nickel removal treatment of wastewater system brings effluent levels into compliance

**challenge**

**High nickel content in stormwater impacted discharge into local tributary**

A petrochemical plant in North America (southeast Texas) exceeded its permitted daily average mass loading limit for nickel (Ni) discharge into a local tributary in January 2012, because the stormwater being processed through the plant’s wastewater pond system contained high levels of nickel.

During the previous summer, routine sampling activities in one of the upstream wastewater treatment ponds suspended non-soluble Ni that had settled in the sludge on the bottom of the pond. Re-suspending the settled material containing nickel resulted in higher than normal Ni concentrations in the wastewater system.

Once higher than normal Ni concentrations were detected, operators at the facility based on past experience, began feeding MetClear* MR2405, a SUEZ metals removal product for wastewater systems, into the pond at a rate based on past practice.

Over the next 30-days, treating the ponds with MetClear MR2405 brought the Ni concentrations in the discharge down within compliance limits.

The problem with high Ni concentrations, however, resurfaced in January 2012, when for much of the month, captured stormwater from a retention pond was being pumped to the aerated treatment ponds for processing.

After investigating all potential sources of Ni in the plant through sampling and analysis of samples by an outside compliance lab, the stormwater retention pond was identified as the contributing source of the excess Ni.

Heavy rainfall during the previous two months had significantly raised the liquid level in the stormwater pond to a point where it had to be pumped to the wastewater pond system for treatment. However, pumping untreated stormwater into the wastewater ponds threatened to push Ni concentrations to the total mass discharge limit (TMDL) and jeopardized permit compliance, which could result in potential enforcement actions for non-compliance with discharge limits.

**solution**

**Product treatment and analytical tool remove Ni from wastewater stream**

On SUEZ’s recommendation in February and March, the plant stopped processing stormwater in the aerated pond system. MetClear MR2405 was applied to the inflow to the final pond to drop the Ni concentration in the pond effluent. Then to increase Ni removal throughout the pond system, plant operators began feeding MetClear MR2405 to the outflow from a central pond. Applying MetClear MR2405 to the outflow of one of the central ponds took advantage of the quiescent conditions of three downstream settling ponds that preceded the final discharge pond.

Noncompliance with TDML for Ni was prevented during February and March by closely monitoring and controlling the pumping rate from the stormwater pond and treating the centralized ponds with MetClear MR2405.

Ultimately to address the high Ni concentrations in the nearly full stormwater pond, the plant again used MetClear MR2405 through March and April.

The system was setup to feed MetClear MR2405 into the stormwater flow, at the stormwater discharge...
point into the wastewater pond system; in addition, MR2405 was fed into the outfall of the downstream treatment pond where the stormwater had been discharged.

It was necessary to establish a reliable method of Ni testing to measure levels over time, but the only available option initially was a third-party, compliance-certified, commercial laboratory that took at least a week to provide results. Instead, SUEZ’s account manager for the plant, found a bench-top analytical method that utilized the DR2800 spectrophotometer system in use at the plant. Applying this testing method allowed SUEZ to survey Ni levels throughout the pond system and receive results within minutes that were very reproducible and consistent with the compliance lab’s Ni measurements. Routine Ni surveys were conducted each week to optimize the MetClear MR2405 application rates and to test the discharge water to assure the treatment’s effectiveness.

By establishing a sampling and monitoring plan, applying a bench-top analytical solution and furnishing expert consultative advice, SUEZ brought its full range of services into play to gauge and ensure the effectiveness of the MetClear MR2405 applications.

**Results**

**Stormwater and nickel levels go way down to assure discharge compliance**

The measures implemented by SUEZ paid off. In the wake of the controlled MetClear MR2405 application, the potential for immediate permit noncompliance was avoided, and stormwater was processed through the pond system, without exceeding the Ni TMDL discharge limitation. The stormwater pond level was lowered from about 12.5 feet, or 80 per cent capacity, down to about 7 feet, or 50 per cent capacity, within about four weeks. And, the pond level continued to drop to desired levels, so the threat of an overflow, and an accompanying threat of an unpermitted discharge, was eliminated.

With routine Ni sampling and monitoring to enable the proper adjustment of the MetClear MR2405 addition rate, daily Ni reduction in the discharge pond outfall typically reached 70 per cent, which dropped and maintained the Ni concentration in the wastewater ponds to normal system levels.