Monitoring Oil in Cooling Water

The Situation

A municipal power plant in the southern United States operates more than 10 stationary power plant engines capable of producing 52 megawatts of electric power. The plant is part of a larger statewide power grid system. Within the grid, the municipality brokers the purchase or sale of power hourly, based on the needs of municipality and the market rate for power on the grid system.

The power plant engines are fired-up on short notice to meet the needs of the dispatcher. The engines produce power ranging from two to 7.5 megawatts per engine. The engines operate on a blend of diesel fuel and natural gas. The cooling system for the power plant is a combination of closed and open loop cooling. The open loop cooling water comes from ground water wells and is circulated through the stationary power plant engines. The plant is permitted to discharge several million gallons of cooling water on a continuous basis per day into a canal system.

The Problem

The success of this municipal power plant relies on its ability to provide economical and uninterrupted power to its clientele. A primary component to keeping the economics favorable is the plant's ability to continuously discharge uncontaminated cooling water into the canal system. As part of a NPDES permit renewal in the early 1990s, the power plant added a cement lined pond containing a slant rib separator to effect the mechanical separation of any oil present in the cooling water that is caused by a leak from a power plant engine. The permit also maintained the requirement that a continuous monitor verify that the discharged water was free of oil.

The municipal power plant had utilized a Dissolved Oil in Water (D.O.W.) monitor. The DOW utilized UV absorbance for oil detection and an articulated mechanical wiper design to maintain flow cell cleanliness. This design proved to be very high maintenance and difficult to calibrate. Eventually, the articulated wiper failed and scratched the optical flow cell windows. The power plant could not risk an undetected discharge of oil in cooling water with the DOW technology.

The Solution

The TD-4100 series monitor, in conjunction with grab sampling, verifies NPDES discharge compliance for oil and grease in power plant cooling water. The plant manager states,

> "The power plant decided to update the monitoring system with the latest monitoring technology. A Turner Designs TD-4100 series monitor was selected to reduce maintenance hassles and insure compliance with the NPDES discharge permit."

The criteria used by the plant operators for finding the best available technology was accuracy, low maintenance, continuous monitoring, built-in alarm system and alarm relay system. The TD-4100 was the monitor of choice by the municipal power company. The TD-4100 utilizes a non-fouling, non-contact flow cell which requires little to no maintenance, and uses fluorescence technology to accurately detect oil in water from low ppb to high ppm. For this application, the TD-4100 monitors oil in water at 1 to 5 ppm and signals an operator with an alarm when the concentration exceeds the high alarm relay set-point. The key to routine, long term, continuous monitoring is a non-fouling flow cell or detection system. The TD-4100 will clear fouling, even if high concentrations of oil were to pass through the monitor.