The use of leaching data to estimate long-term leaching ratios from facades

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INTRODUCTION

The Biocidal Products Directive (BPD, Directive 98/8/EC) requires the risk assessment of biocidal products to the surrounding environment. This necessitates the estimation or measurement of the rate of emission of active substances from the products from 30 days to twenty years, and then the use of those rates of emission in Emission Scenarios (e.g. cladding on a house). In this study some of the problems by using experimental leaching data to predict long term leaching values are highlighted. As an example of a façade treated with biocide we used data from a long term emission study where copper was used as the biocide in preservative treated wood above ground not covered (Use Class Class 3 scenario).

AIM

1. To measure the rate of emission of copper from preserved wood exposed to natural weathering and rainfall in a Use Class 3 situation, to obtain values which could be used in a BPD Environmental Risk Assessment.
2. To quantify the effect of a risk mitigation method, such as hot oil drying, on the emission of copper.
3. To measure the emission of copper after several years of exposure, and to determine if the reduction of emission with time fitted an exponential curve, allowing the estimation of emission after a six year period of exposure after only one or two years of measurements.

RESULTS

The first diagram shows the concentration of copper in the collected emissate. Conventionally air-dried panels showed a higher emission during the first months of exposure, whereas the emission from hot oil dried panels was consistently lower (actually at all points lower than the accepted Cu concentration in Danish drinking water; 2 mg/L).

The total amount of copper emitted from the air-dried panels over 6 years was 4.4% of the amount in the wood after treatment. This result contrasts with a 'Tier 1' approach to calculating emission values for use in the BPD Scenarios, which could be used when no data are available, where 100% of the active substance is considered to leach immediately on exposure. In the case of wood preservatives this approach overestimates emission. Hense the risk to the environment.

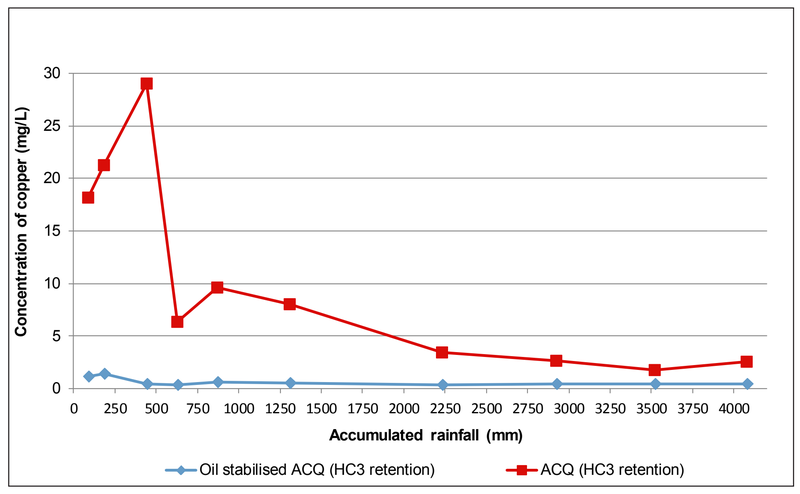
PREDICTION OF LONG-TERM LEACHING

The prediction of long term emission (20 years) from short term experiments was investigated by calculating estimates based on either 2 or 6 years of data and applying linear and logarithmic models for extrapolation. The impact of using different models is shown for both systems. For the air-dried system the prediction varied with a factor of 3.6 between highest and lowest estimate. For the hot oil treated system no variation in the prediction was found.

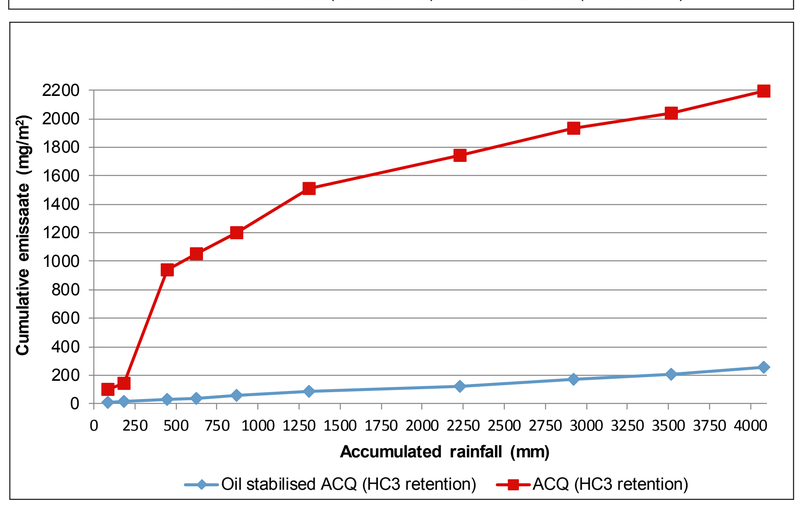
PT 8: Leaching study

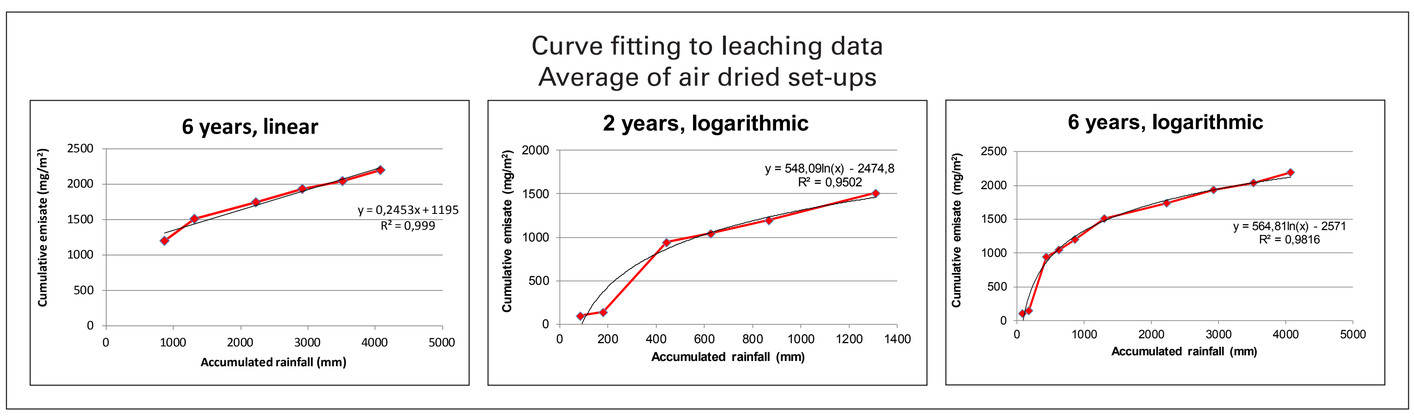
- NT Build 509
- 7 test specimens in each set-up
- 3 replica set-ups for each treatment

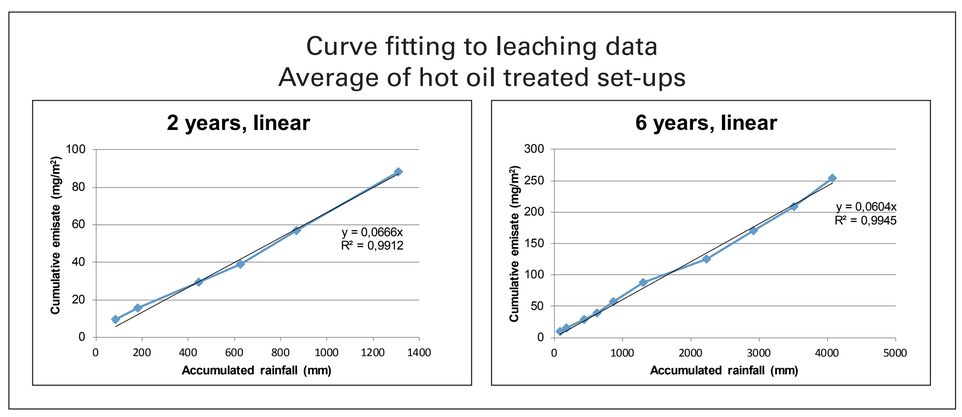
Concentration of Cu as a function of accumulated rainfall



Cumulative quantity of Cu leached/m² as a function of accumulated rainfall







CONCLUSIONS

About 2 years of leaching data give a reliable basis for estimating long time leaching values (Time 2)

The curve shape giving the best fit cannot be defined beforehand, but will depend on the system in question: For systems with a high initial release of biocides a logarithmic model may give the most realistic fit, while for systems with a constant release a linear model may be the most realistic

In this case the used Risk Mitigation Measure reduced the long time leaching estimate with a factor of 3-11. Depending on choice of estimate