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December 2001

ISOE INFORMATION SHEET

TRENDS IN COLLECTIVE DOSES PER JOB FROM 1995 TO 2000

ISOE European Technical Centre - CEPN Information Sheet No. 28

This Information Sheet presents, on the basis of a three-years rolling average for the period 1995-2000, an analysis of evolution of the average doses per job. The data available in ISOE1 concern mainly European countries and China, South Africa, Mexico and Slovenia which provide regularly these data. The following results are presented first by reactor type and second by sister unit groups.

1. Evolutions per reactor type

Table 1 gives the 3-Years rolling average dose per job for the PWRs, BWRs and VVERs and Table 2 the number of data available per job.

Concerning the PWRs, although a regular decrease of the 3-Years rolling average dose per job from 1995 to 2000 can be observed for most of the jobs, there is an exception for the job "Routine inspection" for which an increase by a factor of 43% can be seen and for the Job "Primary circuit" where the doses are quite stable.

Whatever the type of reactor, the most important job doses correspond to Valve work and General work (i.e. cleaning-painting, work site preparation, temporary shielding, waste handling…). In these cases, doses in BWR are about 2 times higher (around 200 man.mSv per outage) than in PWR and 3 times higher than in VVER. These two jobs do not show dose decreases as important as other jobs, letting think that there are still there important potential dose savings through better planning, training and work management.

The design of the reactor seems to play an important role on the level of doses. BWR has doses much more higher (about ten times) for one job, work on Reactor Water Clean up System (RWCS), than the others. The same situation is noticeable for the work on Residual or Shutdown Heat Removal System, however the gap is smaller (BWRs doses are about five times higher than the others). As well, the doses for the Steam Generator (primary side) are 3 to 4 times lower for VVER than for PWRs.

Some other jobs have dose figures quite similar: that is the case for Refuelling and Reactor Vessel works. However for Reactor Vessel work, the evolutions have been totally different: big improvement for PWRs doses, while doses increase for BWRs and VVERs.

Table 1. 3-Years rolling average dose per job by reactor type (man.mSv)

Job	Years	BWR	PWR	VVER
Refuelling	1995-97	72.14	119.15	51.29
	1996-98	65.86	100.30	46.46
	1997-99	57.79	89.06	47.18
	1998-00	45.37	71.82	49.93
Reactor vessel	1995-97	70.26	78.11	67.24
	1996-98	97.24	68.32	75.19
	1997-99	93.23	49.38	71.13
	1998-00	98.44	42.62	76.80
Steam generator	1995-97		170.29	24.35
Primary side	1996-98		125.76	31.80
	1997-99		89.71	26.91
	1998-00		73.44	21.90
Steam generator	1995-97		53.28	53.45
Secondary side	1996-98		49.28	66.91
	1997-99		45.46	54.68
	1998-00		40.73	68.94
Residual or shutdown heat	1995-97	112.69	37.64	27.16
removal system	1996-98	114.65	27.70	23.97
& safety injection system	1997-99	78.63	18.40	16.97
	1998-00	78.78	15.07	2.79
Chemical and volume control	1995-97		21.71	5.94
system & coolant pump seal	1996-98		18.35	4.81
water system	1997-99		13.52	4.76
	1998-00		9.26	3.28
Pressuriser	1995-97		30.49	15.86
	1996-98		24.85	16.72
	1997-99		15.98	4.57
	1998-00		8.42	16.33
Reactor water clean-up system	1995-97	76.97	5.28	2.68
	1996-98	72.44	5.18	2.73
	1997-99	47.62	3.15	2.55
	1998-00	34.09	3.38	13.35
Reactor coolant	1995-97		24.84	20.48
pumps	1996-98		19.98	16.57
	1997-99		18.28	17.31
	1998-00		18.65	15.68
Primary circuit	1995-97		31.46	32.64
	1996-98		30.81	71.34
	1997-99		25.44	59.23
	1998-00		33.46	60.75
Valve work	1995-97	241.79	178.74	77.71
	1996-98	281.69	160.52	75.00
	1997-99	264.43	136.78	61.28
	1998-00	206.57	109.89	68.24
Routine	1995-97	114.43	56.51	
inspection	1996-98	109.88	67.77	
	1997-99	90.47	73.77	
	1998-00	65.53	80.79	

Table 1 (next). 3-Years rolling average of job dose (man.mSv)

Job	Years	BWR	PWR	VVER
General work	1995-97	221.57	166.11	81.59
	1996-98	248.95	154.63	87.95
	1997-99	238.17	135.06	73.62
	1998-00	190.74	120.61	72.02
Scaffolding	1995-97	62.37	42.55	15.82
	1996-98	63.72	38.65	13.37
	1997-99	52.36	30.67	13.56
	1998-00	34.45	26.90	15.43
Insulation	1995-97	144.28	73.13	98.82
	1996-98	141.33	66.63	101.85
	1997-99	108.84	64.57	92.74
	1998-00	82.75	56.47	103.29
Steam system	1995-97	110.80		
	1996-98	127.54		
	1997-99	111.85		
	1998-00	79.26		
Recirculation system & coolant pump seal water system	1995-97	228.59		
	1996-98	189.33		
	1997-99	165.41		
	1998-00	44.17		
Control rod drives	1995-97	64.01	99.46	2.68
	1996-98	54.57	30.77	6.31
	1997-99	45.38	4.39	5.63
	1998-00	32.41	13.88	4.00

Table 2. Number of data available per job

JOB	TYPE	1995	1996	1997	1998	1999	2000
Refuelling	BWR	16	19	18	18	14	15
	PWR	83	79	77	74	67	67
	VVER	6	6	6	6	6	4
Reactor vessel	BWR	18	17	16	15	12	14
	PWR	79	74	73	70	64	62
	VVER	4	5	4	4	4	4
Steam generator	PWR	78	73	73	67	63	56
Primary side	VVER	4	4	4	4	4	4
Steam generator	PWR	79	71	70	67	62	53
Secondary side	VVER	4	6	6	6	6	4
Residual or shutdown heat	BWR	17	15	16	19	13	13
removal system	PWR	77	70	73	68	60	58
& safety injection system	VVER	3	2	4	4	4	4
Chemical and volume control	PWR	73	68	67	66	56	56
system & coolant pump seal water system	VVER	4	4	4	4	4	4
Pressuriser	PWR	41	25	24	59	55	55
	VVER	3	4	2	3	4	2
Reactor water clean-up system	BWR	17	15	15	20	14	15
	PWR	13	12	12	11	5	8
	VVER	4	4	3	4	4	4
Reactor coolant pumps	PWR	83	73	76	67	63	60
	VVER	4	4	5	6	5	4
Primary circuit	PWR	73	62	63	24	11	23
	VVER	6	6	6	6	6	4
Valve work	PWR	75	72	70	64	58	56
	BWR	15	14	16	16	11	13
	VVER	3	5	4	4	4	4
Routine	BWR	19	18	18	18	14	16
inspection	PWR	71	67	72	71	62	61
General work	BWR	20	13	17	14	14	14
	PWR	83	72	73	73	63	63
	VVER	6	6	6	6	6	4
Scaffolding	BWR	17	17	18	17	16	16
	PWR	77	72	70	68	59	58
	VVER	4	4	6	6	6	4
Insulation	BWR	18	16	18	19	16	16
	PWR	75	64	68	68	61	59
	VVER	3	4	6	6	6	4
Steam system recirculation system &	BWR	19	18	19	18	15	14
coolant pump seal water system	BWR	19	17	17	18	14	13
Control rod drives	BWR	19	15	17	18	13	15
	PWR	4	6	4	6	2	2

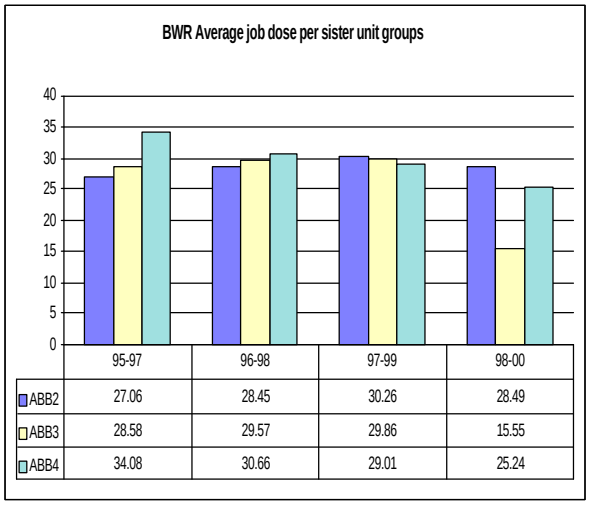
VVER	4	2	3	4	4	4

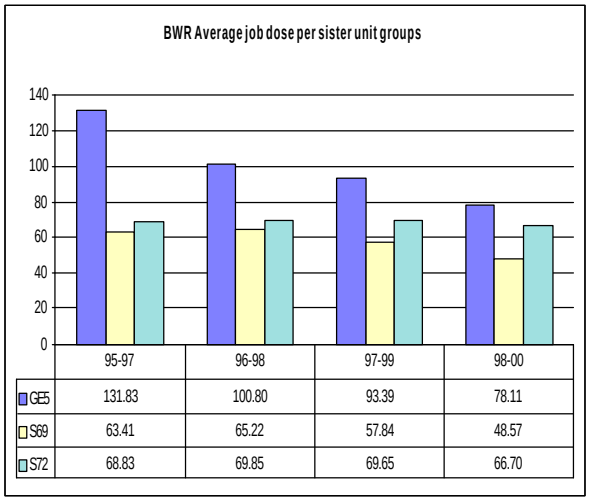
2. Evolution per sister unit group

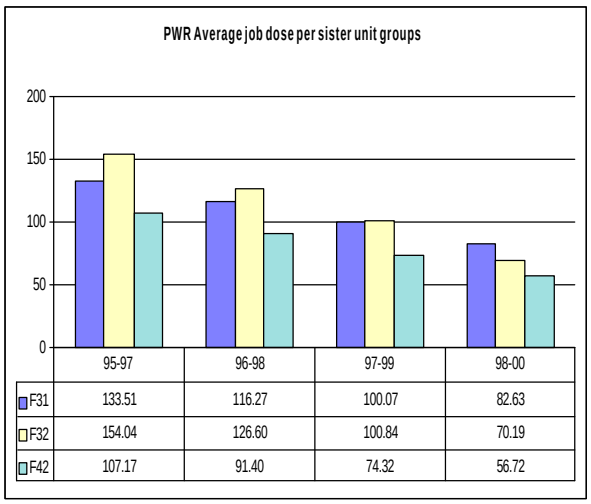
Analysis has also been done for sister units groups, as defined in ISOE, in order to be able to facilitate benchmarking. Annex 1 provides the names of the reactor units belonging to each sister unit group as well as the countries where they are located.

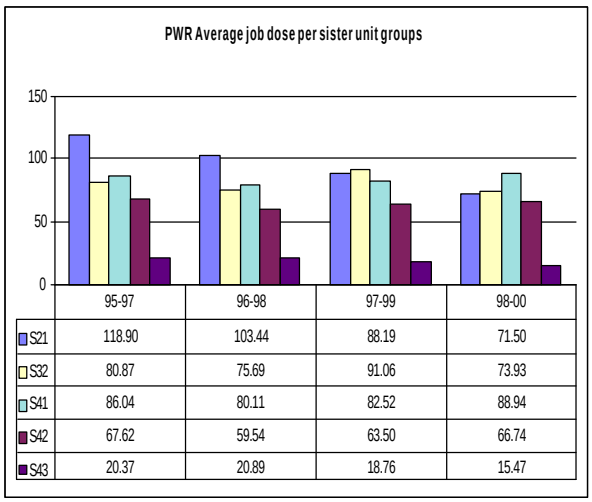
All the graphs have been prepared excluding all the sister unit groups including only one data. The Jobs “other” and “large tasks” have not been considered.

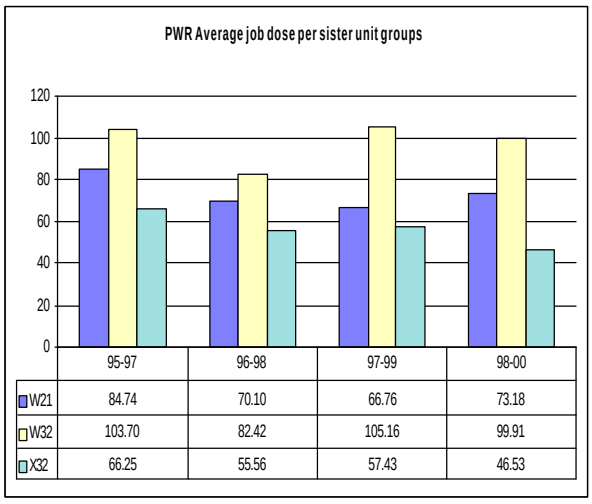
The average doses per sister unit group for each of the 17 jobs are presented in Figure 1 to 17 and are sorted by type and manufacturer. The use of these figures will enable each unit to compare its results with those of its sister unit group and similar sister unit groups.











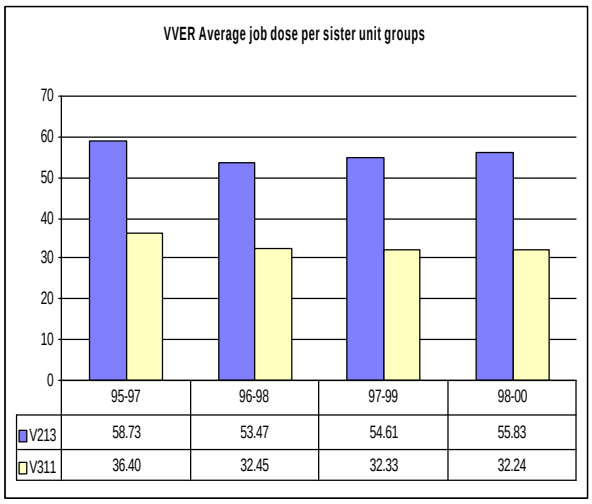


Figure 1. Evolution of the average dose by sister unit group for the job "Refueling" (man.mSv)

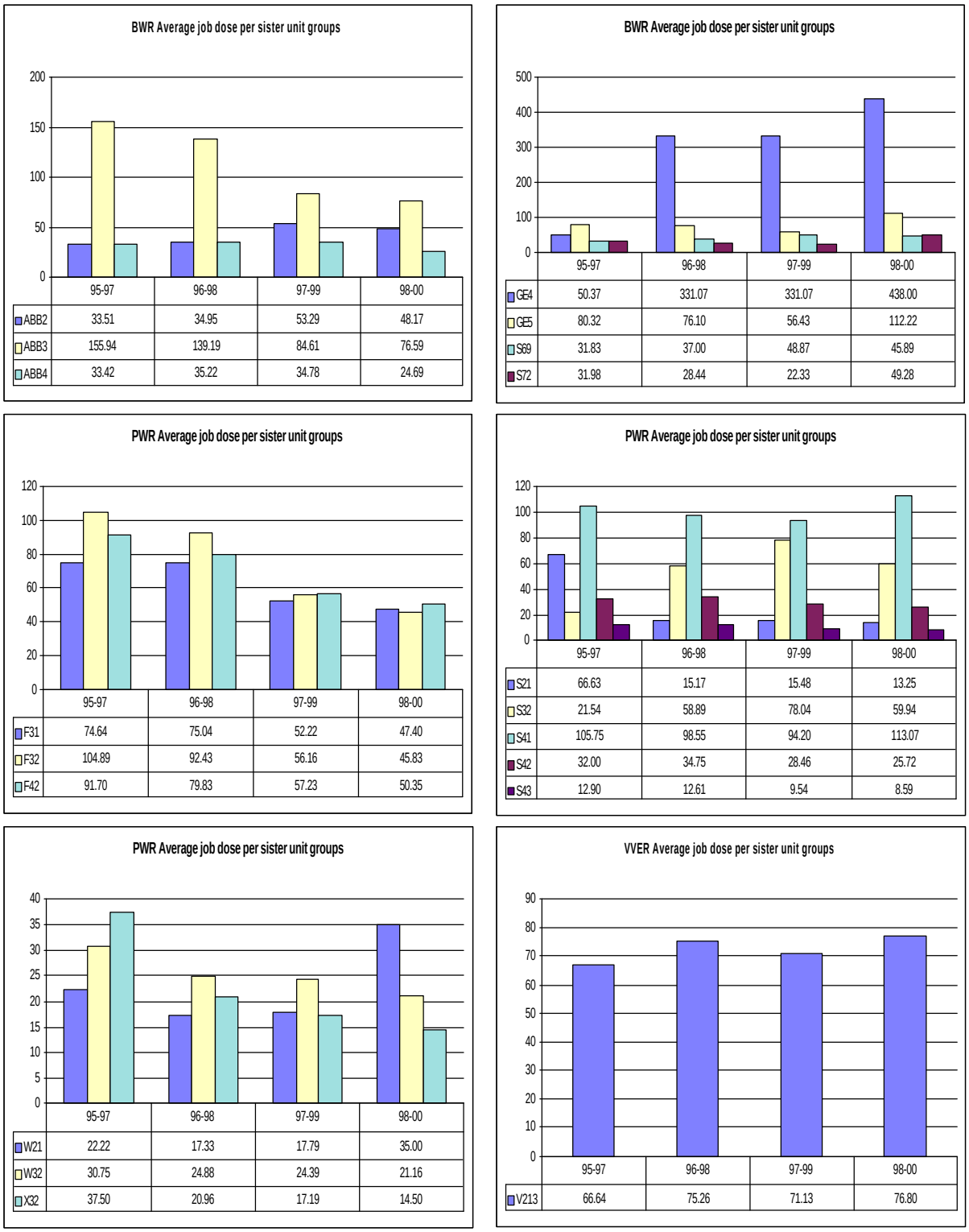
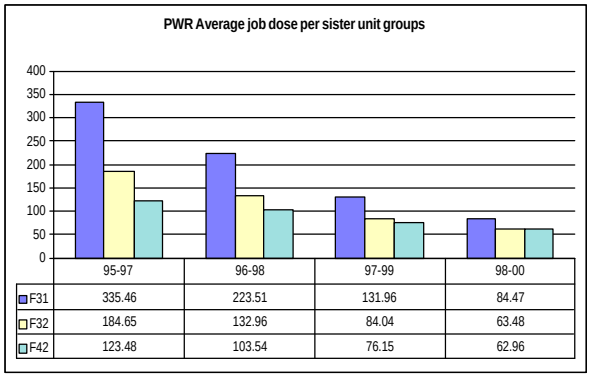
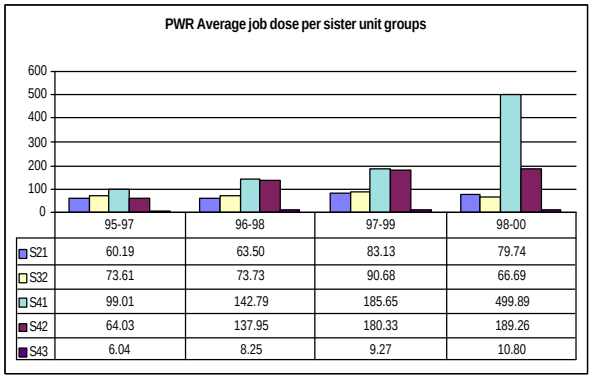
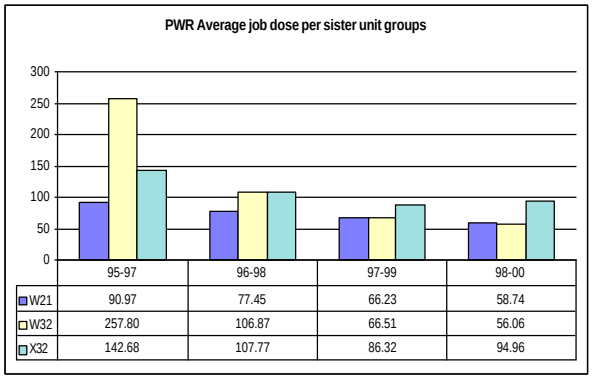


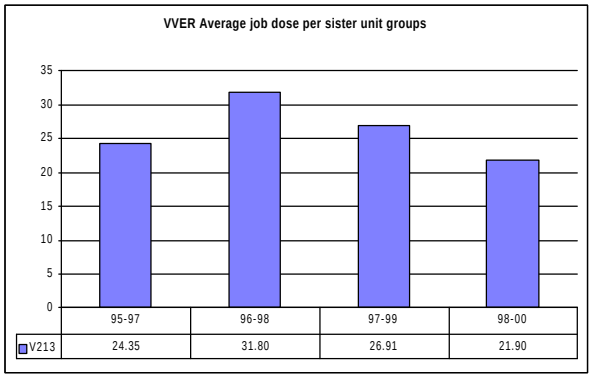
Figure 2. Evolution of the average dose by sister unit group for the job "Reactor vessel" (man.mSv)

Steam Generator – Primary side

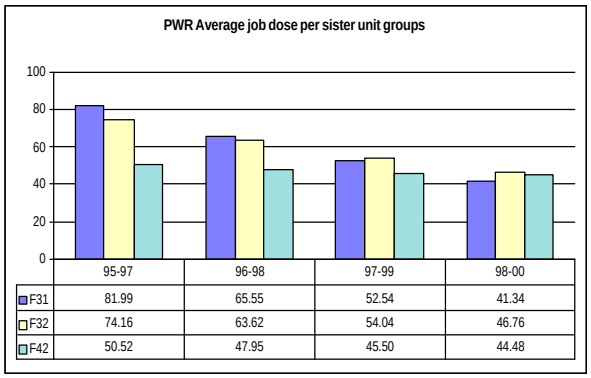


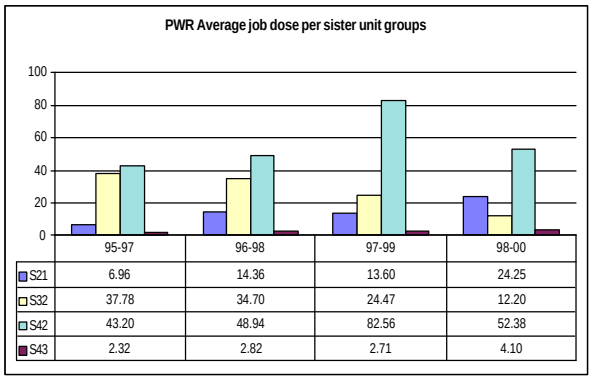


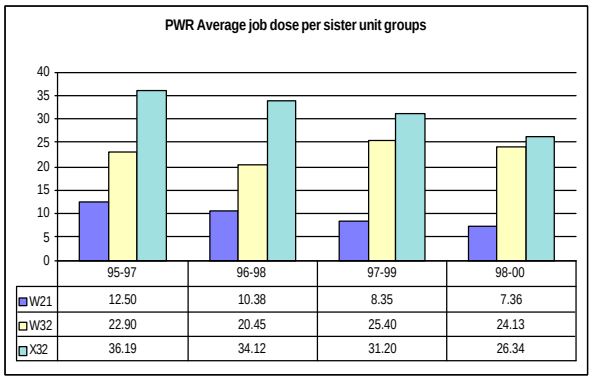




Steam Generator – Secondary side







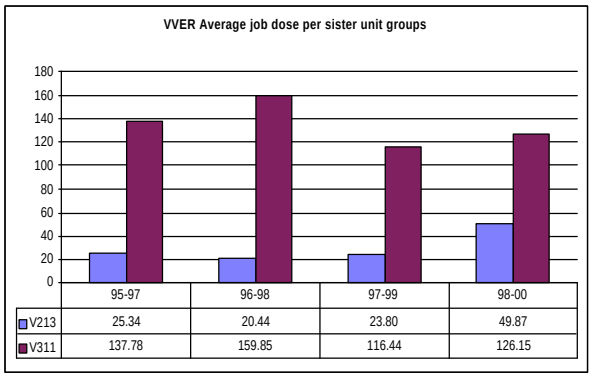
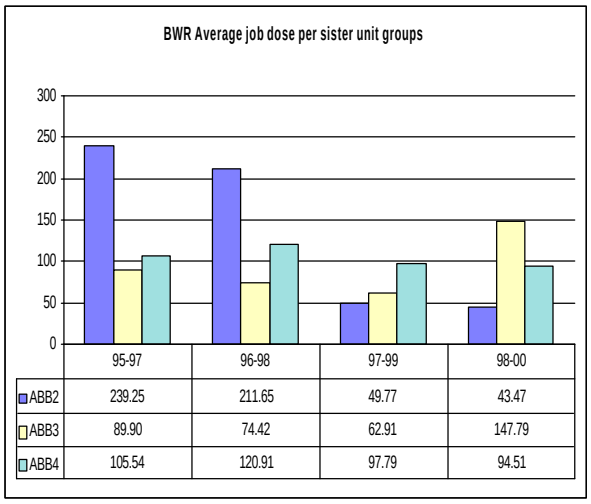
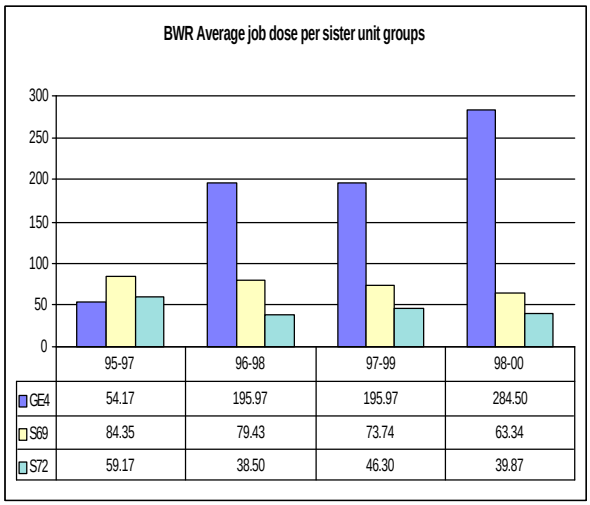


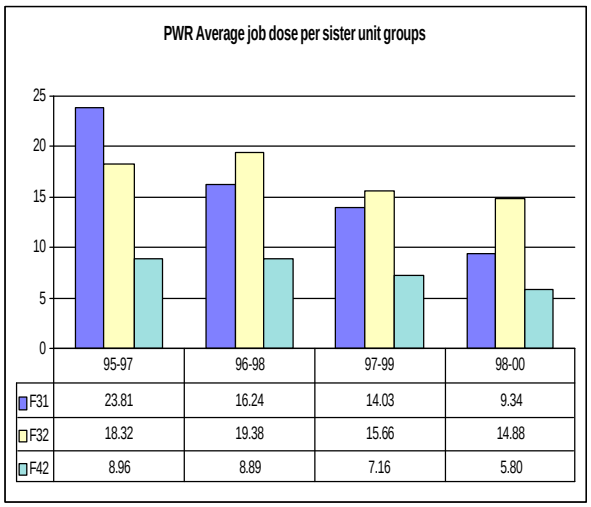
Figure 3. Evolution of the average dose by sister unit group for the jobs "Steam generator – Primary side" and "Steam generator – Secondary side" (man.mSv)



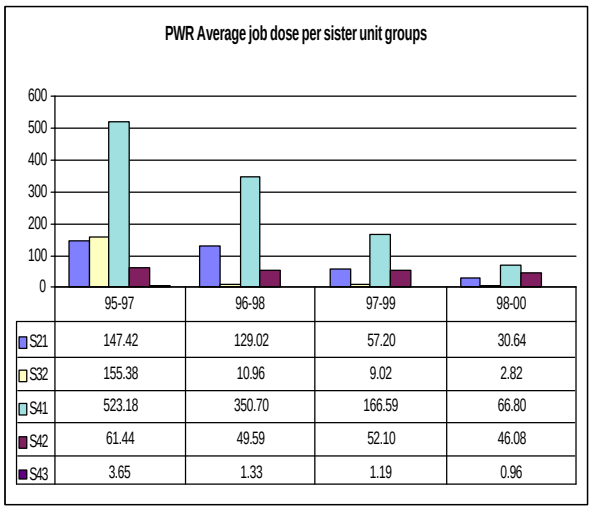
	95-97	96-98	97-99	98-00
ABB2	239.25	211.65	49.77	43.47
ABB3	89.90	74.42	62.91	147.79
ABB4	105.54	120.91	97.79	94.51



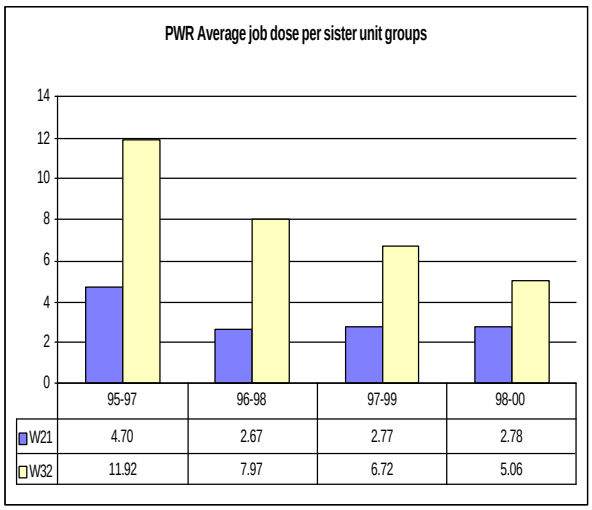
	95-97	96-98	97-99	98-00
GE4	54.17	195.97	195.97	284.50
S69	84.35	79.43	73.74	63.34
S72	59.17	38.50	46.30	39.87



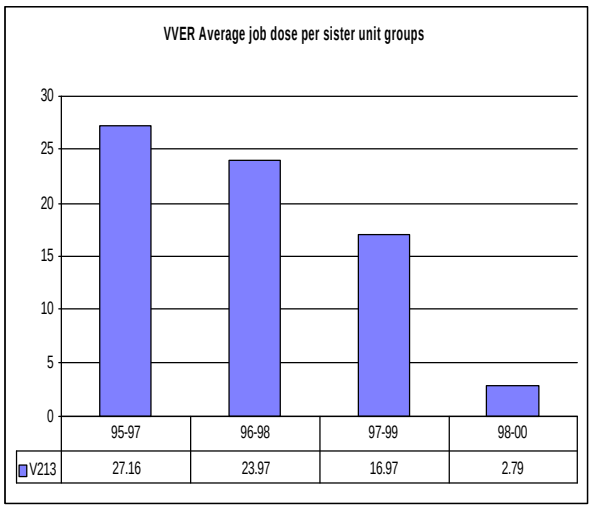
	95-97	96-98	97-99	98-00
F31	23.81	16.24	14.03	9.34
F32	18.32	19.38	15.66	14.88
F42	8.96	8.89	7.16	5.80



	95-97	96-98	97-99	98-00
S21	147.42	129.02	57.20	30.64
S32	155.38	10.96	9.02	2.82
S41	523.18	350.70	166.59	66.80
S42	61.44	49.59	52.10	46.08
S43	3.65	1.33	1.19	0.96



	95-97	96-98	97-99	98-00
W21	4.70	2.67	2.77	2.78
W32	11.92	7.97	6.72	5.06



	95-97	96-98	97-99	98-00
V213	27.16	23.97	16.97	2.79

Figure 4. Evolution of the average dose by sister unit group for the job "Residual or shutdown heat removal system & safety injection system" (man.mSv)

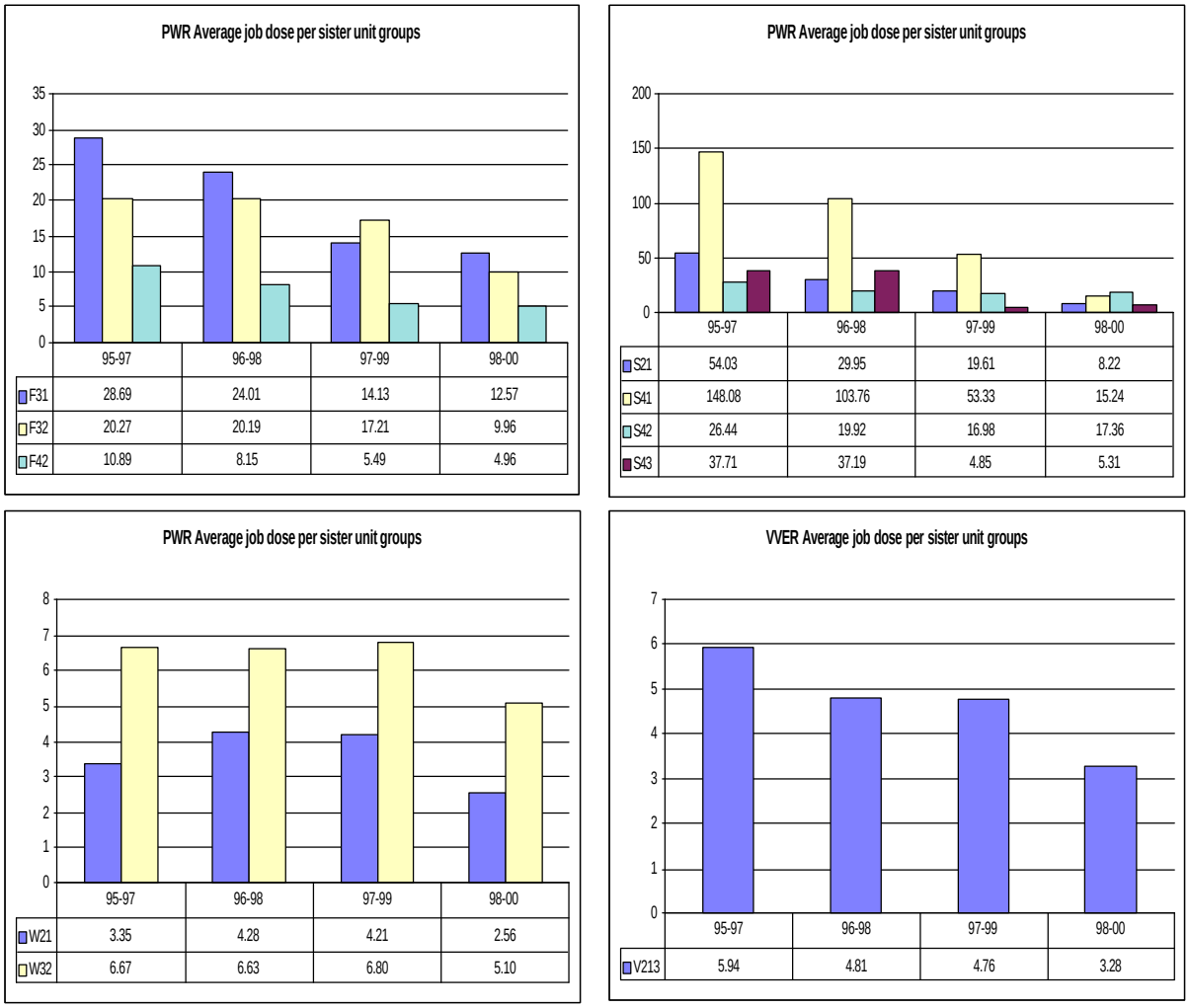


Figure 5. Evolution of the average dose by sister unit group for the job "Chemical and volume control system & coolant pump seal water system" (man.mSv)

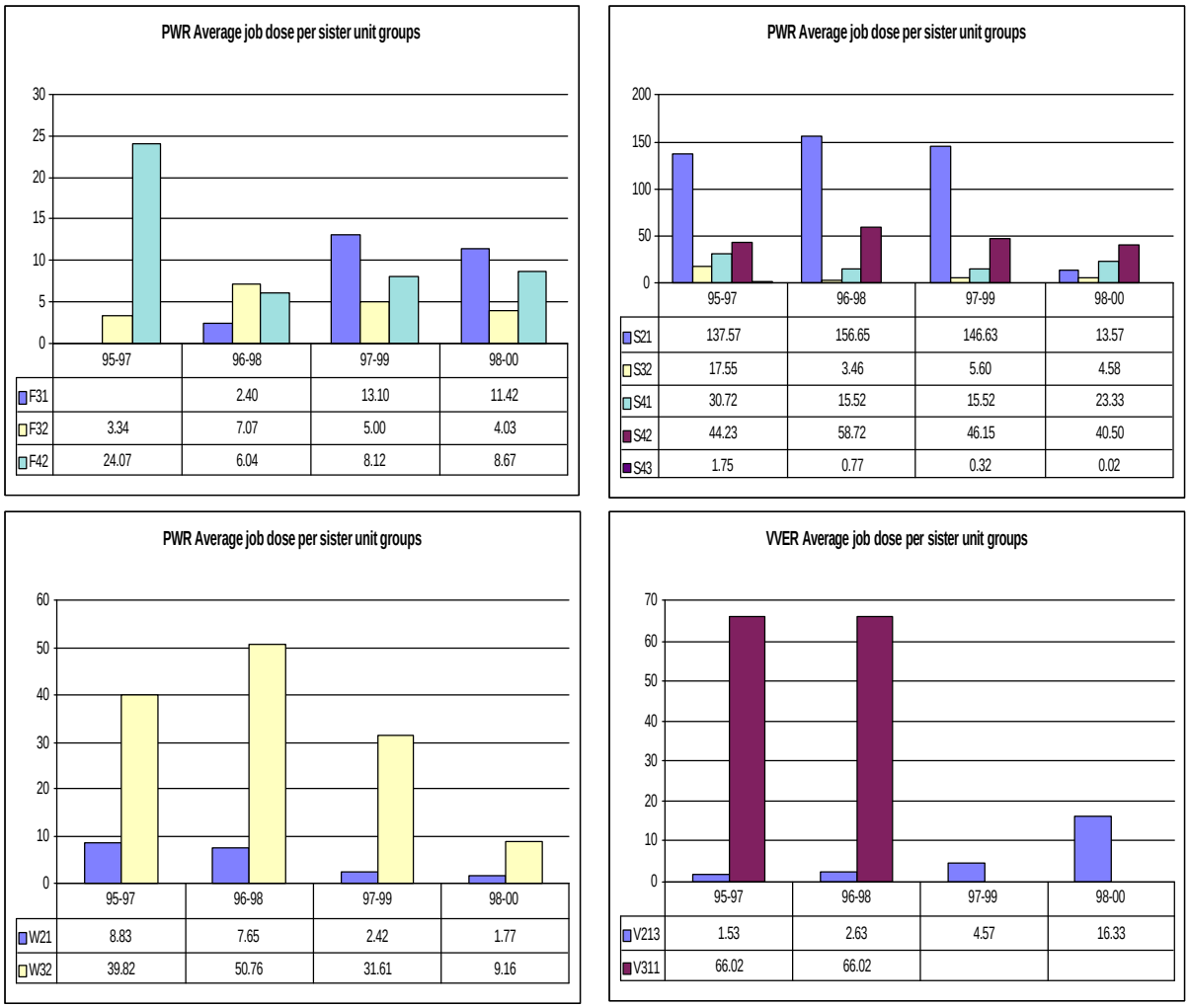
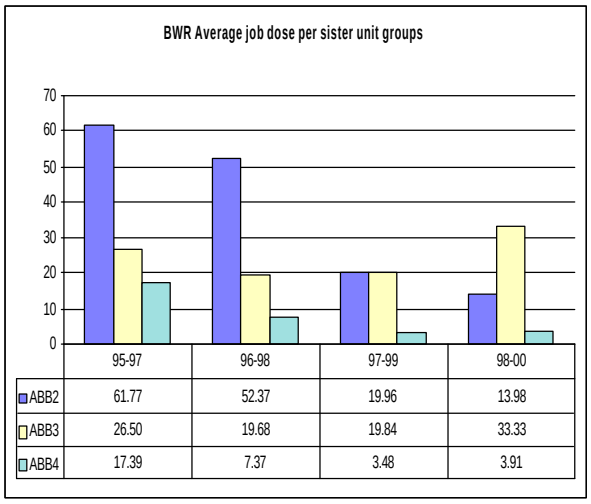
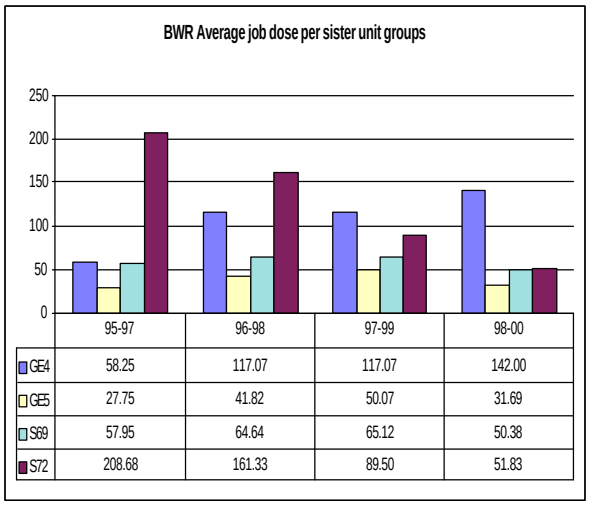


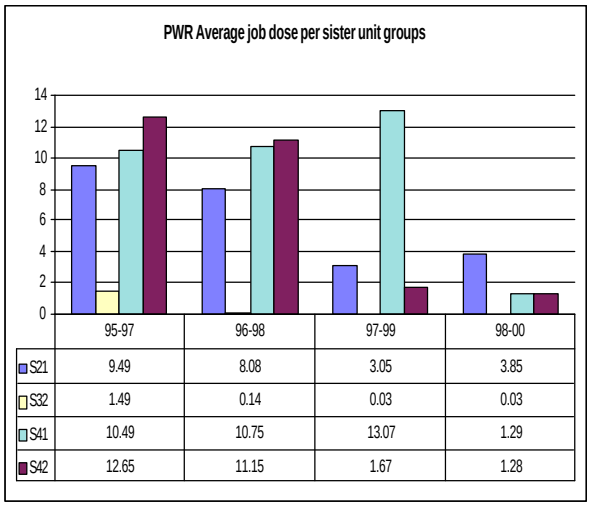
Figure 6. Evolution of the average dose by sister unit group for the job "Pressuriser" (man.mSv)



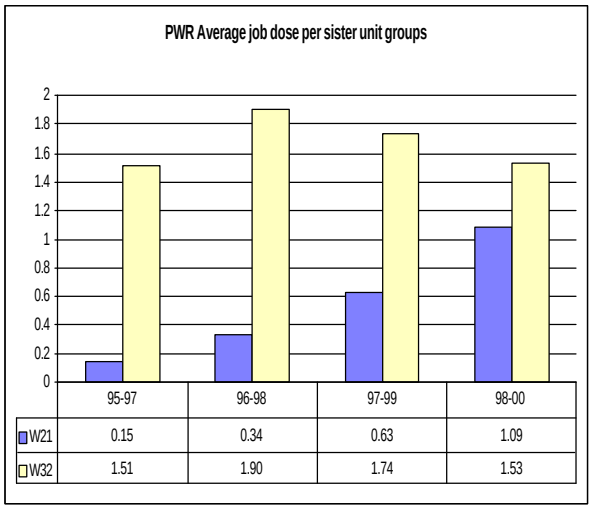
	95-97	96-98	97-99	98-00
ABB2	61.77	52.37	19.96	13.98
ABB3	26.50	19.68	19.84	33.33
ABB4	17.39	7.37	3.48	3.91



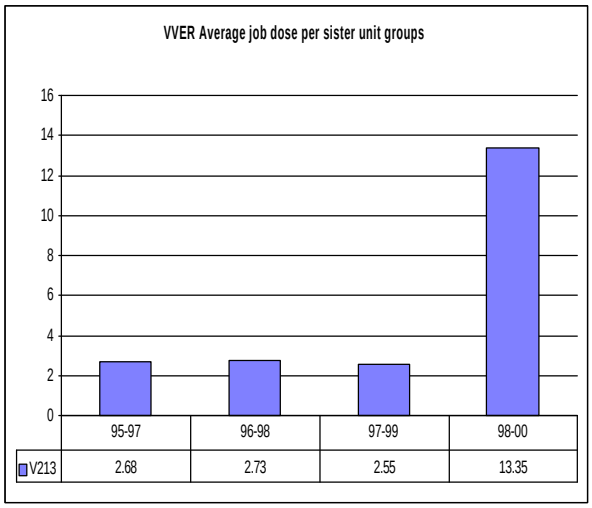
	95-97	96-98	97-99	98-00
GE4	58.25	117.07	117.07	142.00
GE5	27.75	41.82	50.07	31.69
S69	57.95	64.64	65.12	50.38
S72	208.68	161.33	89.50	51.83



	95-97	96-98	97-99	98-00
S21	9.49	8.08	3.05	3.85
S32	1.49	0.14	0.03	0.03
S41	10.49	10.75	13.07	1.29
S42	12.65	11.15	1.67	1.28

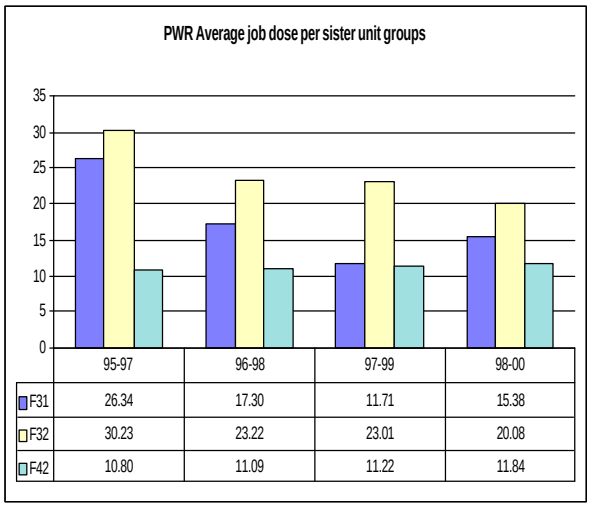


	95-97	96-98	97-99	98-00
W21	0.15	0.34	0.63	1.09
W32	1.51	1.90	1.74	1.53

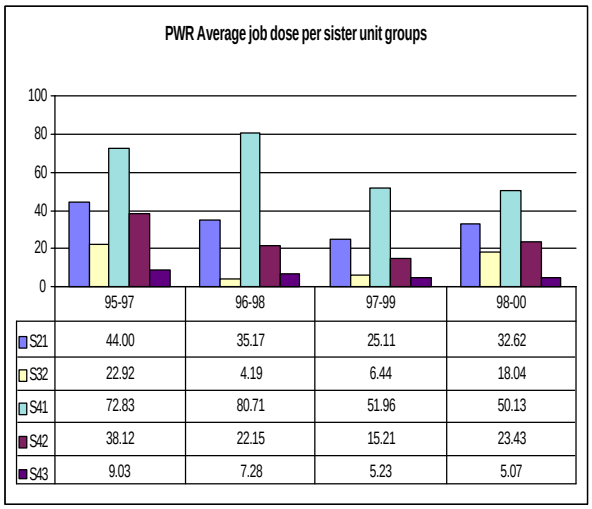


	95-97	96-98	97-99	98-00
V213	2.68	2.73	2.55	13.35

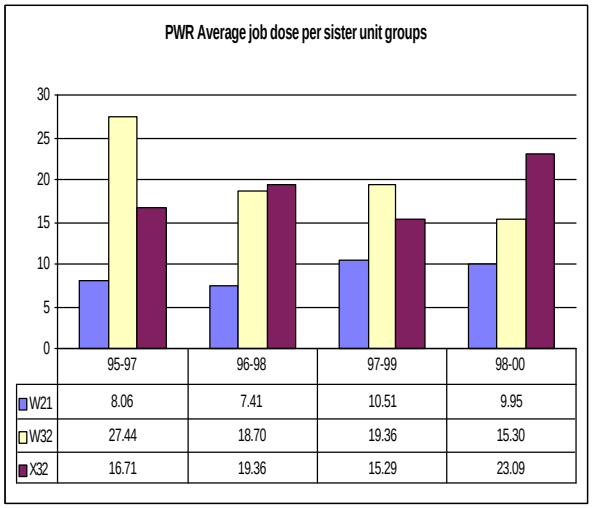
Figure 7. Evolution of the average dose by sister unit group for the job "Reactor water clean-up system Residual or shutdown heat removal system & safety injection system" (man.mSv)



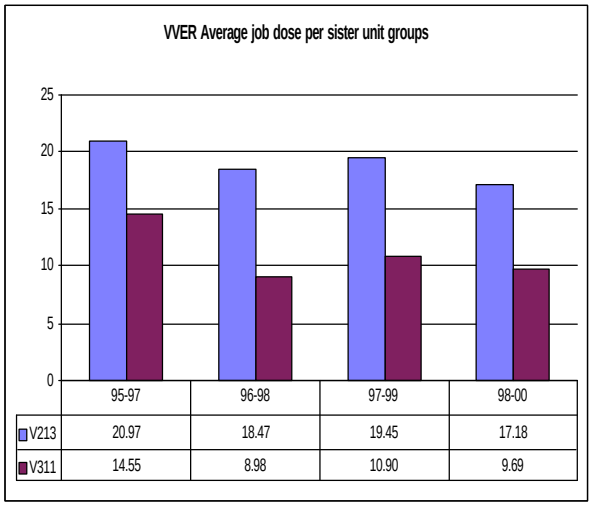
	95-97	96-98	97-99	98-00
F31	26.34	17.30	11.71	15.38
F32	30.23	23.22	23.01	20.08
F42	10.80	11.09	11.22	11.84



	95-97	96-98	97-99	98-00
S21	44.00	35.17	25.11	32.62
S32	22.92	4.19	6.44	18.04
S41	72.83	80.71	51.96	50.13
S42	38.12	22.15	15.21	23.43
S43	9.03	7.28	5.23	5.07



	95-97	96-98	97-99	98-00
W21	8.06	7.41	10.51	9.95
W32	27.44	18.70	19.36	15.30
X32	16.71	19.36	15.29	23.09



	95-97	96-98	97-99	98-00
V213	20.97	18.47	19.45	17.18
V311	14.55	8.98	10.90	9.69

Figure 8. Evolution of the average dose by sister unit group for the job "Reactor coolant pumps" (man.mSv)

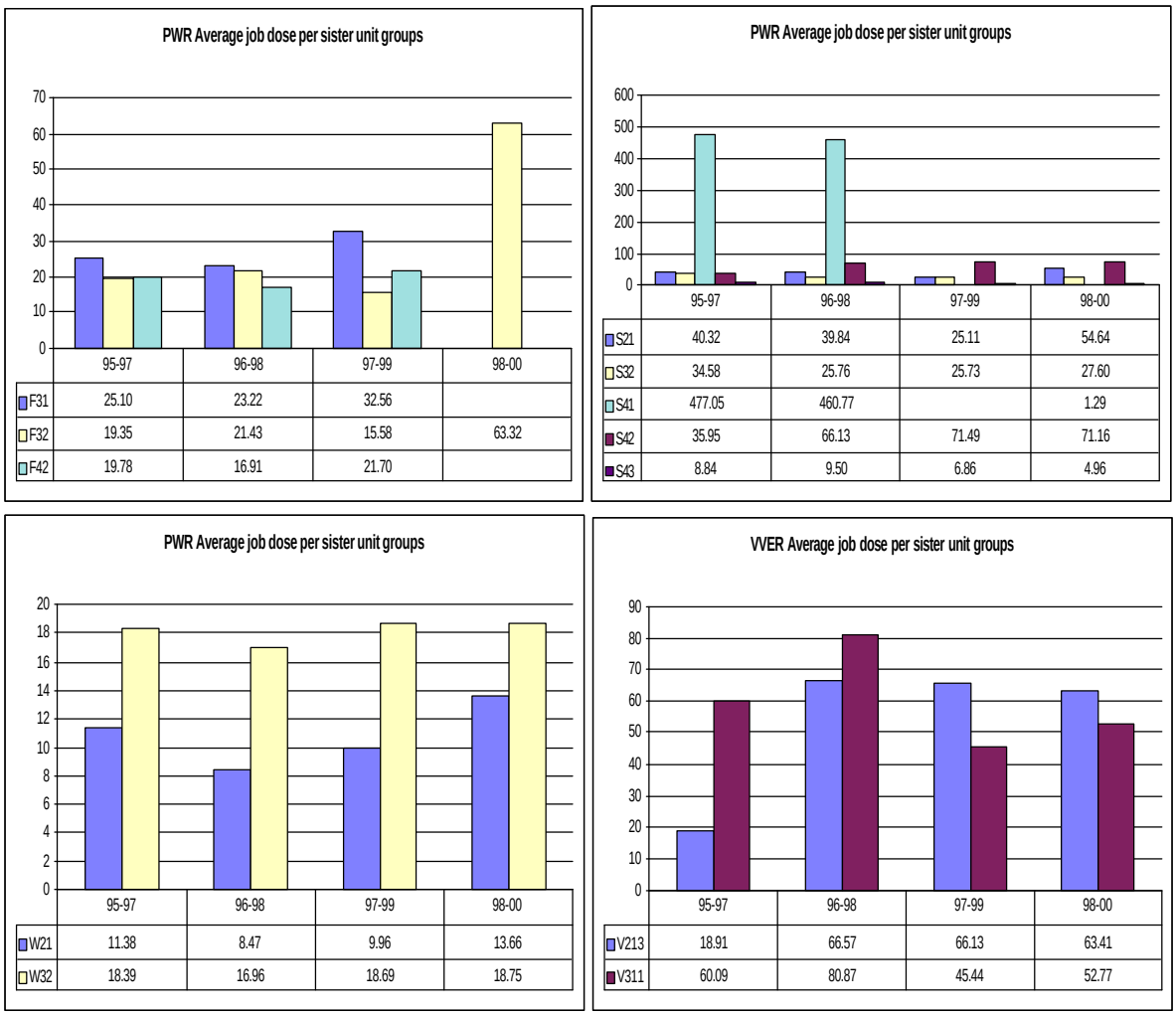
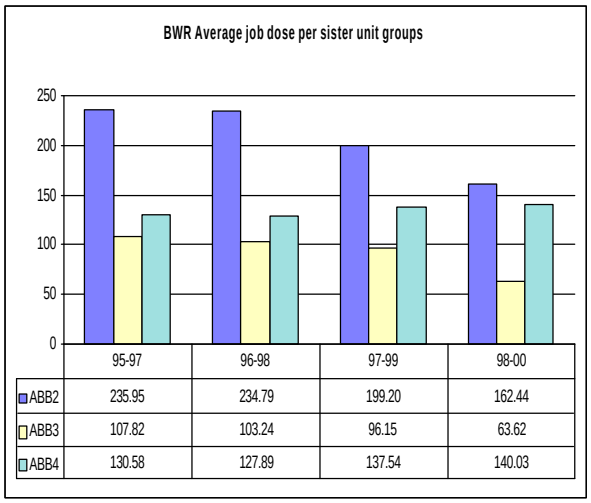
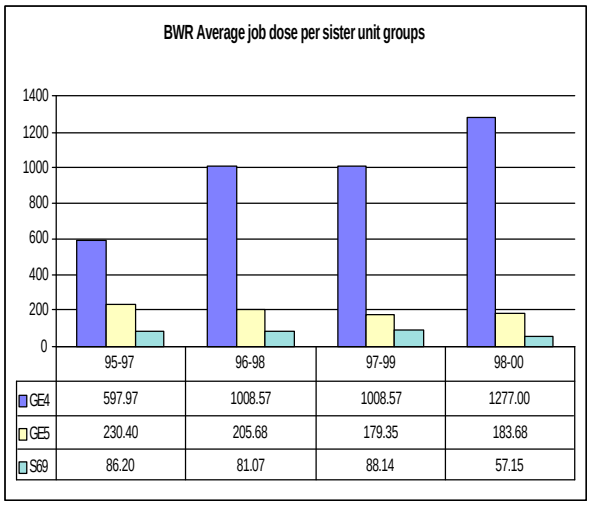


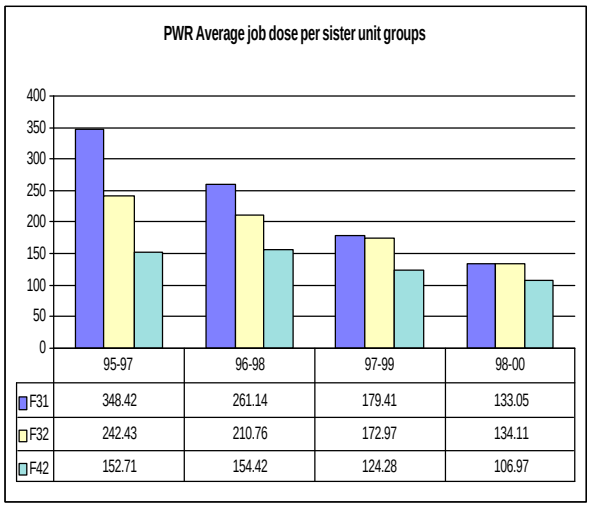
Figure 9. Evolution of the average dose by sister unit group for the job "Primary circuit" (man.mSv)



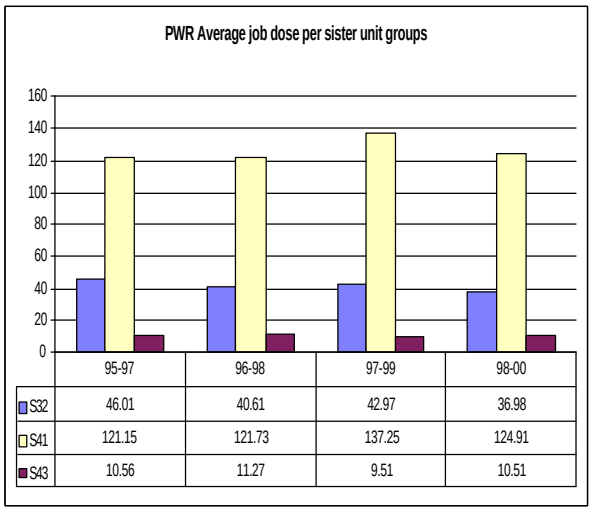
	95-97	96-98	97-99	98-00
ABB2	235.95	234.79	199.20	162.44
ABB3	107.82	103.24	96.15	63.62
ABB4	130.58	127.89	137.54	140.03



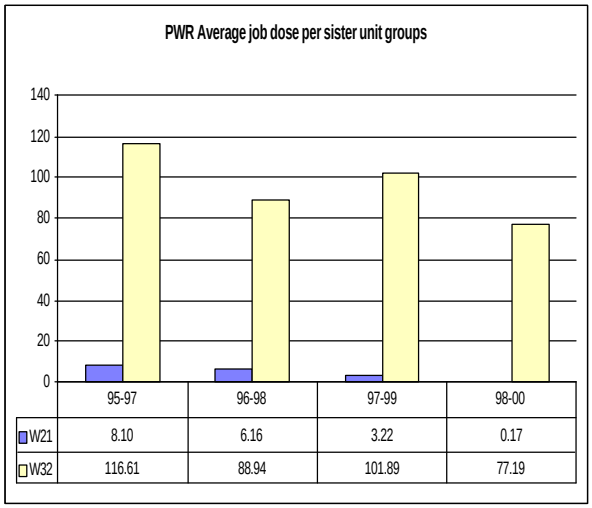
	95-97	96-98	97-99	98-00
GE4	597.97	1008.57	1008.57	1277.00
GE5	230.40	205.68	179.35	183.68
S69	86.20	81.07	88.14	57.15



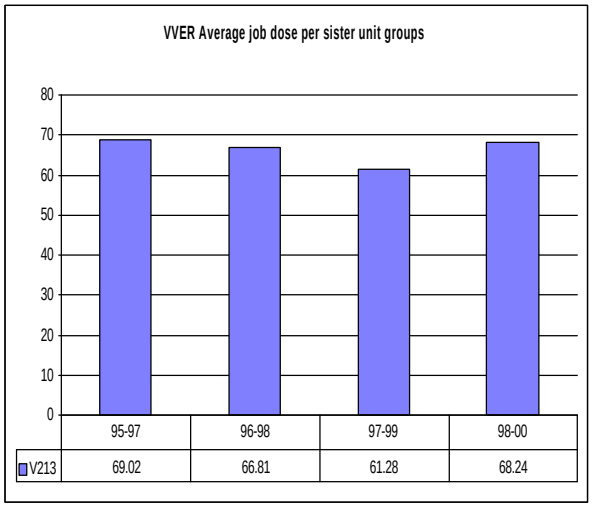
	95-97	96-98	97-99	98-00
F31	348.42	261.14	179.41	133.05
F32	242.43	210.76	172.97	134.11
F42	152.71	154.42	124.28	106.97



	95-97	96-98	97-99	98-00
S32	46.01	40.61	42.97	36.98
S41	121.15	121.73	137.25	124.91
S43	10.56	11.27	9.51	10.51

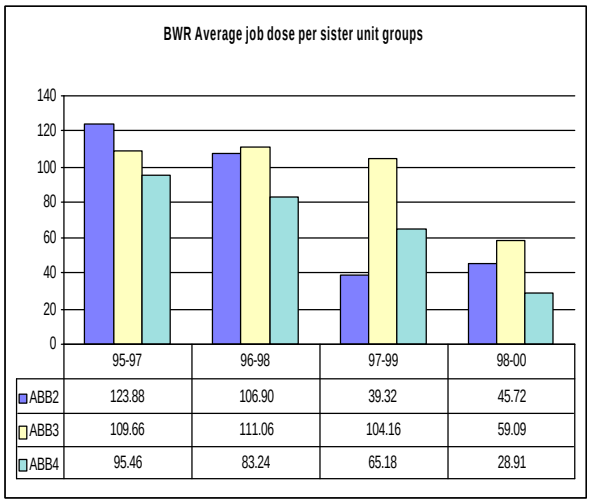


	95-97	96-98	97-99	98-00
W21	8.10	6.16	3.22	0.17
W32	116.61	88.94	101.89	77.19

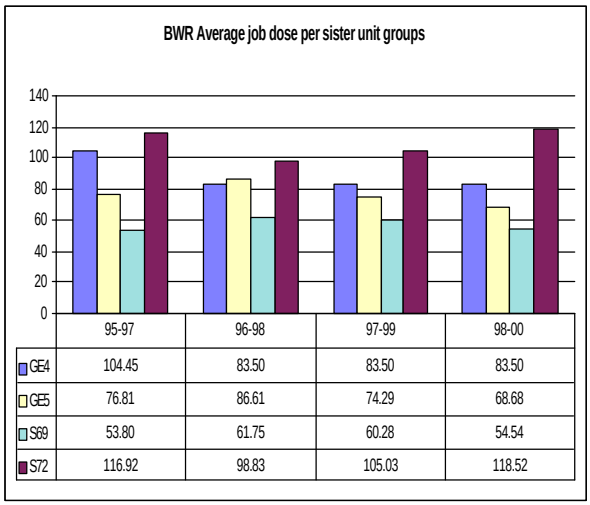


	95-97	96-98	97-99	98-00
V213	69.02	66.81	61.28	68.24

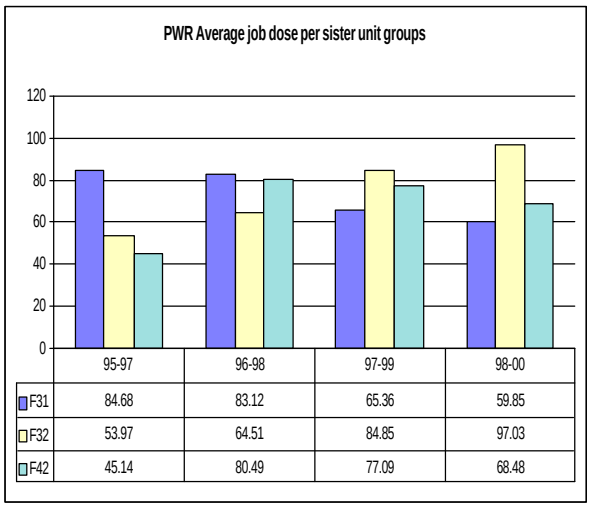
Figure 10. Evolution of the average dose by sister unit group for the job "Valve work" (man.mSv)



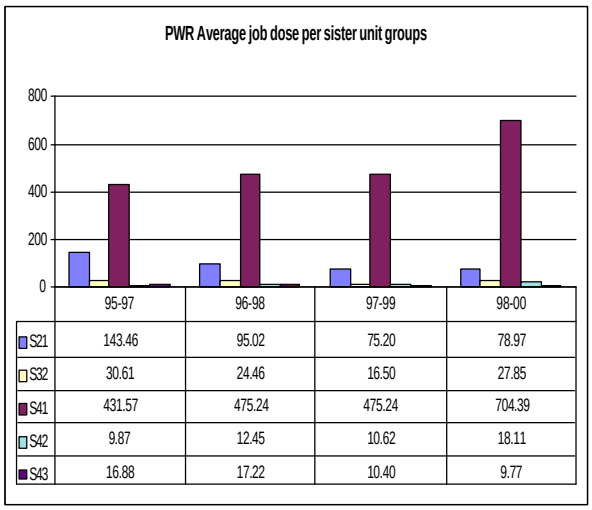
	95-97	96-98	97-99	98-00
ABB2	123.88	106.90	39.32	45.72
ABB3	109.66	111.06	104.16	59.09
ABB4	95.46	83.24	65.18	28.91



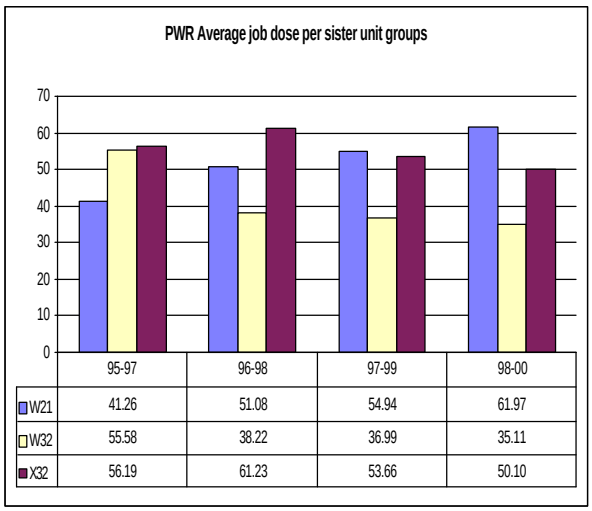
	95-97	96-98	97-99	98-00
GE4	104.45	83.50	83.50	83.50
GE5	76.81	86.61	74.29	68.68
S69	53.80	61.75	60.28	54.54
S72	116.92	98.83	105.03	118.52



	95-97	96-98	97-99	98-00
F31	84.68	83.12	65.36	59.85
F32	53.97	64.51	84.85	97.03
F42	45.14	80.49	77.09	68.48

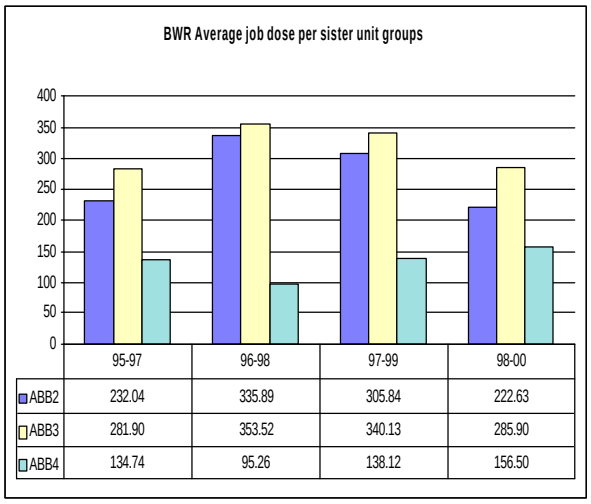


	95-97	96-98	97-99	98-00
S21	143.46	95.02	75.20	78.97
S32	30.61	24.46	16.50	27.85
S41	431.57	475.24	475.24	704.39
S42	9.87	12.45	10.62	18.11
S43	16.88	17.22	10.40	9.77

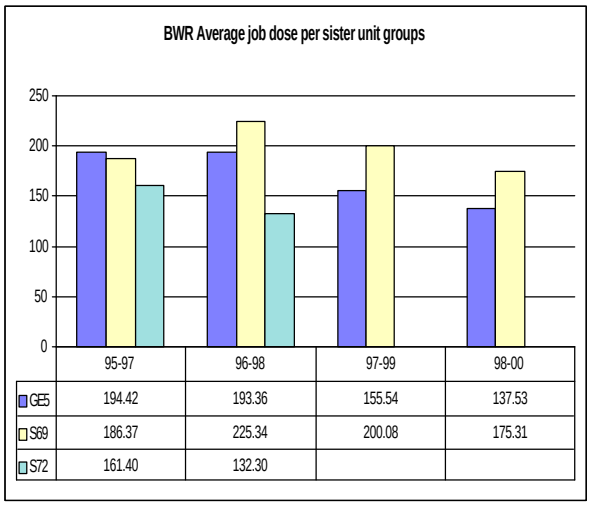


	95-97	96-98	97-99	98-00
W21	41.26	51.08	54.94	61.97
W32	55.58	38.22	36.99	35.11
X32	56.19	61.23	53.66	50.10

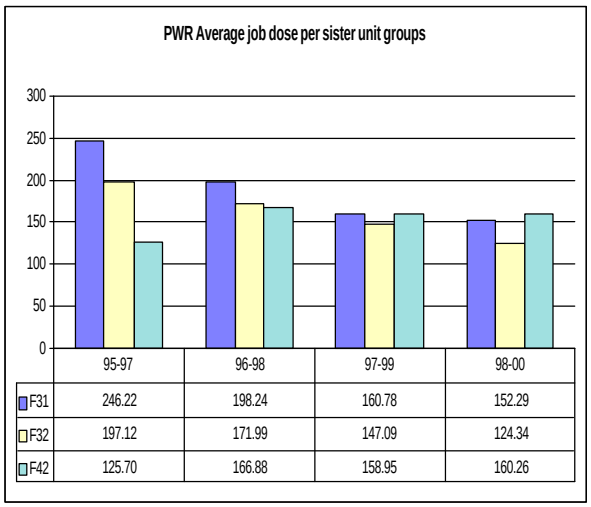
Figure 11. Evolution of the average dose by sister unit group for the job "Routine inspection" (man.mSv)



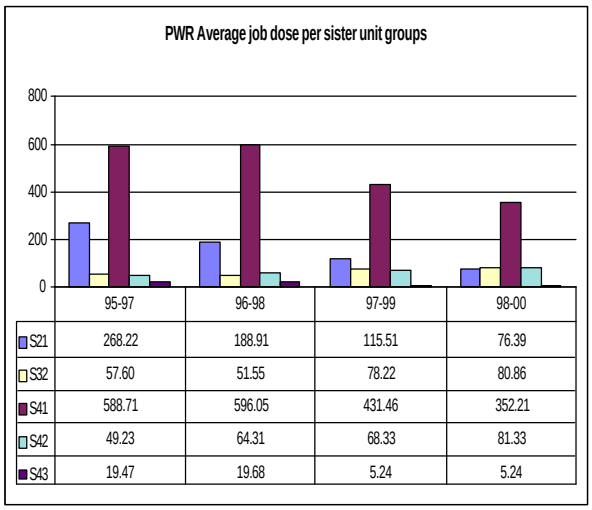
	95-97	96-98	97-99	98-00
ABB2	232.04	335.89	305.84	222.63
ABB3	281.90	353.52	340.13	285.90
ABB4	134.74	95.26	138.12	156.50



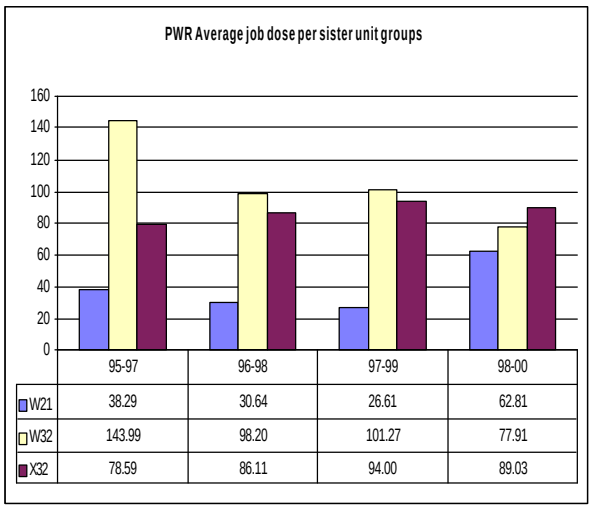
	95-97	96-98	97-99	98-00
GE5	194.42	193.36	155.54	137.53
S69	186.37	225.34	200.08	175.31
S72	161.40	132.30		



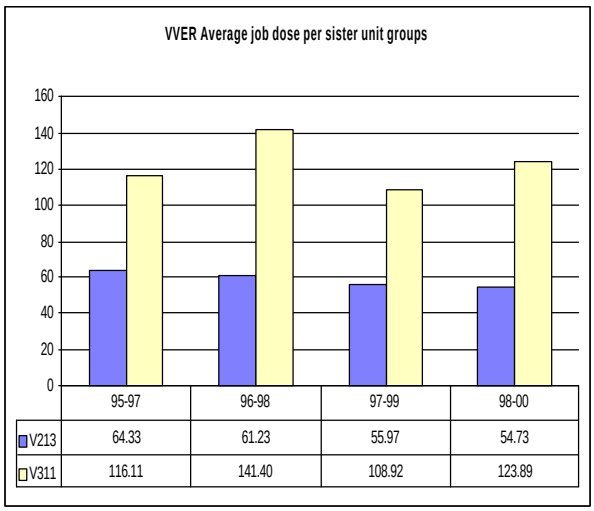
	95-97	96-98	97-99	98-00
F31	246.22	198.24	160.78	152.29
F32	197.12	171.99	147.09	124.34
F42	125.70	166.88	158.95	160.26



	95-97	96-98	97-99	98-00
S21	268.22	188.91	115.51	76.39
S32	57.60	51.55	78.22	80.86
S41	588.71	596.05	431.46	352.21
S42	49.23	64.31	68.33	81.33
S43	19.47	19.68	5.24	5.24

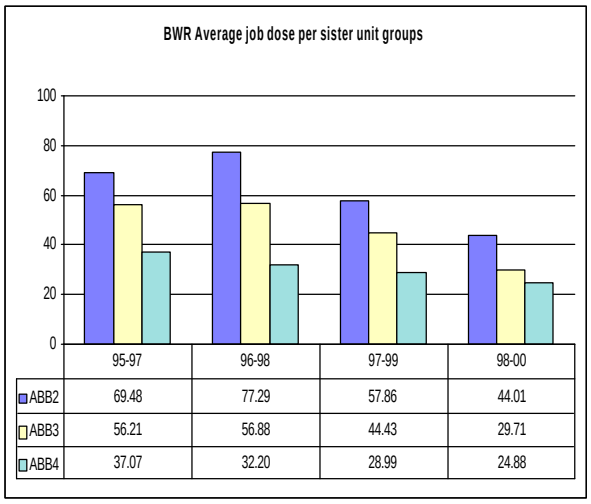


	95-97	96-98	97-99	98-00
W21	38.29	30.64	26.61	62.81
W32	143.99	98.20	101.27	77.91
X32	78.59	86.11	94.00	89.03

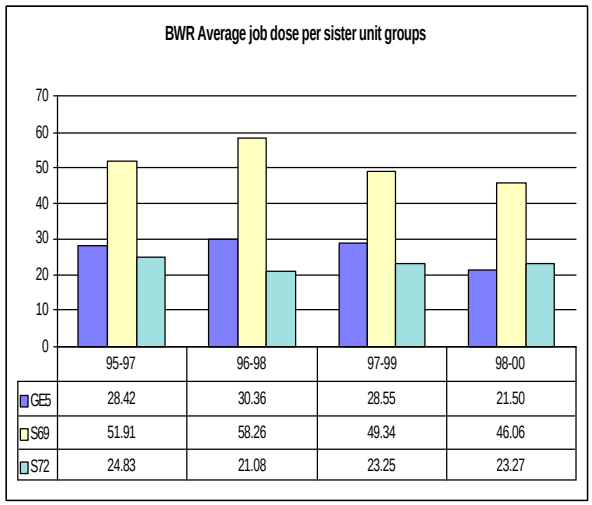


	95-97	96-98	97-99	98-00
V213	64.33	61.23	55.97	54.73
V311	116.11	141.40	108.92	123.89

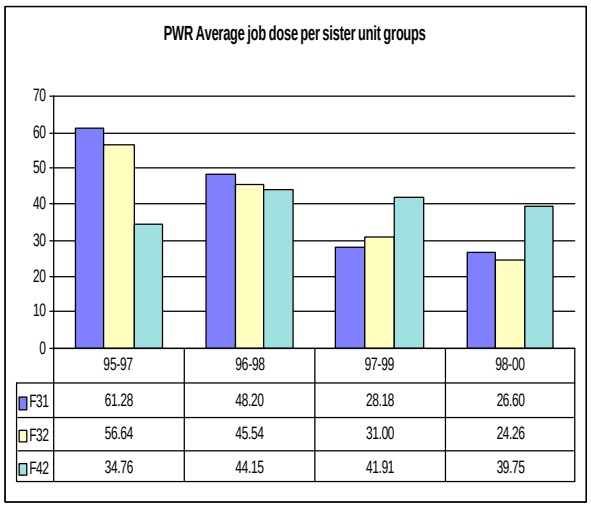
Figure 12. Evolution of the average dose by sister unit group for the job "General work" (man.mSv)



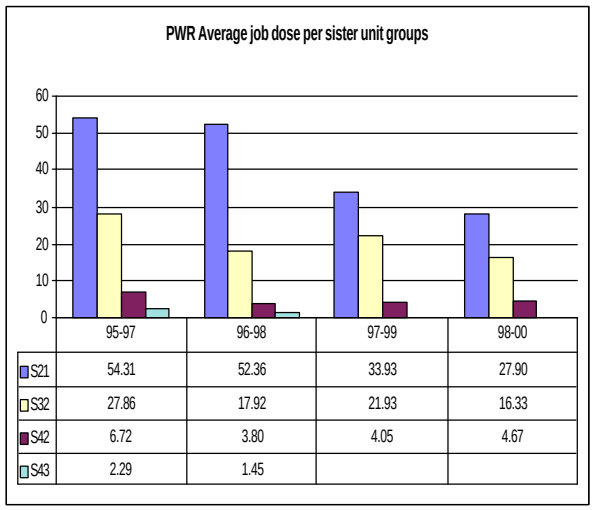
	95-97	96-98	97-99	98-00
ABB2	69.48	77.29	57.86	44.01
ABB3	56.21	56.88	44.43	29.71
ABB4	37.07	32.20	28.99	24.88



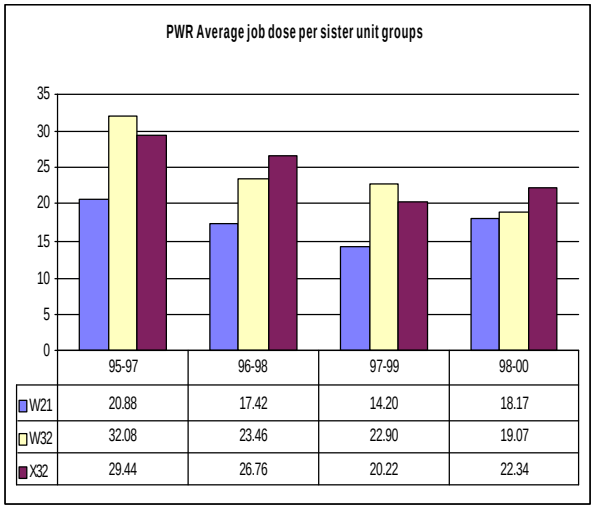
	95-97	96-98	97-99	98-00
GE5	28.42	30.36	28.55	21.50
S69	51.91	58.26	49.34	46.06
S72	24.83	21.08	23.25	23.27



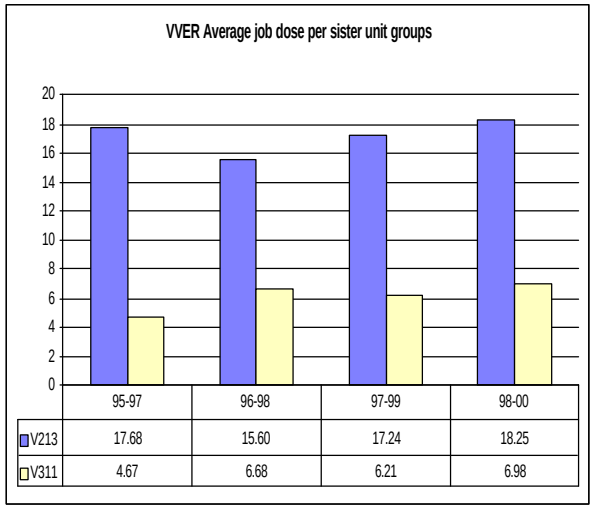
	95-97	96-98	97-99	98-00
F31	61.28	48.20	28.18	26.60
F32	56.64	45.54	31.00	24.26
F42	34.76	44.15	41.91	39.75



	95-97	96-98	97-99	98-00
S21	54.31	52.36	33.93	27.90
S32	27.86	17.92	21.93	16.33
S42	6.72	3.80	4.05	4.67
S43	2.29	1.45		

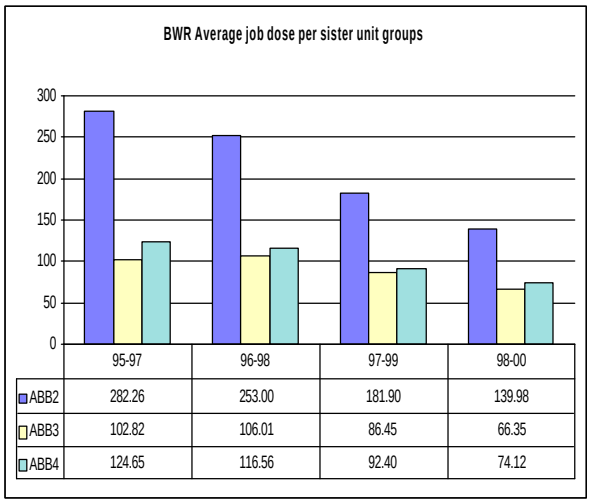


	95-97	96-98	97-99	98-00
W21	20.88	17.42	14.20	18.17
W32	32.08	23.46	22.90	19.07
X32	29.44	26.76	20.22	22.34

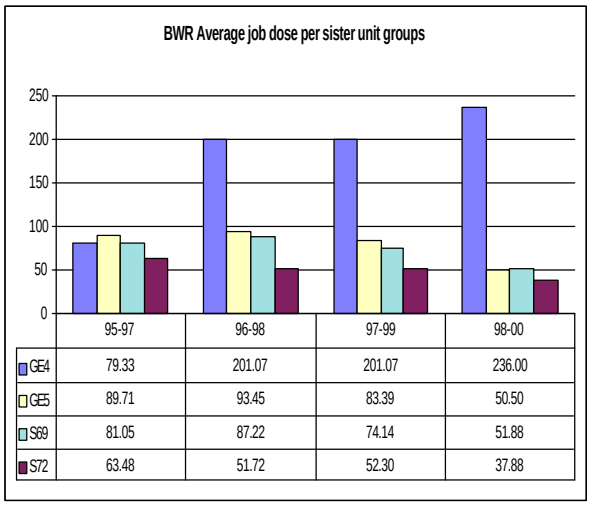


	95-97	96-98	97-99	98-00
V213	17.68	15.60	17.24	18.25
V311	4.67	6.68	6.21	6.98

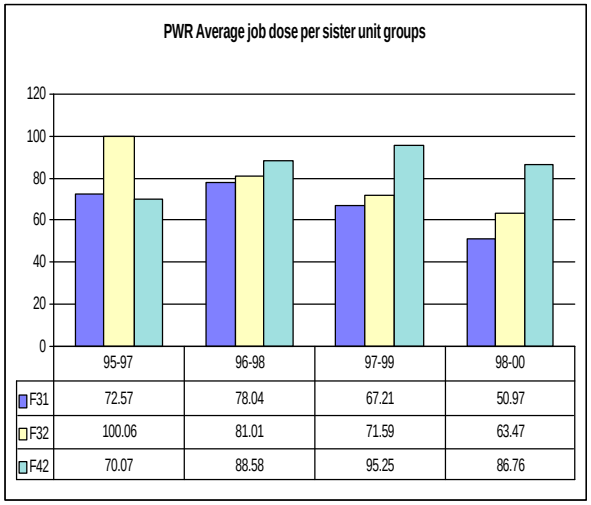
Figure 13. Evolution of the average dose by sister unit group for the job "Scaffolding" (man.mSv)



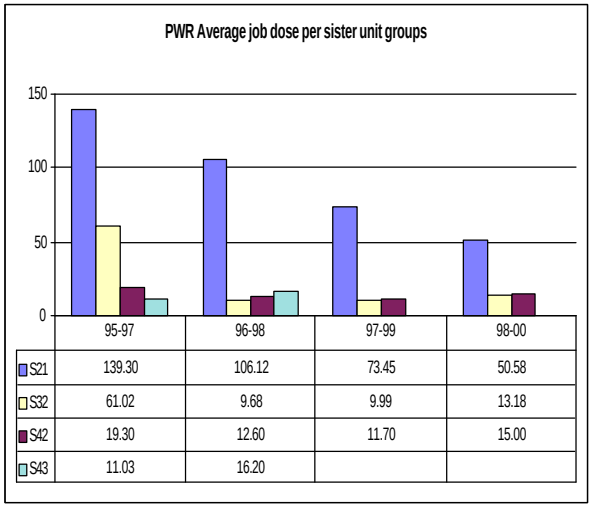
	95-97	96-98	97-99	98-00
ABB2	282.26	253.00	181.90	139.98
ABB3	102.82	106.01	86.45	66.35
ABB4	124.65	116.56	92.40	74.12



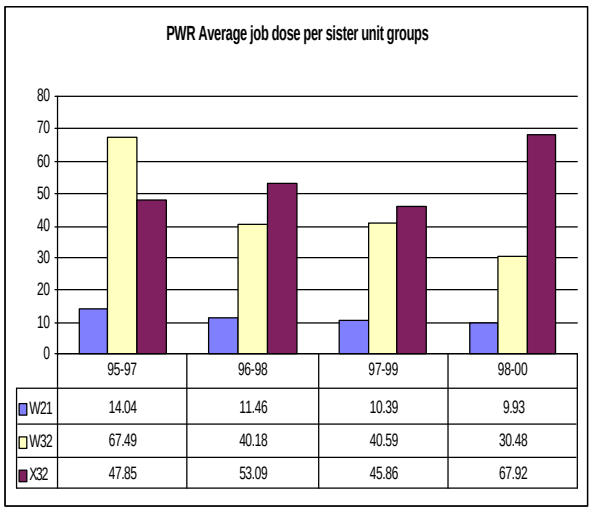
	95-97	96-98	97-99	98-00
GE4	79.33	201.07	201.07	236.00
GE5	89.71	93.45	83.39	50.50
S69	81.05	87.22	74.14	51.88
S72	63.48	51.72	52.30	37.88



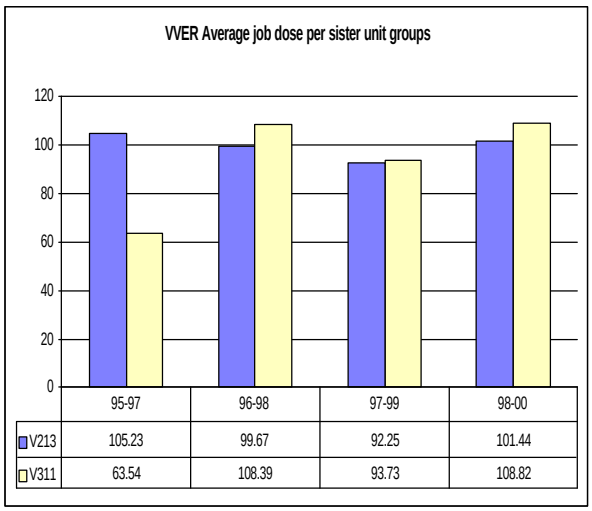
	95-97	96-98	97-99	98-00
F31	72.57	78.04	67.21	50.97
F32	100.06	81.01	71.59	63.47
F42	70.07	88.58	95.25	86.76



	95-97	96-98	97-99	98-00
S21	139.30	106.12	73.45	50.58
S32	61.02	9.68	9.99	13.18
S42	19.30	12.60	11.70	15.00
S43	11.03	16.20		

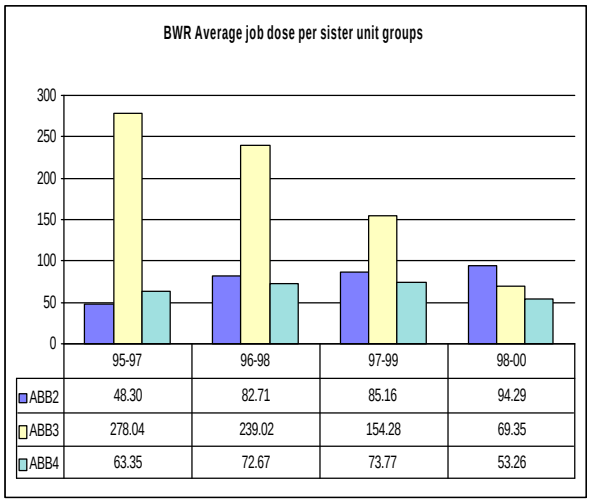


	95-97	96-98	97-99	98-00
W21	14.04	11.46	10.39	9.93
W32	67.49	40.18	40.59	30.48
X32	47.85	53.09	45.86	67.92

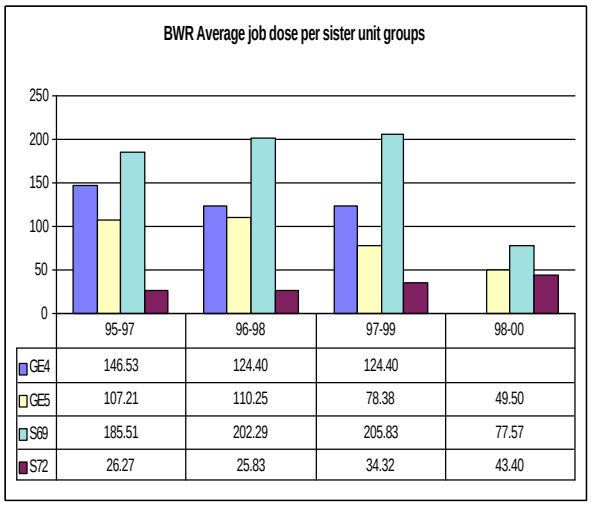


	95-97	96-98	97-99	98-00
V213	105.23	99.67	92.25	101.44
V311	63.54	108.39	93.73	108.82

Figure 14. Evolution of the average dose by sister unit group for the job "Insulation" (man.mSv)

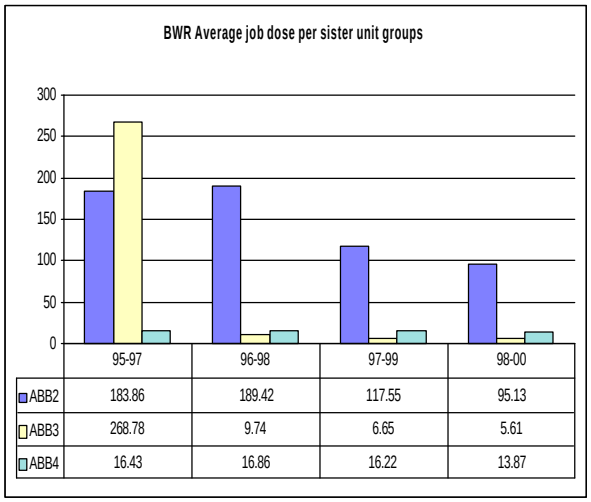


	95-97	96-98	97-99	98-00
ABB2	48.30	82.71	85.16	94.29
ABB3	278.04	239.02	154.28	69.35
ABB4	63.35	72.67	73.77	53.26

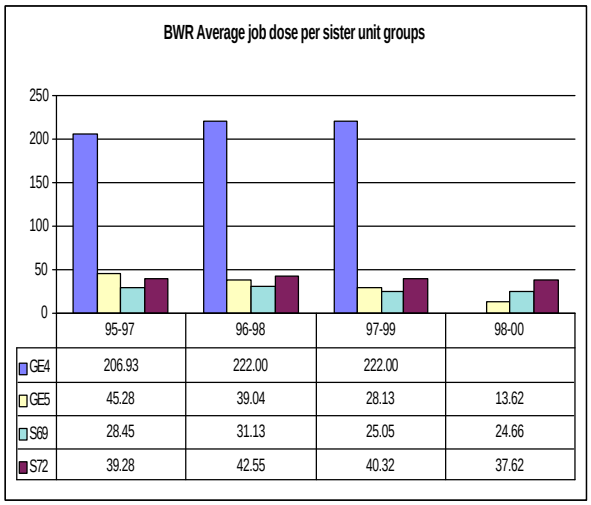


	95-97	96-98	97-99	98-00
GE4	146.53	124.40	124.40	
GE5	107.21	110.25	78.38	49.50
S69	185.51	202.29	205.83	77.57
S72	26.27	25.83	34.32	43.40

Figure 15. Evolution of the average dose by sister unit group for the job "Steam system" (man.mSv)



	95-97	96-98	97-99	98-00
ABB2	183.86	189.42	117.55	95.13
ABB3	268.78	9.74	6.65	5.61
ABB4	16.43	16.86	16.22	13.87



	95-97	96-98	97-99	98-00
GE4	206.93	222.00	222.00	
GE5	45.28	39.04	28.13	13.62
S69	28.45	31.13	25.05	24.66
S72	39.28	42.55	40.32	37.62

Figure 16. Evolution of the average dose by sister unit group for the job "Recirculation system & coolant pump seal water system Steam system" (man.mSv)

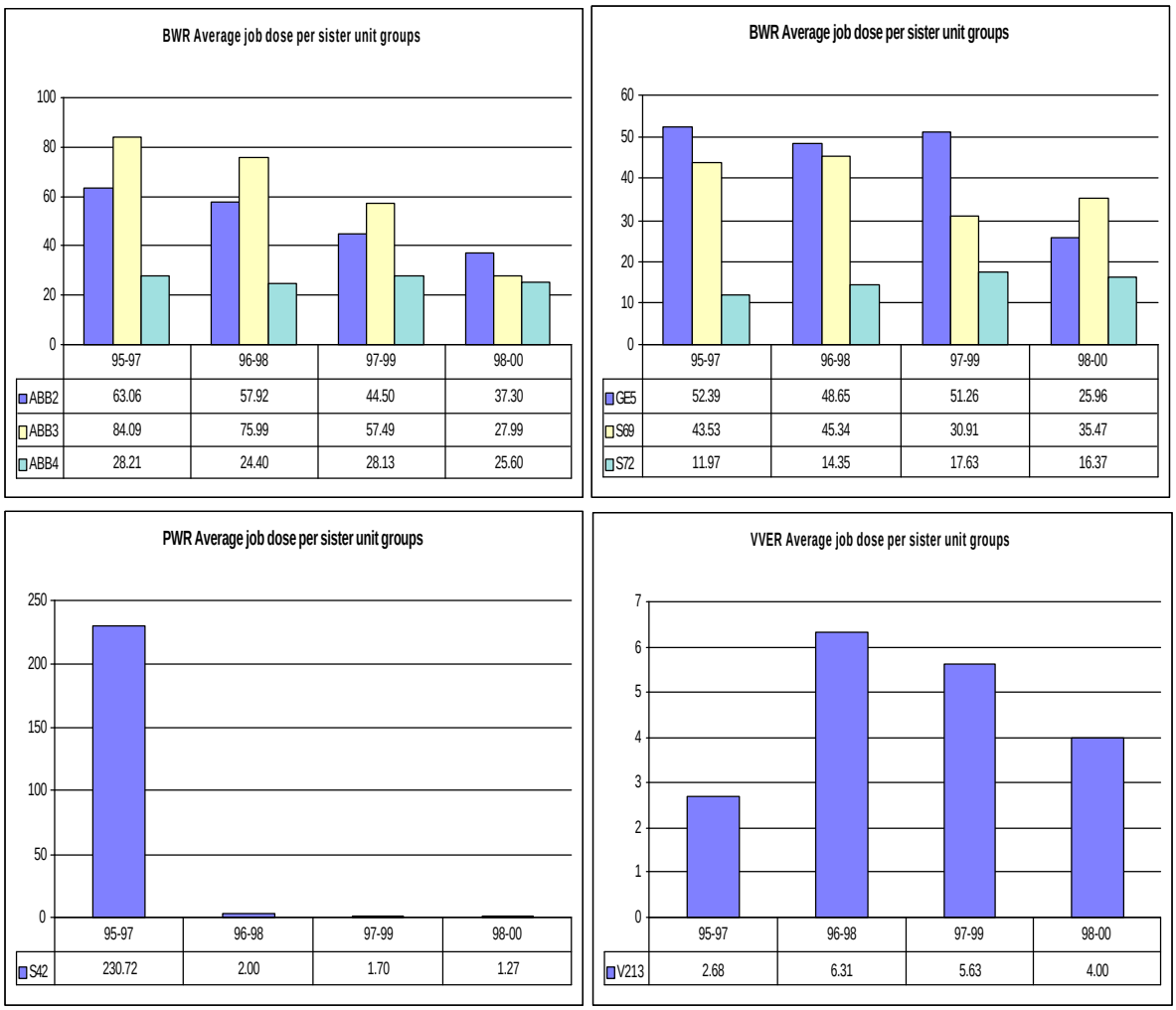


Figure 17. Evolution of the average dose by sister unit group for the job "Control rod drives" (man.mSv)

ANNEX 1

SISTER UNIT GROUPS (referred to in this Information Sheet)

In italics are the units belonging to the group but not providing regular data per job

PWR	
F31	
Bugey 2	France
Bugey 3	France
Bugey 4	France
Bugey 5	France
Fessenheim 1	France
Fessenheim 2	France
F32	
Blayais 1	France
Blayais 2	France
Blayais 3	France
Blayais 4	France
Chinon B1	France
Chinon B2	France
Chinon B3	France
Chinon B4	France
Cruas 1	France
Cruas 2	France
Cruas 3	France
Cruas 4	France
Dampierre 1	France
Dampierre 2	France
Dampierre 3	France
Dampierre 4	France
Daya Bay 1	China
Daya Bay 2	China
Gravelines 1	France
Gravelines 2	France
Gravelines 3	France
Gravelines 4	France
Gravelines 5	France
Gravelines 6	France
Koeberg 1	South Africa
Koeberg 2	South Africa
St. Laurent B1	France
St. Laurent B2	France
Tricastin 1	France
Tricastin 2	France
Tricastin 3	France
Tricastin 4	France
Ulchin 1	*Korea*
Ulchin 2	*Korea*
F42	
Belleville 1	France
Belleville 2	France
Cattenom 1	France
Cattenom 2	France
Cattenom 3	France
Cattenom 4	France
Flamanville 1	France
Flamanville 2	France
Golfech 1	France
Golfech 2	France
Nogent 1	France
Nogent 2	France
Paluel 1	France
Paluel 2	France
Paluel 3	France
Paluel 4	France
Penly 1	France
Penly 2	France
St. Alban 1	France
St. Alban 2	France
S21	
Borssele	Netherlands
Obrigheim	Germany
S32	
Gosgen	Switzerland
Neckar 1	Germany
Trillo	Spain
S41	
Biblis A	Germany
Biblis B	Germany
Unterweser	Germany
S42	
Brokdorf	Germany
Grafenrheinfeld	Germany
Grohnde	Germany
Philippsburg 2	Germany
S43	
Emsland	Germany
Isar 2	Germany
Neckar 2	Germany
W21	
Beznau 1	Switzerland
Beznau 2	Switzerland
Doel 1	Belgium
Doel 2	Belgium
Ginna	*USA*
Mihama 1	*Japan*
Point Beach 1	*USA*
Point Beach 2	*USA*
W22	
Krsko 1	Slovenia
Prairie Island 2	*USA*
Prairie Island 1	*USA*
Angra 1	*Brazil*
Kori 2	*Korea*
Kori 1	*Korea*
Kewaunee 1	*USA*
W32	
Almaraz 1	Spain
Almaraz 2	Spain
Asco 1	Spain
Asco 2	Spain
Doel 4	Belgium
Harris 1	USA
Ringhals 3	Sweden
Ringhals 4	Sweden
Tihange 3	Belgium
Vandellos 2	Spain
Kori 3	*Korea*
Kori 4	*Korea*
Summer	*USA*
Yonggwang 1	*Korea*
Yonggwang 2	*Korea*
X32	
Doel 3	Belgium
Tihange 2	Belgium
V213	
Bohunice 3	Slovakia
Bohunice 4	Slovakia
Dukovany 1	Czech Rep.
Dukovany 2	Czech Rep.
Dukovany 3	Czech Rep.
Dukovany 4	Czech Rep.
Greifswald 5	Germany
Mochovce 1	Slovakia
Mochovce 2	Slovakia
Paks 1	Hungary
Paks 2	Hungary
Paks 3	Hungary
Paks 4	Hungary
Kola 3	*Russia*
Kola 4	*Russia*
Rovno 1	*Ukraine*
Rovno 2	*Ukraine*
V311	
Loviisa 1	Finland
Loviisa 2	Finland
BWR	
ABB2	
Barsebäck 1	Sweden
Barsebäck 2	Sweden
Oskarshamn 2	Sweden
ABB3	
Forsmark 1	Sweden

Forsmark 2	Sweden
TVO 1	Finland
TVO 2	Finland
ABB4	
Forsmark 3	Sweden
Oskarshamn 3	Sweden
GE4	
Laguna Verde 2	Mexico
Laguna Verde 1	Mexico
WNP 2	*USA*
Tokai 2	*Japan*
Fukushima Daiichi 6	*Japan*
Nine Mile Point 2	*USA*
La Salle 2	*USA*
La Salle 1	*USA*
GE5	
Cofrentes	Spain
Leibstadt 1	Switzerland
Clinton	*USA*
Grand Gulf 1	*USA*
Perry 1	*USA*
River Bend 1	*USA*
S69	
Brunsbüttel 1	Germany
Isar 1	Germany
Krümmel 1	Germany
Philippsburg 1	Germany
S72	
Gundremmingen B	Germany
Gundremmingen C	Germany