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ISOE INFORMATION SHEET

MAN-SIEVERT MONETARY VALUE SURVEY (2012 UPDATE)

ISOE European Technical Centre - Information Sheet No. 55 (2012)

In order to balance the costs associated with radiological protection options and their benefits in terms of exposure reduction the International Commission on Radiation Protection has suggested the use of cost benefit or cost effectiveness analysis in which options' benefits or effectiveness are given a monetary value according to a monetary reference value of the avoided unit of exposure: the man-sievert value, often referred as "alpha value".

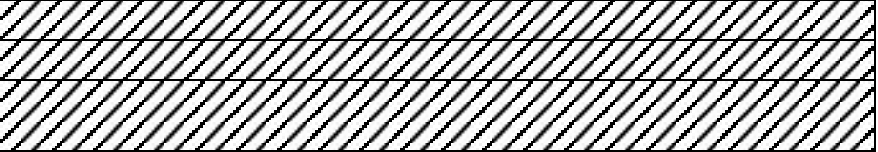
In 1997, the ISOE European Technical Centre performed a first international survey among regulatory bodies and nuclear facilities to check the actual use of such a tool in the different countries. A second survey has been performed in 2002 to update the first survey.

The main conclusions, as well as the values used have been made available through the ETC ISOE Information Sheet No. 18 and No. 34 downloadable from the ETC Web site (<http://isoe.cepn.asso.fr/>).


Today, it appears useful to check whether the values have evolved or not. Therefore a third survey has been performed in 2009 among all the ISOE participants. The following tables show a synopsis of the 2002 and 2009 results. The graphs present the 2009 values and the 2002 values when there have been no answers in 2009. It is noticeable that the "alpha values" have not been drastically modified except in Sweden where they have been multiplied by 2.

Table 1. Adoption by regulatory bodies in charge of radiological protection of a system of man-sievert reference monetary values

Country	2002 Survey		2009 Survey	
	Existence of man-sievert monetary value system	α -values per man-mSv (in Euro)	Since	α -values per man-mSv (in Euro)
Armenia	under consideration			
Belgium	No value		No value	
Canada	1997 ALARA guidelines referring to the concept to be published	79.06 EUR (100 CAD) as an international reference	No value 2004 ALARA guidelines referring to the concept	
China	under consideration			
The Czech Republic	RP Decree No. 307/2002 of 13/06/2002	20.08-100.39 EUR (500-2500 CZK) depending on individual dose level and exposure situation	RP Decree No. 307/2002 of 13/06/2002	20.08-100.39 EUR (500-2500 CZK) depending on individual dose level and exposure situation in process of updating
Finland	1984 recommended value 1991 recommended value	15.44 EUR (20 USD) 77.21 EUR (100 USD)		
France	No value		No value	
Germany	No value		No value	
Japan	No value		No value	
Korea	under consideration		2008	0-1mSv: 13.13 EUR (17 USD), 1-5mSv: 61.77 EUR (80 USD), 5-10mSv: 270.23 EUR (350 USD), \geq 10mSv: 1312.54 EUR (1700 USD). As given by Constant Price in the year of 2000 set in 2008
Mexico			No value	
Netherlands	1995 recommended value	453.78 EUR (1000 NLG)		
Romania	Approval of the α -value proposed by Cernavoda NPP 169.86 EUR (220 USD)		2010	570 EUR

Country	2002 Survey		2009 Survey	
	Existence of man-sievert monetary value system	α -values per man-mSv (in Euro)	Since	α -values per man-mSv (in Euro)
Slovakia	RP Decree No. 12/2001 in 2001 adjusted by consumer price	<2 mSv: 66.39EUR (2000 SKK) 2-5 mSv: 165.97 EUR (5000 SKK) 5-15 mSv: 497.91 EUR (15000 SKK) 15-30 mSv: 663.88 EUR (20000 SKK) 30-50 mSv: 829.85 EUR (25000 SKK)	Governmental ordinance No 345/2006 Coll.	\leq 5 mSv: 33.19 EUR 5-15 mSv: 49.79 EUR 15-20 mSv: 199.16 EUR 20-50 mSv: 663.88 EUR
Spain	<i>No value</i>		<i>No value</i>	
Sweden	recommended values adjusted by consumer price	55.48-283.29 EUR (470-2400 SEK)	<i>No value</i>	
Switzerland	1994 recommended value	2481.39 EUR (3000 CHF)		
Ukraine	No value			
United Kingdom	recommended values	12.55-125.39 (10-100 GBP) depending on exposure situation		
USA	154.30 EUR (200 USD) Except for effluents where 77.15 EUR (100 USD) is still used as listed in the Appendix I to the 10 CFR ¹ Part 50		154.30 EUR (200 USD)	

Exchange rate of the 25 September 2012

 no answer

¹: CFR : Code of Federal Regulations

Table 2. Corporate or NPP alpha values for occupational exposure: single values

Country	Nuclear Power Plant / Utility	2002 Survey		2009 Survey	
		Since	α -value per man-mSv (in Euro)	Since	α -value per man-mSv (in Euro)
Bulgaria	Kozloduy NPP	No value		No value	
Belgium	ELECTRABEL	No value		No value	
Canada	Gentilly NPP	seventies	789.70 EUR (1000 CAD)		
Finland	Olkiluoto NPP	1998	170 EUR	No value	
	Loviisa NPP			No value	
Hungary	Paks NPP	1999	87.84 EUR (25000 HUF) will be updated in 2003		
Mexico	Laguna Verde NPP			1990	404.20 EUR (520 USD)
Romania	Cernavoda NPP	2003	171.01 EUR (220 USD)	2010	570 EUR
Slovenia	Krsko NPP	2003	1000 EUR		
South Africa	Koeberg NPP	2003	1010.49 EUR (1300 USD)	2003	1010.49 EUR (1300 USD)
Spain	Vandellos 2 NPP, Jose Cabrera NPP	No value		No value	
	Almaraz NPP Santa Maria NPP Trillo NPP			No value	
	Asco NPP	2002	1554.61 EUR (2000 USD)	No value	
Sweden	Barsebäck NPP	2002	531.22 EUR (4500 SEK)		
	Ringhals NPP, Oskarshamn NPP	2002	531.22 EUR (4500 SEK)	2008	1179.76 EUR (10000 SEK)
	Forsmark NPP	471.90 EUR (4000 SEK) In process of updating		2008	1179.76 EUR (10000 SEK)
USA	Entergy Nuclear Operations, Inc. (except Vermont Yankee NPP)			No value	
	Consumers Energy Co. (Palisades NPP)				
	First Energy Nuclear Operating Co. (FENOC)			Under review	

Country	Nuclear Power Plant / Utility	2002 Survey		2009 Survey	
		Since	α -value per man-mSv (in Euro)	Since	α -value per man-mSv (in Euro)
	South Carolina Electric & Gas Co. (SGEC)				466.31 EUR (600 USD)
	Detroit Edison Co. (DTE-Energy)				777.18 EUR (1000 USD)
	Florida Power & Light Co. (FPL)				
	FPL Energy Point Beach, LLC (FPL-Energy)				
	Maine Yankee Power Co. (MYPCO)				
	Pacific Gas & Electric Co. (PG&E)				
	Progress Energy (Pro-Energy) (Brunswick, Robinson NPPs)				
	Public Service Electric & Gas Nuclear (PSE&G)				
	TXU Generating Company Lp				932.62 EUR (1200 USD)
	Nuclear Management Co., LLC (NMCCO) (Monticello NPP)				
	Nebraska Public Power District (NPPD)				971.48 EUR (1250 USD)
	Dominion Nuclear Connecticut, Inc. (Millstone, North Anna NPPs)				
	Duke Energy Power Co., LLC				1088.05 EUR (1400 USD)
	Progress Energy (Pro-Energy) (Shearon Harris NPP)				
	Omaha Public Power District (OPPD)				1165.77 EUR (1500 USD)
	Entergy Nuclear Operations, Inc. (Vermont Yankee NPP)				
	Nuclear Management Co., LLC (NMCCO) (Prairie Island NPP)				

Country	Nuclear Power Plant / Utility	2002 Survey		2009 Survey	
		Since	α -value per man-mSv (in Euro)	Since	α -value per man-mSv (in Euro)
	Arizona Public Service Co. (APS)				1554.36 EUR (2000 USD)
	Dominion Nuclear Connecticut, Inc. (Kewaunee NPP)				
	PPL Susquehanna, LLC				
	Southern Nuclear Operating Co., Inc. (except Farley NPP)				
	Constellation Energy (Nine Mile Point NPP)				
	AmerenUE				
	Constellation Energy (Except Nine Mile Point NPP)			1942.95 EUR (2500 USD)	
	Dominion Nuclear Connecticut, Inc. (Surry NPP)				
	Energy NorthWest (ENERGY-NW)				
	Southern Nuclear Operating Co., Inc. (Farley NPP)				
	Tennessee Valley Authority (TVA)				
	Progress Energy (Pro-Energy) (Crystal River NPP)				2331.55 EUR (3000 USD) Depending on management goals
	Indiana Michigan Power Co. (IMP)				2536.10 EUR (3263,2 USD)
Wolf Creek Nuclear Operating Corp. (WCNOC)	3108.73 EUR (4000 USD)				

Exchange rate of the 25 September 2012

no answer

For the USA in 2010, α -values per man.mSv are between 466.31 and 6217.46 EUR (600 to 8000 USD) with an average of 1865.24 EUR (2400 USD).

Table 3. Corporate or NPP alpha values for occupational exposure: set of values

Country	Nuclear Power Plant / Utility	2002 Survey		2009 Survey	
		Since	α -values per man-mSv (in Euro)	Since	α -values per man-mSv (in Euro)
Canada	Darlington NPP <i>the values of the system depends on the type of worker category</i>	(?)	from 79.16 to 1583.28 EUR (from 100 to 2000 CAD) *		
Czech Republic	Dukovany NPP <i>depending on indiv. dose level and exposure situation</i>			1999	Average effective dose < 1/10 limits (5 mSv): 19.99 EUR (500 CZK) 1/10 limits (5 mSv) < average effective dose < 3/10 limits (15 mSv): 39.98 EUR (1000 CZK) Average effective dose > 3/10 limits (15 mSv): 99.94 EUR (2500 CZK)
	Temelin NPP <i>depending on indiv. dose level and exposure situation</i>			1999	Average effective dose < 1/10 limits (5 mSv): 60.10 EUR (1500 CZK) 1/10 limits (5 mSv) < average effective dose < 3/10 limits (15 mSv): 120.19 EUR (3000 CZK) Average effective dose > 3/10 limits (15 mSv): 300.48 EUR (7500 CZK)
France	EDF <i>the values of the system depends on annual individual dose level</i>	2003	0 - 10 mSv: 650 EUR 10 - 16 mSv: 1300 EUR 16 - 20 mSv: 1800 EUR	2003	0 - 10 mSv: 650 EUR 10 - 16 mSv: 1300 EUR 16 - 20 mSv: 1800 EUR
Germany	VGB proposal agreed on by all utilities for testing <i>the values of the system depends on annual individual dose level</i>	In process of updating			
Korea	KHNP			2007	0 - 1 mSv: 13.22 EUR (17.10 USD) 1 - 5 mSv: 123.72 EUR (160 USD) 5 - 10 mSv: 417.57 EUR (540 USD) ≥ 10 mSv: 2165.17 EUR (2 800 USD)
Netherlands	Borssele NPP <i>the values of the system depends on individual dose level</i>	2002	<10 mSv: 500 EUR >10 mSv: 1000 EUR In process of updating		

Country	Nuclear Power Plant / Utility	2002 Survey		2009 Survey	
		Since	α -values per man-mSv (in Euro)	Since	α -values per man-mSv (in Euro)
Spain	Cofrentes NPP <i>the values of the system depends on the unit annual collective dose level and on individual dose level</i>	1994	Total collective dose (3 years average): <1250 man.mSv: 1000 EUR >1250 man.mSv: 5000 EUR Individual dose: <10 mSv: 1000 EUR >10 mSv: 5000 EUR	2002	< 10 mSv/year: 1000 EUR 10-50 mSv/year: 5000 EUR
Switzerland	Beznau NPP <i>the values of the system depends on individual dose level per job</i>	1995	< 10 mSv: 413.46 EUR (500 CHF) > 10 mSv: 4134.62 EUR (5000 CHF)		No value
UK	Sizewell NPP <i>the values of the system depends on annual individual dose level</i>	?	use of the NRPB data set from 12.56 to 25.12 EUR (10 to 20 GBP)		No value
USA	STPNOC (South Texas NPP) <i>the values of the system depends on annual individual dose level</i>	2002	<10 mSv: 388.59 EUR (500 USD) >10 mSv: 1942.95 EUR (2500 USD)		<10 mSv: 388.59 EUR (500 USD) >10 mSv: 1942.95 EUR (2500 USD)
	CONNYANKEE (Haddam Neck NPP)	2002	From 77.72 to 1554.36 EUR (from 100 to 2000 USD)		From 77.72 to 1554.36 EUR (from 100 to 2000 USD)
	EXELON			2009	1554.36 EUR x INPO Quartile ranking (2000 USD x INPO Quartile ranking)

Exchange rate of the 25 September 2012

* ex: general workers: 158.33 EUR (200 CAD); reactor maintenance crew: 1187.46 EUR (1500 CAD)

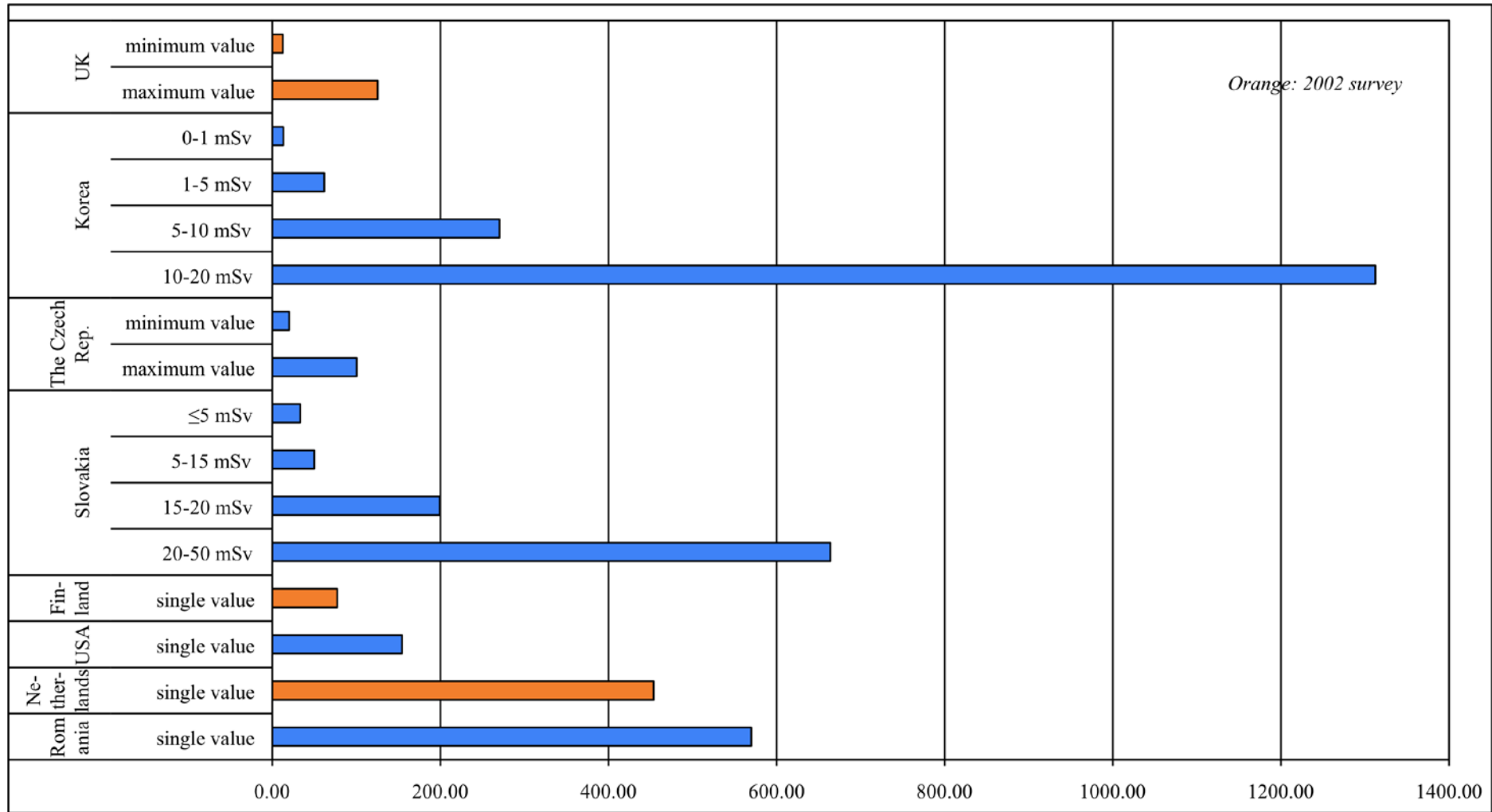


Figure 1. Alpha values adopted by the Regulatory bodies (Euro per man.mSv)

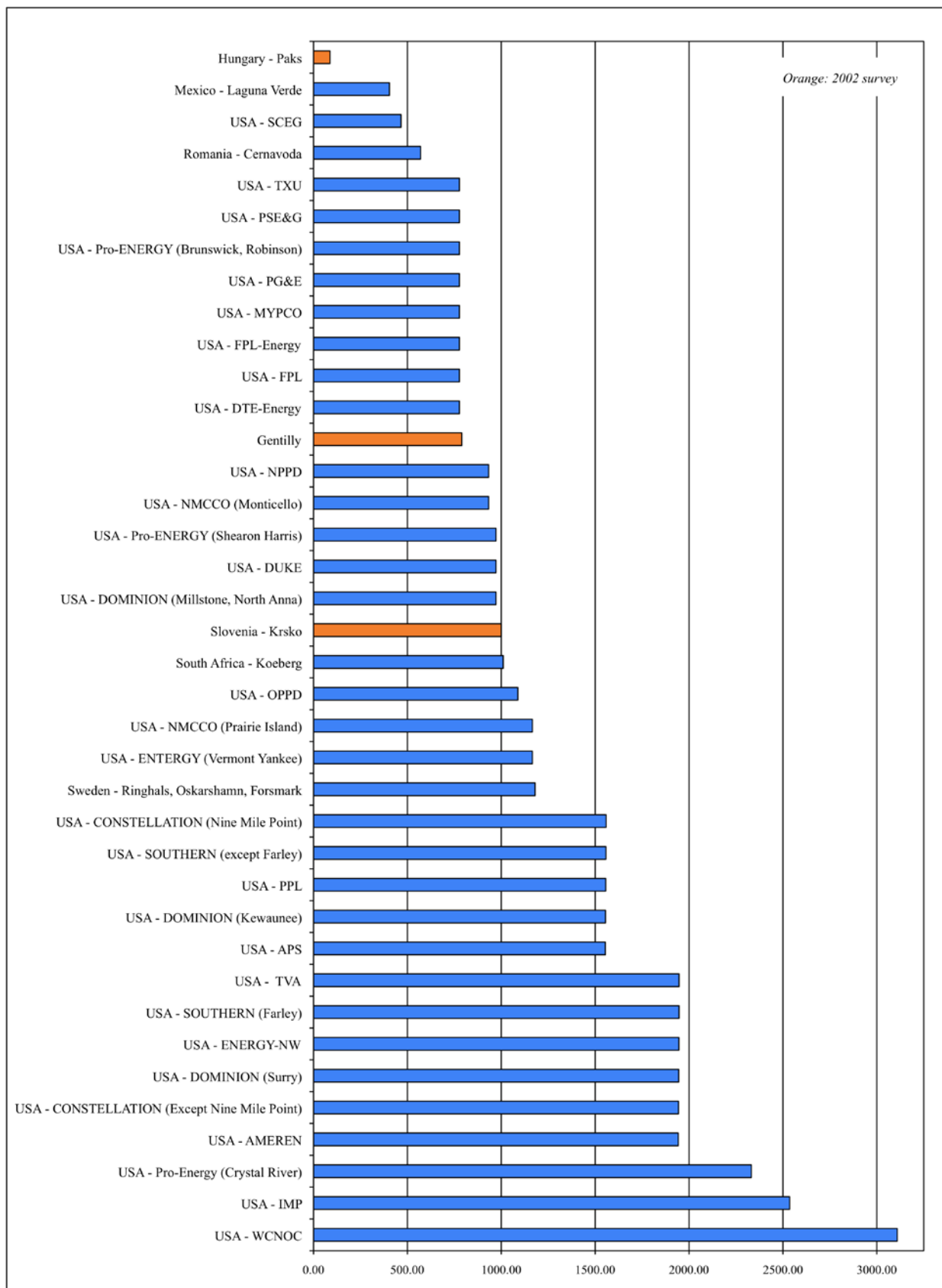


Figure 2. Corporate or NPP alpha values for occupational exposure: single value (Euro per man.mSv)

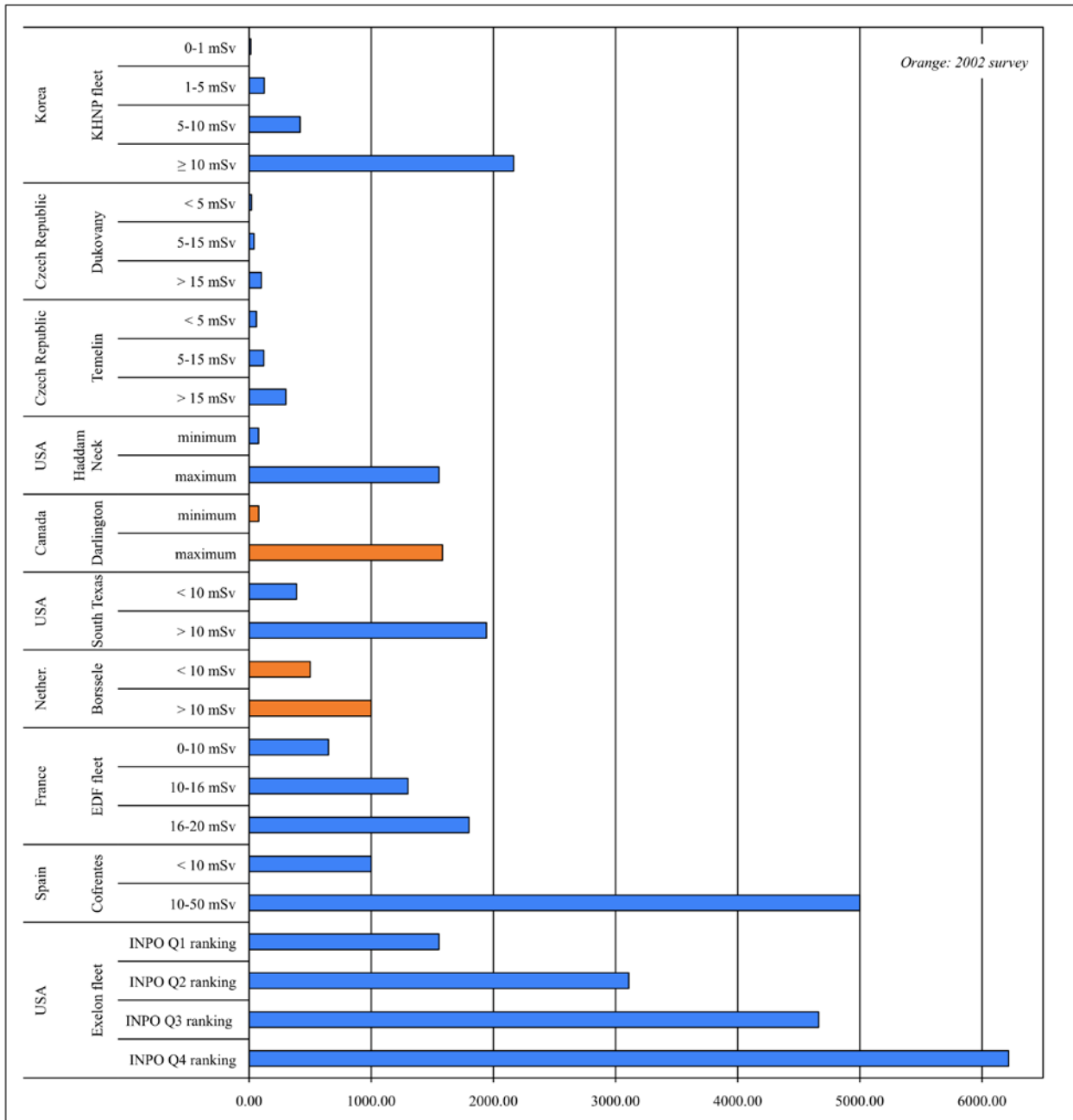


Figure 3. Corporate or NPP alpha values for occupational exposure: set of values (Euro per man.mSv)