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Inventory of Odour Emissions at German Wastewater Treatment Plants

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Environmental Odour Management

International Conference

Cologne, 17th – 19th November 2004

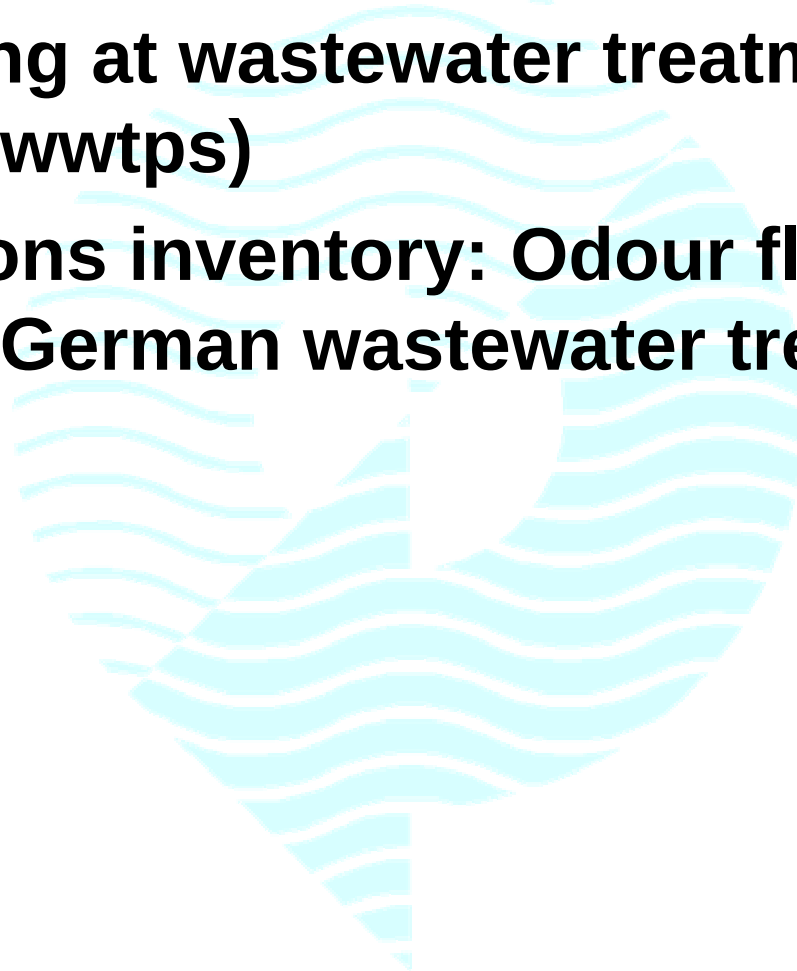
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Content of the presentation

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



Sampling: active point source

		measurable airflow	
		present	not present
Size of source	point 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.

Sampling: active point source

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



Sampling : active area source

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

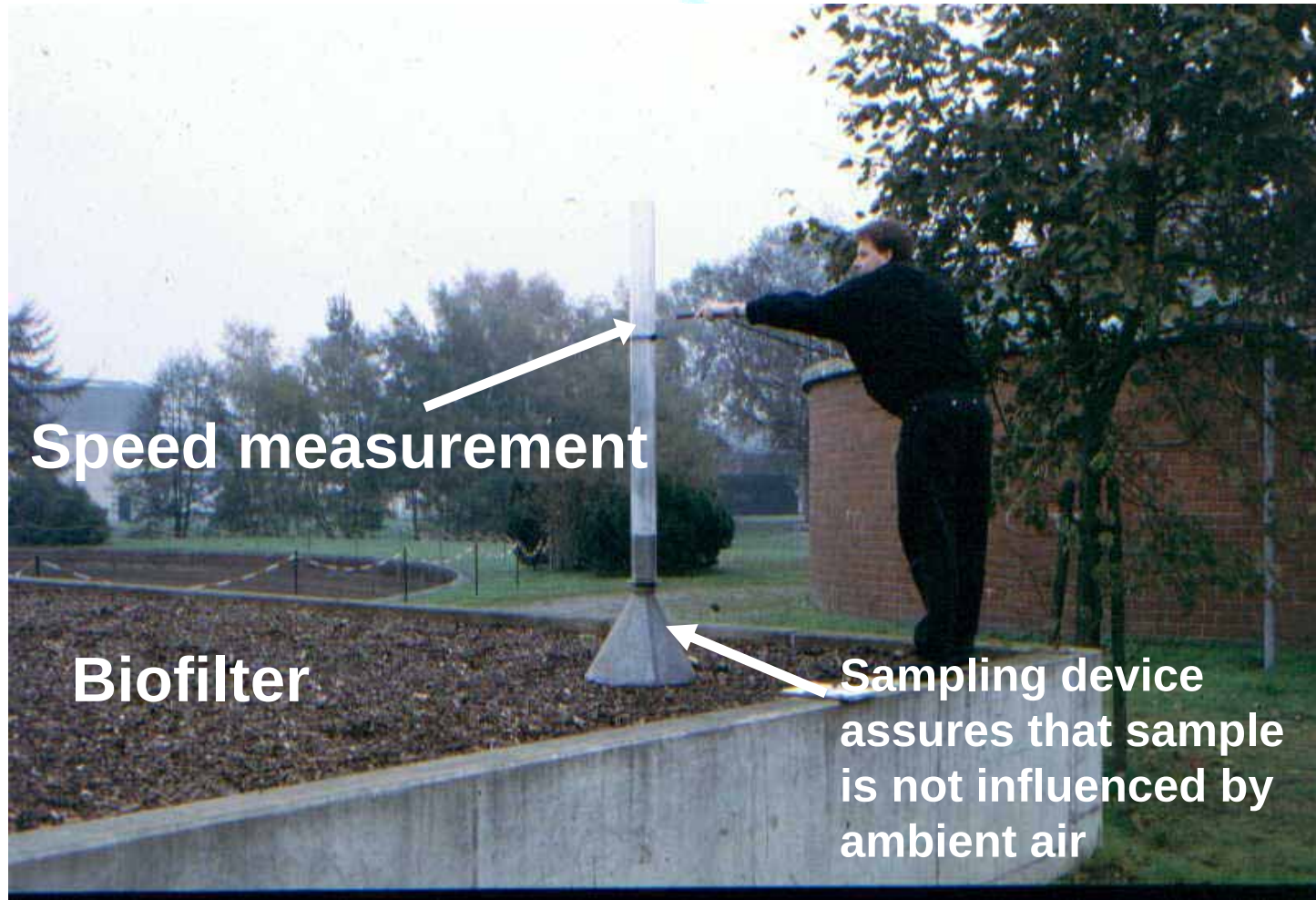
With active area sources it is necessary to sample without any influence from ambient air, thus to collect only air that comes through the source surface. Odour flow rate OFR is calculated by multiplying emitted airflow and odour concentration and specific OFR can be calculated by dividing OFR by the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

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

Sampling: active area source



Sampling: active area source



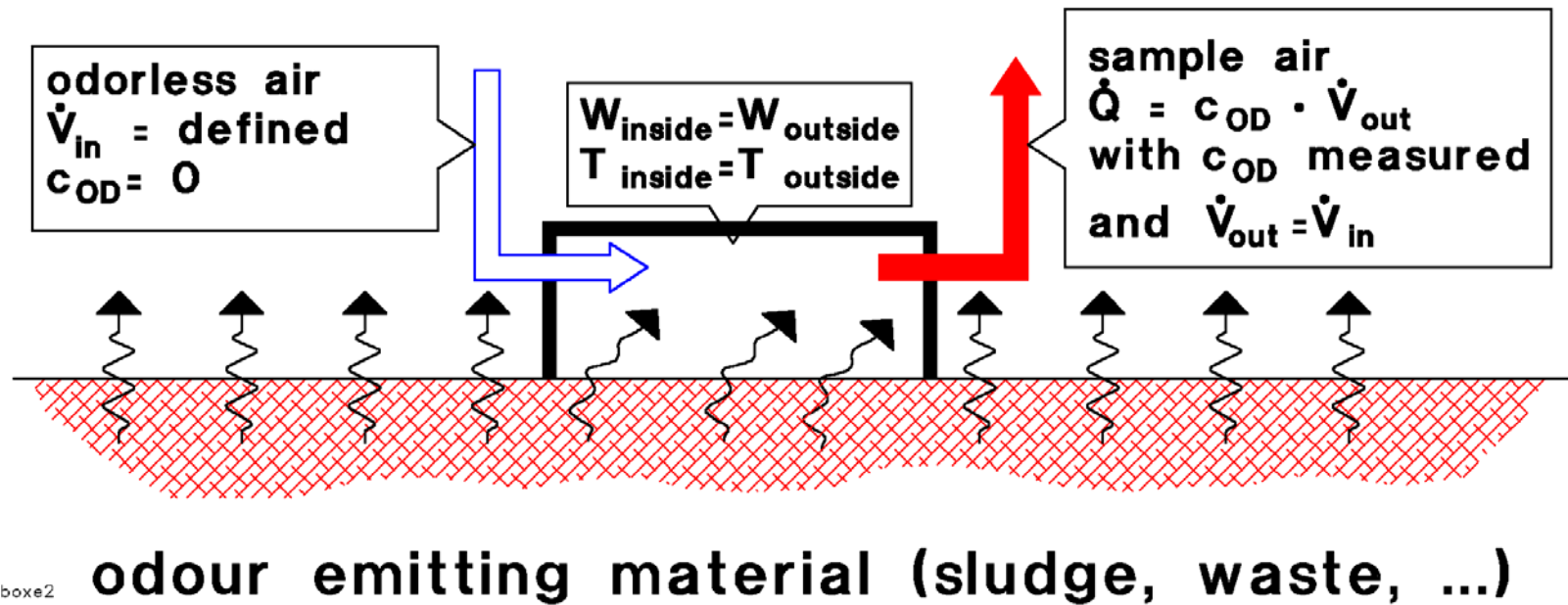
Sampling: passive area source

		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, sedimentation tanks, landfill surfaces etc. are typical examples for this kind of source.

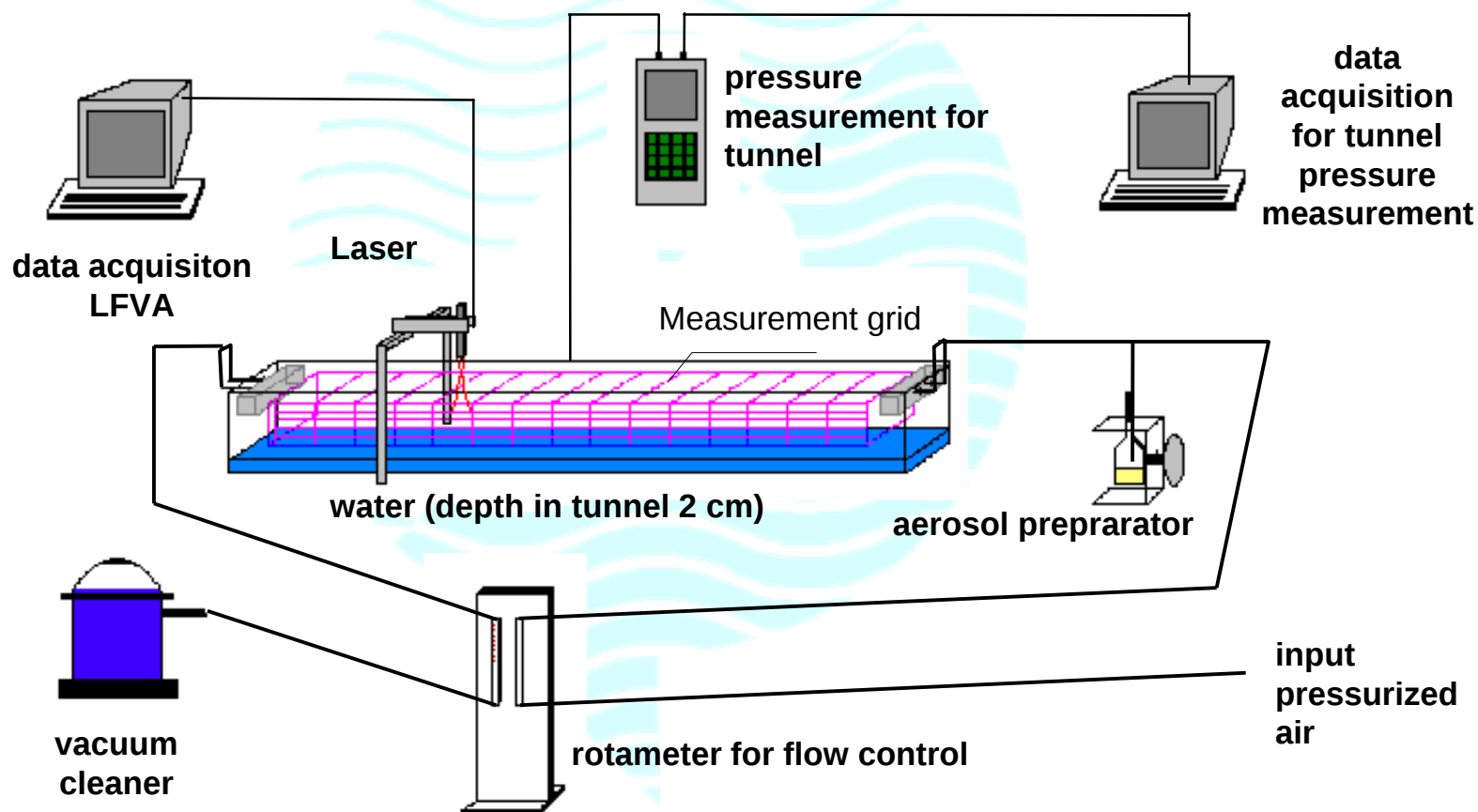
Sampling on passive area sources



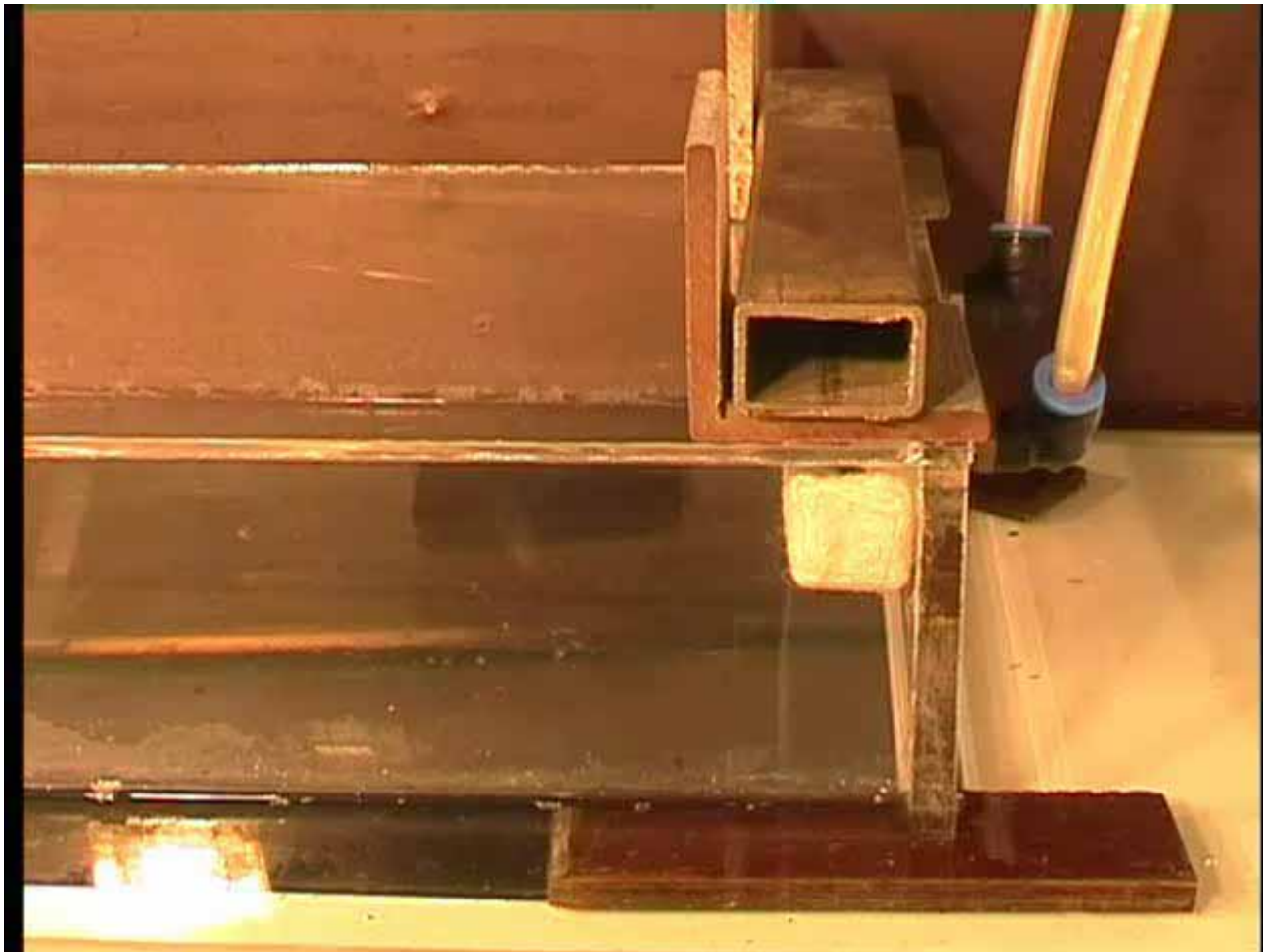
Sampling



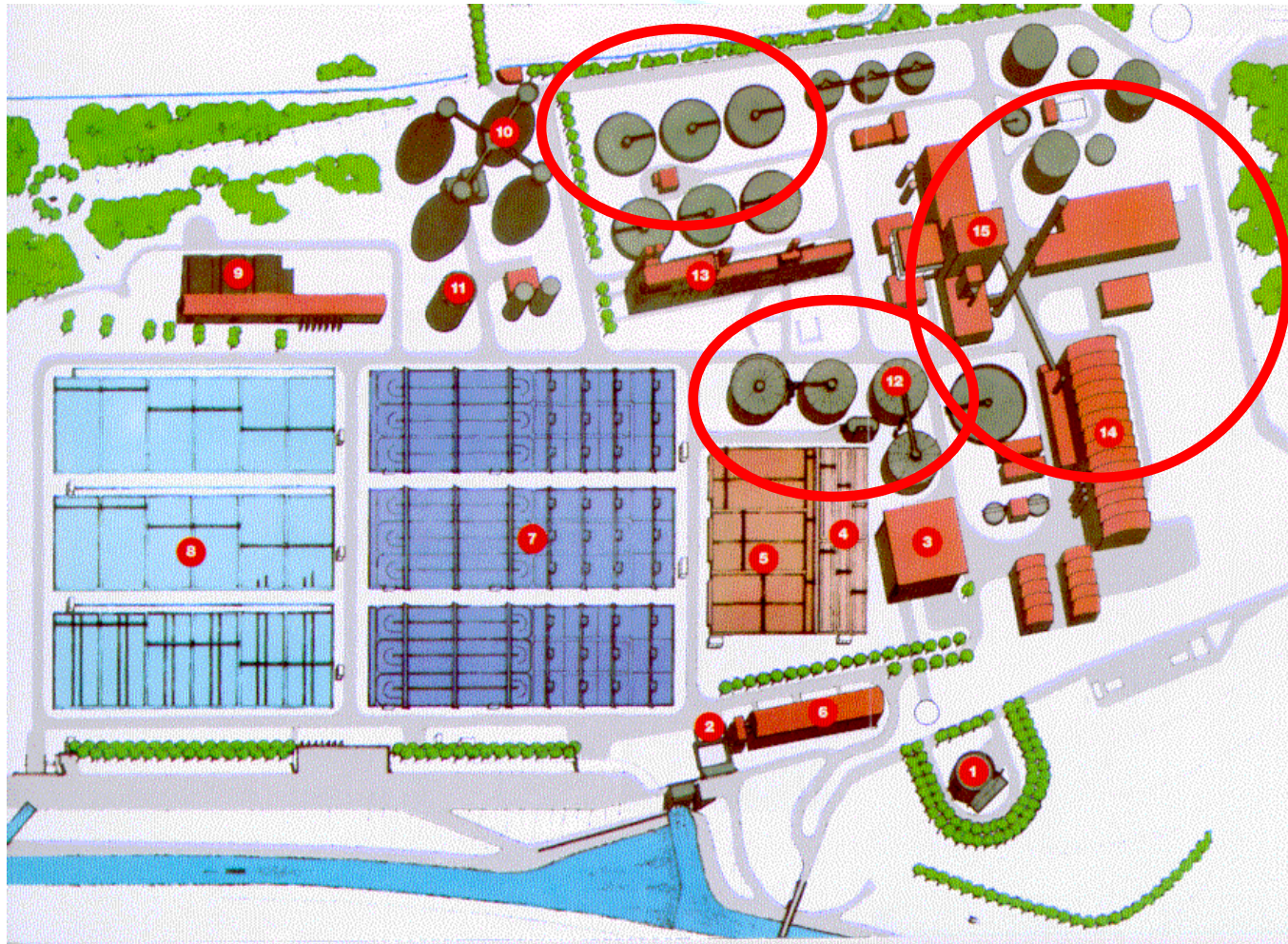
Low Speed Wind Tunnel: airflow speed measurement



LSWT: airflow speed measurement



Odour sources at wwtps



Screenings (passive)

**Odour
sources
at
wwtps**



**Aeration tanks
active/passive**

**Odour
sources
at
wwtps**



Final sedimentation tanks (?) (passive)

**Odour
sources
at
wwtps**



Sludge dewatering (building)

**Odour
sources
at
wwtps**



Sludge Thickener (passive)

**Odour
sources
at
wwtps**



Sludge Thickener (covered)

**Odour
sources
at
wwtps**



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

**Odour
sources
at
wwtps**



Odour Flow Rates OFR

Part of wwtp	low ^{*1} ou/(m ² *h)	average ^{*2} ou/(m ² *h)	high ^{*1} ou/(m ² *h)	maximum ou/(m ² *h)	Number of values 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



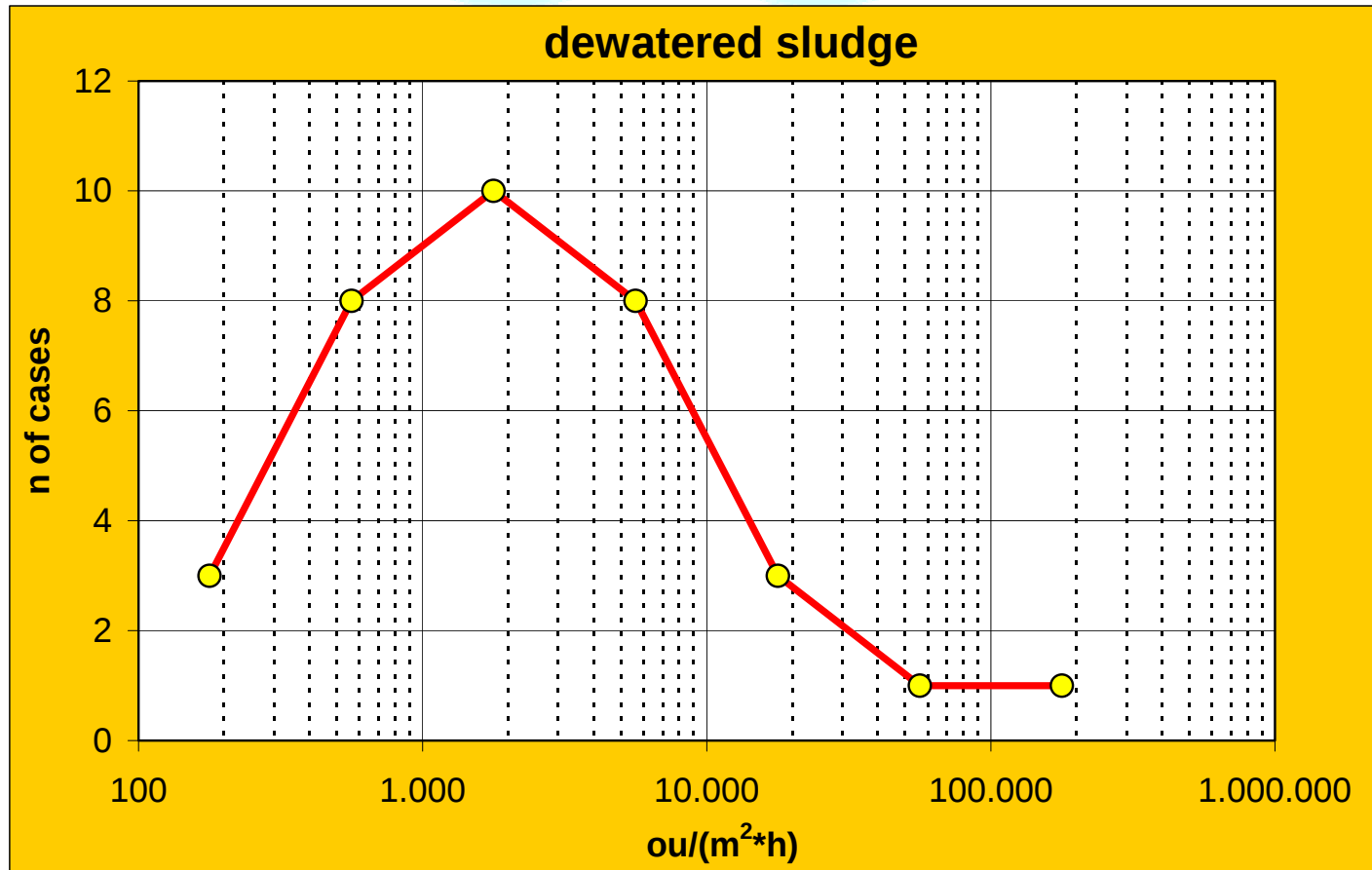
Odour Flow Rates OFR

Part of wwtp	low ^{*1} ou/(m ² *h)	average ^{*2} ou/(m ² *h)	high ^{*1} ou/(m ² *h)	maximum ou/(m ² *h)	Number of values 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

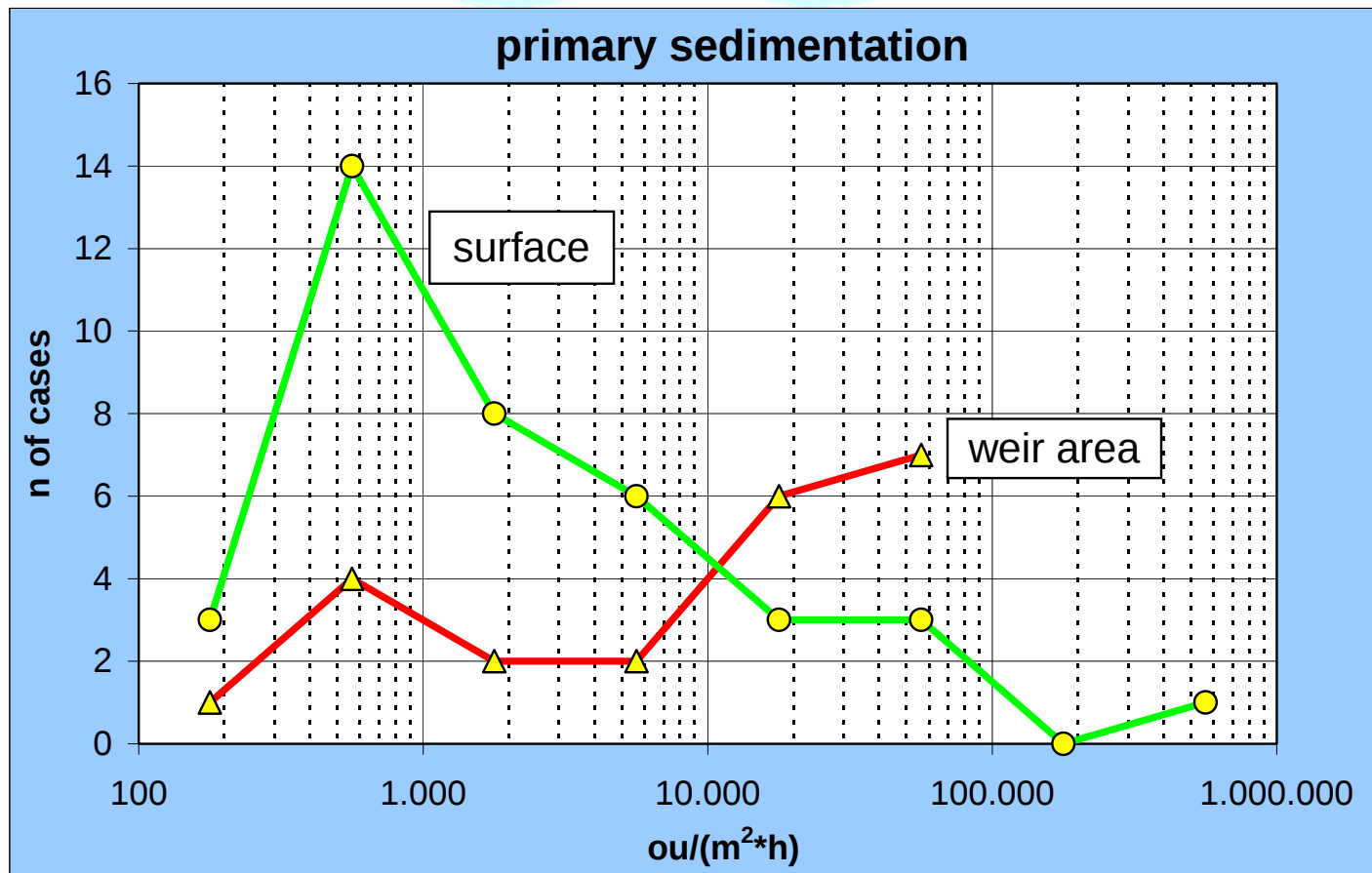
*1 – delog of log (average minus / average plus standard deviation)

*2 – geometric mean (arithmetic mean of log), two significant numbers

Results of odour emission measurements – area-related OFR



Results of odour emission measurements – area-related OFR



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

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Department of Sanitary & Environmental Engineering

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Thank you and „Auf wiedersehen“

