Flare Gas Recovery Project
at TAKREER Ruwais Refinery

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COSMO OIL CO., LTD.
Abu Dhabi National Oil Company (ADNOC) has been actively engaging in environmental countermeasures.
  → Gas Conservation Task Force (1996)
    • Instruct the group companies to eliminate or minimize gas flaring.
  → Launch a health, safety and environmental management program (1997~)
    • Reducing the flue gas and wasted materials.

Abu Dhabi Oil Refining Company (TAKREER)
  ➢ Tackle the environmental issues
  ➢ Making effort to reduce the flare gas

We conducted joint implementation of gas recovery project with JCCP
  ◆ Reduce SOx and CO2 ◆
2. Project Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>2005FY</th>
<th>2006FY</th>
<th>2007FY</th>
<th>2008FY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Design</td>
<td></td>
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<td>Contract of EPC</td>
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<td>EPC</td>
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<tr>
<td>Performance test</td>
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<tr>
<td>Technical support evaluation</td>
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### 3. Ruwais Refinery

<table>
<thead>
<tr>
<th>Unit</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Crude Distillation Unit</td>
<td>120,000 BPD</td>
</tr>
<tr>
<td>Condensate Splitters</td>
<td>140,000 BPD × 2 units</td>
</tr>
<tr>
<td>Naphtha, Kerosene, Gas oil Hydrodesulphurization Units</td>
<td></td>
</tr>
<tr>
<td>Vacuum Distillation Unit</td>
<td>46,000 BPD</td>
</tr>
<tr>
<td>Hydrocracker</td>
<td>27,000 BPD</td>
</tr>
<tr>
<td>Hydrogen Plant</td>
<td>60,000 m³N/hr</td>
</tr>
<tr>
<td>Sulfur Recovery units</td>
<td>44/49 tons/day</td>
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<tr>
<td>Other</td>
<td></td>
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</table>

Our target is in the Hydrocracker group
The some units emitted a part of the gas to the flare gas header. And they burn the flare gas in the flare stack. In this project, we executed the introduction of the flare gas recovery unit in the hydrocracker group. And we can recovery the flare gas and reduce the fuel gas.
We have the following facilities for the flare gas recovery. This system requires a large land by a Gas holder. We have a lot of equipment for this system, so the operation is complex.

**Conventional Flare gas recovery unit**

- Flare Stack
- Flare Gas
- Gas Holder
- Reciprocating Gas Compressor
- Recovered Flare Gas
5. Conventional gas recovery system - 2
6. Introduced gas recovery system - 1

Introduce the Liquid-Ring compressor and Spill Back Control.

a) Stable against fluctuations of flare header.

b) The unit configuration is simple and easy to operation

C) Operating range is wide. (0 – 1,000m³N/h)
6. Introduced gas recovery system - 2
New flare gas recovery unit is a very compact compared to the conventional unit.
This project is the one greatly contributing to the environmental improvement. Especially, it is the one to achieve the result to the CO2 reduction greatly.

### Project Result - 1

<table>
<thead>
<tr>
<th>Recovered Flare gas (m³N/h)</th>
<th>Operation</th>
<th>CO₂ reduction (ton/y)</th>
<th>Operation</th>
<th>SOx reduction (ton/y)</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>About 400</td>
<td>About 7,000</td>
<td>About 40</td>
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</tbody>
</table>

**Operating result (m³N/h)**

- Feb-09: 400
- Mar-09: 400
- Apr-09: 400
- Jun-09: 400
- Jul-09: 400
- Aug-09: 400
This project is covered ADNOC News and TAKREER News.
This project wins The Japan Petroleum Institute ’s Award for International cooperation.
This news is also covered the Japanese newspapers.
9. Finally

We not only achieved through this environmental project, we were able to build a good relationship. We will continue the good relationship as partners in the future.