

# Draft paper on calculating emissions from UWWTPs

**Objective:** help MS to improve quantification of priority substance emissions from UWWTPs

**Result:** average UWWTP effluent concentrations for selected substances

- Background: literature check
- Approach: monitored effluent concentrations (median) of single studies were used to derive an average median concentration

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## Annex 1

### Statistical values of EQS Directive substances frequently found in UWWTP effluents

Parameter	Median (µg/l)	Mean (µg/l)	Min—Max (µg/l)	Emission factor (mg/p.e.)	Comments	References
<b>Category A substances (see chapter 3), page 5 in this document</b>						
<b>Lead, and its compounds</b> (EQS: 1.2 µg/l (bioavailable fraction))	0.14	0.18	0.05—7	11.6	49-UWWTP, n=1,000, 2017-2019, DE (emission factor is based on median effluent concentrations of 49 UWWTPs (found in more than 50% of samples); total concentration)	Toshovski et al. (still unpublished)
	0.2	7.9			91-UWWTP, 2001-2010, DE, Saxony	Engelmann et al. (2016)
	1.1	1.2	<LoQ—3.7		LoQ: 1.4 µg/l; LoD: 0.7 µg/l; total concentration	Clara et al. (2009)
	1.2				9-UWWTP, 1-year, AT; total concentration	Clara et al. (2012)
		0.069—0.38	0—0.5		8-UWWTP, AT (LoQ: 0.5 µg/l; 22 out of 32 values <LoQ); total concentration	Clara et al. (2017)
	0.64	1.118	0—27	18	25-UWWTP, 1990-2015, NL; total concentration	Data base NL
	0.62	0.87			600-UWWTP, 2015-2017, UK; total concentration	Gardner and Jones (2018)
	0.86				162-UWWTP, 2010-2013, UK; total concentration	Gardner et al. (2014)

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## Recommended predefinitions to derive average concentrations:

- Using median concentration values (2 values at least),
- Using studies not older than 2010
- Using  $\frac{1}{2}$  LOQ if median concentration is  $<$  LOQ

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Table 5. Derived mean (median) concentrations for UWWTP effluents<sup>1)</sup>

Parameter <sup>α</sup>	Mean (median) concentration (μg/l) <sup>α</sup>	Comment <sup>α</sup>
Lead <sup>α</sup>	0.61 <sup>α</sup>	Range <sup>1)</sup> : 0.14—1.2 μg/l; 6 different studies, 4 MS <sup>α</sup>
Cadmium <sup>α</sup>	0.0216 <sup>α</sup>	Range <sup>1)</sup> : 0.006—0.05 μg/l; 5 different studies, 4 MS <sup>α</sup>
Nickel <sup>α</sup>	4.19 <sup>α</sup>	Range <sup>1)</sup> : 3.8—4.8 μg/l; 5 different studies, 4 MS <sup>α</sup>
Mercury <sup>α</sup>	0.00434 <sup>α</sup>	Range <sup>1)</sup> : 0.0007—0.01 μg/l; 5 different studies, 4 MS <sup>α</sup>
4-iso-Nonylphenols <sup>α</sup>	0.113 <sup>α</sup>	Range <sup>1)</sup> : 0.01—0.2 μg/l; 6 different studies, 4 MS <sup>α</sup>
DEHP <sup>α</sup>	0.66 <sup>α</sup>	Range <sup>1)</sup> : 0.24—1.7 μg/l; 6 different studies, 4 MS <sup>α</sup>
PFOS <sup>α</sup>	0.00575 <sup>α</sup>	Range <sup>1)</sup> : 0.003—0.122 μg/l; 4 different studies (one European-wide) <sup>α</sup>
Fluoranthene <sup>α</sup>	0.00478 <sup>α</sup>	Range <sup>1)</sup> : 0.0021—0.01 μg/l; 5 different studies, 3 MS <sup>α</sup>
Diuron <sup>α</sup>	0.0191 <sup>α</sup>	Range <sup>1)</sup> : 0.004—0.059 μg/l; 6 different studies (one European-wide) <sup>α</sup>
Isoproturon <sup>α</sup>	0.0186 <sup>α</sup>	Range <sup>1)</sup> : 0.0004—0.056 μg/l; 6 different studies (one European-wide) <sup>α</sup>
Terbutryne <sup>α</sup>	0.021 <sup>α</sup>	Range <sup>1)</sup> : 0.005—0.035 μg/l; 3 different studies, 2 MS <sup>α</sup>

<sup>1)</sup> Range of median values of different single studies<sup>α</sup>

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**Challenge:** dealing with results of different studies regarding sampling strategies, analytical methods (LoD/LoQ), number of UWWTPs monitored....

## **Limits:**

- Only a first approximation of real emissions
- Should only be used if no further information (monitoring data) are available

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## Main comments (1 MS and Eurometaux):

- Literature requirements
- Remarks on missing information:
  - Dissolved/total concentrations
  - LoD/LoQ values
  - Natural background (for metals)
  - ...

**Are you content with the way we address your comments?**

**Do you have any further remarks on the paper?**

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## Standing issues (for some studies):

- Missing information:
  - Dissolved or total concentration
  - Information about LoD/LoQ
  - Median values
- ...

**More information such as monitoring data/emission factors is very welcome!**

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## Remaining Questions:

- How do you feel about the paper - **do you think the paper is ready to go to the WG Chemicals?**
- What should be done to improve the paper? Would you be able to help?

**Thank you!**