Remediation of Hydrocarbon Contaminated Soils in a Soil Cell

A BioNorth Solutions Case Study

Client Problem: Over years of operations at a mining site in Northwestern Ontario, the daily use of heavy equipment has resulted in the build up of multiple tonnes of contaminated soil on site. The soil is saturated with gas, diesel, oil and crude fuel and needs immediate remediation.

Solution: An evaluation of the suitability of Microbiate SG™ was undertaken. BioNorth Solutions and the client determined that soil cells should be constructed and treated with Microbiate SG™.

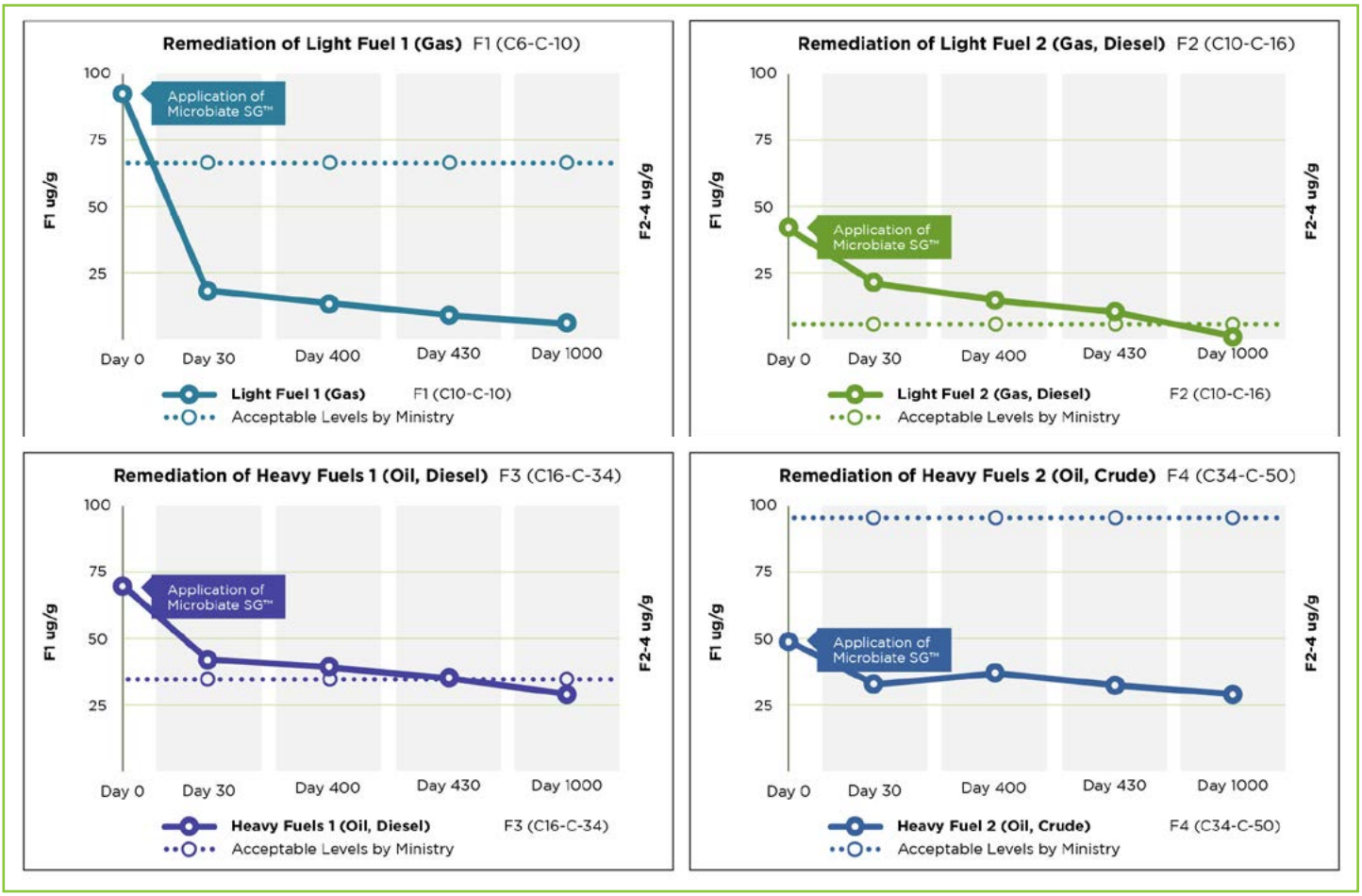
Protocol called for an initial application of Microbiate SG™ subsequent to soil cell construction. Samples were to be tested for bacterial cell counts and hydrocarbon (spilled fuel) concentrations on a monthly basis. This evaluation would allow for determination of annual application rates of Microbiate SG™.

Treatment: The soil cell was built at the client site and divided into sub-cells. Soil type varied. The picture above shows the initial construction of the soil cell.

Microbiate SG™ was applied to the Cells in mid to late summer. Over the temperate season of the first year (2-3 months time after application of Microbiate SG™ in late July/ August) moisture levels were maintained at an average of 11%, slightly drier than optimal; soil was sampled after 30 days. This is representative of Day 0 and Day 30 on the accompanying graphs.

In the second year, contrary to recommendations, the cells were not retreated with Microbiate SG™ and were sampled in September and October of that year, representative of Day 400 and Day 430 in the accompanying graphs. The cells were not tested in year 3, the cell was again tested in May of the following year, representative of Day 1000 in the accompanying graphs.

Remediation Results Of A Contamination Site Using Microbiate SG™



The graphs above displays the results of soil sampling and subsequent analysis by ALS Environmental. Microbiate SG™ was to have been applied on an annual basis to the soil cell based on sampling results, a change in management at the client site altered the course of work on the soil cells. Results shown are from a single application of Microbiate SG™ in a soil cell that was not kept to specifications over time.

Results: The graphs display results that are typical of hydrocarbon (spilled fuel) degradation using Microbiate SG™. The initial decline in concentration is rapid, as the most accessible hydrocarbon chains are being consumed. Hydrocarbon degradation then occurs at a slower rate as the chains become more difficult to consume. Had subsequent applications of Microbiate SG™ been applied it is highly likely hydrocarbon degradation would have been accelerated.

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Conclusions: Application of Microbiate SG™ was effective in reducing hydrocarbon (spilled fuel) contamination. Although application and maintenance of the site was not performed to specifications, Light and Heavy Fuel (F1-F4) concentrations have decreased to below acceptable ministry levels.

Light Fuel (Gas: F1) was reduced to within Ministry standards within the first month, Light Fuel (Gas, Diesel: F2) levels have met standards by the time of testing in year 3, Heavy Fuel (Diesel, Oil: F3) levels were met at just over 1 years time, and Heavy Fuel (Oil, Crude: F4) levels were within standards at the time of project initiation.