Case Study

**TURNKEY HYDROGEN PEROXIDE PROGRAM HELPS REFINERY THROUGH AN AERATION BASIN MAINTENANCE OUTAGE**

**Background**

In the summer of 2010, a large refinery complex in the Northeast was facing a 2-3 month maintenance outage on one of two aeration basins in their activated sludge wastewater treatment system. During the outage, all of the refinery wastewater would need to be routed through the one remaining aeration basin. Since the refinery periodically had difficulty maintaining dissolved oxygen (DO) levels with both aeration basins in service, they needed a temporary (and non-capital) means to provide the biological treatment system with supplemental DO during the maintenance outage.

Hydrogen peroxide has been used as a source of supplemental dissolved oxygen (DO) in activated sludge treatment systems for decades. In the aeration basin mixed liquor, H$_2$O$_2$ converts to DO according to the following reaction:

$$2 \text{ H}_2\text{O}_2 \rightarrow \text{O}_2 + 2 \text{H}_2\text{O}$$

This decomposition to DO occurs very rapidly due to the catalytic effect of enzymes (i.e. catalase) present in all activated sludge mixed liquors, and thus provides an immediate source of DO to the biomass. Since H$_2$O$_2$ is a liquid, and infinitely soluble in water, the amount of DO provided is not limited by mass transfer of oxygen from the gas phase to the liquid as is the case with mechanical aeration. More information on this application is provided at [http://www.h2o2.com/industrial/refinery-petrochemical-applications.aspx?pid=99&name=Supplemental-Dissolved-Oxygen](http://www.h2o2.com/industrial/refinery-petrochemical-applications.aspx?pid=99&name=Supplemental-Dissolved-Oxygen).

**Solution**

The refinery contracted with US Peroxide to provide a turnkey supply scope that included:

- **27% Refinery Grade** hydrogen peroxide (H$_2$O$_2$)
- Engineered storage and dosing equipment system
- Equipment installation and maintenance services during the project
- Remote monitoring and product inventory management
- Applications services, including dose rate optimization and process hazard analysis (PHA) support and safety training.

**Program Benefits**

US Peroxide’s 27% H$_2$O$_2$ Treatment Program offered the refinery several benefits:

- US Peroxide’s turnkey supply scope provided a safe and cost effective solution for supply of supplemental dissolved oxygen to this large refinery during the maintenance outage.
- The biological treatment system’s performance during the outage convinced the refinery to maintain the H$_2$O$_2$ storage and dosing system on site to provide supplemental DO on an “as needed” basis during periods of high BOD/COD loading, upstream process upsets, and filamentous bulking episodes.

**US Peroxide provides full-service 27% hydrogen peroxide treatment programs to treat refinery wastewater systems.**
When the maintenance outage was initiated and wastewater flow was diverted to the lone aeration basin, DO levels rapidly dropped from the target range of 2-3 mg/L to near zero (0.1-0.2 mg/L). Dosing of 27% hydrogen peroxide into the effluent of dissolved air floatation (DAF) unit, just upstream of the aeration basin was started to offset this unacceptable drop in DO.

Within a matter of a few hours, a measurable DO increase was observed and continued to trend upward through the day. Within 24 hours of starting H₂O₂ dosing, the DO levels in the aeration basin was back in the 1-2 mg/L range, and within 48 hours had reached the refinery targeted 2-3 mg/L range.

Dosing of 27% H₂O₂ was continued throughout the maintenance outage and maintained the DO levels required for effective BOD removal and nitrification (ammonia removal).

It is noteworthy that during the outage, the refinery experienced no filamentous bulking episodes which translated to good clarifier settling, which had historically been a concern when treatment system DO’s were experienced.


About US Peroxide

US Peroxide is the leading supplier of hydrogen peroxide-based technologies and services for environmental applications. We have been serving the water, wastewater and remediation markets for over 15 years and have offices and field service locations throughout North America.

Our consultative approach to problem solving includes application assessment, technology selection (which may include lab scale testing, if necessary) and development of a tailored treatment approach. Our full-service programs successfully integrate storage and dosing equipment systems, chemical supply, inventory and logistics management, and ongoing field and technical support. This approach provides cost-effective "hands-off" solutions to our customers.

Getting Started

We look forward to supporting your refinery treatment needs, whatever the scale of your requirements. To obtain a streamlined refinery treatment solution tailored to your specific needs, please call 877-346-4262 or email: info@h2o2.com