Prefeasibility Report
For
Pigments Manufacturing Plant
At
Plot No. FS-34, Mahad Five star Industrial area, MIDC, Mahad, Raigad, Maharashtra

of
Sapphire Pigments Private Limited
A-1/12, Phase II GIDC, Vatva,
Ahmedabad-382445

Prepared by
Ultra-Tech Environmental Consultancy and Laboratory
NABET Accredited EIA Consulting Organization
Saudamini Commercial Complex, 2nd Floor, Building C3, Right Bhusari Colony, Paud Road, Kothrud, Pune - 411038

2016
1. Executive Summary

M/s. Sapphire Pigments Private Limited (SPPL) is situated at A-1/12, Phase II, GIDC, Vatva, Ahmedabad – 382 445. The company manufactures beta blue, Green 7, Alpha blue & CPC crud. Now, the company proposes to manufacture beta blue, Green 7, Alpha blue, CPC Blue & Turquoise blue at Plot No. FS- 34, Mahad Five star Industrial area, MIDC, Mahad, Raigad, Maharashtra.

The Notification No. S. O. 1533 promulgated on 14th September 2006 has covered this type of industries under its schedule 5(f) Synthetic Organic Chemical Industries located within notified industrial estate will come under Cat B. Hence SPPL intend to approach SEAC and SEIAA for environment clearance for proposed project. The prefeasibility report is prepared for forming a frame work for EIA study, scoping and finalizing terms of reference as may be required.

Form I, as is prescribed by the said notification is duly filled up and submitted. The Prefeasibility Report is an accompaniment to the same and prepared as per MoEF guideline dated 27/02/2012. It generally covers, Introduction, Justification, Location, Resources, Process, Pollution Control, Background Study, Safety, Benefits, EIA Structure, Scoping & Conclusion.

2. Justification of Project

The company manufactures the pigments which are used by various industries like:

- Paint Industry
- Ink Industry
- Plastic Industry
- Rubber Industry: Natural Rubber
- Textile Industry

2. Project Description

Raw Materials Used:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Raw Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Copper Phthalocyanine Crude (CPC) Blue</td>
</tr>
<tr>
<td>2</td>
<td>Caustic Doda Flakes</td>
</tr>
<tr>
<td>ITEM</td>
<td>MATERIAL OF CONS</td>
</tr>
<tr>
<td>------</td>
<td>-----------------</td>
</tr>
<tr>
<td>3</td>
<td>Hydro Chloric Acid</td>
</tr>
<tr>
<td>4</td>
<td>Gum Rosin</td>
</tr>
<tr>
<td>5</td>
<td>TLS</td>
</tr>
<tr>
<td>6</td>
<td>Phthalic Anhydride</td>
</tr>
<tr>
<td>7</td>
<td>Tech Clearer</td>
</tr>
<tr>
<td>8</td>
<td>MCB</td>
</tr>
<tr>
<td>9</td>
<td>Nitro Benzez</td>
</tr>
<tr>
<td>10</td>
<td>Ammonium Molybdate</td>
</tr>
<tr>
<td>11</td>
<td>Sulphuric Acid</td>
</tr>
<tr>
<td>12</td>
<td>Aluminium Chloride</td>
</tr>
<tr>
<td>13</td>
<td>Common Salt</td>
</tr>
<tr>
<td>14</td>
<td>Solvent: Tolvin, NBA, Ortho Zylene</td>
</tr>
</tbody>
</table>

Storages details:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>MATERIAL OF CONS</th>
<th>CAPACITY</th>
<th>NOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>H$_2$SO$_4$ (98%)</td>
<td>MS</td>
<td>25 KL</td>
<td>1</td>
</tr>
<tr>
<td>HCl (30%)</td>
<td>HDPE</td>
<td>20 KL</td>
<td>1</td>
</tr>
<tr>
<td>NITROBENZENE</td>
<td>MS</td>
<td>10 KL</td>
<td>1</td>
</tr>
<tr>
<td>MONOCHLOROBENZENE</td>
<td>MS</td>
<td>10 KL</td>
<td>1</td>
</tr>
<tr>
<td>LIQUID AMMONIA</td>
<td>MS</td>
<td>10 KL</td>
<td>1</td>
</tr>
<tr>
<td>NBA</td>
<td>MS</td>
<td>5 KL</td>
<td>1</td>
</tr>
<tr>
<td>WATER</td>
<td>MS</td>
<td>BALANCE</td>
<td></td>
</tr>
</tbody>
</table>

Following products will be manufactured by SSPL

1) CPC Blue : 100 TPM
2) Alpha Blue: 40 TPM
3) Beta Blue: 40 TPM
4) Green 7 – 25 TPM
5) Turquoise Blue – 10 TPM

Detail Flowchart of Process Attached as Annexure
3.1 Copper phthalocyanine blue crude (cpc blue):

Charge Phthalic Anhydride, Urea, Cuprous Chloride & Ammonium Molybdate with Nitrobenzene in closed glasslined vessel at atmospheric pressure in 2 hours. Start heating from 135°C and gradually increase the temperature up to 180°C. Reaction time is 8 hours for completion. After completion of reaction, start vacuum distillation of the solvent Nitrobenzene in Rotary Vaccum Dryer. Distillation completion time is 8 hours. The Nitrobenze is taken further for solvent recovery and Dry Crude CPC Blue is obtained. This CPC Blue is further taken for purification. Purification is started with Sulphuric Acid diluted up to 5% solution and heated at 95°C for 6 hours. Here we obtain 96% pure CPC Blue. This is then Filtered, Washed, Dried, Pulverised & Packed for dispatch.

3.2 Phthalocyanine pigment alpha blue:

Pigment Alpha Blue is manufactured by a 2 stage process.

- Stage 1 - Reaction
  Charge CPC Blue with 98% Sulphuric Acid in a jacketed MS reaction vessel with water circulation in jacket. The ratio of CPC Blue to Sulphuric Acid is maintained at 1:8. Reaction temperature is maintained at 70°C for 6 hours. After reaction is complete, heating is withdrawn and the mixture is cooled to room temperature.

- Stage 2 - Drowning
  In a MS Rubber lined and Brick Lined vessel, CPC Blue in a ratio of 1:5 with water is dumped inside the vessel. The mixture is stirred for 2 hours and the whole mass is then washed in Filter Press till the pH of mixture is obtained pH 5-6. After washing, the press cake obtained is put into another MS Vessel with water in the ratio of 1:2 of the batch volume. Of the mixture, Slurry is made by stirring the mass and making the pH 9 with Caustic Flakes and adding O-Xylene & TriethylaminoSulphate. The temperature is maintained at 90°C for 6 hours. After 6 hours, the mixture is filtered, washed till pH 7 is obtained, Dried, Pulverised, Blended and final powder form of pigment is taken for Packing.
3.3 Phthalocyanine pigment beta blue:

Grind Crude CPC Blue with steel balls in MS jacketed Ball Mill for 24-30 hours. Under water circulation in jacket, maintain the temperature just under 55°C. After ball milling, Pigmentation process is initiated with Solvent, Water, Rosin and Caustic Flakes.

Take water and solvent in 1:3 ratio. The selection of usage of solvents such as O-Xylene, Isopropyl Alcohol, N-Butyl Alcohol, etc is based on the end application of the grade of pigment being manufactured. Start heating the mixture in jacketed vessel and reflux it for 6 hours. Distil the solvent for recovery. Up to 98% solvent is recovered. The remaining mixture is adjusted to pH 7 with usage of Hydrochloric acid at concentration of 30% and then the process of Filtration is initiated. After filtration, the product is moved to washing, drying, pulverizing, classifying, blending and packing.

3.4 Phthalocyanine pigment green 7:

In Glass lined reaction vessel charge common salt, Aluminium chloride, cupric chloride and pass chlorine gas under continuous stirring. Heat the mixture to 135°C. Chlorination completion takes 15-18 hours with continuous sample testing for quality. After chlorination completion, in drowning vessel, dump the mixture with water under continuous slow stirring or aeration. The ratio of mixture to water is 1:10. After drowning, filtration is carried out by washing the mixture to pH 6-7. The press cake obtained from filtration is taken for pigmentation process. In MS Jacketed Vessel, charge the press cake, Monochlorobenzene and water in ratio 1:2:4. Add emulsifier, oleic acid and adjust the pH of the mixture to 9 with usage of caustic flakes. Start heating the above reaction mixture via jacket for reflux for 6 hours. Distil off the solvent by recovery. 95% Monochlorobenzene is recovered. After reaction is completed, cool the above mass to 55°C, Filter, wash until pH 7 is obtained and proceed for Drying. The dried powder is taken further for Pulverising, Blending and Packing.

3.5 Direct dyes: turquoise blue:

Charge Crude CPC Blue in closed Jacketed MS vessel with 23% Oleum. Heat the mixture at 70°C and check the Sulphonation. When the Sulphonation is complete, charge the above mixture in a drowning vessel with 1:5 to water under stirring. Filter wash the mixture till pH 6 and transfer the press cake to a MS rubber line brick line vessel with water stirrable slurry.
Add Caustic Flakes or Soda Ash and stir the mix for 2 hours. Then Drying, pulverising and packing is carried out for final output.

Utilities:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot Area</td>
<td>8000 m²</td>
</tr>
<tr>
<td>Water Input</td>
<td>93 m³/day Assured from MIDC</td>
</tr>
<tr>
<td>Work force</td>
<td>Approx. 60Nos.</td>
</tr>
<tr>
<td>Effluent Facility</td>
<td>Reused. Segregated, treatment and sent to CETP (40 m³/day) later.</td>
</tr>
</tbody>
</table>
| Electricity          | • Max. Demand – 150 HP  
                      | • Connected Load – 200 HP – from MSCDCL, MIDC      |
| Haz. Waste Facility  | Sent to CSWTSDF at Taloja                         |
| Total Investment     | Rs. 5.00 Crores                                    |
| Environment Fund     | 2 % of the project cost                            |

4. Project Location

The manufacturing unit of SSPL is located in Mahad MIDC at Plot No. FS-34, Mahad Five star Industrial area, MIDC, Mahad, Raigad, Maharashtra. Map showing project location & google image are presented in Figure 1 and 2.

![Figure 1: Project Location Map](image-url)
Government MIDC at Mahad has provided all infrastructure like assured Electrical power, continuous water supply with purification from water works having, RSF (Rapid Sand Filtration) and disinfection, internal road, network, external approach roads and has networking with Common Hazardous Waste Storage Treatment and Disposal Facility (CHWTsDF). CHWTsDF at Maharashtra Industrial Development Corporation (MIDC), Taloja, in vicinity has been established with support of MIDC and Maharashtra Pollution control Board (MPCB). A Common effluent Treatment Plant (CETP), is also functional at MIDC, Mahad.

As there are other industries in the neighborhood with similar nature, there is compatibility. The proposed land plot admeasuring 8000 m² This is not a Prime Agricultural Land. The land use is already as “Industrial”. Thus, there is no change in the status. This is a flat land where by cutting- filling balances and there will be No Low Borrowing from Nature.

There are ecologically sensitive area and patches of reserved forest within 10 km radius of Mahad MIDC as per Draft notification of 26/03/14S.O. 733(E).
5. Water Balance

The proposed manufacturing facility will be located within existing plant area of 8000 m². Project layout is shown in Figure 2. Waste water generated from process will be recycled and utilized for process, boiler and cooling purpose. Total effluent treated in ETP will be 72 m³/day out of which 40 m³/day of waste water will be released in CETP and 32 m³/day will be reused in plant. Domestic waste water will be treated in ETP. Net water requirement will be 93 m³/day.
Effluent treatment Plant is proposed. Process flow diagram is given below;

![Block diagram of ETP](image)

Figure 4 : ETP Block Diagram

6. Solid Waste

Solid waste details are given below:

<table>
<thead>
<tr>
<th>Non hazardous solid waste generation</th>
<th>Type of waste</th>
<th>Total Qty</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Domestic Activities</td>
<td>Dry garbage</td>
<td>19 Kg/day</td>
<td>Handed over to the authorised recyclers</td>
</tr>
<tr>
<td></td>
<td>Wet garbage</td>
<td>8 Kg/day</td>
<td>Composting</td>
</tr>
<tr>
<td>From Process</td>
<td>Coal Ash</td>
<td>200 Kg/day</td>
<td>DISPOSAL AT CHWT SDF / Brick Manufacturing</td>
</tr>
<tr>
<td></td>
<td>Plastic Drums / Containers</td>
<td>2 no./day</td>
<td>Handed over to the authorised recyclers</td>
</tr>
<tr>
<td>Haz. waste</td>
<td>ETP Sludge</td>
<td>15 MT/day</td>
<td>Disposal at CHWT SDF</td>
</tr>
</tbody>
</table>
7. Proposed Infrastructure

The existing infrastructure for manufacturing, ancillary operations, transport of raw material and final products are adequate.

8. R&R Plan

Project will be in MIDC area, hence, R&R plan is not applicable.

9. Project Schedule and Cost Estimates

M/s SPPL has ability to complete proposed construction within 13 months and likely to be commission the project for operation purpose.

Total estimated cost of project will be Rs. 5 Crore.
PROCESS FLOW CHART FOR CPC – BLUE

1. **REACTION GLASSLINED VESSEL**
   - Charge Phthalic Anhydride + Urea + Nitrobenzene + Cuprous Chloride

2. **ROTARY VACCUM DRYER**
   - Distillation of Solvent Nitrobenzene

3. **PURIFICATION VESSEL**
   - CPC Crude + Water + Sulphuric Acid

4. **FILTER PRESS**
   - Filter Pump
   - Wet Cake

5. **DRYING IN SFD**
   - Dry Powder from Wet Cake

6. **PACKING**
   - Bag Packing

7. **DISPATCH**
PROCESS FLOW CHART OF ALPHA BLUE

REACTION IN MS VESSEL
- CPC Blue + Sulphuric Acid

DROWNING VESSEL
- Water

FILTER PRESS
- Filter Pump
- Water

PIGMENTATION VESSEL
- TLS
- Caustic Lye
- Water

Drying in SFD
- Dry Powder

Classifier
- Fine mesh powder

Blending
- Mixing of different batches

Packing
- HPDE Bags

Dispatch
PROCESS FLOW CHART OF PIGMENT BETA BLUE

BALL MILL
• Crude CPC Blue + Steel Balls

PIGMENTATION VESSEL
• Grind Powder + NBA Solvent

FILTER PRESS
• Wet Cake

SFD
• Drying

CLASSIFIER
• Fine Mesh Powder

BLENDER
• Mix Different Batches

PACKING
• HPDE Bags

DISPATCH
PROCESS FLOW CHART OF PIGMENT GREEN7

REACTOR GLASSLINE VESSEL
• CPC Blue + Aluminium Chloride + Cupric Chloride + Common Salt + Chlorine Gas

DROWNING VESSEL
• Water

FILTER PRESS
• Wet Cake

PIGMENTATION VESSEL
• Wet cake + NX100 + Caustic Flakes + Oleic Acid + Monochlorobenzene

FILTER PRESS
• Wet Cake

SFD
• Drying

BLENDING
• Mix Different Batches

PACKING
• HPDE Bags

DISPATCH
PROCESS FLOW CHART FOR PIGMENT DIRECT TURQUOISE BLUE 86

1. REACTOR MS JACKETED VESSEL
   - CPC Blue + 23% Oleum

2. DROWNING VESSEL
   - Water + Salt

3. FILTER PRESS
   - Wet Cake

4. NEUTRALISATION VESSEL
   - Caustic + Water

5. SPRAY DRYER
   - Dry Powder from wet cake

6. BLENDING
   - Mix Different batches

7. PACKING
   - HDPE Bags

8. DISPATCH