Technical Cooperation Programme

September 2012

# *Enhancing capabilities to treat wastewater using radiation processing technology in Hungary*

## *The challenge…*

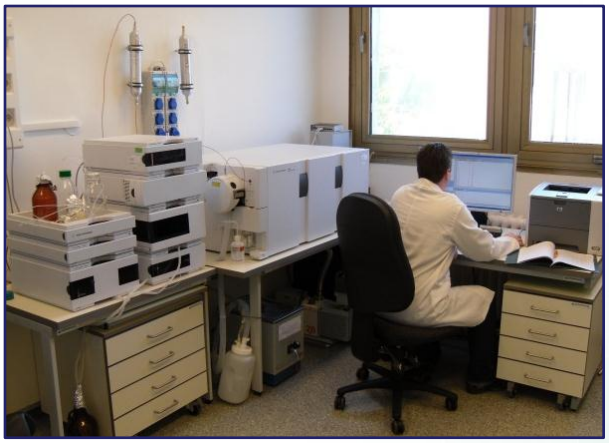
Water pollution has increased significantly in recent years, largely due to intensive industrial, domestic and agricultural activities. The problem is aggravated by organic water pollutants, created when effluents enter natural water bodies. Organic pollutants can cause severe health problems and have a significant impact on the environment even at extremely low concentration levels.

As they can be resistant to chemical/biological degradation, eliminating organic pollutants from wastewaters is a challenge that requires efficient technologies for the decomposition of toxic substances and their subsequent removal. Effective control and treatment strategies to remediate water pollution are essential.

## *The project…*

Through its technical cooperation programme, the IAEA has provided Hungary with support in using radiation technology to break down pollutants, such as textile dyes and pharmaceutical drugs, that are found in wastewaters at low concentrations. The project aimed to promote and transfer this technology to governmental and private enterprises.Through the project, a pilot plant using an electron beam accelerator for the treatment of wastewater and industrial effluents was set up. In addition, the project helped with the development of methodologies for the application of sensitive analytical techniques, such as high performance liquid chromatography-mass spectrometry (HPLC-MS), for the detection and identification of degradation products and metabolites formed in very low concentrations.

Support was provided through transfer of expertise, fellowships, training courses and exchange of information.



*HPLC-MS instrument installed in the Institute of Isotopes.*

## *The impact…*

As a result of the project, a significant decrease in the concentration of toxic organic pollutants was achieved by irradiating waters with a low absorbed dose. Hungary's pollution monitoring capabilities have improved considerably as a result of the new up to date water analysis laboratory, and pollutant degradation products or metabolites can now be detected at extremely low concentrations. The decomposed products formed by the irradiation of pollutants are non-toxic, confirming the effectiveness and suitability of irradiation for treating polluted waters.

A partnership has been established between the technical cooperation project counterpart institution and Budapest Sewage Works, which further enables the effective transfer of state of the art radiation technology to end users in Hungary. The counterpart institution has also been invited to join an international project on the treatment of highly toxic wastewaters using advanced oxidation processes.

The project results have contributed to the establishment of measures to improve the quality of wastewater in Hungary and will be of benefit to municipalities and industries in the region.

**Technical cooperation project HUN/8/008: Implementation of a Pilot Plant and Upgrading the Laboratory for Treatment of Water and Wastewater Using Radiation Processing Technology**