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ISOE INFORMATION SHEET

INVESTIGATION ON ACCESS AND DOSIMETRIC FOLLOW-UP RULES IN NPPs FOR FOREIGN WORKERS

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1. INTRODUCTION

Contractors' workers are more and more often led to work abroad during their professional life. It has been considered useful to make a review on the applied rules and the current practices which are implemented for foreign workers in the different nuclear power plants, before and during their jobs.

This investigation, which started on behalf of a European request, has covered almost all the countries who have nuclear power plants in operation today. 44 answers have been received from ISOE contact-persons belonging to 21 countries: Belgium, Finland, France, Germany, the Netherlands, Spain, Sweden, Switzerland, UK, Bulgaria, Czech Republic, Hungary, Romania, Lithuania, Slovakia, Slovenia, China, USA, Brazil, Japan and Korea.

This Information Sheet reveals the tendencies of the practices, and also points out the main exceptions brought to the fore by the investigation.

2. PROFESSIONAL QUALIFICATION

The qualification obtained in the country of origin is not systematically agreed abroad. Only half of the NPPs who have answered to the questionnaire (20 cases / 44 answers) consider this qualification as an official « work passport ». But, very often, there is no homogeneity inside a given country: in fact, this point mainly depends on the nuclear power plant where the worker is supposed to work.

Even if the professional qualification is recognised, mandatory access tests are sometimes needed (34/44) and/or a complementary training is often given to foreign workers (38/44).

3. WORKERS' DOSIMETRIC HISTORY

More surprising is that the detailed dosimetric history (a “dosimetric passport”) of the foreign worker is not requested everywhere before his work: for example in Belgium, Lithuania, Slovakia or USA (see Annex, Table 1, column 4). However, a certificate of the employer attesting that doses taken by the worker in the past are compatible with the national and corporate dose limits, is systematically requested. For example, in Slovenia, one request the dosimetric history and medical examinations for the last five years, and the contractor company has to approve all these data in a special form as well as dose credit.

4. MEDICAL ABILITIES

The medical ability provided by a medical foreign authority is generally considered as valid (24/44). But, the production of a simple medical certificate is not sufficient when other abilities are requested (13/44). To check the ability and in order to valid the medical investigation undertaken abroad, the complete medical file of the worker can also be requested (13/44). The investigation for alcohol and/or drugs consumption is also quite widely used (13/44). Other investigations are less common: the criminal background can be checked (like in the USA), psychological tests can be performed (that is the case in the Czech Republic and Slovenia) and, the pregnancy test for women workers is sometimes implemented (like in Germany).

If necessary, the medical ability is provided by the medical authority of the host NPP (29/44). This ability will stay valid for 6 months (14/44) to one year (30/44).

5. RESPONSABILITY

In the majority of cases, the utilities' HP departments are in charge of recording the operational, legal and internal doses of foreign workers, with a very few exceptions. For example, in France and Belgium, the utility's medical department is in charge of internal dosimetry, and the contractor's medical department is in charge of legal recording of doses. Sometimes, this responsibility is shared between utility and contractor (see Table A).

Table A. Services in charge of operational, legal and internal dosimetry

No of Answers	The Utility's HP Dept is in charge of			The Utility's Medical Dept is in charge of			The Contractor's HP Dpt is in charge of		The Contractor's Medical Dpt is in charge of	
	O.D.	L.D.	I.D.	O.D.	L.D.	I.D.	O.D.	L.D.	O.D.	L.D.
YES	41	35	39	0	3	3	2	8	0	2
NO	0	5	2	41	37	38	39	32	41	38
Exceptions in	-	France Brazil Japan	Belgium France	-	Belgium Japan	Belgium France	Bulgaria Japan	Belgium Germany Spain USA Brazil Japan	-	Belgium France

O.D. : Operational Dosimetry ; L.D. : Legal Dosimetry ; I.D. : Internal Dosimetry

6. DOSE LIMITS

In the majority of cases, the regulatory individual dose limit is still fixed at 50 mSv per year. Only, the Netherlands, Switzerland and Romania (it is also the case in the UK since January 2000) have already opted for 20 mSv per year as a maximum. It is stricter than the ICRP 60 recommendation, which has proposed that value as a five years rolling-average (100 mSv/5 years), and than the European Directive (96-29) which has also introduced the 100 mSv as a limit for five years. This limit should be applied in the European Community before mid-May 2000, but Finland, Sweden and the UK have anticipated that deadline. That is also the case for Lithuania, the Czech Republic, Slovakia and Korea. The regulatory three-monthly based limit (generally equal to 25 mSv or 30 mSv) is not widespread. This can also be said for the « whole life » dose limit, for which values vary considerably from one country to another (up to a factor of 5).

Figure 1 to 4 show also very important disparities in the establishment of corporate dose constraints in different NPPs over the world. For all the different individual dose limits, a factor of -at least- 4 is observed between the stricter level and the highest. This factor is equal to five when comparing the strictest corporate dose limits with the highest regulatory dose limits.

Therefore it is not very easy for an employer in a contractor firm to manage the workforce exposure when dealing with these discrepancies. The harmonisation of practices in that area is strongly desirable.

7 EXTERNAL DOSE MEASUREMENT EQUIPMENTS

TLDs (25/42) and/or film badges (20/42) are almost everywhere the devices used for the legal (official) dose recording. A second device is sometimes mandatory, but its dose measurements are only used as official results in case of a failure or a default in the legal apparatus: in these cases, the second device is an electronic dosimeter.

Two exceptions must be pointed out: the status of the electronic dosimetry has recently changed in France and in the UK (majority of NPPs), becoming a legal means of dose measurement.

The device used for operational dosimetry (real time dose measurement) is everywhere an electronic dosimeter – with or without alarm.

8. INTERNAL DOSES ASSESSMENT AND RESULTS

At least one of the following types of controls, - whole body gamma measurements (36/44), - whole body quicky counting (32/44), or - bio-assays in case of incidents (25/44), is performed to assess the foreign workers' internal doses. There is more differences lying in the thresholds records (% of ALI) and minimum levels used to trigger further investigations. The register and action levels vary from 0.1% of ALI up to 20% of ALI (Annual Limit of Intake)! Moreover, most of the NPPs are not yet using the latest values of dose conversion factors and models recommended to be used by ICRP since 1990... The more widespread reference used for the assessment of internal doses is ICRP Publication 30.

This confirm one of the conclusion taken from the EAN Workshop on “Managing internal exposures” (München 1999): *“large variations in the intake and dose assessment results were observed, essentially due to the variety of the different biokinetic models and software tools used. Misinterpretation of instructions (i.e. the exposure scenario) and inconsistencies between dose*

factors and models used (old/old, new/old or old/new) were also put in evidence. Internal dose inter-comparisons (mSv) reveal commonly larger differences in the results than measurements inter-comparisons (Bq). (...) Depending on the case, the differences vary from a factor ten to several thousands!”

The addressee(s) of internal doses results is (are) shown on Table 4. Usually, the worker is personally informed of the internal (and also external) doses he has taken abroad. The employer or the HP departments of the employer is also often informed (except for France, USA, Brazil, Korea, and China). If this is not the case, the HP department of the nuclear power plant has the information, except for France, where the Medical Department of the NPP is the only one other addressee (than the worker himself) of the internal dose results.

ANNEX

Table 1.	Recognition of qualification of foreign workers and verifications made before their work
Table 2.	Medical and other abilities
Figure 1.	Corporate and regulatory dose limits (over one year)
Figure 2.	Corporate and regulatory dose limits (over 60 months = 5 years)
Figure 3.	Corporate and regulatory dose limits (over 3 months)
Figure 4.	Corporate and regulatory dose limits (over the whole occupational life)
Table 3.	Internal doses (Type of controls – Register Levels)
Table 4.	Internal doses results addressees

Table 1. Recognition of qualification of foreign workers and verifications made before their work

Country	NPP	Foreign Qualification agreed?	Mandatory Access Tests?	Complementary Training?	Dosimetric passport requested?
Belgium	Doel	X	X	X	
	Tihange	X	X	X	
Finland	Loviisa			X	
	TVO		X	X	X
France	<i>all sites *</i>				X
Germany	Krummel	X	X	X	X
	AVR	X		X	X
	Obrigheim	X		X	X
	Brokdorf		X		X
	Neckar			X	X
	Philippsburg			X	X
Netherlands	Borssele		X	X	X
Spain	Cofrentes	X	X	X	X
	SM de Garona	X	X	X	X
	<i>all sites *</i>	X	X	X	X
Sweden	Oskarshamn	X	X	X	X
	Forsmark				X
Switzerland	Beznau		X	X	X
UK	Sizewell		X		X
Bulgaria	Kozloduy	X		X	X
Czech Rep.	Dukovany	X	X		X
Hungary	Paks	X	X	X	X
Romania	Cernavoda		X	X	X
Lithuania	Ignalina	X	X		
Slovakia	Bohunice	X		X	
Slovenia	Krsko		X	X	X
China	Daya Bay	X	X	X	
	Qinshan	X	X	X	X
USA	<i>all sites *</i>		X	X	
	San Onofre	X	X	X	
	Palo Verde		X	X	X
Brazil	Angra	X		X	X
Japan	Tomari		X	X	X
	Fukushima / Kashiwazaki		X	X	X
	Tsuruga / Tokai		X	X	X
	Ikata		X	X	X
	Onagawa		X	X	X
	Sendai / Genkai		X	X	X
	Hamaoka		X	X	X
	Mihama / Oh / Takahama		X	X	X
	Shimane		X	X	X
Shika		X	X	X	
Korea	Yonggwang	X	X	X	X
	<i>all sites *</i>	X	X	X	X

all sites * = most current practice (generic answer)

Table 2. Medical and other abilities

Country	NPP	Medical Ability from abroad valid?	Other abilities requested?	Medical file requested?	Investigation for alcohol and/or drugs consumption?	Other Investigations?	Medical Ability provided, if necessary?	Duration of the validity of the medical ability
Belgium	Doel	X		X			X	6 months
	Tihange						X	6 months
Finland	Loviisa	X					X	1 year
	TVO	X			X		X	1 year
France	<i>all sites</i> *		X	X			X	6 months
Germany	Krummel	X	X				X	1 year
	AVR	X	X			-	X	1 year
	Obrigheim	X	X			X	X	1 year
	Brokdorf						X	1 year
	Neckar		X		X	X	X	1 year
	Philippsburg	X	X				X	1 year
Netherlands	Borssele	X					X	1 year
Spain	Cofrentes	X	X	X			X	1 year
	SM de Garona	X		X			X	1 year
	<i>all sites</i> *		X				X	1 year
Sweden	Oskarshamn	X		X	X	X	X	1 year
	Forsmark						X	1 year
Switzerland	Beznau			X			X	1 year
UK	Sizewell	X			X		X	1 year
Bulgaria	Kozloduy	X	X	X	X		X	1 year
Czech Rep.	Dukovany	X	X		X	X	X	1 year
Hungary	Paks	X		X	X		X	1 year
Romania	Cernavoda	X			X		X	1 year
Lithuania	Ignalina		-		X			1 year
Slovakia	Bohunice	X						1 year
Slovenia	Krsko	X			X	X	X	1 year
China	Daya Bay	X		X			X	1 year
	Qinshan	X		X				1 year
USA	<i>all sites</i> *		X		X	X	X	6/12 months
	San Onofre	X	X		X	X	X	1 year
	Palo Verde		X	X	X	X		1 year
Brazil	Angra	X					X	1 year
Japan	Tomari							6 months
	Fukushima / Kashiwazaki							6 months
	Tsuruga / Tokai							6 months
	Ikata							6 months
	Onagawa							6 months
	Sendai / Genkai							6 months
	Hamaoka							6 months
	Mihama / Ohi / Takahama							6 months
	Shimane							6 months
	Shika							6 months
Korea	Yonggwang	X		X				1 year
	<i>all sites</i> *	X		X			X	1 year

Figure 1. Dose Limits over one year

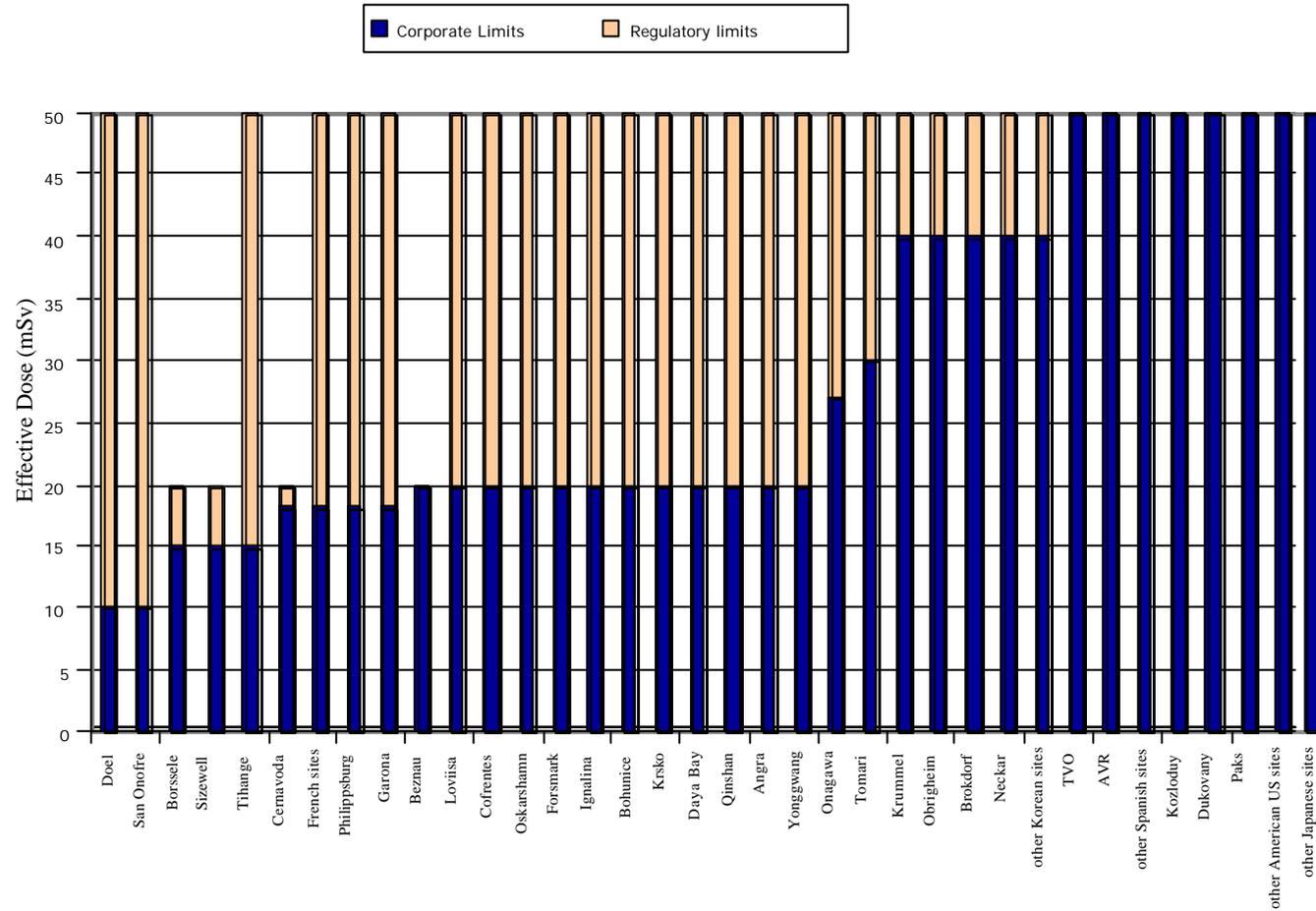


Figure 2. Dose Limits over 5 years

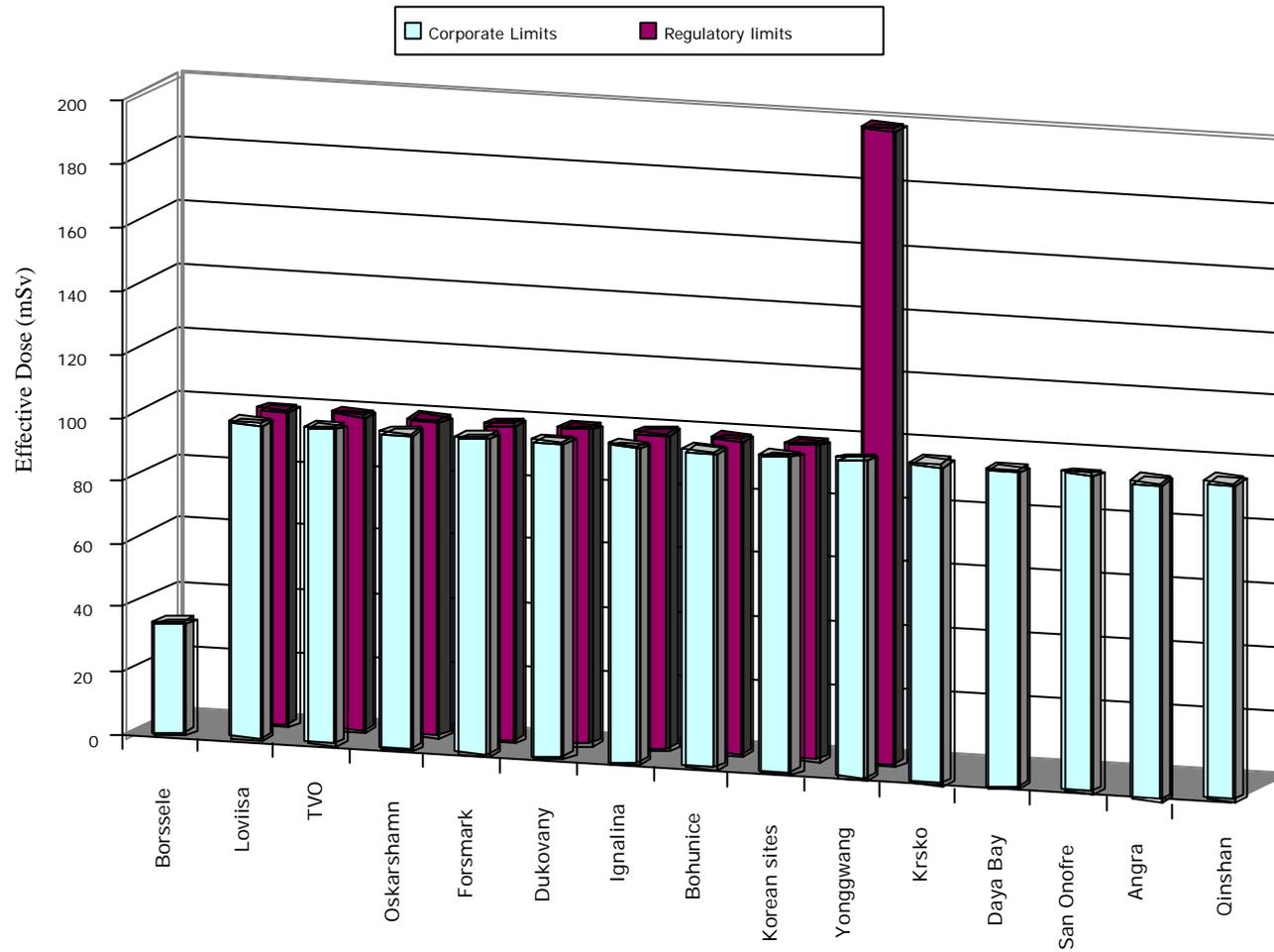


Figure 3. Dose Limits over 3 months

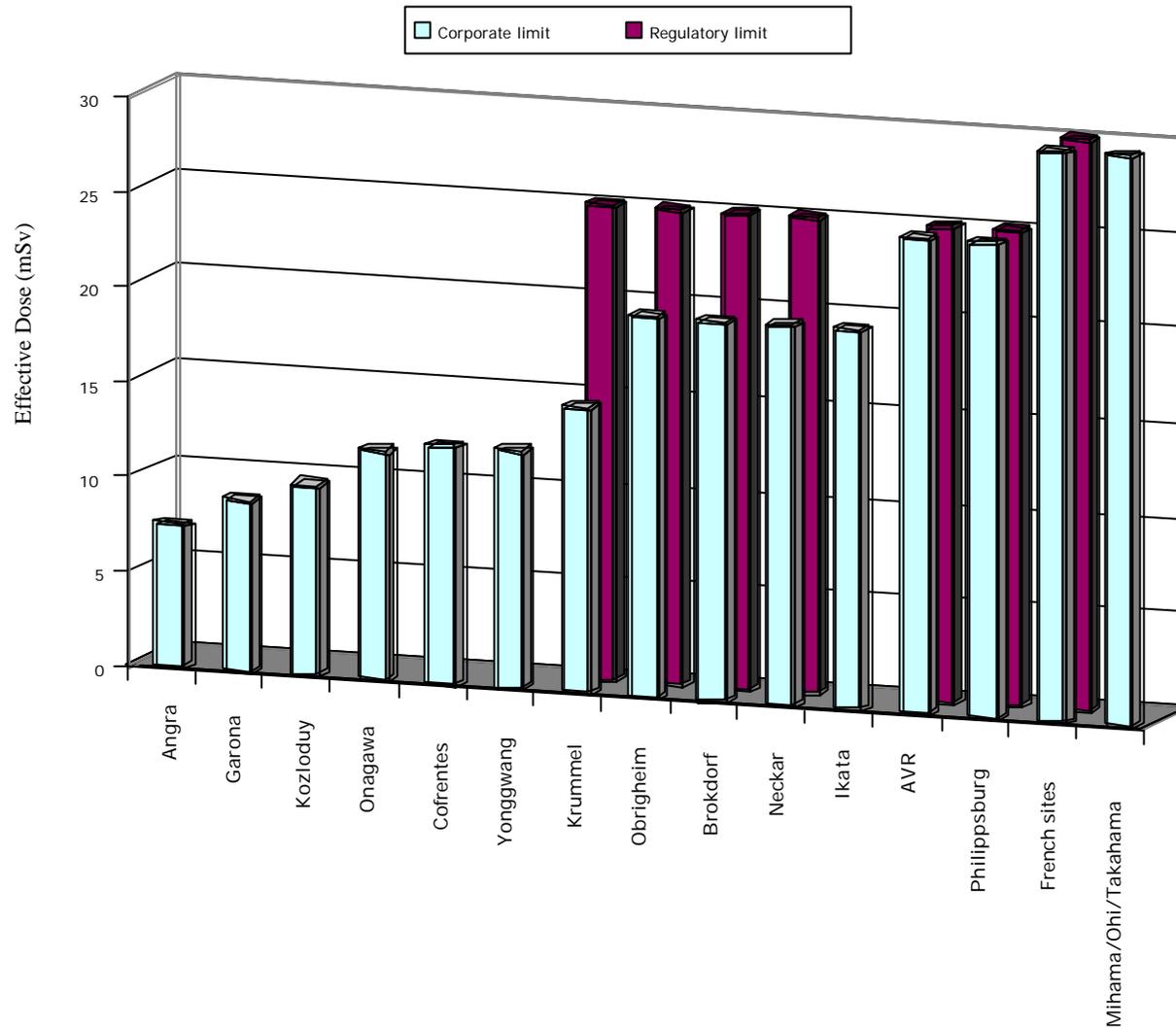


Figure 4. Dose Limits over the whole occupational life

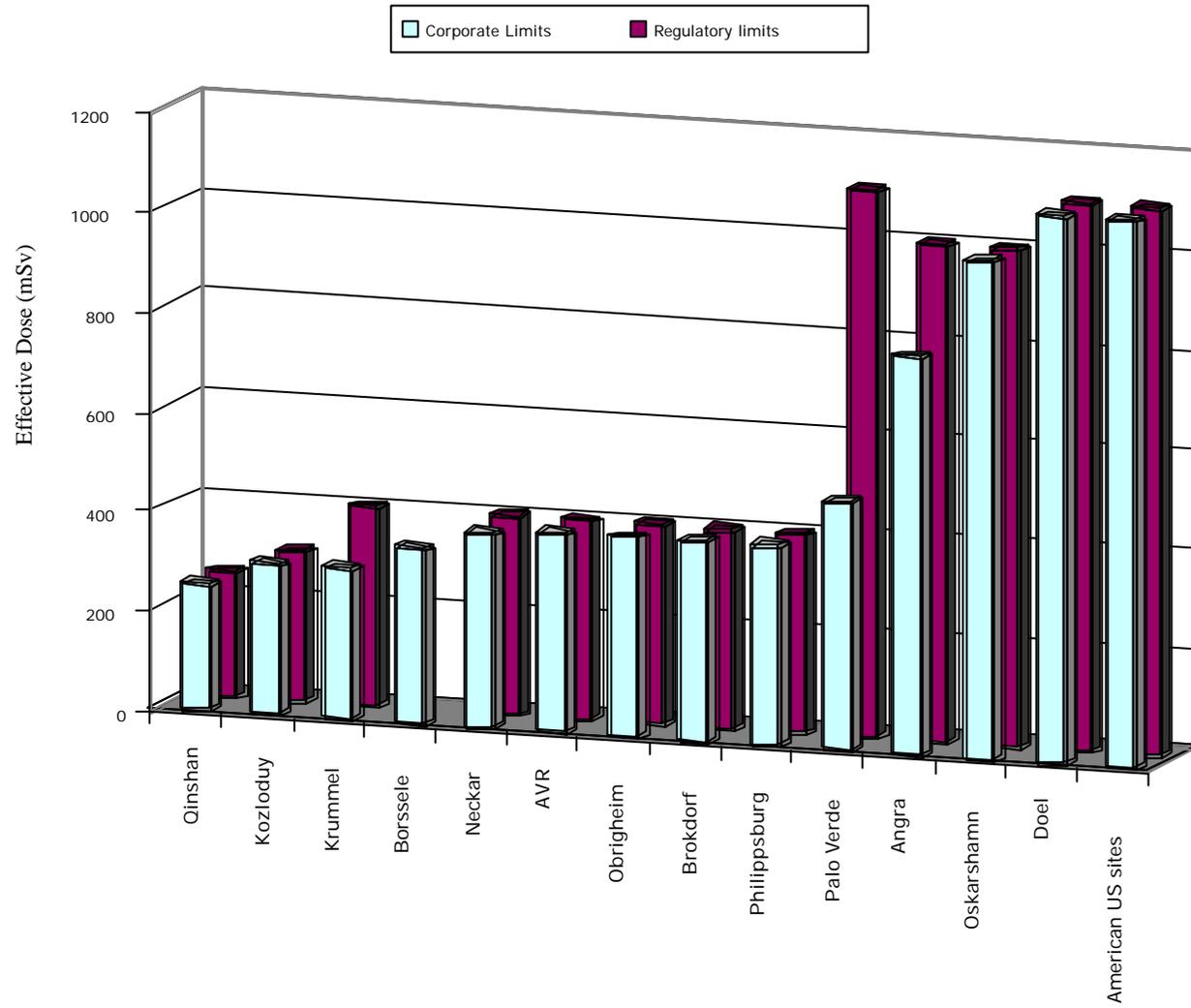


Table 3. Internal doses (Type of controls – Register Levels)

Country	NPP	Whole body gamma measurement	Whole body quicky counting	Bio-assays	Register Level % of ALI
Belgium	Doel	X	X	X	1%
	Tihange	X	X	X	1%
Finland	Loviisa		X		-
	TVO	X	X		0.4%
France	<i>all sites *</i>				1%
Germany	Krummel		X	X	10%
	AVR	X		X	1.5%
	Obrigheim	X	X		
	Brokdorf		X		3%
	Neckar	X		X	
	Philippsburg	X	X		3%
Netherlands	Borssele	X	X		2%
Spain	Cofrentes	X	X		1%
	SM de Garona	X	X		1%
	<i>all sites *</i>	X	X	X	1%
Sweden	Oskarshamn	X			?
	Forsmark	X			0.5%
Switzerland	Beznau		X		1200 Bq
UK	Sizewell		X	X	>10% DAC
Bulgaria	Kozloduy	X	X		1%
Czech Rep.	Dukovany	X		X	0.2%
Hungary	Paks				?
Romania	Cernavoda	X		X	10%
Lithuania	Ignalina	X			(1%) - 5%
Slovakia	Bohunice	X	X	X	20%
Slovenia	Krsko	X			Co-60: 400 Bq
China	Daya Bay	X	X	X	1%
	Qinshan		X		1%
USA	<i>all sites *</i>	X		X	0.25
	San Onofre	X	X		0.1%
	Palo Verde	X	X	X	8%
Brazil	Angra	X			0.6%
Japan	Tomari	X	X	X	4%
	Fukushima / Kashiwazaki	X	X	X	4%
	Tsuruga / Tokai	X	X	X	4%
	Ikata	X	X	X	4%
	Onagawa	X	X	X	4%
	Sendai	X	X	X	4%
	Hamaoka	X	X	X	4%
	Mihama / Ohi / Takahama	X	X	X	4%
	Shimane	X	X	X	4%
	Shika	X	X	X	4%
	Korea	Yonggwang	X	X	X
<i>all sites *</i>		X	X	X	4%

all sites * = most current practice (generic answer)

Table 4. Internal doses results addressees

Country	NPP	Worker	Employer	Employer's HP Dpt	NPP's HP Dpt	Employer's Medical Dpt	NPP's Medical Dpt
Belgium	Doel	X	X	X	X	X	X
	Tihange	X	X		X	X	X
Finland	Loviisa	X	X		X		
	TVO	X	X	X	X	X	X
France	<i>all sites</i> *	X					X
Germany	Krummel	X	X				
	AVR	X	X	X	X		
	Obrigheim	X	X	X	X		
	Brokdorf	X		X	X		
	Neckar	X	X	X	X		X
	Philippsburg			X	X		
Netherlands	Borssele	X	X	X	X		X
Spain	Cofrentes	X	X				
	SM de Garona	X	X				
	<i>all sites</i> *	X	X	X	X	X	X
Sweden	Oskarshamn	X	X	X	X		
	Forsmark	X	X	X	X		
Switzerland	Beznau		X	X			
UK	Sizewell	X	X		X		
Bulgaria	Kozloduy	X	X	X	X	X	
Czech Rep.	Dukovany	X	X		X	X	
Hungary	Paks	-	-	-	-	-	-
Romania	Cernavoda	X	X		X		
Lithuania	Ignalina	X	X	X	X		
Slovakia	Bohunice		X		X		X
Slovenia	Krsko	X	X		X		X
China	Daya Bay	X			X		
	Qinshan	X	X	X	X		
USA	<i>all sites</i> *	X		X	X		
	San Onofre	X			X		
	Palo Verde	X			X		
Brazil	Angra	X			X		
Japan	Tomari	X		X	X		
	Fukushima / Kashiwazaki	X		X	X		
	Tsuruga / Tokai	X		X	X		
	Ikata	X	X	X	X		X
	Onagawa	X		X	X		
	Sendai	X			X		
	Hamaoka	X		X	X		
	Mihama / Ohi / Takahama	X		X	X		
	Shimane	X		X	X		
Shika	X		X	X			
Korea	Yonggwang	X	X		X		
	<i>all sites</i> *	X	X		X		

all sites * = most current practice (generic answer)