Laboratorien Dr. Döring Haferwende 21 28357 Bremen

Wiertsema & Partners
Feithspark 6

9356 BZ TOLBERT, NL

October 22nd 2025

Analysis Report 240425015-2

Order No. Customer:	-
Project Name:	-
Sampling:	by Customer
Sample Transport:	via Laboratorien Dr. Döring GmbH
Sample Reception:	13.12.2024
Period of Measurement:	13.12.2024 – 22.08.2025
Sample Number:	181123 / 24, 25147277
Sample Material:	Soil
Packaging:	White glass (0,8 L)
Remarks:	Grain distribution in the appendix, Adoption of values from the previous analysis report
Sonstiges:	The measurement error in these tests is within the usual range. We will gladly provide you with further details upon request. Lists of measurement uncertainties can be viewed on the homepage. The test results refer exclusively to the specified test items. Information on outsourcing and accreditation under measurement procedures. Any reproduction of an extract from this test report requires the written permission of Laboratorien Dr. Döring GmbH. Any totals shown for individual parameters are calculated automatically. Sums are created purely numerically and the digits given do not correspond to significance. Determination limits can vary depending on the matrix/initial weight.
Results of Analysis:	Pages 3 – 10
Measurement Methods:	Page 2
Quality Check:	

Name: Dr. Dirk Schlüter
Grund: Geprüft und freigegeben.
Datum: 22.10.2025 16:42:29 (UTC+02:00:00)

Dr. Dirk Schlüter
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Dr. Joachim Döring
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Method	Norm	Measurement uncertainty [%]
Sample preparation	DIN 19747: 2009-07 [1)]	-
Dry matter	DIN EN 14346: 2007-03 [1)]	3
TOC	DIN EN 15936: 2012-11 [1)]	16
Hydrocarbons (GC;F)	DIN EN 14039: 2005-01 DIN EN 14039: 2005-1: i.V. mit LAGA KW/04: 2019-09 [1)]	22
Cyanide	DIN ISO 11262: 2012-04 [1)]	21
EOX	DIN 38414-17 (S17): 2017-01 [1)]	25
Digestion	DIN EN 13657: 2003-01 [1)]	-
Arsenic	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	23
Lead	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	21
Cadmium	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	25
Chrome, in total	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	24
Copper	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	12
Nickel	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	28
Mercury	DIN EN ISO 12846 (E12): 2012-08 [1)]	22
Thallium	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	-
Zinc	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	26
PCB	DIN EN 15308: 2016-12 [1)]	31
PAH	DIN ISO 18287: 2006-05 [1)]	32
BTEX	DIN EN ISO 22155: 2016-07 [1)]	28
LHKW	DIN EN ISO 22155: 2016-07 [1)]	35
Phosphorous, in total	DIN EN ISO 11885 (E22): 2009-09 [1)]	-
Nitrogen, in total	DIN 11261b [*)]	-
Organotin compounds	DIN 38107-13 (F13): 2001-03 [1)]	-
Hexachlorobenzene	DIN ISO 10382: 2003-05 [1)]	30
Pentachlorophenole	DIN ISO 14154: 2005-12 [1)]	30
Organochlorine insecticides	DIN 38407-2 (F2, GC/MS) [1)]	-
Grain distribution	DIN 18123: 2011 [**)]	-
Eluate 10:1	DIN EN 12457-4: 2003-01 [1)]	-
Eluate 2:1	DIN 19529: 2015-12 [1)]	-
pH value (W,E)	DIN EN ISO 10523 (C5): 2012-04 [1)]	abs. 0,4
el. conductivity (E)	DIN EN 27888 (C8): 1993-11 [1)]	11
Phenol index	DIN 38409-16 (H16): 1984-06 [1)]	48
Cyanide (W)	DIN 38405-13 (D13): 2011-04 [1)]	11
Chloride	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	15
Sulfate	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	17
Arsenic	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	16
Lead	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	12
Cadmium	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	16
Chrome, in total	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	14
Copper	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	16
Nickel	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	12
Mercury	DIN EN ISO 12846 (E12): 2012-08 [1)]	25
Thallium (E)	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	-
Zinc (E)	DIN EN ISO 17294-2 (E29): 2017-01 [1)]	16
PAH (E)	DIN 38407-39 (F39): 2011-09 [1)]	27
PCB (E)	DIN 38407-37 (F37): 2013-12 [1)]	27
Nitrogen/Carbon	DIN EN 12260:2003-12 analogue DIN EN 15936: 2012-11 [*)]	-
Density	DIN 18125-2: 2020-11 [*)]	-
Freeze drying	DIN 38414-S 22 [**)]	-
Grain-size fractions (> 63, < 63, < 20µm)	Sieve analysis according to the BfG method *[**)]	-
Separating the fine grain fraction < 20 µm	DIN 18123: 2011 [**)]	-

[1)] Laboratorien Dr. Döring GmbH, a testing laboratory accredited by DAkkS according to DIN EN ISO/IEC 17025:2018. The accreditation is valid only for the scope of accreditation listed in the certificate annex D-PL-13462-01-00
[2)] The testing was carried out on a subcontract basis by the accredited testing laboratory Chemisches Untersuchungsamt Emden GmbH
[*)] Laboratorien Dr. Döring GmbH, non-accredited measurement method
[**)] The testing was carried out on a subcontract basis by the testing laboratory Chemisches Untersuchungsamt Emden GmbH, non-accredited measurement method
[***)] The testing was carried out on a subcontract basis by the testing laboratory Chemisches Untersuchungsamt Emden GmbH, non-accredited measurement method, on newly received material.

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Parameters according to LAGA 2004 1/3

Laboratory number		181123	Assignment values for the use of ground-like applications[1)]		
Sample name		**OW4-RAM-014-VC**	Z 0	Z 1	Z 2
Sampling depth		0,0-2,85m			
Parameter	Dimension				
Dry matter	%	71,3			
TOC	%	1,1	0,5	1,5	5,0
Hydrocarbons, n-C_{10-22}	mg/kg dm	< 5	200	300	1.000
Hydrocarbons, n-C_{10-40}	mg/kg dm	11	(400)	(600)	(2.000)
Cyanide, in total	mg/kg dm	< 0,05		3	10
EOX	mg/kg dm	0,3	1	3	10
Arsenic	mg/kg dm	1,8	15	45	150
Lead	mg/kg dm	3,8	140	210	700
Cadmium	mg/kg dm	< 0,1	1	3,0	10
Chrome	mg/kg dm	4,6	120	180	600
Copper	mg/kg dm	3,9	80	120	400
Nickel	mg/kg dm	4,5	100	150	500
Mercury	mg/kg dm	< 0,1	1	1,5	5,0
Thallium	mg/kg dm	< 0,1	0,7	2,1	7,0
Zinc	mg/kg dm	8,3	300	450	1.500
PCB 28	mg/kg dm	< 0,001			
PCB 52	mg/kg dm	< 0,001			
PCB 101	mg/kg dm	< 0,001			
PCB 138	mg/kg dm	< 0,001			
PCB 153	mg/kg dm	< 0,001			
PCB 180	mg/kg dm	< 0,001			
Sum PCB (6 Kong.)	mg/kg dm	**n.d.**	0,1	0,15	0,5
Naphthaline	mg/kg dm	< 0,001			
Acenaphthylene	mg/kg dm	< 0,001			
Acenaphthene	mg/kg dm	< 0,001			
Fluorene	mg/kg dm	< 0,001			
Phenanthrene	mg/kg dm	0,005			
Anthracene	mg/kg dm	< 0,001			
Fluoranthene	mg/kg dm	0,006			
Pyrene	mg/kg dm	0,003			
Benzo(a)anthracene	mg/kg dm	0,001			
Chrysene	mg/kg dm	0,001			
Benzo(b)fluoranthene	mg/kg dm	0,002			
Benzo(k)fluoranthene	mg/kg dm	< 0,001			
Benzo(a)pyrene	mg/kg dm	< 0,001	0,6	0,9	3
Indeno(1,2,3-cd)pyrene	mg/kg dm	< 0,001			
Dibenzo(a,h)anthracene	mg/kg dm	< 0,001			
Benzo(g,h,i)perylene	mg/kg dm	< 0,001			
Sum PAH (EPA)	mg/kg dm	**0,018**	3	3 (9)	30
C:N-ratio	-	> 25			

[1)] Requirements for the material recycling of mineral waste, Part 2: Technical rules for recycling, 1.2 Soil material (TR Boden), as of: November 5, 2004, revision 00/05-2013, Table II. 1.2-2 + 4
* Assignment values for soil material being used for backfilling excavations below the rooted soil layer.

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Parameters according to LAGA 2004 2/3

Laboratory number		181123	Assignment values for the use of ground-like applications[1)]		
Sample name		**OW4-RAM-014-VC**	Z 0	Z 2	Z 2
Sampling depth		0,0-2,85m			
Parameter	Dimension				
Benzene	mg/kg dm	< 0,01			
Toluene	mg/kg dm	< 0,01			
Ethylbenzene	mg/kg dm	< 0,01			
Xylols	mg/kg dm	< 0,01			
Sum BTEX	mg/kg dm	**n.d.**	1	1	1
Vinylchloride	mg/kg dm	< 0,01			
1,1-Dichloroethene	mg/kg dm	< 0,01			
Dichloromethane	mg/kg dm	< 0,01			
1,2-trans-Dichloroethene	mg/kg dm	< 0,01			
1,1-Dichloroethane	mg/kg dm	< 0,01			
1,2-cis-Dichloroethene	mg/kg dm	< 0,01			
Tetrachloromethane	mg/kg dm	< 0,01			
1,1,1-Trichloroethane	mg/kg dm	< 0,01			
Chloroforme	mg/kg dm	< 0,01			
1,2-Dichloroethane	mg/kg dm	< 0,01			
Trichloroethene	mg/kg dm	< 0,01			
Dibromomethane	mg/kg dm	< 0,01			
Bromodichloromethane	mg/kg dm	< 0,01			
Tetrachloorethene	mg/kg dm	< 0,01			
1,1,2-Trichloroethane	mg/kg dm	< 0,01			
Dibromochloromethane	mg/kg dm	< 0,01			
Tribromomethane	mg/kg dm	< 0,01			
Sum LHKW	mg/kg dm	**n.d.**	1	1	1

[1)] Requirements for the material recycling of mineral waste, Part 2: Technical rules for recycling, 1.2 Soil material (TR Boden), as of: November 5, 2004, revision 00/05-2013, Table II. 1.2-2 + 4

* Assignment values for soil material being used for backfilling excavations below the rooted soil layer.

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Parameters according to LAGA 2004 3/3

Laboratory number		181123	Assignment values for the use of ground-like applications[1)]			
Sample name		**OW4-RAM-014-VC**	Z 0	Z 1.1	Z 1.2	Z 2
Sampling depth		0,0-2,85m				
Parameter	Dimension	10:1 ELUATE				
pH value at 20 °C	-	7,6	6,5-9,5	6,5-9,5	6,0-12	5,5-12
el. conductivity at 25°C	µS/cm	1.050	250	250	1.500	2.000
Phenol index	µg/L	< 10	20	20	40	100
Cyanide, in total	µg/L	< 5	5	5	10	20
Chloride	mg/L	160	30	30	50	100
Sulfate	mg/L	380	20	20	50	200
Arsenic	µg/L	< 2,0	14	14	20	60
Lead	µg/L	< 0,2	40	40	80	200
Cadmium	µg/L	< 0,2	1,5	1,5	3	6
Chrome	µg/L	< 0,3	12,5	12,5	25	60
Copper	µg/L	< 2,0	20	20	60	100
Nickel	µg/L	< 1,0	15	15	20	70
Mercury	µg/L	< 0,1	< 0,5	< 0,5	1	2
Zinc	µg/L	< 2,0	150	150	200	600

[1)] Requirements for the material recycling of mineral waste, Part 2: Technical rules for recycling, 1.2 Soil material (TR Boden), as of: November 5, 2004, revision 00/05-2013, Table II. 1.2-2 + 4

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Parameters according to Ersatzbaustoffverordnung 1/2

Laboratory number		181123	Material values for soil- and dredged material[2)]				
Sample name		**OW4-RAM-014-VC**	BM-0* BG-0*	BM-F0* BG-F0*	BM-F1 BG-F1	BM-F2 BG-F2	BM-F3 BG-F3
Sampling depth		0,0-2,85m					
Parameter	Dimension						
Dry matter	%	71,3					
TOC	%	1,1	1	5	5	5	5
Hydrocarbons, n-C_{10-22}	mg/kg dm	< 5	300	300	300	300	1.000
Hydrocarbons, n-C_{10-40}	mg/kg dm	11	600	600	600	600	2.000
EOX	mg/kg dm	0,3	1				
Arsenic	mg/kg dm	1,8	20	40	40	40	150
Lead	mg/kg dm	3,8	140	140	140	140	700
Cadmium	mg/kg dm	< 0,1	1	2	2	2	10
Chrome	mg/kg dm	4,6	120	120	120	120	600
Copper	mg/kg dm	3,9	80	80	80	80	320
Nickel	mg/kg dm	4,5	100	100	100	100	350
Mercury	mg/kg dm	< 0,1	0,6	0,6	0,6	0,6	5
Thallium	mg/kg dm	< 0,1	1,0	2	2	2	7
Zinc	mg/kg dm	8,3	300	300	300	300	1.200
PCB 28	mg/kg dm	< 0,001					
PCB 52	mg/kg dm	< 0,001					
PCB 101	mg/kg dm	< 0,001					
PCB 118	mg/kg dm	< 0,001					
PCB 138	mg/kg dm	< 0,001					
PCB 153	mg/kg dm	< 0,001					
PCB 180	mg/kg dm	< 0,001					
Sum PCB (7 Kong.)	mg/kg dm	**n.d.**	0,1				
Naphthaline	mg/kg dm	< 0,001					
Acenaphthylene	mg/kg dm	< 0,001					
Acenaphthene	mg/kg dm	< 0,001					
Fluorene	mg/kg dm	< 0,001					
Phenanthrene	mg/kg dm	0,005					
Anthracene	mg/kg dm	< 0,001					
Fluoranthene	mg/kg dm	0,006					
Pyrene	mg/kg dm	0,003					
Benzo(a)anthracene	mg/kg dm	0,001					
Chrysene	mg/kg dm	0,001					
Benzo(b)fluoranthene	mg/kg dm	0,002					
Benzo(k)fluoranthene	mg/kg dm	< 0,001					
Benzo(a)pyrene	mg/kg dm	< 0,001					
Indeno(1,2,3-cd)pyrene	mg/kg dm	< 0,001					
Dibenzo(a,h)anthracene	mg/kg dm	< 0,001					
Benzo(g,h,i)perylene	mg/kg dm	< 0,001					
Sum PAH (EPA)	mg/kg dm	**0,018**	6	6	6	9	30

[2)] Regulation for the introduction of a replacement building materials regulation, for a new version of the Bundes-Bodenschutz- and Altlastenverordnung and for modification of the Landfill Ordinance and Commercial Waste Ordinance, as of: July 9, 2021, Appendix 1 Table 3

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Parameters according to Ersatzbaustoffverordnung 2/2

Laboratory number		181123	Material values for soil- and dredged material[2)]				
Sample name		**OW4-RAM-014-VC**	BM-0* BG-0*	BM-F0* BG-F0*	BM-F1 BG-F1	BM-F2 BG-F2	BM-F3 BG-F3
Sampling depth		0,0-2,85m					
Parameter	Dimension	2:1 ELUATE					
pH value at 20 °C	-	7,8	6,5-9,5	6,5-9,5	6,5-9,5	6,5-9,5	5,5-12,0
el. conductivity at 25°C	µS/cm	2.180	350	350	500	500	2.000
Sulfate	mg/L	620	250	250	450	450	1.000
Arsenic	µg/L	< 2,0	8	12	20	85	100
Lead	µg/L	< 0,2	23	35	90	250	470
Cadmium	µg/L	< 0,2	2	3,0	3,0	10	15
Chrome	µg/L	< 0,3	10	15	150	290	530
Copper	µg/L	< 2,0	20	30	110	170	320
Nickel	µg/L	< 1,0	20	30	30	150	280
Mercury	µg/L	< 0,1	0,1				
Thallium	µg/L	< 0,2	0,2				
Zinc	µg/L	7,3	100	150	160	840	1.600
PCB 28	µg/L	< 0,01					
PCB 52	µg/L	< 0,01					
PCB 101	µg/L	< 0,01					
PCB 118	µg/L	< 0,01					
PCB 138	µg/L	< 0,01					
PCB 153	µg/L	< 0,01					
PCB 180	µg/L	< 0,01					
Sum PCB (7 Kong.)	µg/L	**n.d.**	0,01				
Acenaphthylene	µg/L	< 0,1					
Acenaphthene	µg/L	< 0,1					
Fluorene	µg/L	< 0,1					
Phenanthrene	µg/L	< 0,1					
Anthracene	µg/L	< 0,1					
Fluoranthene	µg/L	< 0,01					
Pyrene	µg/L	< 0,05					
Benzo(a)anthracene	µg/L	< 0,05					
Chrysene	µg/L	< 0,05					
Benzo(b)fluoranthene	µg/L	< 0,01					
Benzo(k)fluoranthene	µg/L	< 0,01					
Benzo(a)pyrene	µg/L	< 0,01					
Indeno(1,2,3-cd)pyrene	µg/L	< 0,01					
Dibenzo(a,h)anthracene	µg/L	< 0,01					
Benzo(g,h,i)perylene	µg/L	< 0,01					
Sum PAH without naphthaline	µg/L	**n.d.**	0,2	0,3	1,5	3,8	20
Naphthaline and Methylnaphthaline, in total	µg/L	< 0,1	2				

[2)] Regulation for the introduction of a replacement building materials regulation, for a new version of the Bundes-Bodenschutz- and Altlastenverordnung and for modification of the Landfill Ordinance and Commercial Waste Ordinance, as of: July 9, 2021, Appendix 1 Table 3

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Parameters according to GÜBAK 1/3

Laboratory number		181123	Baltic Sea guideline values[3)]	
Sample name		**OW4-RAM-014-VC**	R1	R2
Sampling depth		0,0-2,85m		
Parameter	Dimension	whole fraction		
Dry matter	%	71,3		
TOC	%	1,1		
Phosphorous, in total	mg/kg dm	280	500	500
Nitrogen, in total	mg/kg dm	160	1.500	1.500
Monobutyltin^{+++}	µg/kg dm	< 1		
Dibutyltin^{++}	µg/kg dm	< 1		
Tributyltin^{+}	µg/kg dm	< 1	20	300
Tetrabutyltin	µg/kg dm	< 1		
Triphenyltin^{+}	µg/kg dm	< 1		
Sum TBT	µg/kg dm	**n.d.**		
Grain size fraction [> 63 µm]	%	84,3		
Grain size fraction [< 63 µm]	%	15,7		
Grain size fraction [< 20 µm]	%	5,2		
Density	g/cm³	1,7		

[3)] Common transitional provision for the handling of dredged material in coastal waters, as of: August 2009, Table 1

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Parameters according to GÜBAK 2/3

Laboratory number		181123	Baltic Sea guideline values[3)]	
Sample name		**OW4-RAM-014-VC**	R1	R2
Sampling depth		0,0-2,85m		
Parameter	Dimension	< 63 µm fraction		
Hydrocarbons, n-C_{10-22}	mg/kg dm	6		
Hydrocarbons, n-C_{10-40}	mg/kg dm	38	250	750
Hexachlorobenzene	µg/kg dm	< 1	2	6
Pentachlorobenzene	µg/kg dm	< 1		
α-HCH	µg/kg dm	< 1	1	3
γ- HCH	µg/kg dm	< 1	6	18
p,p´-DDE	µg/kg dm	< 1	8	24
p,p´-DDD	µg/kg dm	< 1	7	21
p,p´-DDT	µg/kg dm	< 1	7	21
PCB 28	µg/kg dm	< 1		
PCB 52	µg/kg dm	< 1		
PCB 101	µg/kg dm	< 1		
PCB 118	µg/kg dm	< 1		
PCB 138	µg/kg dm	< 1		
PCB 153	µg/kg dm	< 1		
PCB 180	µg/kg dm	< 1		
Sum PCB (7 Kong.)	µg/kg dm	**n.d.**	40	120
Naphthaline	mg/kg dm	0,003		
Acenaphthylene	mg/kg dm	0,002		
Acenaphthene	mg/kg dm	0,001		
Fluorene	mg/kg dm	0,003		
Phenanthrene	mg/kg dm	0,018		
Anthracene	mg/kg dm	0,003		
Fluoranthene	mg/kg dm	0,020		
Pyrene	mg/kg dm	0,010		
Benzo(a)anthracene	mg/kg dm	0,004		
Chrysene	mg/kg dm	0,004		
Benzo(b)fluoranthene	mg/kg dm	0,007		
Benzo(k)fluoranthene	mg/kg dm	0,002		
Benzo(a)pyrene	mg/kg dm	0,001		
Indeno(1,2,3-cd)pyrene	mg/kg dm	0,002		
Dibenzo(a,h)anthracene	mg/kg dm	< 0,001		
Benzo(g,h,i)perylene	mg/kg dm	0,003		
Sum PAH (EPA)	mg/kg dm	**0,083**	3	9

[3)] Common transitional provision for the handling of dredged material in coastal waters, as of: August 2009, Table 1

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Parameters according to GÜBAK 3/3

Laboratory number		181123	Baltic Sea guideline values[3)]	
Sample name		**OW4-RAM-014-VC**	R1	R2
Sampling depth		0,0-2,85m		
Parameter	Dimension	< 20 µm fraction		
Arsenic	mg/kg dm	7,5	20	60
Lead	mg/kg dm	19	100	300
Cadmium	mg/kg dm	0,3	2	6
Chrome	mg/kg dm	19	90	270
Copper	mg/kg dm	19	70	210
Nickel	mg/kg dm	20	70	210
Mercury	mg/kg dm	< 0,1	0,4	1,2
Zinc	mg/kg dm	44	250	750

Laboratory number		181123	Baltic Sea guideline values[3)]	
Sample name		**OW4-RAM-014-VC**	R1	R2
Sampling depth		0,0-2,85m		
Parameter	Dimension	10:1 ELUATE		
Phosphorous, in total	mg/L	< 0,050	2	2
Nitrogen, in total	mg/L	1,6	6	6

[3)] Common transitional provision for the handling of dredged material in coastal waters, as of: August 2009, Table 1

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