Ministerie van Volkshuisvesting,
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Dutch Target and Intervention Values, 2000 (the New Dutch List)

ANNEXES Circular on target values and intervention values for soil remediation

Four annexes belong to this circular:

- annex A deals with the target values, the soil remediation intervention values and the indicative levels for serious contamination;
- annex B contains the measurement and analysis regulations for soil/sediment and groundwater for the substances listed in annex A;
- annex C gives the data required for determining the remediation urgency and the remediation deadline for the substances in part A;
- annex D provides a guideline for dealing with substances for which there are no standards.

ANNEX A: TARGET VALUES, SOIL REMEDIATION INTERVENTION VALUES AND INDICATIVE LEVELS FOR SERIOUS CONTAMINATION

Introduction

Soil remediation policy uses soil remediation intervention values, indicative levels for serious contamination and target values. These three types of standards are dealt with below. The point of departure in setting standards for environmental policy as a whole is the risks involved. This strategy is set forth in the document Premises for Risk Management [Omgaan met risico's]. The risk-based approach in environmental policy (Ministry of Housing, Spatial Planning and the Environment (VROM), Lower House of Parliament, parliamentary proceedings 1988-1989, 21 137, no. 5).

The intervention values and the accompanying target values for soil/sediment and groundwater are given in table 1. The indicative levels for serious soil contamination and the accompanying target values for soil/sediment and groundwater are given in table 2. The intervention values, indicative levels and target values for soil/sediment for metals depend on the concentration of organic substances and clay. The additional comments to table 1 and 2 describe how the values can be converted for the soil to be assessed. The soil type correction is not applied for the intervention value for PAH (sum of 10) for soils with an organic matter content of up to 10% and for soils with an organic matter content from 30% upwards.

Soil remediation intervention values

The soil remediation intervention values indicate when the functional properties of the soil for humans, plant and animal life, is seriously impaired or threatened. They are representative of the level of contamination above which there is a serious case of soil contamination.

The soil remediation intervention values are based on extensive studies of the National Institute for Public Health and Environmental Protection (RIVM, report numbers 725201001 to 725201008 inclusive, report numbers 715810004, 715810008 to 715810010 inclusive, report numbers 711701003 to 711701005 inclusive) of both human and ecotoxicological effects of soil contaminants.

Human toxicological effects have been quantified in the form of concentrations in the soil above which the so-called maximum permissible risk (MPR) for humans may be exceeded. For non-carcinogenic substances this corresponds to the Tolerable Daily Intake (TDI). For carcinogenic substances this is based on an additional chance of tumour incidence of 10^4 for lifetime exposure. It is assumed here that all exposure routes are operational.

Ecotoxicological effects are quantified in the form of concentrations in the soil above which 50% of the potentially present species and processes may experience negative effects. The ultimate intervention values for soil and sediment are based on an integration of the human and ecotoxicological effects. In principle the most critical effects are definitive.

The intervention values for groundwater are not based on any separate risk evaluation with regard to the presence of contaminants in groundwater, but are derived from the values for soil/sediment.

The intervention values in this circular deviate for some substances from the values proposed by RIVM. There may be several reasons for this. The report of the Technical Soil Protection Committee (TCB) may have resulted in adjustments to the RIVM's proposals, but it may also be

the case that during policy discussions new data became available or additional considerations played a role.

Intervention values are related to a spatial scale. For there to be a case of values being exceeded and thus an instance of serious contamination, the average concentration of a minimum of 25 m^3 of the soil volume in the case of earth or sediment contamination, or 100 m^3 pore saturation soil volume in the case of groundwater contamination, must be higher than the intervention value for at least one substance. The protocols for preliminary and further investigations indicate how tests should be carried out. If one of the different sampling protocols is being used or will be used, the sampler himself needs to determine and give adequate reasons as to how the 25 m^3 or 100 m^3 criteria have been tested.

Serious contamination below the level of the intervention value

In specific cases there is a chance that for concentrations in the soil below the intervention levels the functional properties of the soil for humans, plant or animal life have nevertheless been seriously impaired or are in danger of being impaired and that there is a case of serious contamination. A few examples are given below:

- If in the case of point sources of pollution (for example based on calculations) it is likely that the failure to take measures in the near future (a maximum of a few months) will result in soil contamination on the said scale, then one is also dealing with a case of serious contamination.
- Humans can be exposed to soil contamination through numerous routes. When determining human exposure for the purpose of deriving intervention values the assumption has been that all exposure routes are in place. A type of standard behavioural pattern has been assumed to determine exposure. Filling in most of these factors has only a limited impact on the exposure occurring, but the influence of a few of these factors such as soil ingestion and the consumption of crops grown on contaminated soil can be considerable. If the standard is exceeded for these factors, this may result in exposure above the human MPR without the intervention value being exceeded.
- The MPR for humans can also be exceeded at concentrations below the intervention value in the case of the inhalation of volatile compounds under floor areas and in ambient air.

If a situation of this kind is suspected it is advisable to have an additional investigation carried out into the actual exposure. An additional investigation is necessary to ascertain the deviation in relation to standard exposure and what the repercussions of this may be. The C-SOIL/SEDISOIL/VOLASOIL-models developed should be used for this in which the actual consumption/inhalation can be filled in instead of the standard. The actual exposure should then be compared with the MPR for humans. If this is exceeded one is dealing with a case of serious soil contamination.

Indicative levels for serious contamination

The RIVM's proposals for intervention values have not resulted in intervention values being set for a number of substances. The so-called indicative levels for serious contamination have been given for these substances. Indicative levels have been set for substances in the second, third and fourth series. No indicative levels have been set for the first series of substances.

There are two reasons why it was decided to set indicative levels for the second, third and fourth series of substances instead of intervention values.

1. There are no standardised measurement and analysis regulations available or to be expected in the near future. Annex B gives an overview of the available measurement and analysis regulations. In principle indicative levels have been given for substances for which there are no measurement regulations for soil/sediment and groundwater.

2. The ecotoxicological underpinning of the intervention values does not exist or is minimal and in the latter case it would appear that the ecotoxicological effects are more critical then the human toxicological effects. The TCB's report gives a number of criteria which can be used to decide whether the ecotoxicological underpinning is sufficient. On the strength of the TCB report the following criteria have been used in this circular to determine whether an intervention value can be set:

- there have to be a minimum of four toxicity data available for a minimum of two taxonomic groups;
- for metals all the data have to relate to the soil compartment;
- for organic substances a maximum of two data may be derived from data on the water compartment via equilibrium partitioning;
- there have to be a minimum of two data for individual species available.

If one or more of these criteria fail to be met and if ecotoxicological effects are more critical than human toxicological effects, the setting of an indicative level for serious contamination suffices. For example this is the case for silver and beryllium.

The indicative levels have a greater degree of uncertainty than the intervention levels. The status of the indicative levels consequently is not equal to the status of the intervention levels. Exceeding or undershooting of the indicative levels therefore does not have any direct consequences on a decision about the gravity of the contamination being taken by the competent authority. Hence the competent authority should bear in mind other considerations besides the indicative levels when deciding whether there is a case of serious contamination. Examples which spring to mind are:

1. Decide on the basis of other substances whether there is a case of serious contamination and whether remediation is urgent. Frequently several substances occur simultaneously in contaminated sites. If intervention values have been set for other substances, it can be ascertained on the basis of these substances whether there is a case of serious contamination and whether remediation is urgent. In a case of this kind an estimate of the risk for substances for which there are only indicative levels is less relevant. It is however important to make a risk estimate for substances for which there is only an indicative level if there is no question of serious contamination or remediation being urgent for other substances.
2. An ad hoc determination of the actual risks. Other site-bound factors alongside toxicological criteria play a role in determining the actual risks for deciding on the urgency of remediation. These include exposure possibilities, the use of the site or the surfaces of the contamination. These factors can frequently be readily determined and this allows a reasonable estimate of the actual risks to be carried out, despite uncertainty as to the indicative levels. It is advisable here to use bio-assays, since this solves the problem of the uncertainties in the ecotoxicological underpinning as well as the uncertainties arising as a result of the lack of standardised measurement and analysis regulations.
3. Additional investigation into the risks of the substance. Additional toxicity experiments can be carried out to make a better estimate of the risks of the substances.

Procedure for deriving intervention values and indicative levels for serious contamination

The first circular containing intervention values (Circular on intervention values for soil remediation; Netherlands Government Gazette 1995, no. 95) was drawn up in 1994. The substances listed in this circular are referred to as the first series of substances. The RIVM has carried out an ecotoxicological and human toxicological risk evaluation of these substances. Intervention values for earth/sediment and for groundwater have been set by circular on the basis of this study. For the first series no distinction has been made between intervention values and indicative values for serious contamination.

Since 1991 provincial authorities, local authorities, environmental inspectorates and consultancies have been reporting substances encountered in the soil, but not included on the intervention values list dating from 1994. For a number of these substances the RIVM has carried out risk evaluations per series of substances and made proposals for intervention values. The risk evaluations have been carried out in a similar way to those for the first series of substances from 1994. The TCB has published a report on the RIVM's proposals. The Working Group on Soil Remediation Urgency and Intervention Values (UI) of the Soil Steering Party (StuBo) has made a proposal for intervention values and indicative values for serious contamination on the basis of the RIVM's proposals and the TCB's report. A circular was published in 1997 for the second and third series of substances (Netherlands Government Gazette 1997, no. 169). The values for the fourth series of substances are given in the present circular.

In future new series of substances will go through the same procedure. The choice of substances for future intervention values is dealt with in annex D.

Target values

The target values indicate the level at which there is a sustainable soil quality. In terms of curative policy this means that the target values indicate the level that has to be achieved to fully recover the functional properties of the soil for humans and plant and animal life. Besides this the target values give an indication of the benchmark for environmental quality in the long term on the assumption of negligible risks to the ecosystem.

The target values derive from the Integrated Environmental Quality Standards project (called INS) and were published in December 1997 (VROM, INS for Soil, Water, Air 1997). The INS target values have been included in the circular with a few exceptions. The INS target values are underpinned by a risk analysis wherever possible and apply to individual substances. The same target values for soil/sediment as in the present circular, which applies to soil remediation policy, are included in the Fourth Report on Water Management (NW4).

Target values soil/sediment

For soil/sediment the target values from the INS project have been checked for their practical feasibility in the project evaluating the use of target values (HANS), which was carried out in the period 1996-1998. The principle is that soils in relatively unpolluted areas in the Netherlands must for the most part meet the target values. The HANS project has drawn up a list of target values and a method of testing these so that the chance of soils in relatively unpolluted areas meeting the target values is a minimum of 95%. Where necessary the INS target values have been adjusted to the results from the HANS project.

The list of soil/sediment target values has been coordinated with the former list of intervention values. If there was a sum standard for the intervention value (this is a standard for a specific group of allied substances), a sum standard target value was also set. In that case this deviated from the target values for individual substances derived as part of INS.

The value for EOX is a trigger value. If the value is exceeded this does not result in the conclusion being drawn that the earth or sediment is polluted but that there is a necessity for further investigation. The investigation will have to ascertain whether the exceeding of the trigger value is the result of the presence of contaminants or whether it has a natural cause.

The following applies to testing the quality of a batch of earth against the soil/sediment target values:

- the quality of the sample data must be sufficient to allow the test to be implemented. This means that two combined samples are compiled, each comprising 50 increments. The quantity of earth/soil to be assessed is a maximum of 1250 m^3 (around 2000 tonne). This can be deviated from with reasons in the case of larger (or smaller) homogenous quantities provided the quality of the test is not diminished;
- for non-suspect situations the combined samples are examined for the following substances: arsenic, cadmium, copper, chrome, mercury, nickel, lead, zinc, PAH (sum of 10), mineral oil and EOX. For suspect situations the package is added to by other substances which have a bigger chance of being encountered in higher concentrations;
- if there is a target value for an individual substance that comes under the quantification limit then the target value is exceeded if the quantification limit is exceeded;
- if there is a target value for a group of substances and substances which are part of this group are encountered in non-quantifiable concentrations below the quantification limit, 0.7 * of the quantification limit is taken in determining the concentration of the sum of the total group of substances;
- clean soil/sediment exists if the following three conditions are met:
    1. all substances to be tested are below the interim value (½ (interim value + intervention value) and for sediment are also under the trigger value. The trigger value is given in NW4, Ministry of Transport, Public Works and Water Management (V&W), December 1998);
    2. there are a maximum of N substances exceeding the target value. N depends on the number of substances to be tested: for 10 to 20 substances N = 3; for more than 20 substances N = 4. No limit may be exceeded in the case of less than 10 substances;
    3. the exceeding of the limit for the N substances amounts to a maximum of a factor of two, except for DDT/DDE/DDD and the drins, for which a factor of three applies.

Reference should be made to NEN 5740 for more information on implementing soil research or sampling a quantity of earth to check the target values. This Dutch standard is published by the Dutch Standardization Institute (NNI).

It was observed in HANS that the file with data on concentrations of substances in relatively unpolluted areas is incomplete. Hence it was decided to build up a complete database which will give information on the concentrations in relatively unpolluted areas for all substances for which target values have been set. This can then be used in a number of year's time to evaluate the testing rules and to make adjustments to these if necessary. The HANS follow-up project, Background values 2000 (AW2000), is currently at the definition phase.

Groundwater target values

Tables 1 and 2 also include target values for groundwater. For metals a distinction is made between deep and shallow groundwater. The reason for this is the difference in background concentrations in these. An arbitrary limit of 10 metres has been adopted. It has to be remembered that this limit is indicative. If information is available that another limit is more plausible for the site to be assessed then a different limit can be adopted. An example which springs to mind is information about the boundary between the phreatic groundwater and the first aquifer.

- For shallow groundwater (< 10 metres) the environmental quality objectives for soil and water (MILBOWA) values have been adopted as target values. These are based on background concentrations and serve as a guide.
- For deep groundwater (> 10 metres) the target values proposed in INS have been adopted. This means that the target value comprises the background concentration which is naturally present (BC) plus the Negligible Addition (NA). The background concentrations included in the INS are given as a guide.

In both cases the background concentration given must be viewed as a guide. If information is available on the local background concentration, this can be used as target value together with the Negligible Addition (NA). More information on background concentrations of metals in different areas in the Netherlands can be found in the RIVM report number 711701 017.

For some metals the background concentration in shallow groundwater is considerably higher than the background concentration in surface water. The background concentrations of surface water and groundwater and the target values based on these, are not coordinated. When granting permits for pumping and discharging groundwater to surface water as part of the Pollution of Surface Waters Act (WVO) this may result in the target values for surface water being exceeded. It is up to the competent authority to decide whether the local target values should be adjusted.

As part of INS the derived target values for some aromatic compounds and chlorinated hydrocarbons are approximately the same as the intervention values for groundwater. Since this produces an unworkable situation in practice, the INS target values for these substances have not been adopted and the MILBOWA target values have been retained.

Table 1a: **Target values and soil remediation intervention values and background concentrations soil/sediment and groundwater for metals. Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).**

	EARTH/SEDIMENT (mg/kg dry matter)			GROUNDWATER (µg/l in solution)			
	national background concentration (BC)	target value (incl. BC)	intervention value	target value shallow	national background concentration deep (BC)	target value deep (incl. BC)	intervention value
I Metals							
antimony	3	3	15	-	0.09	0.15	20
arsenic	29	29	55	10	7	7.2	60
barium	160	160	625	50	200	200	625
cadmium	0.8	0.8	12	0.4	0.06	0.06	6
chromium	100	100	380	1	2.4	2.5	30
cobalt	9	9	240	20	0.6	0.7	100
copper	36	36	190	15	1.3	1.3	75
mercury	0.3	0.3	10	0.05	-	0.01	0.3
lead	85	85	530	15	1.6	1.7	75
molybdenum	0.5	3	200	5	0.7	3.6	300
nickel	35	35	210	15	2.1	2.1	75
zinc	140	140	720	65	24	24	800

Table 1b: **Target values and intervention values for soil remediation soil/sediment and groundwater for inorganic compounds, aromatic compounds, PAH, chlorinated hydrocarbons, pesticides and other contaminants. Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).**

	EARTH/SEDIMENT (mg/kg dry matter)		GROUNDWATER (µg/l in solution)	
	target value	intervention value	target value	intervention value
II Inorganic compounds				
cyanides-free	1	20	5	1500
cyanides-complex (pH<5)[1]	5	650	10	1500
cyanides-complex (pH ≥5)	5	50	10	1500
thiocyanates (sum)	1	20	-	1500
bromide (mg Br/l)	20	-	0.3 mg/l[2]	-
chloride (mg Cl/l)	-	-	100 mg/l[2]	-
fluoride (mg F/l)	500[3]	-	0.5 mg/l[2]	-
III Aromatic compounds				
benzene	0.01	1	0.2	30
ethyl benzene	0.03	50	4	150
toluene	0.01	130	7	1000
xylenes	0.1	25	0.2	70
styrene (vinyl benzene)	0.3	100	6	300
phenol	0.05	40	0.2	2000
cresols (sum)	0.05	5	0.2	200
catechol(o-dihydroxybenzene)	0.05	20	0.2	1250
resorcinol(m-dihydroxybenzene)	0.05	10	0.2	600
hydroquinone(p-dihydroxybenzene)	0.05	10	0.2	800
IV Polycyclic aromatic hydrocarbons (PAH)				
PAH (sum 10) [4,14]	1	40	-	-
naphthalene			0.01	70
anthracene			0.0007*	5
phenatrene			0.003*	5
fluoranthene			0.003	1
benzo(a)anthracene			0.0001*	0.5
chrysene			0.003*	0.2
benzo(a)pyrene			0.0005*	0.05
benzo(ghi)perylene			0.0003	0.05
benzo(k)fluoranthene			0.0004*	0.05
indeno(1,2,3-cd)pyrene			0.0004*	0.05

Table 1b(continued): Target values and intervention values for soil remediation soil/sediment and groundwater for inorganic compounds, aromatic compounds, PAH, chlorinated hydrocarbons, pesticides and other contaminants. Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).

	EARTH/SEDIMENT (mg/kg dry matter)		GROUNDWATER (µg/l in solution)	
	target value	intervention value	target value	intervention value
V Chlorinated hydrocarbons				
vinyl chloride	0.01	0.1	0.01	5
dichloromethane	0.4	10	0.01	1000
1,1-dichloroethane	0.02	15	7	900
1,2-dichloroethane	0.02	4	7	400
1,1-dichloroethene	0.1	0.3	0.01	10
1,2-dichloroethene (cis and trans)??	0.2	1	0.01	20
dichloropropane	0.002#	2	0.8	80
trichloromethane (chloroform)	0.02	10	6	400
1,1,1-trichloroethane	0.07	15	0.01	300
1,1,2-trichloroethane	0.4	10	0.01	130
trichloroethene (Tri)	0.1	60	24	500
tetrachloromethane (Tetra)	0.4	1	0.01	10
tetrachloroethene (Per)	0.002	4	0.01	40
chlorobenzenes (sum)[5,14]	0.03	30	-	-
monochlorobenzene			7	180
dichlorobenzenes			3	50
trichlorobenzenes			0.01	10
tetrachlorobenzenes			0.01	2.5
pentachlorobenzene			0.003	1
hexachlorobenzene			0.00009*	0.5
chlorophenols (sum)[6,14]	0.01	10	-	-
monochlorophenols (sum)			0.3	100
dichlorophenols			0.2	30
trichlorophenols			0.03*	10
tetrachlorophenols			0.01*	10
pentachlorophenol			0.04*	3
chloronaphthalene	-	10	-	6
monochloroaniline	0.005	50	-	30
polychlorobiphenyls (sum 7)[7]	0.02	1	0.01*	0.01
EOX	0.3		-	

Table 1b(continued): Target values and intervention values for soil remediation soil/sediment and groundwater for inorganic compounds, aromatic compounds, PAH, chlorinated hydrocarbons, pesticides and other contaminants. Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).

	EARTH/SEDIMENT (mg/kg dry matter)		GROUNDWATER (µg/l in solution)	
	target value	intervention value	target value	intervention value
VI Pesticides				
DDT/DDE/DDD[8]	0.01	4	0.004 ng/l *	0.01
drins[9]	0.005	4	-	0.1
aldrin	0.00006		0.009 ng/l*	
dieldrin	0.0005		0.1 ng/l	
endrin	0.00004		0.04 ng/l	
HCH-compounds[10]	0.01^	2	0.05^	1
α-HCH	0.003		33 ng/l	
β-HCH	0.009		8 ng/l	
γ-HCH	0.00005		9 ng/l	
atrazine	0.0002	6	29 ng/l	150
carbaryl	0.00003	5	2 ng/l*	50
carbofuran	0.00002	2	9 ng/l	100
chlorodane	0.00003	4	0.02 ng/l*	0.2
endosulfan	0.00001	4	0.2 ng/l*	5
heptachloro	0.0007	4	0.005 ng/l*	0.3
heptachloro-epoxide	0.0000002	4	0.005 ng/l*	3
maneb	0.002	35	0.05 ng/l*	0.1
MCPA	0.00005#	4	0.02	50
organotin compounds[11]	0.001	2.5	0.05*-16 ng/l	0.7
VII Other contaminants				
cyclohexanone	0.1	45	0.5	15000
phthalates (sum)[12]	0.1	60	0.5	5
mineral oil[13]	50	5000	50	600
pyridine	0.1	0.5	0.5	30
tetrahydrofuran	0.1	2	0.5	300
tetrahydrothiophene	0.1	90	0.5	5000
tribromomethane	-	75	-	630

Notes to table 1:

1. *Acidity: pH (0.01 M $CaCl_2$). In order to determine whether pH is greater than or equal to 5, or less than 5, the 90 percentile of the measured values is taken.*
2. *In areas subject to marine influence higher values occur naturally (salt and brackish water).*
3. *Differentiation by clay content: (F) = 175 = 13L (L = % clay).*
4. *PAH (sum of 10) here means the total of anthracene, benzo(a)anthracene, benzo(k)fluoroanthene, benzo(a)pyrene, chrysene, phenantrene, fluoroanthene, indeno(1,2,3-cd)pyrene, naphthalene and benzo(ghi)perylene.*
5. *'Chlorobenzenes (sum)' here means the total of all chlorobenzenes (mono-, di-, tri-, tetra-, penta- and hexachlorobenzene).*
6. *'Chlorophenols (sum)' here means the total of all chlorophenols (mono-, di-, tri-, tetra- and pentachlorophenol).*
7. *In the case of the intervention value, 'polychlorobiphenyls (sum)' means the total of PCB 28, 52, 101, 118, 138, 153 and 180. For the target value it refers to the total excluding PCB 118.*

8. *'DDT/DDD/DDE' above means the sum of DDT, DDD and DDE.*
9. *'Drins' above means the sum of aldrin, dieldrin and endrin.*
10. *'HCH compounds' above means the sum of á-HCH, â-HCH, ã-HCH and ä-HCH.*
11. *The intervention value applies to the sum of the concentrations of organotin compounds encountered.*
12. *'Phthalates (sum)' above means the total of all phthalates.*
13. *'Mineral oil' is defined in the analysis standard. Where the contamination is due to mixtures (e.g. gasoline or domestic heating oil), then not only the alkane content but also the content of aromatic and/or polycyclic aromatic hydrocarbons must be determined. This aggregate parameter has been adopted for practical reasons. Further toxicological and chemical disaggregation is under study.*
14. *The values for the sum of polycyclic aromatic hydrocarbons, the sum of chlorophenols and the sum of chlorobenzenes in earth/sediment apply to the total concentration of the compounds belonging to the relevant category. If the contamination is due to only one compound of a category, the value used is the value for that compound. Where there are two or more compounds the value for the total of these compounds applies, etc. For earth/sediment, effects are directly additive (i.e. 1 mg of substance A has the same effect as 1 mg of substance B) and can be tested against an aggregate standard by summing the concentrations of the substances involved. In the case of groundwater, effects are indirectly additive and are expressed as a fraction of the individual intervention values (i.e. 0.5 of the intervention value of substance A has the same effect as 0.5 of the intervention value of substance B). This means that an addition formula must be used to determine whether an intervention value is exceeded. The intervention value for the sum of a group of substances is exceeded if:*

$$\{ \acute{o} c_i) / I_i \geq 1,$$

where: C_i *= measured concentration of a substance in the group of substances in question*
I_i *= intervention value for the group.*

**numeric value below the detection level/quantification level or measurement method is lacking*
 # These target values have not been tested in HANS. All the other values have been tested in HANS.
^ The individual standards in INS are given in the Fourth Policy Document on Water Management along with the sum standards marked ^.

Table 2a: Target values , indicative levels for serious soil contamination and background concentrations soil/sediment and groundwater for metals. . Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).

	EARTH/SEDIMENT (mg/kg dry matter)			GROUNDWATER (mg/l in solution)			
	national background concentration (BC)	target values (incl. BC)	indicative level serious contaminat-ion	target values shallow	national background concentration deep (BC)	target values deep (incl. BC)	indicative level serious contaminat-ion
I Metals							
beryllium	1.1	1.1	30	-	0.05*	0.05*	15
selenium	0.7	0.7	100	-	0.02	0.07	160
tellurium	-	-	600	-	-	-	70
thallium	1	1	15	-	<2*	2*	7
tin	19	-	900	-	<2*	2.2*	50
vanadium	42	42	250	-	1.2	1.2	70
silver	-	-	15	-	-	-	40

Table 2b: Target values and indicative levels for serious contamination for soil/sediment and groundwater for inorganic compounds, aromatic compounds, PAH, chlorinated hydrocarbons, pesticides and other contaminants. Values for soil/sediment have been expressed as the concentration in a standard soil (10% organic matter and 25% clay).

	EARTH/SEDIMENT (mg/kg dry matter)		GROUNDWATER (µg/l in solution)	
	target values	indicative level for serious contamination	target values	indicative level for serious contamination
III Aromatic compounds				
dodecylbenzene	-	1000	-	0.02
aromatic solvents[1]	-	200	-	150
V Chlorinated hydrocarbons				
dichloroaniline	0.005	50	-	100
trichloroaniline	-	10	-	10
tetrachloroaniline	-	30	-	10
pentachloroaniline	-	10	-	1
4-chloromethylphenols	-	15	-	350
dioxin[2]	-	0.001	-	0.001 ng/l
VI Pesticides				
azinphos-methyl	0.000005#	2	0.1* ng/l	2
VII Other contaminants				
acrylonitrile	0.000007#	0.1	0.08	5
butanol	-	30	-	5600
1,2-butylacetate	-	200	-	6300
ethylacetate	-	75	-	15000
diethylene glycol	-	270	-	13000
ethylene glycol	-	100	-	5500
formaldehyde	-	0.1	-	50
isopropanol	-	220	-	31000
methanol	-	30	-	24000
methyl-tert-butyl ether (MTBE)	-	100	-	9200
methylethylketone	-	35	-	6000

Notes to Table 2

1. *Aromatic solvents are defined as a standard mixture of substances referred to as "C9-aromatic naphtha" as defined by the International Research and Development Corporation: o-xylene 3.2%, i-isopropylbenzene 2,74%, n-propulbenzene 3.97%, 1-methyl-4 ethyl benzene 7,05%, 1-methyl-3-ethyl benzene 15.1%, 1-methyl-2-ethyl benzene 5,44%, 1,3,5-trimethylbenzene 8,37%, 1,2,4-trimethylbenzene 40,5%, 1,2,3-trimethylbenzene 6,18% and ≥ ?? alkulbenzenes 6,19%.*
2. *The indicative level is expressed on the basis of toxicity equivalents based on the most toxic compound.*

**numeric value below the detection level/quantification level or measurement method is lacking*
 # These target values have not been tested in HANS. All the other values have been tested in HANS.

Supplementary remarks on tables 1 and 2

The target values, intervention values and indicative levels for metals and arsenic, with the exception of antimony, molybdenum, selenium, tellurium, thallium and silver depend on the clay content and/or the organic matter content. In assessing the quality of the soil the values for a standard soil are converted to values applying to the actual soil concerned on the basis of the measured organic material (measured by percentage weight lost by volatilisation, on the total dry weight of the soil) and clay content (the percentage by weight of the total dry material comprising mineral particle matter with a diameter of less than 2 µm). The converted values can then be compared with the measured concentrations in the soil.

The following soil type correction formula can be used for the conversion for metals:

:

$(SW,IW)_b = (SW,IW)_{sb} \times [\{ A+(Bx\%\ clay\ (grain\ size< 2 \mu m^3)) + (Cx\%\ organic\ matter)\}/ \{(A+(Bx25) +(CX10)\}]$

in which:

$(SW,IW)_b$ = target value or intervention value for the soil to be assessed
$(SW,IW)_{sb}$ = target value or intervention value for standard soil
% clay (grain size<2 μm^3) = measured percentage clay (grain size<2 μm^3) in the soil to be assessed
% organic matter = measured percentage organic matter in the soil to be assessed.
A, B, C = substance dependent constants for metals (see below)

Substance dependent constant for metals:

Substance	A	B	C
arsenic	15	0.4	0.4
barium	30	5	0
beryllium	8	0.9	0
cadmium	0.4	0.007	0.021
chromium	50	2	0
cobalt	2	0.28	0
copper	15	0.6	0.6
mercury	0.2	0.0034	0.0017
lead	50	1	1
nickel	10	1	0
tin	4	0.6	0
vanadium	12	1.2	0
zinc	50	3	1.5

· *De target values, intervention values and indicative levels for serious contamination for organic compounds, depend on the organic matter content. For the conversion for organic compounds, with the exception of PAH, the following soil type correction formula can be used:*

$(SW,IW)_b = (SW,IW)_{sb} \times (\%\ organic\ matter/10)$

in which:

$(SW,IW)_b$ = target value or intervention value for the soil to be assessed
$(SW,IW)_{sb}$ = target value or intervention value for standard soil
% organic matter = measured percentage organic matter in the soil to be assessed. For soils with measured organic matter content of more than 30% or less than 2% contents of 30% and 2% are adhered to respectively.

· *For the target value and intervention value PAH no soil type correction is used for soils with an organic matter content up to 10% and soils with an organic matter content above 30%. For soils with an organic matter content up to 10% a value is used of 1 respectively 40 mg/kg and for soils with an organic matter content from 30% upwards a value is used of 3 respectively 120 mg/kg. For an organic matter content between 10% and 30% the following soil type correction formula can be used:*

$(SW)_b = 1 \times (\%\ organic\ matter/10)$ $(IW)_b = 40 \times (\%\ organic\ matter/10)$

in which:

$(SW,IW)_b$ = target value,intervention value for the soil to be assessed
% organic matter = measured percentage organic matter in the soil to be assessed.

- *Reference should be made to Annex B of this Circular and the protocols for preliminary and further investigations or the Soil Protection Guideline for the general principles of physical and chemical soil investigations (e.g. choice of site of observation points, drilling system to be used, the method of taking soil and groundwater samples, sample preservation, pretreatment, preparation and analysis).*

APPENDIX B: MEASUREMENT AND ANALYSIS REGULATIONS

This annex includes:
. analysis standard
. analysis techniques
. sampling
. sample preservation
. sample pre-treatment
. sample digestion
. quantification limit: this is the lowest concentration in the sample for which the measured value can be established with any degree of certainty.

The analysis and measurement regulations are given for all substances for which intervention values have been set. For substances for which indicative levels for serious contamination have been included, the regulations are listed if available. The regulations are given in table 3 and 4 for soil/sediment and groundwater respectively.

The data have largely been taken from Documentation Environmental Standardization (DOMINO), an overview of standardised measurement regulations that is updated every quarter by the Netherlands Standardization Institute (NNI). DOMINO only lists a measurement regulation for a substance if that regulation for the substance in question has been tested in accordance with the relevant procedures. The consequence of this is that some substances do not have a measurement regulation, while it is to be expected that workable regulations do exist. This expectation is based on knowledge of common practice or the fact that measurement regulations are given for allied, tested substances. In some cases this has already been confirmed in further research, but this has not yet been incorporated into the regulations. Hence for a number of substances measurement regulations that have been derived from allied substances are given. These regulations are printed in italics. There are no measurement regulations for substances for which there is no common practice.

For some substances several standardised measurement and analysis regulations are given in table 3 and 4. It is up to the user to decide which regulation to use. In the case of low concentrations it may be important to use the method with the lowest quantification limit.

Table 3: Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample treatment
I Metals					
antimony	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
arsenic	NEN 5760 NVN 7322	H-AAS AES-ICP	NEN 5742 NEN 5742	NEN 6426 NEN 6426	NEN 5751
barium	NVN 7321 NVN 7322	G-AAF AES-ICP	NEN 5742 NEN 5742	NEN 6426 NEN 6426	NEN 5751
cadmium	NEN 5762 NVN 7321 NVN 7322	F-AAS AES-ICP	NEN 5742 NEN 5742	NEN 6426 NEN 6426	NEN 5751
chromium	NVN 7322 NVN 7321 NEN 5767	HES-ICP G-AAF F-AAS	NEN 5742 NEN 5742 NEN 5742	NEN 6426 NEN 6426 NEN 6426	NEN 5751
cobalt	NVN 7321 NVN 7322	G-AAF AES-ICP	NEN 5742 NEN 5742	NEN 6426 NEN 6426	NEN 5751
copper	NEN 5758 NVN 7321 NVN 7322	F-AAS G-AAF AES-ICP	NEN 5742 NEN 5742 NEN 5742	NEN 6426 NEN 6426 NEN 6426	NEN 5751

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
mercury	draft NEN 5779 NVN 7324	KV-AAS KV-AAS	NEN 5742 NEN 5742	NEN 6426 NEN 6426	Draft NEN 5779 NEN 5751
lead	NEN 5761 NVN 7321 NVN 7322	F-AAS G-AAF AES-ICP	NEN 5742 NEN 5742 NEN 5742	NEN 6426 NEN 6426 NEN 6426	NEN 5751
molybdenum	NVN 7321 NVN 7322	G-AAF AES-ICP	NEN 5742 NEN 5742	NEN 6426 NEN 6426	NEN 5751
nickel	NEN 5765 NVN 7321 NVN 7322	F-AAS G-AAF AES-ICP	NEN 5742 NEN 5742 NEN 5742	NEN 6426 NEN 6426 NEN 6426	NEN 5751
zinc	NEN 5759 NVN 7321 NVN 7322	F-AAS G-AAF AES-ICP	NEN 5742 NEN 5742 NEN 5742	NEN 6426 NEN 6426 NEN 6426	NEN 5751
II Inorganic compounds					
cyanides-free	NEN 6655	Photometric	NEN 5742	NEN 6655	NEN 6655
cyanides-complex (pH<5)	NEN 6655	Photometric	NEN 5742	NEN 6655	NEN 6655
cyanides-complex (pH ≥5)	NEN 6655	Photometric	NEN 5742	NEN 6655	NEN 6655
thiocyanates (sum)	test protocol	n.a.	NEN 5742	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
bromide	VPR C85-06 NEN-EN-ISO 10304-2	IC	NEN 7542	VPRC85-06 VPRC85-06	VPRC85-06
chloride	NEN 6476 NEN-EN-ISO 10304-2	IC	NEN 7542	VPRC85-06	VPRC85-06
fluoride	NEN 6483	POT	NEN 7542	VPRC85-06	VPRC85-06
III Aromatic compounds					
benzene	draft NVN 5732	PET TD-GC	NEN 7543	draft NVN 5732	NVN 5730
ethyl benzene	draft NVN 5732	PET TD-GC	NEN 7543	draft NVN 5732	NVN 5730
toluene	draft NVN 5732	PET TD-GC	NEN 7543	draft NVN 5732	NVN 5730
xylenes	draft NVN 5732	PET TD-GC	NEN 7543	draft NVN 5732	NVN 5730
styrene (vinylbenzene)	draft NVN 5732	PET TD-GC	NEN 7543	draft NVN 5732	NVN 5730
phenol	test protocol	n.a.	Test protocol	test protocol	test protocol
cresoles (sum)[2]	test protocol	n.a.	Test protocol AP04	test protocol	test protocol
catechol (o-dihydroxybenzene)	test protocol	n.a.	Test protocol AP04	test protocol	test protocol
resorcinol (m-dihydroxybenzene)	test protocol	n.a.	Test protocol AP04	test protocol	test protocol
hydroquinone (p-dihydroxybenzene)	test protocol	n.a.	Test protocol AP04	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
IV Polycyclic aromatic hydrocarbons (PAH)					
PAH (sum 10)	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
naphthalene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
anthracene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
phenatrene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
fluoranthene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
benzo(a)anthracene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
chrysene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
benzo(a)pyrene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
benzo(ghi)perylene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
benzo(k)fluoranthene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
indeno(1,2,3-cd)pyrene	2nd draft NEN 5731	HPLC	NEN 5742	NEN 5742	NVN 5730
V Chlorinated hydrocarbons					
vinylchloride	interim GCHS-V	GCHS	interim GCMS-V	interim GCMS-V draft	NVN 5730

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
dichloromethane	draft NVN 5732	PET TD-GC	NEN 5743	NEN 5743	NVN 5730
1,1-dichloroethane	draft NVN 5732	PET TD-GC	NEN 5743	draft NVN 5732	NVN 5730
1,2-dichloroethane	draft NVN 5732	PET TD-GC	NEN 5743	draft NVN 5732	NVN 5730
1,1-dichloroethene	PET TD-GC	PET TD-GC	NEN 5743	draft NVN 5732	NVN 5730
1,2-dichloroethene (cis and trans)	draft NVN 5732	PET TD-GC	NEN 5743	draft NVN 5732	NVN 5730
dichloropropane	test protocol	test protocol	test protocol	test protocol	NVN 5730
trichloromethane (chloroform)	draft NVN 5732	PET TD-GC	*NEN 5743*	draft NVN 5732	NVN 5730
1,1,1-trichloroethane	*draft NVN 5732*	*PET TD-GC*	*NEN 5743*	*draft NVN 5732*	*NVN 5730*
1,1,2-trichloroethane	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	*NVN 5730*
trichloroethene (Tri)	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	*NVN 5730*
tetrachloromethane (Tetra)	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	*NVN 5730*
tetrachloroethene (Per)	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	*NVN 5730*
chlorobenzenes (sum)	See individual chloro benzenes below				
monochlorobenzene	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	NVN 5730

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
dichlorobenzenes (sum)	draft NVN 5732	PET TD-GC	*NEN 5743*	*draft NVN 5732*	NVN 5730
trichlorobenzenes (sum)	2nd draft NEN 5734	GC	*2nd draft*[e] *NEN 5742*	*2nd draft NVN 5734*	NVN 5730
tetrachlorobenzenes (sum)	2nd draft NEN 5734	GC	*2nd draft* *NEN 5742*	*2nd draft NVN 5734*	NVN 5730
pentachlorobenzene	2nd draft NEN 5734	GC	*2nd draft* *NEN 5742*	*2nd draft NVN 5734*	NVN 5730
hexachlorobenzene	2nd draft NEN 5734	GC	*2nd draft* *NEN 5742*	*2nd draft NVN 5734*	NVN 5730
chlorophenols (sum)	see individual chloro phenols below				
monochlorophenols (sum)	VPR C85-14	GC	VPRC85-14	VPRC85-14	NVN 5730
dichlorophenols (sum)	VPR C85-14	GC	VPRC85-14	VPRC85-14	NVN 5730
trichlorophenols (sum)	VPR C85-14	GC	VPRC85-14	VPRC85-14	NVN 5730
tetrachlorophenols (sum)	VPR C85-14	GC	VPRC85-14	VPRC85-14	NVN 5730
pentachlorophenol	VPR C85-14	GC	VPRC85-14	VPRC85-14	NVN 5730
chloronaphthalene					
monochloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
polychlorobiphenyls (sum 7)	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NEN 5730
EOX	2nd draft NEN 5735	COUL	NEN 5742	2nd draft NEN 5735	NEN 5730
VI Pesticides					
DDT/DDE/DDD	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NEN 5730
drins	see individual drins below				
aldrin	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
dieldrin	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
endrin	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
HCH-compounds	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
α-HCH	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
β-HCH	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
γ-HCH	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	NVN 5730
atrazine	VPR C85-17		NEN 5742	VPR C85-17	NVN 5730

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
carbaryl	test protocol	n.a.	NEN 5742	test protocol	test protocol
carbofuran	test protocol	n.a.	NEN 5742	test protocol	test protocol
chlorodane	*2nd draft NEN 5734*	*GC*	*NEN 5742*	*2nd draft NEN 5734*	*soil: NVN 5730 aquatic sediment : dr NEN 5719*
endosulfan	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	soil: NVN 5730 aquatic sediment : dra NEN 5719
heptachloro	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	soil: NVN 5730 aquatic sediment : dra NEN 5719
heptachloro-epoxide	2nd draft NEN 5734	GC	NEN 5742	2nd draft NEN 5734	soil: NVN 5730 aquatic sediment : dra NEN 5719
maneb	test protocol	n.a.	NEN 5742	test protocol	test protocol
MCPA	test protocol	n.a.	NEN 5742	test protocol AP04	test protocol AP04
organotin compounds	concept draft NEN 5729	EX-GCMS	concept draft NEN 5729	concept draft NEN 5729	concept draft NEN 5729

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
VII Other contaminants					
cyclohexanone	test protocol	n.a.	test protocol	test protocol	test protocol
phthalates (sum)	test protocol AP04	n.a.	test protocol	test protocol	test protocol
mineral oil	NEN 5733	GC-FID/IR?		NEN 5730	NEN 5733
pyridine	interim GCMS-V	GCMS	interim GCMS-V	interim GCMS-V	interim GCMS-V
tetrahydrofuran	test protocol	n.a.	test protocol	test protocol	test protocol
tetrahydrothiophene	interim GCMS-V	GCMS	interim GCMS-V	interim GCMS-V	interim GCMS-V
tribromomethane	test protocol	n.a.	test protocol	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
I Metals					
beryllium	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
selenium	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
tellurium	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
thallium	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
tin	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
vanadium	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
silver	NEN 6426	AES-ICP	NEN 5742	NEN 6426	NEN 5751
III Aromatic compounds					
dodecylbenzene	test protocol	n.a.	test protocol	test protocol	test protocol
aromatic solvents	test protocol	n.a.	test protocol	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
V Chlorinated hydrocarbons					
chloroaniline (sum)					
dichloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol
trichloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol
tetrachloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol
pentachloroaniline	test protocol	n.a.	test protocol	test protocol	test protocol
4-chloromethylphenols	test protocol	n.a.	test protocol	test protocol	test protocol
dioxin	test protocol	n.a.	test protocol	test protocol	test protocol
VI Pesticides					
azinphos-methyl	test protocol	n.a.	test protocol	test protocol	test protocol

Table 3 (continued): Standards for earth. The standards apply to terrestrial and aquatic soils unless stated otherwise.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample pretreatment
VII Other contaminants					
acrylonitrile	test protocol	n.a.	test protocol	test protocol	test protocol
butanol	test protocol	n.a.	test protocol	test protocol	test protocol
1,2-butylacetate	test protocol	n.a.	test protocol	test protocol	test protocol
ethylacetate	test protocol	n.a.	test protocol	test protocol	test protocol
diethylene glycol	test protocol	n.a.	test protocol	test protocol	test protocol
ethylene glycol	test protocol	n.a.	test protocol	test protocol	test protocol
formaldehyde	test protocol	n.a.	test protocol	test protocol	test protocol
isopropanol	test protocol	n.a.	test protocol	test protocol	test protocol
methanol	test protocol	n.a.	test protocol	test protocol	test protocol
methyl-tert-butyl ether (MTBE)	test protocol	n.a.	test protocol	test protocol	test protocol
methylethylketone	test protocol	n.a.	test protocol	test protocol	test protocol

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	monster preservation	sample preservation	sam
I Metals						
antimony	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6433	AAS-HG	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6611	GF-AAS	-	NEN 6611	NEN 6611	NEN
arsenic	NEN 6432	AAS-HG	NEN 5744	NEN-EN-ISO 5667-3	NEN 6432	NEN
	NEN-EN-ISO 11969	AAS-HG	NEN-ISO 5667-1	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN 119
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6457	GF-AAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6457	-
barium	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6436	GF-AAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
cadmium	NEN-EN-ISO 5961	FAAS	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN-EN-ISO 5961	GFAAS	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6452	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6458	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6458	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
chromium	NEN-EN 1233	FAAS	NEN-EN 1233	NEN-EN 1233	NEN-EN 1233	NEN
	NEN-EN 1233	GFAAS	NEN-EN 1233	NEN-EN 1233	NEN-EN 1233	NEN
	NEN 6444	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6448	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
cobalt	NEN 6426	AES-ICP	NEN 5744	NEN 6426	-	NEN
	NEN 6468	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
copper	NEN 6451	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6454	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6454	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
mercury	NEN-EN 1483	KD-AAS	NEN-ISO 5667-1	NEN-EN 1483	NEN-EN 1483	NEN
	NEN-EN 12338	KD-AAS	NEN-ISO 5667-1	NEN-EN 12338	NEN-EN 12338	NEN
	NEN 6445	KD-AAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6445	NEN
lead	NEN 6429	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6429	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6453	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
molybdenum	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
nickel	NEN 6430	GFAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6430	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NEN
	NEN 6456	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN 6447 NEN 6464 NEN 6465	NEN
zinc	NEN 6443	FAAS	NEN 5744	NEN-EN-ISO 5667-3	NEN-EN-ISO 5667-3	NEN
	NEN 6426	AES-ICP	NEN 5744	NEN 6426	NEN 6426	NVN 620 576

Table 4: Standards for groundwater.

Substance	analysis standard	analysis technique	sampling	sample preservation	sample preservation	sam
II Inorganic compounds						
cyanides-free	NEN 6655	CF-SP	NPR 6600	NEN 6655	NEN 6655	NEN
cyanides-complex (pH<5)	NEN 6655	CF-SP	NPR 6600	NEN 6655	NEN 6655	NEN
cyanides-complex (pH ≥5)	NEN 6655	CF-SP	NPR 6600	NEN 6655	NEN 6655	NEN
thiocyanates (sum)	NEN-EN-ISO 10304-3	IC	NEN-ISO 5667-1	NEN-EN-ISO 10304-3	NEN-EN-ISO 10304-3	NEN 103(
bromide	NEN-EN-ISO 10304-1	IC	ISO 5667-11 ISO 5667-4	NEN-EN-ISO 10304-1	NEN-EN-ISO 10304-1	NEN 103(
chloride	NEN-EN-ISO 10304-1	IC	ISO 5667-11 ISO 5667-4	NEN-EN-ISO 10304-1	NEN-EN-ISO 10304-1	NEN 103(
	NEN 6651	CF-SP	NEN 5744	NEN-EN-ISO 5667-3	-	NEN
	NEN 6476	PT	NEN 5744	-	-	NEN
	NEN 6470	T	NEN 5744	-	-	NEN
fluoride	NEN-EN-ISO 10304-1	IC	ISO 5667-11 ISO 5667-4	NEN-EN-ISO 10304-1	NEN-EN-ISO 10304-1	-
	NEN 6483	POT	NPR 6600	NEN-EN-ISO 5667-3	NEN 6483	NEN
III Aromatic compounds						
benzene	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	NEN
ethyl benzene	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	NEN
toluene	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	NEN
xylenes	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	NEN
styrene (vinyl benzene)	NEN 6407	PET-TD-GC	NEN 5744 and NEN 6407	NEN 6407	NEN 6407	NEN
phenol	NEN 6670	4-ASP	NEN 5744	NEN 6670	NEN 6670	NEN
cresoles (sum)	ISO 8165-1		NEN-ISO 5667-2	NEN-EN-ISO 5667-3	ISO 8165-1	
catechol (o-dihydroxybenzene)	test protocol	test protocol	test protocol	test protocol	test protocol	test
resorcinol (m-dihydroxybenzene)	test protocol	test protocol	test protocol	test protocol	test protocol	test
hydroquinone (p-dihydroxybenzene)	test protocol	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
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.