Dŵr Cymru
Welsh Water

AMP7 and 8 Water Industry Chemical Investigation Programme

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Chemical investigations programme – so far

Phase 1

- £25m spent between 2010-15
- 63 PHS
- Screening of WwTW final effluents to confirm the concentrations and loads of PHS.
- Process sampling and analysis for the whole range of chemicals.
- Took into account wider source apportionment and need to meet downstream WFD objectives.
- Catchment monitoring/modelling investigations to assess catchment sources and advanced treatment options.

Phase 2

- £140m spent in 2015-20
- 12,180 samples across 609 individual discharges.
- 74 PHS substances were surveyed
- Pilot and feasibility trials of new treatment technologies with particular focus on P-removal.
- Five catchment studies to evaluate catchment management options.
- Programme level options appraisal assessed impact of point source; proportion of TBT attributable to point source inputs is surprisingly low.

Phase 3

- £25m spending in 2020-25.
- 14,850 samples across 359 sites.
- wider range of elements including sources of chemicals, environmental die away and trend analysis, emerging and watch list substances.
- Address emerging concerns including antimicrobial resistance and microplastics.
- Extend the scope of monitoring to groundwater, estuarine and coastal waters.
- Provide better understanding of new and existing approaches to wastewater treatment.

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Volume 1
AMR

Volume 2
Microplastics

Volume 3
Groundwater

Volume 4
Environmental die away

Volume 5
Emerging substances

Volume 6
Biosolids

Volume 7
Transitional and costal waters

Volume 8
Mechanisms of removal

Volume 9
Trends analysis

Volume 10
Substances removal

Volume 11
Sewer and river catchment

Volume 12
Biosolids report

Volume 13
Data mining

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Download available at https://ukwir.org/water-industry-research-reports

CIP3 – key findings

- Wastewater treatment works are effective at reducing the abundance of antibiotic resistant genes.
- Percent removals ranged from 83% to 98% for different ARGs.
- Antibiotic concentrations were not statistically correlated with AMR but ammonia had a positive correlation.
- Surprisingly, larger catchments had lower richness and prevalence of ARGs than small catchments.

- Most common polymer type found was of the amorphous acrylate variety followed by polyethylene and polypropylene.
- High removals from the final effluent of 99% by number and 99.5% by mass of microplastics.
- Primary and secondary settlement stages were particularly important with respect to proportions removed.
- On average around 1 MP/L or 2.5 µg/L in effluent → 0.2% to water courses and 99.8% to sludge

- Reductions in concentrations of three substances discharged in final treated effluents: DEHP, triclosan and TBT.
- CIP3 have shown the downward trend in effluent concentration for all three substances has continued.
- The mean effluent concentration is predicted to be below the annual average EQS for all three substances by 2027.
- Data shows that at some sites, upstream concentrations are found to be greater than downstream concentrations.

- Substances with greatest risk of EQS non-compliance (or PNEC) such as HBCDD, Cypermethrin, PFOS and PFOA.
- Range of sources have been identified: Cypermethrin – abattoirs, laundry services and pest control trade but also domestic; HBCDD – domestic suggesting that it arises from historic use of materials containing flame retardants; PFOS and PFAS – landfill leachate, bakery, metal plating and manufacturing and domestic. high concentrations were found upstream of any obvious discharge points supporting the evidence of ubiquitous nature of these chemicals.

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- Chemicals – estuary, CSO and PFOS
- Further sludge investigations
- First ground water sampling in Wales for CIP
- Emerging substances
- Innovative pathway control - pesticides
- AMR – process and WQ assessments
- Local investigations: Zn a Penybont and TBT at Mold

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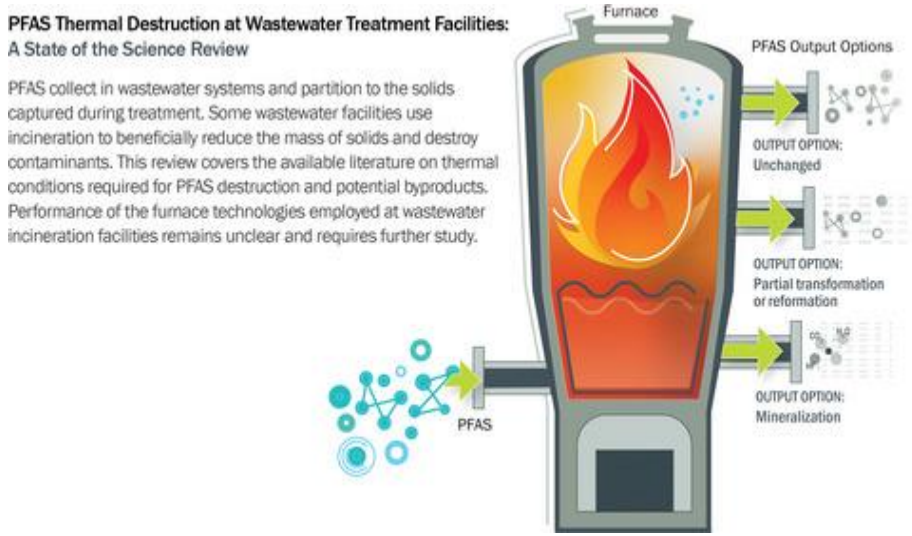
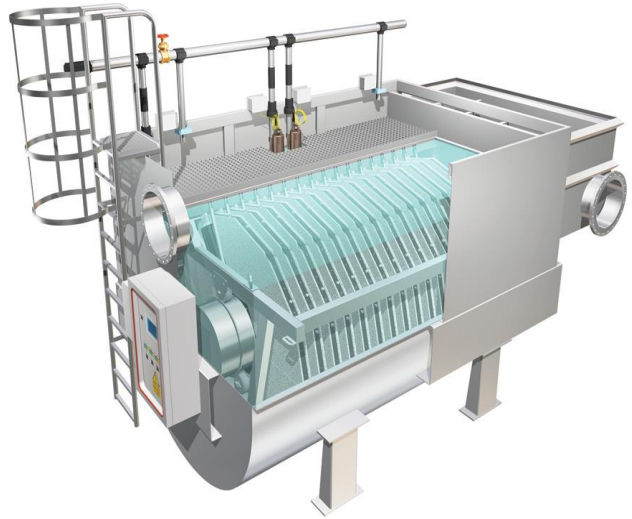
CIP4 – the plan

Microplastics





Water Environment Research, https://doi.org/10.1002/wer.1483

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QUESTIONS