Treatment of Contaminated soil and waste

A matter of separation
Let’s make it clean

Decontamination of soil is a matter of separation

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A flowsheet involving pre-treatment classification, flotation and dewatering was developed and verified in pilot scale at the Metso laboratories. Metso engineered and supplied the plant shown below with guaranteed performance.

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Metso has been a leading supplier of separation processing equipment throughout the century.

Through the years the company has also developed equipment and methods for environmental control.

Metso goes all the way from investigation, process design, equipment manufacturing as well as engineering, plant erection and commissioning.

Our people around the world are located close to you, in order to understand the forces that shape your business realities. This empowers us with unique insight to create effective solutions that increases the productivity and environmental quality of your operations.
Offshore and beach oil/sand separation

The sand scrubber system:
- Reduces oil content from 70000 to less than 30 ppm in drilling sand
- Opens a way for offshore sand discharge
- Treats also beach sand and bottom sludge from tanks and tankers

Thermal systems for volatile contaminants
The PYRO Kiln system, developed by the Metso Pyro division, is an established technology for removal of primarily organic contaminants. As an alternative the Metso Holo-Flite® processor, offers the following unique features:
- Indirect heating. No contact between product and heating media
- Exhaust gas only originates from the waste
- Heat transfer through the heated media means maximum utilisation of energy
- Excellent control of mass flow and temperature
- Operation up to 315°C / 600°F
Steps in the soil-washing process

A simplified general flowsheet of a soil washing process is shown above. All the unit operations must not necessarily be used in the system. Also variations and additional steps may apply from case to case.

As illustrated, practically all components critical for the process will be delivered by Metso. We also provide process services, engineering and plant commissioning. Adaptions and modifications of the process are available depending on specific needs.

1. Feeding
The feed is charged by front loader to a feed station. Stones, stubs and the like are rejected on a grizzly. Special conveyor arrangements, here Stephen Adamson apron feeder, allows for feeding of clay and sticky materials.

2. Coarse screening
The coarse fraction material is normally unpolluted. The +2 mm oversize material may simply be screened off and recovered as a product on a Metso Low Head Wet Screen. In the following treatment the soil will be in slurry form.

3. Desliming
Material finer than 0.03 - 0.1 mm is normally heavily contaminated. Cyclones are suitable for separation of the fines. Overflow fines are dewatered with the toxic concentrate from the further processing.

4. Attrition scrubbers
Contaminants are released from the particle surfaces by friction forces. As alternative to Metso attrition scrubbers, the Metso Washing Drum or SRR Mill may be preferred for this purpose.
5. Conditioning
Chemicals are added for the preparation of the particles to make them respond as desired in the following flotation. Heavy duty Metso slurry mixers are used for the conditioning.

6. Flotation
Finely dispersed air bubbles introduced in the flotation circuit will attract hydrophobic material. The conditioning will direct a certain substance to a float or sink product. Selectivity is the prime quality of the Metso flotation cells.

7. Gravity separation
Gravity separation is an alternative to flotation, which may offer cost advantages in particular for the separation of light organic material.

8. Dewatering of clean sand
Recovery of clean sand and pre-clarification of process water is made in one step in Metso screw dewaterers. Alternatively cyclones in combination with a dewatering screen may be used in this position.

9. Froth pumping
Pump and pump sump are integrated in the Metso VF pump, making it ideal for feed from various sources. The VF pump is in addition specially developed for froth pumping. The VF, like the alternatively VS pump, uses no sealing water, accepts dry running and is simple to maintain.

10. Dewatering of concentrates
The concentrated contaminated sludge may be dewatered with the Metso Vertical Plate Pressure Filer, VPA, before further processing or final controlled disposal.

11. Water recovery / sludge concentration
Conventional clarification and thickening would have been a bottle-neck in a mobile soil-washing plant. The Metso inclined plate settler gives 100 m² mobile heavy duty settling area.

12. Slurry pumping
Abrasive resistant slurry pumps are to be used in all positions. The VS pump uses no sealing water, accepts dry running and pumps gravel material if necessary.
Laboratory and field test services

Virtually all components used in soil washing plants today are supplied by Metso. Dimensioning laboratory bench and pilot studies can be made for each individual unit process. Various flowsheets can be built up and checked out in pilot scale at our laboratories or in the field. We can offer a wide experience in the design of processes and systems as a guide to optimum ways of treatment. Where performance and sizing criteria are not fully known, tests, equipment modifications and process development will be made to solve the problem.

Cyclosizer. Preparation of feed material for fraction analysis.

Bench tests for flotation and other solid/solid separation methods.

Pilot vertical plate pressure filter, VPA, in the Sala laboratory.

Pilot plant with a capacity of 1 tph for on-site treatment of a creosote contaminated soil, on lease by NOAH and Aquateam A/S, Norway.
The Metso process system group has delivered more than one hundred processing plants throughout the years. Some of these have been of mobile or semi-mobile, design, in itself a record by number in mobile plant commissioning.

The plants may be supplied as:

- Fully mobile on wheel carriers or king-pin trailers
- Semi-mobile in standard container size frame modules, dismantled and moved on regular transports from one site to the next.
- Stationary plants, designed for high production capacity. A mobile plant will be limited to a capacity of some 30-50 tph. The stationary plant may be preferred from multiple units of mobile type when high capacities are required.
- The engineering can be adapted from previous plants shortening delivery time and promoting plant availability.

Mobile and modular plant experience

Metso supplies:

- Equipment and equipment packages
- Erection and erection supervision
- Laboratory and field testing
- Basic and detailed engineering
- Education and start-up services
- Plant documentation
- ... or altogether, process solutions with performance guarantees.

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