Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
IV Polycyclic aromatic hydrocarbons (PAH)						
PAH (sum 10)						
naphthalene	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
anthracene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
phenatrene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
fluoranthene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
benzo(a)anthracene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
chrysene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
benzo(a)pyrene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
benzo(ghi)perylene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
benzo(k)fluoranthene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
indeno(1,2,3-cd)pyrene	draft NEN 6527	HPLC	draft NEN 6527	draft NEN 6527	draft NEN 6527	
V Chlorinated hydrocarbons						
vinylchloride	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
dichloromethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
1,1-dichloroethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
1,2-dichloroethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
1,1-dichloroethene	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
1,2-dichloroethene (cis and trans)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
dichloropropane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
trichloromethane (chloroform)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
1,1,1-trichloroethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
1,1,2-trichloroethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
trichloroethene (Tri)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
tetrachloromethane (Tetra)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
tetrachloroethene (Per)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
chlorobenzenes (sum)	see individual benzenes					
monochlorobenzene	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
dichlorobenzenes (sum)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
trichlorobenzenes (sum)	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	
tetrachlorobenzenes (sum)	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
pentachlorobenzene	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
hexachlorobenzene	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
chlorophenols (sum)	see individual phenols					
monochlorophenols (sum)	NEN-EN 12673	EX-GC		NEN-EN 12673	NEN-EN 12673	
dichlorophenols (sum)	NEN-EN 12673	EX-GC		NEN-EN 12673	NEN-EN 12673	
trichlorophenols (sum)	NEN-EN 12673	EX-GC		NEN-EN 12673	NEN-EN 12673	
tetrachlorophenols (sum)	NEN-EN 12673	EX-GC		NEN-EN 12673	NEN-EN 12673	

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
pentachlorophenol	NEN-EN 12673	EX-GC		NEN-EN 12673	NEN-EN 12673	
chloronaphthalene	test protocol	n.a.	test protocol	test protocol	test protocol	test
monochloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol	test
polychlorobiphenyls (sum 7)	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
EOX	NEN 6402	COUL	NEN 5744	NEN 6402	NEN 6402	NEN
VI Pesticides						
DDT/DDE/DDD	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
drins	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
aldrin	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
dieldrin	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
endrin	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
HCH-compounds	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
α-HCH	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
β-HCH	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
γ-HCH	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
atrazine	NVN 6409	GC-NPD		NVN 6409		
	NEN-EN-ISO 11369	HPLC-UV	NEN-EN-ISO 11369	NEN-EN-ISO 11369	NEN-EN-ISO 11369	NEN
carbaryl	NEN 6403	HPLC-UV	draft NEN 6403	draft NEN 6403	draft NEN 6403	draft
carbofuran	NEN 6403	HPLC-UV				
chlorodane	test protocol		test protocol	test protocol	test protocol	
endosulfan	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
heptachloro	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
heptachloro-epoxide						
	NEN-EN-ISO 6468	GC-ECD	NEN-ISO 5667-1; NEN-ISO 5667-2	NEN-EN-ISO 6468	NEN-EN-ISO 6468	-
maneb	test protocol	test protocol	test protocol	test protocol	test protocol	test
MCPA	NEN 6408	GC	GC	GC	GC	GC
organotin compounds	*concept draft NEN 5729*	*EX-GCMS*	*concept draft NEN 5729*	*concept draft NEN 5729*	*concept draft NEN 5729*	-
VII Other contaminants						
cyclohexanone	test protocol	test protocol	test protocol	test protocol	test protocol	test
phthalates (sum)	test protocol	-	test protocol	test protocol	test protocol	test
mineral oil	NVN 6678	GC-EX	NEN 5744	NVN 6678	NVN 6678	NVN
pyridine	test protocol	-	test protocol	test protocol	test protocol	test

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
tetrahydrofuran	test protocol	-	test protocol	test protocol	test protocol	test
tetrahydrothiophene	test protocol	-	test protocol	test protocol	test protocol	test
tribromomethane	NEN-EN-ISO 10301	EX-GC	NEN-EN-ISO 10301	NEN-EN-ISO 10301	NEN-EN-ISO 10301	-
List of substances for which indicative level						
I Metals						
beryllium	NEN 6435	GF-AAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN 5667
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
selenium	NEN 6434	AAS-HG	NPR 6600	NEN 5744	NEN 6434	NEN
	NEN 6612	GF-AAS	-	NEN 6612	NEN 6612	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
tellurium	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NVN 6201 6465
thallium	ISO/WD 15586	test protocol	test protocol	test protocol	test protocol	test
tin	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
vanadium	NEN 6426	AES-ICP	NEN 5744	NEN 6426	-	NEN
	NEN 6463	GF-AAS	NEN 5744	NEN-EN-ISO 5667-3	-	NEN
silver	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6462	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6609	GF-AAS	-	NEN 6609	NEN 6609	NEN

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
III Aromatic compounds						
dodecylbenzene	test protocol	n.a.	test protocol	test protocol	test protocol	test
aromatic solvents						
V Chlorinated hydrocarbons						
chloroaniline (sum)	test protocol	n.a.	test protocol	test protocol	test protocol	test
dichloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol	test
trichloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol	test
tetrachloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol	test
pentachloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol	test
4-chloromethylphenols	test protocol	n.a.	test protocol	test protocol	test protocol	test
dioxin	test protocol	n.a.	test protocol	test protocol	test protocol	test
VI Pesticides						
azinphos-methyl	Draft NEN-EN 12918	GC-EX	NEN-ISO 5667-1, 5667-2	NEN-ISO 11369	NEN-ISO 11369	Draf
VII Other contaminants						
acrylonitrile	test protocol	n.a.	test protocol	test protocol	test protocol	test
butanol	test protocol	n.a.	test protocol	test protocol	test protocol	test
1,2-butylacetate	test protocol	n.a.	test protocol	test protocol	test protocol	test
ethylacetate	test protocol	n.a.	test protocol	test protocol	test protocol	test
diethylene glycol	test protocol	n.a.	test protocol	test protocol	test protocol	test

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
ethylene glycol	test protocol	n.a.	test protocol	test protocol	test protocol	test
formaldehyde	test protocol	n.a.	test protocol	test protocol	test protocol	test
isopropanol	test protocol	n.a.	test protocol	test protocol	test protocol	test
methanol	test protocol	n.a.	test protocol	test protocol	test protocol	test
methyl-tert-butyl ether (MTBE)	test protocol	n.a.	test protocol	test protocol	test protocol	test
methylethylketone	test protocol	n.a.	test protocol	test protocol	test protocol	test

Notes to table 3 and 4

Italics: Standards have been derived from allied substances

ANNEX C: DATA FOR DETERMINING REMEDIATION URGENCY AND REMEDIATION DEADLINE

Determining the remediation urgency for substances given in the circular should be done in accordance with the system described in the Circular on the Assessment and Coordination of the Soil Protection Act Remediation Regulations (Netherlands Government Gazette 1998, no. 4). To help in applying this system the following are given in table 5 for substances for which an intervention value has been included and in table 6 for substances for which an indicative level for serious soil contamination is given:

- maximum permissible risk level for humans (MPR) in ìg/kg bw (=body weight) per day.
- ecotoxicological HC50-values (hazardous concentration 50% that is to say concentration at which 50% of the species and processes in an ecosystem are completely protected) in mg/kg soil/sediment (dry weight). The HC50-values are given for standard soil (10% organic substance and 25% clay). For soils with a different composition corrections have to be applied using the formula given with tables 1 and 2.
- log K_d values for metals, log Koc values for organic compounds (equilibrium partitioning coefficients) which are required to determine the dispersal risks in l/kg.

Table 5: Human MPR-values, HC50-values (standard soil) and Kd/logKoc-values for substances for which intervention values have been set.

	human MPR (mg/kgbw/d)	HC50 (mg/kg)	Kd/log Koc (l/kg)
I Metals			
antimony	0.9	2900	80
arsenic	2.1	40	980
barium	20	625	60
cadmium	1	12	190
chromium	5	230	144400
cobalt	1.4	240	120
copper	140	190	540
mercury	0.6	10	3300
lead	3.6	290	2400
molybdenum	10	480	20
nickel	50	210	560
zinc	1000	720	250
II Inorganic compounds			
cyanides-free	50	-	0.1
cyanides-complex (pH<5)	13	-	0.1
cyanides-complex (pH >5)	13	-	0.1
thiocyanates (sum)	11	-	0.1
bromide (mg Br/l)			
chloride (mg Cl/l)			
fluoride (mg F/l)			
III Aromatic compounds			
benzene	4.3	25	1.9
ethyl benzene	136	-	2.2
toluene	430	130	2.1
xylene	10	-	2.6
styrene (vinylbenzene)	77	-	2.7
phenol	60	40	1.6
cresoles (sum)	50	50	1.5
catechol(o-dihydroxybenzene)	40	-	2
resorcinol(m-dihydroxybenzene)	20	-	1
hydroquinone(p-dihydroxybenzene)	25	-	0.2
IV Polycyclic aromatic hydrocarbons (PAH)			
PAH (sum 10)	-	40	-
naphthalene	50	-	3
anthracene	50	-	4.4
phenatrene	20	-	4.4
fluoranthene	20	-	4.9
benzo(a)anthracene	20	-	5.9
chrysene	2	-	5.2
benzo(a)pyrene	2	-	5.3
benzo(ghi)perylene	20	-	6.2
benzo(k)fluoranthene	20	-	6.5
indeno(1,2,3-cd)pyrene	20	-	4.6

Table 5(continued): Human MPR-values, HC50-values (standard soil) and Kd/logKoc-values for substances for which intervention values have been set.

	Human MPR (mg/kgbw/d)	HC50 (mg/kg)	Kd/log Koc (l/kg)
V Chlorinated hydrocarbons			
vinyl chloride	3.5	60	2.3
dichloromethane	60	60	1
1,1-dichloroethane	80	40	1.4
1,2-dichloroethane	14	60	1.6
1,1-dichloroethene	3	130	1.8
1,2-dichloroethene (cis and trans)	16	240	1.8
dichloropropane (1,2/1,3)	50/70	125	1.6
trichloromethane (chloroform)	30	60	1.6
1,1,1-trichloroethane	80	90	2
1,1,2-trichloroethane	4	460	2
trichloroethene (Tri)	540	60	2
tetrachloromethane (Tetra)	4	60	2.3
tetrachloroethene (Per)	16	60	2.2
chlorobenzenes (sum)	-	30	-
monochlorobenzene	300	-	2.3
dichlorobenzenes (sum)	190	-	2.6
trichlorobenzenes (sum)	0.5	-	3.2
tetrachlorobenzenes (sum)	0.5	-	3.7
pentachlorobenzene	0.5	-	3.6
hexachlorobenzene	0.5	-	4
chlorophenols (sum)	-	10	-
monochlorophenols (sum)	3	10	1.8
dichlorophenols (sum)	3	10	2.5
trichlorophenols (sum)	3	10	3.2
tetrachlorophenols (sum)	3	10	4.1
pentachlorophenol	30	5	4.5
chloronaphthalene	0.5	-	3.5
monochloroaniline	0.9	46	2.5
polychlorobiphenyls (sum 7)	0.09	1	5.7

Table 5(continued): Human MPR-values, HC50-values (standard soil) and Kd/logKoc-values for substances for which intervention values have been set.

	Human MPR (mg/kgbw/d)	HC50 (mg/kg)	Kd/log Koc (l/kg)
VI Pesticides			
DDT/DDE/DDD	20	4	5,2
drins	0.1	4	4.6
aldrin	-	-	-
dieldrin	-	-	-
endrin	-	-	-
HCH-compounds	4	2	3.2
a-HCH	-	-	-
b-HCH	-	-	-
g-HCH	-	-	-
atrazine	5	6	2.2
carbaryl	10	5	2.1
carbofuran	10	1.5	1.7
chlorodane	0.5	4	4.6
endosulfan	6	4	3.1
heptachloro	0.3	4	4.5
heptachloro-epoxide	0.4	4	2.9
maneb	20	35	7
MCPA	1.5	95	1.8
organotin compounds	0.4	2.5	4.2
VII Other contaminants			
cyclohexanone	4600	-	0.4
phthalates (sum)	25	60	4.6
pyridine	1	150	0.4
tetrahydrofuran	10	-	0.8
tetrahydrothiophene	3.5	-	1.7
tribromomethane	20	300	2.2

Table 6: Human MPR-values, HC50-values (standard soil) and Kd/logKoc-values for substances for which indicative levels for serious soil contamination have been set.

	Human MPR (mg/kgbw/d)	HC50 (mg/kg)	Kd/log Koc (l/kg)
I Metals			
beryllium	0.5	30	40
selenium	5	5	20
tellurium	2	-	300
thallium	0.2	14	158
tin	2000	910	1905
vanadium	2	250	309
silver	5	15	125
III Aromatic compounds			
dodecylbenzene	5	-	-
aromatic solvents	170	200	-
V Chlorinated hydrocarbons			
dichloroaniline	-	43	2.9
trichloroaniline	-	7.8	3.1
tetrachloroaniline	-	27	3.8
pentachloroaniline	-	5.9	4
4-chloro-2-methylphenol	20	15	1.9
4-chloro-3-methylphenol	300	15	1.9
dioxin	$1*10^{-5}$	0.025	6.2
VI Pesticides			
azinphos-methyl	5	2	3.2
VII Other contaminants			
acrylonitrile	0.1	1.3	1
butanol	125	30	0.8
1,2-butylacetate	200	100	1.6
ethylacetate	900	68	0.7
diethylene glycol	400	480	0
ethylene glycol	400	100	0
formaldehyde	150	0.3	0
isopropanol	1000	220	0.5
methanol	500	30	0
methyl-tert-butyl ether (MTBE)	900	125	1.1
methylethylketone	190	175	0

APPENDIX D: GUIDELINE FOR DEALING WITH SUBSTANCES FOR WHICH THERE ARE NO STANDARDS

Introduction
Asbestos is a well-known example of a substance which is encountered on a regular basis in investigating soil contamination or carrying out soil remediation, but for which no standards have been included in the present circular. There are also many substances which occur only incidentally in the soil and for which no standards have been listed in this circular. Such substances are referred to as substances for which there are no standards. It has to be emphasised that when encountering substances for which there are no standards, a case of contamination that is serious and/or urgent may be involved.

If substances for which there are no standards are encountered and one wishes to assess whether there is a case of contamination or one wishes to issue an order on the seriousness and urgency of the case of contamination, this cannot be underpinned with a reference to the target values, intervention values or indicative levels for serious contamination in this circular. The present annex provides a guideline that can be followed when encountering substances for which there are no standards.

Demarcating the areas of application of the guideline
The present guideline applies to soil and aquatic sediment and the contamination of soil and aquatic sediment. Dealing with substances for which there are no standards however is not only a matter that crops up when it comes to soil contamination, but also when it comes to a possible re-use of a batch of earth. In assessing a batch of earth in the context of the Building Materials Decree, which may be contaminated with a substance for which there is no standard, the method described can be used as a guide.

Before the guideline is used it first has to be established, as is the case with the substances for which there are standards, whether the case of contamination comes within the orbit of the present circular. This area of application is dealt with in the main text of the circular under the heading Area of application of the circular, duty of care.

Target values for substances without standards
The absence of a target value means that there is no clear limit above which one can speak of the presence of a case of contamination.

The lack of a target value for soil/sediment produces the following options:
- the INS document contains target values for more substances than have been set as part of policy in the present circular.
- for substances occurring in nature it may decided to establish the local natural background concentration of that substance and to use this as a target value. Should this local background concentration be exceeded then there is a case of contamination. To determine the natural background concentration use can be made of the basic principles in the Manual on background concentrations (Begeleidingscommissie Actief Bodembeheer [Steering committee on active soil management], September 1998, TNO-MEP-R 98/283) and of the basic principles from the Guideline on drafting and applying soil quality charts as part of the Ministerial exemption regulation on earth moving from VROM, which is due out shortly.
- if a substance is not naturally present in the soil and no target value has been included in the INS document the quantification limit can be used as the target value. The quantification limit is to be found in the NNI's DOMINO. If the substance is encountered there is a case of contamination.

The following approach can be adopted for missing target values in groundwater:
- for groundwater as well the INS document can be consulted in which groundwater target values for more substances have been included than have been set as part of policy in the present circular;
- for substances which naturally occur in groundwater the local natural background concentration is in principle used as the target value. Just as with metals for which target values have been included in this circular, a distinction is made between deep and shallow groundwater. Information on the

natural background concentration is obtainable from RIVM published data on the National measurement network for groundwater quality (for example RIVM report Background concentrations of 17 trace elements in the groundwater in the Netherlands, Report number 711701 017) and from the Provincial measurement networks for groundwater quality. If these sources fail to provide information it may be decided to establish the naturally present background concentration in the locality on the basis of measurements;
- for substances that do not occur naturally in groundwater and for which the INS document does not include any standards the quantification limit will be taken as the target value. The quantification limit is to be found in the NNI's DOMINO.

The quantification limit is preferably not used as the target value since a risk-based approach is adopted as a point of departure for introducing standards in environmental policy. However for the substances without standards a complete risk evaluation is lacking nor can the risk to humans be estimated either on the basis of an intervention value/indicative level for serious contamination. The quantification limit therefore is used because there is no better alternative available.

Primary assessment of the seriousness and urgency of the case of contamination
If the remediation regulation under the Soil Protection Act (Wbb) or the arangement in the case of an unusual event is applicable, the case of contamination with a substance for which no intervention value or indicative level for serious contamination is available, can be first assessed by taking the following steps:
1. Assessment on the basis of other substances which are present for which an intervention value does exist. Frequently in the case of contamination several substances are encountered, so that the decision on the seriousness of the case of contamination is seldom based on only a single substance. Consequently the remediation of a site does not normally have to be halted because of the lack of intervention values for one or even several substances;
2. Assessment of the risks on the basis of Ad hoc ECOTOX SCC, Ad hoc HUMTOX SCC, Ad hoc intervention value for soil/sediment and/or Ad hoc intervention value for groundwater set for other cases of contamination. The available ad hoc values and a note explaining the concept referred to, as well as comments on the use of set values, is given in the next section.
3. Assessing the risks using other standards for example from water quality management, legislation on fertilisers or other agricultural standards (including the standards from the NW4, V&W December 1998), INS, VROM, DGM, December 1997), the LAC provisional warning values (Ministry of Agriculture, Nature Management and Fisheries (LNV), December 1991; these are currently being revised); see also Substances and Standards, Overview of the main substances and standards in environmental policy, VROM, DGM, Samson H.D. Tjeenk Willink, 1999).

Assessment solely on the basis of physical and chemical similarity by using an intervention value for the chemically allied substances is not sufficient because a physical chemical similarity of substances is not always related to the toxicological similarity.

The competent authority may be able to take a decision based on the above procedure as to the seriousness and urgency of a case of contamination or on a possible remediation plan. If the competent authority takes the view that it cannot sufficiently underpin its decision on the basis of the data available, the RIVM, at the instructions of the competent authority and in consultation with the inspector for environmental hygiene, may derive an Ad hoc intervention value, an Ad hoc ECOTOX SCC and/or an Ad hoc HUMTOX SCC. The terms are explained below.

Ad hoc intervention values and SCCs
The RIVM may put forward a proposal at the instruction of the competent authority or the problem holder and through the intervention of the inspector for environmental hygiene, depending on the situation, for:
- an Ad hoc ECOTOX SCC (Ad hoc Ecotoxicological serious soil contamination concentration). This is a concentration of a contaminant in the soil/sediment above which the ecotoxicological criterion on which the intervention values have been based, is exceeded;
- an Ad hoc HUMTOX SCC (Ad hoc Human toxicological serious soil contamination concentration). This is the concentration of a contaminant in the soil/sediment above which the human toxicological criterion on which the intervention values have been based, is exceeded;

- both aforementioned values. If both values are or can be derived the lowest of the two is regarded as the Ad hoc intervention value for soil/sediment.

For groundwater an Ad hoc intervention value is derived from the Ad hoc intervention value for soil/sediment. If the latter value is not available the RIVM indicates the concentration in groundwater that can be derived from the ad hoc HUMTOX SCC or from the Ad hoc ECOTOX SCC.

Should the competent authority be of the opinion that the set of legislative instruments needs to be applied to assess a specific case of contamination, then the competent authority can request the inspector for environmental hygiene on behalf of the Minister (VROM) to set an Ad hoc ECOTOX SCC and/or an Ad hoc HUMTOX SCC on the basis of the RIVM proposals and possibly at the same time an Ad hoc intervention value for soil/sediment and for groundwater. An Ad hoc intervention value cannot automatically be used as a legal intervention value because the ad hoc intervention value is frequently based on much less complete information and/or on unreliable information. Moreover no broad advisory route has been taken to arrive at Ad hoc intervention values which is the case for the “real” intervention values. More trouble is taken to obtain statistically underpinned input parameters for the proposals for intervention values obtained for the regular series and greater emphasis is placed on improving the most relevant parameters on the basis of a more intensive sensitivity analysis. Hence a proposal for an intervention value can indicate a different concentration of a substance in the soil than the earlier derived Ad hoc intervention value for the substance in question.

In the past few years the RIVM has already derived a number of Ad hoc ECOTOX SCC, Ad hoc HUMTOX SCC and Ad hoc intervention values. These are listed in table 7. The Ad hoc intervention values can be used as a preliminary indication of the risks of the presence of the substance in the soil or sediment but have no legal status for other cases of contamination than the specific one for which they have been derived and set. It should be pointed out that the Ad hoc intervention values in the table in the future may be replaced by “real” intervention values or an indicative level for serious contamination. If this happens the Ad hoc intervention value in question becomes invalid and the intervention value or indicative level for serious contamination set by the environment minister becomes the valid one. In view of the above it is possible that the ultimate intervention level/indicative level for serious contamination will be different from an Ad hoc intervention value set earlier.

Supplementary assessment of actual risks
If the above approach offers insufficient insight into the actual risks, a decision may be taken to consider specifically certain relevant actual risks. To assess the actual risks for humans parts of the formula for the CSOIL model can be used (for example carrying out an ingestion calculation). The CSOIL model is described in RIVM report 725201006. Exposure of humans to soil contamination. A qualitative and quantitative analysis, leading to proposals for human toxicological C-trigger values. Van der Berg, 1995. The SEDISOIL model (1999) can be used to calculate human exposure resulting from contaminated aquatic sediment. The SEDISOIL formula is described in RIVM/RIZA report 99.162x. The VOLASOIL model can also be used to calculate the evaporation of volatile compounds to ambient air. The VOLASOIL model is described in RIVM report 715810014. The VOLASOIL risk assessment model based on CSOIL for soils contaminated with volatile compounds, Waitz et al, 1996. Actual risks may possibly be assessed by carrying out bioassays.

Future intervention values
An endeavour has been made as much as possible to use objective criteria in selecting substances for new regular series for RIVM to derive proposals for intervention values. Criteria for checking whether or not there is any point in deriving a proposal for the intervention value for a substance are:
1. Toxicity of the contaminant
2. Frequency of occurrence in soil/sediment and/or groundwater, the need in practice
3. Residence time of the substance in soil and leaching to groundwater
4. Existence of other testing frameworks.

A substance is selected for which a proposal for an intervention value can be derived if the combination of criteria provide reason to do so. For example there is only a reason for deriving a proposal for an intervention value if the substance is both toxic and occurs frequently in the soil and has not disappeared in the soil in a short time span. Deciding whether the criteria have been met is a subjective

decision. The Technical Committee for Soil Protection (TCB) endorses the importance of the interrelationship of the criteria in its report on the selection of substances. The availability of the requisite input data also plays a role. Moreover the substance has to be suitable for a proposal for an intervention value to be derived according to the standard procedure. Policy-makers have a need, if it is possible, for group values to be derived with the aim of enhancing the degree to which derived intervention values can be applied.

It has been decided provisionally not to derive a proposal for an intervention value for the following substances:
. metals: aluminium[*1], hafnium[*2], magnesium[*1], manganese[*1], osmium[*2], palladium[*2], platinum[*2], titanium[*2], wolfram[*3].
. nutrients: phosphate, nitrogen compounds[*4].
. other inorganic substances: bromide[*5], chloride[*5].
. other substances and groups of substances: asbestos[*6].

*1 Naturally occurs in high concentrations in the soil. High concentrations in groundwater are more likely to be a result of acidification than from increased emissions. Preference for testing these in other contexts;
*2 Is not frequently encountered;
*3 Too little data available to derive a Maximum Permissible Risk Level for humans (one of the building blocks of the intervention values);
*4 In principle has a short residence time in the soil: however repeated input into the soil takes place and, through the soil, into groundwater. For this reason elimination of such compounds is mainly a question of regulating the input. Preference for tackling this by means of other legislative frameworks (for one thing regulations on the use of fertiliser). Aquatic sediment containing phosphates transmit these slowly to surface water. Hence it could be possible that phosphates will be tackled by means of soil remediation;
*5 Too short residence time in the soil. Preference for tackling this by means of other legislative frameworks. Because of chloride's toxicity for plant and animal life an intervention value for groundwater might be considered, but then proper account has to be taken of areas subject to marine influence.
*6 See next section.

Dealing with asbestos

General

Asbestos is regarded as a problem in diverse policy frameworks. Hence asbestos is being tackled in different contexts besides soil remediation. A residual concentration standard of 10mg/kg highly stabilised asbestos per kg dry matter(ds) was set for asbestos in demolition aggregate and in earth/soil. For loosely stabilised asbestos the zero standard (in the form of the quantification limit) is adhered to. The residual concentration standard of 10mg/kg will be included in legislation on health and safety at work in 2000. In this circular the residual concentration standard of 10mg/kg highly stabilised asbestos per kg dry matter (ds) and the 0 mg/kg for loosely stabilised asbestos are declared applicable to the application and reuse of earth.

Despite the fact that in practice many problems occur with asbestos in the soil, it has been decided for the time being not to derive an intervention value for soil remediation for asbestos[1]. Asbestos does meet the criteria that the substance is both toxic, occurs frequently in the soil and does not disappear from the soil within a short time span. But the main reason for deciding not to derive an intervention value for asbestos is the fact that the uncertainties in assessing the potential risks of asbestos in the soil based on the standard procedure are considered to be too great. A derived intervention value for asbestos could deviate by several orders of magnitude from an actually relevant value. It is regarded as irresponsible to base policy on such an unreliable value which could have significant financial and legal repercussions.

In the past at request of the inspector for environmental hygiene it was decided to derive an Ad hoc HUMTOX SCC for asbestos. But this SCC has not been included in the table with the Ad hoc values

[1] In the past it was decided at the request of the inspector for environmental hygiene to derive an Ad hoc Intervention value for asbestos. This has not been included in the Ad hoc values table because the underpinning was too weak. The standard derived in the past has therefore lapsed and is no longer be used.

because it has been found to be too reliable after all. Hence the standard derived in the past has lapsed and should be no longer used.

It is important in preliminary investigations (notably in historical investigations) to include asbestos. This applies in particular if a construction work containing asbestos has been situated or is situated on the site in question. The main reasons for carrying out an investigation of this kind are:

- use and reuse of earth with a concentration higher than 10 mg/kg highly stabilised asbestos as described earlier, are banned;
- regulations based on the Working Conditions Decree apply to the use of (as in building on), excavating and cleaning of earth containing asbestos (see also below);
- when selling earth containing asbestos the presence of asbestos can affect the price and failing to report the presence of asbestos in the earth may result in the buyer taking the seller to court.

Reference to the report 'Asbestos in the soil' can be made for a method of measuring asbestos in the soil. The development of a measurement method for determining asbestos in the soil (phase 2 and 3) of TNO-MEP, report number R96/181 (to be ordered from TNO-MEP, telephone 055-5493812). The method described will be standardised in 2000.

Areas to which the asbestos guideline is not applicable

In the case of asbestos the guideline explicitly does not apply to assessing the quality of material other than soil such as landfill material, pavement material or (road) building material.

Before the asbestos guideline is applied it should be decided first of all of course whether assessment of the case of contamination comes within the orbit of the present circular. That orbit is demarcated in the section on the Area of application of the circular, duty of care in the main text of the circular. What is important for asbestos in particular are the duty of care in the Wbb, any permit regulations and the Working Conditions Decree.

Finally the guideline below does not apply if asbestos is solely present on the soil [2]. In a case of this kind there is no question of soil contamination. It can be decided in consultation whether it is necessary to demonstrate the presence of asbestos in the underlying soil by means of an analysis of asbestos in samples of earth. If there is no question of soil pollution by asbestos no decision is taken on the seriousness and urgency of a remediation plan as part of the Wbb.

If asbestos is solely present on the soil it is advisable to remove the asbestos with a view to the use of the soil for reasons of public health and/or health and safety at work. This must be done bearing in mind the regulations on health and safety at work relating to asbestos in the Working Conditions Decree and in conformity with policy rule 4.9-4 of this decree. If it is decided to remove the asbestos, this should preferably be carried out by a soil remediation company or an asbestos removal company which holds a KOMO process certificate for removing asbestos. However there is (as yet) no obligation to commission a company with a KOMO process certificate for removing asbestos to actually remove the asbestos from the soil. The government body involved is primarily the local authority and, depending on the situation, the Factories inspectorate in the case of a work situation and in some cases the provincial authority and the inspectorate general for the environment (IMH).

Assessment of earth contaminated with asbestos

If asbestos is present in (and possibly also on) the soil the actual risks of the case of contamination are assessed. The (suspected) presence of asbestos may be based both on historical data and on soil investigation data (field observations and/or analyses). There has to be a reason for assuming that there are small pieces of material containing asbestos and/or asbestos fibre in the soil and not for example waste in the form of a bulky piece of asbestos cement sewer pipe. In assessing the actual risk it is above all important to ascertain whether it would be possible for human beings to inhale the asbestos. Besides this it is important to ascertain whether it is highly stabilised asbestos or loosely stabilised

[2] Asbestos can end up on the soil in the wide vicinity of a fire. More information is obtainable in Action Plan for Asbestos fire from the Ministry of Housing, Spatial Planning and the Environment (VROM) and the Ministry of Home Affairs, report number 17013 (to be ordered from the VROM Distribution Centre, telephone 079-3449449). If the road or plot is paved with material containing asbestos the owner is required to take measures based on the Asbestos roads regulation Wms (Netherlands Government Gazette 1999, 28). Certain owners are entitled to a one-off subsidy in 1999 (for more information: Environment Info line 070-3610575).

asbestos. In the case of highly stabilised asbestos the dangerous asbestos fibre only enters the air if it is treated or removed. Under normal circumstances asbestos fibres only enter the air in the case of loosely stabilised asbestos as a result of mechanical causes. Comments made under the 'General' heading are also important.
Having assessed the actual risks the competent authority (the provincial authority, the four large municipalities or the Public works department) can decide on the urgency of the case of contamination. If the competent authority decides to declare the case urgent this also means that it is a case of serious contamination, because of the actual human risks. If the competent authority decides to declare it a non-urgent case, it has to be indicated in the order that there may be a case of serious contamination (there are possibly potential risks) but that the seriousness cannot at present be established. In the case of any change in the use of the soil, the actual risks and the urgency will have to be assessed afresh in conformity with the usual procedure. The assessment of the actual risks may also form the basis for the assessment of any remediation plan.

Remediation of soil containing asbestos must be implemented bearing in mind the regulations on asbestos in the Working Conditions Decree and policy rule 4.9-4 of the decree. Removal and any cleaning should preferably be carried out by a soil remediation company or a company with a KOMO process certificate for removing asbestos (see also under the heading 'Areas to which the asbestos guideline does not apply').

Table 7: Ad hoc Ecotoxicological Serious Soil Contamination Concentration (Ad hoc ECOTOX SCC), Ad hoc Human toxicological Serious Soil Contamination Concentration (Ad hoc HUM-TOX SCC); Ad hoc intervention values for earth/sediment (standard soil: 10% organic matter) and ad hoc intervention values for groundwater.

SUBSTANCE	Ad hoc ECOTOX SCC soil/sediment ($mg/kg_{d.s.}$)	Ad hoc HUM-TOX SCC soil/sediment ($mg/kg_{d.s.}$)	Ad hoc intervention value soil/sediment ($mg/kg_{d.s.}$)	Ad hoc intervention value groundwater (µg/l) (in solution)
II Other inorganic substancesl				
Fluoride	n.a.	24	n.a. (24)[a)]	n.a. (2,3)[a)] mg F/l
V Chlorinated hydrocarbons				
CFK113	n.a.	303	303	n.a. (820) [a)]
Hexachloroethane	n.a.	12	n.a. (12)[a)]	n.a. (10)[a)]
Monochloroethane	66	5.1	5	579
Tetrachloronaphthalene	n.a.	33.1	n.a. (33)[a)]	n.a. (0.25)[a)]
Trichloronaphthalene	n.a.	106	n.a. (106)[a)]	n.a. (16)[a)]
VI Pesticides				
Bentazon	26	85	26	n.a.
Chloropropham	21	256	21	44.5
Chlorothalonil	1.78	17073	1.8	n.a.
Dichlobenil	47	2585	47	129
MCPP	12	38	12	37
VII Other substances				
Acetone	n.a.	31	n.a. (31)[a)]	n.a. (3141)[a)]
Dichlorocresol	n.a.	5110	n.a. (5110)[a)]	n.a. (7328)[a)]
Dicyclopentadiene	n.a.	38	n.a. (38)[a)]	n.a. (206)[a)]
Dimethylformamide	n.a.	51	n.a. (51) [a)]	n.a. (204)[a)]
1,4-Dioxane	n.a.	33	n.a. (33)[a)]	n.a. (3141)[a)]
Ethanol	25	8071	25	n.a.
Ethylacetone	n.a.	86	n.a. (86)[a)]	n.a. (5968)[a)]
Propyleneglycol (1,2-propaandiol)	33	146	33	n.a.
Rhodamine B	n.a.	1	n.a. (1)[a)]	n.a. (30)[a)]
Tri(x-chloropropyl)phosphate	n.a.	271	n.a. (271)[a)]	n.a. (1240)[a)]

Notes to table 7
n.a. not available

a) no ad hoc intervention values could be derived because ECOTOX SCC is not available (between brackets: the value is only based on HUM-TOX SCC)

Supplementary comment to table 7
The values for organic compounds depend on the organic matter content. The method of calculation is indicated in table 1 of the circular.