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List of Annexures:

ABBREVIATION

AAQ	Ambient Air Quality
AAQMS	Ambient Air Quality Monitoring Station
ACES	Advance Cost and Energy Saving
AEGL	Acute Exposure Guideline Levels
APC	Ammonia Process Condensate
BDL	Below Detection Limit
BFW	Boiler Feed Water
BHEL	Bharat Heavy Electricals Limited
BLEVE	Boiling Liquid Expanding Vapour Explosion
BOD	Biological Oxygen Demand
CFCL	Chambal Fertilisers and Chemicals Limited
CFG 3	Chambal Fertilizer Gadepan 3
COC	Cycles of Concentration
COD	Chemical Oxygen Demand
CSO	Chief Security Officer
CSR	Corporate Social Responsibility
CT	Cooling Tower
DCL	Development Consultant Limited
DMP	Disaster Management Plan
EC	Environmental Clearance
ECC	Emergency Control Centre
EHS	Environment Health & Safety
EIA	Environmental Impact Assessemnt
EMP	Environmental Management Plan
ERPG	Emergency Response Planning Guidelines
ETP	Effluent Treatment Plant
F	Flouride
GAIL	Gas Authority of India Limited
GLC	Ground Level Concentration
GT/HRSG	Gas Turbine/ Heat Recovery Steam Generator

GTG	Gas Turbine Generator
GV Process	Giammarco Vetrocoke Process
HC	Hydro Carbon
HDPE	High Density Poly Ethylene
HF	Hydrogen Flouride
HRSG	Heat Recovery Steam Generator
HSD	High Speed Diesel
HTS	High Temperature CO Shift converter
IDLH	Imminent Danger to Life and Health
IMD	India Meteorology Department
ISCST	Industrial Source Complex Short Term
LEL	Lower Explosive Limit
LP	Low Pressure
LTS	Low Temperature CO shift converter
MoEF	Ministry of Environment and Forests
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
MTPA	Metric Ton Per Annum
MTPD	Metric Ton Per Day
NG	Natural Gas
NSC	National Safety Council
NTPC	National Thermal Power Corporation
O & G	Oil and Grease
PDIL	Project & Development India Limited
PGRU	Purge Gas Recovery Unit
PPE	Personnel Protective Equipment
PVC	Poly Vinyl Chloride
RCCI	Rajasthan Chamber of Commerce & Industries
RLNG	Regasified Liquid Natural Gas
RO-System	Reverse Osmosis System
RPCB	Rajasthan State Pollution Control Board
RSPM	Respirable Suspended Particulate Matter

SPM	Suspended Particulate Matter
STP	Sewerage Treatment Plant
T Alk	Total Alkalinity
TDS	Total Dissolved Solids
TEIL	Toyo Engineering India Limited
TH	Total Hardness
TKN	Total Kjheldal Nitrogen
TLV	Threshold Limit Value
TOR	Terms of Reference
TPH	Ton Per Hour
TSDF	Treatment, Storage and Disposal Facility
TSS	Total Suspended Solids
UPC	Urea Process Condensate
VOC	Volatile Organic Carbon
WEF	World Environment Forum
WHC	Water Holding Capacity

EXECUTIVE SUMMARY

Project Highlight

Chambal Fertilisers and Chemicals Limited (CFCL) is flagship company of Zuari-Chambal, part of K.K. Birla group, having 2 plants (Gadepan-I&II) manufacturing nitrogenous fertiliser at Gadepan, Kota. CFCL is the largest private sector fertiliser complex in India with total (Gadepan-I&II plants) re-assessed capacity of 8,64,600 tons of urea per annum of each plant. Both Gadepan-I&II plants represent a total investment of over Rs. 2,500 Crores. The total land acquired at Gadepan is about 1060 acres.

Gadepan-I plants were commissioned in December 1993 and its commercial production commenced in January 1994. Commercial production of Gadepan-II plants started in October 1999.

Chambal Fertilisers and Chemicals Limited (CFCL), Gadepan (Kota, Rajasthan) is one of the ten gas based nitrogenous fertilizer projects, set up in the country to meet the growing demand of the green revolution,

Chambal Fertilisers and Chemicals Limited, has planned expansion of its fertilizer manufacturing facilities at Gadepan, Kota, Rajasthan by installing a Ammonia Plant Capacity – 690000 MTPA, Urea Plant Capacity - 1200000 MTPA, Power Generation Unit - 18 MWh and upgrading existing utilities and other off site facilities for the proposed expansion project. The estimated cost of the proposed expansion project is Rs 4000 Crores.

The proposed project is located at Gadepan in Kota district of Rajasthan state at approximately 76^0 11' E longitude and 25^0 08' N latitude. The plant is located on a plot of about 1060 acres. CFCL is located at Gadepan on Kota-Baran National highway-76. It is about 35 kms away from Kota City. Kota is located on Bombay-Delhi railway line and is about 470 kms from New Delhi. The existing railway line to plant is coming from Bhonra railway station on Kota-Bina section.

CFCL existing units were set up after obtaining Environmental Clearance from Ministry of Environment & Forests (MoEF), Govt. of India. The company has enhanced the production of existing plant (through revamp) after obtaining necessary clearances from State Pollution Control Board and MoEF.

The plant operation has been subjected to other procedural and compliance monitoring program viz. annual consents under Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981; authorization under Hazardous Waste (Management & Handling) Rules, 1989/ 2000/2008; Environment (Protection) Act, 1986; requirements and statutory norms as per Rajasthan State Pollution Control Board etc..

Pollutants Generation, Treatment and Disposal

Gaseous Emissions

The sources of continuous gaseous emissions at the CFCL plant are stacks from two Reformer (40 m high stack), NG fired three nos. Auxiliary boilers (Chimney 30, 30, 36 m), two HRSG (30 m high stack) and two Prilling Towers (104 and 118 m high).

Emissions from process section of the plant are controlled through the use of eco friendly fuel (NG and in case of its shortage, naphtha is used to a limited extent, only) and high stacks (more height than required as per norms).

Fugitive emission occurs in the bagging plant where large quantity of urea is handled. In order to control the dust, the plant has been provided with dedusting system. Dust from various points is collected & sent to Urea plant where it is dissolved in urea solutions and reprocessed in urea plant. The clean air is discharged to environment through 34 m high stack.

The proposed expansion project will have three more (continuous) stacks namely Prilling Tower (Height-120 m), Reformer (Height- 40 m) and GT/HRSG (Height- 30 m). The emission from all the new stacks will be well within the stipulated norms.

Liquid Effluents

CFCL has followed the policy of "at source treatment of effluents and recycling of treated effluents back into the process". Under this concept, CFCL is treating & recycling various process condensates like:

- Ammonia process condensate (APC) – It is treated in ammonia plant and recycled into the process through DM plant.
- Urea Process condensate (UPC) – It is treated in urea plant and recycled into the process through DM plant.
- Turbine condensate is recycled into the process through DM plant.
- Boiler blow down water is reused as cooling water make-up.

Beside the above, the effluents generated from other points like seal water of pumps, steam traps & sample cooler drains are sent to Effluent treatment plant (ETP) where these are further diluted by other stream of effluent. Such as:

- Acidic/alkaline effluents from DM plant and laboratory are mutually neutralized in neutralization pit & finally taken to Effluent treatment plant.
- Oily water from different sources are collected in oily water pits passing through the plants & sent to Oily water treatment plant for separating the oil from water. The water having very little amount of oil (< 2 ppm) is being send to ETP.
- Sump pits (two) and Holding ponds (two) receive treated effluents from DM plant, CT blow down, Filter back wash water etc. and incase of abnormal situation process condensates also. Sump pits have provision for pH adjustments and sprayers for proper mixing of effluent. The Holding pond have sufficient capacity to hold the treated effluents (meeting RPCB norms) and treated effluents is utilized for horticulture / irrigation and during rainy season only for controlled discharge in Kalisindh River.
- At present ~+ 90 % of treated effluents are being used for green belt development (annual basis).
- Sanitary wastewater from township and plant are treated in STP and treated wastewater is used for irrigation in CFCL green belt.

Solid Waste

CFCL fertilizer plant generates following wastes which has saleable value-

- Spent catalysts & used oil from different section of the plant (Hazardous waste).
- Used batteries are returned back to Supplier.
- All the above materials are sold to reprocessors / recyclers, supplier or interested users except hazardous waste. Hazardous wastes are sold to the authorized recycler/reprocessor only.

- In addition sludge is also generated in Oxidation ponds of sanitary wastewater treatment units. The sludge is dried and used as manure in horticulture.
- The dispensary waste normally consists of rags, cotton, bandages, syringes, needles etc.. The segregated bio wastes are disposed after disinfecting in a pit made as per the guidelines of Bio medical waste rules for deep burial of disinfecting waste.
- The domestic refuse is collected from the residents and disposed off in the designated disposal site within its area.

Environmental Status of Plant Site and Study Area

Site Characteristics

CFCL plant is located in the state of Rajasthan. The lithological units that constitute the Kota Division are mainly those of upper Vindhyan System. Wide areas on the North are covered by the Upper Bhandar sandstone and parts of southern sector are mantled by Deccan trap flows. The eastern parts of the central belt is occupied by the Suket Shales, while on the west there are rock out crops of Kaimur sandstone. Alluvium covers part of the area on the north eastern parts. The land surface has a gentle slope from South to North. The main rivers in the district are Chambal and its tributaries, Kalisindh, Paravan, Ujhar, Parvati etc. The Hadoti region of which Kota district is a part, has sheet rock, as well as rich alluvial soils drained by seasonal rivers. The accelerated pace of siltation of river beds and reservoirs is causing extensive damage to irrigation as well as to agricultural production system. There is no 'National Park, wild life sanctuary and reserve forest' in the 10 km study area.

Soil

The soils of Kota are complex, highly variable, reflecting a variety of parent materials, physiographic land features, range of distribution of rainfall, and its effects etc. As such different soils create different types of habitat for plant growth, therefore, the true choice and afforestation patterns on such kind of soils vary greatly. Soils are thus, variable in their soil-water-plant relationship, conservation needs and production potentials.

The mantle of alluvium in this area is confined to the North Eastern sector. It is then on Sandstone plateaus, where over large spread of bare rock is there. Usually it is light loam, sandier over sandstone tracts, and more clayey upon the shale. The soil is not very good for cultivation.

Water Resources and Water Quality

The annual rainfall data from meteorological department for Kota is 882.8 mm. The winter rains are uncertain. Light showers may occur during December and January.

In the Project area, there are basically three Rivers system in the study area i.e. Chambal River. Kalisindh River and Paravati River System. Basically Kalisindh River and Paravati Rivers are tributaries of Chambal River.

Ground water is important source of drinking water. Ground water depth in study area varies in between 20 -15 mtr. Discharge of tube well in districts varies from 3,000 to 12,000 gallon per hours, in the project area it varies in between 3,000 to 5,000 gallons per hours, TDS value is less than 1,000 mg. Ground water samples are within the 'permissible limit in the absence of alternate source' (as per IS 10500).

Meteorology

Rajasthan climate greatly varies according to the variation in the topography of the region. As Rajasthan has the Thar desert on its western part, the area is much drier and infertile. . But the south eastern part of Rajasthan is much wetter, hilly and more fertile. The landlocked state is devoid of moderating influence of the sea. The regions climate can be divided in four seasons: Pre-Monsoons, Monsoon, Post-Monsoon and Winter.

Pre-monsoon,or summer which extends from April to June, is the hottest one , with temperatures soaring to 45°C and above in some places. **Monsoon:** The second season Monsoon or the rainy season continues from July to September here the temperature drops but high level of humidity makes the days uncomfortable.

The Post-monsoon period extends from October to November. The average maximum temperature recorded is 33°C to 38°C, and the minimum is between 18°C and 20°C.

Winter: The fourth season is the winter or cold season, which extends from December to March. January is the coolest month here.

A metrological station was set up inside the plant and temperature, wind velocity and direction, humidity and rainfall were recorded for the winter season (three months). Maximum and minimum (mean) temperature recorded was 32 and 14 ^{0}C.

Highest relative humidity during the study period is observed as 90% and lowest as 10%.

The predominant wind directions are North and North West.

Air Quality

National AAQ norms for residential areas are always met for SOX, NOX &. Ammonia For SPM /RSPM they could not be met due to local phenomenon.

Noise

Ambient standards both Ld and Ln with respect to noise applicable for residential area during day time {55 dB (A)} and night time Ln {45 dB (A)} are always met.

Environmental Impact Assessment

Topography and Soils

The proposed CFCL plant expansion will have some construction activities and as such construction phase will have very limited impact (within the plant boundary limit only).The operation phases will have no impact on the topography and soils of the study area.

Air Quality

During the operation of the proposed expansion project/ plant, three new sources of gaseous emission are added. The existing sources of emission i.e. Reformers in Ammonia Plant, auxiliary Boilers, two HRSG/ Gas Turbine and two Prilling Towers in Urea Plants will be emitting NOx (from Reformer, boilers and Gas Turbine), SPM and NH_3 (from Prilling Tower). The existing emission load is Nox 112.4 kg/hr, SPM 85.43 kg/hr and NH_3 38.52 kg/hr. The emission load due to expansion project will be Nox 157.2 kg/hr, SPM 66 kg/hr and NH_3 66 kg/hr. The contribution to GLC due to existing stacks is as below:

Description	Maximum Ground Level Concentration ($\mu g/m^3$)		
	NO_x	SPM	NH_3
Existing Stacks	9.93	9.26	4.37
Distance of Occurrence (km)	9.6	1.7	1.7
Direction of Occurrence	NW	WNW	WNW

Incremental increase in ground level concentration due to expansion project has been predicted using the 'Industrial Source Complex - Short Term Version 3 (ISCST-3)' Comes out to be :

Description	Maximum Ground Level Concentration ($\mu g/m^3$)		
	NO_x	SPM	NH_3
Primary Reformer (Gadepan III) GT / HRSG - III Prilling Tower - III	10.97	5.74	5.82
Distance of Occurrence (km)	9.6	1.56	1.56
Direction of Occurrence	NW	WNW	WNW

Average SPM GLCs is 219 $\mu g/m^3$ at village Anta and with additional contribution of 5.74 $\mu g/m^3$ it will be 224.74 $\mu g/m^3$ slightly exceeding with respect to residential area norms of SPM (200 $\mu g/m^3$ for residential and rural area and 500 $\mu g/m^3$ with respect to industrial area). This is due to local phenomenon (desert climate).

The maximum concentration of NOX (42.3 $\mu g/m^3$) was observed at Palaytha at a distance of about 3.5 km in East (but well within the standards) and with additional contribution of 10.97 $\mu g/m^3$ it will be 53.27 $\mu g/m^3$ well below the limit of 80 $\mu g/m^3$ for the residential area.

Noise

The operation of expanded capacity of CFCL plant will have no adverse impact on noise generation because quality machines are being added. The new machines will have latest technology and features for low energy consumption, less noisy and eco friendly. The plantation done all around the plant helps in attenuation of sound waves and as such has created a natural barrier for sound spreading.

The noise level observed in the adjoining township was observed to be Leq (day time) 47.6 dB (A), while in nearest villages (within 3 km) Khan Ki Jhopri it was observed to be Leq (day time) 49 dB (A), Palaytha 49.1 dB (A), Ballabhpur 48.1 dB (A) and Bamori 49.6 dB (A). It shows that noise impact due to CFCL plant {if any} is limited to township (Guest House 47.6 dB (A)) only where even after the impact the noise level is below the 'residential' area norms during daytime.

Employees working near turbines, blowers, compressors or gas turbines are exposed to slightly high decibels noise (+ 80 dBA). Very few employees work in such areas on regular basis and have been provided with ear plugs, ear muffs etc.

Water Resources and Water Quality

Water Resources

The proposed CFCL plant expansion will require 554 m^3 / hr of additional fresh water (from existing 1497 m^3/hr for Gadepan I & II). The additional requirement of water will be met by drawl from river Kalisindh (The water consumption for the existing as well expansion project shall be within the approved allocation of drawl of 20 cusecs from Kalisindh River) and by recycling the additional treated effluents generated due to expansion project by further treating in RO system. As such it will not affect the existing other users.

The operation of the expansion plants will have no adverse impact on surface water resources although there will be some increase in treated effluents quantum. The effluents from the expansion plant will be recycled after treatment through RO unit. Thus CFG3 expansion plant will also be **"ZERO Discharge" unit.**

The proposed CFCL expansion unit will have little impact on ground water resources of the study area as the ground water is not used in the project The treated effluent use for irrigation / development of green belt will not have any adverse impact on ground water quality as the treated effluents are well within the norms laid down by the Rajasthan State Pollution Control Board.

Water Quality

The process effluents from the proposed expansion unit shall be treated in the existing effluent treatment system i.e.

- APC (Ammonia Process condensate) in Ammonia plant, UPC (Urea Process condensate) in Urea plant and turbine condensate in DM plant and these condensates shall be recycled after polishing in DM plant.
- Acidic & alkaline effluents from DM plant & Waste water from laboratory are mutually neutralized in Neutralisation pits in DM Plant and then sent to ETP for further treatment.
- Oily water from plant goes to Oily water treatment plant and after treatment, treated water go to ETP.
- Domestic wastewater will be treated in oxidation ponds and overflow from these will go to delay pond. The treated effluents are utilized for irrigation in CFCL green belt / horticulture.
- The treated effluents will be further treated through RO unit and will be recycled as CT make up thus achieving **"Zero Discharge".**

Climatology and Meteorology

The little construction activities and operation of the proposed CFCL expansion plant will have no impact on climatology and meteorology of the study area.

Land Use

The impacts on land environment are generally of type-:

- Physical impacts, like changes in topography, soil erosion etc. CFCL is not carrying any construction activities outside the premises. The construction activities within the premises are not going to alter the topography of the area and as such adverse impacts are not going to take place.

- The construction and operation of the proposed expansion of CFCL plant will have no impact on the land use in the study area as **no fresh land is being acquired for the plant or township.**

Biological Environment

The proposed Construction and Operation of the plant will have no impact on ecology of the study area. However, growth of plantation and development of green belt at the site is likely to improve flora at the site.

Demographic and Socio-economic

The proposed operation of the plant will have no adverse impact on the demography, agricultural pattern and other socio-economic conditions. However, the operation of proposed expansion plant will have slightly positive and beneficial impact on the status of job opportunities (due to increased inflow of raw materials and out flow of products) and increase in industrial and commercial activities.

Risk Assessment

CFCL fertiliser plant uses a number of hazardous chemicals; namely NG, Naphtha, NH_3, Acids, Chlorine etc. The use of these chemicals is inevitable. CFCL has MSDS and understands the risks associated with these chemicals. Adequate control measures have been taken by the CFCL to prevent any dangerous incident.

CFCL plant has a qualified and trained safety manager along with supporting staff / equipments to assist plant personnel working in the plant & to take all the safety precautions while carrying out various tasks. CFCL has provided PPE to operating personnel (as per requirement) for carrying hazardous activities.

All the employees are being retrained through refresher in Fire & Safety training twice in a year.

Regular health check of staff is carried out as per norms. Health reports are available to the staff for the information.

Disaster Management Plan

- On-site DMP is prepared to minimize the damage to plant machinery and personnel for the selected accident scenarios. A copy of the DMP has been submitted to factory inspector.
- Mock drills for the selected emergencies are being carried out, weak links in the system noted and need full actions are taken.
- CFCL has mutual aid agreement with NTPC Anta, near by power plant for assistance during emergency.
- On-site DMP also discusses suitable management procedures to handle emergencies caused by accidental release or spill of toxic or inflammable material or fire.

Environmental Management Plan

Air Environment

In order to mitigate the adverse environmental impact due to the operation at expanded / increased capacities following measures are recommended:

- Close watch and control on the quality of raw material {NG (S < 0.1 ppm) as increase in sulphur content will be immediately reflected in increased SOx emission and may affect the process also.
- The control measures through proper upkeep; preventive maintenance and good house keeping will considerably reduce the fugitive emission.
- Monitoring of fugitive emission should be continued at human receptive points as per existing practice.
- Existing schedule monitoring system under ISO-14001 for air pollutants like SOx, NOx, ammonia and SPM should be continued.
- Leakages {of gases / liquids/ dust} should be checked and promptly attended.

Water Environment

Water Consumption & Wastewater generation norms ---

- Standard for Straight Nitrogenous Fertilizer units : 8 m^3 / te of urea
- Gadepan I Water consumption rate : 5.29 m^3 / t of urea
- Gadepan II Water consumption rate : 5.07 m^3 / t of urea
- Standard for Waste Water Generation : 5.0 M^3 / te of urea
- Gadepan I / II wastewater generation (combined): 0.88 m^3 / t of urea.

The plant has taken ample precaution to tackle water pollution. Proper segregation of effluent is made to ensure adequate treatment. The plant has well equipped laboratory which regularly tests the effluents & on-line analyzer at final discharge point. Due to this regular checking & on-line monitoring, there is very little scope of unsafe effluent being passed. Even storm water management system is very elaborate & fool proof.

The existing system and efforts to conserve water and treatment of effluents should continue and now efforts shall be directed to:

- "Control of pollutant at source" is part of design itself and these practices shall continue.
- Increase the use of treated effluents in horticulture and green belt developments.
- The treated sewage shall be utilized for irrigation in farm house whenever required.
- Excess use of pesticide and herbicide shall be avoided as they can cause ground water contamination.
- Water is a precious commodity and it should be conserved. Monitoring of underground water level in pre and post monsoon shall continue.
- Awareness program should be continued to increase the interest among employees for conservation of water.
- More water harvesting schemes should be taken up where ever possible.

Climatology and Meteorology

The construction and operation of the proposed expansion of CFCL plant will not affect meteorology and Climatology of the study area and as such no management plan will be required.

Green Belt

CFCL has developed 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 have been planted in blocks of one particular plant; Albezzia Lebbecks, Dalbergia Sissoo, Pinnata, Termenalia Arjuna etc.

- Block plantation of same species of trees is restricted to only 10 to 15% of total population of trees.
- The trees, which have attained their age, shall be cut and new trees shall be planted.
- Proper maintenance shall be done for the avenue trees such as:
  - Avenue trees shall not block the view of road or building. This is necessary from safety and security point of view.
  - The distance of avenue trees shall not be less than 4 to 5 meters.
  - The road curbs should not have trees rather shrubs.

Environment Monitoring Plan

Additional points in EMP have been proposed.

Conclusion

The EIA study of the proposed expansion project concludes that the said project will have very little impact on the surrounding environment The beneficial gains to the people around (increase in business, job opportunities, CFCL contribution through CSR activities), state (contribution through taxes) and nation (through consequential increase in food grain production, less import of fertiliser) out weigh the little adverse impacts. The expansion of CFCL plant is in over all interest of people and the nation.

1. INTRODUCTION

1.1. Importance and Need of an EIA

1. Government of India, as per its policy has given emphasis on Sustainable Development. While it is supporting the industrial growth, the environmental protection has been made the integrated criteria for this support. In line with this policy, Ministry of Environment & Forests has defined elaborated 'Environment Clearance (EC)' framework under The Environmental (Protection) Act, 1986 (Environmental Impact Assessment Notification, 2006) for establishing/expanding an industry/development project. The EC process takes into consideration local conditions, public concerns, effectiveness of impact assessment and proposed mitigation measures in sustaining environmental equilibrium. The base documentation/study report, called Environmental Impact Assessment (EIA) detailing baseline conditions, environmental impacts, mitigation measures and management plan is required to be prepared for start of EC process. Prior Environmental Clearance is required from concerned authorities for all projects detailed in the 'Schedule' as given in the 'Notification date 14th September, 2006'. The fertiliser projects are listed as category A under EIA notification. As per this category all fertiliser projects require environmental clearance. EIA report is mandatory for appraisal by expert committee prior to EC. Since EIA preparation and compliance to EC requirement is time consuming, MoEF has started accepting one season based EIA study to reduce the overall clearance cycle time.

2. **Chambal Fertilisers and Chemicals Limited, has planned expansion of its fertilizer manufacturing facilities at Gadepan, Kota, Rajasthan for installing Ammonia Plant of Capacity – 690000 MTPA, Urea Plant of Capacity - 1200000 MTPA, Power Generation Unit - 18 MWh and upgrading existing utilities and other off site facilities for the proposed expansion project. The estimated cost of the proposed expansion project is Rs 4000 crores.**

1.2. Project & Project Proponent

3. Chambal Fertilisers and Chemicals Limited (CFCL) is the flagship company of Zuari-Chambal, part of K.K. Birla group, having 2 plants (Gadepan-I&II) manufacturing nitrogenous fertiliser at Gadepan, Kota. CFCL is the largest private sector fertiliser complex in India with total (Gadepan-I&II plants) re-assessed capacity of 8,64,600 tons of urea per annum of each plant. Both Gadepan-I&II plants represent a total investment of over Rs. 2,500 Crores. The total land acquired at Gadepan is about 1060 acres.

4. Gadepan-I plants were commissioned in December 1993 and its commercial production commenced in January 1994. Originally Ammonia plant was designed to produce 1,350 MTPD of Ammonia by Haldor Topsoe, Denmark technology and Urea plant was designed to produce 2,348 MTPD of urea (twin streams) based on Snamprogetti, Italy technology. From 1st April 2000, the reassessed capacity of Ammonia & Urea plants are 1520 MTPD of Ammonia & 2620 MTPD of Urea respectively.

5. Commercial production of Gadepan-II plants started in October 1999. Its Ammonia plant is based on Kellog (USA) technology and the Urea Plant is based on ACES process of Toyo, Japan. The Ammonia Plant is a single stream, having a design capacity of 1350 MTPD of Ammonia, like Gadepan-I.

The Urea Plant is designed to have twin streams, each with the design capacity of 1175 MTPD of urea. From Ist April 2000 the reassessed capacity of Ammonia & Urea plants are 1520 MTPD of Ammonia & 2620 MTPD of Urea respectively.

6. The power requirement for both Gadepan-I & II is met by Gas Turbines of 17.65 MW capacity (1+1) each operating on Natural Gas/Naphtha. BHEL-Hyderabad and General Electric-USA have supplied the Gas Turbines. The power generation is further augmented by the installation of MEE Fog unit for the suction air cooling of GT-2. GT-1 capacity has been enhanced by installing suction cooling system based on Vapour Absorption Machine (VAM).

7. The proposed expansion project (CFG - 3) will augment the urea manufacturing facilities of CFCL and contribute in meeting the soaring demand of urea in the country.

8. Elaborate environment protection facilities were installed. The facilities also comply with the conditions made by the Ministry of Environment and Forest, Government of India, Central Pollution Control Board and Rajasthan State Pollution Control Board.

9. CFCL plants are very well operated & maintained that have been acknowledged and praised time to time by various national & international institutes as mentioned below:

Table 1.1 : Awards & Certifications Received

S. No.	Year	Name of Award	Presentation Institute
1.	2007 & 2008	Sword of Honor	British Safety Council, U.K.
2.	2007 & 2006	Good Green governance Awards	Srishti Publication, New Delhi
3.	2006	National safety award 2006	NSC of India
4.	2008	OHSAS 18001:2007 Certification	M/s Det Norske Veritas
5.	2006	"Greentech Safety Gold Award 2006"	Green Tech Foundation
6.	2005	Greentech Gold award for Environment Excellence	Green Tech Foundation
7.	2005	Global Corporate Excellence award	Amity Business School, Noida
8.	2005	Golden Peacock Environment Management Award 2005	World Environment Forum (WEF)
9.	2005	Agriculture Technology Management Agency Award of Excellence	Ministry of agriculture, Govt. of India
10.	2005	Greentech safety silver award for the year 2004-05	Green Tech Foundation
11.	2004	Environmental Protection Award in 2003-04	Fertilisers Association of India
12.	2004	Best Industrial complex for green belt & horticulture development for the year 2003-04	Rose society of Rajasthan
13.	2003	RCCI excellence award for the year 2002-03	Rajasthan Chamber of Commerce
14.	2003	Best Overall Performance Award in 2002-03	Fertilisers Association of India

S. No.	Year	Name of Award	Presentation Institute
15.	2003	Award for excellence for best in house journal in the year 2002-03	Mayaram Surjan Foundation, Raipur, Chattisgarh
16.	2003	Best Technical Innovation Award in 2001-02	Fertilisers Association of India
17.	2001	Environmental Management System Certificate (ISO 14001)	Det Norske Veritas, Netherlands
18.	2000	Shreshtha Pramanpatra (Certificate of Excellence)	National Productivity Council, India
19.	2000	1st Prize in Production/Technical Discipline in the year 1999-2000	The Fertilisers Association of India
20.	1999	Award for best work in forest development and forest safety 1998-99	Department of Forest, Kota Division.

1.3. Project Site and Regulatory Compliance Status

10. The proposed project is located at Gadepan in Kota district of Rajasthan state at approximately 76^0 11' E longitude and 25^0 08' N latitude. The location map for the plant is presented in **Figure 1.1.** The plant is located on a plot of about 1060 acres. CFCL is located at Gadepan on Kota-Baran national highway-76. It is about 35 kms away from Kota City. Kota is located on Mumbai-Delhi railway line and is about 470 kms from New Delhi. The existing railway line to plant is coming from Bhonra railway station on Kota-Bina section into the plant.

11. CFCL existing units were set up after obtaining Environmental Clearance from Ministry of Environment & Forests (MoEF), Govt. of India. The company has enhanced the production of existing plant (through revamp) after obtaining necessary clearances from State Pollution Control Board and MoEF.

12. The plant operation has been subjected to other procedural and compliance monitoring programme viz. annual consents under Water (Prevention and Control of Pollution) Act, 1974; Air (Prevention and Control of Pollution) Act, 1981; authorization under Hazardous Waste (Management & Handling) Rules, 1989/ 2000/2008; Environment (Protection) Act, 1986; requirements and statutory norms as per Rajasthan State Pollution Control Board etc.. The production level of this plant has been as per the approved clearances/consents from respective authorities.

13. In addition to environmental regulatory compliance, CFCL is also complying to all applicable statutory rules and regulations including (but not limited to) following:

- Fuels and other hazardous (Inflammable & Explosives) materials storages (As per Chief Controller of Explosives, Nagpur; rules and guide lines)
- Labour laws and Safety guide lines as per Labour Commissioner, Government of Rajasthan
- Boiler Regulations as per Chief Inspector of Boilers, Government of Rajasthan
- ESIC etc.

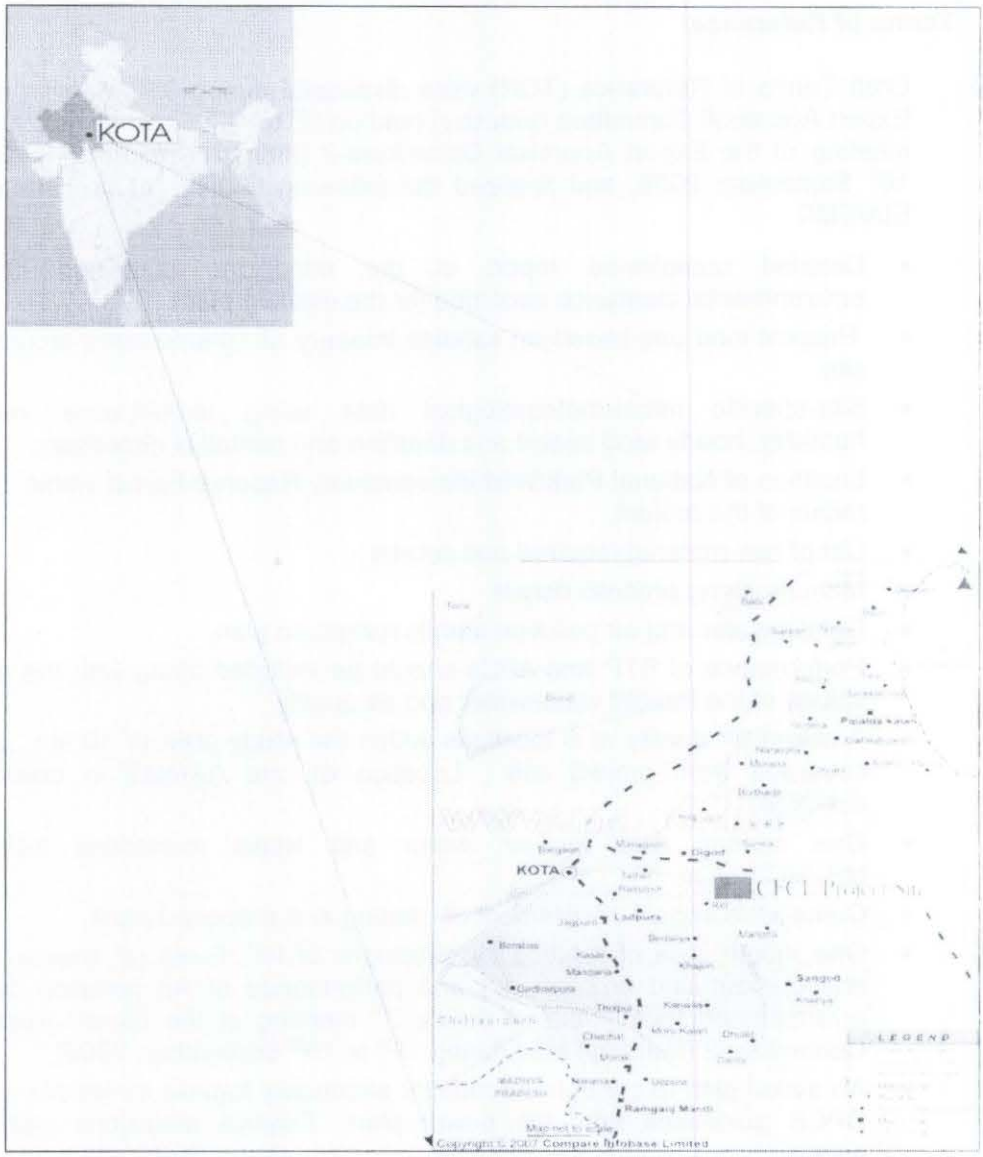

Figure 1.1 : Study Area Location Map

1.4. Objectives of the EIA Study

14. The objectives of the present EIA are to:

- Assess the impacts on various environmental components viz water, air, soil, flora fauna, noise, land use, resource use due to proposed Expansion of urea production Capacity of CFCL.
- Suggest appropriate Impact Mitigation Measures and Environmental Management Plan to ensure that the adverse impacts if any are eliminated or minimized

15. The present EIA is for the manufacture of Ammonia 690000 MTPA (intermediate product), Urea 1200000 MTPA (final product), a 18 MW GTG (captive power plant), HRSG unit with 60 TPH steam and RO unit (of suitable size).

1.4.1. Terms of Reference

16. Draft Terms of Reference (TOR) were discussed during 91st meeting of the Expert Appraisal Committee (Industry) held on 9th to 11th February, 2009 & 3rd meeting of the Expert Appraisal Committee-2 (Industry) held during 15th to 16th September 2009, and finalized the following 'TORs' for preparation of EIA/EMP

- Detailed compliance report of the conditions stipulated in the environmental clearance accorded for the existing plant.
- Present land use based on satellite imagery of 10 km radius around the site.
- Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall is necessary.
- Location of National Park/Wild life sanctuary/Reserve Forest within 10 km radius of the project.
- List of raw material required and source.
- Manufacturing process details.
- Details water and air pollution and its mitigation plan.
- Performance of ETP and APCs should be included along with the actual values of the treated wastewater and air quality.
- Ambient air quality at 6 locations within the study area of 10 km., aerial coverage from project site. Location of one AAQMS in downwind direction.
- One season data for air, water and Noise monitoring including NH_3/HC/VOCs.
- Cumulative impact assessment of existing and proposed plant.
- One month data of existing air emissions of HF, F etc (at source, work environment and ambient air) and performance of Air pollution control arrangements.[point deleted during 3rd meeting of the Expert Appraisal Committee-2 (Industry) held during 15th to 16th September, 2009]
- An action plan to control and monitor secondary fugitive emissions as per CPCB guidelines from the power plant. Fugitive emissions and their control.
- Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features.
- Prior permission for drawl of the water from the river from the competent authority shall be included in report. Details of the anicuts and the down stream flow in the river should be included.
- Ground water monitoring minimum at 6 locations should be carried out. Geological features and Geo-hydrological status of the study area and ecological status (Terrestrial and Aquatic).
- Solid waste generation, storage, utilization and disposal particularly related to the hazardous waste.
- Risk assessment and damage control.
- Occupational health and safety of the workers should be incorporated.
- An action plan to develop green belt in 33 % area
- Scheme for rainwater harvesting.
- Socio economic development activities should be in place.

- Membership of TSDF.
- Risk Assessment Report
- Point wise compliances of the environmental stipulation made in the environmental clearances granted earlier.
- Detailed Environmental Management Plan (EMP) with specific reference to details of air pollution control system, water and wastewater management, monitoring frequency, responsibility and time bound implementation plan for mitigation measures should be provided.
- EMP should include the concept of waste-minimisation, recycle/ reuse/ recover techniques, energy conservation, and natural resource conservation.
- A tabular chart for the issues raised and addressed during public hearing/ consultation should be provided.

1.4.2. TOR Compliance Status

17. The TOR compliance status of the project has been presented in **Table 1.2**.

Table 1.2 : Compliance Status of Terms of Reference

Sr. No	Terms of Reference	Status	Remarks
1.	Detailed compliance report of the conditions stipulated in the environmental clearance accorded for the existing plant.	Annexure I	
2.	Present land use based on satellite imagery of 10 km radius around the site.	Chapter-3; Section 3.8	
3.	Site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall is necessary.	Chapter-3; Section 3.3	
4.	Location of National Park/Wild life sanctuary/Reserve Forest within 10 km radius of the project.	Chapter-3; Section 3.9.1	There is no National Park/Wild life sanctuary /Reserve Forest within 10 km radius of the project.
5.	List of raw material required and source.	Chapter-2 Section 2.5.3	Natural Gas; through GAIL pipeline
6.	Manufacturing process details.	Chapter-2	
7.	Details water and air pollution and its mitigation plan	Chapter-2 Section 2.9	
8.	Performance of ETP and APCs should be included along with the actual values of the treated wastewater and air quality.	Chapter-2 Section 2.9	Table-2.3 ; Table 2.5; Table-2.6
9.	Ambient air quality at 6 locations within the study area of 10 km., aerial coverage from project site. Location of one AAQMS in downwind direction.	Chapter-3 Section 3.4.4	AAQ Monitoring at 11 locations

10.	One season data for air, water and Noise monitoring including NH_3/HC/VOCs	Chapter-3 Section 3.4.4	AAQ Monitoring at 11 locations
11.	Cumulative impact assessment of existing and proposed plant	Chapter-4 Section 4.2	
12.	One month data of existing air emissions of HF, F etc (at source, work environment and ambient air) and performance of Air pollution control arrangements.		Conditions deleted
13.	An action plan to control and monitor secondary fugitive emissions as per CPCB guidelines from the power plant. Fugitive emissions and their control.	Chapter-2 Section 2.9.9.4	
14.	Determination of atmospheric inversion level at the project site and assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features	Included in Chapter 4 in Air Dispersion Modelling	
15.	Prior permission for drawl of the water from the river from the competent authority shall be included in report. Details of the anicuts and the down stream flow in the river should be included.	Chapter-2 Section 2.8.4	CFCL expansion does not require any additional drawl of water from Kalisindh River. Sanctioned drawl is sufficient to take care of expansion.
16.	Ground water monitoring minimum at 6 locations should be carried out. Geological features and Geo-hydrological status of the study area and ecological status (Terrestrial and Aquatic).	Chapter-3 Section 3.6	Ground Water Monitoring at 10 locations
17.	Solid waste generation, storage, utilization and disposal particularly related to the hazardous waste.	Chapter-2 Section 2.9.10	
18.	Risk assessment and damage control.	Chapter-6	
19.	Occupational health and safety of the workers should be incorporated	Annexure - III	
20.	An action plan to develop green belt in 33 % area	Chapter-3 Section 3.11.3	
21.	Scheme for rainwater harvesting	Chapter-2 Section 2.10.2	
22.	Point wise compliances of the environmental stipulation made in the environmental clearances granted earlier.	Annexure-I	
23.	Detailed Environment management Plan (EMP) with specific reference to details of air pollution control system, water & wastewater management, monitoring frequency, responsibility and	Chapter - 5	
24.	EMP should include the concept of waste-minimizations, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Chapter - 5	

25.	A tabular chart for the issues raised and addressed during public hearing/consultation should be provided	To be noted after Public Hearing	

2. PROJECT DESCRIPTION

2.1. Introduction

18. **Chambal Fertiliser and Chemicals Limited** (CFCL), Ammonia – Urea complex is located at Gadepan on Kota – Baran National highway (NH - 76). The plant is 35 km away from historical Kota town. Kota is located on Mumbai–Delhi railway line about 470 km from Delhi. Nearest railway station from CFCL is Bhonra, about 3 km (aerial distance) in NW direction.

19. CFCL is the flagship company of Zuari-Chambal, part of K.K. Birla group, having 2 plants (Gadepan-I & II) manufacturing nitrogenous fertiliser at Gadepan, Kota. CFCL is the largest private sector fertiliser complex in India with total (Gadepan-I&II plants) re-assessed capacity of 8,64,600 tons of Urea per annum of each plant. Both Gadepan-I&II plants represent a total investment of over Rs. 2,500 Crores.

2.2. Project Execution – Gadepan- I

20. Gadepan-I plants were commissioned in December 1993 and its commercial production commenced in January 1994. Originally Ammonia plant was designed to produce 1,350 MTPD of Ammonia by Haldor Topsoe, Denmark technology and Urea plant was designed to produce 2,348 MTPD of Urea (twin streams) based on Snamprogetti, Italy technology. From 1st April 2000, the reassessed capacities of Ammonia & Urea plants are 1520 MTPD of Ammonia & 2620 MTPD of Urea respectively. Gadepan-I is based on natural gas as the feedstock while the fuel demand is met by natural gas / naphtha.

21. The total capital outlay for the project was Rs. 1267 Crores. The main milestones of the project have been as follows:

• MoEF Clearance	15.11.1988
• Zero Date	01.01.1990
• Natural Gas received from GAIL	18.06.1993
• Captive Power Generation	30.06.1993
• Ammonia Plant Feed-in	15.11.1993
• Ammonia production	13.12.1993
• Urea production	26.12.1993
• Commercial Production	01.01.1994

22. **M/s Snamprogetti was the main contractor responsible for providing basic engineering, procurement assistance, construction and commissioning supervision for Ammonia and Urea plants.**

23. **M/s Project and Development India (PDIL), Noida carried-out detailed engineering, procurement of indigenous equipment and provided assistance in construction and commissioning supervision as co-contractor with M/s Snamprogetti.**

24. **M/s Development Consultants Limited (DCL), Calcutta carried out basic / detailed engineering, procurement, construction,**

commissioning and supervision services for Steam and Power Generation plants.

25. **M/s Toyo Engineering India Limited (TEIL), Bombay provided basic / detailed engineering, procurement, construction and commissioning services for all other Off-sites and Utility plants.**

26. **The total cost of the Project has been Rs. 1192 Crores against the estimated cost of Rs.1267 Crores.**

2.2.1. Manufacturing Process of Gadepan-I Plants

2.2.1.1 Ammonia-I

27. **Ammonia-I Plant is a state of art hi-tech complex based on Natural Gas feed stock and designed by M/s. Haldor Topsoe of Denmark.**

28. Following process steps are involved in the manufacturing of liquid ammonia :

- De-sulphurization of Feedstock
- Steam Reforming / Secondary Reforming
- Reforming Heat Exchanger
- Gas Purification (Shift Conversion and CO_2 Removal (GV Process))
- Ammonia Synthesis & Refrigeration
- Ammonia Absorption and Condensate Recovery

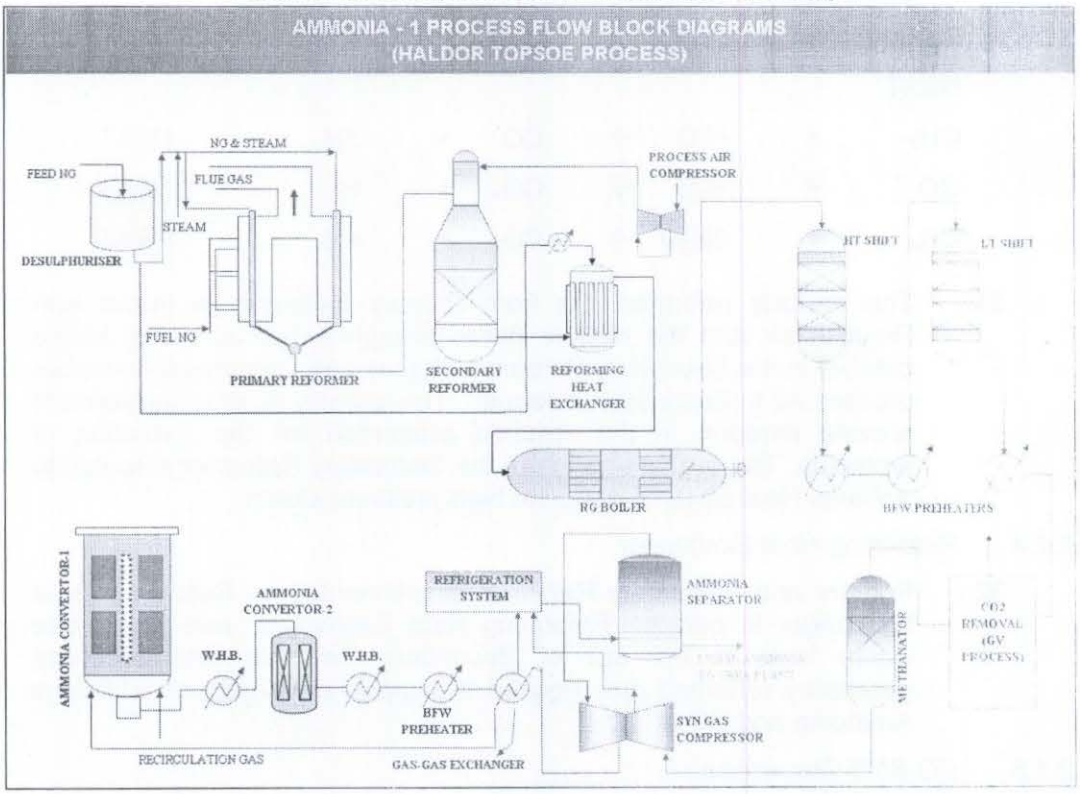

Figure 2.1 : Flow diagram of the Ammonia - I Plant

2.2.1.2 Desulphurisation of Feed Stock

29. Natural Gas is fed to De-sulphurization unit where the sulphur present in Natural Gas (Around 10 ppm as H2S by volume) is converted into Hydrogen Sulphides in presence of hydrogen rich gas & hydrogen sulphides formed is absorbed by zinc oxide in ZnO Absorber as per the following reaction. The final De-sulphurized feedstock contains less than 0.1 ppm sulphur.

$RSH + H_2 \rightarrow RH + H_2S$

$C_4H_4S + 4H_2 \rightarrow C_4H_{10} + H_2S$

$ZnO + H_2S \rightarrow ZnS + H_2O$

2.2.1.3 Steam Reforming/ Secondary Reforming

30. The Desulphurised feed gas is mixed with Process Steam to achieve optimum Steam to Carbon ratio and heated in the convection section of Primary Reformer. The mixture then passes through vertical Primary Reformer tubes containing nickel-based catalyst. Since the reforming reaction is endothermic, necessary heat is provided in the furnace by burning fuel. The Primary Reformer furnace is designed to achieve maximum thermal efficiency and uniform heat distribution. Maximum heat is recovered from the flue gases in the convective section of Primary Reformer to pre-heat mixed feed (gas/steam mixture), Process air for Secondary Reformer, Combustion air and to superheat the High Pressure steam. Primary reforming reaction is given below:

$C_nH_{2n+2} + 2H_2O \rightarrow C_{n-1}H_{2n} + CO_2 + 3H_2$ - HEAT

$CH_4 + H_2O \rightarrow CO + 3H_2$ - HEAT

$CO + H_2O \rightarrow CO_2 + H_2$ - HEAT

$CH_4 + 2H_2O \rightarrow CO_2 + 4H_2$ - HEAT

31. The partially reformed gas from Primary Reformer is mixed with Process air and the mixture flows through a bed of nickel based catalyst in the Secondary Reformer. Process Air Compressor supplies process Air to Secondary Reformer. The quantity of air is controlled to provide nitrogen in the required proportion for the formation of ammonia. The process gas from the Secondary Reformer is routed to a Waste Heat Boiler to generate high-pressure steam.

2.2.1.4 Reforming Heat Exchanger

32. Primary and Secondary Reformer supplemented by Reforming Heat Exchanger in parallel. Reforming Heat Exchanger uses high-grade waste heat at the exit of Secondary Reformer and produces necessary reformed gas required to support production of additional Ammonia and CO_2.

2.2.1.5 CO Shift Conversion

33. Gas leaving the Waste Heat Boiler system enters the High Temperature CO Shift converter (HTS) charged with Iron-oxide catalyst. Here the CO content is converted to CO2. Since the reaction