



IMPACT Research and Development Programme.

The IMPACT programme was launched in April 1994, in response to discussions between BHR Group, the Water Services Association and representatives of the UK Water Industry.

The purpose of IMPACT (Implementation of Process and Control Technology) was to demonstrate real cost benefits to its members, through effective implementation of R&D work. A significant proportion of the funding was directed towards initially focusing R&D work on the members' business objectives and towards delivery of the R&D results in the most effective manner. Two IMPACT projects were carried out by BHR Group entitled;

- More Reliable Disinfection with Fewer Byproducts
- Improving Sedimentation Processes

Both projects were undertaken over a period of 2 years on behalf of the various member companies namely: Yorkshire Water Services (England), Department of Environment - Northern Ireland Water Service and three Scottish Water Authorities.

More Reliable Disinfection with Fewer Byproducts

The main aims of the project were:

- to provide quantitative guidelines for optimising new and existing contact tank and service reservoir designs.
- to improve understanding of the combined effects of the reaction kinetics and hydraulics of chlorination and their influence on disinfection reliability and byproduct formation by numerical modelling.
- to disseminate the results in targeted forms to each member in order that they can be implemented appropriately to their specific needs.
- In the initial stage of the project, two different literature reviews were carried out to assess the state of knowledge on the subject. The first review focused on the reaction kinetics of chlorine disinfection and the second focused on the hydraulics of rectangular contact tanks and service reservoirs. Additionally, to confirm the scope of the project and to define a design envelope for the hydraulic studies, a survey of the members' tanks was conducted.
- Subsequent to the above sub-tasks, an extensive matrix of Computational Fluid Dynamic (CFD) simulations were undertaken on the various members' tanks to provide a database of hydraulic data (Residence time Distributions (RTD) curves).

Validation of the modelling work on selected tanks followed, with on-site tracer tests to produce comparable RTD data.

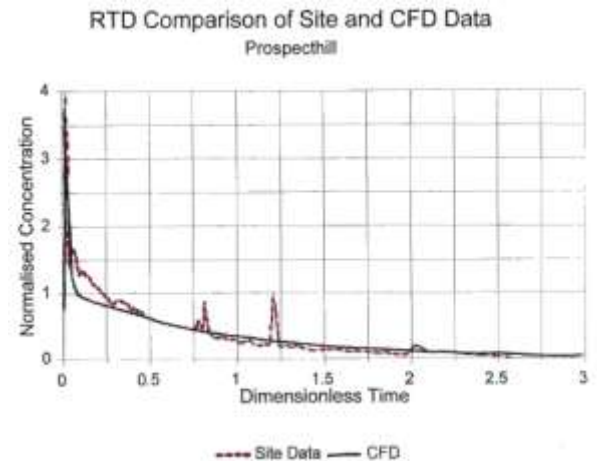




On obtaining the required confidence levels with the modelling, optimisation trials on both service reservoirs and contact tanks was undertaken. This included, but was not limited to, inlet/outlet configurations, baffles, jet mixing etc. Disinfection models including chlorine decay and Trihalomethane (THM) formation were also developed and coupled with the hydraulics of the tanks.

Following on from the above study and reporting stage, BHR Group produced a design guide as one of the final deliverables under the IMPACT project covering disinfection by chlorination in baffled and unbaffled contact tanks and service reservoirs. The aim of the design guide was to provide clear information for the user to either design, retrofit or assess the hydraulic efficiency and chlorine residual levels of a new or an existing chlorine contact tank or service reservoir.

As part of the final deliverables of the project, a software called 'DISINFEX' was developed, incorporating a suite of data manipulation programs for RTD analysis. Models for the chlorine decay and Trihalomethane formation were also encoded in the DISINFEX software. A user manual was also prepared to supplement the software.



Improving Sedimentation Processes

The project focused on both Primary Sedimentation Tanks and Secondary (also referred to as Final) Sedimentation Tanks. The following major tasks were carried out within the IMPACT project:

- Sedimentation tank geometry and design was reviewed.
- The hydraulic performance of two primary and two Secondary tanks was quantified.
- Improved design of inlet and outlet arrangements for rectangular and circular sedimentation tanks was developed through a programme of research.
- Recommendations were provided for inlet and outlet arrangements for both existing tanks (retrofits) and new tanks (design).
- An Operational Manual and Design Guide for Primary and Secondary Tanks were delivered.
- Seminars to disseminate the project results were provided.

The Design Guide for Primary and Secondary tanks also included a section covering the overall sizing of Primary Tanks.

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