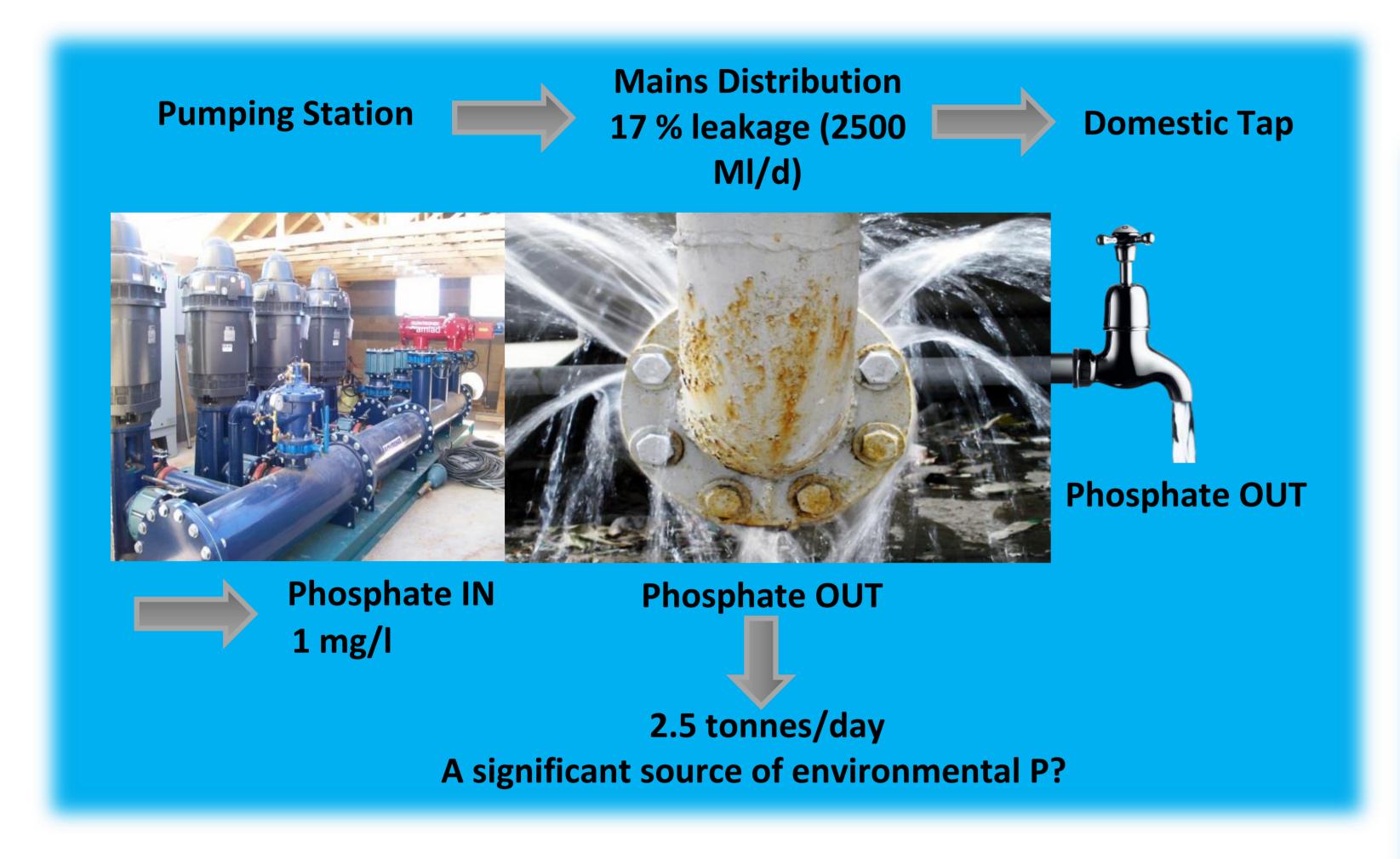


# Phosphate isotopes - a tool to fingerprint leakage and environmental P sources?

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## Introduction

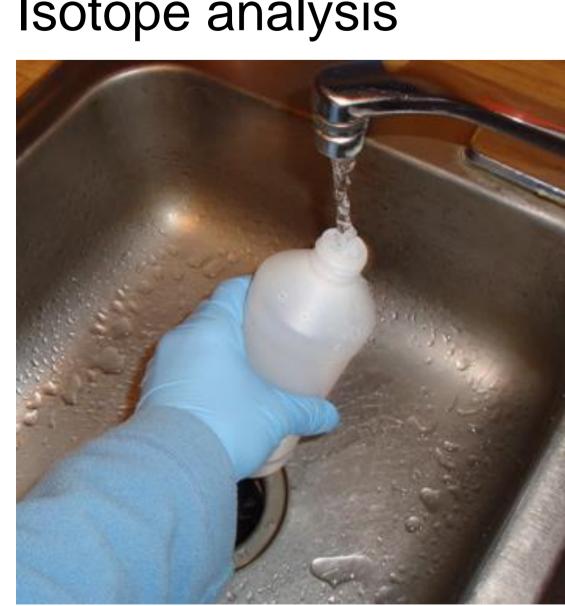
- Up to 25% of mains water can be lost as leakage
- Leakage of phosphate-dosed water may be a significant P source in the environment

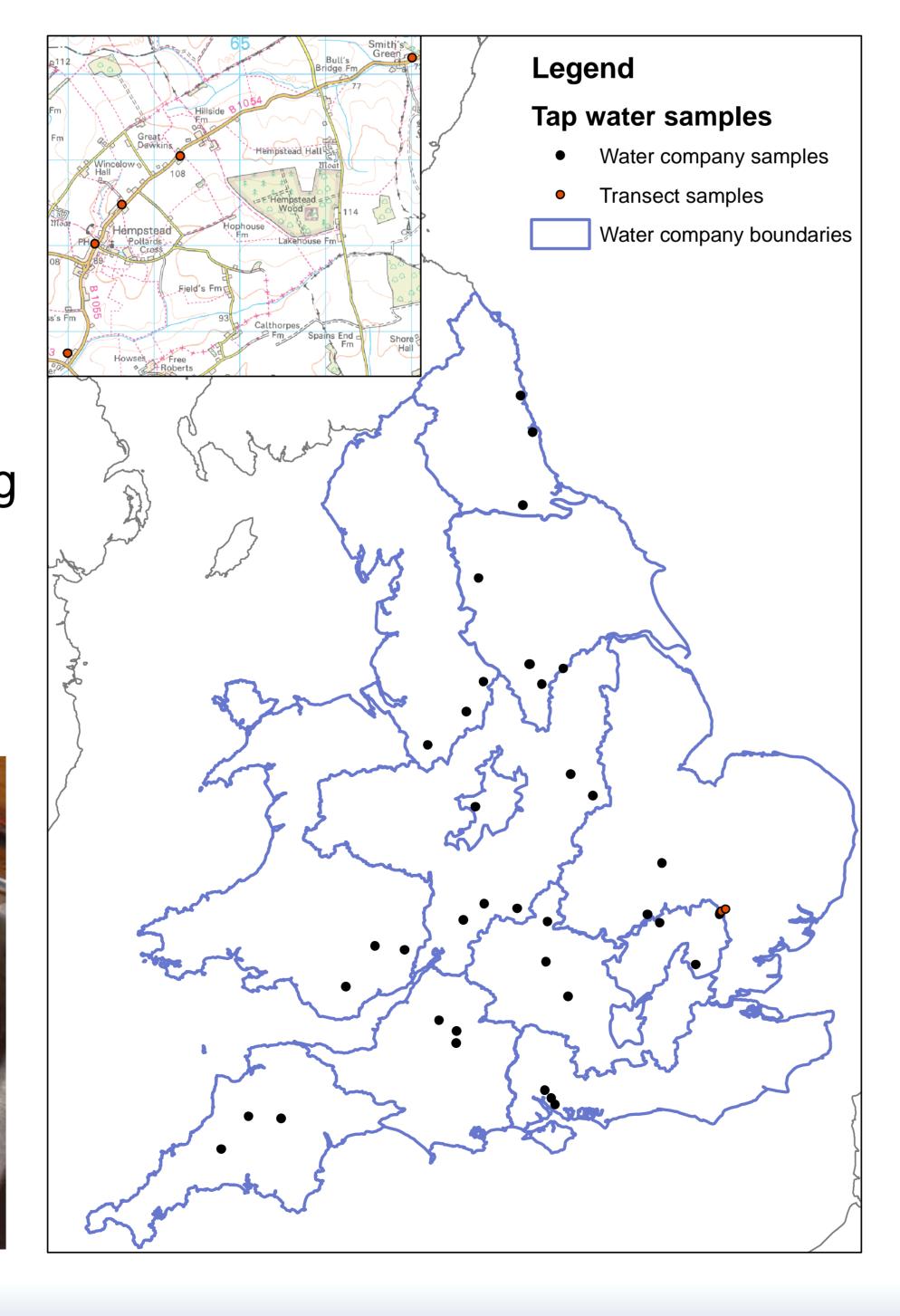


- The oxygen isotope of phosphate  $(\delta^{18}O_{PO4})$ has been used as a tracer for P sources in ecosystems
- Could  $\delta^{18}O_{PO4}$  of tap water be a useful tool to fingerprint leakage in the environment?

#### Method

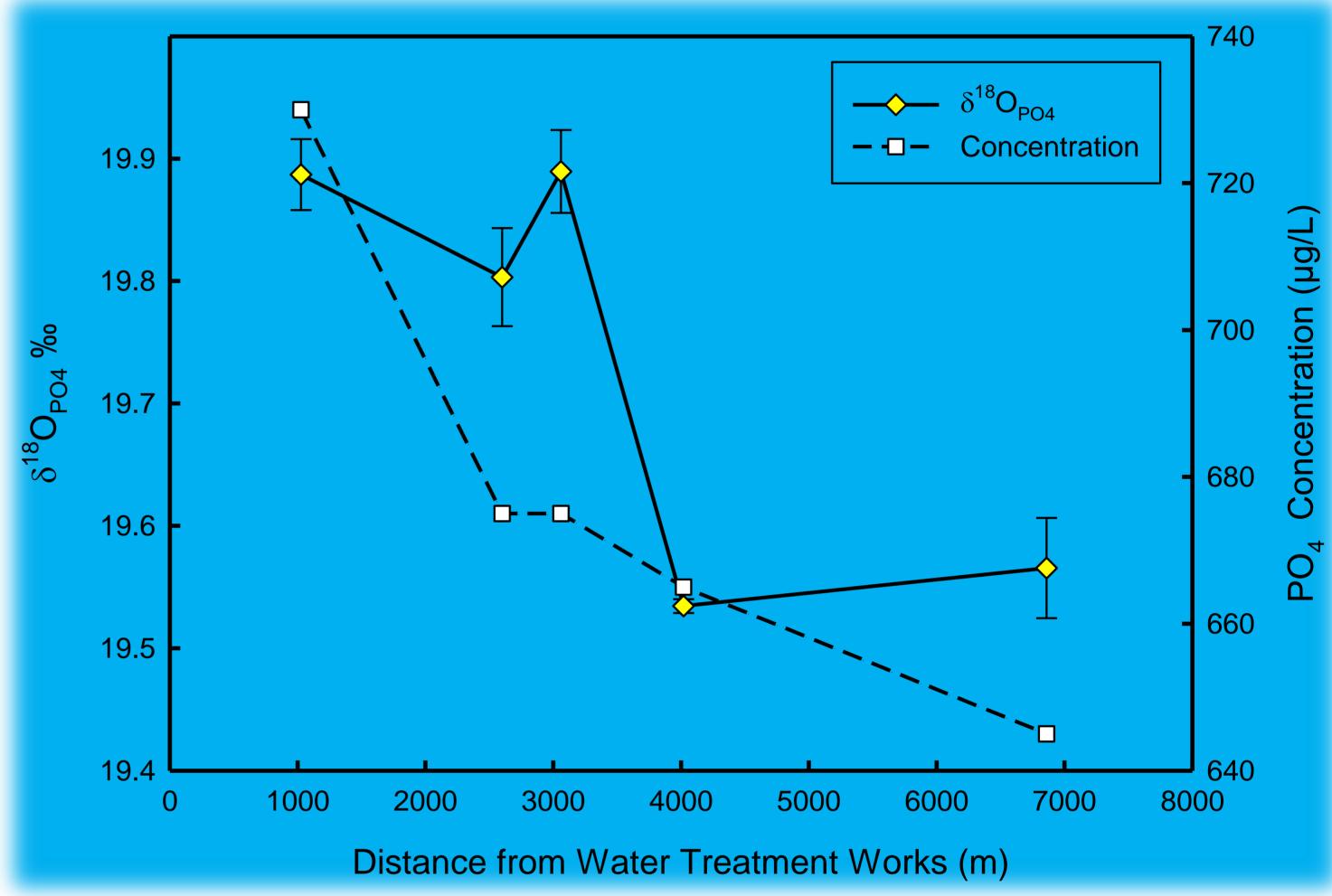
- Sampling of tap waters at 12 water companies across England and Wales
- Sampling along a 8 km main to determine change in  $\delta^{18}O_{PO4}$  along the network
- Samples of dosing orthophosphoric acid
- Isotope analysis





## Results

- 2 suppliers of orthophosphoric acid with different  $\delta^{18}O_{POA}$ 
  - 12.4‰ and 19.7‰
- Tap water samples generally within 1-2‰ of dosed values
- Samples along a main show slight decrease in δ<sup>18</sup>O<sub>PO4</sub>
  - Long residence time at the end of the network
  - Potential biological cycling of phosphate



### Conclusions

- Tap water δ<sup>18</sup>O<sub>PO4</sub> values reflect 2 dosing acids
- Distinct from wastewater treatment discharge
- Potential to use  $\delta^{18}O_{PO4}$  to distinguish mains water from STW discharge and environmental sources
- A tool to assess microbial cycling in water mains?

