Expansion Phase 2

Uberaba Industrial Complex – CIU

by

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Fosfertil's Industrial Units
### Resumé of the Overall Expansion Project for Fosfertil's Industrial Complex in Uberaba

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<thead>
<tr>
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<th>296,000 tpa P2O5</th>
<th>1,200,000 tpa P2O5</th>
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<tbody>
<tr>
<td><strong>Original design</strong></td>
<td>940 tpd P2O5</td>
<td>Modifications to sulphuric &amp; phosphoric acid plants</td>
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<td><strong>Debottlenecking</strong></td>
<td>1200 tpd P2O5</td>
<td>400,000 tpa P2O5</td>
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<td><strong>Phase 1</strong></td>
<td>1490 tpd P2O5</td>
<td>496,000 tpa P2O5</td>
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<td><strong>Phase 2</strong></td>
<td>2001 tpd P2O5</td>
<td>675,000 tpa P2O5</td>
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<td><strong>Phases 3&amp;4</strong></td>
<td>3600 tpd P2O5</td>
<td>1,200,000 tpa P2O5</td>
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<td>2 new evaporators</td>
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- Sulphuric Acid
- Phosphoric Acid
- Fertilizers MAP, TSP, SSP
Resumé of the Phase 2 Expansion Project for Fosfertil’s Industrial Complex in Uberaba

- Revamping of the Monsanto sulphuric acid plant
- Up-rating of the air-cooling and scrubbing systems and resizing of pumps on the original Technip reaction and filtration sections
- Installation of two phosphoric acid evaporator units, cooling tower and storage
- Installation of a MAP granulation unit with Incro pipe reactor Installation of fertilizer storage facilities
- Installation of a ROP-TSP unit, including phosphate grinding, acidulation den, curing and reclaim
- Revamping of the ammonia storage area
- Improvements to the sulphur discharge system
- Improvements to the filtered liquid sulphur pumping system
- Revamping of the off-sites area
- Modifications to the phosphate slurry reception terminal
Revamping of the Sulphuric Acid Unit

- Substitution of the turbo-reduction unit CB-1301T
- Substitution of the rotor of the main blower CB-1301, including the anti-surge system and silencer
- Modifications to the air filter system to cope with the additional flow
- Modification to the demister system in the drying tower TA-1301
- Modification to the upper dome of both of the absorption towers, final & intermediate, to allow the fitting of additional demisters TA-1302/03
- Modifications to the steam drum and boiler to be compatible with the additional steam production VA-1301
- Modifications to the gas inlet and outlet connections to the superheater TE-1301
- Substitution of the hot gas/gas heat exchanger TC-1301
- Modifications to the gas inlets in the converter to allow additional catalyst to be accommodated
- Addition of a second intermediate economiser in parallel to the existing one TE-1303B/04B

Increase in the area of the air filter

Substitution of the turbo-blower

Substitution of the demister of the drying tower
Increase in the capacity of the air blower system

Modification to the upper domes of the absorption towers

Addition of a second intermediate economiser in parallel
Modification to the upper domes of the absorption towers

Modifications to the steam drum and boiler
Substitution of the hot gas/gas heat exchanger

Overall view of the modifications
Modifications to the phosphate reception terminal

- Additional agitated tank TQ-4501D with a capacity of 1700 m³ for slurry with 60% solids
- Additional phosphate slurry transfer pump BA-4501E connected to the new tank TQ-4501D
- Provision of an additional decanter EP-4502 and associated pumps to enable operation with more concentrated slurries
- System for discharging wet phosphate from rail wagons with a capacity of 250 tph
- Two systems for recovery of wet phosphate and the feeding associated transfer conveyors
Plan of the modifications to the phosphate reception terminal

Revamping of the Attack and Filtration Sections
Revamping of the Attack and Filtration Sections

- Additional surface agitators for sulphuric acid dispersion and air-cooling
- Modifications to the scrubbing system to increase the air-flow including a new fan and venturi and scrubbing tower
- Resizing of several of the centrifugal pumps for the new capacities
- Provision of an additional storage tank for phosphoric acid

Air-cooling and gas-scrubber modifications
Air-cooling and gas-scrubber modifications

Two Phosphoric Acid Evaporators & Cooling Tower
Two Phosphoric Acid Evaporation Units

Principal characteristics of the units

- Each line with a capacity to evaporate 1100 tpd H₂O
- Fitted with fluorine recovery units
- The largest Carbon-tube heat exchangers on phosphoric acid service in the world, 979 tubes (50/37mm x 7.5m), Heat exchange area 1135/840 m² based on o.d/i.d. 54tph of steam condensed – supplied by SGL - Germany
- Acid recirculation provided by an axial-flow pump with a capacity of 11500 m³/h and a TDH of 6.3 m, Speed 411 RPM, Diameter 1000mm Installed power 800HP Elbow in 904L, Impeller & wear ring in Sanicro 28 – supplied by Ensival-Moret
- Water from the barometric condensers pumped to a new forced draft cooling tower with 8 cells each handing 1000 m³/h

2-D CAD drawing of the installation of the phosphoric acid evaporators
3-D CAD model of the installation of the phosphoric acid evaporators

Contaminated water cooling towers

8 cells each for 1000 m³/h
Sections of the ROP-TSP unit

- Phosphate grinding, roller mill - capacity 22 t/h
- Den for phosphate attack – capacity 50 t/h
- Curing store for 20,000 t
- Section of reclaim and handing of cured product - capacity 120 t/h
3-D CAD view of the Roller Mill

2-D elevation view of the Acidulation Den
MAP Granulation Unit

Principal characteristics of the unit

- Capacity 50 t/h
- Rotary Granulator and Dryer
- Fluid-bed Cooler
- Double-deck Screens – supplied by J&H
- Polishing Screen – supplied by ROTEX
- Incro pipe-reactor
2-D CAD elevation view of the MAP Granulation Unit