DETAILS OF CLASSIFICATION AND NO. OF INDUSTRIES IN EACH CATEGORY LOCATED IN PONDICHERRY

(1) Basic of Classification of Industries

Industries are classified based on: (i) the quantum of investment and (ii) the polluting nature (which again depends on the process and the product produced).

Based on the investment requires, industries are classified as:

(i) Small scale (SS) - requiring Rs.50 Lakhs to 3 Crores
(ii) Medium scale (MS) - requiring Rs.3 to 5 Crores and
(iii) Large Scale (LS) – requiring Rs. 5 Crores and above.

(The above financial limits are based on the norms set by the Govt. of Pondicherry, as on 1995).

Based on the pollution level of industries they are classified as:

(i) RED (R) – highly polluting (ii) Orange (O) – less polluting and (iii) Green (G) – non-polluting.

The above type of classification is based on the in potential for causing pollution and as per the norms of Ministry of Environment and Forest (MoEF). Govt. of India.

(2) Status of Industries:

As on 1.4.92, there were only 18 LS, 56 Ms and 4219 SS industrial units in the U.T of Pondicherry (comprising Four Far – flung discontiguous regions, namely, Pondicherry, Karaikal, Mahe and Yanam). However, by end of March 2001, the above situation has changed and has grown up to 42 LS, 125 MS and 6388 SS industrial units, with most of the units (i.e. 5271 out of 6555 industrial units) located in Pondicherry region. Break-up of various categories of industries are summarized below:
Based on the survey carried out, polluting industries have been groped and their status in the Pondicherry region, have been summarized below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Industry</th>
<th>Total No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leather</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>Paper</td>
<td>05</td>
</tr>
<tr>
<td>3</td>
<td>Textile</td>
<td>02</td>
</tr>
<tr>
<td>4</td>
<td>Sugar</td>
<td>02</td>
</tr>
<tr>
<td>5</td>
<td>Chemical</td>
<td>08</td>
</tr>
<tr>
<td>6</td>
<td>Others</td>
<td>04</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>
LIST OF VARIOUS CATEGORIES OF INDUSTRIES AS NOTIFIED BY GOVT. OF INDIA (MINISTRY OF ENVIRONMENT AND FORESTS)

(A) RED Category
(1) Lime manufactures
(2) Ceramics, Sanitary-ware
(3) Tyres and tubes
(4) Machines manufacturing
(5) Glassware and glass product
(6) Surgical and medical products
(7) Malted food
(8) Synthetic (acetylene) and fibers
(9) Plant nutrients and fertilizer
(10) Cement plants
(11) Petroleum refineries
(12) Petrochemical industries
(13) Vanaspati, hydrogenated vegetable oils
(14) Sugar and paper mills
(15) Alkalis, caustic soda, potash
(16) Acids and their salts
(17) Explosives, basic drugs
(18) Leather industry, electrochemical
(19) Paints, enamels and varnishes
(20) Pigments dyes and refectories

(B) ORANGE category
(1) Electroplating and galvanizing
(2) Surgical gauges and bandages
(3) Restaurants, Ice cream
(4) Mineralized water and soft water
(5) Laboratory ware
(6) Steel furniture
(7) Fragrance, flavors
(8) Small textile industries
(9) Plastic and chemical
(10) Flour mills and bleaching
(11) Picking, tanning
(12) Processing of fish
(13) Filtration, centrifugation and distillation
(14) Sugarcane
(15) Slaughtering of animals
(16) Steeping and processing of grain
(17) Blanching of fruits and vegetables
(18) Washing of fabric
(19) Polishing
(20) Separated milk and whey

(C) GREEN category
(1) Atta-chakkies
(2) Rice millers
(11) Fountain pens
(12) Rope (cotton and plastic)
(3) Groundnut decorticating (dry)
(4) Tailoring and garment making
(5) Handloom weaving
(6) Zari work and gold and silver thread
(7) Musical instruments manufacturing
(8) Bamboo and cane products
(9) Card board box
(10) Furniture

(13) Carpet weaving
(14) Toys and candles
(15) Cold storages
(16) Printing press
(17) Rubber goods industries
(18) Plastic processed goods
(19) Foot wear rubber
(20) Thermometer making
DETAILS OF SOIL SURVEY CARRIED OUT IN PONDICHERRY REGION

(1) GENERAL

Since one of the objectives of the Thesis is to understand the effect of a few industrial effluents on various types of soil, a soil survey of Pondicherry region was carried out to assess, in general, the various types of soil prevailing in this region and to identify the predominant type of soil. The objectives of the exercise were: (i) to identify the predominant type of soil within the normal depth of location of foundations and (ii) utilize the above information to locate and select a few sampling locations and collect soil samples for conducting experimental investigation on the effect of various pollutants on the selected soils, which is locally available. Moreover, a few cases of pollution of soil have been reported in this region by the general public, due to indiscriminate disposal of industrial wastes/effluents on the surface of the soil.

(2) BRIEF GEOGRAPHICAL BACKGROUND

Pondicherry region is divided into many Commune Panchayats as detailed below:
(i) Pondicherry municipality
(ii) Oudrurate commune
(iii) Nettapakkam commune
(iv) Mannadipet commune
(v) Bahoor commune
(vi) Villianur commune
(vii) Ariankuppam commune

(3) BRIEF OVERVIEW OF SOIL SURVEY CONDUCTED

In order to obtain an overview of the various types of soils present in Pondicherry region, it was decided to collect information on soil types from at least two sites from each of the above communes and from the municipality area, at the first instant. For the above purpose, data available from substantial work carried out on Geotechnical Engineering consultancy and testing projects undertaken by Civil Engineering Department, Pondicherry Engineering
College (PEC), was also utilized. Wherever details on soil profile were not available, soil samples were collected from trial pits located in such commune panchayats. The outcome of such exercise is summarized and given in a nutshell.

(4) DESCRIPTION OF SOIL PROFILE

(i) Pondicherry Municipality
(a) Muthialpet-poorly graded sand. reddish brown, silty sand.
(b) Uppalam-whitish grey, medium dense fine silty sand.
(c) Boulward-silty sand, yellowish white to grayish white, loose, fine sand.

(ii) Oulgaret Commune
(a) Kalapet-low compressibility, dense silty fine sand.
(b) Saram-yellowish grey, medium dense sand.
(c) Lawspet-medium to coarse sand.
(d) Mutharayarupalayam-medium grained sandy soil.

(iii) Nettapakkam Commune
(a) Eripakkam-yellowish brown, medium to fine sand; well graded-poor graded sand.
(b) Pandazhonallur-brownish clay of medium compressibility.

(iv) Mannadipet Commune
(a) Madagadipath-black, soft to medium clay, with medium compressibility.
(b) Thiruvandarkoil-brownish fine silty sand.
(c) Thirubuvanai-yellowish brown medium to fine sand.

(v) Bahoor Commune
(a) Pannitttou-yellowish white medium dense fine sand.
(b) Soriancoupam-clayey silt
(c) Bahoor-clayey sand yellowish white to grayish white, loose, fine sand.

(vi) Villianur Commune
(a) Sedarpet-yellowish white moist medium dense sand.
(b) Thondamantom-greyey white dense lime stone.
(c) Manacoupam-clayey silt.

(vii) Ariankuppam Commune
(a) Ariankuppam-silty clayey sand.
(b) Kosapalyam-silty fine sand.
MODEL CALCULATION FOR FLOW RATE (WITH RESPECT TO HRT)

Flow rate for 8 hr HRT for NS1 = 1.85 ml/min  (Table 3.8)

Diameter of Soil column = 9 cm

Radius = 4.5 cm

Height of column = 80 cm

Liquid volume of reactor = (3.14x4.5x4.5)x65

= 5089 cm³

Liquid Volume of reactor = V = Q x T

Q = flow rate (ml/min)
T = Detention time (min)

5089 = Q x (8 x60)  (ie., T = 8 hr HRT)

Q = 10.6 ml/min

Actual flow rate for 8 hr HRT = Contaminated soil porosity x Q

= 0.175 x 10.6 ml/min

= 1.85 ml/min