

Final report

S-Risk - Technical guidance document - annex IV

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REVISION HISTORY

<i>Date</i>	<i>revision</i>
28/02/2017	<i>Adding total number of hours on site for landuse type heavy industry (Table 10)</i>
15/05/2019	<i>Changes were made to the soil ingestion parameter values in Table 44. More background for the rationale behind these changes can be found in the Release Notes for S-Risk version 1.3.</i>

Annex IV - Default values for the calculation of soil remediation values

Parameter	Unit	Value
SOIL		
Soil type	-	Standard soil
Number of soil layers	-	1
Depth of groundwater table	m	3
OM (organic matter)	%	2
ρ_s (soil bulk density)	kg/m ³	1480
θ_w (water-filled porosity of soil layer)	m ³ /m ³	0.2
θ_a (air-filled porosity of soil layer)	m ³ /m ³	0.23
θ_s (total soil porosity of soil layer)	m ³ /m ³	0.43
CL (clay content)	%	10
CEC (cation exchange capacity)	meq/100 g	10.8
pH-KCl	-	5
$\theta_{w,cz}$ (water-filled porosity of the capillary zone)	m ³ /m ³	0.24
L_{cz} (height of the capillary zone)	m	0.5
k_v (air permeability of the soil layer)	m ²	6.6E-13
Al (aluminium content)	mg/kg	1025
Fe (iron content)	mg/kg	2000
P_{tot} (total phosphorus content)	mg/kg	1250
GROUNDWATER		
k (hydraulic conductivity of the phreatic groundwater layer)	m/y	365
i (hydraulic gradient)	m/m	0.001
L_{leach} (length of the source area)	m	50
q_u (infiltration in the vadose zone, unpaved area)	m/y	0.265
f_u (fraction unpaved)	-	1
d_a (thickness of the phreatic groundwater layer)	m	30
DRINKING-WATER		
drinking-water pipe material		polyethylene
depth of the drinking-water pipe	m	0.8
dt (stagnation time in pipe)	h/d	24
r (internal radius of the pipe)	m	0.0098
d_e (thickness of the drinking-water pipe wall)	m	0.0027
L_p (total pipe length through the contaminated area)	m	50
Q_{dw} (daily drinking-water use)	m ³ /d	0.5
f_g (fraction groundwater used as drinking-water)	-	0
AMBIENT AIR		
L (length of the contaminated area in dominant wind direction)	m	50
Z_{or} (roughness length)	m	
• agriculture (II)		0.1
• residences with vegetable garden (III)		0.6
• day recreation (IVa)		0.1

	<ul style="list-style-type: none"> • holiday resort (IVb) • light industry (Va) • heavy industry (Vb) 		0.1 0.6 0.6
Y	(breathing height)	m	
	<ul style="list-style-type: none"> • plant • child • adult 		0.5 1.0 1.5
h	(height for wind velocity V_h)	m	10
V_h	(wind velocity at reference height h)	m/d	288000
k_{karman}	(von Karman constant)	-	0.4
T	(averaging time)	d	
	<ul style="list-style-type: none"> • agriculture and residences (II, III) • recreation (IV) • industry (V) 		6*365 6*365 45*365
PM_{10}^{soil}	(concentration of PM_{10} resulting from soil)	$\mu g/m^3$	5
$EF_{PM_{10}}$	(enrichment factor from soil so PM_{10})	-	2
INDOOR AIR			
building type			basement
concrete quality calculation option			gaps and holes
L_{bs}	(thickness of the buffer space)	m	0.75 (0.10 in app. II/III)
L_f	(thickness of the floor of the basement)	m	0.1
d	(depth of the basement floor below soil surface)	m	2
ΔP_{si}	(pressure difference between indoor space and soil)	Pa	1
f_{of}	(fraction of openings in the floor)	m^2/m^2	1E-5
n_f	(number of openings per floor area)	$1/m^2$	0.2
η	(dynamic viscosity of air)	Pa.d	2.30E-10
$vv_{i,b}$	(basic air exchange rate in the indoor space)	$1/d$	
	<ul style="list-style-type: none"> • agriculture, residences, recreation (II, III,IV) • industry (V) 		24 48
A_f	(surface area of the floor of the basement)	m^2	50
A_w	(surface area of the walls of the basement)	m^2	60
V_i	(volume of the indoor space)	m^3	150
V_b	(volume of the basement)	m^3	100
L_{bw}	(thickness of the basement walls)	m	0.15
$\epsilon_{v,w}$	(air-filled porosity of the basement walls)	-	0.07
$k_{v,w}$	(air permeability of the basement walls)	m^2	10^{-13}
$F_{soil/settled\ dust}$	(fraction of soil in indoor settled dust)	-	
	<ul style="list-style-type: none"> • agriculture and residences (II, III) • day recreation (IVa) • holiday resort (IVb) • industry (V) 		0.5 0.25 0.5 0.25
$EF_{soil/settled\ dust}$	(enrichment factor from soil to settled indoor dust)	-	1.5
$F_{out/in}$	(contribution of the concentration on ambient PM_{10} to the concentration on indoor PM_{10})	-	1.0

BATHROOM AIR

V_w	(water use during showering)	m^3/h	0.5
t_{sh}	(duration of shower)	h	0.25
t_{br}	(time spent in the bathroom after showering)	h	0.25
V_{sh}	(volume of the shower stall)	m^3	2
V_{br}	(volume of the bathroom)	m^3	15
T_{sh}	(shower temperature)	K	313
t_f	(time of fall for a drop)	h	2.78E-4
r_d	(diameter of a drop)	m	5.0E-4
v_{vbr}	(ventilation rate in the bathroom)	1/h	3.3

PLANTS

Q_{transp}	(transpiration rate)	$m^3/m^2.d$	Table 1
V_r	(root volume)	m^3/m^2	Table 1
ρ_r	(density of the root)	kg fw/ m^3	Table 1
ρ	(density of the plant)	kg fw/ m^3	Table 1
dm	(dry matter content of the plant)	%	Table 1
L_{plant}	(lipid content of the plant)	kg/kg	Table 1
a_{growth}	(chemical elimination via growth)	1/d	Table 1
$a_{metabolism}$	(chemical elimination via metabolism)	1/d	0
$a_{photodegradat}$	(chemical elimination via photodegradation)	1/d	0
r_p	(radius of the potato)	m	Table 1
ρ_w	(density of water)	kg/ m^3	1000
f_{ch}	(fraction of carbohydrates in potato)	kg/kg	0.19
t	(growth period of the plant)	d	Table 1
A	(surface area of aboveground plant parts)	m^2/m^2	Table 1
V	(volume of the aboveground plant parts)	m^3/m^2	Table 1
V_d	(dry particle deposition rate)	m/d	865
R_n	(annual rainfall)	m/d	2.2E-3
R_w	(fraction retained after rainfall)	-	1.0
k_w	(plant weathering constant)	1/d	4.9E-2
Y_v	(plant yield)	kg fw/ m^2	Table 1
W_c	(volumetric washout factor for particles)	-	5E5
f_{eff}	(fraction of soil particles taken up by the plant)	-	1.0
R	(ratio of particles on the leaves to total weight of the plant)	g/g fw	5E-3

ANIMAL PRODUCTS

$t_{f,winter}$	(time fraction for winter diet)	-	
	• beef cattle		0.54
	• milk cattle		0.54
	• sheep		0.33
$q_{soil,summer}$	(daily intake of soil particles in summer/winter)	kg dm/d	
	• beef cattle		0.6 / 0.0
	• milk cattle		0.6 / 0.0
	• sheep		0.175 / 0.175
$q_{pasture}$	(daily consumption of grass in summer/winter)	kg dm/d	

	• beef cattle		0.0 / 0.0
	• milk cattle		7.918 / 0.0
	• sheep		1.8 / 1.8
$Q_{\text{grass,silage}}$	(daily consumption of silage grass in kg dm/d summer/winter)		
	• beef cattle		0.0 / 0.0
	• milk cattle		4.298 / 7.537
	• sheep		0.0 / 0.0
Q_{maize}	(daily consumption of silage maize in kg dm/d summer/winter)		
	• beef cattle		4.745 / 3.811
	• milk cattle		2.217 / 4.358
	• sheep		0.0 / 0.0
Q_{water}	(daily intake of water)	m^3/d	
	• beef cattle		0.067
	• milk cattle		0.067
	• sheep		0.006
$Q_{\text{concentrate}}$	(daily intake of concentrate in kg dm/d summer/winter)		
	• beef cattle		2.61 / 3.314
	• milk cattle		0.257 / 2.346
	• sheep		0.0 / 0.63
f_{local}	(fraction of feed coming from contaminated area)	-	1.0
$f_{\text{c,water,gw}}$	(fraction of groundwater for cattle)	-	1.0
$f_{\text{c,water,wp}}$	(fraction of drinking-water for cattle)	-	0.0
chicken			no chicken
$Q_{\text{mixture,chicken}}$	(daily consumption of feed mixture by chicken)	kg dm/d	0.123
$Q_{\text{grass,chicken}}$	(daily consumption of grass by chicken)	kg dm/d	0.007
$Q_{\text{water,chicken}}$	(daily intake of water by chicken)	m^3/d	0.0002
$Q_{\text{soil,chicken}}$	(daily intake of soil by chicken)	kg dm/d	0.03
$f_{\text{free-range}}$	(fraction of free-range)	-	1.0
$f_{\text{ch,water,gw}}$	(fraction of groundwater for chicken)	-	1.0
$f_{\text{ch,water,wp}}$	(fraction of drinking-water for chicken)	-	0.0
$f_{\text{f,butter}}$	(fat content of butter)	-	0.85
$f_{\text{f,milk}}$	(fat content of milk)	-	0.04
EXPOSURE			
exposure pathways by scenario			Table 2
BW	(body weight)	kg	
	• 1 - < 3 y		12.3
	• 3 - < 6 y		17.6
	• 6 - < 10 y		26.8
	• 10 - < 15 y		44.4
	• 15 - < 21 y		62.5
	• 21 - < 31 y		68.5
	• 31 - < 41 y		70.5
	• 41 - < 51 y		71.0
	• 51 - < 61 y		74.0

	• ≥ 61 y		72.5
$IR_{soil/dust_daily}$	(daily ingestion of soil and dust)	mg/d	Table 3
F_{oral_soil}	(fraction of soil in soil and settled dust ingestion)	-	Table 3
IR_{soil_hourly}	(hourly ingestion of soil)	mg/h	Table 4
IR_{dust_hourly}	(hourly ingestion of settled dust)	mg/h	Table 4
EF_{week}	(exposure frequency on a weekly basis)	d/w	Table 5, Table 6, Table 7, Table 8,
EF_{year}	(exposure frequency on a yearly basis)	w/y	Table 9, Table 10 Table 5, Table 6, Table 7, Table 8,
t_{out}	(time spent outside)	h/d	Table 9, Table 10 Table 5, Table 6, Table 7, Table 8,
t_{in}	(time spent inside)	h/d	Table 9, Table 10 Table 5, Table 6, Table 7, Table 8,
t_{sleep}	(time sleeping)	h/d	Table 9, Table 10 Table 5, Table 6, Table 7, Table 8,
$Q_{vegetable}$	(daily vegetable consumption)	g fw/d	Table 9, Table 10
$Q_{veg_category}$	(daily consumption by vegetable category)	g fw/d	Table 11
$f_{veg_category}^{garden}$	(fraction of locally grown vegetables)	-	Table 11 Table 13
Q_{beef}	(consumption of beef)	g/d	Table 12
Q_{organ_meat}	(consumption of organ meat)	g/d	Table 12
Q_{milk}	(consumption of milk)	g/d	Table 12
Q_{butter}	(consumption of butter)	g/d	Table 12
Q_{eggs}	(consumption of eggs)	g/d	Table 12
$f_{animal_product}^{local}$	(fraction of animal product coming from location)	-	Table 13
$Q_{drinking-water}$	(consumption of drinking-water)	l/d	
	• 1 - < 3 y		0.3
	• 3 - < 6 y		0.313
	• 6 - < 10 y		0.381
	• 10 - < 15 y		0.649
	• 15 - < 21 y		0.999
	• 21 - < 31 y		1.759

	• 31 - < 41 y		2.231
	• 41 - < 51 y		2.199
	• 51 - < 61 y		1.798
	• ≥ 61 y		1.590
RF _{drinking-water}	(reduction factor for drinking-water consumption)	-	Table 13
AF _{soil_skin}	(average soil adherence on skin)	mg/m ²	Table 14
AF _{dust_skin}	(average dust adherence on skin)	mg/m ²	Table 15
SA _{out}	(skin surface area covered with soil during outside activities)	m ²	Table 16
SA _{in}	(skin surface area covered with dust during inside activities)	m ²	Table 17
SA _{total}	(total body surface area)	m ²	
	• 1 - < 3 y		0.560
	• 3 - < 6 y		0.737
	• 6 - < 10 y		0.994
	• 10 - < 15 y		1.394
	• 15 - < 21 y		1.736
	• 21 - < 31 y		1.829
	• 31 - < 41 y		1.849
	• 41 - < 51 y		1.846
	• 51 - < 61 y		1.880
	• ≥ 61 y		1.853
EV _{out}	(number of soil events)	events/d	1
EV _{in}	(number of dust events)	events/d	1
EV _{bathing}	(number of baths per day)	1/d	Table 18
EV _{showering}	(number of showers per day)	1/d	Table 18
EF _{week,bathing}	(frequency of bathing on a weekly basis)	d/w	Table 18
EF _{week,showering}	(frequency of showering on a weekly basis)	d/w	Table 18
l _{sc}	(apparent thickness of the stratum corneum)	cm	1E-3
t _{bathing}	(time in bath)	h	0.33
t _{sh}	(duration of shower)	h	0.25
WF _{age}	(age-dependent inhalation rate based weighting factor)	-	Table 19
WF _{act}	(activity-dependent inhalation rate based weighting factor)	-	Table 19

Table 1: Plant characteristics

plant	Type	Q_{transp} ($m^3/m^2 \cdot d$)	a_{growth} ($1/d$)	L_{plant} (kg/kg)	f_{CH} (kg/kg)	t (d)	ρ / ρ_r (kg/m^3)	V / V_r (m^3/m^2)	A (m^2/m^2)	Y_v ($kg\ fw/m^2$)	dm ($\%$)	r_p (m)
Potato	tuber	n.a.	0.139	0.0015	0.19	128	1020	0.0038	n.a.	3.897	20	0.04
Carrot	Root	0.000778	0.1	0.025	n.a.	120	1020	0.0051	n.a.	5.2	11	n.a.
Radish	Root	0.001292	0.1	0.025	n.a.	29	820	0.0024	n.a.	2	5	n.a.
Scorzonera	Root	0.000271	0.1	0.025	n.a.	120	1020	0.0025	n.a.	2.5	9	n.a.
Onion	Foliar	0.001008	0.035	0.025	n.a.	55	800	0.0043	5	3.4	11	n.a.
Leek	Foliar	0.001563	0.035	0.025	n.a.	179	800	0.0046	5	3	13	n.a.
Tomatoes	aboveground non-foliar	0.000658	0.035	0.025	n.a.	150	800	0.0496	5	39.7	5	n.a.
Cucumber	aboveground non-foliar	0.000658	0.035	0.025	n.a.	150	800	0.0423	5	33.8	4	n.a.
Paprika	aboveground non-foliar	0.000658	0.035	0.025	n.a.	150	800	0.0203	5	16.2	9	n.a.
cabbage	aboveground non-foliar	0.000658	0.035	0.025	n.a.	91	800	0.0069	5	5.5	8	n.a.
Cauliflower	aboveground non-foliar	0.001	0.035	0.025	n.a.	91	800	0.00300	5	2.4	8.1	n.a.
Sprout	aboveground non-foliar	0.000512	0.035	0.025	n.a.	117	800	0.0023	5	1.8	17	n.a.
Lettuce	Foliar	0.001225	0.035	0.025	n.a.	69	610	0.0072	5	4.4	4	n.a.
Lamb's lettuce	Foliar	0.000442	0.035	0.025	n.a.	69	650	0.0015	5	1	4	n.a.
Endive	Foliar	0.000925	0.035	0.025	n.a.	69	735	0.0068	5	5	6.2	n.a.
Spinach	Foliar	0.001225	0.035	0.025	n.a.	69	630	0.0032	5	2	8	n.a.
Chicory	Foliar	0.000563	0.035	0.025	n.a.	73	700	0.0021	5	1.5	6	n.a.
Celery	Foliar	0.000392	0.035	0.025	n.a.	120	800	0.0079	5	6.3	8	n.a.
Beans	aboveground non-foliar	0.000392	0.035	0.025	n.a.	77	800	0.0031	5	2.5	11	n.a.
Peas	aboveground non-foliar	0.000533	0.035	0.025	n.a.	95	800	0.0010	5	0.8	18	n.a.
Grass	Foliar	0.001563	0.035	0.025	n.a.	30	820	0.002	5	5.93	35	n.a.
maize	aboveground non-foliar	0.0012	0.035	0.054	n.a.	183	800	0.0057	5	4.53	25	n.a.

Table 2: Exposure pathways by scenario

	AGR (II)	RES-veg (III)	REC-dayout (IVa)	REC-stay (IVb)	IND-I (Va)	IND-h (Vb)
Oral						
Ingestion of soil	X	X	X	X	X	X
Ingestion of indoor settled dust	X	X		X	X	X
Intake of vegetables from local production	X	X				
Intake of meat and milk from local production	X					
Intake of water (drinking-water or groundwater)	X	X		X	X	X
Dermal						
Absorption from soil	X	X	X	X	X	X
absorption from indoor settled dust	X	X		X	X	X
Absorption from water during showering and bathing	X	X		X		
Inhalation						
Inhalation of outdoor air (gas-phase + particles)	X	X	X	X	X	X
Inhalation of indoor air (gas-phase + particles)	X	X		X	X	X
Inhalation during showering (gas-phase)	X	X		X		

Table 3: Daily soil and dust ingestion rates and fraction of soil contributing to soil and dust ingestion

Age	AGR / RES-veg / RES		RES-ng		REC-stay		IND-I		IND-h	
	IR _{soil/dust_daily} (mg/d)	F _{oral_soil} (-)	IR _{soil/dust_daily} (mg/d)	F _{oral_soil} (-)	IR _{soil/dust_daily} (mg/d)	F _{oral_soil} (-)	IR _{soil/dust_daily} (mg/d)	F _{oral_soil} (-)	IR _{soil/dust_daily} (mg/d)	F _{oral_soil} (-)
1 - < 3 year	106	0.45	87	0.32	129	0.55	0.0	0.0	0.0	0.0
3 - < 6 year	85	0.45	69	0.32	103	0.55	0.0	0.0	0.0	0.0
6 - < 10 year	69	0.45	54	0.25	79	0.55	0.0	0.0	0.0	0.0
10 - < 15 year	68	0.45	51	0.23	73	0.55	0.0	0.0	0.0	0.0
15 - < 21 year	67	0.45	49	0.20	67	0.55	23	0.20	33	0.8
21 - < 31 year	66	0.45	45	0.20	66	0.55	23	0.20	33	0.8
31 - < 41 year	66	0.45	45	0.20	66	0.55	23	0.20	33	0.8
41 - < 51 year	66	0.45	45	0.20	66	0.55	23	0.20	33	0.8
51 - < 61 year	66	0.45	45	0.20	66	0.55	23	0.20	33	0.8
≥ 61 years	66	0.45	45	0.20	66	0.55	23	0.20	33	0.8

Table 4: Hourly soil and dust ingestion values for recreation

Age	REC-dayout (IVa)	
	IR _{soil_hourly} (mg/h)	IR _{dust_hourly} (mg/h)
1 - < 3 year	26	4
3 - < 6 year	20	3
6 - < 10 year	13	2
10 - < 15 year	11	2
15 - < 21 year	9	2
21 - < 31 year	5	1.8
31 - < 41 year	5	1.8
41 - < 51 year	5	1.8
51 - < 61 year	5	1.8
≥ 61 years	5	1.8

Table 5: Time-use for landuse type agricultural residential area with vegetable garden (II)

Age	Sleeping (t _{sleep}) h/d	Awake Inside (t _{in}) h/d	Outside (t _{out}) h/d	Total* on site h/d	EF _{week} d/w	EF _{year} w/y
1 - < 3 year	12	11.5	0.5	24	7	52
3 - < 6 year	11	9.7	1.38	22.08	7	52
6 - < 10 year	10	8.7	1.57	20.27	7	52
10 - < 15 year	9	10.6	1.12	20.72	7	52
15 - < 21 year	8	8.5	0.8	17.3	7	52
21 - < 31 year	8	9.0	1.0	18	7	52
31 - < 41 year	8	11.5	1.3	20.8	7	52
41 - < 51 year	8	11.5	1.5	21	7	52
51 - < 61 year	8	11.5	1.8	21.3	7	52
≥ 61 years	8	11.5	1.7	21.2	7	52

* sum of hours 'sleeping', 'awake' and 'outside'

Table 6: Time-use for landuse type residential with vegetable garden (III)

Age	Sleeping (t _{sleep}) h/d	Awake Inside (t _{in}) h/d	Outside (t _{out}) h/d	Total* on site h/d	EF _{week} d/w	EF _{year} w/y
1 - < 3 year	12	11.5	0.5	24	7	52
3 - < 6 year	11	9.7	1.38	22.08	7	52
6 - < 10 year	10	8.7	1.57	20.27	7	52
10 - < 15 year	9	10.6	1.12	20.72	7	52
15 - < 21 year	8	8.5	0.8	17.3	7	52
21 - < 31 year	8	9.0	1.0	18	7	52
31 - < 41 year	8	11.5	1.3	20.8	7	52
41 - < 51 year	8	11.5	1.5	21	7	52
51 - < 61 year	8	11.5	1.8	21.3	7	52
≥ 61 years	8	11.5	1.7	21.2	7	52

* sum of hours 'sleeping', 'awake' and 'outside'

Table 7: Time-use for landuse type day recreation for children and adults (IVa)

Age	Sleeping (t _{sleep}) h/d	Awake Inside (t _{in}) h/d	Outside (t _{out}) h/d	Total* on site h/d	EF _{week} d/w	EF _{year} w/y
1 - < 3 year	0	0	8	8	5	8
3 - < 6 year	0	0	8	8	5	8
6 - < 10 year	0	0	8	8	5	8
10 - < 15 year	0	0	8	8	5	8
15 - < 21 year	0	0	8	8	5	8
21 - < 31 year	0	0	2.1	2.1	2	44
31 - < 41 year	0	0	2.1	2.1	2	44
41 - < 51 year	0	0	2.5	2.5	2	44
51 - < 61 year	0	0	3.1	3.1	2	44
≥ 61 years	0	0	3.1	3.1	2	44

* sum of hours 'sleeping', 'awake' and 'outside'

Table 8: Time-use for landuse type holiday resort for children and adults for mainly indoors (IVb)

Age	Sleeping (t _{sleep}) h/d	Awake inside (t _{in}) h/d	Outside (t _{out}) h/d	Total* on site h/d	EF _{week} d/w	EF _{year} w/y
1 - < 3 year	12	9.1	2.9	24	7	8
3 - < 6 year	11	9.8	3.2	24	7	8
6 - < 10 year	10	10.4	3.6	24	7	8
10 - < 15 year	9	11.3	3.7	24	7	8
15 - < 21 year	8	12.3	3.7	24	7	8
21 - < 31 year	8	12.3	3.7	24	7	8
31 - < 41 year	8	12.3	3.7	24	7	8
41 - < 51 year	8	12.3	3.7	24	7	8
51 - < 61 year	8	12.3	3.7	24	7	8
≥ 61 years	8	12.3	3.7	24	7	8

* sum of hours 'sleeping', 'awake' and 'outside'

Table 9: Time-use for landuse type light industry (Va)

Age	Sleeping (t _{sleep})	Awake inside (t _{in})	Outside (t _{out})	Total* on site	EF _{week}	EF _{year}
	h/d	h/d	h/d	h/d	d/w	w/y
1 - < 3 year	0	0	0	0	5	47
3 - < 6 year	0	0	0	0	5	47
6 - < 10 year	0	0	0	0	5	47
10 - < 15 year	0	0	0	0	5	47
15 - < 21 year	0	7	1	8	5	47
21 - < 31 year	0	7	1	8	5	47
31 - < 41 year	0	7	1	8	5	47
41 - < 51 year	0	7	1	8	5	47
51 - < 61 year	0	7	1	8	5	47
≥ 61 years	0	7	1	8	5	47

* sum of hours 'sleeping', 'awake' and 'outside'

Table 10: Time-use for landuse type heavy industry with outside activity (Vb)

Age	Sleeping (t _{sleep})	Awake inside (t _{in})	Outside (t _{out})	Total* on site	EF _{week}	EF _{year}
	h/d	h/d	h/d	h/d	d/w	w/y
1 - < 3 year	0	0	0	0	5	47
3 - < 6 year	0	0	0	0	5	47
6 - < 10 year	0	0	0	0	5	47
10 - < 15 year	0	0	0	0	5	47
15 - < 21 year	0	1	7	8	5	47
21 - < 31 year	0	1	7	8	5	47
31 - < 41 year	0	1	7	8	5	47
41 - < 51 year	0	1	7	8	5	47
51 - < 61 year	0	1	7	8	5	47
≥ 61 years	0	1	7	8	5	47

* sum of hours 'sleeping', 'awake' and 'outside'

Table 11: Vegetable consumption data (Q_{veg} and $Q_{veg_category}$) (g fw/d)

age	potatoes		Root and tuberous plants				Bulbous plants			Fruit vegetables			
	potatoes	carrot	Scorzonera and parsnip	Other vegetables (as parsnip)	root (as)	Σ Root and tuberous plants	Bulbous vegetable (as onion)	leek	Σ bulbous plants	cucumber	tomatoes	Other fruit vegetables (as paprika)	Σ fruit vegetables
1 - < 3 year	36.30	9.12	0.24	0.45		9.81	2.23	3.61	5.84	1.61	6.40	0.88	8.89
3 - < 6 year	85.35	14.45	0.38	0.71		15.54	3.53	5.73	9.25	2.56	10.13	1.39	14.09
6 - < 10 year	100.81	15.43	0.48	0.81		16.71	5.59	5.35	10.94	3.70	16.17	1.74	21.62
10 - < 15 year	120.69	16.68	0.60	0.95		18.24	8.25	4.86	13.10	5.18	23.93	2.19	31.30
15 - < 21 year	140.21	21.57	0.79	1.45		23.81	11.68	5.04	16.72	8.59	36.77	4.41	49.77
21 - < 31 year	129.90	24.78	0.46	1.70		26.94	13.85	5.30	19.14	16.98	53.14	9.03	79.15
31 - < 41 year	124.54	24.78	0.46	1.70		26.94	13.85	5.30	19.14	16.98	53.14	9.03	79.15
41 - < 51 year	129.29	24.78	0.46	1.70		26.94	13.85	5.30	19.14	16.98	53.14	9.03	79.15
51 - < 61 year	134.31	24.78	0.46	1.70		26.94	13.85	5.30	19.14	16.98	53.14	9.03	79.15
\geq 61 year	137.19	24.78	0.46	1.70		26.94	13.85	5.30	19.14	16.98	53.14	9.03	79.15

Table 11: Vegetable consumption data (Qveg and Qveg_category) (g fw/d) (continued)

age	cabbages				Leafy vegetables							Σ leafy vegetables
	cabbage	sprouts	Cauliflower and broccoli	Σ cabbages	lettuce	spinach	chicory	celery	endive	lamb's lettuce		
1 - < 3 year	1.74	1.74	3.76	7.24	0.50	4.08	2.07	0.90	0.14	0.14	7.82	
3 - < 6 year	2.76	2.76	5.95	11.47	0.79	6.46	3.28	1.42	0.22	0.22	12.39	
6 - < 10 year	2.40	2.40	6.49	11.29	2.90	6.38	4.72	1.58	0.44	0.44	16.46	
10 - < 15 year	1.93	1.93	7.19	11.06	5.62	6.28	6.58	1.88	0.72	0.72	21.80	
15 - < 21 year	1.50	1.50	10.54	13.54	8.45	5.29	8.89	2.08	1.20	1.20	27.11	
21 - < 31 year	2.50	2.50	13.50	18.50	10.56	8.54	9.33	2.43	0.92	0.92	32.70	
31 - < 41 year	2.50	2.50	13.50	18.50	10.56	8.54	9.33	2.43	0.92	0.92	32.70	
41 - < 51 year	2.50	2.50	13.50	18.50	10.56	8.54	9.33	2.43	0.92	0.92	32.70	
51 - < 61 year	2.50	2.50	13.50	18.50	10.56	8.54	9.33	2.43	0.92	0.92	32.70	
\geq 61 year	2.50	2.50	13.50	18.50	10.56	8.54	9.33	2.43	0.92	0.92	32.70	

Table 11: Vegetable consumption data (Qveg and Qveg_category) (g fw/d) (continued)

age	Leguminous vegetables		Σ	leguminous vegetables
	beans	peas		
1 - < 3 year	3.47	2.00	5.47	
3 - < 6 year	5.49	3.17	8.66	
6 - < 10 year	6.42	3.51	9.94	
10 - < 15 year	7.63	3.96	11.59	
15 - < 21 year	9.60	4.19	13.80	
21 - < 31 year	11.75	3.87	15.62	
31 - < 41 year	11.75	3.87	15.62	
41 - < 51 year	11.75	3.87	15.62	
51 - < 61 year	11.75	3.87	15.62	
≥ 61 year	11.75	3.87	15.62	

Table 12: Consumption data for animal products (g/d)

Age	Q _{beef}	Q _{organ_meat}	Q _{milk}	Q _{butter}	Q _{eggs}
1 - < 3 year	10.0	0.00	395	0.40	15
3 - < 6 year	10.0	0.07	387	0.46	29
6 - < 10 year	18.0	0.23	340	0.97	30
10 - < 15 year	30.0	0.46	280	1.6	30
15 - < 21 year	37.0	0.39	229	2.6	33
21 - < 31 year	32.0	0.15	215	3.1	41
31 - < 41 year	36.0	0.28	181	3.4	43
41 - < 51 year	37.0	0.28	186	4.7	45
51 - < 61 year	38.0	0.28	191	6.0	47
≥ 61 years	35.0	0.28	211	7.5	44

Table 13: Fraction of intake from food and drinking-water coming from local sources

food category	AGR (II)	RES-veg (III)	REC-dayout (IVa)	REC-stay (IVb)	IND-l (Va)	IND-h (Vb)
Potatoes	0.5	0.39	0	0	0	0
Root and tuberous plants	1	0.36	0	0	0	0
Bulbous plants	1	0.52	0	0	0	0
Fruit vegetables	1	0.39	0	0	0	0
Cabbage	1	0.21	0	0	0	0
Leafy vegetables	1	0.36	0	0	0	0
Leguminous plant	1	0.42	0	0	0	0
Stem plants	1	0.10	0	0	0	0
beef	1	0	0	0	0	0
organ meat	1	0	0	0	0	0
milk	1	0	0	0	0	0
butter	1	0	0	0	0	0
eggs	1	0.6	0	0	0	0
groundwater	0	0	0	0	0	0
RF _{drinking_water}	1	1	0	1	0.5	0.5

Table 14: Soil adherence (AF_{soil_skin}) values in mg/m^2

Age	AGR RES-vg (II/III)	REC-dayout (IVa)	REC-stay (IVb)	IND-I (Va)	IND-h (Vb)
1 - < 3 year	2000	4000	4000	0	0
3 - < 6 year	2000	4000	4000	0	0
6 - < 10 year	2000	4000	4000	0	0
10 - < 15 year	2000	4000	4000	0	0
15 - < 21 year	1000	1000	1000	100	100
21 - < 31 year	1000	1000	1000	100	100
31 - < 41 year	1000	1000	1000	100	100
41 - < 51 year	1000	1000	1000	100	100
51 - < 61 year	1000	1000	1000	100	100
≥ 61 years	1000	1000	1000	100	100

Table 15: Dust adherence (AF_{dust_skin}) values in mg/m^2

Age	AGR RES-vg (II/III)	REC-dayout (IVa)	REC-stay (IVb)	IND-I (Va)	IND-h (Vb)
1 - < 3 year	100	100	100	0	0
3 - < 6 year	100	100	100	0	0
6 - < 10 year	100	100	100	0	0
10 - < 15 year	100	100	100	0	0
15 - < 21 year	100	100	100	100	100
21 - < 31 year	100	100	100	100	100
31 - < 41 year	100	100	100	100	100
41 - < 51 year	100	100	100	100	100
51 - < 61 year	100	100	100	100	100
≥ 61 years	100	100	100	100	100

Table 16: Skin surface area for soil contact (m²)

Age	AGR RES-vg (II/III)	REC-dayout (IVa)	REC-stay (IVb)	IND-l (Va)	IND-h (Vb)
1 - < 3 year	0.143	0.180	0.180	0.060	0.060
3 - < 6 year	0.211	0.266	0.266	0.080	0.080
6 - < 10 year	0.281	0.360	0.360	0.100	0.100
10 - < 15 year	0.425	0.544	0.544	0.133	0.133
15 - < 21 year	0.511	0.642	0.642	0.147	0.147
21 - < 31 year	0.566	0.703	0.703	0.152	0.152
31 - < 41 year	0.566	0.703	0.703	0.152	0.152
41 - < 51 year	0.566	0.703	0.703	0.152	0.152
51 - < 61 year	0.566	0.703	0.703	0.152	0.152
≥ 61 years	0.566	0.703	0.703	0.152	0.152

Table 17: Skin surface area for dust contact (m²)

Age	AGR RES-vg (II/III)	REC-dayout (IVa)	REC-stay (IVb)	IND-l (Va)	IND-h (Vb)
1 - < 3 year	0.143	0.180	0.180	0.060	0.060
3 - < 6 year	0.211	0.266	0.266	0.080	0.080
6 - < 10 year	0.281	0.360	0.360	0.100	0.100
10 - < 15 year	0.425	0.544	0.544	0.133	0.133
15 - < 21 year	0.511	0.642	0.642	0.147	0.147
21 - < 31 year	0.566	0.703	0.703	0.152	0.152
31 - < 41 year	0.566	0.703	0.703	0.152	0.152
41 - < 51 year	0.566	0.703	0.703	0.152	0.152
51 - < 61 year	0.566	0.703	0.703	0.152	0.152
≥ 61 years	0.566	0.703	0.703	0.152	0.152

Table 18: Showering and bathing frequency by land use

Age	AGR / RES-veg / REC-stay (II/III/IVb)				REC-dayout (IVa)				IND-I / IND-h (Va/Vb)			
	showering		bathing		showering		bathing		showering		bathing	
	d/week	EV (1/d)	d/week	EV (1/d)	d/week	EV (1/d)	d/week	EV (1/d)	d/week	EV (1/d)	d/week	EV (1/d)
1 - < 3 year	0	0	5	1	0	0	0	0	0	0	0	0
3 - < 6 year	0	0	3	1	0	0	0	0	0	0	0	0
6 - < 10 year	3	1	1	1	1	0	0	0	0	0	0	0
10 - < 15 year	3	1	1	1	1	0	0	0	0	0	0	0
15 - < 21 year	3	1	1	1	1	0	0	0	5	0	0	0
21 - < 31 year	3	1	1	1	1	0	0	0	5	0	0	0
31 - < 41 year	3	1	1	1	1	0	0	0	5	0	0	0
41 - < 51 year	3	1	1	1	1	0	0	0	5	0	0	0
51 - < 61 year	3	1	1	1	1	0	0	0	5	0	0	0
≥ 61 years	3	1	1	1	1	0	0	0	5	0	0	0

Table 19: Weighting factors for differences in inhalation rate due to age (WF_{age}) and activity (WF_{act})

age	WF_{age}	AGR/RES-vg/REC- stay/shower II/III/IVa	REC-dayout* (IVa)	$WF_{activity}$ REC dayin** (IVb)	IND-I / IND-h (Va/Vb)
1 - < 3 yr	1.9	1	2.7	3.6	1.5
3 - < 6 yr	1.8	1	2.7	3.6	1.5
6 - < 10 yr	1.6	1	2.7	3.6	1.5
10 - < 15 yr	1.3	1	2.7	3.6	1.5
15 - < 21 yr	1.2	1	2.7	3.6	1.5
adults	1	1	3.6	3.6	1.5

*: assuming playing activities during summer holidays during the day until 21 years of age and sporting for adults;

** : assuming sporting for all ages