INTEGRATED POLLUTION PREVENTION
AND CONTROL (IPPC)

REFERENCE DOCUMENT ON BEST
AVAILABLE TECHNIQUES FOR
MINERAL OIL AND GAS REFINERIES
FEBRUARY 2003

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The BREF (Best Available Techniques reference document) on Mineral Oil and Gas Refineries reflects an information exchange carried out according to Article 16(2) of Council Directive 96/61/EC.
Techniques to consider in the determination of BAT

- Close to 600 techniques have been considered in the determination of BAT. Those techniques have been analyzed following a consistent scheme:
  - environmental benefits
  - cross-media effects
  - operational data
  - economics
Techniques are given in the BAT as a group of possibilities.

Amongst the many environmental issues addressed in the BREF, the five that are dealt with below are probably the most important:

• increase the energy efficiency
• reduce the nitrogen oxide emissions-NOx
• reduce the sulphur oxide emissions-SO$_2$
• reduce the volatile organic compounds emissions-VOC’s
• reduce the contamination of water
BAT related issues

- Basis for comparing refineries
- Cost- effectiveness
- BAT and environmental approaches
  - The bottom-up approach
  - The top-down approach
The main pollutant in the Refineries

- VOC’s
- PM-Particulate Matter
- $SO_2$
- NOx
- Heavy metal
<table>
<thead>
<tr>
<th>NOx</th>
<th>PM</th>
<th>SO₂</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW NOx burners</td>
<td>Cyclones</td>
<td>Additives to fuels</td>
<td>VRU-vapor recovery units</td>
</tr>
<tr>
<td>Dry-low-NOx combustors</td>
<td>Electro filters (ESP)</td>
<td>flue gas desulphurization processes</td>
<td>LDAR</td>
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<tr>
<td>Diluents injection</td>
<td>Filtration</td>
<td>Seawater scrubbing</td>
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<tr>
<td>Reburning</td>
<td>Wet scrubbers</td>
<td></td>
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<tr>
<td>Selective Non-Catalytic reduction (SNCR)</td>
<td>Washers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective Catalytic reduction (SCR)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Proposal standard for NO\textsubscript{x} and SO\textsubscript{2}

<table>
<thead>
<tr>
<th></th>
<th>NO\textsubscript{x}</th>
<th></th>
<th>SO\textsubscript{2}</th>
<th></th>
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<tbody>
<tr>
<td>Emission</td>
<td>t/y</td>
<td>1170</td>
<td>Emission</td>
<td>t/y</td>
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<tr>
<td>Conc bubble</td>
<td>mg/Nm\textsuperscript{3}</td>
<td>151</td>
<td>Conc bubble</td>
<td>mg/Nm\textsuperscript{3}</td>
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<tr>
<td>Load bubble</td>
<td>kg/ton</td>
<td>0.13</td>
<td>Load bubble</td>
<td>kg/ton</td>
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<tr>
<td>Reduction</td>
<td>%</td>
<td>65%</td>
<td>Reduction</td>
<td>%</td>
</tr>
</tbody>
</table>