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Ordinance on the Remediation of Polluted Sites (Contaminated Sites Ordinance, CSO)

of 26 August 1998 (Status as of 1 January 2016)

The Swiss Federal Council,

based on Article 32c paragraph 1 second sentence and Article 39 paragraph 1 of the Environmental Protection Act of 7 October 1983¹ (EPA),

ordains:

Section 1 General Provisions

Art. 1 Aim and subject matter

¹ This Ordinance is intended to ensure that polluted sites are remediated if they cause harmful effects or nuisances, or if there is a real danger that such effects may arise.

² It regulates the following procedures for treating polluted sites:

- a. their recording in a register;
- b. the assessment of the need for monitoring and remediation;
- c. the assessment of the objectives and urgency of remediation;
- d. the specification of the measures for investigation, monitoring and remediation.

Art. 2 Definitions

¹ *Polluted sites* means sites whose pollution originates from waste, and that are restricted in area. They comprise:

- a. waste disposal sites, i.e. inoperative or operative landfills and other sites where waste has been deposited, except for sites at which only unpolluted excavation material, quarried material or spoil have been deposited;
- b. industrial sites, i.e. sites whose pollution originates from inoperative or operative installations or industrial operations in which environmentally hazardous substances have been used;

AS 1998 2261

¹ SR 814.01

- c. accident sites, i.e. sites polluted as a result of extraordinary events, including industrial accidents.

² *Sites in need of remediation* are polluted sites that cause harmful effects or nuisances or where there is a real danger that such effects may arise.

³ *Contaminated sites* are polluted sites in need of remediation.

Art. 3 Construction and alteration of buildings and installations

Polluted sites may be modified by the construction or alteration of buildings and installations only if:

- a. they are not in need of remediation and the project does not make their remediation necessary; or
- b. their later remediation is not seriously hampered, or, insofar as they are modified by the project, they are remediated at the same time.

Art. 4 General requirements for measures

Investigation, monitoring and remediation measures under this Ordinance must correspond to the state of the art and be documented by those responsible.

Section 2 Register of Polluted Sites

Art. 5 Creation of the Register

¹ The authorities shall identify the polluted sites by evaluating existing information such as maps, registers and reports. They may obtain information from the holders of the sites or from third parties.

² They shall give notice of the content of the proposed register entry to the holders and provide them with the opportunity to state their opinion and to provide clarification. At the request of the holders, the authorities shall issue a declaratory ruling.

³ They shall enter in the Register those sites that are established as polluted in accordance with paragraphs 1 and 2 or where there is a high probability that they are polluted. Where possible, the entries shall contain the following information:

- a. location;
- b. type and quantity of waste delivered to the site;
- c. period of disposal of waste, period of operation, or time of accident;
- d. investigations and measures already taken for the protection of the environment;
- e. effects that have already been ascertained;
- f. endangered environmental areas;
- g. particular events such as waste incineration, landslides, floods, fires or major accidents.

⁴ The authorities shall divide the polluted sites into the following categories based on the information contained in the Register, particularly with regard to type and quantity of waste delivered to the site:

- a. sites from which no harmful effects or nuisances are to be expected; and
- b. sites requiring an investigation as to whether they are in need of monitoring or remediation.

⁵ The authorities shall prepare a list of priorities for performing the investigations. In doing so, they shall pay due regard to the information contained in the Register concerning the type and quantity of waste delivered to the polluted site, the likelihood of substances being released and the importance of the environmental areas affected.

Art. 6 Keeping the Register

¹ The authorities shall add information on the following to the entry in the Register:

- a. the need for monitoring and remediation;
- b. the objectives and urgency of remediation;
- c. the measures taken or ordered by them for the protection of the environment.

² They shall delete the site entry in the Register if:

- a. the investigations show that the site is not polluted with environmentally hazardous substances; or
- b. the environmentally hazardous substances have been eliminated.

Art. 6a² Coordination with the structure and land use planning

The authorities shall take account of the Register in their structure and land use planning.

Section 3 Need for Monitoring and Remediation

Art. 7 Preliminary investigation

¹ Based on the list of priorities, the authorities shall require a preliminary investigation to be carried out within a reasonable period for sites in need of investigation. This shall normally consist of a historical and a technical investigation, so that the need for monitoring and remediation can be assessed (Art. 8), and the environmental hazard evaluated (risk assessment).

² The historical investigation shall establish the possible causes of the pollution of the site, in particular:

- a. the events and the temporal and spatial history of developments at the site;

² Inserted by Annex 6 No 9 of the Waste Management Ordinance of 4 Dec. 2015, in force since 1 Jan 2016 (AS 2015 5699)

- b. the procedures used for handling environmentally hazardous substances at the site.

³ Based on the historical investigation, a performance specification shall be prepared on the aim, extent and methods of the technical investigation. The performance specification shall be submitted to the authorities for comment.

⁴ The technical investigation shall establish the type and quantity of substances at the site, the likelihood of their release and the importance of the environmental areas affected.

Art. 8 Assessment of the need for monitoring and remediation

¹ Based on the preliminary investigation, the authorities shall assess whether the polluted site is in need of monitoring or remediation in accordance with Articles 9 - 12. In doing so, they shall pay due regard to effects caused by other polluted sites or by third parties.

² They shall state in the Register whether a polluted site is:

- a. in need of monitoring;
- b. in need of remediation (contaminated site);
- c. in need of neither monitoring nor remediation.

Art. 9 Protection of groundwater

¹ Subject to paragraph 1^{bis}, a polluted site is deemed to be in need of monitoring to protect the groundwater, if:

- a. any of the concentration values specified in Annex 1 is exceeded in the eluate of the material at the site; or
- b. for groundwater water protection areas A_u , the concentration of substances originating from the site immediately downstream of the site exceeds 10% of one of the concentration values specified in Annex 1; or
- c. for groundwater outside water protection areas A_u , the concentration of substances originating from the site immediately downstream of the site exceeds 40% of one of the concentration values specified in Annex 1.³

^{1bis} If after several years of monitoring a site, it is established that, considering the evolution of pollutant concentrations and the characteristics of the site, it is highly probable that the site will not need remediation under paragraph 2, the site is deemed no longer to be in need of monitoring.⁴

² A polluted site is deemed to be in need of remediation to protect the groundwater, if:

³ Amended by No 1 of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS 2012 2905).

⁴ Inserted by No 1 of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS 2012 2905).

- a. potential water pollutants originating from the site are detected in groundwater catchments of public interest;
- b.⁵ for groundwater in water protection areas A_u⁶: the concentration of substances originating from the site immediately downstream of the site exceeds one-half the concentration value specified in Annex 1;
- c.⁷ for groundwater outside water protection area A_u: the concentration of substances originating from the site immediately downstream of the site exceeds double the concentration value specified in Annex 1; or
- d. it is in need of monitoring in accordance with paragraph 1 letter a, and, owing to insufficient retention capacity, or degradation of substances originating from the site, there is a real danger of groundwater pollution.

Art. 10 Protection of surface waters

¹ Subject to paragraph 1^{bis}, a polluted site is deemed to be in need of monitoring to protect the surface waters, if:⁸

- a. any of the concentration values specified in Annex 1 is exceeded in the eluate of the material at the site which is susceptible of affecting surface waters; or
- b. in water that flows into surface waters, a concentration value specified in Annex 1 is exceeded for substances originating from the site.

^{1bis} If after several years of monitoring a site, it is established that, considering the evolution of pollutant concentrations and the characteristics of the site, it is highly probable that the site will not need remediation under paragraph 2, the site is deemed no longer to be in need of monitoring.⁹

² For the protection of surface waters, a polluted site is deemed to be in need of remediation if:

- a. in water that flows into surface waters, the concentration of substances originating from the site exceeds by tenfold a concentration value specified in Annex 1; or
- b. it is in need of monitoring in accordance with paragraph 1 letter a, and owing to insufficient retention capacity, or degradation of substances originating at the site, there is a real danger of pollution of surface waters.

⁵ Amended by Annex 5 No. 5 of the Ordinance on the Protection of Waters of 28 Oct. 1998, in force since 1 Jan. 1999 (AS **1998** 2863).

⁶ Amended by Article 29 para. 1 let. A of the Ordinance on the Protection of Waters of 28 Oct. 1998 (SR **814.201**).

⁷ Amended by Annex 5 No. 5 of the Ordinance on the Protection of Waters of 28 Oct. 1998, in force since 1 Jan. 1999 (AS **1998** 2863).

⁸ Amended by No I of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS **2012** 2905).

⁹ Inserted by No I of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS **2012** 2905).

Art. 11 Prevention of air pollution

For the protection of persons from air pollution, a polluted site is deemed to be in need of remediation if its interstitial air exceeds a concentration value specified in Annex 2, and the emission originating from the site reaches places that may regularly be frequented by persons for longer periods.

Art. 12¹⁰ Prevention of pollution of the soil

¹ Soil that is a polluted site or part thereof is deemed to be in need of remediation if a substance in the soil exceeds a concentration value specified in Annex 3. The foregoing also applies to soil that is already subject to a restriction of use.

² Soil that is not in need of remediation in accordance with paragraph 1 despite being polluted sites or parts thereof, and the impacts of polluted sites on soil are assessed in accordance with the Ordinance of 1 July 1998¹¹ on the Pollution of Soil.

Art. 13 Action of the authorities

¹ For polluted sites in need of monitoring, the authorities shall require a monitoring plan to be drawn up and suitable measures to be taken to detect a real danger of harmful effects or nuisances before these become manifest. The monitoring measures shall be applied until there is no longer any need for monitoring in accordance with Articles 9–12.¹²

² For sites that are in need of remediation (contaminated sites), the authorities shall require that:

- a. a detailed investigation be carried out within a reasonable period;
- b. the site be monitored until completion of remediation.

Section 4 Objectives and Urgency of Remediation**Art. 14** Detailed investigation

¹ To specify the objectives and assess the urgency of remediation, the following detailed information shall be obtained and evaluated in a risk assessment:

- a. type, location, quantity and concentration of the environmentally hazardous substances at the polluted site;
- b. type, load and temporal development of the existing and possible impacts on the environment;
- c. location and importance of the environmental areas at risk.

¹⁰ Amended by Annex No. II 2 of the Ordinance of 26 Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771).

¹¹ SR **814.12**

¹² Amended by No I of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS **2012** 2905).

² If the results of the detailed investigation deviate substantially from those of the preliminary investigation, the authorities shall reassess whether the site is in need of remediation in accordance with Articles 9–12.

Art. 15 Objectives and urgency of remediation

¹ The objective of remediation is the elimination of impacts that led to the need for remediation in accordance with Articles 9 - 12, or of the real danger of such effects.

² As regards remediation for the purpose of groundwater protection, deviation from the objective is made if:

- a. by this means the total environmental impact can be lessened;
- b. disproportionate costs would otherwise result; and
- c.¹³ the exploitability of groundwater in water protection areas A_u is guaranteed, or if surface waters connected to groundwater outside water protection areas A_u fulfil the requirements of the waters protection legislation regarding water quality.

³ As regards remediation for the purpose of surface waters protection, deviation from the objectives is made if:

- a. by this means the total environmental impact can be lessened;
- b. disproportionate costs would otherwise result; and
- c. the waters complies with the requirements of the waters protection legislation regarding water quality.

⁴ Remediation is deemed to be of particular urgency if an existing use is impaired or immediately endangered.

⁵ The authorities shall assess the objectives and the urgency of remediation on the basis of the detailed investigation.

Section 5 Remediation

Art. 16¹⁴ Remediation measures

¹ The objective of remediation must be achieved by measures that:

- a. enable environmentally hazardous substances to be eliminated (decontamination); or
- b. enable the diffusion of environmentally hazardous substances to be prevented in the long term and monitored (securing).

¹³ Amended by Annex 5 No. 5 of the Ordinance on the Protection of Waters of 28 Oct. 1998, in force since 1 Jan. 1999 (AS **1998** 2863).

¹⁴ Amended by Annex No. II 2 of the Ordinance of 26. Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771).

² These measures must also be carried out in the case of soil that is already subject to a restriction of use.

Art. 17 Remediation project

The authorities shall require that for contaminated sites a remediation project be prepared within a time frame appropriate to the urgency of remediation. This shall describe in particular the following:

- a. the remediation measures including those for monitoring and for waste disposal, the effectiveness of the measures, the assessment of their results and the time expenditure;
- b. the impact of the proposed measures on the environment;
- c. the residual danger to the environment following remediation;
- d. the shares of the responsibility for the contaminated site in cases where the person required to carry out remediation measures demands a ruling on the allocation of costs (Art. 32*d* para. 3¹⁵ EPA).

Art. 18 Specification of essential measures

¹ The authorities shall assess the remediation project. In doing so, they shall pay particular regard to the following:

- a. the environmental impact of the measures;
- b. their long-term effectiveness;
- c. the danger to the environment caused by the contaminated site before and after remediation;
- d. in cases of incomplete decontamination, the extent to which the measures may be monitored, avenues for remedying the deficiencies and securing the necessary funding for the proposed measures;
- e. whether the requirements for deviation from the remediation objective in accordance with Article 15 paragraphs 2 and 3 are satisfied.

² On the basis of this assessment, they shall issue a ruling containing in particular:

- a. the final objectives of the remediation;
- b. the remediation measures, the assessment of results and the time frame to be adhered to;
- c. further charges and conditions for the protection of the environment.

¹⁵ Now: para. 4.

Art. 19¹⁶ Evaluation of results

Persons required to carry out remediation measures must notify the authorities of the remediation measures carried out and demonstrate that the remediation objectives have been achieved. The authorities shall express an expert opinion in this regard.

Section 6
Obligation to carry out Investigation, Monitoring and Remediation Measures**Art. 20**

¹ The investigation, monitoring and remediation measures shall be carried out by the holder of the polluted site.

² If the authorities have reason to believe that the pollution of the site was caused by the action of third parties, the authorities may require them to carry out the preliminary investigation, the monitoring measures or the detailed investigation.

³ If the pollution of the site was caused by the action of third parties, the authorities may require these with the approval of the holder to prepare the remediation project and perform the remediation measures.

Section 7 Final Provisions**Art. 21**¹⁷ Enforcement

¹ The cantons shall enforce this Ordinance unless it delegates enforcement to the Confederation. The cantons shall submit the information required in Articles 5 paragraph 3 und 6 as well a the information on remediated sites required by Article 17 to the FOEN by the end of each calendar year.¹⁸

^{1bis} The FOEN shall evaluate the information and inform the public regularly on the progress with the remediation of contaminated sites.¹⁹

² If federal authorities apply other federal acts or agreements or decisions under international law that relate to the subject matter of this Ordinance, they shall also enforce this Ordinance. The cooperation of the FOEN and of the cantons is governed by Article 41 paragraphs 2 and 4 EPA; statutory duties of secrecy are reserved. If the federal authorities dispense with issuing a ruling when specifying remediation

¹⁶ Amended by Annex No. II 2 of the Ordinance of 26. Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771).

¹⁷ Amended by No. II 16 of the Ordinance of 2 Feb. 2000 relating to the Federal Act on the Coordination and Simplification of Decision-Making Procedures, in force since 1 March 2000 (AS **2000** 703).

¹⁸ Amended by Annex No. II 2 of the Ordinance of 26. Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771).

¹⁹ Inserted by Annex No. II 2 of the Ordinance of 26. Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771).

measures (Art. 23 para. 3), they shall consult the cantons concerned about the intended measures.²⁰

³ The federal authorities shall determine the procedures for categorising polluted sites (Art. 5 para. 4), preparing the list of priorities (Art. 5 para. 5) and deleting entries in the Register (Art. 6 para. 2) after consultation with the FOEN.²¹

⁴ They shall inform the cantons concerned of the content of the Register (Art. 5 and 6) at regular intervals. These shall include a reference to the relevant polluted sites in their own register.

Art. 22²²

Art. 23 Collaboration with those concerned

¹ In enforcing this Ordinance, the authorities shall collaborate with those directly concerned. In particular, they shall examine whether voluntary measures provided for in sectoral agreements of the private sector are suitable for the enforcement of this Ordinance.

² They shall endeavour to reach agreement with those directly concerned on the necessary assessments and measures in accordance with the requirements of this Ordinance. To this end, they shall consult those directly concerned at the earliest possible time.

³ They may dispense with issuing rulings if carrying out the required investigation, monitoring and remediation measures is guaranteed by other means.

Art. 24 Deviation from procedural regulations

Deviation from the procedures specified in this Ordinance shall be permitted if:

- a. immediate measures for the protection of the environment are necessary;
- b. the need for monitoring or remediation can be assessed, or the required measures determined, on the basis of existing information;
- c. a polluted site is modified by the construction or alteration of a building or installation;
- d. voluntary measures by those directly concerned have an equivalent effect to those specified in the Ordinance.

²⁰ Amended by No. 12 of the Ordinance of 29 June 2011 on amendments of ordinances in the field of environment, in force since 1 Aug. 2011 (AS **2011** 3379).

²¹ Amended by No. 12 of the Ordinance of 29 June 2011 on amendments of ordinances in the field of environment, in force since 1 Aug. 2011 (AS **2011** 3379).

²² Repealed by No. II 16 of the Ordinance of 2 Feb. 2000 to the Federal Act on the Coordination and Simplification of Decision-Making Procedures, with effect from 1 March 2000 (AS **2000** 703).

Art. 25 Guidelines

In preparing guidelines for implementing this Ordinance, the Federal Agency shall collaborate with the cantons and the industrial organisations concerned.

Art. 25a²³ Geoinformation

The Federal Office shall specify the minimum geodata models and representation models for geographical base data in accordance with this Ordinance for which the Federal Office is designated as the specialist authority at federal level in Annex 1 to the Geoinformation Ordinance of 21 May 2008²⁴.

Art. 26 Amendment of current legislation

...²⁵

Art. 27 Transitional provision

The Register (Art. 5) shall be prepared by 31 December 2003.

Art. 28 Commencement

This Ordinance comes into force on 1 October 1998.

²³ Inserted by Annex 2 No. 11 of the Ordinance of 21 May 2008 on Geoinformation, in force since 1 July 2008 (AS **2008** 2809).

²⁴ SR **510.620**

²⁵ The amendment may be inspected in AS **1998** 2261.

*Annex I*²⁶
(Art. 9 and 10)

Concentration values for assessing the impact of polluted sites on ground and surface waters

¹ In assessing the impact of polluted sites on waters, the concentration values in the following table apply. Where no concentration values are given in the table for potential water pollutants which are polluting a site, the authority shall specify a value on a case by case basis with the consent of the FOEN and according to the provisions of the legislation on waters protection.

² Where the assessment is based on the eluate of the material of the site, the following requirements apply to sampling, preparation of the eluates and their analysis:

- a. The number of samples and sampling points shall be chosen such that the samples are representative of the pollution of the site.
- b. The eluate shall be prepared on the basis of a test column. The elution liquid used shall be oxygen-free deionised water. This must normally flow upwards through the column at a defined rate. Prior to analysis, the eluate may normally neither be centrifuged nor filtered in a microfilter.
- c. The eluate need only be analysed in respect of those substances that are expected to occur at the site based on the historical investigation. In cases where lumped parameters only are analysed, the lowest concentration value of the individual substances shall be taken as the assessment criterion.

³ For sites with particularly heterogeneous pollution (e.g. waste disposal sites), if samples can be obtained from the seepage water, these may be regarded as equivalent to an eluate.

⁴ In assessing the impact of volatile substances²⁷, the seepage water shall be regarded as equivalent to an eluate. If it is not possible to take samples of the seepage water, pollutant concentrations shall be calculated based on measurements of interstitial air concentration.

⁵ An eluate test in accordance with paragraph 2 may be dispensed with if the pollutant concentration in the eluate of the material is assessable (i.e. to be above or below the concentration values) on the basis of other information, for example composition and origin of the material at the site, lumped parameters or ecotoxicological investigations, or can be calculated from total content.

⁶ The Federal Office shall issue guidelines on sampling, preparation of eluates and their analysis, and on assessment of the impact of volatile substances.

²⁶ Revised by Annex No. II 2 of the Ordinance of 26 Sept. 2008 on the Charge for the Remediation of Contaminated Sites (AS 2008 4771) and No II of the Ordinance of 9 May 2012, in force since 1 Aug. 2012 (AS 2012 2905)

²⁷ Indicated in the table by *.

Substance	Concentration value
<i>Inorganic substances</i>	
Antimony	0.01 mg Sb/l
Arsenic	0.05 mg As/l
Lead	0.05 mg Pb/l
Cadmium	0.005 mg Cd/l
Chromium (VI)	0.02 mg CrVI/l
Cobalt	2 mg Co/l
Copper	1.5 mg Cu/l
Nickel	0.7 mg Ni/l
Mercury	0.001 mg Hg/l
Silver	0.1 mg Ag/l
Zinc	5 mg Zn/l
Tin	20 mg Sn/l
Ammonium	0.5 mg NH ₄ ⁺ /l
Cyanide (free)	0.05 mg CN ⁻ /l
Fluoride	1.5 mg F ⁻ /l
Nitrite	0.1 mg NO ₂ ⁻ /l

Organic substances

Aliphatic hydrocarbons:

- Total (C₅-C₁₀) 2 mg/l
- Methyl tert-butyl ether (MTBE) 0.2 mg/l

Amines

- Aniline 0.05 mg/l
- 4-aniline chloride 0.1 mg/l

Halogenated hydrocarbons

- 1,2-Dibromoethane (EDB) 0.05 µg/l
- 1,1-Dichloroethane* 3 mg/l
- 1,2-Dichloroethane (EDC)* 0.003 mg/l
- 1,1-Dichloroethene* 0.03 mg/l
- 1,2-Dichloroethene (cis and trans)* 0.05 mg/l
- Dichloromethane (methylene chloride, DCM)* 0.02 mg/l
- 1,2-Dichloropropane* 0.005 mg/l
- 1,1,2,2-Tetrachloroethane 0.001 mg/l
- Tetrachloroethene (PERC) 0.04 mg/l
- Tetrachloromethane (carbon tetrachloride)* 0.002 mg/l
- 1,1,1-Trichloroethane* 2 mg/l
- Trichloroethene (TCE)* 0.07 mg/l
- Trichloromethane (chloroform)* 0.04 mg/l
- Vinyl chloride* 0.1 µg/l
- Chlorobenzene 0.7 mg/l
- 1,2-Dichlorobenzene 3 mg/l
- 1,3-Dichlorobenzene 3 mg/l
- 1,4-Dichlorobenzene 0.01 mg/l

Substance	Concentration value
– 1,2,4-Trichlorobenzene	0.4 mg/l
– Polychlorinated biphenyls (PCBs) ²	0.1 µg/l
Monocyclic aromatic hydrocarbons (BTEX)	
– Benzene*	0.01 mg/l
– Toluene	7 mg/l
– Ethylbenzene	3 mg/l
– Xylenes	10 mg/l
Nitro compounds	
– 2,4-Dinitrophenol	0.05 mg/l
– Dinitrotoluene	0.5 µg/l
– Nitrobenzene	0.01 mg/l
– 4-Nitrophenol	2 mg/l
Phenols	
– 2-Chlorophenol	0.2 mg/l
– 2,4-Dichlorophenol	0.1 mg/l
– 2-Methylphenol (o-cresol)	2 mg/l
– 3-Methylphenol (m-cresol)	2 mg/l
– 4-Methylphenol (p-cresol)	0.2 mg/l
– Pentachlorophenol (PCP)	0.001 mg/l
– Phenol (C ₆ H ₆ O)	10 mg/l
Polycyclic aromatic hydrocarbons (PAK)	
– Acenaphthene	2 mg/l
– Anthracene	10 mg/l ³
– Benz[a]anthracene	0.5 µg/l
– Benzo[b]fluoranthene	0.5 µg/l
– Benzo[k]fluoranthene	0.005 mg/l
– Benzo[a]pyrene	0.05 µg/l
– Chrysene	0.05 mg/l
– Dibenz[a,h]anthracene	0.05 µg/l
– Fluoranthene	1 mg/l ³
– Fluorene	1 mg/l
– Indeno[1,2,3-cd]pyrene	0.5 µg/l ³
– Naphthalene	1 mg/l
– Pyrene	1 mg/l ³

¹ Detection threshold

² PCB: the sum of the 6 congeners 28, 52, 101, 138, 153 and 180 multiplied by the factor 4.3 must not exceed the concentration value.

³ Not normally detectable in the eluate at these concentrations.

* To be assessed according to Paragraph 4.

Concentration values for the assessment of interstitial air at polluted sites

¹ In assessing the interstitial air of polluted sites, the concentration values in the following table apply. Where no concentration values are given in the table for emissions occurring at the site, e.g. odours or particles, the site is deemed to be in need of remediation if the emissions may lead to excessive ambient concentrations in accordance with the Ordinance of 16 December 1985²⁸ on Air Pollution Control.

² For sampling and the performance of interstitial air analyses, the following apply:

- a. Samples must be taken using ground gas detectors at a number of points representative of the pollution of the site. It shall be ensured that no extraneous air is included in the samples.
- b. The interstitial air need only be analysed in respect of those constituents that are expected to occur at the site based on the historical investigation. If the analysis is confined to lumped parameters, the lowest concentration value of the individual substances shall be taken as the assessment criterion.

³ Interstitial air samples may be dispensed with if it can be demonstrated by other means that the concentration values in the interstitial air cannot be exceeded, i.e. based on precise information concerning the composition and origin of the material at the site.

⁴ The Federal Agency shall issue guidelines on sampling and on procedures for interstitial air analyses.

Substance	Concentration value
<i>Inorganic substances</i>	
Mercury	0.005 ml/m ³
Carbon dioxide	5000 ml/m ³
Hydrogen sulphide	10 ml/m ³
<i>Organic substances</i>	
Petrol (free of aromatics)	500 ml/m ³
Light petrol (aromatic content 0–10 by vol.-%)	500 ml/m ³
Methane	10 000 ml/m ³
Halogenated hydrocarbons	
– Chlorobenzene	10 ml/m ³
– 1,1-Dichloroethane	100 ml/m ³
– 1,2-Dichloroethane (EDC)	5 ml/m ³
– 1,1-Dichloroethene	2 ml/m ³

Substance	Concentration value
– 1,2-Dichloroethene (cis and trans)	200 ml/m ³
– Dichloromethane	100 ml/m ³
– 1,2-Dichloropropane	75 ml/m ³
– 1,1,2,2-Tetrachloroethane	1 ml/m ³
– Tetrachloroethene (PERC)	50 ml/m ³
– Tetrachloromethane (Carbon tetrachloride)	5 ml/m ³
– 1,1,1-Trichloroethane	200 ml/m ³
– Trichloroethene (TCE)	50 ml/m ³
– Trichloromethane	10 ml/m ³
– Vinyl chloride	2 ml/m ³
Monocyclic aromatic hydrocarbons (BTEX)	
– Benzene	1 ml/m ³
– Toluene	50 ml/m ³
– Ethylbenzene	100 ml/m ³
– Xylenes	100 ml/m ³
Polycyclic aromatic hydrocarbons (PAK)	
– Benzo[a]pyrene	0.0002 ml/m ³
– Naphthalene	10 ml/m ³

Annex 329
(Art. 12 para. 1)

Concentration values for the assessment of the need for remediation of soil

The concentration values in the table below apply in the assessment of the need for remediation of soil. Where no concentration values are given in the table for potential soil pollutants which are polluting a site, the authority shall specify a value on a case by case basis with the consent of the FOEN and according to the provisions of the legislation on the protection of the environment.

1 Sites used for agricultural or horticultural purposes

Substance	Concentration value
<i>Inorganic substances</i>	
Lead	2000 mg Pb/kg
Cadmium	30 mg Cd/kg
Copper	1000 mg Cu/kg
Zinc	2000 mg Zn/kg
<i>Organic substances</i>	
Polychlorinated biphenyls (PCBs)	3 mg/kg
Polycyclic aromatic hydrocarbons (PAHs)*	100 mg/kg
Benzo-a-pyrene	10 mg/kg
* Σ 16 EPA PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz[a]anthracene, chrysene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, benzo[g,h,i]perylene, indeno[1,2,3-c,d]pyrene	

²⁹ Inserted by Annex No. II 2 of the Ordinance of 26 Sept. 2008 on the Charge for the Remediation of Contaminated Sites, in force since 1 Jan. 2009 (AS **2008** 4771). Revised by No II of the Ordinance of 9 May 2012 (AS **2012** 2905) and No I of the Ordinance of 14 Jan. 2015, in force since 1 March 2015 (AS **2015** 317).

2 Sites in private gardens and allotments, children's playgrounds and other facilities where children play regularly

Substance	Concentration value
<i>Inorganic substances</i>	
Antimony	50 mg Sb/kg
Arsenic	50 mg As/kg
Lead	1000 mg Pb/kg
Cadmium	20 mg Cd/kg
Chromium (VI)	100 mg CrVI/kg
Copper	1000 mg Cu/kg
Nickel	1000 mg Ni/kg
Mercury	5 mg Hg/kg
Silver	500 mg Ag/kg
Zinc	2000 mg Zn/kg
<i>Inorganic substances</i>	
Volatile chlorinated hydrocarbons*	1 mg/kg
Polychlorinated biphenyls (PCBs)**	1 mg/kg
Aliphatic hydrocarbons C ₅ -C ₁₀ ***	5 mg/kg
Aliphatic hydrocarbons C ₁₁ -C ₄₀	500 mg/kg
Monocyclic aromatic hydrocarbons (BTEX)****	500 mg/kg
Benzene	1 mg/kg
Polycyclic aromatic hydrocarbons (PAHs)*****	100 mg/kg
Benzo[a]pyrene	10 mg/kg
* ** *** **** *****	<p>Σ7 volatile chlorinated hydrocarbons: dichloromethane, trichloromethane, tetrachloromethane, cis-1,2-dichloroethylene, 1,1,1-trichloroethane, trichloroethylene (TCE), tetrachlorethylene (PERC)</p> <p>Σ6 PCB congeners × 4.3: no. 28, 52, 101, 138, 153, 180</p> <p>ΣC₅- to C₁₀ hydrocarbons: area of the FID-chromatogram between n-pentane and n-decane, multiplied by the response factor of n-hexane, minus ΣBTEX</p> <p>Σ6 BTEX: benzene, toluene, ethylbenzene, o-xylene, m-xylene, p-xylene</p> <p>Σ16 EPA PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz-a-anthracene, chrysene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, benzo[g,h,i]perylene, indeno[1,2,3-c,d]pyrene</p>