

## Monitoring Phenol in Water

### *The Situation*

A plant located in the eastern United States manufactures phenolic resin for applications in plastics molding. This plant uses well water for cooling its reaction process and then discharges the water into a local creek.

A leak in the reactor and associated cooling equipment would cause phenol and phenolic compounds to contaminate the cooling water. Such a leak could result in a discharge violation. The local regulators frequently inspected the plant's discharge to ensure compliance with the discharge permit.

### *Problem*

The company requires online monitoring of the cooling water to detect a leak and prevent a discharge violation. Previously the company employed a Technicon analyzer, which used wet chemistry techniques requiring considerable maintenance. A replacement monitor was necessary to replace the aging Technicon, which was no longer manufactured nor supported. The replacement analyzer had to be capable of reliably detecting phenol in water below the discharge threshold of 150 ppb. Given the direct discharge of the cooling water into a stream, the local regulators as well as the plant were concerned about the potential discharge of phenol, a toxic compound.

### *Solution*

The company chose a Turner Designs Hydrocarbon Instruments TD-4100 series monitor as a replacement for the obsolete analyzer. Phenol is an extremely fluorescent compound; therefore, the fluorescence-technology TD-4100 was capable of detecting phenol at much lower concentrations than the required alarm limit of 150 ppb. The actual detection limit of phenol for this application was determined to be between 12.5 to 25 ppb in the cooling water. A potential company concern was the baseline noise of the TD-4100 compared to the obsolete analyzer, yet this concern was eliminated since both instruments exhibited similar background noise. The instrument drift of the TD-4100 proved to be less than the replaced Technicon.

The company was pleased with the instrument performance, yet the true performance test was verified when the TD-4100 detected a regularly occurring phenol concentration swing in the cooling water. Company personnel initially suspected a problem with the TD-4100, yet the period of the concentration swings identically matched the pressurization cycle of the reactor. The TD-4100 detected a leak in the reactor before the discharge limit had been exceeded, preventing a costly discharge violation and potential catastrophic failure.