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Inventory of Odour Emissions at German Wastewater Treatment Plants

Univ.-Prof. Dr.-Ing. F.-B. Frechen

Environmental Odour Management

International Conference
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Kurt-Wolters-Str. 3
34125 Kassel

frechen@uni-kassel.de
www.uni-kassel.de

Department of Sanitary & Environmental Engineering
Head: Univ.-Prof. Dr.-Ing. F.-B.Frechen

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Content of the presentation

- Sampling at wastewater treatment plants (wwtps)
- Emissions inventory: Odour flow rates OFR at German wastewater treatment plants

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Sampling: active point source

	measurable airflow	
	present	not present
Size of point source area	active point source	

At active point sources sampling is easy (once they are detected).

Leakages in air mains/ducts etc. are typical examples for this kind of source.

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Sampling: active point source

Sampling raw gas from a pressure main leading to a biofilter – determination of biofilter load.

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Sampling : active area source

		measurable airflow	
		present	not present
Size of source	point	active point source	
	area	active area source	

With active area sources it is necessary to sample without any influence from ambient air, thus to collect only air that comes through the source surface. Odour flow rate OFR is calculated by multiplying emitted airflow and odour concentration and specific OFR can be calculated by dividing OFR by the total area of the source.

Biofilters, aeration tanks etc. are typical examples for this kind of source

Sampling: active area source

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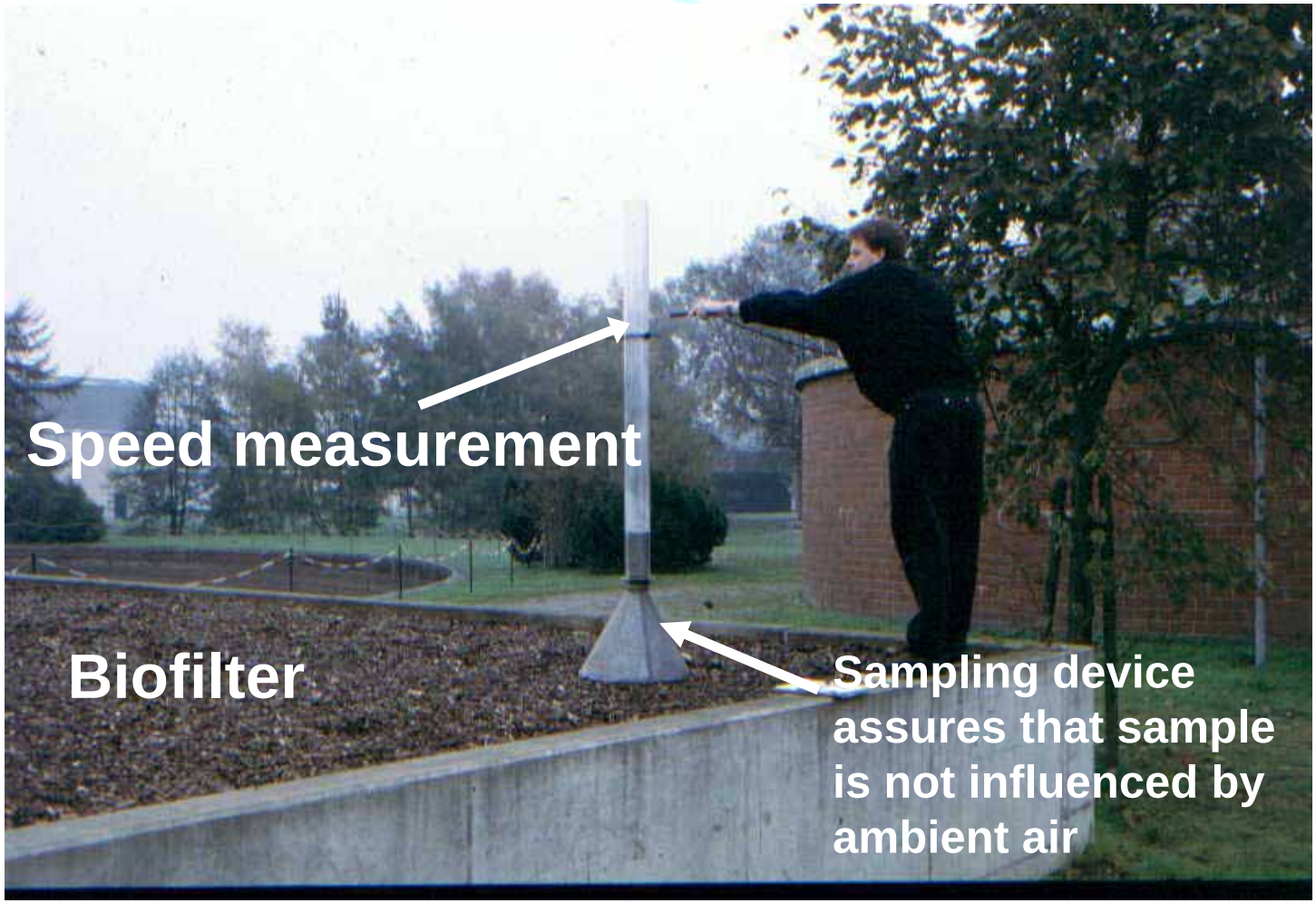
Sampling: active area source



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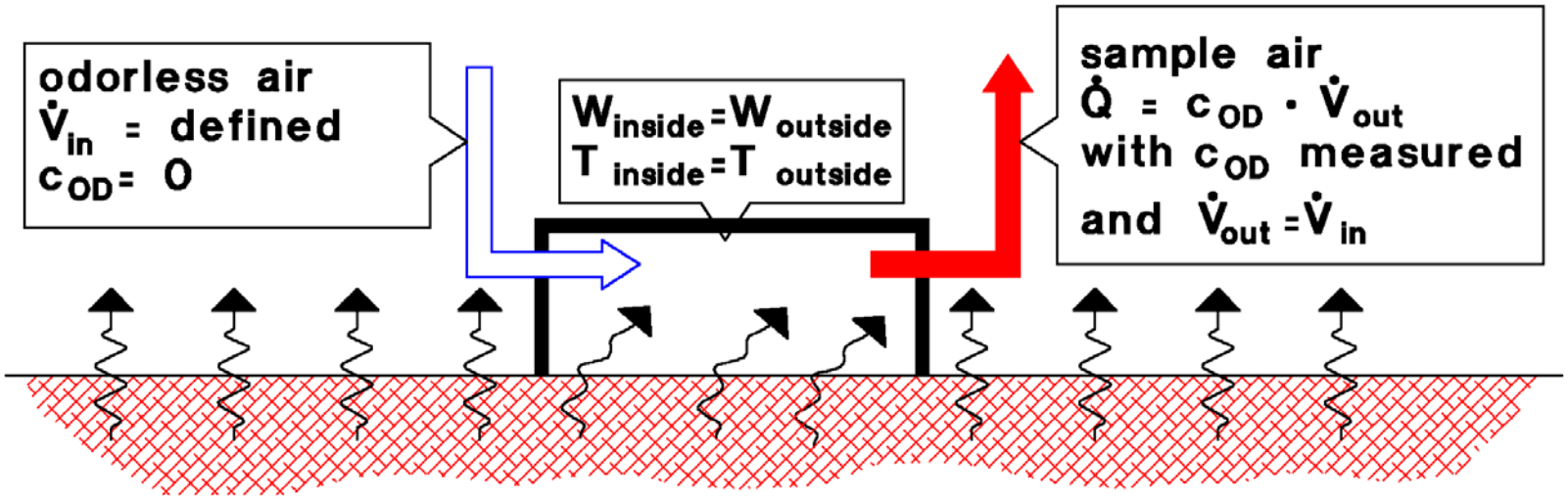
Sampling: passive area source

		measurable airflow	
		present	not present
Size of source	point	active point source	passive point source
	area	active area source	passive area source

Passive area sources pose the most problems on sampling. Obviously, an odour is emitted, but no outward airflow can be measured. hood methods are necessary, see paper on "Aerodynamic Performance of a low speed wind tunnel".

Thickeners, sludge, denitrification tanks, sedimen-tation tanks, landfill surfaces etc. are typical examples for this kind of source.

Sampling on passive area sources



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Sampling

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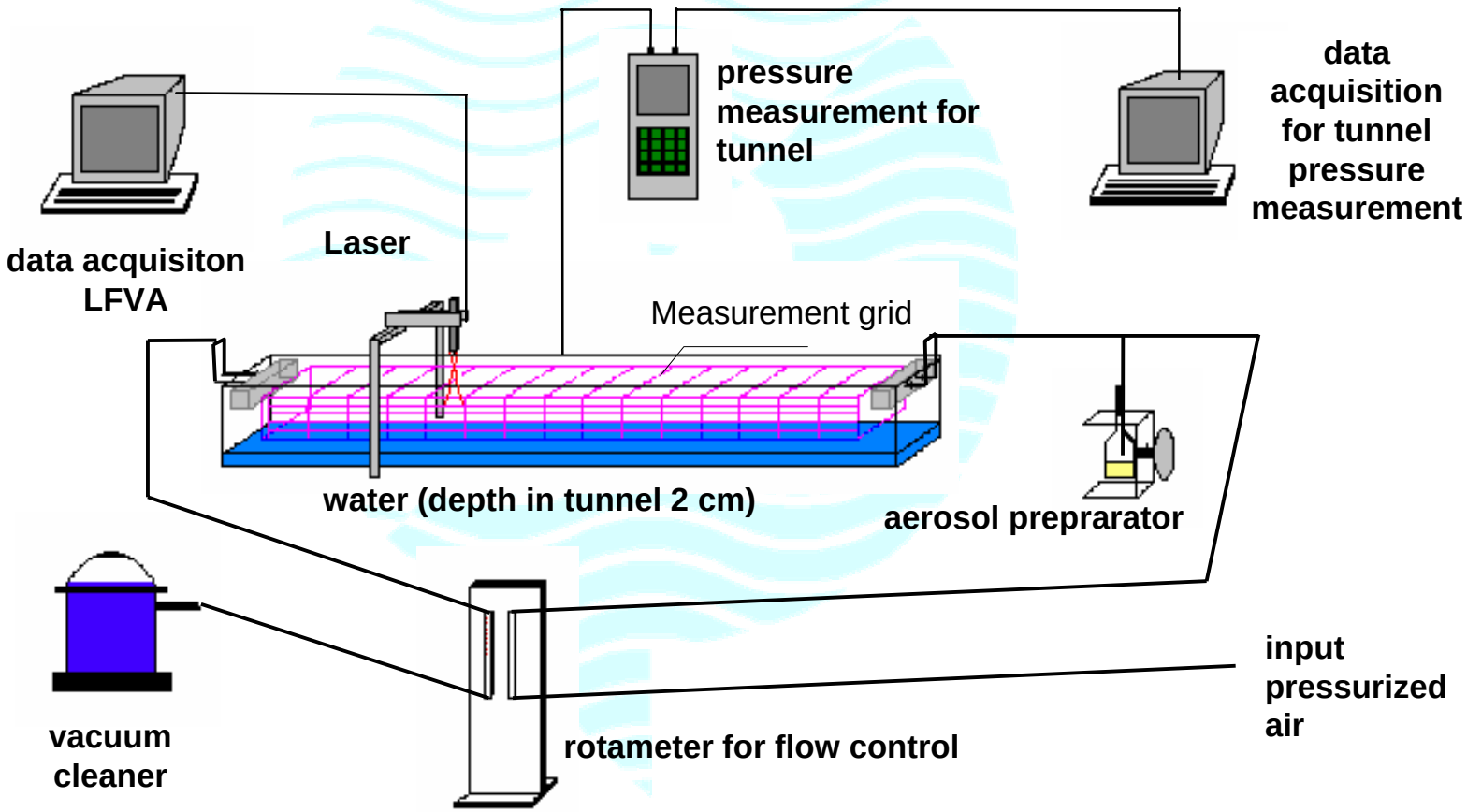
Low Speed Wind Tunnel: airflow speed measurement



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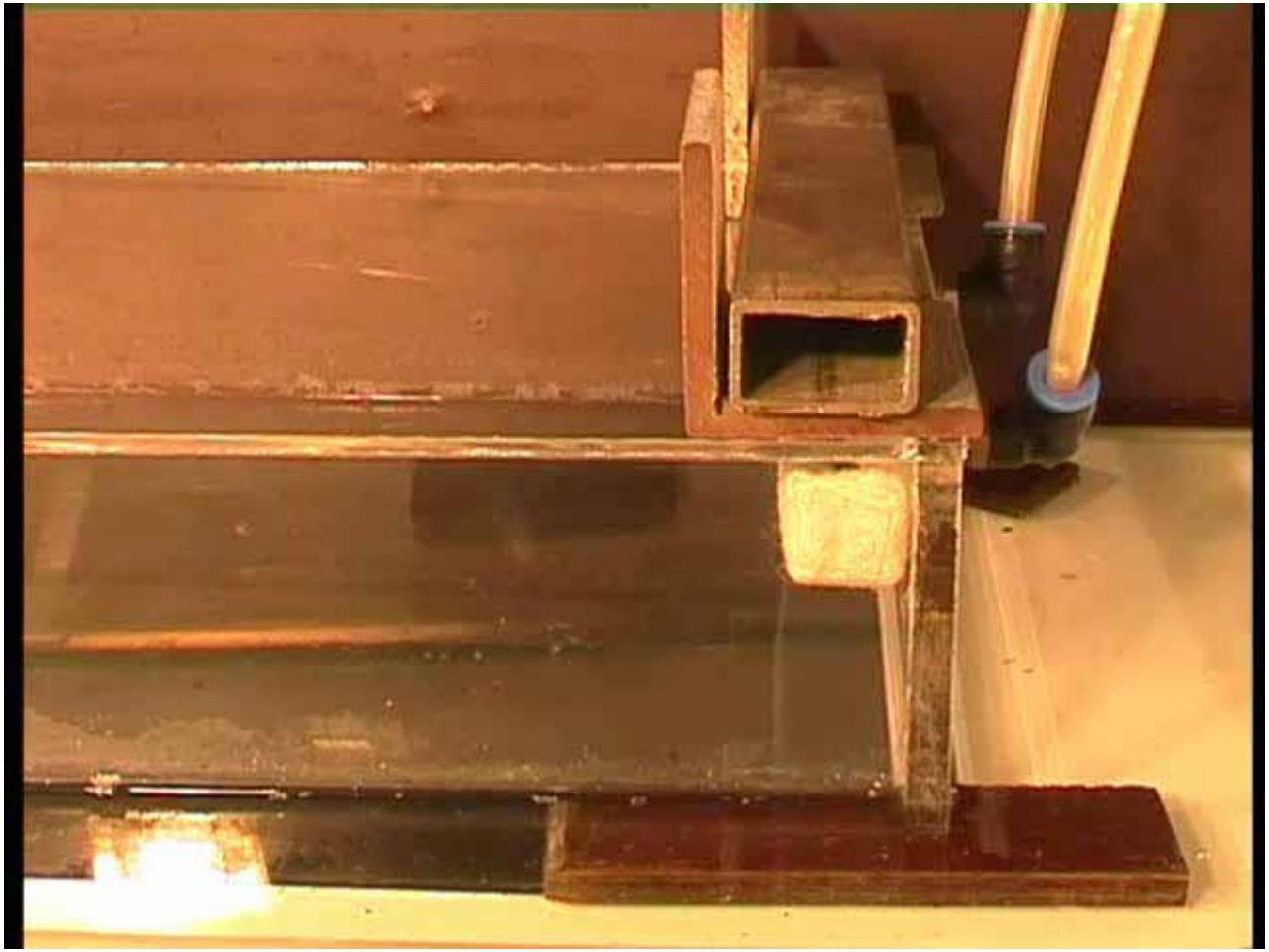
LSWT: airflow speed measurement



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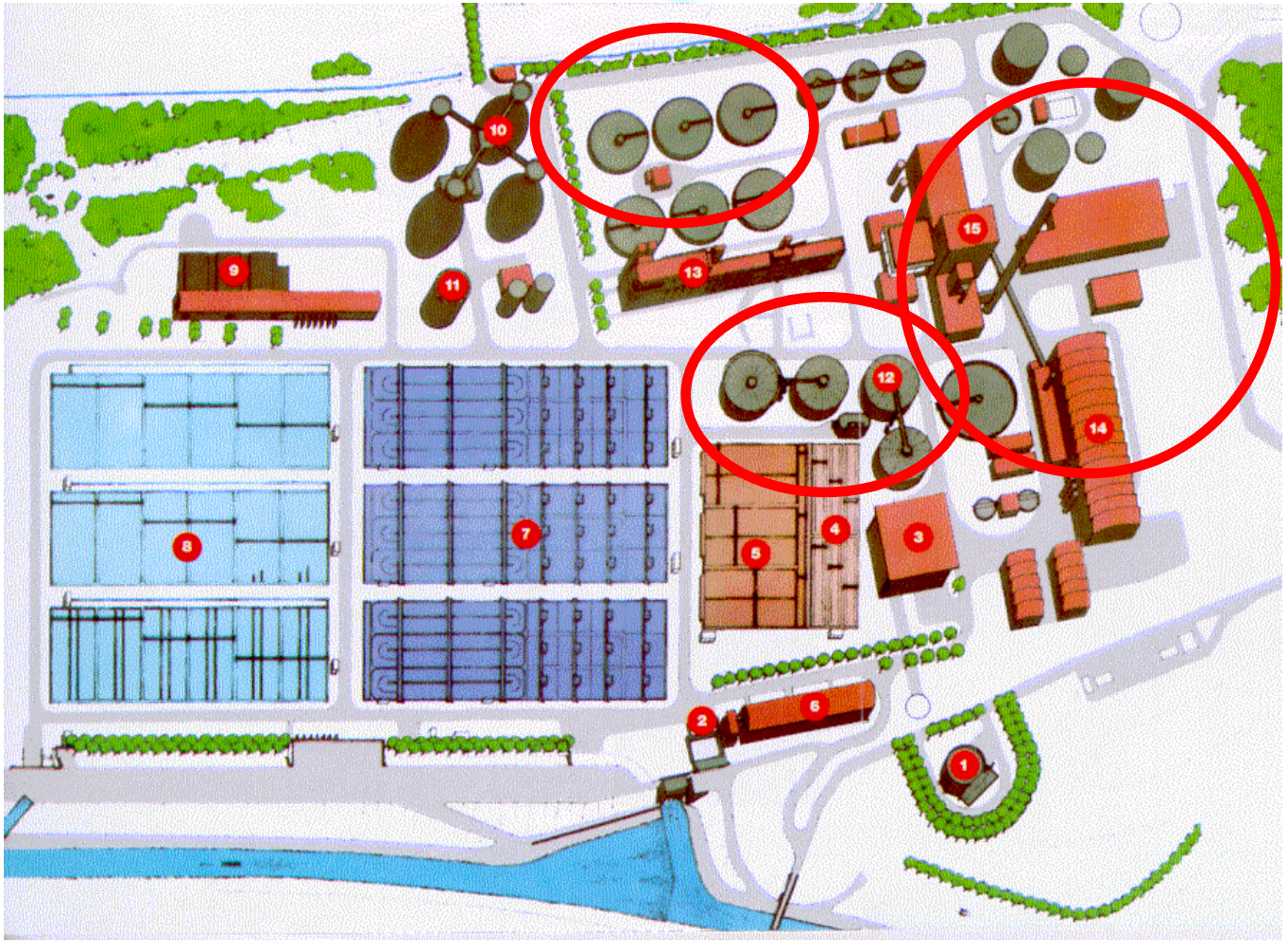
Odour sources at wwtps



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Screenings (passive)

Odour sources at wwtps

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Aeration tanks active/passive

Odour sources at wwtps

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Final sedimentation tanks (?) (passive)

Odour sources at wwtps

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Sludge dewatering (building)

Odour sources at wwtps

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Sludge Thickener (passive)

Odour sources at wwtps

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Sludge Thickener (covered)

Odour sources at wwtps

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Corrosion (due to covering – H_2S etc. ...)

Odour sources at wwtps

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Odour Flow Rates OFR

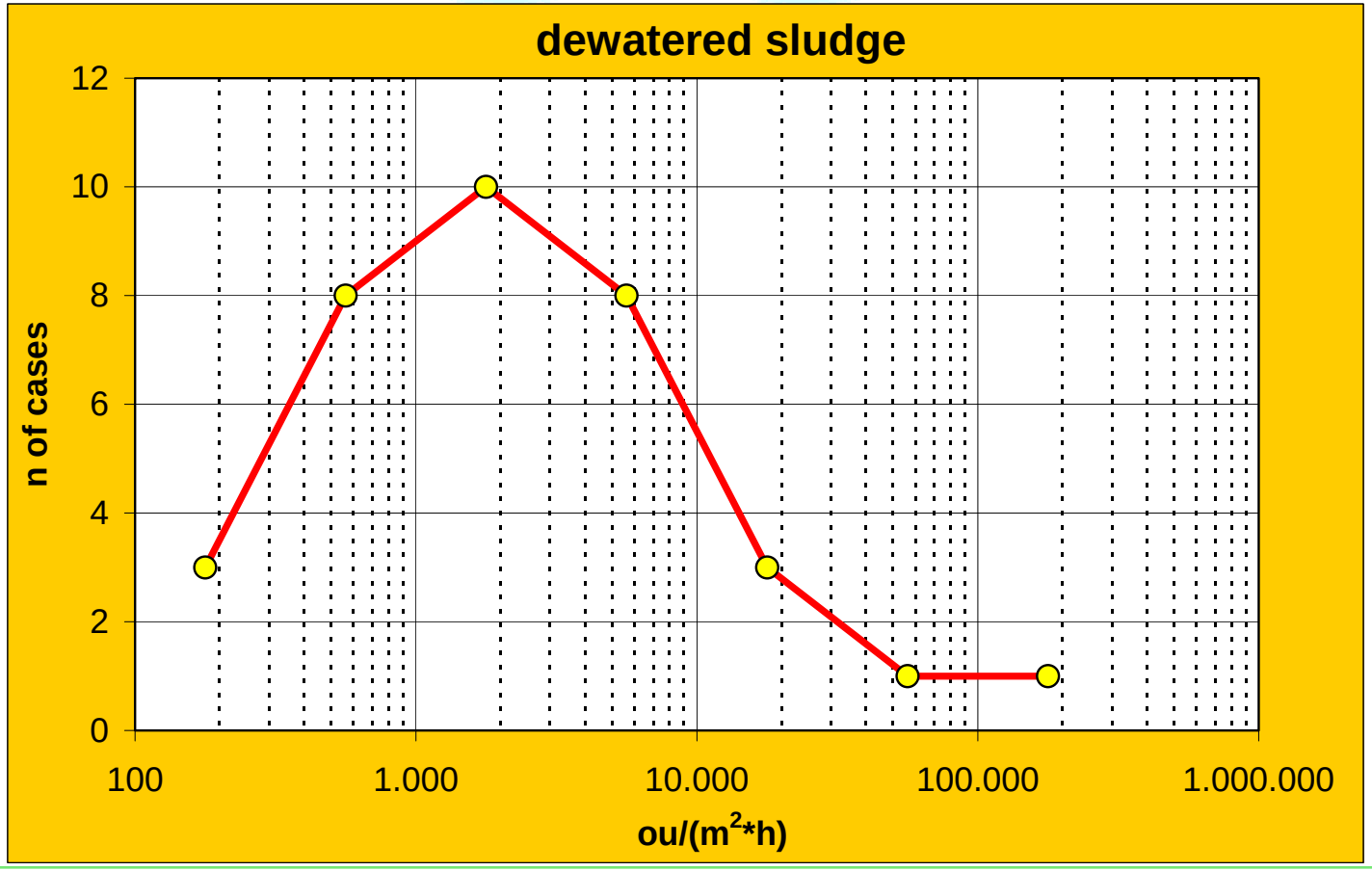
Part of wwtp	low*1 ou/(m²*h)	**average*2 ou/(m²*h)**	high*1 ou/(m²*h)	maximum ou/(m²*h)	Number of values	Number of wwtp's
Influent	357	**1,400**	5,577	46,636	30	9
Screenings	828	**5,200**	32,669	331,636	13	6
Aerated grit chamber	403	**3,200**	24,902	730,485	40	12
Sand from grit chamber	585	**1,100**	2,019	3,938	11	5
Primary sed.: surface	401	**2,300**	12,903	393,818	38	10
Primary sed.: weir	1,258	**7,700**	47,386	73,582	22	7
Intermediate sed. (surface)	1,158	**4,600**	17,962	114,000	27	5
Equalisation tank	4,740	**10,000**	22,693	26,154	4	1
Stormwater tank	110	**450**	1,826	1,347	3	2

Odour Flow Rates OFR

Part of wwtp	low*1 ou/(m²*h)	**average*2 ou/(m²*h)**	high*1 ou/(m²*h)	maximum ou/(m²*h)	Number of values	Number of wwtp's
Anaerobic tank (bio-p-removal)	522	**1,500**	4,305	22,659	18	5
Pre-acidification tank	37,506	**48,000**	61,429	60,812	4	1
Anoxic tank (denitrification)	301	**730**	1,774	14,509	47	13
Aerobic tank (nitrification)	121	**510**	2,113	65,095	30	13
Final sed. (surface)	330	**650**	1,295	5,804	44	13
Filtration	148	**500**	1,680	4,871	10	4
Primary sludge thickener	897	**6,700**	50,566	238,364	13	4
Secondary sludge thickener	521	**1,500**	4,538	12,436	17	7
dewatered sludge	529	**2,500**	11,516	104,276	34	14

*1 – delog of log (average minus / average plus standard deviation)
*2 – geometric mean (arithmetic mean of log), two significant numbers

Results of odour emission measurements – area-related OFR



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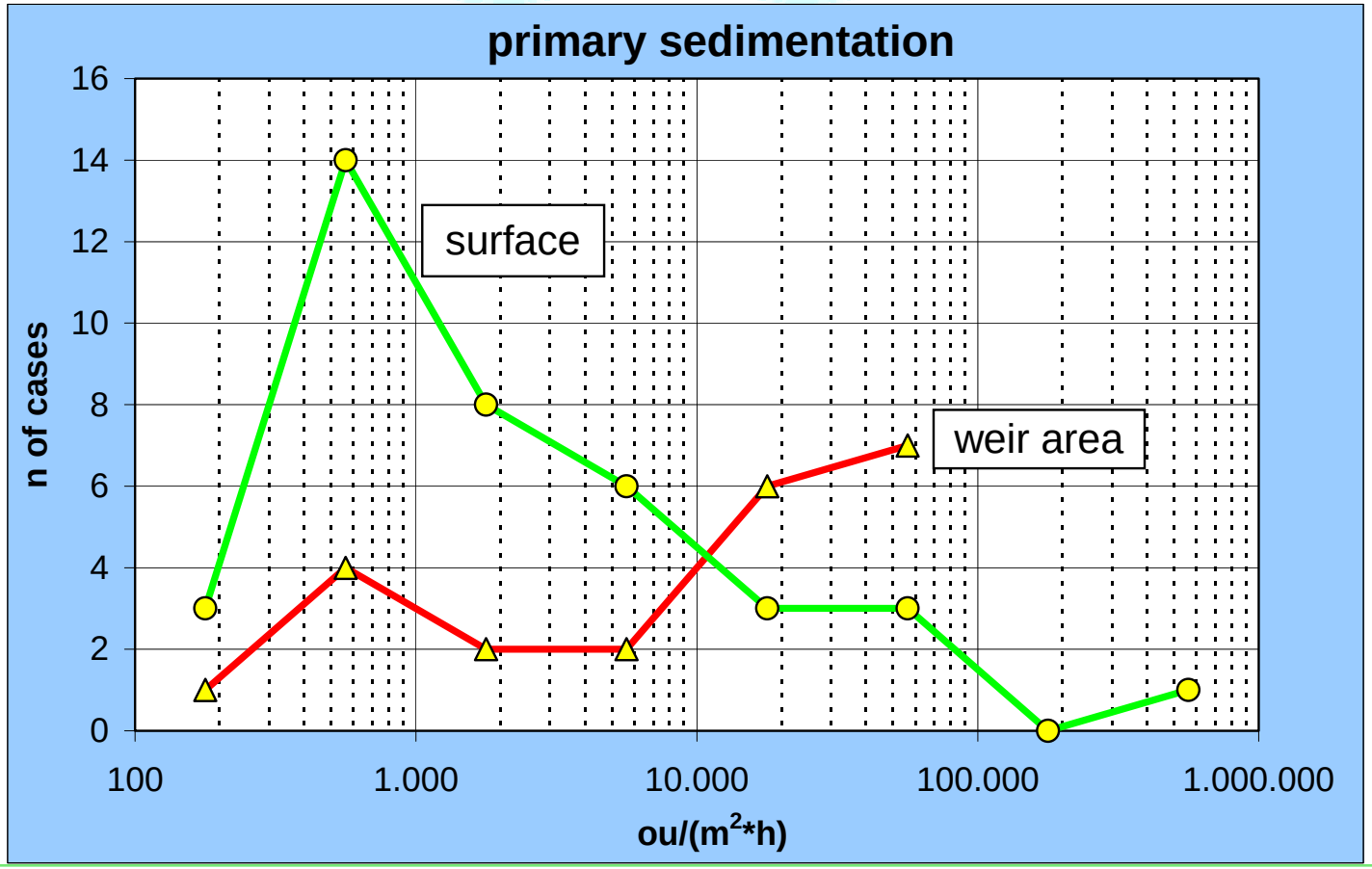

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As this presentation is not included in the VDI book, it can be downloaded at the beginning of December from

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Thank you and „Auf wiedersehen“

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