Penetrometer tests on 110 Pit Latrines in Kibera, Nairobi, Kenya

Identifying Appropriate Pit-Emptying Technologies Based on Sludge Characteristics and Access

Damian Seal
WASH & Infrastructure Coordinator,
Danish Refugee Council, Myanmar
Cone Penetrometer

- Maximum penetration 3 m
- Total Weight 5.03 Kg
- Sliding weight, 1.982kg
- 45 cm Drop Height
- Four rods, each 75 cm x 1.5 cm
- 3.5 cm Diameter Cone
110 pits were randomly selected and tested using a drop weight Cone Penetrometer, measuring penetration per impact to a maximum depth of 3 m.

**Kibera, Nairobi**

- **Area:** 2.25 km²
- **Population:** 1 million (est)
Results
Samples taken from a single pit latrine

By hand at 1 m  Approx 1.4 m  By Gulper at 2 m
# Theoretical De-sludging Equipment Categorization

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Impacts/1 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&lt;=0</td>
</tr>
<tr>
<td>B</td>
<td>1-5</td>
</tr>
<tr>
<td>C</td>
<td>6-20</td>
</tr>
<tr>
<td>D</td>
<td>21-50</td>
</tr>
<tr>
<td>E</td>
<td>50-100</td>
</tr>
<tr>
<td>F</td>
<td>100-200</td>
</tr>
<tr>
<td>G</td>
<td>201-300</td>
</tr>
<tr>
<td>H</td>
<td>&gt;300</td>
</tr>
</tbody>
</table>

- **Vacumn**
- **Vacutug**
- **Gulper**
- **Hand**