Case Example

DuPont: Recovering Up to 90 Percent of the Wastewater in a German Plastic Resins and Synthetic Fibers Plant

DuPont's plant in Hamm-Uentrop, Germany has demonstrated how wastewater treatment upgrades and an innovative effluent water polishing process can yield environmental and economic benefits.

DuPont has been producing high grade plastics (Butacite®, Zytel®, Crastin®) and synthetic fibers (Dacron®) at its plant at Hamm-Uentrop since 1968. In the past, this has required the consumption of 850,000 m3 of municipal drinking water per annum, of which about 600,000 m3 was ultimately released into the Lippe River as wastewater, from the biological purification facility.

Different water purities are required for different applications and these were previously all prepared from potable-quality water in a central unit and then fed into the different supply systems. This project aimed to close the water loop by reusing treated effluent from the biological waste treatment plant as process and soft water, thereby reducing the volume of discarded wastewater by 90 percent while saving the same amount of drinking water.

The objective of the project was to recycle 90 percent of the wastewater from a state-of-the-art chemical plant, in order to preserve drinking water and minimize the pollutant load being released into a local river. With an optimized environmental management system, it was intended to spare the natural water resources. This was to be achieved by recycling the clarified wastewater and returning it for use in the factory.

Specific objectives included:

- Good care of the drinking water resources
- Protection of the environment
- Render the chemical factory virtually free of waste water (90% of the waste water to be reused; the emissions from the plant into receiving stream to be reduced to a minimum)
- Resulting ongoing cost savings for fresh water supply and ecotaxes for release of purified waste water to the public river
- Enhanced attractiveness of the Uentrop site for expansion and new products
- An innovative wastewater recycling concept that could be employed by other companies with large water consumption requirements

The project employed a five-step combination of innovative treatment and water processing units:

1. Alternating aerobic/anoxic sludge process to eliminate nitrogen and phosphorous
2. Ultrafiltration membrane system to remove suspended solids and bacteria
3. Activated carbon to eliminate residual organic material
4. UV disinfection
5. Reverse osmosis for final softening and elimination of dissolved ions

The full-scale wastewater recycling system was implemented, and has been in operation since June 2001. The project demonstrated that the effluent treatment improvements and polishing processes would result in the production of process and boiler feed water quality. The recycling concept has allowed recovery of up to 90 percent of the wastewater, with corresponding savings in the cost of fresh water and wastewater

charges. Annual savings have been estimated at EUR 0.2-0.5 million. Moreover, the chemical oxygen demand was reduced by 15 percent, the nitrogen content was reduced by 60 percent, the phosphorus content was reduced by 67 percent, and soluble salts were reduced by 28 percent.