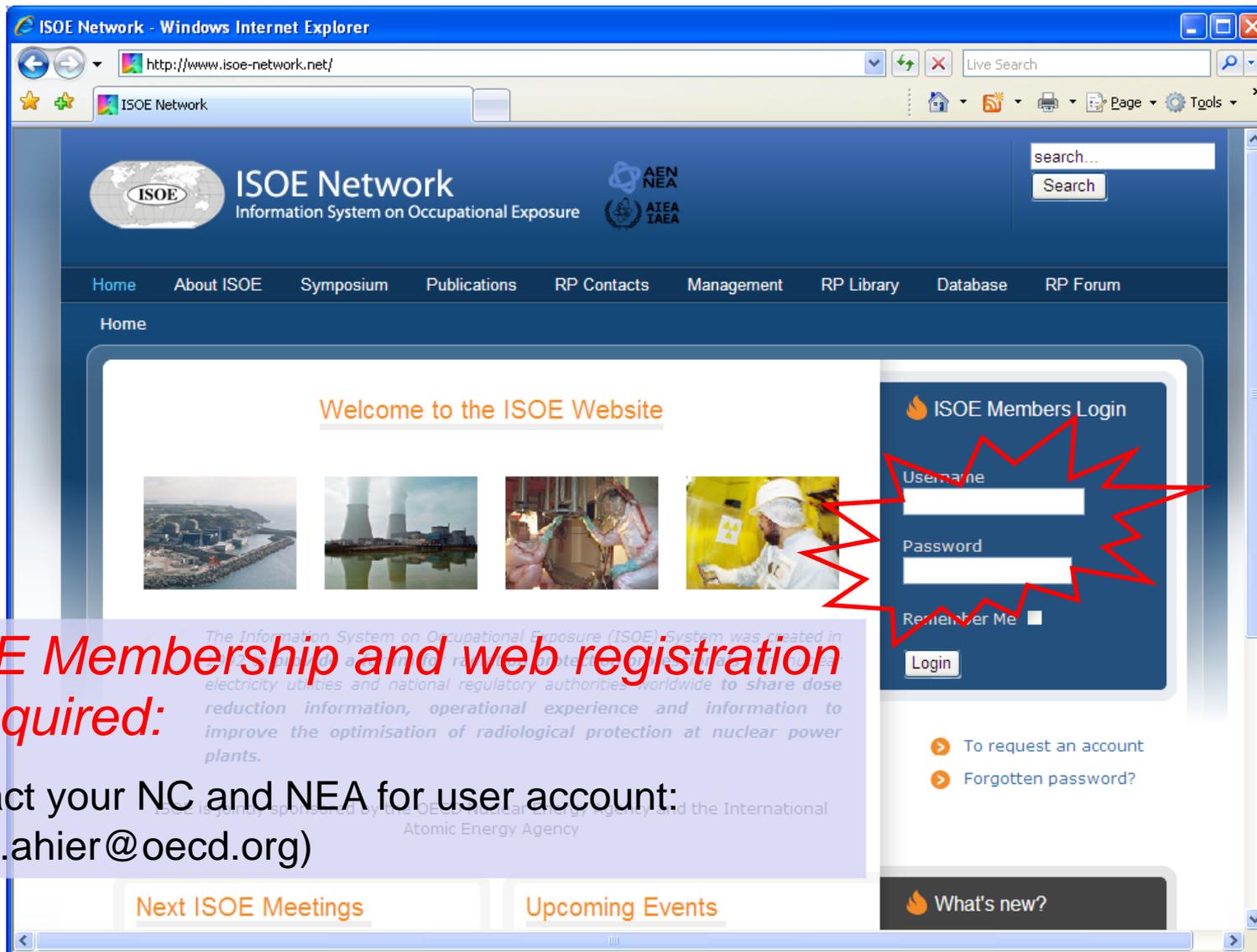
Password

Remember Me

Login

To request an account  
Forgotten password?

**A resource for *ISOE* Participants!**



***ISOE Membership and web registration is required:***

Contact your NC and NEA for user account:  
(brian.ahier@oecd.org)

***... More resources and content only after login!***

# ISOEDAT *on-line*

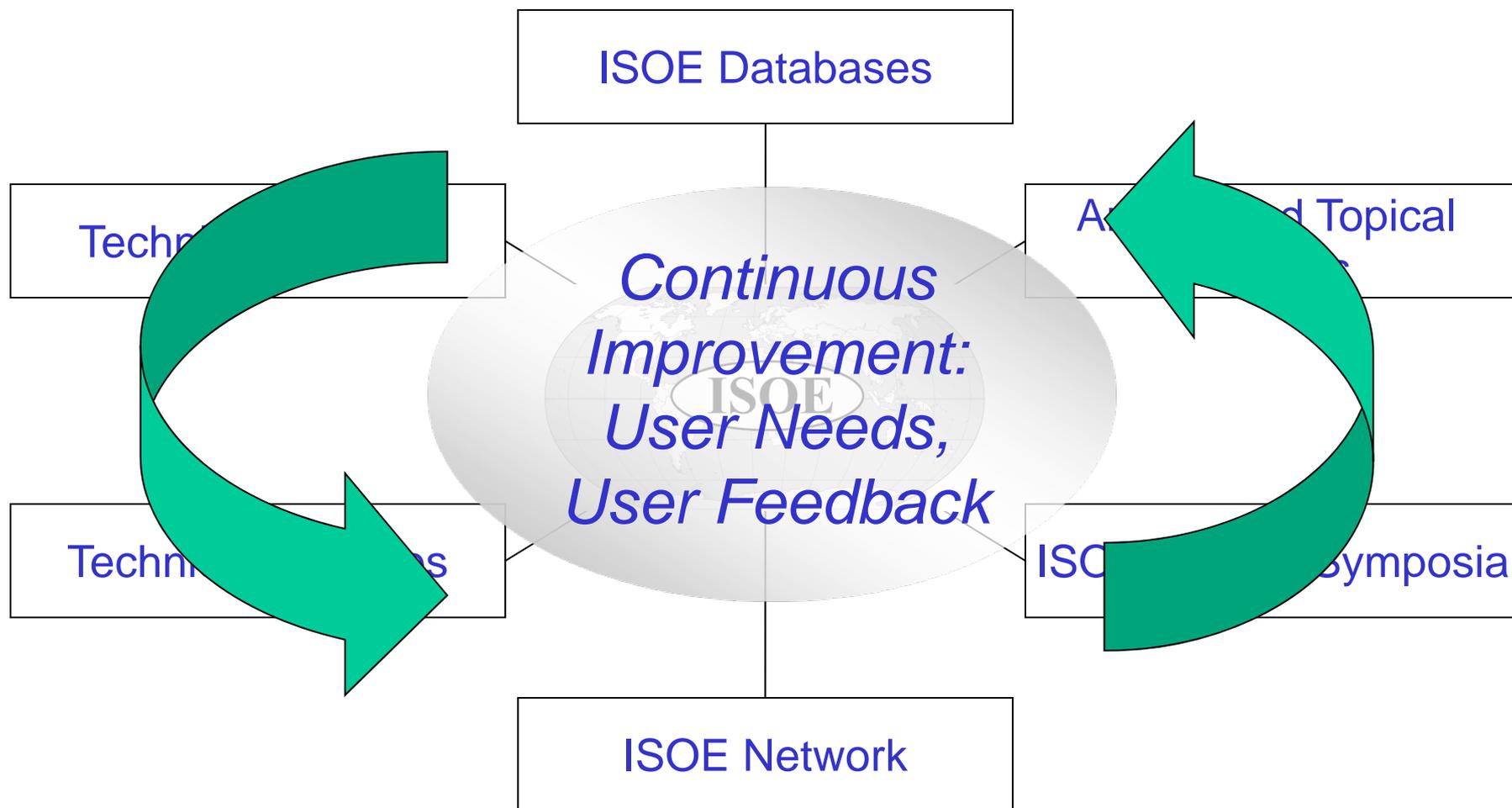
**ISOE Network - Windows Internet Explorer**  
 http://www.iso-network.net/  
 ISOE Network  
 Home About ISOE Symposium Publications  
 Welcome to the ISOE  
 The Information System on Occupational Exposure (ISOE) was created in 1992 to provide a forum for radiation protection information, operational experience, and regulatory information to improve the optimisation of radiological plants.  
 ISOE is jointly sponsored by the OECD Nuclear Energy Agency and the International Atomic Energy Agency.  
 Next ISOE Meetings Upcoming

**ISOE - Mozilla Firefox**  
 https://www.nea.fr/isoeweb/index.html  
 Language: [Flags] en [ahier] Brian AHIER LOG-OUT  
 ISOE > Statistics > MADRAS  
 Annual collective dose benchmarking -> 1 unit vs. its sister unit group and up to 2 other sister unit groups  
 First year to take into account: 1992  
 Last year to take into account: 2007  
 Plant unit: Kashiwazaki-Kariwa 3  
 and its sister unit group: TOS2 - Generation 2 from Toshiba - Hitachi  
 versus  
 Second sister unit group: TOS1 - Generation 1 from Toshiba - Hitachi  
 Third sister unit group: ABB4 - Generation 4 from ABB Atom  
 Run Return to list

**Annual collective dose benchmarking (in man.mSv) for Kashiwazaki-Kariwa 3 between 1992 and 2007**

Year	Kashiwazaki-Kariwa 3	ABB4	TOS1	TOS2
1992	500	1200	1500	900
1993	500	700	3000	1100
1994	500	800	2200	1000
1995	1000	800	1800	1700
1996	600	1500	2100	1000
1997	800	1000	2900	1100
1998	700	700	2500	1000
1999	700	1000	2800	1200
2000	800	400	2900	1200
2001	1200	800	2200	1200
2002	1200	200	2800	1400
2003	2500	300	2300	2500
2004	1200	500	3400	1200
2005	600	500	1300	800
2006	800	400	1800	800
2007	400	500	2200	1100

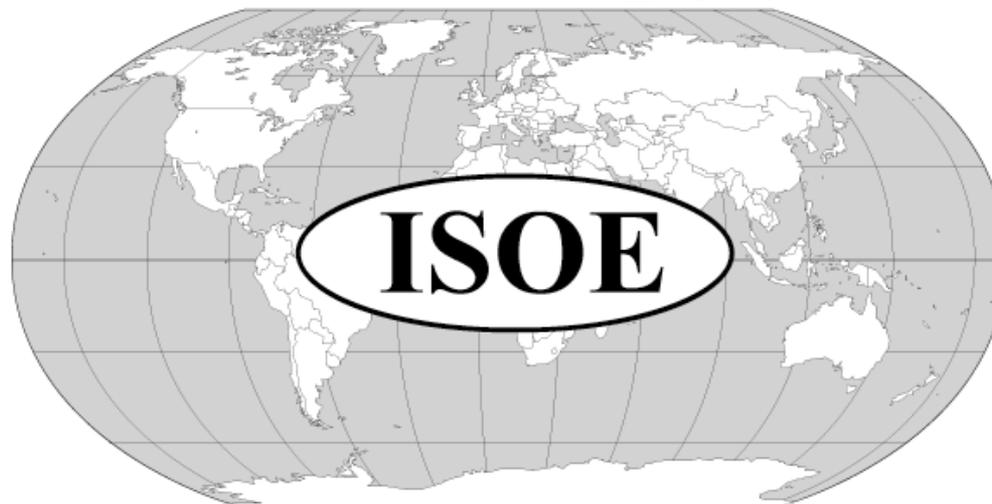
# ISOE Products: Meeting User Needs



## Conclusion

- **Value:** an important combination of global occupational dose data, dose reduction experience and information exchange among participating utilities, authorities to facilitate practical optimisation of worker radiological protection
- **Success:** ISOE has proved successful in helping radiation protection experts to better manage occupational exposures at nuclear power plants
- **Future:** ISOE will continue to facilitate the sharing of experience, and the building of linkages between ISOE members worldwide to develop a global approach to ALARA work management

OECD Nuclear Energy Agency  
International Atomic Energy Agency



**INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE**

*For more information, please visit:*

**[www.isoe-network.net](http://www.isoe-network.net)**

**[www.nea.fr](http://www.nea.fr)**