SOUTHERN PETROCHEMICAL INDUSTRIES CORPORATION LIMITED

Pre-feasibility Report for the Feedstock/Fuel Conversion from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) in Ammonia Plant at SPIC Nagar, Tuticorin District-628005, Tamilnadu

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EQMS
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Environment Quality Management Services

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PROJECT DETAILS							
Name of Publication	Pre-feasibility Report of Changeover of Feedstock and Fuel from Naphtha to to Mixed Feedstock(Natural Gas and naphtha) in Ammonia Plant at SPIC Nagar, District Tuticorin-628005 Tamil Nadu						
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Contents

1 EXECUTIVE SUMMARY

According to Direction of Department of Fertilizer, Government of India all naphtha based fertilizer plants to switch over to Natural Gas for fuel and feed stock and also as per condition of existing environmental clearance of Southern Petrochemical Industries Corporation Limited, Tuticorin the unit shall shift to natural gas as fuel (F.No J-11011/171/2007-IA II(I) dt March 5, 2008.

Southern Petrochemical Industries Corporation Limited, Tuticorin, (SPIC LTD) proposes to convert the feedstock/fuel from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) in Ammonia Plant at SPIC Nagar, Tuticorin District-628005, Tamilnadu.

The production capacity of urea plant will remain the same after the gas conversion at 6,20,400 MT per year.

Southern Petrochemical Industries Corporation Limited, Tuticorin is not acquiring any land for this Natural gas conversion.

The proposed Natural Gas conversion fall under the category of 5 (a) –Chemical fertilizers of the scheduled list of projects in the Environment Impact Assessment (EIA) Notification SO 1533, of 14-09-2006 which necessitates obtaining the Environment Clearance from Expert Appraisal Committee, Ministry of Environment and Forests (MoEF), Government of India.

1.1 Plant Features and Production Capacity

Southern Petrochemical Industries Corporation Limited, Tuticorin, (SPIC LTD) proposes to changeover of Feedstock and Fuel from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) in Ammonia plant at SPIC Nagar, District Tuticorin-628005 Tamil Nadu.

The production capacity of urea plant will remain the same after the gas conversion at 6,20,400 MT per year.

Southern Petrochemical Industries Corporation Ltd., or SPIC, (BSE: 590030, NSE: SPIC) is an Indian company and manufacturing fertilizer products.

The company, headquartered in Chennai, was incorporated on 18 December 1969 and became a joint venture between the M. A. Chidambaram Group and TIDCO (a part of the Government of Tamil Nadu) in 1975. The government sold its stake in 1992. The company's biggest client has been the government of Tamil Nadu, which purchases agro-products for subsidized distribution through its Public Distribution System. SPIC Group has major role in Agricultural development through it s Core Fertilizer business at Tuticorin.

Southern Petrochemical Industries Corporation Ltd Tuticorin plant was commissioned in the year 1975. The industry is one of the largest manufactures of the nitrogenous fertilizer plant was the first non – turnkey venture of its kind in India.

Southern Petrochemical Industries Corporation Ltd, Tuticorin transferred Di Ammonium Phosphate, ALF3 and SSP Units to M/S Green Star Fertilizers Limited, Tuticorin in October 2011 through Business Transfer

Agreement as result of which facility for manufacturing ammonia & urea alone remains with M/s Southern Petrochemical Industries Corporation Ltd, Tuticorin.

Southern Petrochemical Industries Corporation Ltd, Tuticorin has single stream urea plant, with a rated capacity of 6,20,400 MT per annum. Main raw materials for the production of urea are Ammonia and Carbon Dioxide for which the feed stock is Naphtha.

Existing Plant has sufficient land and other necessary facilities for successful establishment and operation of plant after gas conversion and enhanced production. There are no addition land is acquired by Southern Petrochemical Industries Corporation Limited, Carbon di oxide emission from stacks will be reduced after the change the feed stock from naphtha to natural gas.

1.2 Environment

Company policy and prime aim is to ensure that Environmental Norms are strictly adhered to.

Some of the key features with respect to effluents and waste disposal in this unit are:

The effluents generated from Ammonia and urea plant are treated in an integrated effluent Treatment Plant. The liquid effluents from the ammonia and urea plant comprises of,

Cooling Tower blow down from ammonia, urea and captive power plants.

Acidic/Alkaline effluent from water treatment plant

Storm Water

The above effluents collected in a mixing pond and treat in effluent treatment plant. The capacity of integrated effluent Treatment Plant is 150 cubic meter per hour. There is no additional waste water generation after the gas conversion.

At the company's SPIC Nagar Unit

The company has installed state-of-the-art continuous monitoring of Hydrocarbon leak detection.

The company has done regular stack monitoring by pollution control board authorities.

The company is maintaining Flare for any emergency venting.

The company undertook periodical Environmental audit by third party and regularly submits/maintains reports.

The company has to its credit a record of maintaining non failure of any norm as per TNPCB for last two decades of operation.

Our laboratories and production sites are engineered to be safe working environments in accordance with local regulations and the company's high-level operating standards. Stringent safety procedures, applicable to both internal company and external sub-contracted employees, are practiced during the sites' erection stages. SPIC also has made large investments in Automation and in installation and maintenance of advanced safety equipment and fire protection systems.

The project is not likely to cause any significant impact to the ecology of the area since adequate preventive measures will be adopted to control various pollutants within permissible limits. Green belt

development around the area would also be taking up an effective pollution mitigative technique, as well as to serve as biological indicators for the pollutants released from the premises of SPIC.

The company proposes to have similar standards at the gas conversion of existing plant which will be planned on same available existing land.

1.3 Submission

In the light of the above, we would like to state that the Natural gas based ammonia & urea plant at Tuticorin with would have in place systems, procedures and hardware to ensure that all guidelines for protecting the environmental emission norms are followed and its operation has no adverse impact on environment.

2 INTRODUCTION

2.1 Brief Description of the Project

Southern Petrochemical Industries Corporation Ltd., or SPIC, (BSE: 590030, NSE: SPIC) is an Indian company that makes petrochemicals. Its core competency is in fertilizer products.

The company, headquartered in Chennai, was incorporated on 18 December 1969 and became a joint venture between the M. A. Chidambaram Group and TIDCO (a part of the Government of Tamil Nadu) in 1975. The government sold its stake in 1992. The company's biggest client has been the government of Tamil Nadu, which purchases agro-products for subsidized distribution through its Public Distribution System.

Southern Petrochemical Industries Corporation Limited, Tuticorin, (SPIC LTD) proposes to changeover the feedstock/fuel from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) in Ammonia Plant at SPIC Nagar, Tuticorin District-628005, Tamilnadu.

The production capacity of urea plant will remain the same after the gas conversion at 6, 20,400 MT per year.

Southern Petrochemical Industries Corporation Limited, Tuticorin is not acquiring any land for this project.

It is brown field project and plant will use existing utility services after the changeover of feedstock and fuel.

2.2 Need for the project and it's importance to region

Industrialization plays a significant role in the process of economic development. The examples of developed countries indicate that there is a direct relationship between high level of income and industrial development.

Agriculture which accounts for one fifth of GDP provides sustenance to two-thirds of our population. Besides, it provides crucial backward and forward linkages to the rest of the economy. Successive five-year plan have laid stress on self-sufficiency and self-reliance in food grains production and concerted efforts in this direction have resulted in substantial increase in agriculture production and productivity.

This is clear from the fact that from a very modest level of 52 million MT in 1951-52, food grain production rose to about 257 million MT in 2012-13. In India's success in agriculture sector, not only in terms of meeting total requirement of food grains but also generating exportable surpluses the significant role played by chemical fertilizers is well recognized and established.

Keeping in view the vital role played by chemical fertilizers in the success of India's green revolution and consequent self-reliance in food-grain production, the Government of India has been consistently pursuing policies conducive to increased availability and consumption of fertilizers in the country. As a result, the annual consumption of fertilizers in nutrient terms (N, P & K), has increased from 0.7 lakh MT in 1951-52 to 278 lakh MT 2011-12

As of now, the country has achieved near self-sufficiency in production capacity of urea with the result that India could substantially manage its requirement of nitrogenous fertilizers through the indigenous industry.

Out of three main nutrients namely nitrogen, phosphate and potash, (N,P&K) required for various crops, indigenous raw materials are available mainly for nitrogenous fertilizers.

The Government's policy has hence aimed at achieving the maximum possible degree of self-sufficiency in the production of nitrogenous fertilizers based on utilisation of indigenous feedstock. Prior to 1980, nitrogenous fertilizer plants were mainly based on naphtha as feedstock. A number of fuel oil/LSHS based ammonia-urea plants were also set up during 1978 to 1982.

At present, except for few plants, all other Urea production plants has converted to natural gas feedstock. Natural gas has been the preferred feedstock for the manufacture of urea over other feed stocks viz. naphtha and FO/LSHS, firstly, because it is clean and efficient source of energy and secondly, it is considerably cheaper and more cost effective in terms of manufacturing cost of urea which also has a direct impact on the quantum of subsidy on urea.

2.3 Demand Supply Gap

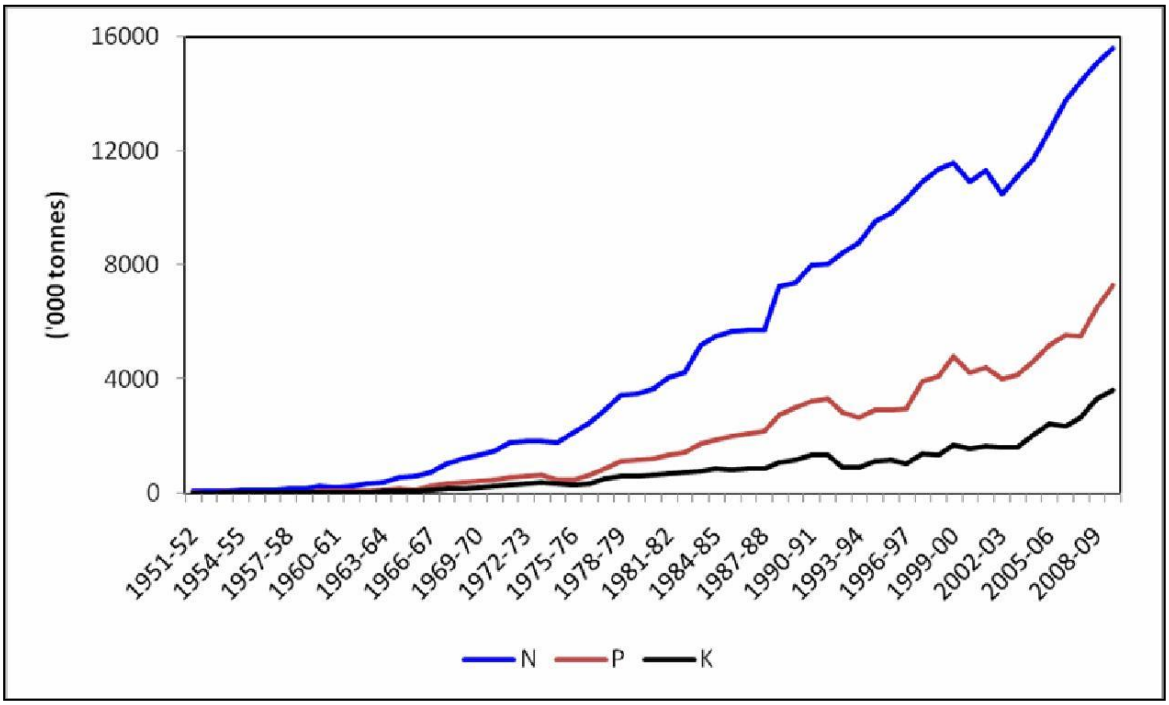
The gap in demand and supply of Urea is projected to rise to 11 million tonnes (MT) by the 2016-17 fiscal, industry body Fertilizer Association of India (FAI) has said. The country produces around 22 MMT of the important nitrogenous fertilizer, while consumption is around 29 MT. The shortfall of 7.8 MMT covered through imports.

"There is an urgent need for construction of new urea projects and modernization of existing urea production plant to fill the projected consumption and production gap of 11 million tonnes by the year 2016-17,"

According to study on "Demand for Fertiliser in India: Determinants and Outlook for 2020" by Indian Institute of Management Ahmadabad

The fertilizer imports increased dramatically in 1977-78 and 1978-79, 1984-85 and again in 1988-89 and 1989-90. However, during the decade of 1990s imports were at low levels except in 1995-96 and 1997-98. Due to low/no addition in domestic capacity coupled with rise in demand for fertilizers during the last two decades, imports have increased significantly in the 2000s.

The growth of imports was rather slow in the eighties and nineties but accelerated in 2000s. The share of imports in total consumption (N+P+K) declined from 57 per cent in 1960s to 43 per cent in 1970s, further to about 24.8 per cent in 1980s, 21.3 percent in 1990s but increased to 26.2 per cent in 2000s. Almost similar trend was observed in case of nitrogenous and phosphatic fertilizers. The share of imports in total consumption was 13.8 percent in case of N and 23.8 percent in P during the 2000s. Rising share of imports is a matter of concern as world fertilizer markets are highly volatile and imperfect. So there is a need to increase domestic production to insulate from international markets.



Source: Fertilizer Association of India (2010)

The fertilizer consumption in India has generally exceeded domestic production in both nitrogenous and phosphatic fertilizers except for few years the entire requirement of potassic fertilizers is met through imports as India does not have commercially viable sources of potash. During 1950s and 1960s, about two-third of domestic requirement of N fertilizers was met through imports.

2.4 Export Possibility

No

2.5 Employment Generation (Direct and Indirect) due to the project

It is natural gas conversion of existing ammonia manufacturing plant so additional major man power is not required even indirect employment will be generate due to development in nearby area.

Southern Petrochemical Industries Corporation Limited, Tuticorin generate the employment on various levels time to time and give the priority to local persons.

3 PROJECT DESCRIPTION

3.1 Type of Project including interlinked and interdependent projects, if any

Proposed gas conversion of feed stack & fuel for Ammonia & Urea Project falls under 'Section 5(a)' Manufacturing / Production of Chemical Fertilizers & 'Category "A".

It does not attract any specific or general condition as per EIA notification dated 14th September 2006 and its amendment on 1st December 2009.

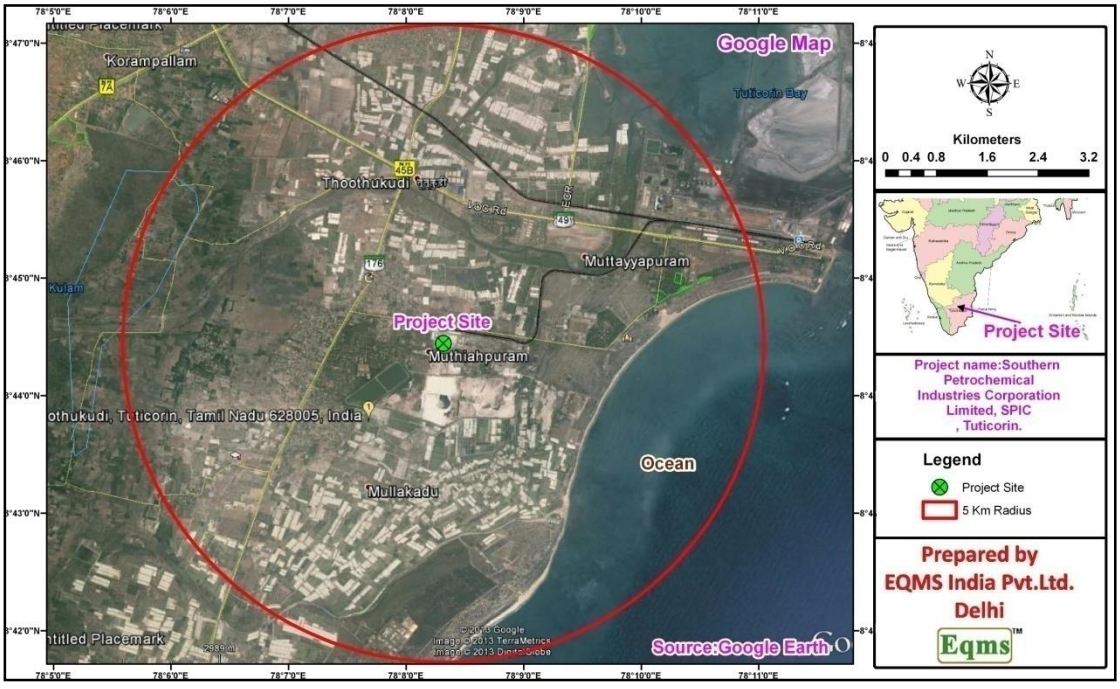
3.2 Location (map showing general location, specific location and project boundary & project lay out) with coordinates

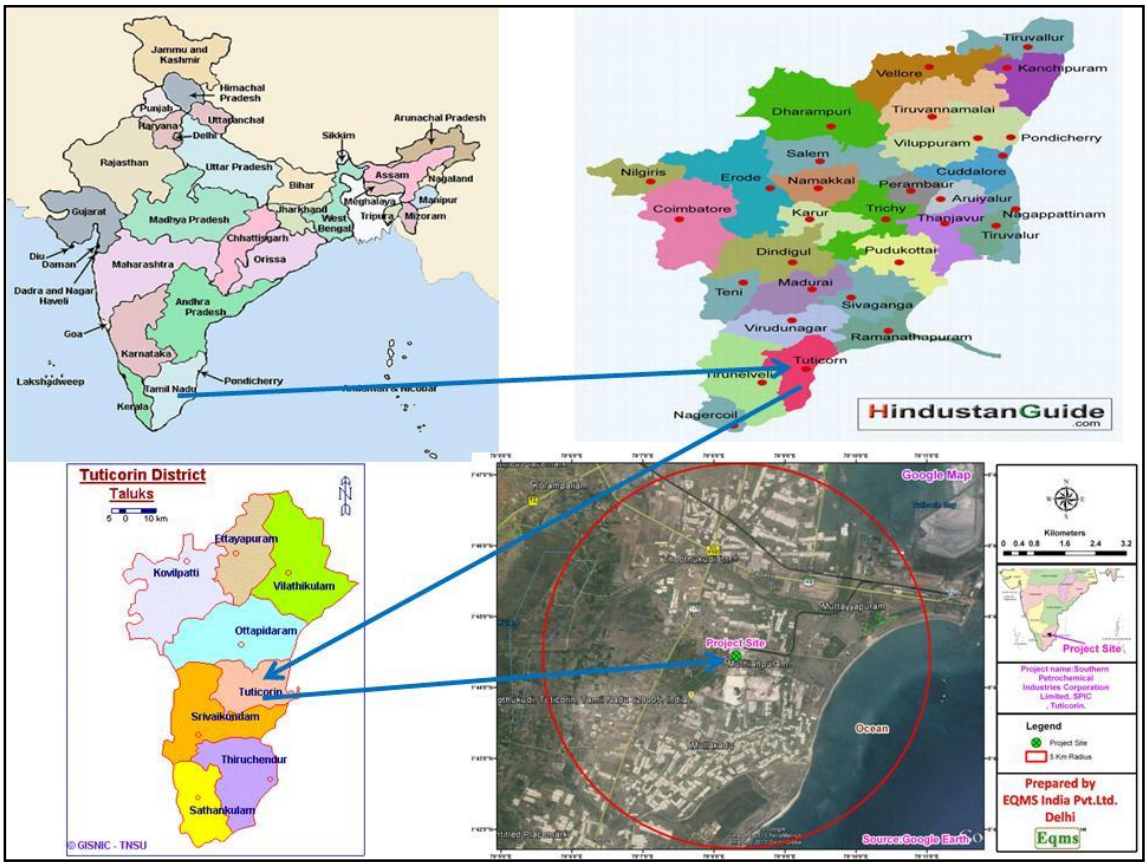
The existing plant situated on industrial Land in SPIC Nagar, Post Office Muthiahpuram S.O Taluka-Tuticorin, District Tuticorin, State of Tamil Nadu - 628005.

The Plant site is located at about 8.0 km from Municipal Office of Tuticorin City on Thoothukudi-Trichendur Road, Kanyakummari Road.

The proposed site lies between 08° 45' 24" N latitude and 78° 13' 36"E longitudes and is well connected by Road (NH-7), Rail and Tuticorin port.

Tuticorin city headquarter is located at a distance of 8 KM from the site. Nearest railway station Tuticorin is located at a distance of 10 KM from the site.





3.3 Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted

No, since this is conversion of feed stock & fuel from naphtha to mixed feedstock (Natural gas and naphtha) for Ammonia unit on an existing site, with requisite facilities available at site. There is no interlinked project.

The project is not likely to cause any significant impact to the ecology of the area since adequate preventive measures will be adopted to control various pollutants within permissible limits. Green belt development around the area has been and shall be taken up as an effective pollution mitigative technique.

Existing urea manufacturing plant was commissioned in the year 1975. It is proposed Changeover of Feedstock and Fuel from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) as per GOI norms.

The production capacity of urea plant will remain the same after the gas conversion at 6,20,400 MT per year.

Size or Magnitude of Operation

Southern Petrochemical Industries Corporation Limited, Tuticorin, (SPIC LTD) proposes to changeover of feedstock and fuel from naphtha to Mixed Feedstock (Natural Gas & Naphtha) at Ammonia plant in SPIC Nagar, District Tuticorin-628005 Tamil Nadu.

The production capacity of urea plant will remain the same after the gas conversion at 6,20,400 MT per year.

SPIC is using the Naphtha as a feed stock and fuel. Natural gas will be used after the gas conversion and it will depend on the receiving of natural gas from sources. Till we get natural gas for the complete requirement, Mixed feedstock will be utilized.

There is no addition land is required for the project.

S. No	Product	Existing Capacity	Capacity after Gas conversion
1	Urea	6,20,400 MT per year (With production ceiling by government)	6,20,400 MT per year **No increase in Production**

3.4 Technology and Process Description

AMMONIA PLANT:

Process Description:

Ammonia plant was designed on the "Total Energy Concept" with Naphtha as the feedstock. The plant is converted to utilize Natural gas as feedstock by M/s Haldor Topsoe. The plant comprises the following process schemes:

- Naphtha Hydro-Desulphurisation based on IIP/IFP Process.
- Pre-Reforming
- Primary reforming based on Steam-Naphtha/ Natural gas reforming process
- Secondary Reforming
- Co-conversion and Methanation
- Bulk CO_2 removal based on Glycine/DEA system (M/s. Giammarco Vetrocoke Process)
- Compression - Centrifugal compressors are used for process air, synthesis gas and refrigeration system.
- Ammonia Synthesis
- Ammonia recovery and storage to store 3000 Metric tonnes of ammonia.

Desulphurization:

The feedstock of the Reforming catalyst should contain less than 0.5 ppm of sulphur. This is necessary as the Sulphur reduces the activity of the reforming catalyst. The feedstock is mixed with a stream of synthesis gas and is heated to approximately 355 ^{o}C. The mixture is passed through the hydro finer catalyst bed where the sulphur in the naphtha is reduced to H_2S. The naphtha is then condensed by cooling and the H_2S is removed in a stripping column. Sweet naphtha from Stripper is cooled and sent to Sweet Naphtha Tank.

Secondary Desulphurization:

Natural gas/ Naphtha/ Mixed feed stock is supplied into NG pre-heater 1435 at 30^0C and 41 Kg/cm^{2}g. Natural gas is mixed along with recycle gas and pre-heated to 360 ^{0}C. Sweet Naphtha from the Sweet

Naphtha storage Tank is mixed with a recycle stream of synthesis gas and heated to approximately 400 ^{o}C in the Process Naphtha Vaporizer. Naphtha feedstock and Natural Gas is mixed and passed into Desulphurization vessel at 360 0C and 37.8 Kg/cm^{2}g. The gas mixture passed through a bed of CoMox catalyst, where unconverted sulphur remaining in the Naphtha & Natural gas is reduced to H_2S. This H_2S is then absorbed in the zinc oxide bed, which is located in the lower part of the vessel. The sulphur content of the feedstock is thus reduced to below the limits imposed by the reforming catalyst manufacturer i.e. to less than 0.5 ppm (by weight).

Pre - Reforming:

The Desulphurized mixed feedstock is then mixed with the Process steam and Recycle hydrogen gas before entering the Feedstock Pre-heater. In the feedstock pre-heater, the inlet temperature to the pre-reformer is raised to 470°C. In pre-reformer all hydrocarbons constituting the naphtha are decomposed to methane. This is an exothermic reaction and pre-reformer outlet temperature is 522°C. The Pre-reformer outlet is mixed with process steam and mixed feed temperature at Primary Reformer inlet is 480°C.

Primary Reforming:

The reforming reaction is basically the reaction between hydrocarbon and steam to produce carbon monoxide and hydrogen. This reaction is carried out at a pressure of 29 kg/cm2 and at a temperature of 794^{o}C. The reforming reactions are endothermic and the necessary heat is supplied to the reaction by:

- Preheating the reactants;
- Carrying out the reactions in externally heated tubes. The heat supply is from flue gas produced by the combustion of naphtha in the reforming furnace. The reforming furnace is of the Power Gas standard "Modular" design, which is bricklined rectangular box like structure in which the tubes are suspended vertically. The furnace consists of 90 top fired burners and 264 tubes arranged in eight rows, each row containing 33 tubes. Steams reforming of naphtha/NG in the presence of catalyst produce reformed gas consisting of methane, carbon di-oxide, carbon monoxide, hydrogen and excess steam.

Secondary Reforming:

Calculated quantity of preheated Nitrogen required for ammonia synthesis is fixed in Secondary Reformer. Air is added to the hot gas from the primary reformer. The oxygen in the air reacts with part of the gas raising the temperature. The heated mixture then flows through a bed of catalyst and the methane present in the gas from the primary reformer reacts with excess steam to produce further hydrogen, carbon monoxide and carbon di oxide. The methane steam reaction is endothermic and therefore the temperature of the gas mixture, after initial sharp increase, falls as the gas pass through the catalyst bed and the reformed gas leaves secondary reformer at 970^{o}C.

CO Conversion:

The gas from the Secondary Reformer normally contains about 14 % carbon monoxide. This is cooled to 360 oC at reformed gas boiler and the gas enters the first stage of the CO conversion section. CO shift conversion takes place in two stages. Stage I is at relatively high temperature between 360 and 430oC. This stage employs the copper promoted iron oxide - chromium based catalyst and the carbon monoxide content is reduced to approx. 2 % by volume.

Stage 2 employs the low temperature catalyst made of a mixture of zinc and copper oxide, which operates between 200 °C to 220°C. Advantage of favourable equilibrium of shift reaction is taken into consideration at lower temperature to reduce the carbon monoxide to 0.2 % by volume of dry gas

CO_2 Removal and methanation:

CO_2 in the gas is absorbed using Glycine and DEA activated Vetrocoke solution. Then the Vetrocoke solution is regenerated in two stage regenerators operating at two different pressures. After CO_2 removal, the gas is passed to the methanator. Methanation is the Catalytic conversion of the oxides of carbon to methane by reaction with hydrogen at elevated temperatures over nickel based catalyst, both reactions are exothermic. The gases are preheated prior to the reaction to 315 °C by heat exchange with the hot gas from the high temperature stage of the CO conversion.

Heat Recovery:

- The heat recovery from the flue gas involves steam raising, steam superheating and preheating of the air to the burners.
- Heat in the product stream is used for the following purposes
  - Boiler feed water preheating.
  - Steam raising.
  - Regeneration of the vetrocoke solution.
- Production of ammonia synthesis gas by the route described is normally characterized by almost complete heat recovery and utilization. Only a very small proportion of the heat is rejected to the atmosphere in the flue gases from the furnace and to the process cooling water system.

Boiler Systems:

Two auxiliary boilers and one Additional Steam generation unit capable of operating independently, form part of Ammonia Plant. Auxiliary boilers are having a capacity of 90 tons of steam per hour each and Additional Steam generation unit having a capacity of 120 tons of steam per hour supply steam at 106kg/cm^2 pressure and 482 ^{0}C to meet steam requirements of process and steam drives. The fuel for these boilers is the fuel oil / Natural gas and is supplied with all equipment necessary for automatic operation.

Ammonia Synthesis:

Ammonia is produced at a rate of 1260 MTD in a single train. The main compressors are centrifugal, in line with current practice for large tonnage ammonia plants, and are driven by steam turbines to ensure maximum reliability in operation. The converter exit gases are water cooled before refrigeration. Refrigeration is provided by liquid ammonia vaporization.

Process Description of Loop:

Make-up gas from the compressor is mixed with the converted gases from the interchanger and the mixture pass through two refrigerated coolers in series. The refrigerated coolers condense ammonia, which is collected in the catch pot. Uncondensed gases from the catch pot are recycled through the interchanger where the gases are heated. The heated gases then enter the circulator before being fed into the converter in four streams - three 'shot' streams and one main feed stream. Converter exit gases

are cooled first in the boiler feed water heater, and then in the water cooler. Further cooling occurs in the loop interchanger after which the loop purge is taken off and the make-up gas stream is added.

Anhydrous Ammonia Recovery:

Liquid ammonia from the primary catch pot is let down to 17.5 kg/cm^2 in the letdown vessel, inert gases flashed off in the letdown vessel and purge gas from synloop fed to an ammonia absorber where the ammonia is absorbed by water. The liquor is sent to a still for recovery of ammonia. Liquid ammonia from the ammonia still overhead receiver is pumped into the letdown vessel. Anhydrous ammonia from the letdown vessel is sent to Urea Plant.

Hydrogen Recovery:

After removal of ammonia and moisture, the temperature of purge gas is reduced to -193^{o}C and hydrogen of 94 % purity is recovered and recycled back to Syn gas compressor. The liquid, which has condensed at -193^{o}C containing methane, argon and Nitrogen and traces of Hydrogen, is flashed and used as a fuel in Reformer.

Instrument Air:

Three instrument air compressors, each having a capacity of 800 NM^3/hour of air at 8 kg/cm^2 abs, are provided. Automatic drying system, capable of drying 2000 NM^3/hour air to a dew point of minus 30^{o}C are included. A normal requirement of Instrument air is fed from the process air system.

UREA PLANT PROCESS

Urea is synthesized from ammonia and carbon Di-oxide obtained from the Ammonia plant. Carbon di-oxide and Ammonia are separately compressed and allowed to react along with the recycled ammonium carbamate solution. The reaction product which is a mixture of Urea, Ammonium carbamate, excess ammonia and water is further decomposed and separated to obtain Urea solution. The excess ammonia and carbon Di oxide are recycled as ammonium carbamate into the urea reactor along with fresh carbon dioxide and ammonia.

The Urea solution is evaporated under vacuum to obtain Urea crystals which are separated by centrifugation, dried, remelted and prilled.

3.4.1 Salient Features of Technology

Southern Petrochemical Industries Corporation Ltd, Tuticorin has single stream urea plant, with a rated capacity of 6,20,400 MT per annum. Main raw materials for the production of urea are Ammonia and Carbon Dioxide for which the feed stocks are Naphtha and fuel oil.

Existing Plant has sufficient land and other necessary facilities for successful establishment and operation of plant after Natural Gas conversion. There are no addition land is acquired by Southern Petrochemical Industries Corporation Limited, Carbon di oxide emission from stacks will be reduced after the gas conversion (change the feed stock from naphtha to natural gas).

Southern Petrochemical Industries Corporation Limited, Tuticorin has estimated that the cost of implementation of the proposed gas conversion will involve a total capital investment of 96 Cr. (INR) inside the plant gas conversion alone.

S. No	Particulars	Details
1	Plant Location	Muthiahpuram village, Taluka - Tuticorin, District - Tuticorin, State- Tamil Nadu Pin Code-628005
2	Plant site Latitude and Longitude	Latitude 80 45' North Longitude 780 13 East
3	Climatic conditions	Arid
a	Temperature	
	Mean maximum	38.9degC
	Mean minimum	17.1degC
b	Mean Annual Rainfall	67 cms
c	Relative Humidity	55% to 81%
d	Predominant wind directions	January – March N to NNE April – July W to WNW August – September SW October – December NE
4	Climatic conditions at Site	Coastal
a	Temperature	19deg C to 41deg C
b	Predominant wind directions	Towards west followed by South-west and North-East
5	Plant site Elevation above MSL	Ave (+) 4.3 meters
6	Plant site Topography	Generally flat
7	Present land use at the site	Industrial land
8	Nearest highway	NH 7A (8 KM from site)
9	Nearest railway station	Tuticorin (10 Kms from the site)
10	Nearest Airport	Tuticorin (18 Kms from the site)
11	Nearest River	Tamiraparani river (20 Kms from the site)
12	Water source for the site	North main channel of the Tamiraparani river system at Peikula or Srivankundam Pump House
13	Nearest town/City	Tuticorin
14	Nearest village	Mullakadu
15	Hills/valleys	No hills and valleys within 10-km radius
16	Archaeologically important places	Marine National park in Gulf of Mannar (115 km from Project Site)
17	Protected areas as per Wildlife	None in 15-km radius

S. No	Particulars	Details
	Protection Act,1972 (Tiger reserve) Elephant reserve Biospheres, National parks, Wildlife sanctuaries, community-reserves and conservation reserves)	
18	Reserved / Protected Forests	None in 15-km radius
19	Defense Installations	None in 15-km radius area
20	Major industries in 15-km radius	1. Green Star Fertilizers Limited 2. Tuticorin Thermal Plant 3. Tuticorin Alkali Chemicals 4. Heavy water plant 5. Ammonia Importation Terminal 6. Indian Oil Corporation 7. SHV LPG India Private Ltd., 8. Bharat Petroleum Industries 9. Sterlite Industries 10. Kilburn Chemicals
21	Socio-economic factors	Backward area, now developing with industrial activities and through Port.

3.5 Raw Materials

SPIC is using the Naphtha as a feed stock and fuel. Natural gas will be used after the gas conversion and it will depend on the receiving of natural gas from sources. Till we get natural gas for the complete requirement, Mixed feedstock will be utilized.

Finished product (Urea) is supplying by road and train. Existing plant is connected with Indian Railway network through dedicated railway line.

3.6 Additives and Chemicals

No

3.7 Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.

3.7.1 Transportation details of Raw Materials

Table 3-1: Details of Raw Material Consumption and Transportation Details

Raw Material	Consumption (MT/Annum)	Source	Mode of Transport
Naphtha (Fuel & Feed stock)	Naphtha = 262180 MT (approx)	IOCL & Import	By ship and Pipe line from port to plant
Furnace oil	Fuel = 122530 MT (approx)	IOCL & Import	By ship and Pipe line from port to plant

Table 3-2: After Gas Conversion of plant **

Raw Material	Consumption (MT/Annum)	Source	Mode of Transport
Natural Gas (Fuel & Feed stock)	378000 MT (approx)	ONGC/IOC/ Other sources	By Pipe Line

** Note – Till the plant is supplied with full gas requirement, the plant will operate with Mixed feed stock of Naptha/Natural gas.

3.8 Availability of water its source, energy/power requirement and source should be given

Existing urea plant is taking water from Tamil Nadu Water Supply and Drainage Board through dedicated water supply pipe line. There is no additional water requirement after the Natural gas conversion of plant.

Existing urea plant is getting the electrical power from Tamil Nadu Electrical Board. Existing urea plant has 18 MWH Captive Power Plant. There is no additional power requirement after the gas conversion of plant.

Table 3-3: Water consumption

S. No.	Area of Consumption	Fresh Water Quantity, KLD	Waste Water Generation, KLD	Treatment / Disposal
1	Process	1690	120	Treated in Integrated Effluent Treatment Plant
2	Cooling	13040	2040	
3	Domestic & gardening	456	120	Treated in Sewage Treatment Plant
Total		**15186**	**2280**	

No additional water consumption after the gas conversion of existing ammonia and urea plant

3.8.1 **Fuel**:

Naphtha is used as a fuel in reformer and furnace oil is used as fuel in boilers at present. After receipt of sufficient gas supply both the fuel will be switched over to natural gas.

3.9 Quantity of waste to be generated (liquid and solid) and scheme for their management /disposal

Existing urea plant is generating the approximate 14M^3/Year of Spent Nickel Catalyst, 3 M^3/Year of Spent COMO Spent Catalyst, 20 M^3/Year of Spent Iron Catalyst, 4 M^3/Year of Spent ZnO Catalyst, 15 KL/Year Used Oil and 350 Used Batteries.

Hazardous wastes are disposing through authorized parties. Recyclable waste is recycling through register recyclers.

Table 3-4: Hazardous Waste Generation and disposal Details

S. No.	Type of Waste	Hazardous Waste Category	Hazardous Waste Generation	Treatment / Disposal
1	Spent catalyst from Nitrogenous fertilizer Plant containing Nickel Nickel content - 10 to 20% W/W	18.1	28 Cubic Meter/once in 2 years	Disposed to TNPCB authorized recycler
2	Spent catalyst from (Nitrogenous fertilizer Plant) Spent catalyst (Cobalt & Molybdenum) from primary and secondary desulphurization vessel.	18.1	5 Cubic Meter/once in 5 years	Disposed to TNPCB authorized recycler
3	Spent catalyst from (Nitrogenous fertilizer Plant) low temperature shift conversion vessel.	18.1	80 Cubic Meter/once in 5 years	Disposed to TNPCB authorized recycler
4	Spent catalyst from (Nitrogenous fertilizer Plant) Zinc Oxide spent catalyst from secondary desulphurization vessel.	18.1	18 Cubic Meter/once in 12 years	Disposed to TNPCB authorized recycler
5	Used oil	5.1	15,000 Liters/years	Disposed to TNPCB authorized recycler
6	Used Lead Acid Batteries		350 Nos per years	Return to Manufacturers

4 SITE ANALYSIS

4.1 Connectivity

Proposed existing site has very good connectivity by Indian Railway, Port, Roads and Air Port. Plant is located on Tiruchendur - Tuticorin State highway. Existing plant is connected with National Highway No-7 through Tiruchendur- Tuticorin State highway.

Tuticorin railway station is nearest railway station and located at a distance of 10 km from existing plant. Tuticorin City (District Head Quarter) is located at a distance of 8 km.

Tuticorin City bus station is located at a distance of 8 km. Tuticorin air port is located 18 KM from existing plant.

V.O. Chidambaram Port Trust, formerly Tuticorin Port Trust is located 10 KM from existing plant. V.O. Chidambaram Port Trus is one of the 12 major ports in India it is second-largest port in Tamil Nadu and fourth-largest container terminal in India. V.O. Chidambaram Port is an artificial port. This is the third international port in Tamil Nadu and its second all-weather port.

V.O Chidambaram Port is connected with existing plant via railway line, Naphtha and Furnace Oil Pipe line.

S. No	Location	Distance in KM
1	Existing Site	Southern Petrochemical Industries Corporation Limited, SPIC Nagar, Tuticorin(TN) Pin Code-628005
2	Tehsil	Tuticorin
3	District	Tuticorin
4	State	Tamil Nadu
5	Railway Station Tuticorin City	10 KM
6	Tuticorin City Government Bus Station	08 KM
7	Tuticorin Air Port	18 KM
8	National Highway -07	06 KM
9	V.O. Chidambaram Port Trust	10 KM

Dedicated existing railway lines (Broad Gauge) are connected existing plant to Indian Railway Network at Melavittan railway station for dispatch the fertilizers and V.O Chidambaram Port trust.

4.2 Land Form, Land Use and Land ownership

Southern Petrochemical Industries Corporation Limited, Tuticorin is not acquiring any land for this project. The existing urea plant of Southern Petrochemical Industries Corporation Limited, Tuticorin make a boundary wall with three industrial units in three directions. Only one side is open in North direction. This side is open on Harbor Construction Road.

Existing Plant is situated on industrial land declared by Tahsildar Tuticorin in year 1968. Existing land is using as Industrial land since 1972. Southern Petrochemical Industries Corporation Limited, Tuticorin is having full ownership of this land.

North: Harbor Construction road is lying adjacent to the boundary wall of existing plant.

East: Tuticorin Alkali Chemicals and Fertilizer Ltd, Tuticorin make boundary wall with existing plant.

South: Heavy Water Plant (Under Ministry of Atomic Energy, GOI) make boundary wall with existing plant.

West: Green star fertilizer Limited, Tuticorin make boundary wall with existing plant

It is gas conversion of existing plant and existing process equipments will be replaced according to technology.

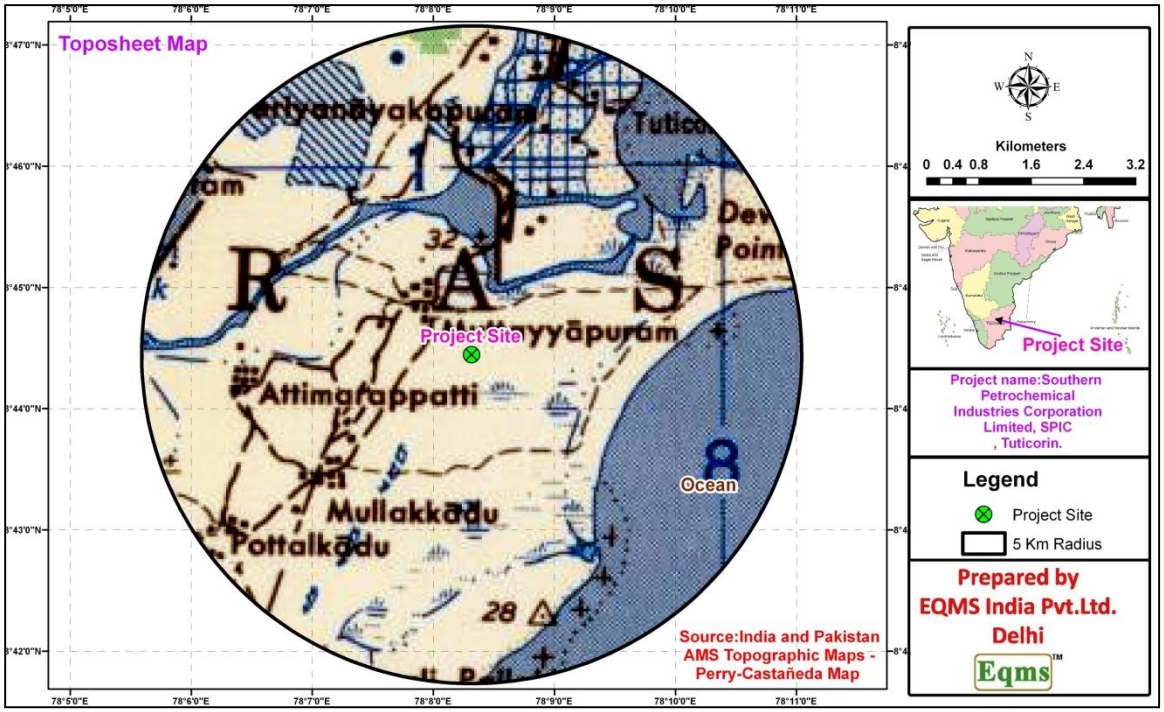
S. No	Description	Area in Sq.m ~	Remark
Total Area			
1	Total SPIC Factory Area	461341	-
Buildings / Road Area			
1	Buildings	36667	-
2	Road	105740	-
	Total	142407	-
Green Belt Area			
1	Developed Green Belt Area	94143	-
2	Proposed Area for Green Belt Development	49393	-
	Total Green Belt Area	143536	-
Area Split-up details as per the requirement			
1	Process Area	63924	Process Area Building also included
3	Material Storage (Urea Silo)	5992	Included in the building area
4	Utility Area - WTP / CPP / OSB / MSS	24398	Process Area Building also included
5	Bagging Plant & Bagged Storage	1111	Included in the building area
6	IETP Area	16694	Process Area Building also included
7	Tank Farm Area	29134	-
9	Railway Siding Area	13212	-
10	Parking Area	660	-
11	Water Reservoir	5453	-
12	Stores Open Yard	8416	-
13	Workshop / Canteen / QCL / Inspection / Instruments shop / Fire / Stores	19102	Included in the building area
14	Project area for Gas Conversion	200	Included in the Process Area

4.3 Topography (along with map)

Thoothukudi District carved out of the erstwhile Tirunelveli District on 20.10.1986 has certain rare features. The mixed landscape of the sea and the 'their (waste) lands has imbibed some special traits in the character of the sons of the soil. Valour and devotion with burning patriotism are the watchwords of the people here. The story of our country'' freedom struggle cannot be complete without mentioning the supreme sacrifices of the illustrious sons of the district like V.O.Chidambaram Pillai who brought the first swadeshi ship "Galia" to the Tuticorin port and Veerapandi Kattabomman who waged a war against the British.

The climate is hot and dry. The district has a coastal line of 135Kms. And territorial waters covering thousands of hectares. The district particularly in and around Tuticorin is the major salt producer in the state and contributes 30% of the total salt production of Tamil Nadu.

Agriculture is the main occupation on which 70% of the people depend. But the recent boom in the industrial sector has put the district prominently in the country's industrial map. Heavy industries like Sterlite, SPIC, TAC, HWP and Thermal Power Plant promise hope for a bright future. Hundreds of ancillary units have also sprung up. Textile units and match industries crowd the Kovilpatti belt. The fast growing Tuticorin Port in the changing economic scenario has added pep to the development of the district.



4.4 Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to periphery of the forests, national park, wild life sanctuary, etc sensitive areas, water bodies (distance from the HFL of the river), CRZ. In

case of notified industrial area, a copy of the Gazette notification should be given.

Land use pattern: The project site area is almost flat land with Industrial use.

Table 4-1: Distance of Project Site from Sensitive Areas

Area	Distance in km	Direction
Western Ghat	100 KM	North -West
Bandipur National Park	360 KM	North -West

Table 4-2: Distance of Project site from Water Bodies

Water body	Distance in km	Direction
Tamiraparani river	20 KM	South
Bay of Bengal	2.5 KM	East

4.5 Existing Infrastructure

The existing site having below infrastructure:

S. No	Existing Infrastructure	Capacity
1	Land	461341 sqm
2	Ammonia Plant	1260 MT/day
3	Urea	1880 MT /day
4	CPP	18.4 MWH
5	DG Set	2760KVA
6	FO Storage	7000 KL
7	Naphtha Storage Facility	36000 KL
8	Bagging Plant	2500 Te/day
9	Integrated Effluent Treatment Plant	150 m^3/hr
10	Urea Silo	25000 Te
11	Water storage reserve	150 MG
12	Railway loading shed	150 Te/hr
13	Offsite boiler	170 T/hr (Both boiler)

4.6 Soil classification

The district is covered by Black Cotton soil in the west with isolated red soil patches in high ground. The sandy soil is present in the coastal tract. Alluvial soil is restricted to river flood plain and coastal part. Alkaline and saline soils are also noticed at places.

4.7 Climatic data from secondary sources

The general agro-climatic zone of the study area is flat.

Information presented in subsequent paragraphs is from the most recently published Long Term Climatological Tables for the nearest observatory, Tuticorin by the Indian Meteorological Department (IMD).

Thoothukudi is located at 8.53°N 78.36°E. Thoothukudi is located in South India, on the Bay of Bengal, about 540 km (340 mi) south of Chennai and 125 km (78 mi) north of Kanyakummari. The hinterland of the port of the city is connected to the districts of Madurai, Tirunelveli, Ramanathapuram and Tiruchirapalli. The city mostly has a flat terrain and roughly divided into two by the Buckle channel. Being in coastal region, the soil is mostly clay sandy and the water table varies between 1 m (3.3 ft) to 4 m (13 ft) below ground level. The city has loose soil with thorny shrubs in the north and salt pans in the south. The city experiences tropical climatic conditions characterized with immensely hot summer, gentle winter and frequent rain showers. Summer extends between March and June when the climate is very humid. Tuticorin registers the maximum temperature of 39 °C (102 °F) and the minimum temperature of 32 °C (90 °F). The city receives adequate rainfall during the months of October and November. The city receives around 444 mm (17.5 in) rainfall from the Northeast monsoon, 117.7 mm (4.63 in) during summer, 74.6 mm (2.94 in) during winter and 63.1 mm (2.48 in) during the South-west monsoon season. The coolest month is January and the hottest months are from May to June. The city has a very high humidity being in the coastal sector.

Tuticorin has a monsoon influenced humid subtropical climate characterized by very hot summers and cool winters. Summers last from early April to late June during and are extremely hot with temperatures reaching 43°C. The monsoon arrives in June and continues till the middle of September. The winter season start from October to the middle of March and temperature fall down up to 20°C. Rainfall is about 80 cm to 100 cm per annum, which is suitable for growing crops. Most of rainfall is received during the monsoon.

4.7.1 Temperature

The period from March to May is one of continuous increase in temperatures. May is generally the hottest month with a mean daily maximum temperature of about 41.1 °C and mean daily minimum of about 21.1 °C.

January is generally the coldest month with the mean daily maximum temperature of about 28.6 °C and mean daily minimum of about 21.3°C.

4.7.2 Wind

Predominant	First		Second		Third	
Month	Morning	Evening	Morning	Evening	Morning	Evening
January	N	E	NW	NE	NE	N
February	N	E	NW	NE	NE	SE
March	N	E	NE	SE	NW	S
April	NW	S	N	SE	W	E
May	W	S	SW	W	NW	SE

Predominant	First		Second		Third	
Month	Morning	Evening	Morning	Evening	Morning	Evening
June	W	W	SW	SW	S	S
July	W	W	SW	SE/S/SW	NW	NW
August	W	W	NW	S	SW	SE
September	W	S	SW	SE	NW	W
October	W	S	NW	SE	SW	W
November	N	NE	NE	E	NW	SE
December	N	NE	NE	SE	NW	N

4.7.3 Rainfall

The total rainfall in year is observed to be 640.7 mm. Distribution of rainfall by season is 69.0 mm in winter (January, February, March), 80.6 mm in summer (April, May, June), 35.8 mm in monsoons (July, August, September) and 455.3 mm in Post monsoon (October, November and December)

4.7.4 Cloud Cover

The area remains cloudy between July - December, which is the active period of the monsoon season. Generally cloud cover ranges from 0 Oktas during this Post monsoon season.

4.7.5 Humidity

The humidity remains relatively high all year round generally it remains between 55 – 81 %

4.8 Social infrastructure available

4.8.1 Assessment of Infrastructure Demand (Physical)

Existing Urea Plant was commissioned in 1974.Today, all basic infrastructures has been developed for smoothly running of industry at this location. Existing Site have well connectivity by road & Indian Railways. Existing Site is 08 away from National Highway and connected with Indian Railway network by dedicated railway track at Meelavittan Railway Station.

A 230 KVA Auto Substation of Tamil Nadu Electric Board is located at a distance of 300 meter from boundary wall of existing plant .Water is supplying by Tamil Nadu Water Supply and Drainage Board through dedicated water supply pipe line.

4.8.2 Assessment of Infrastructure Demand (Social)

Existing plant having more than 450 employees, those are living in SPIC Nagar Township. Nearby area is well developed and needful facilities are available in short distance like School, Hospitals and Parks etc.

There are numerous Educational Institutions, Polytechnic Colleges, Schools in and around Tuticorin giving Quality Education.

The Agricultural College and Research Institute, Killikulam was established in 1984 – 85 as the third constituent College of Tamil Nadu Agricultural University. At the beginning, the College started

functioning in rented building of MDT Hindu College, Pettai in Tirunelveli. Subsequently, after the acquisition of lands and buildings from the State Seed Farm, Killikulam, a part of the educational activities was shifted to Killikulam during 1986–'87. Consequent on the completion of hostel buildings, entire academic activities were shifted to Killikulam campus from 01.11.1989.The institution was upgraded as Agricultural College and Research Institute in 1989. The college was also upgraded as a Post-graduate teaching institute from November 1990. The first batch of B.Sc. (Ag.), graduates passed out in 1988. The institution was made into a co-education institution from 1990–'91.

V.O.C College is one of the few Colleges in Tamil Nadu offering course in Geology.

5 PLANNING BRIEF

Southern Petrochemical Industries Corporation Limited, Tuticorin, (SPIC LTD) proposes to Changeover of Feedstock and Fuel from Naphtha to Mixed Feedstock (Natural Gas & Naphtha) in Ammonia Plant at SPIC Nagar, District Tuticorin-628005 Tamil Nadu.

The production capacity of urea plant will remain the same after the gas conversion at 6,20,400 MT per year.

Follow the Direction of Department of Fertilizer, Government of India all naphtha based fertilizer plants to switch over to Natural Gas before April 2014.

Southern Petrochemical Industries Corporation Limited, Tuticorin is not acquiring any land for this project.

The major raw material is Natural Gas. Natural gas is available in Ramanathapuram field. Existing plant has been submitted the application to Petroleum and Natural Gas Regulatory Board for authorization of laying, building and operating the pipe line from Ramanathapuram field to SPIC Nagar.

It is gas conversion of existing ammonia & urea plant and following facilities are available inside the plant premises and no any further major requirement for production of urea in existing plant.

- Land
- Ammonia Plant
- Urea Plant
- CPP
- Naphtha Storage Tanks
- Electrical Sub Station
- Water Supply
- Integrated Effluent Treatment Plant
- Water storage reserve
- Bagging Plant
- Railway loading shed
- Urea Silo

5.1 Town and Country Planning/Development Authority Classification

5.1.1 Population Projection

According to the 2011 census Thoothukudi district has a population of 1,750,176. This gives it a ranking of 277th in India (out of a total of 640). The district has a population density of 378 inhabitants per square kilometer (980 /sq mi). Its population growth rate over the decade 2001–2011 was 9.14%. Thoothukudi has a sex ratio of 1024 females for every 1000 males, and a literacy rate of 86.52%.

5.2 Land Use Planning (Breakup along With Green Belt, Etc)

The proposed gas conversion will be developed within the existing plant premises.

5.2.1 Land Use and Availability

S.No	Description	Area in Sq.m ~	Remark
Total Area			
1	Total SPIC Factory Area	461341	
Buildings / Road Area			
1	Buildings	36667	
2	Road	105740	
	Total	142407	
Green Belt Area			
1	Developed Green Belt Area	94143	
2	Proposed Area for Green Belt Development	49393	
	Total Green Belt Area	143536	
Area Splitup details as per the requirement			
1	Process Area	63924	Process Area Building also included
3	Material Storage (Urea Silo)	5992	Included in the building area
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10	Parking Area	660	
11	Water Reservoir	5453	
12	Stores Open Yard	8416	
13	Workshop / Canteen / QCL / Inspection / Instruments shop / Fire / Stores	19102	Included in the building area
14	Project area for Gas Conversion	200	Included in the Process Area

6 PROPOSED INFRASTRUCTURE

6.1 Industrial Area (processing area)

Not applicable

6.2 Residential Area (non-processing area)

Not applicable

6.3 Green belt

32.9% of total plot area will be developed as greenbelt.

6.4 Drinking water management (source & supply of water)

Existing plant is taking water from Tamiraparani River (20 KM from the existing plant).

6.5 Sewage system

Southern Petrochemical Industries Corporation Limited, Tuticorin has septic tanks for treatment of sewage. Treated water is using in green belt development.

6.6 Industrial waste management

Generated waste has been categorized in below categories

- Domestic waste
- Solid waste (Non hazardous)
- Hazardous waste

Domestic waste generated from canteen and offices is disposing through land fill. Hazardous waste is sending to authorized recyclers.

The waste water generation from the service water, cooling tower blow down, boiler blow down is treating in integrated effluent treatment plant. The capacity of integrated effluent Treatment Plant is 150 cubic meter per hour. Treated water from integrated effluent Treatment Plant is used in GSFL plant phosphoric acid for gypsum pulping and also used in green belt development inside the plant premises. The remaining quantity is discharged into sea through a well-designed submerged marine out fall system according to existing consent to operate (water).

Domestic waste water generate in toilets & bathrooms. It is treating in septic tanks.

6.7 Power requirement & supply/ source

Existing Site has 110 KVA Electrical Sub Station connected with 230 KVA Auto Substation of Tamil Nadu Electric Board.

Existing Site has 18.4 MWH Captive Power Plant and 2760 KVA Diesel fired D.G set as standby power supply units. These D.G Sets will be operated only when there is a normal supply failure. HSD is used for power generation in D.G Sets.

There is no additional power required after the gas conversion existing of plant.

7 REHABILITATION AND RESETTLEMENTS (R& R) PLAN

7.1 Policy to be adopted (central/state) in respect of the project affected persons including home oustees, land oustees and landless labourers (a brief outline to be given)

Not Applicable

8 PROJECT SCHEDULE AND COST ESTIMATE

8.1 Likely date of start of construction and likely data of completion (time schedule for the project to be given)

It is estimated that the project can be fully implemented in by September 2015 with concurrent sanction of funds. Complete Natural gas Conversion project will be implemented and commissioned in SEP 2015.

This is a tentative schedule in which flexibility can be exercised depending upon the market demand and fund availability.

8.2 Estimated project cost along with analysis in terms of economic viability of the project.

Cost of Estimates of the proposed change over of feed stock and fuel is 96 Cr. (INR) for plant conversion only. Project work will start after getting the environmental clearance.

9 ANALYSIS OF PROPOSAL

Any Industrialization will benefit the local population in a number of ways. Already more than 500 local persons are getting the benefits directly or indirectly from existing Urea Plant. Southern Petrochemical Industries Corporation Limited, Tuticorin shall prefer to recruit new appointees from nearby locality, subject to availability.

Southern Petrochemical Industries Corporation Limited, Tuticorin has proposed to give preference to local people for requirement in semi skilled and unskilled category. Approximately 500 persons would be given direct and indirect employment in operation stage. Transport and other infrastructural facilities such as market centers, business establishment, recreation etc in the area will be improved.

Employment potential both direct and indirect coupled with business opportunity and strong social commitment of the company in the form of different social work would result in enhancement in the status and standard of living of the local population resulting in positive impact.

Tribal population is not living in 15 km radius of proposed site.

EQMS

India Private Limited

www.eqmsindia.com

Environment Quality Management System

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