

CASE STUDY # 039

BIOLOGICAL OIL REMOVAL FROM STEEL MILL SLUDGES

SUBJECT:

Bioremediation of Oil Contaminated Steel Mill Rolling Mill Scale.

PRODUCT APPLIED: MICROCAT[®]-XBS, MICROCAT[®]-NP, MICROCAT[®]-SH

PROCEDURES & OBJECTIVES:

"Bioslurry Methods" were used for remediation of steel mill waste sludges containing metal oil residues. The objective was to reduce the oil content of the rolling mill sludges in order that they be rendered in a non-hazardous classification and ideally that they then be recycled in the steel mill sinter plant for their metal values.

SOIL CHARACTERISTICS

Rolling mill scale and metalworking oil residues of eight to sixty percent.

PROGRAM:

Phase I

Initial bench-scale testing determined that a single stage biotreatment process, operating in a semi-continuous mode, could effectively reduce the mill scale oil by approximately 75%. Bench-scale studies indicated that washing steps, readily incorporated into the initial slurry procedure and final metal solids recovery had the potential for further oil reduction in the complete process.

Phase II

Prewashing of the sludge involved slowly mixing in **MICROCAT-SH** surfactants and water followed by high speed high shear mixing. All decanted aqueous suspensions were then added to the bioreactor.

The bioreactor consisted of conical bottom reactors, mechanical mixers and an air sparging system. The reactor was operated in a semi-batch mode using **MICROCAT-XBS** as a microbial inoculum. A 10% solids slurry of the sludges containing adjusted nutrients (**MICROCAT-NP**) was added to the reactors along with daily removal of an equivalent amount of mixed liquor. The hydraulic retention time and solids retention time was 21 days.

Postwashing of the solids was accomplished by high speed mixing and surfactants. All waste process wash water was pumped into an aerated biological wastewater treatment cell for final treatment.

RESULTS:

A final solids oil content of 1.3% on average was achieved (Figure 1)

BIOSLURRY OF STEEL MILL SLUDGE OIL CONTENT OF SLUDGE

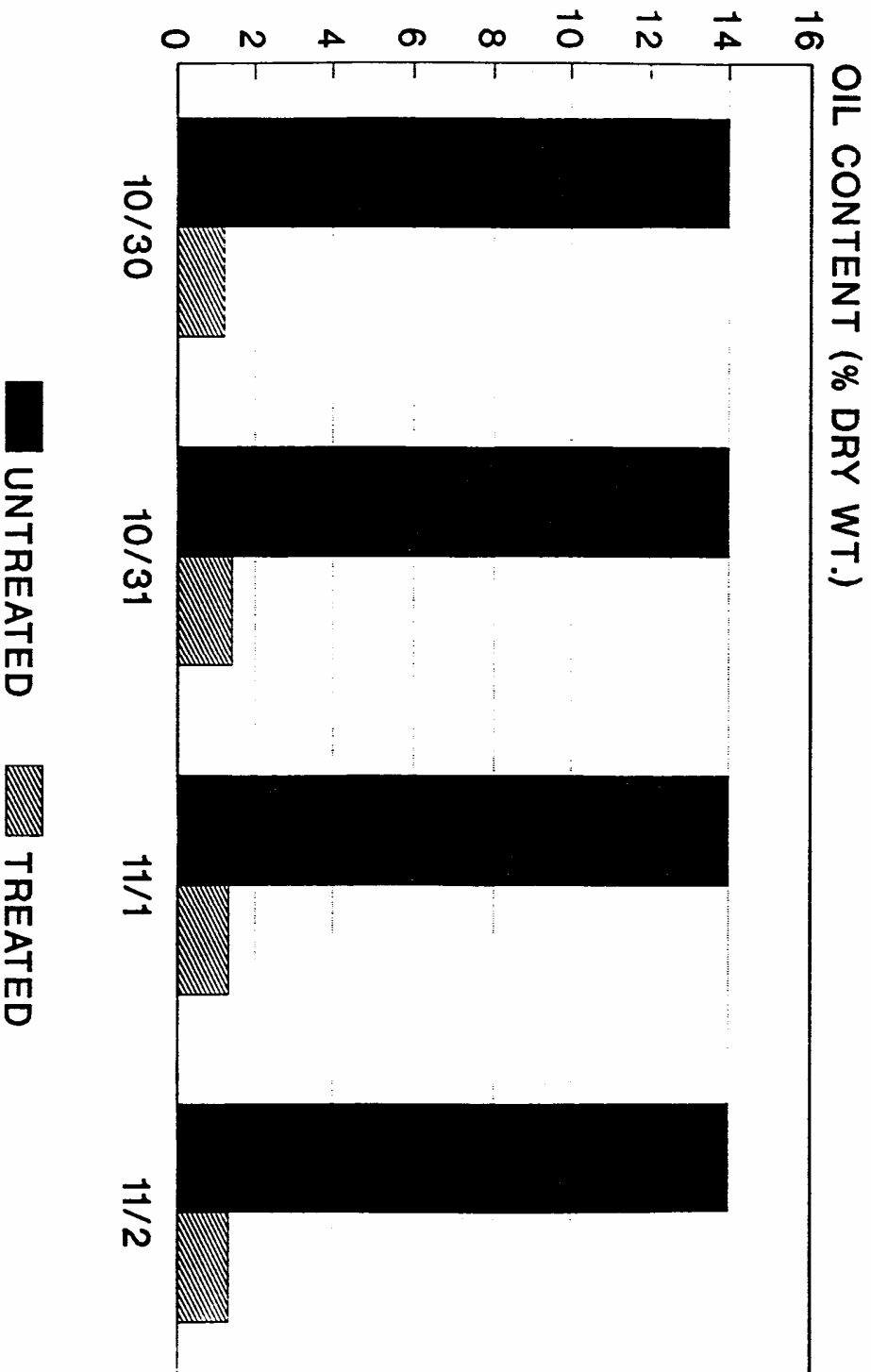


FIGURE 1