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The BioSoil Soil Treatment Installation

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Background

In most cases of a soil contamination the contaminated soil is excavated and transported to a landfill or treatment installation. This method does have some disadvantages:

1. The disposal of contaminated soil results in numerous transport movements.
2. The disposed contaminated soil is sometimes brought to a storage area or landfill and thus basically it shifts the problem.
3. The disposed volume of soil needs to be replaced by new material.

Soil consists of various fractions, like sand, clay and organic material. The mutual relations of these three fractions determine the type of soil. Sand most often is the main fraction. Known exceptions to this are clay and peat, which consist mainly out of clay parts and organic mater.

Most of the contaminants attach mainly to either the organic material or clay parts. Therefore once the soil is separated in the various fractions a large part can be reused on-site. The sand fraction can be re used on – site and the, much smaller, volume of strongly contaminated clay, silt and organic matter can either be treated or brought to a landfill.

In order to separate the contaminated soil BioSoil B.V. has designed and constructed a mobile soil treatment installation. The entire installation can be transported and made operational within a few days. Because the installation is basically a sieve, no permits (in the Netherlands) are needed. The sound level of the installation is so low that also within a rural area the installation can be used (see picture above). The main sound is caused by the power supply.

The installation

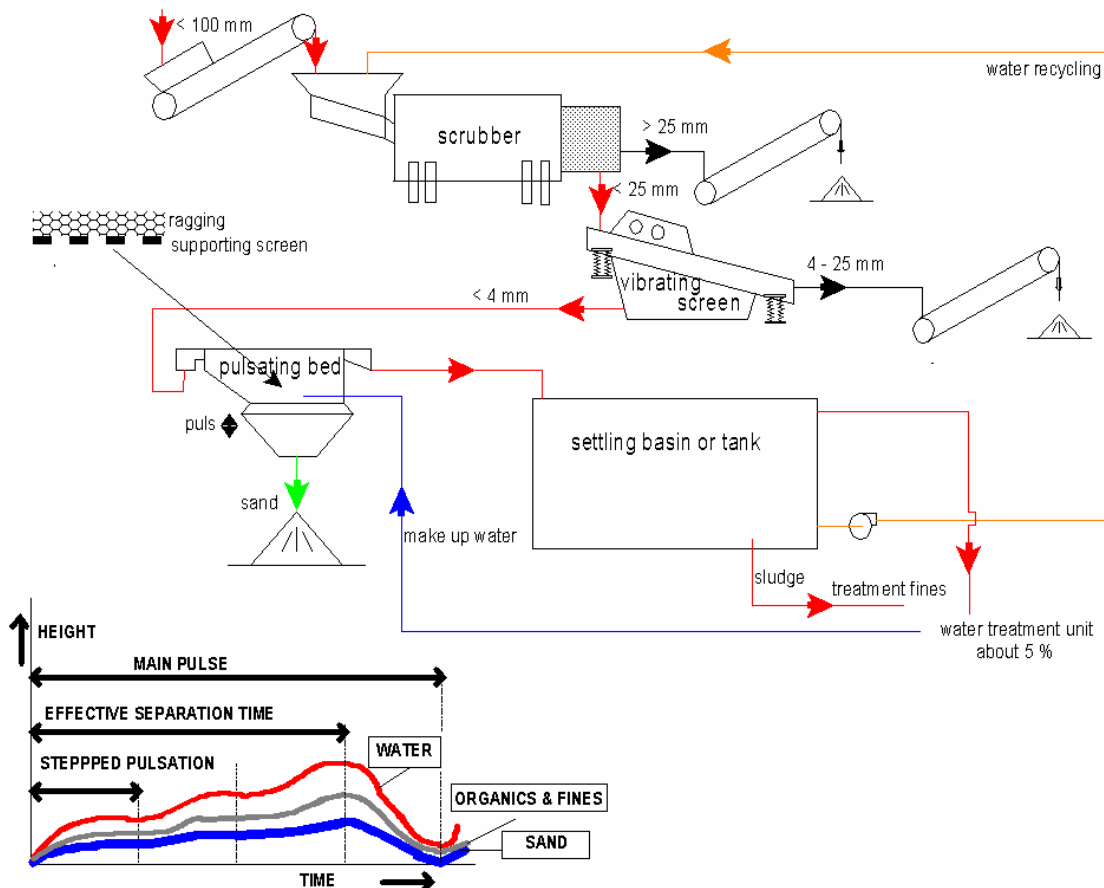
In the installation the soil is separated into different fractions based on difference in density by means of a pulsating bed (a so called jig). The installation basically operates as follows (see scheme on next page):

- The contaminated soil is sieved (dry) on about 10 cm for removal of coarse debris etc.
- The soil is then mixed with water and sieved (wet) in a scrubber on a diameter of 25 mm and afterwards on a 4 mm vibrating sieve. The fractions (> 25 mm and > 4 mm) removed in these two steps are most often not contaminated and ma reused.
- The remaining water/soil mixture is pumped to the jig, where it runs in a thin layer (5 – 10 cm) over a screen on which a coarse gravel bed (ragging) is placed.

- The water is pulsated vertically using a bellows.
- By the pulsation and the net upward flow of clean water (hudge), the sand, which has the largest density, is caught in the ragging. The organic matter and the fine materials (clay and silt) are removed with the water.
- The sand passes through the ragging and is removed at the bottom of the jig, after which it is dewatered by a dewatering sieve.
- The sludge (water/clay/silt) is collected in a storage depot. The sludge can be dewatered either by a natural process or by a sieve belt press.
- The water from the sludge depot is reused after treatment in the process. In this way little fresh water is needed and therefore also less water needs to be disposed of.

By the treatment the contamination is concentrated in the organic matter. The sand fraction hardly contains any contaminants. Usually the treatment results in a reusable amount of about 80-90% (depending on the soil type).

The concept has been developed by BioSoil R&D in close cooperation with MTI Holland and has been extensively investigated in the by NOVEM sponsored programme T2000. A publication of that development is available The jig technology has been used in the mining industry for decades, for separation of minerals. By various adjustments the technology has been made usable for the treatment of contaminated soil.



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