Industrial Wastewater Discharge Management in Cuenca, Ecuador

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CUENCA – ECUADOR

• Location: Southern Ecuador in the Interandean Valley
• Altitude: 2,550 masl
• Population:
  ➢ 505,585 inhabitants
  ➢ 329,928 in urban area
• Crossed by four rivers: Tomebamba, Yanuncay, Tarqui and Machángara.
BACKGROUND

• 1968: Creation of ETAPA EP
• 1985 – 2000: Design and implementation of Master Plan I & II
• 1999: Ucubamba Wastewater Treatment Plant starts to operate
• 2000: Parallel programs implemented
  ➢ Industrial wastewater discharge control program
  ➢ Battery collection program
  ➢ Collection program of waste oil from car shops and vehicle lubrication workshops
EXISTING INFRASTRUCTURE

- Combined sewerage system
- 1160 Km length:
  - 120 Km are interceptor sewer

- Ucubamba Wastewater Treatment Plant (UWWTP)
- Maximum capacity: 1200 l/s
- Water Line Treatment:
  - Preliminary treatment units
  - Two parallel treatment lines: 2 aerated ponds, 2 facultative ponds, and 2 maturation ponds
OBJECTIVES

• Prevent health issues of citizens and company workers
• Prevent polluting substances from clogging and affecting the sewer networks
• Prevent alterations to the normal functioning of UWWTP
• Gathering information to set fees for industrial discharge
LEGAL SCOPE

- Constitution of Ecuador 2008
- Organic Law of Public Companies 2009
- Organic Code of Territorial Organization, Autonomy and Decentralization 2010
- Ordinance Regulating the Constitution, Organization and Operation of ETAPA 1968/2014
- Ordinance for Administration, Regulation and Fees for the use of the Sewer Services of Cuenca City 1993
REGULARIZATION METHODOLOGY
• 100% of Industries register
  ➢ 32% regularized
  ➢ 28% in process of regularization
  ➢ 40% to 2025

• Polluting industries, percentage of contaminants:
  ➢ non-metallic minerals (46%)
  ➢ food (26%)
  ➢ textile (16%)
  ➢ metal products factories (5%)
  ➢ paper mills (2%)

<table>
<thead>
<tr>
<th>INDUSTRY</th>
<th>PERCENTAGE</th>
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<tbody>
<tr>
<td>FOOD</td>
<td>21%</td>
</tr>
<tr>
<td>PAINTS</td>
<td>2%</td>
</tr>
<tr>
<td>PLASTIC</td>
<td>1%</td>
</tr>
<tr>
<td>RUBBE</td>
<td>1%</td>
</tr>
<tr>
<td>PAPER MILLS</td>
<td>1%</td>
</tr>
<tr>
<td>CERAMIC</td>
<td>5%</td>
</tr>
<tr>
<td>CONCRETE</td>
<td>3%</td>
</tr>
<tr>
<td>METAL PRODUCT FACTORIES</td>
<td>5%</td>
</tr>
<tr>
<td>TEXTILE</td>
<td>23%</td>
</tr>
<tr>
<td>TANNERY</td>
<td>1%</td>
</tr>
<tr>
<td>CHEMISTRY</td>
<td>1%</td>
</tr>
<tr>
<td>CAR WASH</td>
<td>38%</td>
</tr>
<tr>
<td>PRINTING AND SIGNAGE</td>
<td>1%</td>
</tr>
<tr>
<td>GAS STATIONS</td>
<td>20%</td>
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</table>
REDUCTION OF OILS AND GREASE CONCENTRATION

GOALS ACHIEVED

<table>
<thead>
<tr>
<th>Oil and Grease (mg/L)</th>
<th>Mean monthly</th>
<th>Average 2013-2016</th>
<th>Average 2017-2018</th>
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</thead>
<tbody>
<tr>
<td>25.27 mg/L</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>16.34 mg/L</td>
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</table>

35%
REDUCTION OF TSS CONCENTRATION

GOALS ACHIEVED

- **REDOx Reduction of TSS Concentration**
  - **Goals Achieved**
    - **Ceramic 1**
      - Before pretreatment
        - 6952 mg/L
    - **Car Wash 1**
      - Before pretreatment
        - 65 mg/L
      - After pretreatment
        - 45 mg/L
    - **Food Ind. 1**
      - Before pretreatment
        - 450 mg/L
      - After pretreatment
        - 350 mg/L
    - **Food Ind. 2**
      - Before pretreatment
        - 350 mg/L
      - After pretreatment
        - 250 mg/L
    - **Car Wash 2**
      - Before pretreatment
        - 250 mg/L
      - After pretreatment
        - 150 mg/L

- **Reduction in TSS Concentration**
  - **Allowed Limit: 220 mg/L**
  - **95%**
  - **30%**
AMOUNT COLLECTED

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AMOUNT COLLECTED WASTEWATER TREATMENT</th>
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<tbody>
<tr>
<td>2016</td>
<td>$235,975,14</td>
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<tr>
<td>2017</td>
<td>$253,850,91</td>
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<tr>
<td>2018</td>
<td>$296,075,30</td>
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<tr>
<td>TOTAL</td>
<td>$785,901,35</td>
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“Polluter Pays” Principle
CONCLUSIONS

- Maintaining and preserving the sewer network system
- Increase of lifespan of UWWTP
- Charging for the wastewater treatment service
- Improving production processes in regularized industries
- Industrial discharge control program is vital to prevent pollution
THANK YOU QUESTIONS?

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