Update on ISOE Website and Database:

New ISOE Database Features and Automated Dose Reports

Lucie D'ASCENZO

ISOE European Technical Centre, CEPN

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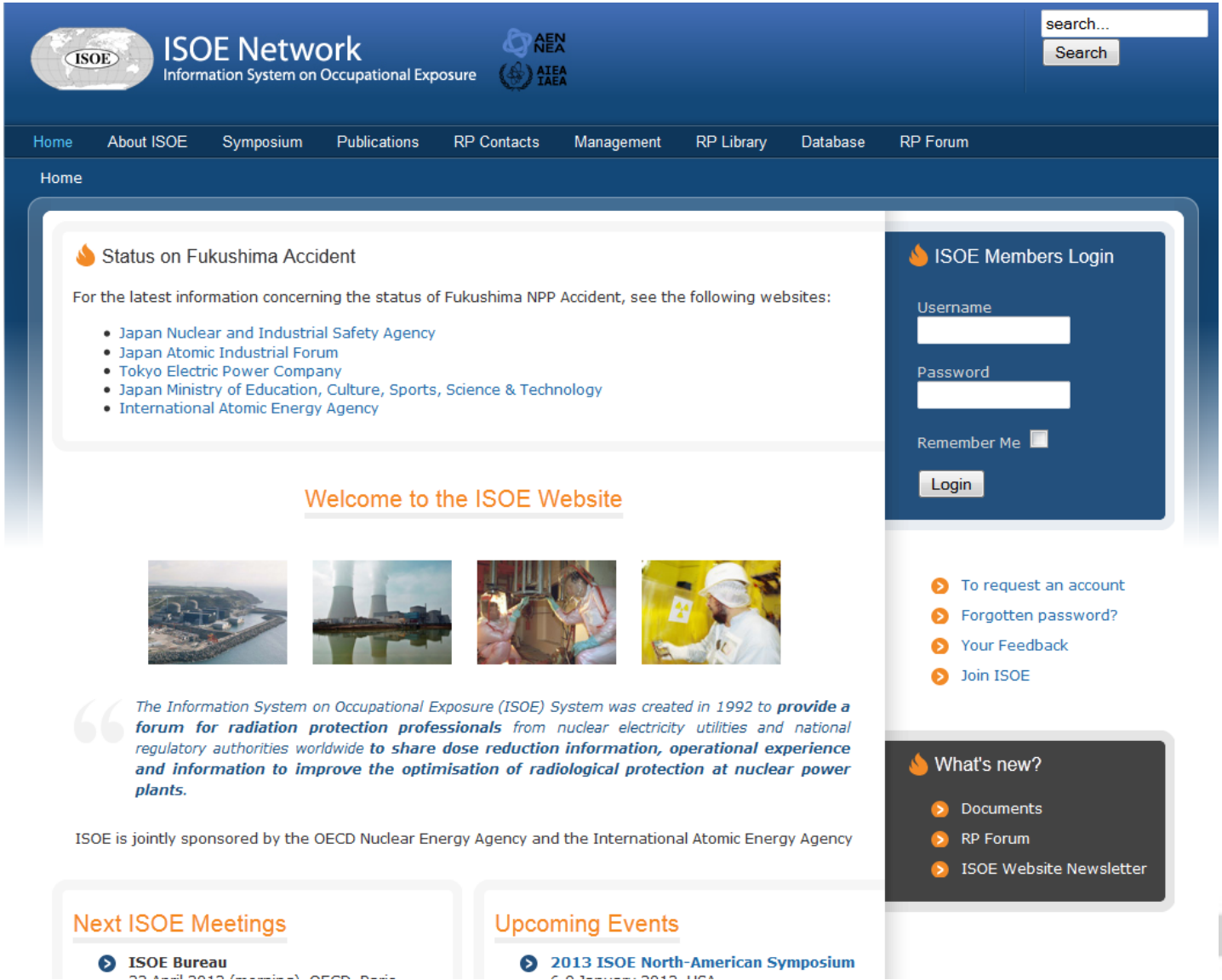
The ISOE Website (www.isoe-network.net)



What is in the ISOEDAT Database?

- ISOE 1: Dosimetric information from commercial NPPs in operation, shutdown 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

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[1]
  - 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:

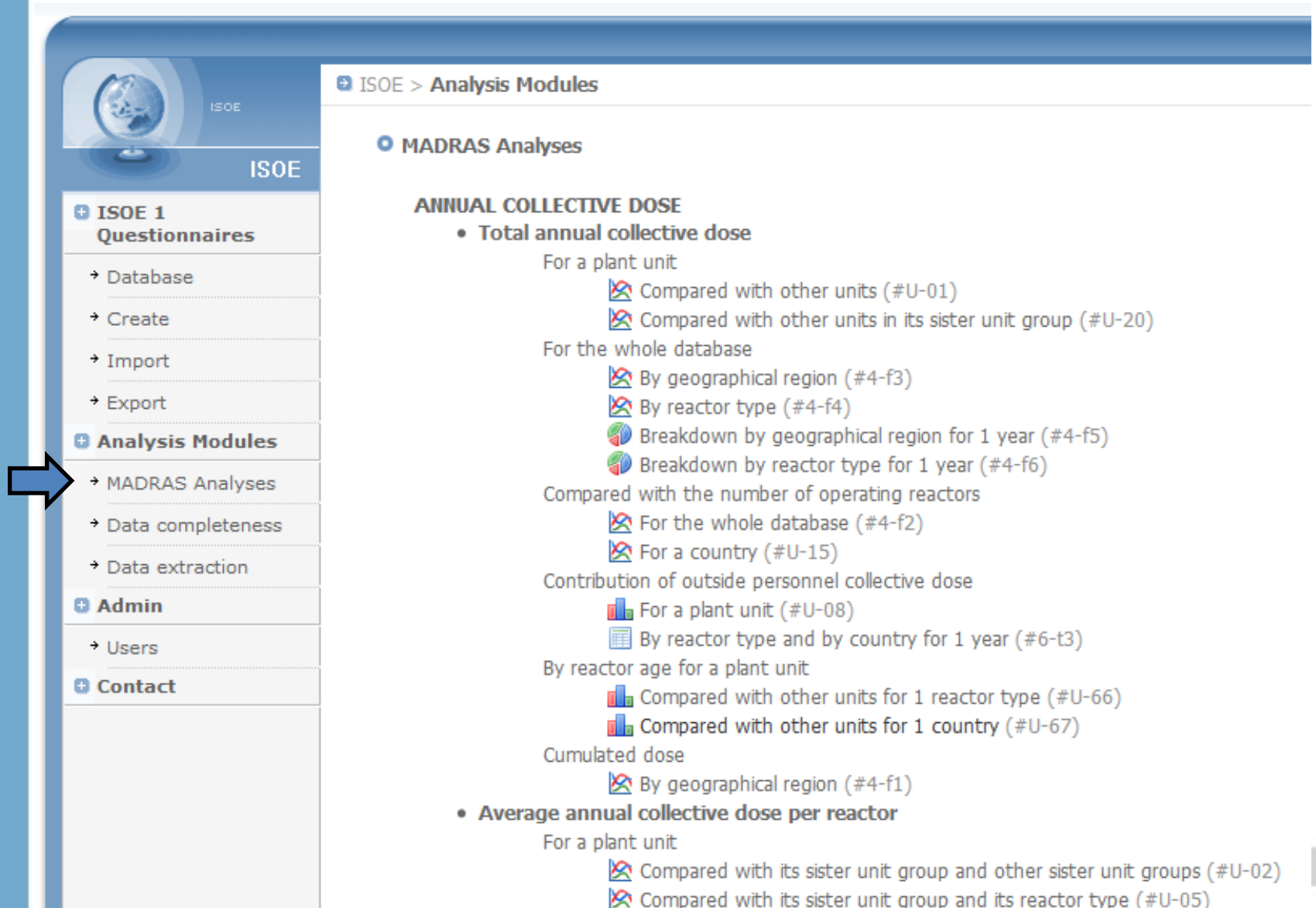
- Full access to ISOE 1 data from national licensees
- Limited access to ISOE 1 data from other countries
  - General information, annual dose statistics, information about external and internal dose

[1] CD-Rom needed by 3 countries: Armenia, Russian Federation and by some German plants

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, …

Database Analyses and Benchmarking



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
  - Total annual collective dose
  - Annual average collective dose per reactor
  - Rolling average collective dose per reactor
  - Total annual collective dose vs. number of operating reactors
  - Total annual collective dose by reactor age
  - Average annual collective dose per TWh
  - Contribution of outside personnel and outages to total collective dose
  - Dose rates
- All automated dose reports are available in **Sv** or **rem**

Using ISOEDAT as a Benchmarking Tool

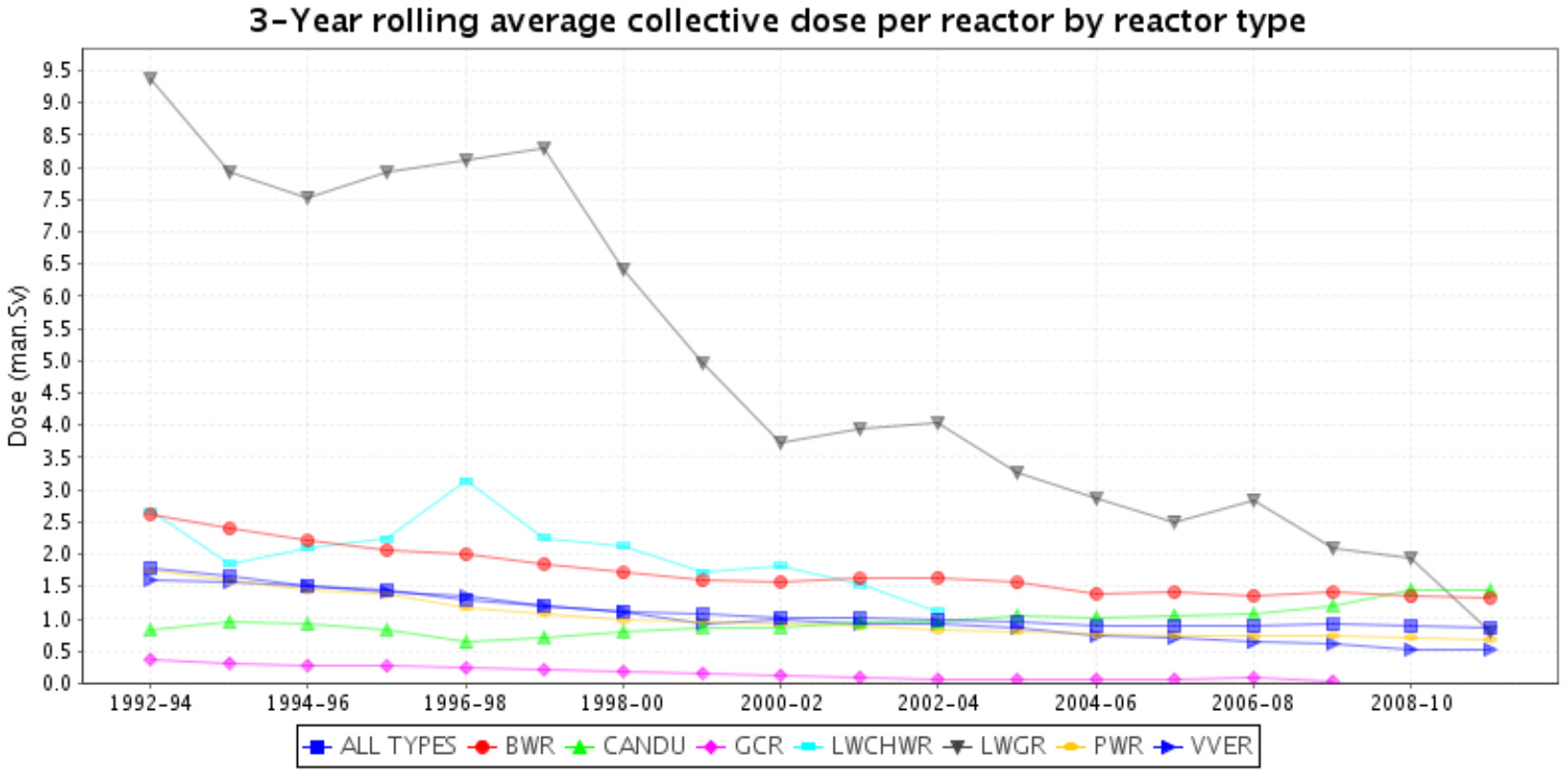
- Analyses at country or regional level:

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

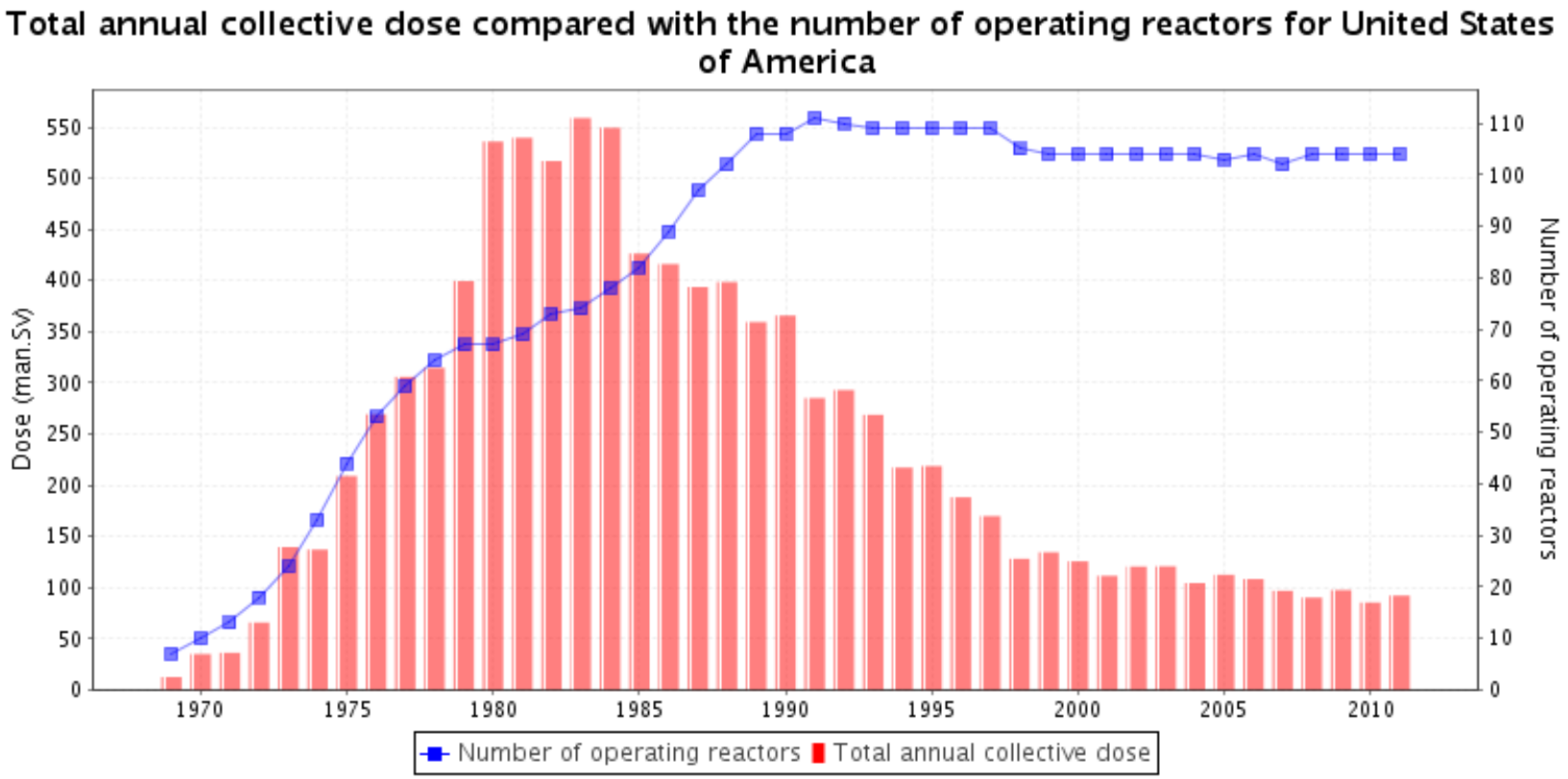
  - Between countries or regions: by country/region for a given reactor type, or all reactors, including 3-yr rolling average
  - Within a country: Specific unit against another unit or by type of reactor
- Analyses at utility level:
  - Specific utility against other utilities
  - Specific utility by 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

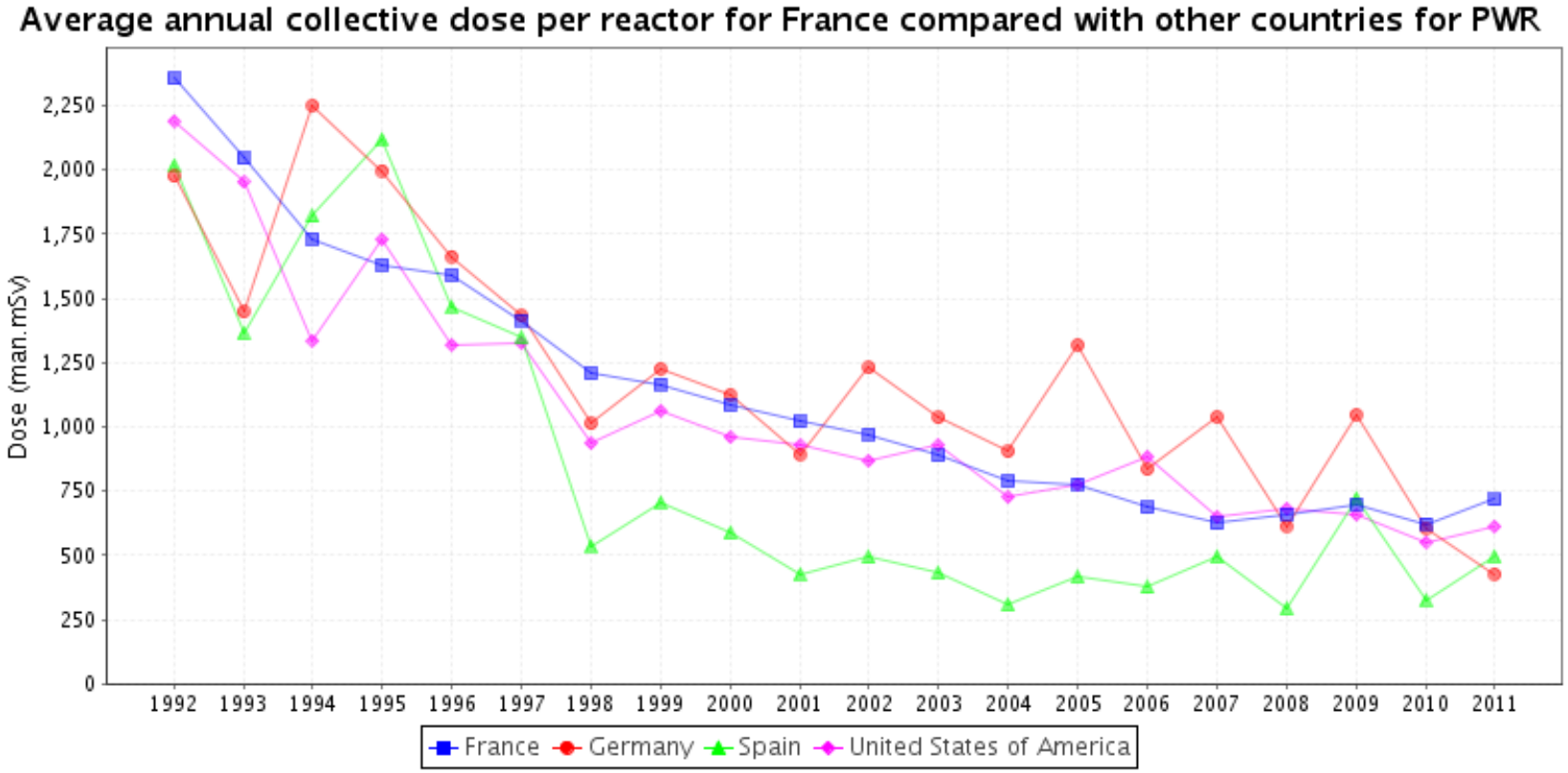
- For most reactor types, the annual average collective dose per operating reactor has consistently decreased over the time period covered in by ISOE



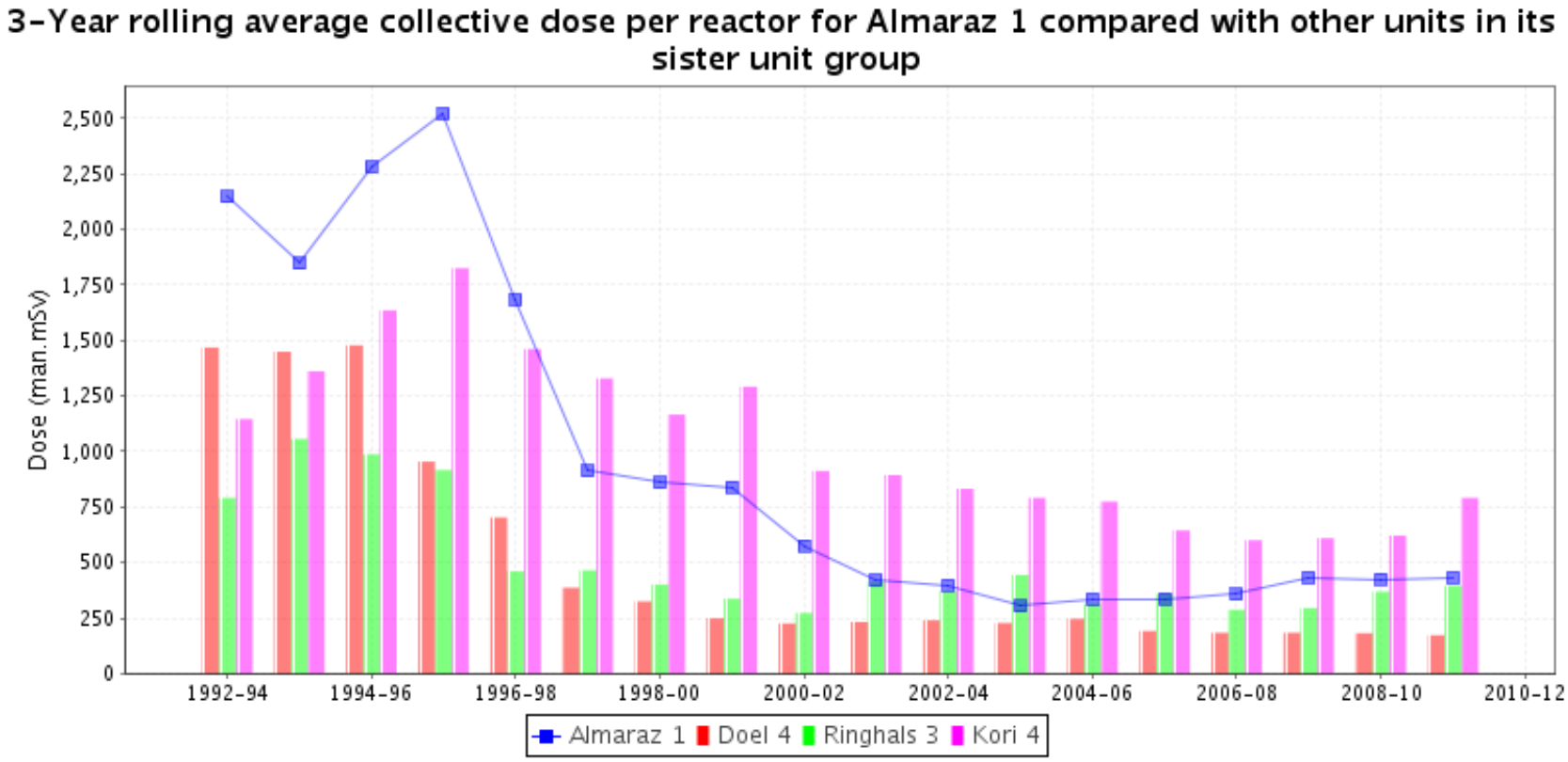
Example 2
Total dose vs. number of operating reactors



Example 3
Country dose trends by reactor type (PWRs)



Example 4
1 reactor vs. other reactor units in its sister group



Bookmarks

- **Rolling average collective dose per reactor**
  - For a plant unit
    - Compared with other units (#U-21)
    - Compared with other units in its sister unit group (#U-23)
      - 1992,2011; ALMARAZ 1,DOEL 4,RINGHALS 3,KORI 4; W32; 3 rolling years
    - Compared with its sister unit group and other sister unit groups (#U-22)
    - Compared with its sister unit group and its reactor type (#U-25)
    - Compared with some countries for the same reactor type (#U-24)
  - For a utility
    - By reactor type (#U-44)
  - For a utility and a reactor type
    - Compared with its country and its reactor type (#U-43)
    - Compared with other utilities (#U-45)
    - Compared with some countries (#U-46)
  - For a country
    - Compared with other countries for 1 reactor type (#6-fy)
  - For a sister unit group
    - Compared with other sister unit groups (#6-fz)
  - For the whole database
    - By reactor type (#4-fy)

All parameters of the analysis are saved (Bookmark query appears once you've run the analysis and Remove selected bookmarks is available at the bottom of the list)

New MADRAS Analyses provided in Aug. 2012

- Quartile Ranking analyses based on rolling average collective dose per reactor
  - For a country
  - For a country and a reactor type
  - For a reactor type
  - By number of loops (PWR)

- Plant Unit Ranking analyses based on rolling average collective dose per reactor
  - For a country
  - For a country and a reactor type
  - For a reactor type
  - By number of loops (PWR)

Quartile ranking for United States of America - BWR

Quartile	Plant unit	2009 - 2011 (man.mSv)	2008 - 2010 (man.mSv)	Percent change from 2008 - 2010	2008 - 2010 Quartile (if changed)	
1	Susquehanna 1	697.28	997.60	-30%		
	Limerick 1	725.35	1071.94	-32%	2	
	Grand Gulf 1	836.52	1289.86	-35%	3	
	Hatch 1	863.53	1360.57	-37%	3	
	Dresden 3	871.80	1264.81	-31%	3	
	Peach Bottom 2	905.70	1395.03	-35%	3	
	Quad Cities 2	911.24	1610.27	-43%	4	
	Fitzpatrick 1	953.74	1465.94	-35%	3	
	Oyster Creek 1	965.80	1403.24	-31%	3	
2	Fermi 2	1064.72	1101.74	-3%		
	Browns Ferry 1	1073.92	1189.51	-10%		
	Hatch 2	1165.76	728.32	60%	1	
	Hope Creek 1	1196.27	1215.94	-2%		
	Duane Arnold 1	1223.50	1205.35	2%		
	Susquehanna 2	1242.03	842.54	47%	1	
	Brunswick 1	1273.15	1943.16	-34%	4	
	Browns Ferry 3	1314.41	2471.91	-47%	4	
	LaSalle 1	1324.51	1807.48	-27%	4	
3	Limerick 2	1337.37	978.64	37%	1	
	Nine Mile Point 2	1388.68	2030.11	-32%	4	
	Dresden 2	1404.02	869.48	61%	1	
	Nine Mile Point 1	1457.01	1019.21	43%	1	Average: 1418.08 man.mSv
	Vermont Yankee 1	1478.52	1215.94	22%	2	
	Monticello 1	1556.46	915.80	70%	1	
	River Bend 1	1598.22	1905.00	-16%	4	
	Browns Ferry 2	1611.80	966.60	67%	1	
	Clinton 1	1633.18	1577.93	4%		
4	Pilgrim 1	1770.66	1041.74	70%	1	
	Quad Cities 1	1889.74	1151.25	64%	2	
	LaSalle 2	1969.78	1042.09	89%	2	
	Brunswick 2	2115.00	1277.12	66%	3	
	Peach Bottom 3	2157.06	1080.40	100%	2	
	Cooper 1	2215.27	2360.05	-6%		
	Columbia 1	2257.44	1321.77	71%	3	
	Perry 1	3183.37	2330.67	37%		

Example 5 Quartile ranking for a country and a reactor type

USA-BWRs

(U.S.NRC NUREG-0713 Report)

Top 20 plant units for PWR

Plant unit	2008 - 2010 (man.mSv)
Emsland 1	115.08
Neckar 2	131.13
Ulchin 5	147.54
Ulchin 6	148.96
Isar 2	149.91
Doel 4	182.17
Three Mile Island 1	217.46
Doel 2	225.27
Philippsburg 2	246.47
Brokdorf 1	249.41
Indian Point 3	250.49
Saint Alban 1	261.50
Cook 2	270.97
Angra 2	272.95
Beznau 2	273.00
Paloverde 3	285.73
Sizewell B1	290.40
Yonggwang 6	290.62
Qinshan 1	299.60
Farley 1	300.50

Example 6
Plant unit ranking for a reactor type

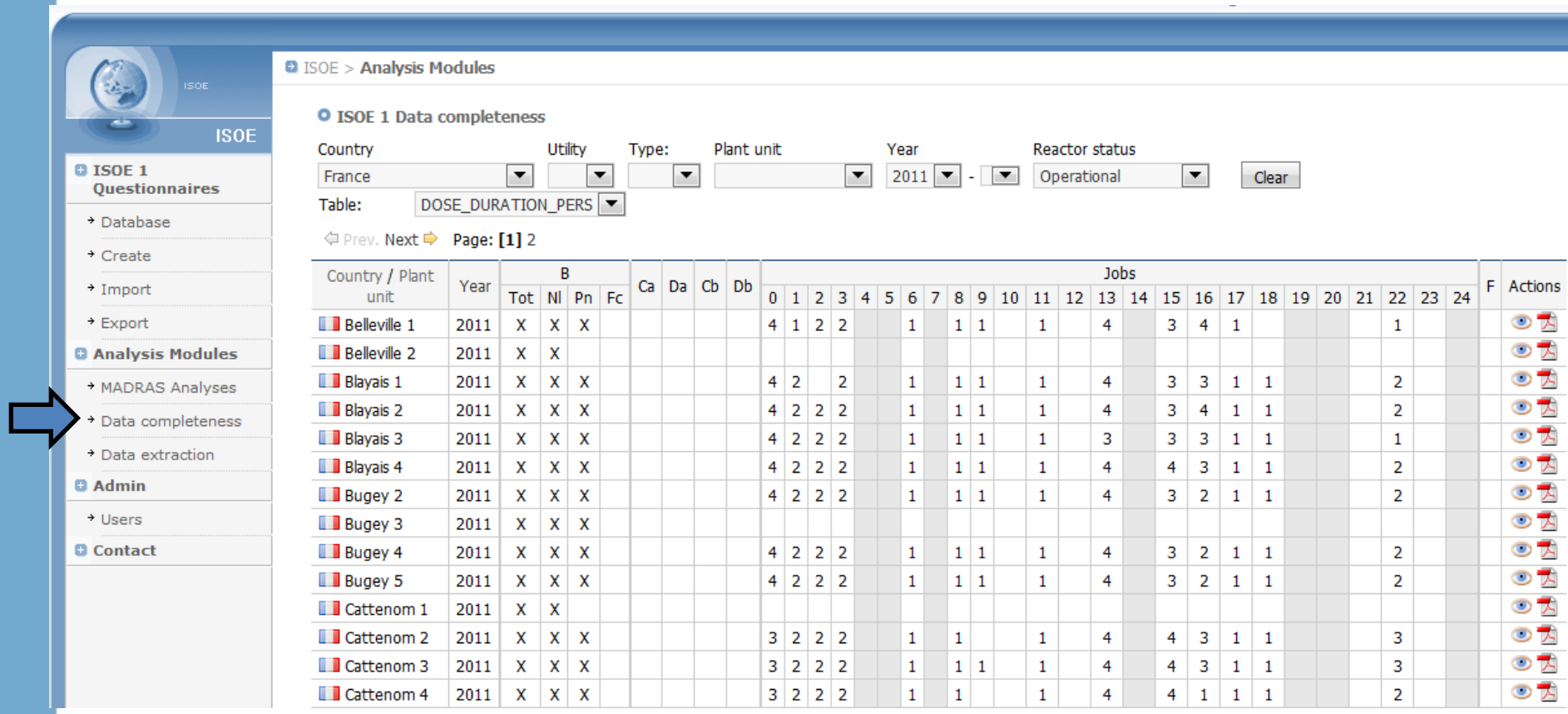
Top 20 for PWRs

New MADRAS Analyses

- MADRAS Analysis module is improved every year with new developments based on user feedback and requests

- New analyses planned for 2013:
  A set of new queries to improve outage benchmarking

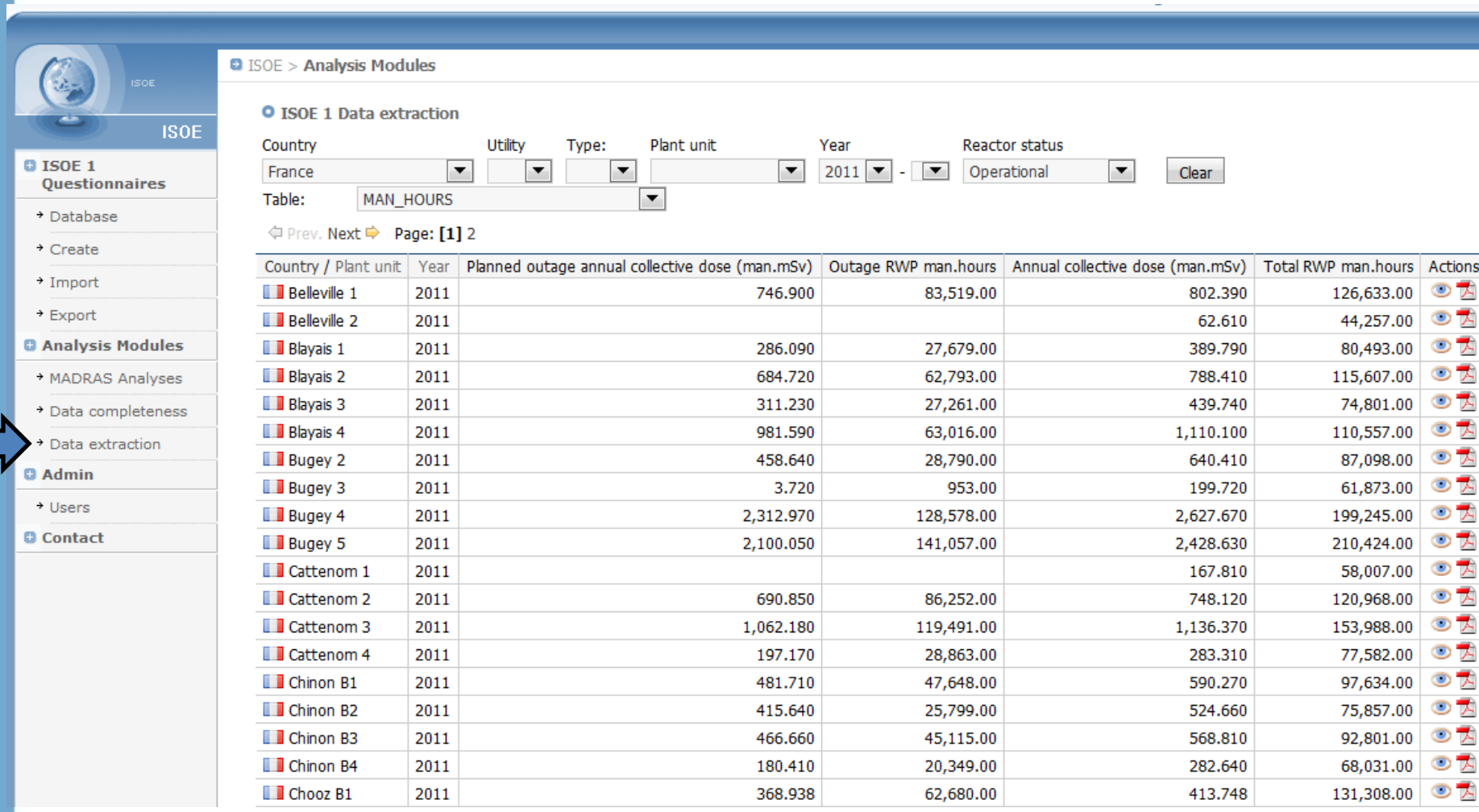
Data Completeness



Country / Plant unit	Year	B				Ca	Da	Cb	Db	Jobs																							F	Actions
		Tot	Nl	Pn	Fc					0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Belleville 1	2011	X	X	X						4	1	2	2			1		1	1		1		4		3	4	1					1				
Belleville 2	2011	X	X																																	
Blayais 1	2011	X	X	X						4	2		2			1		1	1		1		4		3	3	1	1				2				
Blayais 2	2011	X	X	X						4	2	2	2			1		1	1		1		4		3	4	1	1				2				
Blayais 3	2011	X	X	X						4	2	2	2			1		1	1		1		3		3	3	1	1				1				
Blayais 4	2011	X	X	X						4	2	2	2			1		1	1		1		4		4	3	1	1				2				
Bugey 2	2011	X	X	X						4	2	2	2			1		1	1		1		4		3	2	1	1				2				
Bugey 3	2011	X	X	X																																
Bugey 4	2011	X	X	X						4	2	2	2			1		1	1		1		4		3	2	1	1				2				
Bugey 5	2011	X	X	X						4	2	2	2			1		1	1		1		4		3	2	1	1				2				
Cattenom 1	2011	X	X																																	
Cattenom 2	2011	X	X	X						3	2	2	2			1		1			1		4		4	3	1	1				3				
Cattenom 3	2011	X	X	X						3	2	2	2			1		1	1		1		4		4	3	1	1				3				
Cattenom 4	2011	X	X	X						3	2	2	2			1		1			1		4		4	1	1	1				2				

New! Authorities have access to detailed information since January 2013 (only for Data completeness form)

Data Extraction



Country / Plant unit	Year	Planned outage annual collective dose (man.mSv)	Outage RWP man.hours	Annual collective dose (man.mSv)	Total RWP man.hours	Actions
Belleville 1	2011	746.900	83,519.00	802.390	126,633.00	
Belleville 2	2011			62.610	44,257.00	
Blayais 1	2011	286.090	27,679.00	389.790	80,493.00	
Blayais 2	2011	684.720	62,793.00	788.410	115,607.00	
Blayais 3	2011	311.230	27,261.00	439.740	74,801.00	
Blayais 4	2011	981.590	63,016.00	1,110.100	110,557.00	
Bugey 2	2011	458.640	28,790.00	640.410	87,098.00	
Bugey 3	2011	3.720	953.00	199.720	61,873.00	
Bugey 4	2011	2,312.970	128,578.00	2,627.670	199,245.00	
Bugey 5	2011	2,100.050	141,057.00	2,428.630	210,424.00	
Cattenom 1	2011			167.810	58,007.00	
Cattenom 2	2011	690.850	86,252.00	748.120	120,968.00	
Cattenom 3	2011	1,062.180	119,491.00	1,136.370	153,988.00	
Cattenom 4	2011	197.170	28,863.00	283.310	77,582.00	
Chinon B1	2011	481.710	47,648.00	590.270	97,634.00	
Chinon B2	2011	415.640	25,799.00	524.660	75,857.00	
Chinon B3	2011	466.660	45,115.00	568.810	92,801.00	
Chinon B4	2011	180.410	20,349.00	282.640	68,031.00	
Chooz B1	2011	368.938	62,680.00	413.748	131,308.00	

Possibility to extract any type of data of the ISOE 1 Questionnaire in order to perform your own analyses

The ISOE Website and Database

Thank you for your attention!

OECD Nuclear Energy Agency
International Atomic Energy Agency

ISOE

INFORMATION SYSTEM ON OCCUPATIONAL EXPOSURE

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www.isoe-network.net