CURRENT DATA RELATED TO POME TREATMENT

Currently about 418 palm oil mills, Discharged Wastewater contain >0.4CPO, Requires land area (15 to 25 acres), Retention time (almost 3 months), Excavation and Disposal (3 years);

COST OF REUSABLES COST OF ENVIRONMENTAL SERVICES

CHARACTERISTICS OF SLUDGE OILS

THE NEED FOR NEW TREATMENT METHOD
Sequential Process Flow of the Palm Oil Mill Effluent Treatment Process:
Enhanced Solid Liquid and Oil Separation

1. Mixing of POME with chemicals
2. Settling of particles, fibres and floatation of the oils
3. Removal of settled solids from the bottom of the tank
4. Transfer of liquid effluent
5. Transfer of floatable oil from the tank
6. Separation of solids from liquid effluent
7. Separation of dissolved solid from the liquid effluent
8. Separation of oils from liquid effluent
9. Removal of biodegradable components from clarified effluent

The project benefits
- Solid Oil liquid separation
- Recover entrained CPO (>0.4%)
- Recycle the treated water for boiler
- Reduce SHG to claim carbon credit from Clean Development Mechanism (CDM)
- Reduced land area used for the treatment processes
- Stabilized solid sludge generated ready for final treatment (composting)
CPO Recovery Technique

Crude Palm Oil recovery system from POME

Pretreatment Process
EFFECTIVE REMOVAL OF FREE FLOATING OIL

SYSTEM SPECIFICATIONS:
- 85% Removal, capable of removing 25 gal/liter
- pH 7.5 is preferred
- Biad 300, 450, and 550 gpm capacity, stainless steel construction
- Influent and effluent are free from suspended and dissolved solids
- Filtration and associated pipework, 3-5 gpm, polymeric materials, anti-corrosion resistant options available

INVERSE EMULSION FOR SEPARATION AND EXTRACTION OF OILS

ROD TECHNOLOGY IS BASED ON A SERIES OF PATENTS DEVELOPED IN CONJUNCTION WITH SWISS FEDERAL INSTITUTE OF TECHNOLOGY IN LAUSANNE.
BASED ON TWO PRINCIPLES:
1. Emulsion separation technology the morphology of the polymers are improved.
2. An accompanying increase in solubility (solvent and solute interaction)

- RESULTING IN:
  - Higher charge density on the polymers
  - A more charged matrix has a higher osmotic pressure and can squeeze out oil more effectively
  - The use of hydrophobic comonomer permits these polymers to act as deoilers.

Polymer Characteristics

High Molar Masses
Uniform charge distribution in patches
Range of Branching Levels
Residual Monomer < Legal Limits

Competition Technology Cannot Meet these Requirements!

► New Processes.
**Increasing DeOiling Efficiency 20-35%**

*Clean Water is High Technology*

Figure 1. Schematic of flocculation with (a) linear and branched polymers (*c*). The chain structure is shown in panel *b*.

**SEPARATION WITH TYPICAL COAGULANT**

NEED 10 TO 30 HOURS TO SETTLE

**SEPARATION OF OIL USING ROD**

**SETTLEABILITY OF SOLID in POME using alum**

Particles Distribution of sludge past 0.5 gm alum

**SETTLEABILITY OF POME**

**BOD REMOVAL FROM POME**
SETTLEABILITY OF POME

Solid, Oil, Liquid separator

POME solid oil liquid settling system to separate solid, oil and liquid including the bio-degradable

- solid liquid settling
- oil liquid separation
- separate of solid
- liquid from the bio-degradable

Solid, Oil, Liquid separator

solid liquid separation by settling
Type-A: Oil Water Recovery System

Oil recovery system from POME. Unpressurized Vessels

The multiphase separator with rectangular, unpressurized vessels are used for effluent purification.

The separated light phase forms a layer on the surface and runs off via height-adjustable channel.

The heavy phase is collected and removed at the bottom of the vessel.

The flow rate is based on the separation of all emulsions of d > 25 μm under standard conditions (Ap = 100 kg/m², main phase 1 MPa).

Type-B: Oil Water Separator
Solid, Oil, Liquid separator

Air bubbles, oil and liquid separation

Unpressurized (THREE PHASE SEPARATOR) Vessels

Solid, Oil, Liquid separator

Separate of solid-screening vibration

Solid liquid Separation System

Remove the sludge from Effluent Treatment Plant, single and multiple decks SS304/SS316 and MS contact. Solid-liquid separation

SCREW CONVEYOR

- Oil Trough Screw Conveyors are made up from a 316 stainless steel trough, equipped with a constant pitch solid screw, a centraliser, and a screw conveyor housing welded on a centre pipe with a coupling bush at each end, two end bearing assembly complete with adjustable shaft end unit, a number of intermediate bearing assembly depending on the overall length of the screw conveyor, and tumbled trough covers.
- Furthermore, Oil Trough Screw Conveyors are equipped with a gear motor that suits the application. Depending on the nature to be handled, Oil Trough Screw Conveyors can be used for medium-heavy loadings.

Solid, Oil, Liquid separator

Liquid from the bio-degradable
Solid, Liquid separator

Solid liquid separation system to separate solid from liquid including the biodegradable.

MicroFILTRATION: MEMBRANE

- Thickness is approximately 10-200 μm with pore sizes ranging from 0.05 to 10 μm.
- Driving force for separation is pressure (< 2 bar).
- Separation principle is a sieving mechanism.
- Membranes are porous, typically symmetric.
- The membrane materials EITHER organic and inorganic materials.

MicroFILTRATION:

Micro Filtration

High Capacity Solid, Liquid separator

Pressure loss graph of AMK 63K

Micro filtration system
NEWater is produced using technology from various manufacturers. All four NEWater factories are served by Amiad pre-filtration screening, using their robust and reliable automated self-cleaning steel mesh (BRUSH) filtration units. These Amiad units effectively treat the influent feedwater and are an integral part of the plant that reliably provides a high-quality permeate on a large scale.

<table>
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<th>Sample Point</th>
<th>Turbidity</th>
<th>Suspended Solids</th>
<th>Yr</th>
<th>Yr</th>
<th>Yr</th>
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<tbody>
<tr>
<td></td>
<td>%</td>
<td>mg/l removal</td>
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<td>0.1</td>
<td>0.1</td>
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</tr>
</tbody>
</table>

Comparison of Performance

Particle Removal Capability

NEWater is produced using technology from various manufacturers. All four NEWater factories are served by Amiad pre-filtration screening, using their robust and reliable automated self-cleaning steel mesh (BRUSH) filtration units. These Amiad units effectively treat the influent feedwater and are an integral part of the plant that reliably provides a high-quality permeate on a large scale.
EFFLUENT COMPLIANCE

RECOVERED OIL FROM 5 DAYS OLD POME

Commercialized System

Overall Treatment system and Control

PILOT PLANT SCALE
## Proposed Effluent Standard

<table>
<thead>
<tr>
<th>Parameter</th>
<th>STD</th>
<th>PROPOSED</th>
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<tbody>
<tr>
<td>Dissolved Oxygen</td>
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<tr>
<td>Suspended solids</td>
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<td>&lt;10</td>
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<tr>
<td>Ammoniacal Nitrogen</td>
<td>&lt;150</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Total Nitrogen</td>
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<td>&lt;10</td>
</tr>
<tr>
<td>pH</td>
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<td>6.5-7.5</td>
</tr>
<tr>
<td>Temperature</td>
<td>30°C</td>
<td>30°C</td>
</tr>
</tbody>
</table>

### Video Presentation of POMEF Treatment Technology

Thank You