



Nagarjuna Fertilizers & Chemicals Ltd, Kakinada
Welcomes You
for the Presentation on
Excellence in Water Management
By A Hari Prasada Rao & R Raghavan



ISO 9001:2000
ISO 14001:2004
ISO 18001:1999



Vision:

To be global leaders in plant nutrition

Mission:

We shall

- Pioneer transformation in plant nutrition*
- Deliver wholesome plant nutrition solutions to the farmers*
- Be the most preferred organization to be associated with*

Nagarjuna Fertilizers and Chemicals Limited

COMPANY PROFILE

Location : Agricultural town close to market

Water : Godavari River

Gas : Gas Authority of India Ltd.(GAIL)

Naphtha : HPCL, KAKINADA

Area : 121 acres plant built up area

789 acres green belt

160 acres water bodies

57 acres Landscaping and Roads

Railway : Siding connected to South Central Railway

PLANTS

✓AMMONIA 2 x 1050 MTPD

✓UREA 2 x 1810 MTPD

✓OFFSITE FACILITIES

Water Treatment	1200	M ³ /hr
Cooling Towers	2 x 18000	M ³ /hr
	2 x 12000	M ³ /hr
Boilers	2 x 100	MT/hr
Gas Turbines	2 x 7.5	MW
	1 x 18.0	MW
Ammonia Storage	2 x 5000	MT
Naphtha Storage	2 x 3450	KL
	1 x 7050	KL

Water Distribution

- NFCL has permission to draw 40,000 m³/ Day of water from River Godavari
- Present drawl is about 21,000 m³/Day (900m³/Hr).

Cooling reqt : 70%

Process reqt : 15%

(DMW reqt as BFW is around 700 M³/hr of which 85% comes thru recycle as PC, TC & SC)

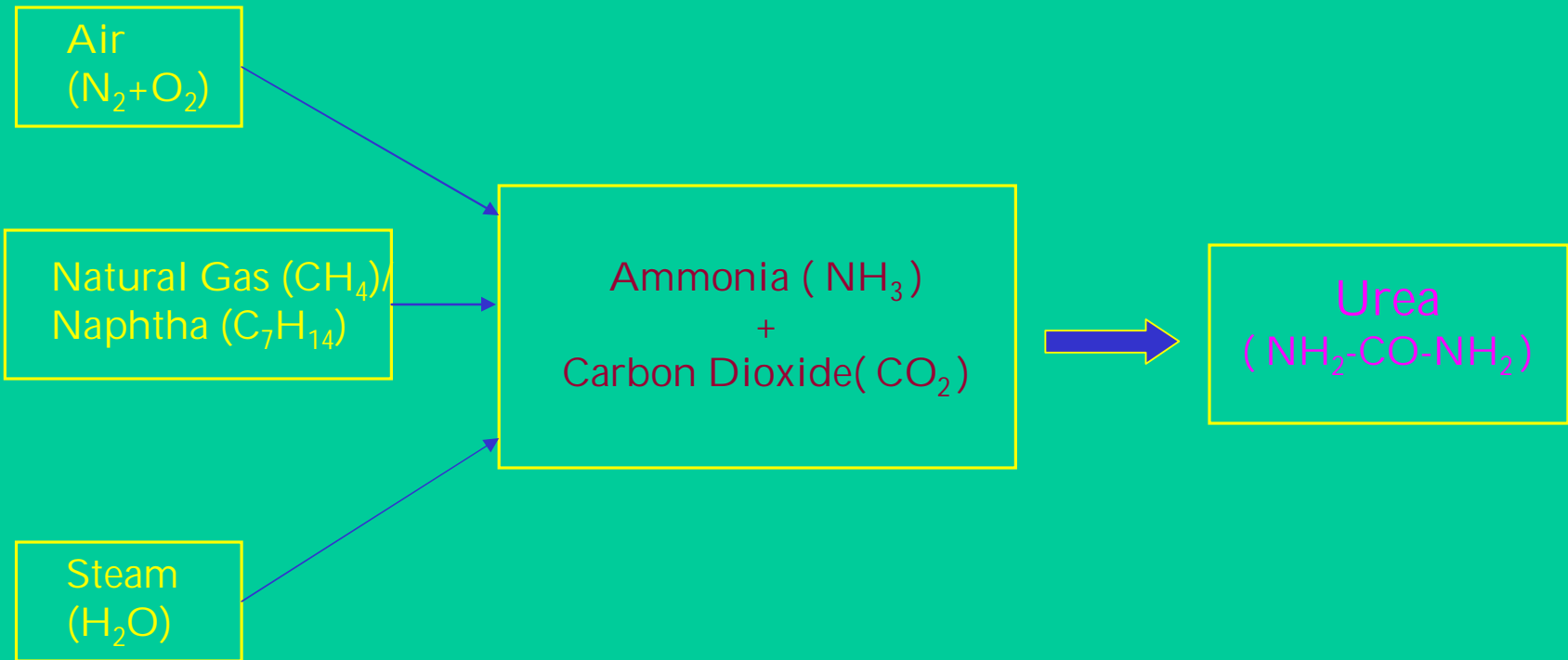
Services &

Domestic : 10%

School,Club

Greenbelt etc : 5%

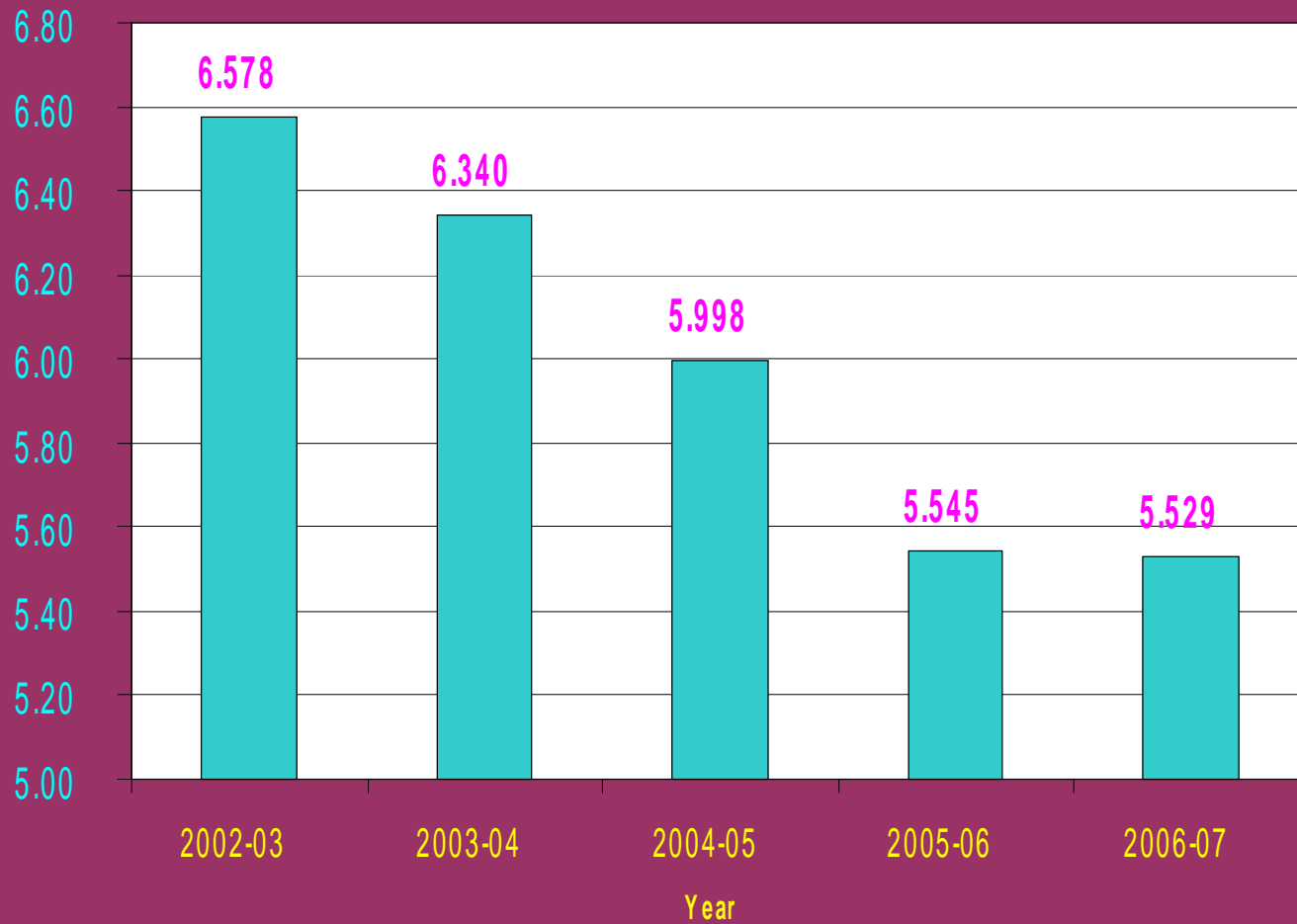
PROCESS



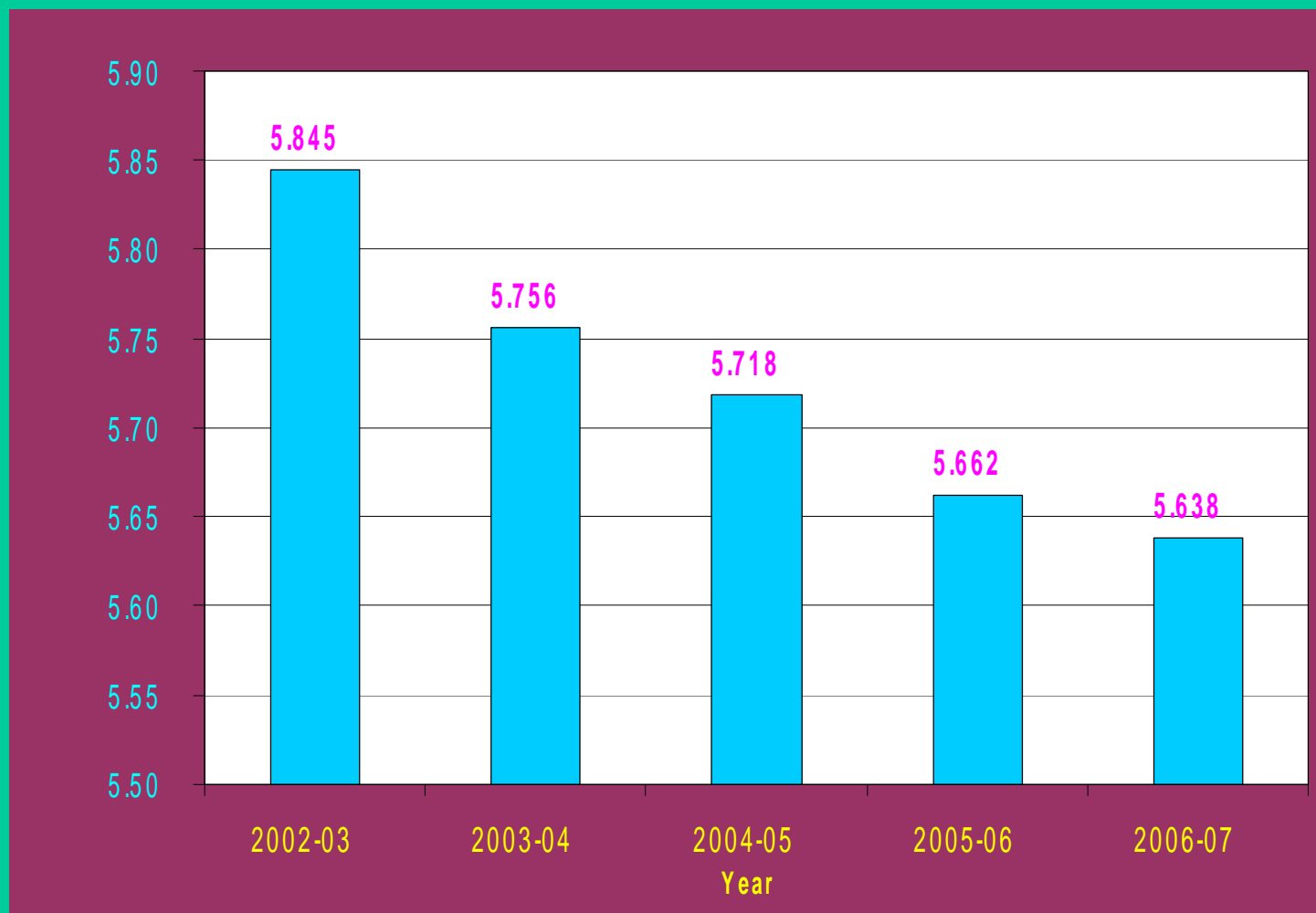
Water & Energy Consumption Data

Year	Industrial In M ³	Domestic In M ³	Production In MT	Specific Water Consumption M ³ /MT	Specific Energy Consumption MMKCal/MT
2002-03	69,90,859	5,86,077	11,87,259	6.578	5.845
2003-04	65,87,962	7,87,041	11,93,960	6.340	5.756
2004-05	73,65,229	8,48,828	13,92,538	5.998	5.718
2005-06	67,13,716	8,14,537	13,79,220	5.545	5.662
2006-07	65,66,028	7,54,820	13,24,054	5.529	5.638

Specific Water Consumption (m³/MT)



Specific Energy Consumption (MMKCal/MT)



Benchmarking

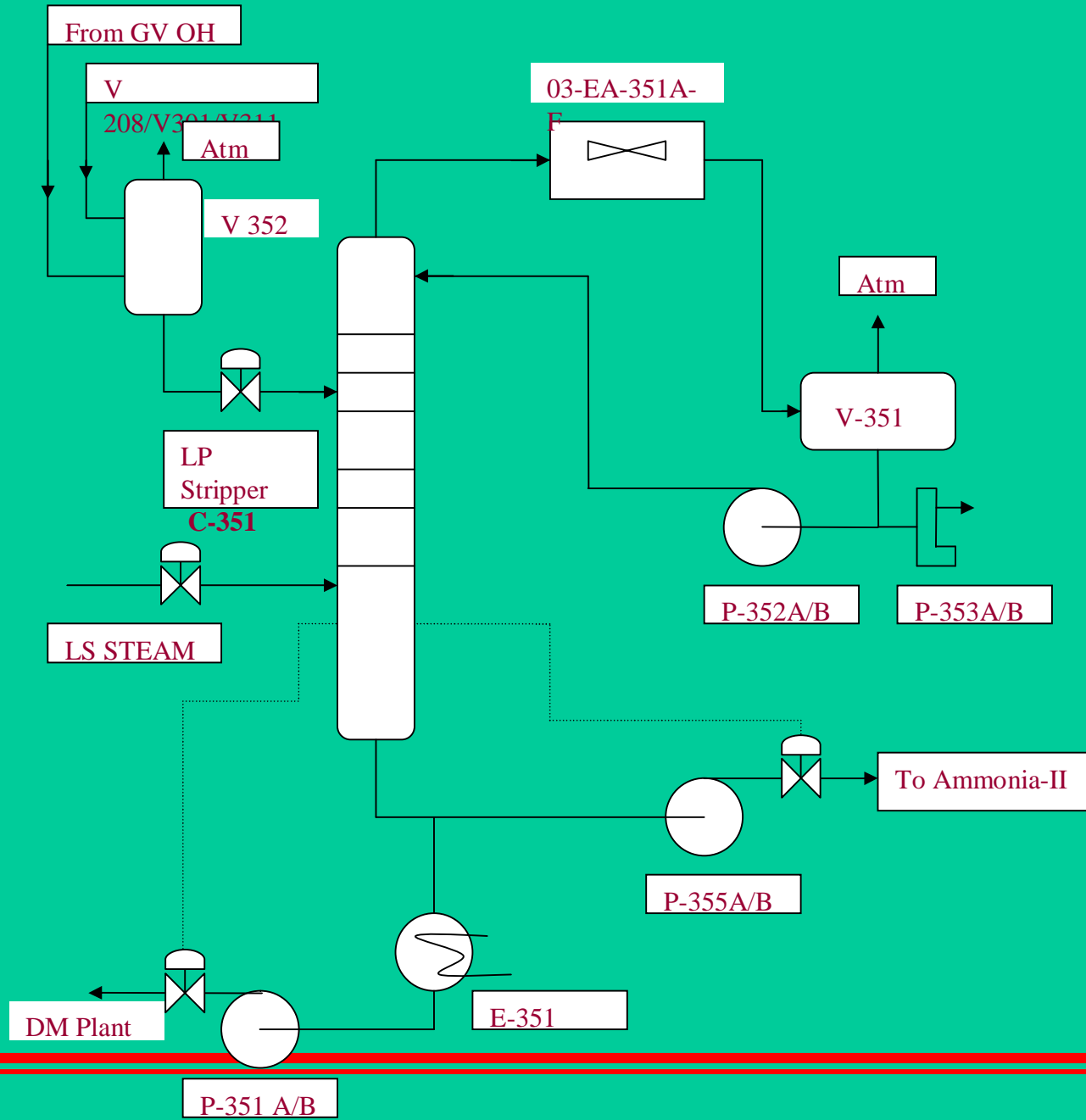
Collected data from Fertilizer Units of CFCL, TCL, IFFCO, Oswal, NFL, RCF, KRIBHCO, Indogulf for Benchmarking

2005 - 06

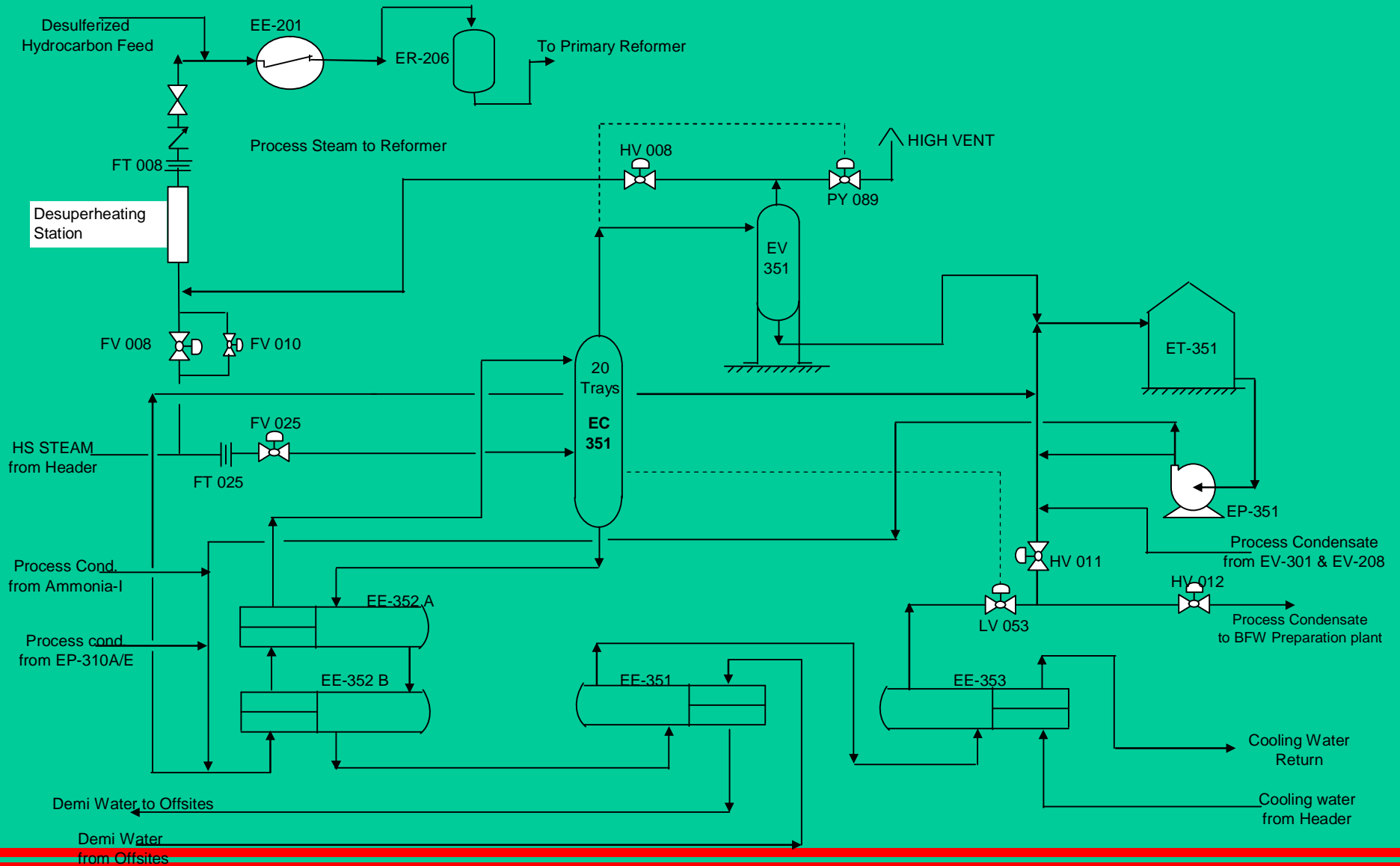
Best in India

√ Specific Water Consumption (m ³ /MT)	4.816
√ Specific Waste Water Generation(m ³ /MT)	0.498

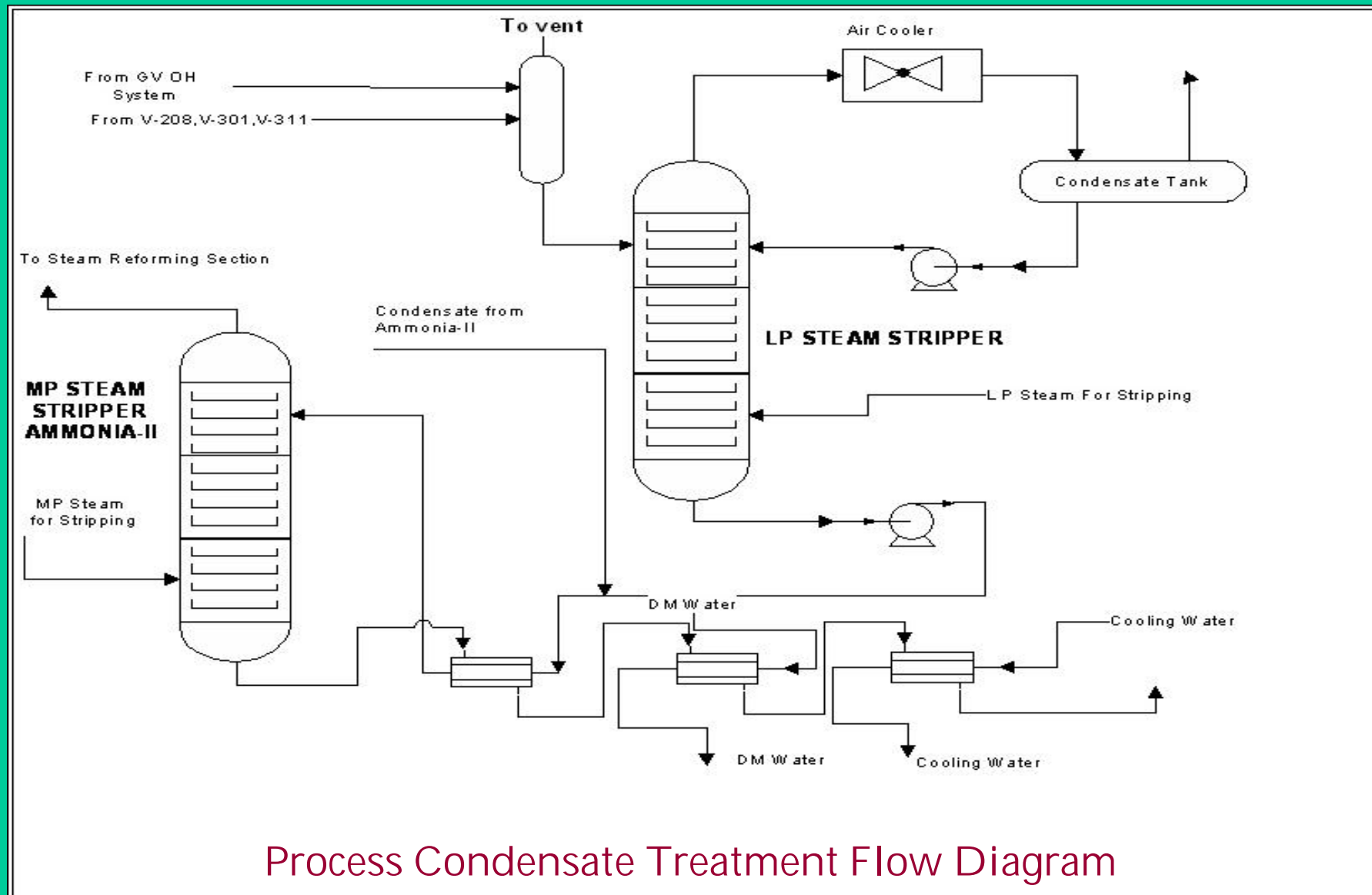
Ammonia-I Process Condensate System



Ammonia-II Process Condensate System



Water Conservation Scheme



Process Condensate Treatment Flow Diagram

Process Condensate Stripping

AMMONIA-I PLANT

- Process condensate from 02 and 03 Area contain small amounts of dissolved CO₂, NH₃ and Methanol.
- CO₂ removal section Over Head condensate from V-302 and V-303 contain mainly dissolved CO₂.
- The dissolved gases in the condensate from the above separators are to be reduced to a tolerable limit before sending it to DM Plant for further polishing to reuse as Boiler Feed Water.
- The condensate from the bottom of the flash separator V-352 at 101°C enters Process Condensate Stripper C-351, which is a tray type column having 28 trays.
- In the stripper, stripping of dissolved gasses is achieved by using LS steam at the bottom. LS steam at 3.5 Kg/cm²g and 150°C is used as stripping steam. The purified condensate from stripper bottom at 109°C is cooled in the Stripper condensate cooler E-351 by cooling water to 45°C and then pumped to DM plant.

Process Condensate Stripping

AMMONIA-II PLANT

- The process of Process condensate stripping is same as in Ammonia-I. The only differences are:
- 1. Use of HS steam (38 kg/cm²g, Temperature : 380° C)
- 2. There is no atmospheric venting of vapours.
- All the vapours generated during stripping process are used in Primary Reformer of Ammonia-II plant along with Feed Steam.

WATER CONSERVATION

- In case of Ammonia-I LP Condensate Stripper there is a vapour (H₂O and small amount of CO₂) venting of about 1.30 m³/hr of in to the atmosphere, where as in case of MP Condensate Stripper there will not be any vapour venting.
- The capacity of Ammonia-II steam stripper is quite high and it can process the total process condensate from Ammonia-I plant also. Keeping this in view an inter connection was made and in gradual manner all the process condensate from Ammonia-I is being processed in Ammonia-II stripper. In this way about 1.3m³/hr. (The CO₂ quantity is almost negligible as it in ppm level) venting is stopped and equivalent steam to primary reformer was reduced.

TOTAL SAVINGS with this scheme : 2.09 Lakhs per Annum

Water Conservation Measures

(Since 2003)

1. Treating Ammonia – 1 process condensate with M.P. Steam instead off L. S. Steam.
2. Deareator steam venting reduced by Monitoring Dissolved Oxygen in Boiler Feed Water.
3. Sterilization of Side Stream Sand Filters with biocides to regulate the microbiological activity across the filters.
4. Increase in Cycles of Concentration in Cooling Water from 6.0 to 9.0, Heat Exchangers flow study once in 3 months, giving a saving of 1950 m³/day



5. DM plant – Rinse water Tank (640 m³/day) Sources

Rinse Water from Week based anion , Strong based anion and mixed beds , Water from Online Analysers, Back Wash water from Condensate Polishing Unit



Water Conservation Measures

(Since 2003)

6. Boiler Blow down water to Cooling Towers
as makeup (500 m³/day)

[Video](#)

7. Cathodic Protection for Fire water pipe system to minimize leaks

8. Clarified water from Sand filters backwash pit

in Raw Water Pretreatment is recycled back to

Raw water reservoirs (700 m³/day)

[Video](#)

9. Steam leaks, Water leaks etc. are identified and rectified
immediately (100 m³/day)

10. Periodic inspection of Steam traps and corrective actions for
repair/replacement.

11. Timely maintenance of Fire Hydrant leaks.

Water Conservation Measures

12. Survey of all taps in toilets for leaks and action initiated to replace such leaky valves
13. Display of awareness slogans in all toilets/wash rooms (50 m³/day)
14. Educated contract workmen for proper usage especially in Canteen and Bagging Plants (200 m³/day)
15. Usage of Chlorine Dioxide in Raw water Pretreatment and Cooling water treatment to reduce consumption of Chlorine and total Chlorides in circulating cooling water.



Water Conservation Measures – Cost Saving

Annual Savings Achieved
m³ Rs. Lakhs

Treating Amm – 1 Process Condensate
with M.P. Steam instead off L.S.Steam

10,452

2.09

Deareator steam venting reduced by
Monitoring Dissolved Oxygen in BFW

4,020

0.80

Increase in COC

4,62,000

11.55

Rinse Water (DM Plant)

1,51,800

3.79

Boiler Blow down to Cooling Towers

1,65,000

4.12

Cathodic Protection (Fire Water System)

2,31,000

5.77

Water Conservation Measures – Cost Saving

	m ³	Rs. Lakhs
Display of slogans in Toilets/Wash rooms	18,250	0.55
Contract Workmen for proper water usage	73,000	2.19
Liquid Effluent to Green belt	1,09,500	3.28
Clarified water from Sludge Pits	2,31,000	5.77
Condensate leaks are rectified	36,500	7.30
Fire Water Usage under control	18,250	0.55
Survey of all Taps & Repair	73,000	2.19
Total (Average savings)	15,83,772	49.95*

* All the saving schemes were taken up with the in house material and manpower.

Control of Liquid Effluent Generation

- ✓ Diversion of Boiler blow down from ETP to Cooling Towers.
- ✓ Alkali regeneration effluent from DM plant diverted to Cooling Towers on need basis to maintain the pH.
- ✓ Throughputs between regenerations of cation resin beds were increased (from 1200 to 2000 m³).
- ✓ Turbine Condensate diverted to DM tanks without polishing (This saves regeneration chemicals and reduces the regeneration effluent).
- ✓ Improvement in Liquid Effluent Quality by reducing the Total Kjeldahl Nitrogen (TKN) from 48 to 35 ppm, Dissolved Solids from 1166 to 1136 ppm.

Rain Water Harvesting

- ✓ All the rain water from the complex is getting accumulated in Water bodies (11 Nos., covering 115 acres) present in the Green Belt and not allowing the saline water table to raise thereby improving the quality of ground water in our Green Belt helping the sustenance of trees.



Plant Lay-out

Total Area	Built up area	Greenbelt	Water bodies	Landscapes, roads non built up area
1127	121	789	160	57

Area in acres



Employees & Community Involvement

- ✓ As a proactive approach NFCL released two Video films on “Safety in Storage and Handling of Ammonia” and “Contractors workmen safety”. To create awareness among the Employees and contract workmen.
- ✓ Ultrasonic Leak Detector is using to identify the Steam Traps passing.
- ✓ All the Employees and Contract workmen at the site were given proper awareness programme to conserve and use water judiciously.
- ✓ Specific Water consumption values being monitored by departmental heads on daily basis for deviations and corrective actions.
- ✓ Slogans for the conservation of Water were displayed at all the consumer points of water i.e., Toilets, Canteen etc.

Water Monitoring

- Daily specific consumption of water being reviewed along with production and energy
- Calibration of water measurement meters, incoming raw water, CT makeup, DM water to boilers, condensate recovery and effluent generation.
- Water audit by TS & production, external audit by experts / consultants from time to time.
- Suggestion scheme and rewards.
- Mutual sharing of best practices in SHE Management thru East Godavari EHS Association.

Employees & Community Involvement

- ✓ Any water losses are being monitored and corrective measures were initiated in time.
 - ✓ Drinking water from NFCL was provided to the neighboring community at the Kondelpet village.
 - ✓ Drinking Water samples from various consumer points in the complex being analyzed for E-Coli and corrective actions being initiated.
 - ✓ Employees are allowed to take drinking water for their usage at home.
 - ✓ Ground water samples in and around the factory being monitored to ascertain no contamination from the plant effluents.
 - ✓ Creating awareness among School teachers and children regarding water conservation
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AWARDS & RECOGNITION

- ✓ Rajiv Gandhi Parti Bhoomi Mitra Award in the year 1996 by Waste Land development Board, Govt. of India
- ✓ Golden Peacock Environment Management Award for 1998 by World Environment Foundation, New Delhi
- ✓ The Fertilizer Association of India, New Delhi awarded the prestigious “Environmental Protection Award” for the years 2001-02, 2004-05 & 2006-07 under Nitrogenous fertilizers plant category. There are 32 Nitrogenous Fertilizer plants in the country.
- ✓ Award for Good Practices in Cleaner Production & Pollution Control from APPCB, Hyderabad during World Environment Day celebrations in June 2004.
- ✓ Five star rating in “Health and Safety Management System Audit” by British Safety Council in January 2005.
- ✓ Received National Awards as “ Water efficient unit in 2004” for the year 2004 and Excellent Water Efficient Unit for the year 2006

In addition to these, we received Number of awards in Production, Safety, Health, Environment, Social Responsibility etc, from different prestigious organizations since inception.

SYSTEMS

- ∨ ISO 9002 May 1995
(Upgraded to ISO 9001:2000 in July 2003)

 - ∨ ISO 14001:1996 May 2000
(Upgraded to ISO 14001:2004 in April 2006)

 - ∨ OHSAS 18001:1999 April 2001

 - ∨ Process Safety October 2007
Management System
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Future plans

- Air compressors inter stage separators condensate recovery – 50 M³ / Day
- Vacuum PSVs sealing water collection & Recovery – 50 M³ / Day
- Carbon Di Oxide recovery from Flue gases – 450 MTPD.
- Debottlenecking and capacity increase from 3620 to 4560 MTPD of Urea.

Specific energy reduction from 5.638 to 5.518 MMKcal / MT of urea

Specific water consumption reduction from 5.529 to 5.50 M³ / MT

Barren Lands Before NFCL Inception



Green Cover After NFCL Inception





Industry in Harmony with Nature





THANK YOU