



# **GEMINI PROCESS**

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The Gemini Process offers clients an integrated technology based principally on the use of hydrocyclone technology.

## **Primary Operation**

- ⊃ *De-oiling of oil contaminated water lagoons*
- ⊃ *De-watering and solids removal from contaminated oil*
- ⊃ *De-oiling and de-watering of soil and sand tracts*

## **Secondary Operation**

- ⊃ *Bio-remediation of de-oiled 'soil' via mobile unit.*

## **Note:**

We can offer advice and possible solutions on down stream problems such as:

- ⊃ *Further treatment of recovered oils (upgrading)*
- ⊃ *Treatment and remediation of inorganic contaminants.*

## **ADVANTAGES OF THE GEMINI SYSTEM**

### **a) Separation of contaminants from water, oil and soil/sand**

The equipment can be used to achieve any of the above functions; it is a fraction of the weight, size and capital cost of conventional filters, centrifuges and or decanters.

The equipment:

- ⤷ *Has no moving parts*
- ⤷ *Can be used in continuous operation*
- ⤷ *Is not orientation sensitive*
- ⤷ *Is of modular design*
- ⤷ *Has turndown or expansion flexibility*

### **b) Bio-remediation (of recovered “soils”/sand)**

Mobile (modular design) bio-accelerator system which dramatically reduces the need for large dedicated land areas.

Specifically designed bacteria for destruction of a range of oleophilic materials (“oils”) and functional substituted hydrocarbons such as polyphenols, polychlorinated benzenes etc.

- ⤷ *The equipment has turndown or expansion flexibility.*

**PRIMARY OPERATION – SEPARATION OF OIL, WATER  
AND INORGANIC MATERIALS**

- (1) OIL LAGOONS
- (2) OIL CONTAMINATED WATER LAGOONS
- (3) OIL CONTAMINATED SOIL/SAND TRACTS

## (1) OIL LAGOONS

This type of problem involves the handling of medium to heavy oil deposits, which are contaminated with both water and inorganic sediments.

### **Removal**

The contaminated oil is removed by speciality heavy-duty skimmer pumps heated (if necessary) and transported via pipeline to the process area.

### **Processing**

The process is based on the disbursement of the contaminated oil in water and thereafter separated into various phases:

- ⊃ *Water*
- ⊃ *Oleophilic materials "oils"*
- ⊃ *Solids*

### **The Process Summary (SEE ALSO SCHEMATIC DIAGRAM FIG. 1)**

The heated contaminated oil from extraction area is held in heated intermediate tanks where it is mixed with water (experimentally determined) to optimise separation on combined banks of cyclones:

- ⊃ *Solids removal*
- ⊃ *Water removal*

### **Solids Removal**

In the first cyclone stage inorganic contaminants are separated from the oil and water admixture

### **Water Removal**

In the second cyclone stage the combined oil/water stream (max solids content 2% w/w) is fed to the cyclone where the water is separated from the oil (max water content in oil 2% w/w).

The recovered water is recycled for further incoming 'feedstock' dilution and the oil sent to storage for disposal or sale.

## **(2) OIL CONTAMINATED WATER LAGOONS**

This type of problem involves the handling of low levels of free-floating oil accumulated on open water lagoons.

### **Removal**

Free floating oil is removed by skimmers and transported to the treatment zone

### **Processing**

The process is based on the separation of oil from water using hydrocyclones.

### **The Process Summary (see also schematic diagram fig. 2)**

The process uses defined levels of extra process water (experimentally determined) to optimise separation conditions on combined banks of primary and secondary “de-oiling hydrocyclones.

Primary cyclones remove approx. 80% of water. Secondary cyclones remove remainder of water +/- 2% max residual content.

Water is recycled for use in the process. Recovered oil is sent to storage for disposal or sale.

### **(3) GENERALLY CONTAMINATED SOIL/SAND TRACTS**

#### **Removal**

The contaminated soil/sand (feedstock) is removed via mechanical excavating equipment and transported to the process area.

#### **Processing**

The process is based on the disbursement of the contaminated soil/sand, 'feedstock' in water and thereafter separated into the various phases.

- ⊃ *Water*
- ⊃ *Oleophilic materials "oils"*
- ⊃ *Solids*

#### **The Process Summary (see also schematic diagram fig. 3)**

The process initially uses a small quantity of high-pressure water to break down the contaminated soil/sand into particulate slurry (in a mixing hopper)

The slurry from the hopper is fed into a mixing pump where it is mixed with more water (experimentally determined) to give intimate dispersion.

The dispersed material is then fed to the first of the cyclones.

In the first cyclone stage coarse soil/sand is separated from the oil and water admixture. In the second cyclone stage medium and fine soil/sand is separated from the oil and water admixture. The two solid streams are then combined and sent for further treatment.

The combined oil/water streams (max solids content 2% w/w) is then fed to the de-watering/de-oiling the water and oil is separated continuously. Water is recycled for further incoming 'feedstock' dilution and the oil is sent to storage for disposal or sale.

#### **Bio-Remediation**

The solids phase (containing 5% oils and 10% water max.) from the de-watering/de-oiling cyclones is sent to the mobile biological treatment unit.

The unit is trailer mounted and fed continuously with de-watered/de-oiled soil/sand and is continuously inoculated with specially selected bacteria. The bacteria are specifically designed to degrade to the oils requiring degradation.

#### **Note:**

*The bio-remediation process of the residue 'oils' present in the soil is accelerated by the introduction of hot air under controlled conditions.*