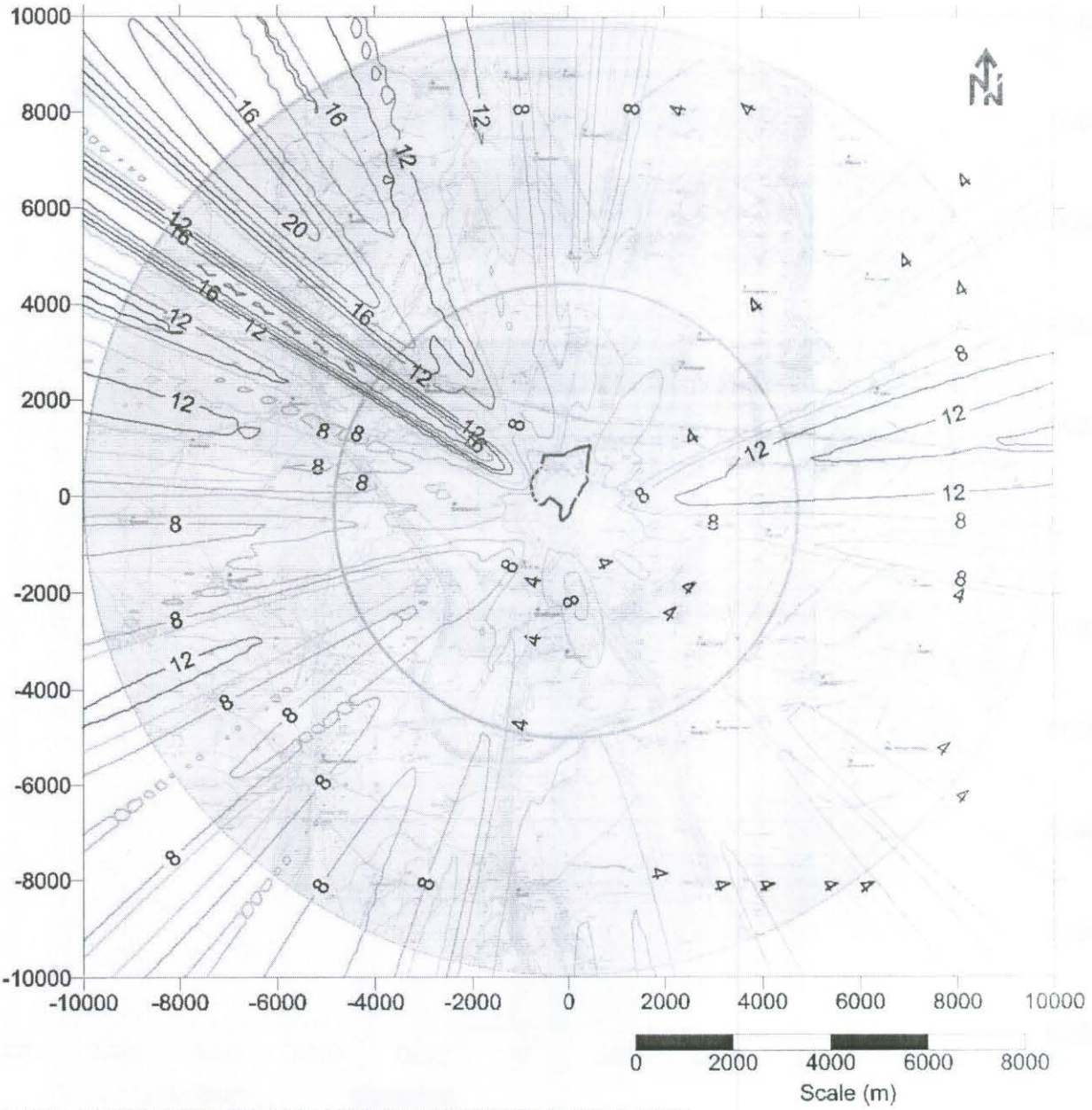

(C) NO_X ISOPLETHS OF EXPANSION EMISSIONS SOURCES

Figure 4.2 : Isopleths (Contribution to GLC due to Expansion Emission Sources) [(A-SPM),(B-NH3),(C-NO_X)]

Table 4.1 : Contribution to GLCs (maximum) due to existing CFCL plant stacks

Description	Maximum Ground Level Concentration ($\mu g/m^3$)		
	NO_x	SPM	NH_3
Primary Reformer (Gadepan I) Primary Reformer (Gadepan II) Auxiliary Boiler - I Auxiliary Boiler - II Auxiliary Boiler - III HRSG – I / II Prilling Tower - I Prilling Tower - II Bagging Plant	9.93	9.26	4.37
Distance of Occurrence (km)	9.6	1.7	1.7
Direction of Occurrence	NW	WNW	WNW

296. The pollutants contribution (maximum) to GLCs due to existing plant is very limited. The additional emission from the stacks due to Proposed expansion project is given below and the expected contribution shall be in the range as give below –

Table 4.2 : Contribution to GLCs (maximum) due to Proposed Expansion Project Stacks

A. "Three" 24 hourly Maximum Concentration Values due to Expansion Stacks

Expansion Stacks	Maximum Concentration Value				
	Pollutant	High Value	Concentration ($\mu g/m^3$)	Distance (km) from Source	Direction of Occurrence
Primary Reformer (Gadepan III) HRSG - III Prilling Tower - III	NO_x	First	10.97	9.6	NW
		Second	8.68	9.65	NNW
		Third	8.32	9.82	NNW
	SPM	First	5.74	1.56	WNW
		Second	4.21	2	WNW
		Third	3.57	1.72	WNW
	NH_3	First	5.82	1.56	WNW
		Second	4.21	2	WNW
		Third	3.43	1.72	WNW

B. Contribution to GLC from Stacks (Expansion)

Description	Maximum Ground Level Concentration (µg/m³)		
	NO_x	SPM	NH_3
Primary Reformer (Gadepan III) 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

4.2.3.1 SPM

297. The monitoring results indicate maximum (average)SPM GLCs of 219 µg/m³ at village Anta (due to local phenomenon) and with additional contribution of 5.74 µg/m³ it will be 224.74 µg/m³ slightly exceeding with respect to residential area norms of both SPM (200 µg/m³ for residential and rural area and 500 µg/m³ with respect to industrial area).

4.2.3.2 NOx

298. The monitoring results indicate maximum concentration of NOX (42.3 µg/m³) 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 µg/m³ it will be 53.27 µg/m³ well below the limit of 80 µg/m³ for the residential area.

4.2.3.3 NH_3

299. The monitoring results indicate Maximum concentration of NH3 (57.3 µg/m³) was observed at Simaliya and with additional contribution of 5.82 µg/m³ it will be 63.12 (well within prescribed norms of 100 µg/m³ by RPCB) . There are no prescribed stipulated standards of NH_3 for industrial area and for residential area respectively.

4.3. Noise Environment

300. The sources of noise during the operational phase of the plant are mainly turbines compressors, blowers, pumps and furnaces. The other sources of noise are the movement of vehicles along the road. The noise survey of the plant was carried out and the noise level at various locations is given in **Table - 2.9.** The proposed expansion project will be similar but will have advanced technology and improved equipments both in terms of energy efficiency and less noisy.

301. A critical review of Table – 2.8 shows that:

- Within the plant area noise level was more near synthesis compressor in ammonia (~82 dB (A)) and near CT turbine (~80 dB(A) etc. However the noise level along the plant boundary gets reduced to considerable extent as monitored at main security gate (~49.4 dB(A)), Holding pond (~45.8 dB(A)) and outside Cooling tower (~57.4 dB(A)) which is equivalent to silence zone (day time).

- In township the noise level was measured in public places like shopping centre and guest house. It was 47.6 to 55 dB (A) which is equivalent to Residential area (day time).

4.3.1. Impacts due to Transportation

302. Noise level contributed from light medium and heavy vehicles on the roads can be considerable depending upon the traffic density. The area around the employees and material gates is the traffic- affected areas due to transportation activities. The light vehicles and two wheelers pass at the shift hours only except vehicles of the visitors which are limited only. The heavy commercial vehicles traffic is limited depending upon the material receipt and dispatch of fertilisers through road transport. The major quantity of fertilisers is dispatched through railway rakes.

4.3.2. Impact on Community

303. Equivalent sound levels for are often used to describe community exposures to noise. Noise survey was also carried out at 13 locations outside the plant but within the study area. Equivalent noise levels were measured for residential area both in CFCL Township as well as in other places in study areas. The Leq for these areas is found to be well within the prescribed limits promulgated by CPCB.

304. The noise level norms in villages of study area are being met with respect to the norms of 'Ambient Air quality Standards in Respect of Noise'.

305. The operation of CFCL proposed expansion project will have the noise level not exceeding the present noise level and as such will not have any adverse impact on the human settlement around it. The noise will not be audible beyond its boundary limit, particularly due to natural green belt and other attenuators.

4.4. Water Environment

306. Impact on water environment due to CFCL proposed expansion project scheme will be in terms of additional water consumption {water demand} and waste water / effluent generation and discharge to environment.

4.4.1. Water Demand

4.4.1.1 Construction Phase

307. Since the CFCL expansion project will have water requirement both during construction period as well as during operation. The requirement during construction period will be much less as compared to that during operation and will be met with the existing withdrawal from Kalisindh River. As such the there will not be any additional water requirements for construction.

4.4.1.2 Operational Phase

308. Water during operational phase is normally required for:

- Cooling Water
- Boiler Feed Water
- Process Water
- Domestic and Green Belt

309. Existing requirement of water for Gadepan I & II is 1740 m^3 / hr but actual consumption is much lower i.e.1497 m^3 / hr under different heads is given in "Water Balance {Existing Status}" in **Figure – 2.5.** The fresh water water consumption in proposed expansion project will be 554 m^3 / hr and the expected water balance is given in **Figure – 2.9**. This will be partly met by recycle of treated effluents (after further treatment in RO unit) to plant (as CT make up). The additional water requirement will be met from Kalisindh River (a new anicut is proposed to be built to harness water).**The water consumption for the existing as well expansion project shall be within the approved allocation of drawl of 20 cusecs from Kalisindh river.**

310. The additional water will not pose any burden on near by downstream users since the water flow will be harnessed by building an anicut upstream of the drawl point.

4.4.1.3 Effluent Generation and Discharge

311. Industrial wastewater after it is discharged into surface water body should not produce significant deterioration in its water quality. The effects on surface water depend on wastewater characteristics and quantity. The impact on surface water depends on the characteristics and also on quantity of water in the receiving water body. CFCL has gradually reduced its water consumption/ effluent generation and energy consumption as given below:

Year 2007 – 2008 data	
Specific Water Consumption	
Gadepan-I	5.29 m3/t of urea
Gadepan-II	5.07 m3/t of urea
CPCB (Probe 97/2002-03) Norms	8.0 m3/t of urea
Treated Effluent Generation	
Gadepan-I&II (combined)	0.88 m3/t of urea
CPCB (Probe 97/2002-03) Norms	5.0 m3/t of urea
Treated Effluent used for green belt development within the complex.	
River Discharge Only during rainy season	

4.4.1.4 CO2 Emission

312. CFCL was ranked 5th & 9th out of 93 plants in world as per IFA benchmarking survey 2006-2007

4.4.1.5 Energy Trend Gadepan-I

313. CFCL was ranked 19th out of 93 plants in world as per International Fertiliser Association (IFA) 2007 Benchmarking.

- 1999-2000 6.082 Gcal/MT urea
- 2007-2008 5.621 Gcal/MT urea

4.4.1.6 Energy Trend Gadepan-II

314. CFCL was ranked 25th out of 93 plants in world as per IFA2007 Benchmarking.

- 1999-2000 6.127 Gcal/MT urea
- 2007-2008 5.551 Gcal/MT urea

315. The treatment philosophy (treatment at source details in section 2.5.1, chapter - 2) adopted by CFCL has given very good results. The treated effluent quality

has also considerably improved. The total Ammonical nitrogen (TAN) in Urea battery limit has come down below 10 ppm (**Table 2.3**) through various measures:

- Awareness programs on EHS.
- Arresting leaky points of TAN at source itself. And
- Mapping of TAN generation points & countermeasures.

316. The sump pit and the guard ponds have got sufficient capacity to hold the effluents even during emergency. The sump pits and guard ponds are lined with impervious lining to prevent seepage to ground water. The plant is operating since last sixteen years and no complaint of ground water contamination has been received from neighbouring villages. This is also confirmed by the analysis of ground water in the study area – NH3 content – NT in all the ground water samples of the study area (see **Table 3.8**).

317. As results the quality of treated effluents has considerably improved and most of the effluent is being utilised for horticulture purposes except in rainy season when water requirement for irrigation is nil or very less.

318. The existing philosophy of treating the effluents in the plant and recycling the same in the process {process condensates} or send these to sump pits - guard ponds and after equalisation / treatment use for irrigation or discharge to Kalisindh river (during rainy season only) shall be some what improved for CFG-3 project. For CFG-3 project it is proposed to augment the existing Effluent Treatment Plant by adding one more chamber to accommodate the additional effluent. The effluent expected to be generated due to CFG-3 project, is proposed to be treated in a RO unit. The treated water from RO unit shall be used as make up water for Cooling Towers. Thus no additional of water discharge to Kalisindh is expected even in raining season consequently no adverse impact on environment due to expansion effluents.

319. The expected characteristics of treated effluents shall be maintained as today or shall be improved further

4.5. Land Environment

320. Essentially, the two major problems normally faced in impact on land environment due to any development project are:

- Diversion of land from designated use to the 'project use'.
- Deterioration of land / soil in terms of soil fertility and toxicity.

4.5.1. Land Diversion

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

4.5.2. Land Deterioration

322. Low soil fertility is attributable to either to low levels of nutrients {e.g. nitrogen, phosphorus, potassium etc.} in the soil or their being made unavailable for plant intake in someway. High levels of elements or compounds being present in the soil cause soil toxicity. Some elements, which are essential and beneficial for crops at low concentrations, become toxic to crops at higher concentrations.

The soil analysis shows that existing operations has not caused any deterioration to near by land in the study area. There can be slight increase in nitrogen content of the soil and this elevated nitrogen content will have positive impact on the on the plant growing in the area. Plant Proposed expansion project will improve the urea availability in the area and consequently better crop yield.

323. The healthy growth of trees and other plants both in factory as well as in township shows that there is no deterioration of soil and land due to CFCL plant. This was also noted during the site survey of limited villages in the study area.

324. The solid wastes generated in the plant are having intrinsic values and are sold to interested parties. The plant operations after CFCL expansion project will be similar emission and solid waste and as such not have any impact which is likely to affect soil, or effluents release likely to affect soil. As such soil chemistry is not going to be affected with CFCL expansion project.

4.6. Biological Environment

4.6.1. Flora

325. The quality of soils in the premises of the CFCL {factory and township} shows that there is no adverse effect of air, water and solid effluents on the soil system. A special thrust has been given right from the beginning to develop the premises into a live green belt. Green belt has been developed in an area of 500 acres within the premises with more than 100 species of trees. Thus, the plant has a significant positive impact on flora and fauna. 2.2-lac tree have been planted. The treated effluent is used for the irrigation purposes to the maximum extent within the CFCL premises. This is confirmed by the healthy growth and development of green belt consisting of variety of trees, plants and lawns within and near the factory area.

326. The development of green belt provides habitat, food and breeding areas to birds, small animals and insects. No rare or endangered species of fauna are reported to exist in the area. Thus, no impacts on rare / endangered species are envisaged due to normal operations. The *groves of Neem, Kadamb, Kanchan, bottle bush, Bougainvillea sp., Nerium, Tabernaemontana Siris, Rain tree, Queen's flower, Queen of the Night, Scarlet Cordia, Tulip tree, Gul Mohar, growing* within the plant showed no adverse effect. The lawns and other plants after watering with treated effluents continued their healthy growth. The leaf and flowers are all healthy and flowering pattern has not changed. The CFCL expansion project would not affect the soil and so the plant growth in the study area.

4.6.2. Fauna

327. The cattle and birds living in and around in CFCL factory area did not show any harmful symptoms due to grazing or other soil contamination. The survey team carried out investigation by checking with villagers in the study area and also discussed with doctors in state veterinary centre. There is a natural pond inside the factory, which has become bird's habitat including Siberian birds, Cranes and other birds. There is a lake full of lotus and aquatic animals. The large numbers of birds were seen during the site visit and photographs taken

Figure – 4.3 and Figure-4.4. The dense plantation inside the township has provided habitats to peacocks, foxes and other animals.

4.7. Socio – Economic Environment

328. CFCL Gadepan-I plant was commissioned in December 1993 and Gadepan-II in October 1999 and during its sixteen years of operation it has spurred a lot of growth in the Gadepan area.

329. The Company has been volunteering social programmes for the benefit of surrounding villages, which have been adopted by it. Making Kharanja roads for the villages, arranging medical camps for the villagers, constructing school rooms and books etc. to students, craft training, giving free medical aid and ambulance facilities, giving fire fighting aid, free farm services, free fruit tree plantations in the villages etc. are some of the prominent social services which the Company has been rendering.

330. In addition CFCL as good corporate citizen is carrying out a lot of social work as detailed in section "**2.7 Corporate Social Responsibility**".

331. CFCL expansion project will have some impacts also on socio – economic environment of the study area- some are as given below:

4.7.1. Positive Impacts

- Proposed expansion project of the plant would result in handling of more product and raw material, which will increase manpower requirement at some stages directly, or indirectly resulting in more income of people.
- CFCL expansion project would increase requirement from ancillary and auxiliary industries in the vicinity e.g. bagging units.
- With more load on infrastructure facilities – roads and rails; these facilities would be improved.
- More income to Government through more taxes on higher amount of production.

4.7.2. Negative Impact

332. Increased traffic on road due to more raw material requirement and more production results in deterioration of road and increase likelihood of accidents.

333. However these can be handled and safety on roads can be ensured through increased awareness and better management.

Figure 4.3 : Lake Full of Lotus and Aquatic Animals

Figure 4.4 : Birds in CFCL Plant Area

5. ENVIRONMENT MANAGEMENT PLAN

5.1. Introduction

334. Prediction of the potential adverse environmental and social impacts arising from development interventions is at the technical heart of EIA process. An equally essential element of this process is to develop measures to eliminate, offset, or reduce impacts to acceptable levels during implementation and operation of projects. The integration of such measures into project implementation and operation is supported by clearly defining the environmental requirements within an Environmental Management Plan (EMP).

335. Normally, potential impacts are identified early during the initiation of project, and measures to avoid or minimize impacts are incorporated into the alternatives being considered. In this respect, some of the most important measures to protect the environment and local communities become integral to the project design, and may not be reflected in a formal EMP.

336. **CFCL** by way of EIA study proposes to identify all the likely potential impacts, collect data information and incorporate all the measures necessary to avoid or minimize impacts on surrounding environment. Many of the mitigation measures are already in place as *this is the case of expansion of the plant where two similar units are already operating efficiently with little pollution CFCL has got spotless record (as regard to environment protection) since last sixteen years.*. It is desirable to collect even such information in the EMP to facilitate better assessment and communication as well as improve the systems and technologies to improve mitigation for environmental components having moderate residual impacts.

5.2. Objectives of EMP

337. Overall objective of EMP:

- **Prevention**: Measures aimed at impeding the occurrence of negative environmental impacts and/or preventing such an occurrence having harmful environmental impacts.
- **Preservation**: Preventing any future actions that might adversely affect an environmental resource or attribute.
- **Minimization**: Limiting or reducing the degree, extent, magnitude, or duration of adverse impacts.

338. This is achieved by step wise process of treatment, recovery and reuse/recycle of pollutants (mainly ammonia and urea) and natural resources (mainly water). Various measures taken for these are detailed in the following section. Saving of resources also results in energy conservation.

5.3. Components of EMP

339. EMP for CFCL to enhance the production capacity through expansion project considers the following aspects:

- Description of mitigation measures
- Description of monitoring program
- Institutional arrangements

- Implementation schedule and reporting procedures

340. Institutional framework includes the responsibilities for environmental management as well as responsibilities for implementing environmental measures.

5.4. Central Pollution Control Board {CPCB} Guide Lines for Fertiliser Industry

341. CPCB in its publication **"Probe/97/2002 - 03"-** 'Environmental Management in Selected Industrial Sectors Status / Needs', which also includes fertilizer sector has brought out suggestions / recommendations and norms for fertilizer units. The suggestions / recommendations and norms as applicable to CFCL and their compliance status is detailed below

5.4.1. Emission and Effluent Standards

342. Energy consumption is also an indicator of efficient plant running. CFCL energy consumption trend is as follows.

- Energy Trend in CFCL Complex (2008 – 2009)
  - Gadepan - I 5.68 Gcal/MT urea
  - Gadepan – II 5.56 Gcal/MT urea

5.4.1.1 Emission

343. Emission from PT {for units commissioned after Jan., 01, 1986.} 50 mg / Nm3 or 0.5 kg / t of product.

- CFCL Emission from PT
  - Gadepan--I 42.8 mg / Nm3
  - Gadepan-II 43.5 mg/Nm^3

5.4.1.2 Water Consumption

- Norms for Straight Nitrogenous Fertilizer units 8 m3 / t of urea or equivalent
- Gadepan I Water consumption rate (2007-08) 5.29 m3 / t of urea
- Gadepan II Water consumption rate (2007 - 08) 5.07 m3 / t of urea
- Norms for waste Water Generation Rate 5 m3 / t of urea
- Gadepan I / II wastewater generation (combined) 0.88 m3 / t of urea.

Table 5.1 : Important Recommendations / suggestions for Improvement of Environment in Fertiliser Industry and their 'Status in CFCL'.

Sr. No.	Action Points	Status at CFCL
1. 1	All the plants should recover ammonia as well as bottom water from condensate arising from ammonia plant by installing steam-stripping system.	CFCL has 'Steam Stripping System ' in Ammonia plants to recover condensate, CFG-3 will also have similar system
2.	All the operating urea plants should install deep hydrolyser –	CFCL has deep hydrolyser – stripping system for recovery of

Sr. No.	Action Points	Status at CFCL
	stripper as a facility for treatment of condensate arising from urea plant and to recycle ammonia and use bottom water.	ammonia and use of bottom condensate. CFG-3 will also have similar system
3.	As far as possible, the treatment units should be provided at the end of the processing plant for specific pollutants such as oil removal system at the place of oil handling, phosphate and fluoride removal system after phosphate and fluoride bearing effluents, ammonia removal system for ammonia bearing effluents, chromium removal system for CW blow down where chromate based chemicals are used.	CFCL has followed this practice of treating pollutants at the place of generation {oil, ammonia, acidic etc.} and will continue the practice for CFG-3
4.	Residual pollutants can be removed in a centralized biological treatment plant, where necessary by providing nitrification and de - nitrification system. It must be ensured that performance of de - nitrification process is complete.	CFCL effluents do not require this. Its effluents are already meeting the desired norms. In last sixteen years of operation no difficulty has been experienced.
5.	The industries should install holding ponds for storing occasional, accidental and unforeseen effluents, which can disturb the performance of effluent treatment system. Such holding ponds should have an arrangement to pump the effluents to ETP at regulated rate.	CFCL have centralized treatment system and holding ponds {Sump pits with treatment facilities and two large guard ponds}. These can cater to the need of CFG-3 also.
6.	Water Conservation: Industry should consider and attempt dry floor cleaning so as to minimize use of water for floor washing. No process water is to be used for floor washing.	CFCL follows this and will continue to do so.
7.	The leakages, overflows and spillages taking place in distribution system should be checked and controlled to avoid wastage of water.	CFCL follows this and will continue to do so.
8.	For development of green belt treated wastewater may be used instead of fresh water.	CFCL follows this to full extent {as seen in water balance diagram} and will continue to do so.
9.	Spillage urea around prilling tower should be recovered by dissolving	CFCL follows this and will continue to do so.

Sr. No.	Action Points	Status at CFCL
	in urea dissolving tank followed by recycle in the process. At the bagging plant also spilled urea and the de-dusting scrubber liquor are to be collected and recycled in the process plant through urea dissolving unit.	
10.	Hazardous chemicals are to be adequately stored and marked.	CFCL follows all norms as applicable (hazardous chemicals-inflammable, explosives and toxic) and will continue to do so.
11.	Solid Waste Management: Catalysts are charged or made up based on loss of activity after use for some time. The waste catalysts are to be disposed. Disposal should be done with appropriate and organised manner – secured land fill, returning to the supplier with special contract at the time of purchasing, selling for metal recovery.	CFCL follows – selling of solid waste (Catalysts) to authorized re-processors or recyclers and will continue to do so.
12.	Monitoring: AAQ monitoring at appropriate locations.	Ambient Air Quality Monitoring at all the five stations are being carried out as per the standard procedures on bi-weekly basis and data regularly submitted to RPCB In addition monthly AAQ monitoring outside the factory in radial distance of 5 km and 10 km distance in four directions is also carried out.
13.	Ground water monitoring around the storage facilities and also beyond the factory premises are to be carried out .at the regular interval – particularly for the parameters nitrate, fluoride, pH etc. The records of sampling, Depth and locations are to be maintained are to be maintained. The locations of sampling stations should be indicted in a map showing the contours of the area.	Monitoring of ground and available surface water quality along due North, South, East & West directions at distances 5 &10 kms from the periphery of campus is being carried out on monthly bases and reports are being sent regularly on quarterly basis. Total ground water locations 08 nos. and available surface water locations 03 Nos.
14.	Environment Management Cell headed by an experienced technologist and provided with facilities like laboratory, library and sufficient manpower.	CFCL has a Environment Management cell headed by a senior executive and the same system will continue.