

# Spectrus\* NX and BIOSCAN\* ATP Monitoring Dramatically Decrease Bulk Water Counts and Reduce Unscheduled Downtime at Steel Mill

## Challenge

A major Southeastern steel mill wanted a microbiological control program that used biocide only when needed...not simply fed on a predetermined schedule. They also wanted a biocide that did not foam, because foaming in their Direct Reduced Iron (DRI) clean water system would shut their process down.

The DRI process produces low carbon iron directly from iron ore by using a reducing gas, such as methane. A wide variety of feedstocks (iron fines, wastes) and reducing agents (methane, coke oven gas, coal) can be used to produce 90% to 95% metallized iron containing only 1% to 4% carbon. DRI pellets can be used to supplement scrap charges into an electric furnace to achieve better end use product quality.

The DRI reactor, in which iron ore is reduced to Fe, must be kept under a gas seal at the top and bottom of the reactor. Any biocide that foams (e.g., quaternary compounds) breaks the gas seal on the reactor once it is added to the clean water system. After the seal is broken, the reaction is interrupted and production is shut down.

Initial bulk water counts at the mill were only 60,000 CFU/mL in the bulk water as measured by BIOSCAN adenosine triphosphate (ATP) monitoring, but reached as high as 4,000,000 CFU/cm<sup>2</sup> on mild steel monitoring coupons. The mill had a particular concern about sessile bacteria in their DRI facility, because biofouling can quickly force an unscheduled outage to clean seal gas coolers.

## Solution

The combination of a non-foaming microbiological control agent, Spectrus NX, and BIOSCAN monitoring satisfied both of the mill needs. In addition, metal-free

Spectrus NX contributed no copper or iron to this critical system.

Mill personnel like to use BIOSCAN ATP monitoring because:

- It's fast. Results are obtained within seconds of sampling.
- BIOSCAN testing is easy. Mill operators took turns running tests, and all said they were very comfortable with the test method. This enables the mill to feed biocide only when needed.
- Treatment program corrections are made immediately. No more running three to five days behind actual conditions because of incubation requirements.
- BIOSCAN monitoring measures total microbial populations. Bacteria (aerobes and anaerobes), as well as molds, yeasts, and algae, are counted without performing multiple MB tests that require different media and incubation conditions.
- BIOSCAN is flexible and can be used to quantify both bulk water and sessile bacteria.

## Results

Bulk water counts decreased from 60,000 CFU/mL to less than 1,000 CFU/mL 18 hours after biocide addition. Sessile bacteria were kept from reattaching to cleaned coupon surfaces, even after 24 hours. The fact that Spectrus NX does not foam means mill personnel do not have to feed antifoam after each biocide addition. This also avoids unscheduled shutdowns for seal gas cooler cleaning or gas seal leaks.



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