

DECREE
of
The Ministry of Environment of the Czech Republic

from 17th October 2001

on
the conditions for using treated sludge on agricultural land

The Ministry of Environment, in co-operation with the Ministry of Health Care and the Ministry of Agriculture, provides according to Section 33, par. 4 of the Act No. 185/2001 Coll., on Waste and Amendment to Some Other Acts(her-in-after called "the Act"):

PART ONE

THE CONDITIONS FOR USING TREATED SLUDGE ON AGRICULTURAL LAND

Section 1

Technical conditions for using treated sludge on agricultural land

Treated sludge¹ can be used on agricultural land under the following conditions:

- a) the sludge must be ploughed in the soil within 48 hours after it was applied on the agricultural land,
- b) the necessity to supply nutrients to the soil on the plot that is intended for sludge application has to be supported by the results of an analysis concerning the soil agrochemical properties and the results have to be provided in the record sheet concerning the agricultural use of sludge, according to Annex 1,
- c) more than 5 tons of sludge dry matter per hectare within three successive years must not be used. This amount can be increased up to 10 tons of sludge dry matter within 5 successive years if the sludge contains less than a half of the limit amount of each of the monitored high-risk substances and elements. The exact determination of the dry matter dose shall be calculated from the nitrogen amount that was found out. The dose of nitrogen from the sludge must not exceed 70% of the total amount of nitrogen necessary for the plant fertilised. The sludge dose (the amount and use period) also conforms to the needs of the plants for nutrients, with respect to available nutrients and the soil organic component, as well as the local conditions,
- d) the sludge dose, determined according to the requirements provided in par. c) shall be applied on the respective plot within one agro-technical operation and within one continual time period, under favourable physical and moisture conditions,
- e) the minimum content of dry matter in sludge for the pressure application on land using ploughshare applicators is 5%, the minimum content of dry matter in sludge for the application using mechanical spreader of organic fertilisers is 18%.

¹ Section 32 b) of the Act No. 185/2001 Coll., on Waste and Amendment to Some Other Acts.

Section 2

The limit values of concentrations of selected high-risk substances in soil and high-risk substances that can be added into soil

- (1) The limit concentration values of the selected high-risk substances listed in Annex 2 must not be exceeded in the soil on which sludge can be applied.
- (2) The total allowed introduction of high-risk substances into agricultural land through sludge within 10 successive years is defined in the allowed sludge dose provided in Section 1 c) and the limit concentration values of high-risk substances and the substances listed in Annex 3.

Section 3

The limit concentration values of selected high-risk substances and elements in sludge and microbiological criteria for using sludge on agricultural land

Only that sludge can be applied on agricultural land which complies with

- a) the limit concentration values of the selected high-risk substances and elements listed in Annex 3 and
- b) microbiological criteria stated in Annex 4.

Section 4

The procedures to take samples of sludge and soil and the methods to analyse sludge and soil

(1) Taking and analysing soil samples (here-in-after called "monitoring of soil") from the plots intended for sludge application and taking and analysing sludge samples (here-in-after called "monitoring of sludge") are ensured by sludge producers. A proposal for soil monitoring and sludge monitoring on the plots intended for sludge application is apart of the programme to use sludge on agricultural land according to Section 5.

(2) Monitoring of soil shall always be carried out before the first sludge application and then in regular ten-year intervals, in accordance with the special legal regulation² and in the extent stated in Annexes 1 and 2.

(3) During sludge monitoring, sampling and chemical and microbiological analyses are carried out in the extent and frequency as stated in Annexes 3, 4, and 5. The following requirements are also valid for the sludge monitoring:

- a) determination of adsorbable organic halogens (AOX) and polychlorinated biphenyls in sludge shall always be carried out before the first application of the sludge,
- b) sludge samples shall be taken according to ČSN EN ISO 5667³,
- c) samples of sludge for microbiological examination have to be taken in such a way so that there is no secondary contamination and their preservation and transport shall follow ČSN ISO 10 381.⁴

(4) Monitoring of soil shall be carried out by persons authorised by The Central Agricultural Control and Testing Institute, according to the special legal regulation⁵, using procedures listed in the special legal regulation⁶.

² Section 2, par. 1 a), b), c) of the Decree No. 257/1998 Coll., on agrotechnical testing of agricultural lands and determination of soil properties of forest plots, in the wording of the Decree No. 477/2000 Coll.

³ ČSN EN ISO 5667 – 13: Instructions for taking samples of sludge from water treatment and purification plants.

⁴ ČSN ISO 10381 - 6: Soil quality – Sampling – Part 6: Instructions for sampling, manipulation with and preservation of soil samples intended for examination of aerobic microbial processes in a laboratory.

- (5) The reference methods to analyse soil and sludge samples are provided in Annex 6.
- (6) The results of sludge monitoring and soil monitoring shall be stated in the record sheet concerning the agricultural use of sludge, according to Annex 1 that is apart of the sludge use programme according to Section 5. The records of soil monitoring and sludge monitoring that were carried out shall always be attached to the filled-in report. The sludge producer shall keep these records in the archives for 30 years.

Section 5

The contents of the programme to use sludge on agricultural land

- (1) The sludge use programme, drawn up by the sludge producer, shall always contain the following:
- a) evaluation of the sludge in terms of its use on agricultural land, in correspondence with Annexes 3, 4 and 5,
 - b) a list of selected plots intended for application of the sludge, including the indicators for their evaluation according to Annex 2,
 - c) hydrological conditions in the area concerning the sludge application,
 - d) involvement of the sludge application into the crop rotation,
 - e) a proposal for sludge monitoring and soil monitoring,
 - f) sampling plan,
 - g) measures to protect health at work with sludge.
- (2) The sludge use programme also involves the record sheets concerning agricultural use of sludge according to Annex 1.

PART TWO

EFFECTIVENESS

Section 6

This Decree becomes effective on January 1st, 2002.

Minister
RNDr. Kužvart

⁵ Section 10, par. 2 of the Act No. 156/1998 Coll., on fertilisers, auxiliary plant preparations and substrates, and on agrochemical testing of agricultural lands, as amended.

⁶ The Decree No. 275/1998 Coll., in the wording of the Decree No. 477/2000 Coll.

Annex 1 to the Decree No. 382/2001 Coll.

Record sheet concerning sludge use in agriculture

For the year

File No. (filled in by district council)

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Sheet No.

Number of sheets

		1

Producer										Separate workshop										
ID:										Workshop number:										
Licenced person (name):										Workshop name:										
Street:										Street:										
Locality:										Locality:										
POST CODE:										POST CODE:										
District code (CZ-NUTS 4):										District code (CZ-NUTS 4):										
IC ZÚJ:										Person authorised to act in the name of the firm:										
Date of issue:										Telephone:										
Stamp and signature:										FAX:										
										Treatment plant locality										
										Name of locality or its part:										
										ICZÚJ:										
Treatment plant owner (ID, owner name, full address, District code (CZ-NUTS 4))																				

Sludge user:

Agricultural firm or licenced person (farmer)										Separate workshop									
ID										Workshop number:									
Firm (name):										Workshop name:									
Street:										Street:									
Locality:										Locality:									
POST CODE:										POST CODE:									
ID:										District code (CZ-NUTS 4):									

District code(CZ-NUTS 4):	<input type="text"/>	IC ZÚJ:	<input type="text"/>
IC ZÚJ:	<input type="text"/>	Person authorised to act in name of firm:	
OKEČ:	<input type="text"/>	Telephone, FAX:	
Date of issue:	<input type="text"/>	Total amount of used sludge:	
Stamp and signature:		Note:	

Annex 1 (continued)

ID

Sheet No. 2

Number of sheets

1) Agrochemical properties of soil:

Soil reaction - pH	
Soil category	
Average content in soil	mg. kg⁻¹
Mg - magnesium	
K – potassium	
P - phosphorus	

High-risk element	Content in soil (mg.kg ⁻¹ dry matter)	Limit concentration values of elements in soil (mg.kg ⁻¹ dry matter)	
		Usual soils	Sand, loamy soil, gravel sand
As - arsenic		20	15
Cd – cadmium		0,5	0,4
Cr - chromium		90,0	55,0
Cu - copper		60,0	45,0
Hg - mercury		0,3*	0,3*
Ni - nickel		50,0	45,0
Pb - lead		60,0	55,0
Zn - zinc		120,0	105,0

* total content

2) Supplies of sludge from wastewater treatment plant:

No.	Date	Sludge supply	unit area			
		tons of dry matter	% dry matter for unit area	unit area number/ grid reference**	size of unit area (ha)	crop on the unit area

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**** grid reference according to Křovák, Section 10 of the Law No. 156/1998 Coll.**

Annex 1 (continued)ID

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Sheet No.

	2
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Number of sheets

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3) Properties of sludge from wastewater treatment plants

Sample taken on:		Record No.	
Sludge analysed on:		Record No.	
Sludge analysed by:			
Number of attachments:			
Indicator	Content in the original mass (%)	Content in dry matter (%)	
loss on ignition – organic matter			
N - total nitrogen			
NH ₄ -N - ammonia nitrogen			
NO ₃ -N - nitrate nitrogen			
Ca - calcium			
Mg - magnesium			
K - potassium			
P - phosphorus			
pH of treatment plant sludge			

Indicator	values determined (mg.kg ⁻¹)	Maximum concentration values in sludge (mg.kg ⁻¹ dry matter)
As – arsenic		30
Cd - cadmium		5
Cr - chromium		200
Cu - copper		500
Hg – mercury		4
Ni – nickel		100
Pb – lead		200
Zn - zinc		2500
AOX		500
PCB (sum of 6 congeners - 28+52+101+138+153+180)		0,6

Introduction of high-risk elements into soil with the sludge dose (kg . ha⁻¹)

As	Cd	Cr	Cu	Hg	Ni	Pb	Zn

Annex 1 (continued)

ID

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Sheet No.

3

Number of sheets

	3

micro-organism	values found (KTJ) in 1 g of sludge dry matter	Allowed amount of micro-organisms (KTJ [*]) in 1 g of dry matter of applied sludge	
		sludge category	
		I.	II.
thermo-tolerant coliform bacteria		< 10 ³	10 ³ - 10 ⁶
enterococci		< 10 ³	10 ³ - 10 ⁶
<i>Salmonella sp.</i>		negative result	not determined

- KTJ – a colony forming a unit

1. The way of filling in the form in Annex 1

In case sludge from more than one supplier is used, a separate Annex 1 shall be filled in for each of the suppliers (producers)

The producer:

ID – identification number - to fill in the identification number of the organisation (if granted); If the organisation's number has less than 8 digits there will be zeros added from the left to form an 8-digit number.

Producer or licenced person (name) - to fill in the name of the producer or licenced person, in a way that is written in the Trade Register or Business Licence.

Street, municipality, post code – to fill in the exact and complete address of the producer or licenced person.

District code (CZ-NUTS 4) – to fill in the code of the district (CZ-NUTS 4) where there is the seat of the firm, according to the Unified code-book of districts in the Czech Republic (Classification of statistical unit areas issued by The Czech Statistical Authority).

ICZÚJ - is the identification number of the basic unit area of the municipality – the producer or authorised person's address. It is taken from the Unified code-book of localities in the Czech Republic.

OKEČ – to fill in the code of the prevailing (main) economic activities, according to the Industry classification of economic activities, published by The Czech Statistical Authority.

Separate workshop – meaning a workshop according to Section 5, par. 1 of the Law No. 455/1991

Coll. on Trade Licencing, as amended.

Separate workshop number – to fill in the internal number of the workshop if the producer or licenced person has numbered their workshops. Otherwise this is not to be filled in and the number is added by the district office in the upward row, according to the order of the workshop as registered at the district office.

Name of workshop – to fill in the name of the workshop.

Street, municipality, post code – to fill in the exact and complete address of the separate workshop.

District code (CZ-NUTS 4) of the separate workshop – to fill in the code of the district (CZ-NUTS 4) where there is the separate workshop belonging to the firm, according to the Unified code-book of districts in the Czech Republic (Classification of statistical unit areas issued by The Czech Statistical Authority).

Workshop locality – is determined by the name and identification number of the basic unit area of the municipality where the sludge is produced.

Name of municipality – to fill in the name of the municipality of the workshop locality.

ICZÚJ - is the identification number of the basic unit area of the municipality – the workshop locality. It is taken from the Unified code-book of localities in the Czech Republic.

The sludge user:

ID – identification number - to fill in the identification number of the organisation (if granted); If the organisation's number has less than 8 digits there will be zeros added from the left to form an 8-digit number. In case of farmers who do not have identification number, the birth number shall be filled in (if assigned).

The firm (name) - to fill in the name of the agricultural firm or the licenced person, in a way that is written in the Trade Register or Business Licence.

Street, municipality, post code – to fill in the exact and complete address of the producer or the licenced person.

District code (CZ-NUTS 4) – to fill in the code of the district (CZ-NUTS 4) where there is the firm, according to the Unified code-book of districts in the Czech Republic (Classification of statistical unit areas issued by The Czech Statistical Authority).

ICZÚJ - is the identification number of the basic unit area of the municipality – the firm's address. It is taken from the Unified code-book of localities in the Czech Republic.

OKEČ – to fill in the code of the prevailing (main) economic activities, according to the Industry classification of economic activities, published by The Czech Statistical Authority.

Separate workshop – meaning a workshop according to Section 5, par. 1 of the Law No. 455/1991 Coll., on Trade Licencing, as amended. In case the firm does not have a separate workshop, the right part shall not be filled in.

Separate workshop number – to fill in the internal number of the workshop if the producer or licenced person has numbered their workshops. Otherwise this is not to be filled in and the number is added by the district office in the upward row, according to the order of the workshop as registered at the district office.

Name of workshop – to fill in the name of the workshop.

Street, municipality, post code – to fill in the exact and complete address of the separate workshop.

District code (CZ-NUTS 4) of the separate workshop – to fill in the code of the district (CZ-NUTS 4) where there is the separate workshop belonging to the firm, according to the Unified code-book of districts in the Czech Republic (Classification of statistical unit areas issued by The Czech Statistical Authority).

The number of sludge producers (suppliers) for one plot of land – in case there are sludges from different suppliers (sludge producers) applied on one plot of land, the total number of suppliers shall be written down.

The limit concentration values of selected high-risk elements in soil (indicators for soil evaluation)

The limit concentration values of elements in the extract with aqua regia in mg.kg⁻¹ of dry matter in soil								
	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Usual soils	20	0.5	90	60	0,3*	50	60	120
Sands, loamy sand, gravel sand	15	0.4	55	45	0,3*	45	55	105

* total content

Explanatory notes:

- 1) The limit concentration values of selected elements in soil determine the maximum values of the selected high-risk elements in soil, which, if exceeded, could lead to damage of the soil functions and environmental media.
- 2) Soil categories:
 - a) Usual (light loam, loamy and clay) soils that cover the majority of agricultural land. The term "usual soils" means the soils with normal variability of elements, with normal soil development in different geomorphological conditions and in regions with different psammitic, pelitic rocks, sedimentary, acidic, neutral, sometimes also base igneous rocks, and also metamorphic rocks. Thus, these are soils that did not arise, in terms of geogenesis and petrography, from anomalous rocks such as sands, gravel sands, ultrabasic rocks (serpentine, amphibolite, leucite) and carbonate rocks. This group also involves areas where rocks or dykes with a high degree of metallogenetic ore-formation take part in soil development.
 - b) Sandy soils, on very light and poor parent rocks, such as sands and gravel sands. In definition of these soils it is necessary to focus on representation of fine particles (below 10 µm) that are maximum 10% of the soil. In case of sand soils on sand and gravel sands on gravel, this is mainly because of low sorption ability, and if raw materials with normal contents of high-risk elements are used directly, groundwater and river water get quickly polluted.
 - c) Soils on substrates with extreme contents of some elements that are conditional on geogenesis. These soils are evaluated separately and the reference background values do not concern them. The upper limit values for the elements are not determined for the soils on the other extreme rocks because their values in these rocks are often very unbalanced and high, especially for Cr, Co, Ni, and in the whole soil profile.

Annex 3 to the Decree No. 382/2001 Coll.

The limit concentration values for selected high-risk substances and elements in sludge to be used on agricultural land (indicators for sludge evaluation)

High-risk substance	Maximum concentration values in sludge (mg.kg⁻¹ dry matter)
As – arsenic	30
Cd - cadmium	5
Cr - chromium	200
Cu - copper	500
Hg – mercury	4
Ni – nickel	100
Pb – lead	200
Zn - zinc	2500
AOX	500
PCB (sum of 6 congeners - 28+52+101+138+153+180)	0,6

Microbiological criteria for the use of sludge on agricultural land

Sludge category	Allowed amount of micro-organisms (KTJ*) in 1 gram of dry matter of applied sludge		
	thermo-tolerant coliform bacteria	enterococci	Salmonella sp.
I.	$< 10^3$	$< 10^3$	negative result
II.	$10^3 - 10^6$	$10^3 - 10^6$	not determined

* KTJ- a colony forming a unit

Explanatory notes:

Category I – sludge that can generally be applied on land used in agriculture, if other provisions of this Decree are kept.

Category II – sludge that can be applied on agricultural land intended for technical crops and on lands where no vegetables and intensive fruit crops will be grown for at least 3 years after the wastewater treatment sludge was applied, and the principles to protect health at work are kept as well as the other provisions of this Decree.

The minimum frequency of chemical and microbiological analyses of sludges to be used on agricultural land per year

Production of sludge from wastewater treatment plant (in tons of sludge dry matter per year)	Minimum number of analyses per year			
	agrochemical parameters* (nutrients)	high-risk elements (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	microbiology (thermo-tolerant coliform bacteria, enterococci, <i>Salmonella sp.</i>)	organic contaminants (AOX, PCB)
< 250	2	2	2	** —
250-1000	4	4	4	** —
1000-2500	4	4	6	1
>2500	12	12	12	1

* agrochemical parameters: pH, content of dry matter, content of organic matter (expressed as loss on ignition), total nitrogen, ammonium nitrogen, nitrate nitrogen, phosphorus, potassium, calcium, magnesium

** analyses shall be done according to Section 4, par. 2 of this Decree, always before the sludge is used for the first time

The methods to take samples, analytical methods and methods for biological determinations

subject, purpose indicator	standard
Instructions for taking samples of sludge from water treatment and purification plants	ČSN EN ISO 5667 Sampling, part 13
Soil quality – sampling – part 6: Instructions for taking, manipulation with and storing soil samples intended for studying aerobic microbial processes in a laboratory	ČSN ISO 10 381-6
Soil quality – Preparation of samples for physical and chemical analyses	ČSN ISO 11 464
Physical and chemical analysis of sludge – determination of total dry matter, ignition residue and loss on ignition	ČSN 83 05 50 part 3
Physical and chemical analysis of sludge – Determination of pH	ČSN EN 12 176
Soil quality – Determination of pH	ČSN ISO 10 390
Soil quality – Determination of total nitrogen - modified Kjeldahl method	ČSN ISO 11 261
Soil quality – Determination of the weight portion of dry matter and the soil moisture (as weight) – Gravimetric method	ČSN ISO 11 465
Characterisation of sludges – Determination of trace elements and phosphorus – Aqua regia extraction methods	EN 13346 proposed ČSN EN 13346
Determination of 33 elements using atom emission spectrometry with induction-bonded plasma (P, K, Na, Ca, Mg, Cd, Cr, Cu, Ni, Pb, Zn)	ČSN EN ISO 11 885
Water quality. Determination of total mercury using one-purpose atom absorption spectrometer	TNV 75 74 40
Water quality. Determination of mercury	ČSN EN 1483
Soil quality – Extraction of trace elements soluble in aqua regia (As, Cd, Cr, Cu, Ni, Pb, Zn)	ISO 11 466
Water quality. Determination of potassium and sodium. Part 1 - 3: Determination of potassium and sodium using atom absorption spectrometry	ČSN ISO 9964-1, 2, 3 (75 7378)
Water quality. Determination of calcium and magnesium. The method: atom absorption spectrometry	ČSN ISO 7980 (75 7383)
Water quality. Determination of Co, Cu, Ni, Zn, Cd a Pb. Method: flame atom absorption spectrometry	ČSN ISO 8288

Water quality. Determination of Cr. Method: atom absorption spectrometry	ČSN EN 1233
Water quality. Determination of Cd using atom absorption spectrometry	ČSN EN ISO 5961
Schlamm und Sedimente. Bestimmung von adsorbierten organisch gebundenen halogenen (AOX)	DIN 38414-18
Schlamm und Sedimente. Bestimmung von 6 polychlorierten biphenylen (PCB)	DIN 38414-20
General instructions for preparation of dilution at microbiological testing	ČSN ISO 6887
General instructions for microbiological testing	ČSN ISO 7218
Water quality. General instructions for determination of micro-organisms using cultivation methods	ČSN ISO 8199
Recommended method to determine detection of Salmonella sp. in sludge from wastewater treatment plants *	ČSN EN 12 824
Recommended method to determine the numbers of thermo-tolerant coliform bacteria in sludge from wastewater treatment plants *	Modified ČSN ISO 7899 - 2
Recommended method to determine the numbers of thermo-tolerant coliform bacteria Microbiology. General instructions for determination of the number of coliform bacteria. The colonies counting technique*	Modified ČSN ISO 9308 - 1

* the procedures are published in Acta hygienica et microbiologica (AHM) No. 7/2001.