



Using REACH registration data for the identification of persistent, mobile and toxic (PMT) substances to protect raw water resources

Michael Neumann, Daniel Sättler and Lena Vierke

Protection of raw water

Drinking water in Europe:

- 65% groundwater
- 35% reservoirs or river bank filtration
- Protected by the precautionary principle

REACH Regulation

Registration, Evaluation, Authorisation and Restriction of Chemicals (EC No. 1907/2006):

- Use of chemicals must be registered
- Data and information depend on tonnages and hazard properties
- Registrant guarantees safe use of chemicals.

Properties of concern

Fate and behaviour of polar substances:

- Intrinsic hazard potential is maximised if at the same time persistent in the environment
- Substance properties and hazard are comparable to those of POPs and PBTs
- Several names and terms in the literature

PPOP or **polar POPs**: polar persistent organic pollutant (Giger et al., 2005)

P3 substances or **PPPs**: persistent polar pollutants (Reemtsma & Jekel, 2006)

NANA: nicht abbaubar & nicht adsorbierbar (English: not degradable & not adsorbable)

PMT substances: persistent in environment, mobile in the water cycle and toxic

If PM substances are also toxic:

- Emission and impact are separated in time and space
- Quantitative risk based assessment approach can NOT be applied.

Regulatory Options

- Substance properties hinder the degradation by ozone and UV and the filtration by activated charcoal during the water treatment process
- PMT substances might be identified as substances of very high concern (SVHC) because of equivalent concern as those substances with persistent, bioaccumulative and toxic (PBT) properties.

Validation with monitoring

- Applied the PMT assessment to 93 REACH-registered chemicals
- Confirmed for 14 their PM or PMT properties
- Monitoring data exist for 6 substances

PMT substances:

- **2,4,6-Trinitrotoluol, Diuron**

PM substances:

- **Trichloropropylphosphat, Benzotriazol, Tolyltriazol, Acesulfam K**

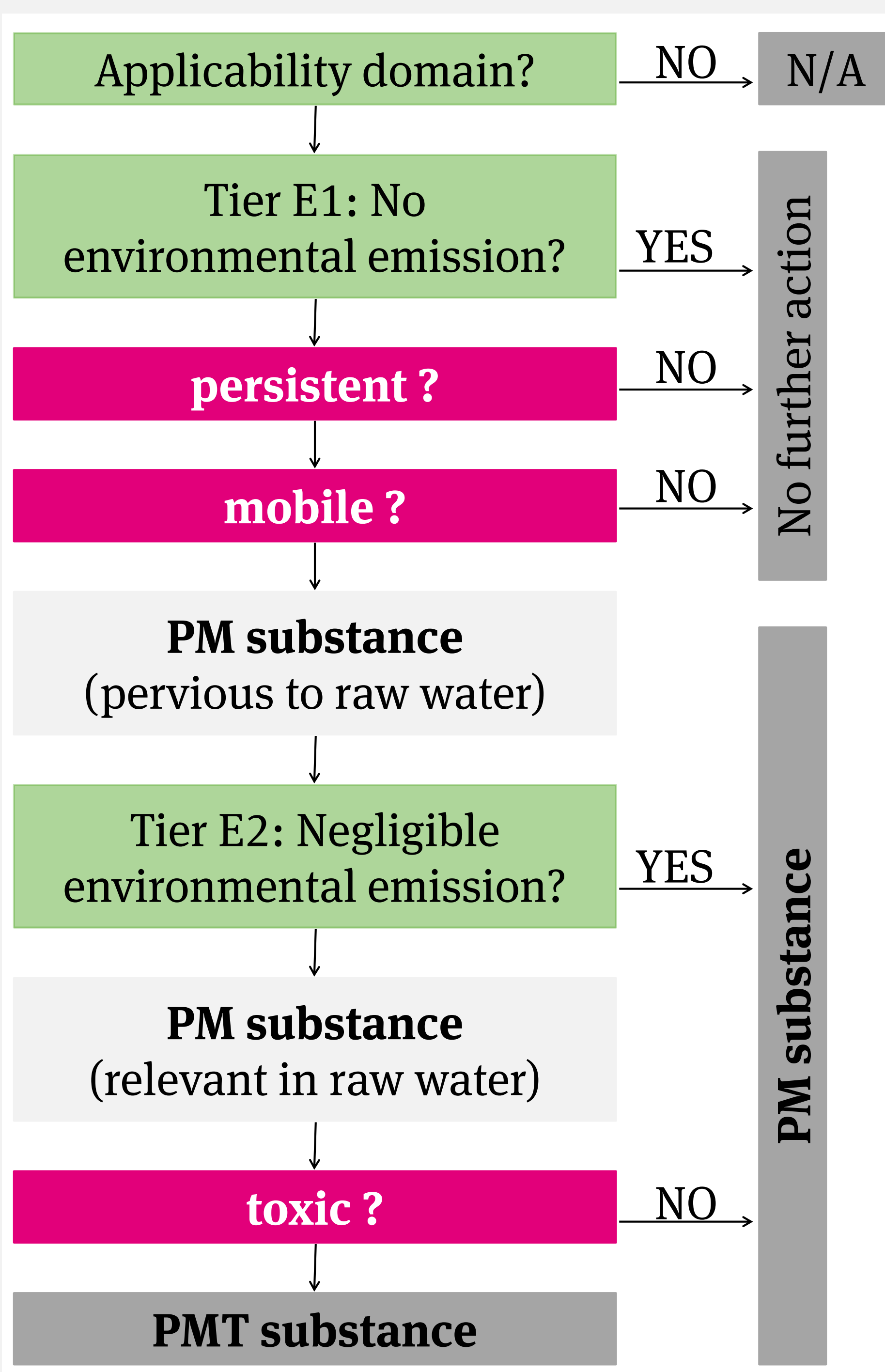
Conclusion

The Federal Environment Agency (UBA) views the **protection of raw water** resources from chemical contamination insufficiently implemented within the **REACH regulation**. We will support industry to fulfil their responsibility by providing **guidance** with an **PMT assessment concept**. This will not cause additional workload, because it is compatible to the obligations of registrations of uses > 10 t/year. During the **water treatment process** the intrinsic substance properties of PMT substance may hinder the degradation by ozone and UV and the filtration by activated charcoal. PMT substances may cause a hazard **comparable to POP and PBT substances**. The identification as substances of very high concern (SVHC) might be regulatory option for the future.

Assessment concept

Identification of **persistent, mobile** and **toxic** chemicals (**PMT substances**):

- Proposal by Kalberlah et al. (2014)
- Criteria and assessment concept as hierarchical approach from P over M to T
- Assess environmental emissions (E1 and E2) to avoid unnecessary work load



Step 1: Assessment of P properties

- Criteria adopted from PBT assessment
- Tiered approach including screening and assessment steps
- **A substance is “P” if it fulfils the criteria in the Annex XIII of REACH**

Step 2: Assessment of M properties

- Criteria determined with a modelling approach using the software ECETOC-TRA
- Partitioning to surface and ground water of 64 persistent substances correlated with several physico-chemical parameters
- Correlation only with organic carbon normalized adsorption coefficient K_{OC}
- Water solubility not correlated with mobility
- Potential to adsorb not correlated with BCF-value => overlap of criteria for “M” and “B”
- **A persistent substance is “M” if water solubility > 150 µg/L and log K_{oc} < 4.5.**

Step 3: Assessment of T properties

- Precautionary principle
- **T criteria from Annex XIII of REACH** and
- Additional criteria e.g. **DNEL (derived no effect level) is ≤ 9 µg/kg body weight / day**

Table 1: The proposed criteria to identify a PMT substance. For details see full study report.

P criteria (half live)	M criteria (if substance is P)	T criteria
<ul style="list-style-type: none"> • freshwater > 40 d • sediment > 120 d • soil > 120 d • marine water > 60 d • marine sediment > 180 d 	<ul style="list-style-type: none"> • water solubility > 150 µg/L and • log K_{OC} < 4.5 	<ul style="list-style-type: none"> • CMR Cat. 1A, 1B, 2, H362, STOT RE Cat. 1 or 2 • DNEL ≤ 9µg/kg body weight and day • Cramer Class III or structural alerts for genotoxicity and carcinogenicity • suspected to have endocrine disrupting properties • listed in toxic substance inventories

Guidance

- UBA aims in providing guidance
- PMT assessment concept could be applied by registrants to ensure a safe use of chemicals
- Authorities may identify chemicals for which regulatory action are necessary.

Literature

Kalberlah et al (2014): Guidance for the precautionary protection of raw water destined for drinking water extraction from contaminants regulated under REACH. Project no. 371265416 of The Federal Ministry for the Environment (BMUB) in Germany