Location of cement units

- Grinding units
- Integrated cement plants
Location of cement units + TPP

- Grinding units
- Integrated cement plants
- Thermal power plants
Location of cement units + TPP + china clay deposits

- Grinding units
- Integrated cement plants
- Thermal power plants
- China clay mines
Location of cement units + TPP

Grinding units
Integrated cement plants
Thermal power plants
China clay mines

+ china clay deposits
Mapping methodology

- China clay detail mapping based on secondary literature
  - Indian Bureau of Mines published data
  - State Department of Mines and Geology
- Demarcate between commercial mines and prospected deposits
  - Based on Department of Mines and Geology data
- Visit to commercial mines
  - Plotting of GPS coordinates
  - Collect mine and clay deposit data
  - Collect samples of china clay (good and medium)
- Analysis of samples
  - TGA, DTA, XRD
  - Calcination
  - TGA, XRD and reactivity
Mapping methodology

- Team agreement on selection of samples for pilot trials
  - Selection of 5 clays for pilot trials from each state
  - Feedback from Industries
- Collection of samples
  - Around 200 kg each
- Processing
  - Confirmatory analysis for compositional deviation
  - Grinding, calcination, production of cement in 200 kg ball mill
  - Testing and analysis
- Analysis in mortar and concrete
  - At IIT labs and TARA
- Update data in GIS map
- Publications
Evaluation of china clay for North East India
Calcom Cement Unit of Dalmia Cements, Assam, NE India
Location of Assam Clay, North East India
Location of Mulieh Clay, Meghalaya, NE India
Evaluation of china clay for North East India
Evaluation of china clay for North East India
Evaluation of china clay for North East India

<table>
<thead>
<tr>
<th>Sample</th>
<th>% Weight loss</th>
<th>% Kaolinite content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam clay</td>
<td>8.90</td>
<td>64.08</td>
</tr>
<tr>
<td>Mullieh A</td>
<td>8.40</td>
<td>60.48</td>
</tr>
<tr>
<td>Mullieh B</td>
<td>10.86</td>
<td>78.20</td>
</tr>
</tbody>
</table>

Diagram showing temperature versus weight loss for raw and calcined Mullieh A samples.
Evaluation of china clay for North East India
Evaluation of china clay for North East India

- Good quality clay found 13 km from Calcom cement plant (Reserve to be established)
- Clay in Mullieh, 60 km from plant, also suitable
- Large quantities of clay available in Mullieh
- Initial reactivity results are positive for utilisation in LC³
- Major minerals are kaolinite and quartz; no detectable traces of minor minerals
- Dalmia Bharat Cements interested in following this up for pilot production
CLAY DEPOSITS OF RAJASTHAN

Legend
- Clay Deposit District
- Without Clay Deposits District

0 45 90 180 270 360 Kilometers
CLAY SAMPLING STATUS OF RAJASTHAN

Legend
Status
- Covered
- Uncovered
- Without Clay Deposits District
## Details of sample analysis

<table>
<thead>
<tr>
<th>District</th>
<th>No. of sample collected</th>
<th>Kaolinite content %</th>
<th>XRD analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bikaner</td>
<td>11</td>
<td>45-71</td>
<td>Major: K,Q Minor: Mus,</td>
</tr>
<tr>
<td>Nagaur</td>
<td>17</td>
<td>47-83</td>
<td>Major: K,Q Minor: Mus</td>
</tr>
<tr>
<td>Jaipur</td>
<td>3</td>
<td>48-84</td>
<td>Major: K,Q Minor: Goethite</td>
</tr>
<tr>
<td>Pali</td>
<td>10</td>
<td>30-83</td>
<td>Major: K,Q Minor: Mus</td>
</tr>
<tr>
<td>Jaisalmer</td>
<td>2</td>
<td>30-50</td>
<td></td>
</tr>
<tr>
<td>Chittorgarh</td>
<td>9</td>
<td>Under testing</td>
<td>Under testing</td>
</tr>
</tbody>
</table>
TGA Analysis

- Calcined quality
- Medium quality clay – 6.5% (47% K)
- Average clay – 8.6% (62% K)
- Good quality clay – 11.5% (83% K)