



This equipment package includes descriptions of the process lines, the technologies used, and the overall equipment configuration. Processing parameters and conditions are presented in summary form. A process material balance and a list of consumables for a specific process line must be developed through laboratory testing based on the information provided by the customer in the technical specification.

PROCESSING OF ASPHALTENE-RESIN-PARAFFIN DEPOSITS AND AGED OIL SLUDGE



Mobile configuration: Each plant module may be fitted with a semitrailer of suitable load capacity for transport on public roads. The plant may also be fitted with equipment for unloading some modules from their transport vehicles during operation.

Time required to prepare the equipment for transport: 1 day.

Stationary configuration: The equipment is supplied with the utility connections needed to link the modules, taking into account possible placement constraints at an industrial site. No transport vehicles are included, but all modules remain mobile.

Time required to prepare the equipment for transport: 2 days.



As oil sludge ages, light fractions evaporate, emulsions stabilize, and the share of asphaltenes, resins and paraffins rises. Such sludge is difficult even to incinerate, let alone treat by physicochemical methods. Similar deposits accumulate in oil pipelines and preparation tanks.

To process high-viscosity oil sludge rich in heavy hydrocarbons, this three-module line blends it with liquid oil sludge, breaks down the heaviest fractions and reduces the density of the homogenized product to a level comparable with crude oil. It is intended for refineries and oil-production sites where these deposits repeatedly form.

MODULE 6 — REMOVAL OF HYDROCARBONS FROM SEDIMENT AND SOIL

Module 6 starts the process. It receives bottom sediment and asphaltene-resin-paraffin deposits from sludge lagoons, aged oil sludge and soil slurry. In a vertical extractor, the feed is blended with a small amount of a light hydrocarbon stream, such as emulsified crude oil, recovered trap oil, liquid oil sludge with a pour point below -10°C , off-specification gas condensate or other liquid hydrocarbon waste.

Two stages treat the sediment and soil, and two treat the liquid fraction. After each solid-treatment stage, thickened soil undergoes hydrocavitation and steam-jet treatment; at the second stage, a vertical extractor applies a special solvent and other reagents. The liquid fraction also passes through two hydrocavitation and steam-jet stages. Recovered light hydrocarbon concentrate is collected after each stage and sent to Module 3 for final separation. Solvent-treated solids go by conveyor to Module 7.

MODULE 7 — SEDIMENT SETTLING AND DEWATERING

Module 7 receives thickened soil containing solvent from Module 6. In an acoustic disintegrator, an intense acoustic field separates residual hydrocarbons from the soil; the hydrocarbons then form an emulsion with water. The emulsion and soil undergo two stages of hydrocavitation and steam-jet treatment. The remaining water-hydrocarbon mixture is sent to Module 3.

MODULE 3 — SEPARATION OF PURIFIED OIL PRODUCT FROM EMULSION

Module 3 removes free water and solids from the concentrated light hydrocarbons delivered by Modules 6 and 7. An elongated horizontal three-phase centrifuge (3,000 rpm) with screw discharge of solids is followed by a three-phase disc-stack separator (5,000 rpm). Both machines are designed for hydrocarbon treatment. The module includes solids-discharge equipment, heat exchangers and demulsifier and flocculant dosing systems.

A separate control compartment houses the automation and power supply for the acoustic equipment and motors. It is isolated from the process area by a double sealed partition and kept at positive pressure by clean-air ventilation to support explosion-safe operation.

TYPES OF WASTE TREATED

Oil sludge containing high levels of sulfur, chloride salts, nitrogen compounds, heavy metals or rare elements; asphaltene-resin-paraffin deposits; high-viscosity and solid oil sludge stored for up to 60 years; and oil-contaminated soil.



EQUIPMENT CONFIGURATION		
Module	PROCESSING OF ASPHALTENE-RESIN-PARAFFIN DEPOSITS AND AGED OIL SLUDGE	
Module 3	14.0 t — Separation of purified oil product from emulsion (centrifuge and separator)	
Module 6	12.0 t — Removal of oil products from sediment and soil (integrated sediment treatment)	
Module 7	10.5 t — Sediment settling and dewatering (water treatment and final sediment treatment)	
Design processing capacity:	High-viscosity oil sludge	5 t/h
Rated throughput by feedstock type	Soil and drill cuttings	5 t/h
Feed composition accepted for treatment:	Hydrocarbons	Predominant
	Water	≤50%
	Soil	≤30%
Utility requirements at maximum processing load:	Electric power	95 kW
	Steam	1,200 kg/h
Consumables (indicative values, subject to confirmation):	Demulsifiers	250 g/t
	Flocculants	500 g/t
Achievable parameters for treated hydrocarbon concentrate:	Water	0.5–1%
	Mechanical impurities	0.05–0.1%
Achievable parameters for treated soil:	Hydrocarbons	0.05–0.1%
Achievable parameters for treated water:	Hydrocarbons	0.0005%
		5 mg/L