EXECUTIVE SUMMARY

Introduction

Rashtriya Chemicals & Fertilizers limited (RCF) is a public sector undertaking involved in the manufacture and marketing of nitrogenous, phosphatic and potassic fertilizers as well as a variety of industrial chemical products. The company has presently two manufacturing units, one at Trombay and the other Thal, located in the state of Maharashtra. The Thal unit of RCF is one of the first fertilizer complexes established to utilize the Bomaby high off-shore natural gas. The Thal complex of RCF is spread over an area of about 850 acres of industrial land provided by government of Mahrashtra. Initially RCF Thal complex comprised of two trains of ammonia plant of 1750 tpd capacity each i.e. Combined capacity of 3500 tpd and three trains of urea plant of combined capacity of 6060 tpd. A group of chemical plants for manufacture of Dimethyl Formamide (DMF), methylamine (MA), Dimethyl Acetamide (DMAC), Formic acid, Argon and Chickton were subsequently added to the Thal unit of RCF, making it an integrated fertilizer and chemical complex. Considering the market demand RCF has proposed to set up a GSSP unit at its existing Thal complex. The proposed project shall have capacity of 1700 MTPD of Granulated Single Superphosphate. The proposed project shall also have Sulphuric Acid plant of approx. 700 MTPD capacity based on Sulphur as raw material and associated offsite, utility, product handling and storage facilities

Project Location

The plant will be located at existing site at Thal in Raigad District, Maharashtra. The site already has nearly all infrastructural facilities. RCF Thal Complex is located at Thal-Vaishet village in Raigad District. The location co-ordinates of the proposed plant site are:

- Latitude: 18º42'19" N and
- Longitude: 72º52'38" E.

The location is a coastal plain, about 1.5 kms from sea at mean sea level of 3m, borderingThe proposed plant site is well connected by road network and nearest highway is NH – 17 connecting Panvel (Mumbai) in Maharashtra to Erankulam in Kerala. The nearest airport is Mumbai which is 120 km from site.The proposed plant site is around 30 Km from the nearest railway station of Pen

Project Description

.The raw material for SSP are rock phosphate and sulphuric acid and for GSSP will be powdered Single Super Phosphate, which will be produced by the RCF unit. All necessary pollution control equipments are provided to control the stack emission as per norms prescribed by the Maharashtra Pollution Control Board.

Manufacturing Process GRANULAR SINGLE SUPER PHOSPHATE (GSSP):
The SSP manufacturing process:

The proposed plant will have a capacity to produce 1700 MT/day. The SSP manufacturing process will comprise of two basic steps: grinding and acidulation. Rock Phosphate which is the major raw material of the product will be fed through hoppers to the grinding section of the plant. Rock phosphate will be ground using ball mill to size of 95 % passing through 100 mesh size which is the requirement of the process. The fine particles of rock phosphate generated by the process will be collected through a cyclone cum bag filter combination and the clean air will be vented out to the atmosphere.

The next stage is acidulation. Sulfuric acid of 98% concentration will be diluted to 68%-69% concentration by mixing fresh and recycled water. This diluted acid and the ground rock phosphate will be fed to the mixing unit where they will be thoroughly mixed.

The output of the mixer which is in slurry form will then be discharged to the Den. The Den output which is in a dry crumbling state will be conveyed to the SSP covered storage area and stored in heaps for curing. The curing will take 12 to 20 days depending on the source of rock phosphate during which time the SSP will be reshuffled and aerated to aid the process.

GRANULATED SINGLE SUPER PHOSPHATE:

Proposed plant will have a capacity to manufacture 1700 MT/Day of Granular Single Super Phosphate . The SSP powder will be fed to the granulation plant. In the rotating granular drum the powder SSP will be mixed with water up to 14%, which results in the formation of granules.

The granules will then be sent to the Dryer Drum for heating up to ~ 600^0C temperature to reduce the moisture content to 5 %. The hot granules will then be cooled in the cooler drum from where they will be send to the vibrating screens for desired mesh. Two types of screens will be used; Undersize Vibrating Screen and Oversize Vibrating Screen.

Under Size Vibrating Screen (Size -1mm)

- The oversize material of this screen will be send to the oversize screen and the undersize material will be recycled to the granulator drum.

Oversize Vibrating Screen(Size+1.4mm)

- The oversize material of this screen will be send to the crusher from where it will be taken to the granulator drum. The undersize material will be packed in 50 kg HDPE Bags.

Sulfuric acid Manufacturing Process

The Sulfuric Acid shall be used to meet the captive requirement of 1700 TPD Single Super Phosphate Plant. The plant capacity is 700 TPD of 98% Sulphuric Acid. The basic raw material used for the production of Sulfuric Acid shall be Sulphur.

The plant shall be based on the PLC/ DCS Control system.

The Sulfuric acid is manufactured by the Double Contact Double Absorption (DCDA) Technology. The process is sub divided into the following main sections

- Burning of Sulphur to form Sulphur Di-Oxide
- Catalytic conversion of SO_2 to SO_3
- Absorption of SO_3 in Strong acid

The basic reaction chemistry is

$$S + O_2 = SO_2$$

$$SO_2 + 0.5\ O_2 = SO_3$$

$$SO_3 + H_2O = H_2SO_4$$

Resources Requirement

Land: No land is to be acquired for the proposed project. It will be located in the existing complex spread over 344 ha.

Raw Material: The raw materials required for the manufacture of Single Super Phosphate is detailed out as follows:

Details of Raw material requirement and their source

Sl.No.	Item	Unit	Annual Requirement
1.0	Rock Phosphate	MT	292500
2.0	Sulphur	MT	80750
3.0	Process Water	100 m^3	14400
4.0	Power	MWh	Captive
5.0	Natural Gas	1000 Nm^3	24998
6.0	Bags & Threads	100 Nos	100500

Water: The total requirement of process water for the project is envisaged to be around 4800 m3/day Water requirement for the plant will be made available from existing MIDC System.
Power: For Power requirement for the proposed project, a Captive Power plant is considered. In addition to this, power is considered to be supplied to plant through DG set in case of emergency.
Fuel: The NG will be used as fuel for GSSP plant and HAG.

Manpower: The Project will generate indirect employment in and around the Project's area. During construction period, it is expected that about 500 jobs will be created in connection with the construction of the Project. Besides this, the proposed project would create 3500 jobs in the dealer and marketing network. Such indirect additional employment will in turn help boost economic stimulus in the area.

Environmental Aspects

Air Pollution

During the operation of the proposed project, the sources of air pollution occur shown in following table:-

S. No	Plant Stack	Stack Details (Height/Dia.; m; Flow in m^3/hr/ Temp. ^0C)	Pollutant Concentration mg/NM^3	Emission Load Kg/hr
1	Sulphuric Acid Plant	50 ;1.3 50,000 75 – 80	SO_2: 1.5 kg/Mt of Acid Acid Mist: 50	SO_2: 43.75[P1] Acid Mist: 2.5
2	GSSP Plant	50;1.5 95,000 50 - 55	SPM : 150 Fluoride: 25	SPM : 14.25 Fluoride: 2 .375
3	HAG Stack	30;0.6 12500Nm^3/hr 200-250	NOx: 125 SOx: Negligible	NOx- 1.563[P2]
4	Auxiliary Boiler	30;0.6 7000Nm^3/hr 20 - 250	NOx: 125 SOx: Negligible	NOx- 0.875[P3]

Water Pollution

i. SSP / GSSP Plant are zero effluent plant. All the scrubber liquid containing fluoride/silica chemicals will be recycled in the plant as acid diluents. The added water will go through evaporation or through product.

ii. Sulphuric Acid Plant: The major consumer is Cooling Tower (both for acid plant and TG set). The other consumers are DM plant, CPU and WHB. The effluent generated due to blow down will be neutralised and sent to existing ETP (have sufficient capacity however it will be augmented at a cost of Rs. 6.1 crores). The treated effluents (meeting the norms) will be discharged in the sea.

Noise Pollution

The plant will have various rotating machines including blowers, vacuum pumps, process pumps, etc. along with DG sets, which will generate noise. These machines will be provided with appropriate acoustic enclosures to maintain the noise levels within limits.

Waste Generation

The following Hazardous Waste shall be generated in the Plant

Sulphur Sludge

Sulphur to be used for proposed Sulphuric acid plant is 99.9% pure and its impurities in form of ash etc shall be separated through filtration. The sludge containing these impurities shall be removed manually. The sludge removed will be recycled back into process or used in GSSP plant.

The only solid wastes generated will be sulphur sludge which will be recycled back in the system (GSSP plant or acid plant). Oily sludge and other wastes will be treated as per existing practices. The SSP process will generate silica sludge cake which contains silica & fluorine. The material so produced will be stored in covered godown and then will be used as filler in final SSP product

Environmental Status of Plant Site and Study Area

Site Characteristics

The proposed new Granular single super phosphate manufacturing plant is located at Thal- Vaishet Village (near coastal region of Western Ghats),

- Tehsil - Alibag,
- District- Raigad, Maharashtra.

The site is situated at **Latitude 18° 42' 19" N** and **Longitude 72° 52' 38" E**at an altitude of 3 m above the mean sea level. The project site is located on the National highway NH -17with located at a narrow distance.

Topography: The topography of the project site and the study area of 10 km radial zone is plain. The elevation of the project area varies from 0 to 400 m in general. However, in the southern and eastern side to the project area the elevations are in the range of 0 to 404 m, which provides a gentle slope towards west direction of the project site There are no hills, hillocks but at parts there is undulating land in the study area which is not a major area of concern.

RCF Thal complex is located in an undulating terrain, with small sporadic basaltic ridges on the eastern side. The Thal fertilizer complex is located merely at a distance of 1.5-km from Arabian Sea coast.

Climate: In general, Konkan belt experiences tropical warm, humid or maritime climate throughout the year with regular rainfall of an average 3884.3mm and the temperature difference (between minimum and maximum) exceed 10°C.

Atmospheric temperature varies from 15-35°C with the average humidity ranging between 60-90%.

Summary of Rainfall and Temperature

Climate & Rainfall	
Average Rainfall in District	3884.3 M.M.
Minimum Temperature	16.1 Degree Celsius
Maximum Temperature	40.4 Degree Celsius

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Seismicity: According to the seismic-zoning map of India, Historically, parts of this region have experienced seismic activity in the 6.0 – 6.5 range.

Micro-meteorology: The meteorological data recorded during the study period is used for interpretation of the baseline information as well as input for air quality simulation models. Meteorological data was collected Summer Season (March to June, 2012).

Soil: The soil samples collected from the project site reveal sandy and silty (in Karle, Sagaon and Kihim village) characteristics. The soil is slightly alkaline in Kihim otherwise inhibits neutral characteristics. Organic content of the soil in the study area is average with available nitrogen content varying in the range of 284 kg/ha to 328 kg/ha and available phosphorous content in the range of 134 to 214 kg/ ha. The land use includes planting agaves, quick growing grasses, quick growing economic species of hard wood including bamboo in staggered contour trenches. In the eastern fringe of Raigad, planting of pine apple, cashew, mango, coconut, cocoa pepper and agave with grasses are suggested. The land use to be followed is also depends upon the rainfall characteristics

Landuse: Land use / land cover map of 10 km study area has been show in Figure 3.12 The agricultural area and open land represents around 1.1% and 1.9% of the whole land cover. Vegetation represents the second land use class. It covers about 36.8 % of the area. Table 3.22 shows the land use categories with the respective percentages in the study area:

Class	Area(sqkm)	Area %
Agricultural Land	3.48	1.1
Agricultural fallow Land	24.95	7.9
Open Land	6.1	1.9
B.L	5.36	1.7
Settlement	16.95	5.4
Ocean	140.03	44.4
Waterbody	2.21	0.7
Vegetation	116.1	36.8
Total	315.18	100

Water:- Ground water quality was compared with the drinking water norms (IS 10500: 1993;). It was observed that ground water samples from project site and surrounding is more or less Ok for drinking purposes ("permissible limit is the limit in absence of other source of water"). The surface water quality in the region has been compared with respect to the Drinking Water Quality

Standards as per IS: 2296 and it has been found that the surface waters of lakes are having more or less Ok for drinking purposes

Air Quality: The average of the analytical results of air quality monitoring in the above mentioned locations are compared against the Based on the above, 6 sampling locations were selected a shown in Figure 3.10. The name and code of the sampling locations are given in Table 3.13.
National Ambient Air Quality Standards (NAAQS). The maximum, minimum and average concentrations of the air pollutants are given in Table 3.14
Hence, it can be concluded that the air quality of the monitored locations in the study area are well within the permissible standards for Industrial, Residential, Rural & other areas.

Noise: The noise levels at all the locations were found within the ambient noise standards for Residential and Rural Areas and commercial areas during day as well as night time for which the standards are 55 dB(A) and 45 dB(A) during daytime & night time, respectively.
It is clear from the above table that noise levels at all the locations were well below the National Ambient Noise Standards for Residential & Rural Areas

Flora & Fauna: There are no national parks, wild life sanctuaries, tiger reserve, and bird sanctuaries or elephant reserves within the study area. Also, no endangered plant and/or faunal species were found within the study area.

Demography: According to the 2011 census Raigad district has a population of 2,635,394, roughly equal to the nation of Kuwait or the US state of Nevada. This gives it a ranking of 153rd in India (out of a total of 640). The district has a population density of 368 inhabitants per square kilo metre (950 /sq mi)
Its population growth rate over the decade 2001-2011 was 19.36 %.Raigad has a sex ratio of 955 females for every 1000 males and a literacy rate of 83.89 %.
Several scheduled tribes live in Raigad district. Among these are the Mahadev, Koli, Katkari and Thakur.

Environmental Impact Assessment
The activities involved in site preparation will be site clearance of the project site, earthwork excavation etc. The development of site will also involve the removal of soil, , etc. As the topography of the land is almost flat, there will be very minimum cutting and filling required for setting up of the plant and no filling material from outside is required. Hence, there will be very limited impact on the land environment due to the proposed project.

Air Quality

The major air pollutants expected to be emitted from proposed Granulated SSP project are mainly SPM, SOX, NOX, Acid mist, Flourides. The contribution to GLCs for the pollutants i.e. NOx, SOx,SPM, acid mist and flourides were predicted over the study area both due to Thal III and also due to proposed expansion GSSP project considering the worst scenario.The prediction (maximum) is based on the expected total emission rate from each stack (existing scenario and after the Thal III and RCF proposed GSSP expansion project) and are given in isopleths **Figure 4.1.**. The additional contribution to GLC is also given below in **Table 4.1 and Table 4.2**. As seen the GLC in the study area will be well below the NAAQ norms.

Noise

The sources of noise during the operational phase of the GSSP plant are mainly granulator, dryers and coolers, crushers, bucket elevators, screw conveyors, pumps etc. The other sources of noise are the movement of vehicles along the road all around the plant. The proposed SSP project will be a smaller project with advanced technology and improved equipment both in terms of energy efficiency and less noisy. However the material handling equipment especially crushers, bucket elevators and pay-loaders are noisy but the noise level is limited. These machines will be provided with appropriate acoustic enclosures to maintain the noise levels within limits.

The existing ambient noise levels near the project site are in the range of 43.5 to 52.5 dB(A). Therefore, the future noise impacts on the environment are not expected to be significant. Due to the masking effect, the ambient noise level in the nearby areas will not increase during the operation of the plant. Also, the greenbelt with taller trees is proposed in the plant periphery. Hence, there would not be any adverse impact due to the operation of the plant on the residents of the nearby areas. Employees working near crushers, bucket elevators and pay-loaders are exposed to slightly high decibels noise (+ 85 dB(A)). Employees working in these areas will be provided with adequate PPEs.

Water Resources and Water Quality

Water requirement for proposed expansion project is around ~200 m3 / hr (~ 4800 m3/day) "Water Balance" in Table 2.14.. The water will be drawn from existing source i.e. MIDC (Amba and Kundalika River). Necessary approval / clearance from Statutory Authority/ Board is being taken.

RCF philosophy of treating the effluents in the plant and recycling the same in the process {process condensates} or send these to ETP (with large capacity) and after equalisation / treatment use discharge to sea (with due approval from MPCB) shall be followed. GSSP plant is zero effluent plant and sulphuric acid / Auxiliary boiler unit will have blow down of 580 m3/d which will be neutralized and sent to existing ETP. For proposed expansion project it is proposed to augment the existing Effluent Treatment Plant (provision of Rs 6.1 crores) as per requirement to accommodate the additional effluent.

Land Use

RCF expansion project is being located within the existing premises and as such no additional land is required. Since there is no additional land required for RCF expansion project, no soil erosion or diversion of land is involved.

More than 33% of the land is being utilized for greenbelt development, which will help in enhancing the aesthetic environment of the area.

Biological Environment

Around the project site, various types of trees would be planted along the periphery of the project as well as green area. These activities would help in reducing the air and noise pollution and would also enhance the biological and aesthetic environment in and around the project site. The development of green belt provides habitat, food and breeding areas to birds, small animals and insects. No rare or endangered species of fauna are reported to exist in the area. Thus, no impacts on rare / endangered species are envisaged due to normal operations. Indigenous tree plantation will be preferred in greenbelt development. Hence, no negative impact on biological environment is envisaged.

Demographic and Socio-economic

Proposed project will generate direct employment and indirect employment for persons. In addition some person get direct job as per the qualification and nearly 3500 persons will involved in various activities due to the proposed project. The industrial growth of the region will help in infrastructure development in the area. It will also generate income for government through taxes. Overall the project will have positive impacts on socio-economic environment.

Environmental Management Plan

Air Environment

In order to mitigate the adverse environmental impact due to the construction and operation of the proposed Granulated SSP project following measures are recommended:

Construction Phase:

- Excavators shall be used for construction. The excavated material such as topsoil and stones shall be stacked at safe places for reuse at a later stage of construction.
- To prevent soil erosion during construction phase, temporary seeding, sedimentation basins, contour trenching, mulching etc. can be done based on the net imperviousness of the site and it should not exceed the imperviousness factor as prescribed by the National Building Code, 2005.
- Preserving existing vegetation or re-vegetating disturbed soils is one of the most effective ways to control soil erosion.
- During dry weather, control of the dust nuisance created by excavation, and transportation activities shall be carried out by water sprinkling.
- Spill prevention and control plans shall be made, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material including paints, cleaners, and petroleum products.

Operation Phase:

- All trucks will be transported after covering from the top.
- Dust collectors will be in line with unloading hoppers.
- HAG will be provided with two stage cyclone separator followed by wet scrubber.
- Dust collector and cyclone separator will be provided for removal of particulate matter generated from grinding of rock phosphate.
- Dust separated form the cyclone separator as well as from the dust collector will be used in process.
- Hydrogen fluoride gas generated from the SSP process will be conveyed in rubber lined ducts to the scrubbers. A settling chamber along with two stage water spray scrubbers and two stage venturi scrubbers followed by alkali scrubber will be provided to obtain the desired level of hydrogen fluoride.
- Greenbelt and green area will be developed with tall trees with wide leaves in the periphery of the plant for control of air pollution.
- A 2 stage separator unit for GSSP unit and 4 stage venture scrubber unit for SSP unit has been under provision to ensure to have the flue gases flowing under prescribed norms.

Noise Environment

iii. All the equipments in the plant would be designed to have a total noise level not exceeding 85- 90 dB(A) as per the requirement of Factory Rules .

iv. Manufacturers/Suppliers of major noise generating machines/ equipments like compressors, feed pumps, vacuum pumps, diesel engines, generators etc. should ensure the State-of-the-Art low noise equipments to comply with statutory requirements.

v. Noise traps/ mufflers silencers shall be provided for noise reduction wherever possible. Acoustic design with sound proof glass panelling should be provided for in-house operators/ control rooms to mitigate any occupational exposure.
vi. Use of personal protective devices such as ear-muffs, ear-plugs etc. should be strictly enforced for the workers engaged in high noise areas.
vii. Provision of acoustic dampeners in foundations and insulators in the interiors.
viii. The insulation provided for prevention of loss of heat and personnel safety will also act as noise reducers.

Water Environment

The water environment inside the plant has been properly planned with suitable measures in place for reduction of consumption of fresh water supplements by nearly recycling and reutilizing this water for dilution purposes during the manufacturing process. A proper planning has been made for maintaining a "ZERO Effluent DISCHARGE UNIT" by having the water inlet and outlet properly materialized hence ensuring no losses from any stream and complete utility of all input water and also to have no liquid solution become waste.. The H_2SiF_6 effluent that is hazardous in nature is recycled and reused. . The effluent generated in Sulphuric acid plant will be treated and disposed off in Arabian sea with approval from authorties.

Green Belt

RCF has already developed > 33% of area as green belt all around it and also along roads, as groves of fruit trees, as forest blocks, lawns and ornamental / flowering bushes. Mostly the trees should be planted in blocks of one particular plant – after consulting forest department or other experts etc.

Block plantation of same species of trees is not a healthy practice as it can cause lots of diseases (although no diseases have been noticed).

The trees, which have attained their age, should be cut and new trees should be planted.

Proper maintenance is required for the avenue trees such as:

Avenue trees should not block the view of road or building. This is necessary from safety and security point of view.The distance of avenue trees should not be less than 4 to 5 meters.The road curbs should not have trees rather shrubs.

Corporate Social Responsibility

- As a good corporate citizen and major industry RCF may consider adopting few more selected villages in developing them as model villages.
- Awareness program are to be initiated in immediate neighbouring villages about RCF plant activities and the various EHS measures undertaken to make the plant safe and environment friendly.
- RCF should finalise the study and start carrying out CSR activities.

Environment Monitoring Plan

A detailed environmental monitoring plan for the proposed project during construction and operation phases of the project has been outlined. The same will be adhered during the project execution. In addition to that all the conditions being imposed in the consent to establish/ operate and environmental clearance shall be adhered.

Hazards and Risks

The additional hazards due to proposed projects are SOX leakages from Sulphuric acid plant The impact of these toxic gas leakages will be within the plant. Preventive measures have been suggested as safe guard against incidents.

General Safety Measures

i. All the personnel at the plant will be made aware about the manufacturing processes and details of the products, their proximity of its exposure and risks associated with them.
ii. Based on which a through awareness of storage of these substances, associated risks and safe operational conditions its maintenance inside the plant would be taken care and also making the workers aware of hazards with manual handling of chemicals.
iii. Personnel engaged in handling of hazardous chemicals will be trained to respond in an unlikely event of emergencies.
iv. Safe work practices will be developed to provide for the control of hazards during operation and maintenance.
v. Adequate fire fighting facilities will be provided at the plant, including, dry chemical powder type, water CO_2 type, mechanical foam type, CO_2 type of Fire Extinguishers and sand buckets. Personnel will be trained to combat the fire in various hazardous chemicals.
vi. The fire fighting system and equipment will be tested and maintained as per relevant standards.
vii. Safety measures in the form of DO and Don't Do will be displayed at every strategic locations especially in local language and in pictorial form.
viii. The required PPEs for each area/ operation should be identified and the necessary PPEs, like, helmets, goggles, hand gloves, mask, PVC suit, Self Contained Breathing Apparatus, safety belts, ear muff and plug, etc. will be provided to the personnel.
ix. The plant will check and ensure that all instruments provided in the plant are in good condition and documented.
x. Adequate ventilation will be provided. Local exhaust ventilation will be effective in controlling the dust and fumes in the work environment.
xi. All equipment and storage tanks/containers of flammable chemicals should be bounded and earthed.
xii. Good house keeping will be maintained in the plant and First aid box will be provided within the plant.
xiii. List of important telephone numbers will be displayed at each and every location in the plant.
xiv. All the accidents and incidents will be recorded, investigated and analysed in the proposed plant.
xv. Safety awareness programme and training of the worker will be carried out to motivate the workers to increase the safety level at personal level.
xvi. Occupational Health Aspect: As per govt. standard all facilities will be provided.

Safety Precautions for Storage & Handling of Acids:

i. The unit will provide special precautions for storage & handling of Sulphuric Acid & Hydro Fluoro Silisic Acid within the premises.
ii. Acids storage tanks will be placed in to the separate storage area within the premises with all sign boards stating the proximity of danger to the personnel.
iii. The proper collection system will be provided for the leakage & spillage collection of both the acids by preparing dyke wall and Acid Resistant tiling RCC Flooring with spillage collection tank and will be transferred to the emergency storage tank.
iv. During the shutdown and cleaning process of the acid tank proper care would be taken and all safety ensured precautions would be followed.
v. Proper vent will also be provided to each storage tank. Moreover, Weather shed and water sprinkling system will be provided.

Disaster Management Plan

RCF has got an exhaustive 'Emergency Preparedness Plan' and is also carrying out Mock Drills for various scenarios. However a model Emergency Management Plan is given to review the existing EPP.

Project Cost & Cost towards Environmental Protection

The proposed project will require an investment of about Rs. 299.01 crores including expenditure of about US $ 6 million / Rs. ~ 45 crores for pollution Control measures. Key expenditures on these measures are as given below:

- Scrubber system in SAP,
- Cyclone separators with scrubber
- Green belt development etc