

Bioremediation Technology

Bioremediation is a process which relies on micro-organisms to break down and detoxify organic chemicals such as hydrocarbons, and some organo-chlorines. Carbon dioxide and water are the final degradation products for hydrocarbon wastes using this process.

Bioremediation has a number of applications within the mining industry; including the treatment of the following types of wastes:

- oily sludges;
- hydrocarbon contaminated effluent (eg. heavy equipment washdown pads);
- hydrocarbon contaminated soils;
- specific low volume oil spillages; and
- workshop and power station liquid wastes.

Within Australia, bioremediation is being used as a cost-effective alternative for the treatment of wastewater effluent and hydrocarbon contaminated soils. Most applications involve the construction of a 'bioremediation pad', and implementing the process known as landfarming. Landfarming involves the spreading of wastes (usually about 30 cm thick) over the ground to enhance the natural degradation process.

This procedure involves the use of soil micro-organisms, water or effluent application, nutrients (usually fertiliser) and oxygen (air). This technique is highly suited to minesites in arid regions, due to the higher degradation rates that can be achieved with high air and soil temperatures.

Prior to commitment to this technology, the soil and effluent stream need to be assessed by a suitably qualified laboratory for the following:

- soil type (particle size analysis, organic content, etc.);
- the level of activity of hydrocarbon degrading microbes (ie. C17: pristane ratio);
- the nutrient status of the material to be degraded;
- the moisture content; and
- concentration of specific hydrocarbon fractions.

In the event that insufficient numbers or incorrect species are present, then the waste stream can be inoculated with microbes that are grown within an on-site bioreactor.