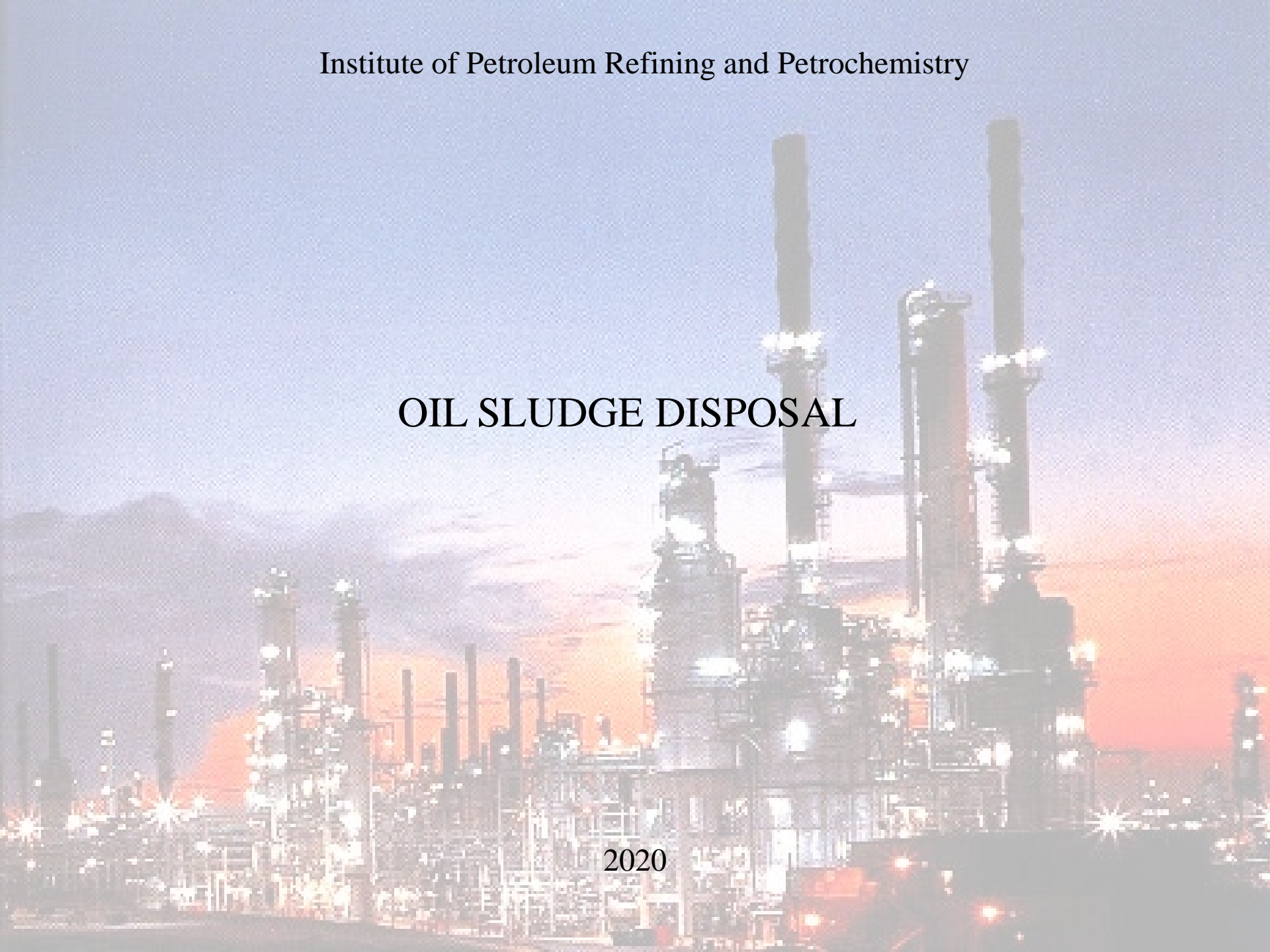


# OIL SLUDGE DISPOSAL

2020



- development and integration of new processes in the field of waste recycling and disposal, industrial gas emission and waste water treatment, and oil-contaminated soil remediation
- detail design, equipment supply, and turn-key construction of mechanical, physical and chemical and biological treatment facilities, waste recycling and disposal units, gas emission treatment units, industrial waste and solid waste landfills for oil-producing and oil-refining facilities, fuel and energy complexes, mining plants and smelters, and housing and utilities sector
- development of regulatory documents (maximum permissible emission, maximum permissible discharge, draft waste generation standards and waste disposal limits, calculation of water consumption and discharge rates, etc.)

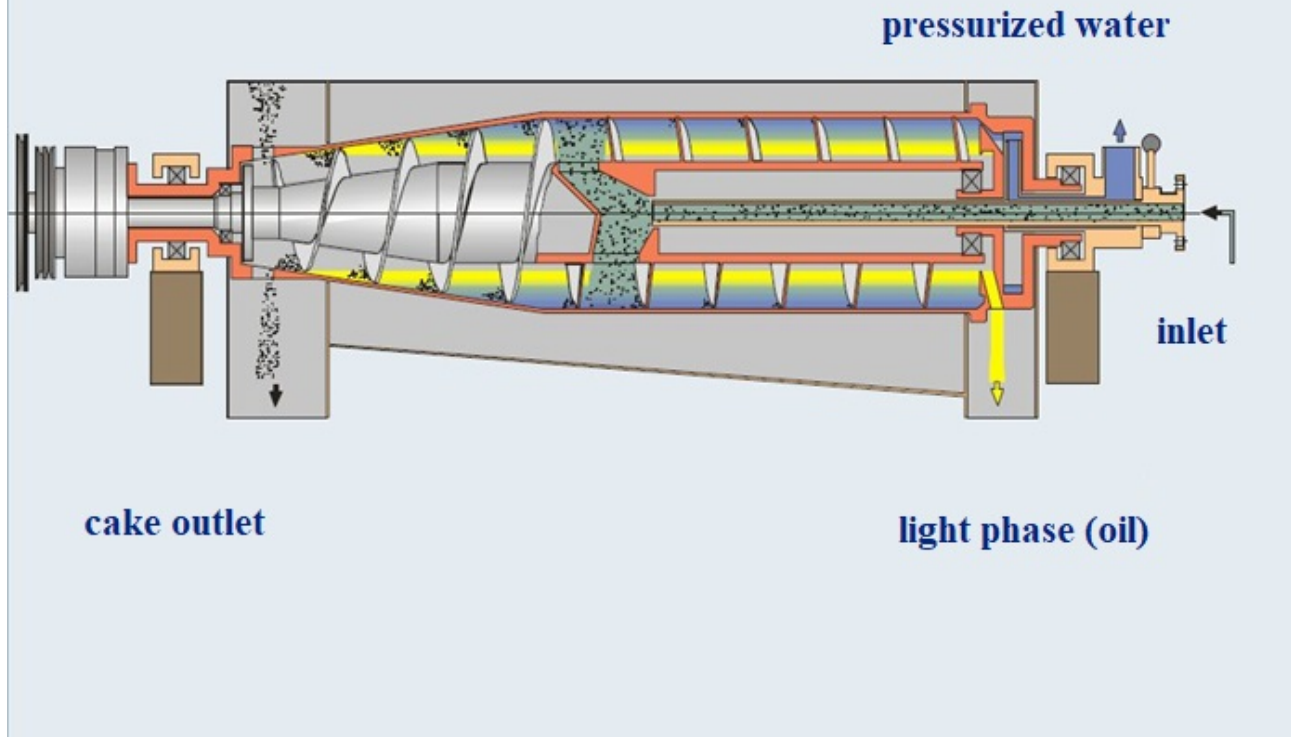
## Main Types of Refinery Waste

- Liquid oily waste
- Bottom sediments
- Surplus activated sludge at biological treatment plants
- Post-centrifugation cake
- Contaminated soil

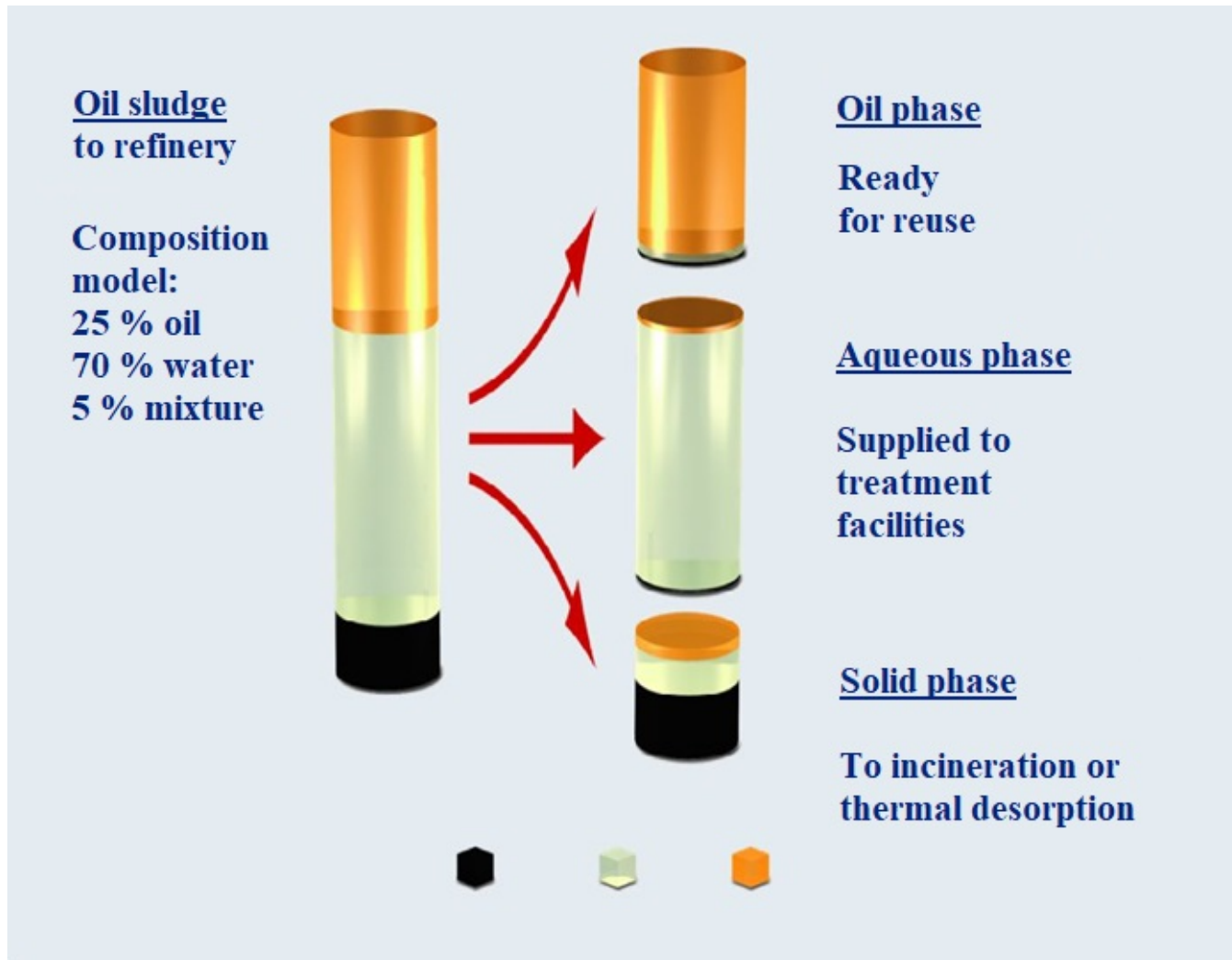
- Oil sludge gathering and pumping unit
- Sludge tanks
- Heat exchangers
- 3-Phase centrifuges
- Accumulation tanks for water-free oil products
- Reagent dosing station

# Three-phase centrifuge

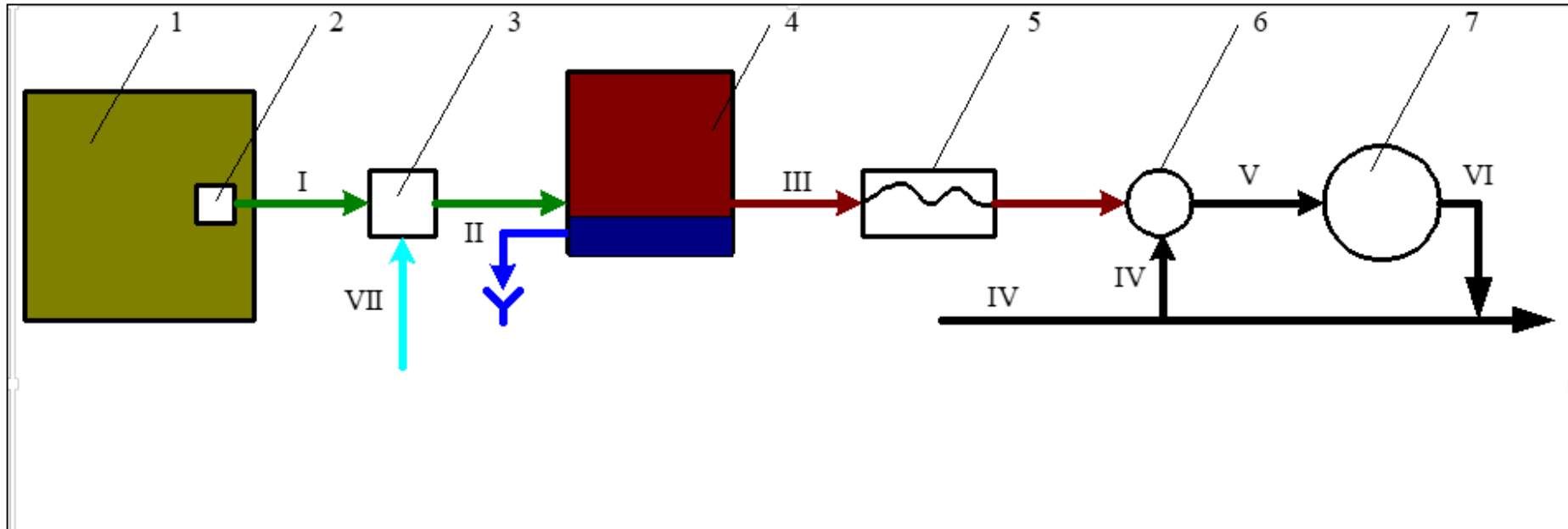
## Three-phase separation



# Typical separation



# Process flow diagram of a unit adding emulsive sludge to heating fuel



## Equipment:

1 – sludge collector; 2 – oil skimmer; 3 – activator; 4 – make-up vessel;  
5 – dosing pump; 6 – mixer ; 7 – disintegrator

## Flows:

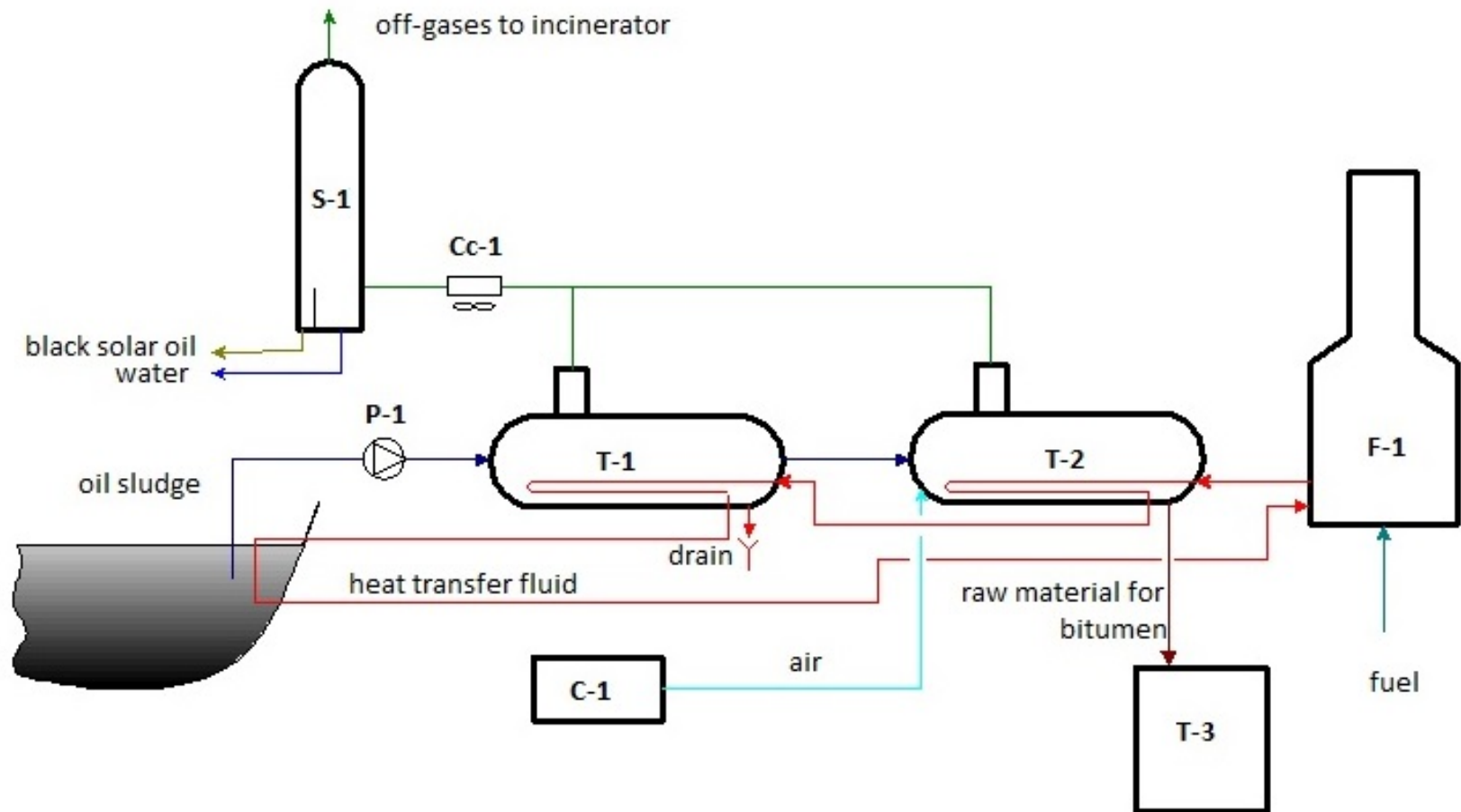
I – oil sludge; II – treated water; III – emulsive oil sludge; IV – heating oil; V – mixture of treated oil sludge and heating oil; VI – fuel composition; VII – gas-vapour mixture

- Atyrau Refinery, LLP
- Bashneft-Ufimsky Refinery, PJSC
- NNK-Khabarovsk Refinery, JSC
- Shymkentnefteorgsintez, OJSC
- Slavneft-YANOS, OJSC
- Bashneft-Ufaneftekhim, PJSC
- Angarskaya Petrochemical Company, JSC
- Lukoil-Ukhtaneftepererabotka, OJSC



# Flow diagram of oil sludge recycling to give bitumenous raw material

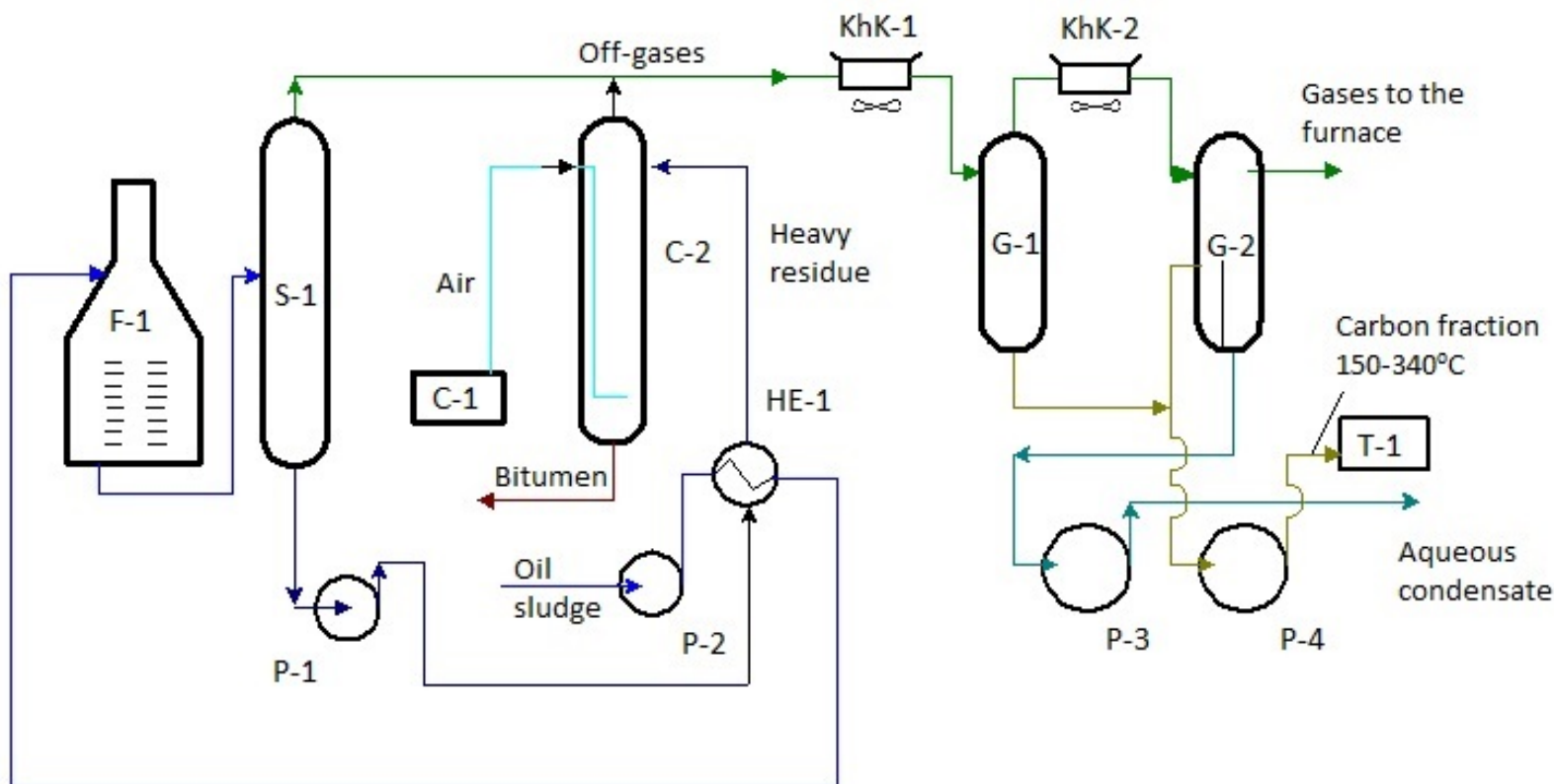
Gazprom neftekhim Salavat, LLC



F-1 – furnace; T-1 – stripping tank; T-2 – oxidizing tank; T-3 – ready product tank; P-1 – screw-type pump;  
C-1 – compressor; Cc-1 – condenser-cooler; S-1 – separator

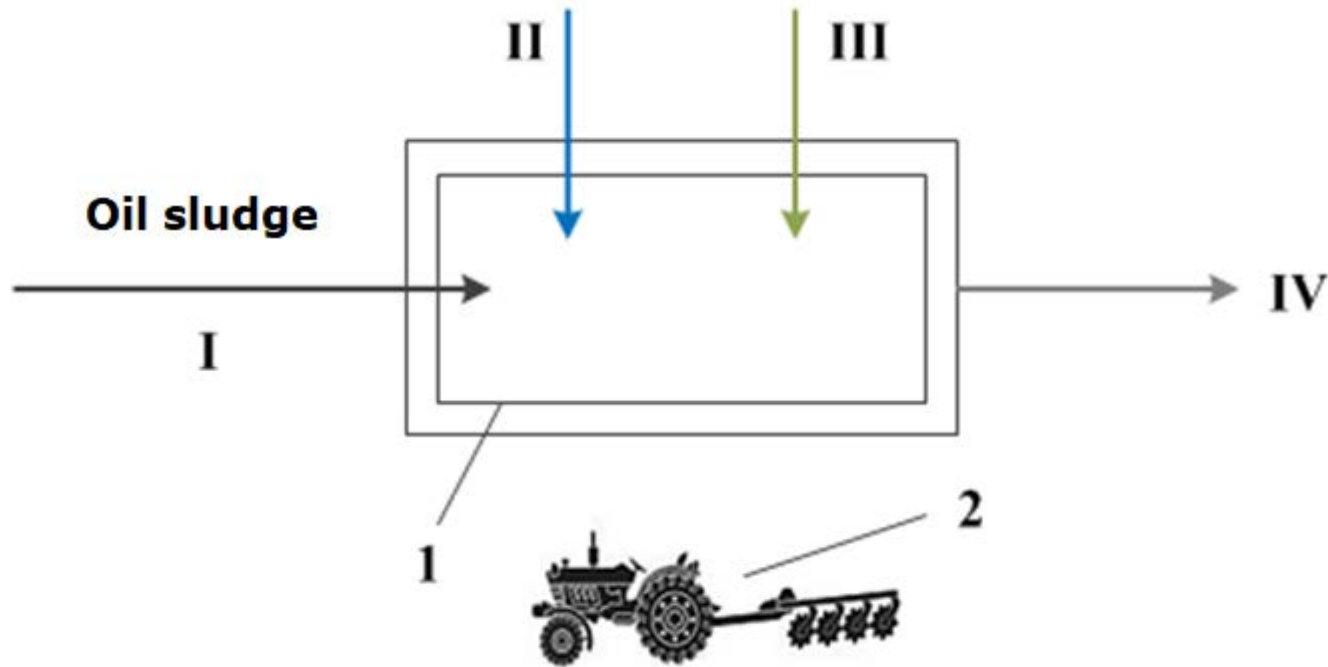
# Flow diagram of oil sludge recycling to give commercial road bitumen

Permavtodor, OJSC, Perm  
Bitumstroy, LLC, Noginsk



F-1 – furnace; S-1 – stripper; C-2 – oxidizing column; C-1 – compressor;  
KhK-1, KhK-2 – condensers; HE-1 – heat exchanger; T-1 – tank; G-1, G-2 – gas separators;  
P-1 - P-4 – pumps

# Biological destruction of hydrocarbons – oil sludge



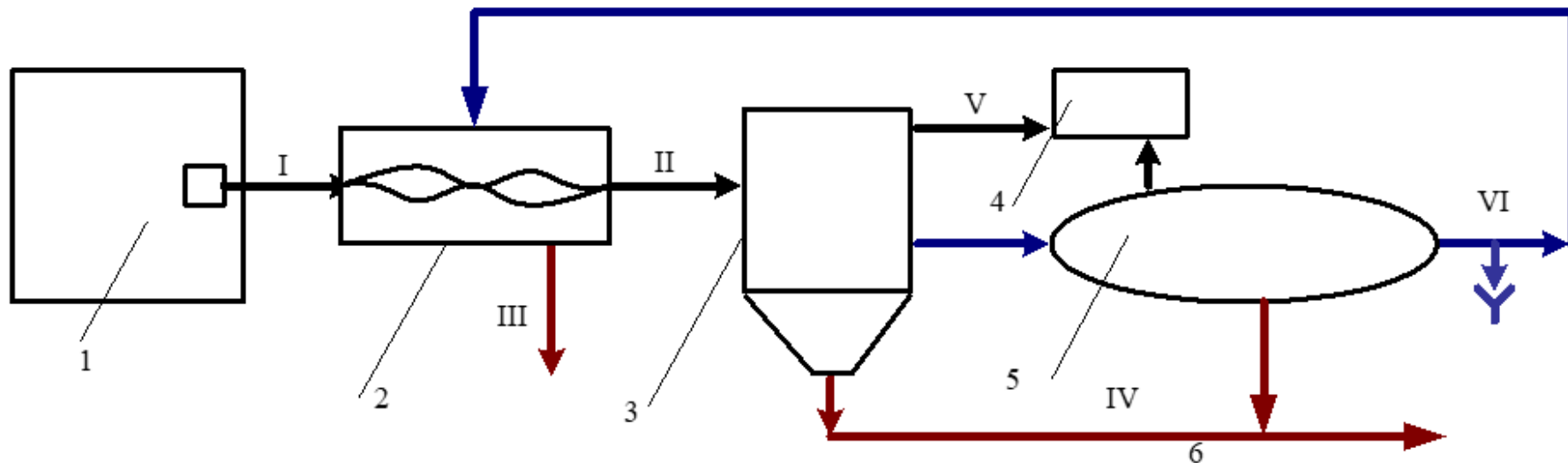
## Designation:

1 – landfill with impervious bed, 2 – landfarming machines.

## Flows:

I – oil sludge, II – biological preparation; III – mineral fertilizers; IV – remediation material .

# Oil-contaminated Soil Treatment Flow Diagram



## Equipment:

1 – oil sludge collector; 2 – auger agitator; 3 – hydrocyclone (Development of JSC «INHP»);  
4 – oil product tank; 5 – shelf sludge tank (Development of JSC «INHP»)

## Flows:

I – contaminated soil ; II – water after washing; III – treated soil; VI – fine fraction;  
V – oil product; VI – water with reagent