

HACH AUTOSAMPLERS USED AS PART OF THE WELSH GOVERNMENT WASTEWATER-BASED EPIDEMIOLOGY (WBE) SURVEILLANCE PROGRAMME

In May 2020, as part of a coordinated response to the Covid-19 pandemic the Welsh Government began testing SARS-CoV-2 in their population's wastewater.

Previously in January 2020, when the pandemic began, Bangor University commenced some of the UK's first testing which aligned with some existing WBE testing already taking place at Bangor Treborth Wastewater Treatment works (WwTW). The WBE surveillance programme, managed by the Welsh Government, created a Technical Advisory Cell (TAC), which involved the partnership of the two water utility companies in Wales – Dŵr Cymru Welsh Water (DCWW) & Hafren Dyfrdwy, as well as Cardiff & Bangor Universities.

At the start of the programme, the Welsh Government were monitoring 19 x WwTWs sites across Wales, which focussed solely on the heavily populated areas in the South & North of Wales. This then expanded to 47 x WwTWs sites, which now represents circa 80% of the Welsh population. The programme involves taking 24-hour average composite samples, 5 days a week using automatic samplers positioned on the inlet of these treatment works. Data analysis reporting takes place every week, which is shared in advance with public health officials, published to all relevant stakeholders & also uploaded to the Welsh Government website.

The WwTWs monitoring sites were structurally selected to reflect the various communities across Wales as well as sites of particular interest. It was deemed important to ensure that the sites were chosen right across the 14 Level 2 National Resources Wales (NRW) drainage basin management catchment areas, so that accurate and representative reporting could be guaranteed for each catchment area and local authority region. The structured monitoring approach employed, not only

ensured a good representation of the Welsh population, but also an excellent geographical and regional coverage. This is evident from previous reports showing how different the levels of the virus and people's behaviour is across these regions and reflects on how the public health profile of these communities varies from rural areas to densely populated conurbations.

DCWW were contracted by the Welsh Government with the installation of automatic samplers, supported by Hach, who provided training for many of the sampling units used in this programme. The training was delivered on site to DCWW operators & University sampling staff at various sites across Wales. The samplers were installed just after the rag bar screens & grit removal chambers to avoid fouling of the sample intake tubing. Each MCERTS refrigerated Bühler 4011 autosampler was programmed to take a 50ml sample every 15 mins to ensure an average composite sample was collected each morning by the university staff. These samples were then tested later in the day at the nearest University laboratory.

The future – early warning tool

WBE sampling & testing in Wales has allowed the development of single nucleotide polymorphisms (SNP) assays to provide **rapid identification of mutations associated with SARS-CoV-2**. These assays have assisted greatly with Covid-19 monitoring and have become an **invaluable early warning tool** to identify peaks in demand for local hospitals.

The future looks bright for WBE in Wales as the Country moves beyond the Covid-19 pandemic. Access to permanent



autosampler installations across the Welsh wastewater network has allowed new research to take place, with **regular testing for other public health indicators** such as Enterovirus, Norovirus & Influenza, as well as Antimicrobial Resistance (AMR) surveillance. Bangor University are also planning to trial the GeneXpert PCR cartridge from Hach's sister company Cepheid for simple, quick, portable & multi-target analysis for SARS-CoV-2, Flu A, Flu A1, Flu B and Norovirus.

These developments reflect substantial government investment over the past 2 years and it is expected that WBE will develop further to safeguard public health in the future.

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