

4.2.3.7 Fertilizers

1.0 Subject Matter

(Present a brief historical background on the growth of Fertilizer industry – a bird's eye view picture and analysis of the industry using the information/ tables) provided in the annexure.

GIS based map depicting location of all the Fertilizer industries - District level

Type of Fertilizer industries in the State along-with total production (*Refer Annexure: Table-1*)

Time trend of the number (growth) of Fertilizer industries in the state and water demand and supply position (*Refer Annexure: Table-2*)

2.0 Details of Water Availability, Supply, Demand, Withdrawal & Consumption for the Fertilizer industries

Water Supply & Demand for Fertilizer industries in the State

Time trend of total water demand and actual current water supplied to the Fertilizer industries along with growth of industries in the state.

Provide trend analysis (10-15 years) with breakup. (Refer Annexure: Table – 2, 3a, 3b)

Total Freshwater Withdrawal and Actual Water Consumption by Fertilizer industries in the State

Comparative trend of Total Freshwater Withdrawal Vs Actual Water Consumption by Fertilizer industries in the State:

State Water Budgeting: *Refer Annexure- Table 3(e)*

SECTOR	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
All Fertilizer industries				
GRAND TOTAL	xxx	xxx	xxx	xxx

3.0 Issues and Challenges

Illustrative issues and challenges may include

- Waste water disposal and associated surface and ground water contamination
- Water demand and supply issues in the Fertilizer sector in the state, provide details
- Capital investment related issues w.r.to wastewater treatment/recycle/reuse, water conservation interventions etc.
- Issues related to water pricing in Fertilizer sector
- Technology availability, affordability and efficiency related issues
- Issues & challenges relevant to the water supply & consumption
- Issues related to monitoring and reporting of data

(Supporting data & analysis for above points may also be furnished)

4.0 Problem Tree / Root cause Analysis: Cause, Effect and Interventions

5.0 Governance / Management:

Statute / Law / Policy/ Regulations if any

- State level laws, policy and governance for the Fertilizer sector in the state on water access, consumption and wastewater discharge.
- Any specific fresh and waste water regulation/ guidelines in state, provide details.
- Has the state notified any regulations including for zero liquid discharge for the Fertilizer sector in state? Provide details.

Institutions governing / managing / monitoring the resources and Institutional structure.

- Institutions governing / managing / monitoring the industrial water consumption and supply.

Governing body for Fertilizer sector	Water allocation & Monitoring authority	Waste water discharge monitoring
<i>E.g. Ministry of Chemicals & Fertilizers</i>	<i>E.g. CGWA/ Water resource department/ Urban or Rural body</i>	<i>e.g. State pollution Control Board</i>

Areas of Peoples/Private Participation if any

- Water Projects set up by Fertilizer industries for the benefit of neighborhood/ local community/ Environment.

Fertilizer	Any OE ¹⁶ or critical block within the watershed	Water Conservation / Waste Water Treatment initiatives if any	Partnership			Sustainability of initiative
			Community Participation	PPP	Others	

Fertilizer	Any OE or critical block within the watershed	Water Reuse/ Recycle initiatives under PPP	PPP Yes/No	Sustainability of initiative

Schemes, Economics & Financing-

Existing schemes and programs along with financial allocations, expenditure etc.

- Water Tariff and procurement cost (*Refer Annexure: Table 6(a) & 6(b)*)
- Expenditure on Water management (*Refer Annexure: Table 6(c) & 6(d)*)

6.0 Measurement, Monitoring and Data Constraints/ Management

• Water & Wastewater Measurement:

Shall specify measurement methods and technologies at Raw water source, industrial process and Waste Water (generation, recycle/reuse & discharge) and Water Quality as per CPCB / SPCB

- **Monitoring** at State Government: Institution/ Agency/ Official responsible for Sustainable Water Management comprehensively for this Industry Sector.
- **Data Management:** Should specify - Frequency of measurement, Frequency of Reporting to centralized agency, Water Quality Parameters monitored, how data is being used to improve Water Use Efficiency and ensure water quality parameters within the prescribed norms etc.
- **Constraints** with respect to the measurement & monitoring.

7.0 Performance Indicators:

a. **Benchmarks on water use** (*Refer Annexure: Table-13*)

b. **Status of various Performance Indicators– for comparison across Districts/ Plants/ Units/ Products etc.**

Category	Indicator		Bench Mark/ Unit (<i>as applicable</i>)	Unit 1	Unit 2	Unit 3
Measurement	Water Quantity					
	Measurement at Raw water source	Manual	Yes/No			
		Real Time/	Yes/No			

¹⁶Overexploited block of groundwater

		Automatic				
		Use of ICT (SCADA)	Yes/No			
	Measurement at major water usage areas	Manual	Yes/No			
		Real Time/Automatic	Yes/No			
	Waste Water (generation, recycle/reuse & discharge)	Use of ICT (SCADA)	Yes/No			
		Manual	Yes/No			
		Real Time/Automatic	Yes/No			
	Undertaken internal Water Audit in the last Year?	Use of ICT (SCADA)	Yes/No			
	Undertaken Third party Water Audit in the last Year?		Yes/No			
	Submitting monthly water balance to state pollution control board (SPCB)?		Yes/No			

Performance Indicators

Category	Indicator	Bench Mark/ Unit (as applicable)	Unit 1	Unit 2	Unit 3
Management Plans	Having Water Management Plans?	Yes/No			
	Whether Water Managements are operational	Yes/No			
Water Conservation	Have taken up RWH/ GW Recharge?	Yes/No			
	% of total Water requirement being met from Treated Waste Water				
	% reduction in water consumption compared to the previous year.				
	Introduction of water efficient technologies in process to reduce water consumption.	Yes/No			
Water Use Efficiency (Annexure: Table 7)	Specific Water Consumption (SWC); (m ³ /MT of fertilizer produced) (refer Annexure: Table 7(a),(b) & (c))				
	Have specific water consumption norms/benchmarks established	Yes/No			
Water Productivity (Annexure: Table 8)	Water Productivity (INR/m ³) Quantity of water necessary to produce these goods (refer Annexure: Table 8(a)&(b))				
Water Intensity (Annexure: Table 9)	Water Intensity ; (m ³ /1000 Rs or m ³ /US\$) Volume of water used per unit of gross value added (GVA) (refer Annexure-9(a)&(b))				
Water Foot print (Annexure: Table 10)	Total volume of freshwater used directly and/or indirectly for the industrial operation/product (refer Annexure: Table 10(a))				
Waste Water (Annexure: Table 11)	Total Waste Water Generated				
	% of Waste Water Treated				
	% of Treated waste water recycled				
	Implemented/ achieved zero liquid discharge (ZLD)				

Category	Indicator	Bench Mark/ Unit (as applicable)	Unit 1	Unit 2	Unit 3
Waste Water Quality (Annexure: Table 12)	Installation of online water quality monitoring systems.	Yes/No			
	Compliance with the wastewater quality discharged norms.	Yes/No			
	Discharging wastewater into open area/ earthen nallah /open drain/ municipal sewer?				
	Notified for violating effluent discharge norms for discharge in natural resources (surface/ground).	Yes/No			
Economics	Whether economic incentives are in place by state to encourage water efficiency & conservation?	Yes/No			
	Whether economic disincentive mechanisms like penalties etc. are in place by state to discourage water wastage & inefficient use?	Yes/No			
	Whether water use charges & tariff are revised regularly and are reflective of rational pricing mechanisms?	Yes/No			

Performance Indicators

Category	Indicator	Bench Mark/ Unit (as applicable)	District 1	District 2	District 3
Water Quantity Measurement	% of Fertilizer industries with water flow meters				
	% of Fertilizer industries undertaken internal water audits in the last year				
	% of Fertilizer industries undertaken external water audit in the last year				
	% of Fertilizer industries submitting water balance to SPCB (State Pollution Control Board)				

8.0 Reforms undertaken/ being undertaken/ proposed if any

9.0 Road map of activities / tasks proposed for

- Better governance
- Better source / supply management
- Better demand management /improved Water Use Efficiency
- Water Quality
- Water Economics and Financing
- Sustainable Water budgeting with timelines and agencies responsible for each task/activity.

ANNEXURE

1 Total number, types & production of Fertilizer industries in the State

Total Production from Fertilizer industries in the State		
Type – Based on Ownership	No. of Fertilizer industries	Daily Average Production in metric tonne (MT/day)
Government		
Private		
Cooperative		
Total		

2 Growth Trend of Fertilizer industries over a period and Water Demand and Supply position

Fertilizers – Based on Ownership	Years					
	1990	1995	2000	2005	2010	2017
No. of Industries						
Government						
Private						
Cooperative						
Total						
Water Demand and Supply						
Total Water Demand (MCM)						
Total Water Supply (MCM)	<i>GW</i>					
	<i>SW</i>					
	<i>Total</i>					
Demand-Supply Gap						

3 Water Budgeting

3(a) Demand, Supply (Withdrawals) & Consumptive Use:

Fertilizer Industries: (MCM) Present Water Year: 1 st June to 31 st May next year									
INDUSTRY (within the Basin/ Sub-basin A)	Previous Year/ Average Annual Demand	Demand for Present Water Year	Previous Year/ Average Annual Supply				Previous Year/ Average Annual Waste Water Generated	Previous Year/ Average Annual Consumptive Use	Remarks
			Rain Water	Surface Water	Ground Water*	TOTAL SUPPLY			
Unit 1									
Unit 2									
GRAND TOTAL									

*GW Draft can be calculated from the number of GW abstraction structures & corresponding draft for each Industrial Use/ Process.

3(b) Source Wise: Previous Year/ Average Annual Water Supply

Fertilizer Industries: (MCM)										
Source	Sub Source	Unit 1	Unit 2	Unit 3	Unit 4					TOTAL
Rain Water	Directly Harvested Rain Water									
Total										
Surface Water	Springs, Nallahs									
	Major Projects									
	Medium Projects									
	Minor Projects									
	Ponds, Tanks									
	Wetlands									
	Sea Water /Desalinated Water									
Inter Basin Transfer										
Total										
Ground Water* (Dynamic / Static)	Dug wells (Total No. x Draft)									
	Dug cum Bore well (Total No. x Draft)									
	Bore/Tube wells (Total No. x Draft)									
	Others etc									
Total										
Treated Waste Water										
GRAND TOTAL										

*GW Draft can be calculated from the number of GW abstraction structures & corresponding draft for each Industrial Use/ Process.

3(c) Previous Year/ Average Annual Demand, Supply (Source wise) and Consumption for Basin/ Sub-basin A:

Source of Water	Demand of all Units in Basin/ Sub-basin A	Supply/ Withdrawal for all Units	Consumptive Use of all Units	Gap/Remarks
Rain Water (Directly Harvested)				
Springs, Nallahs				
Major Projects				
Medium Projects				
Minor Projects				
Ponds, Tanks				
Wetlands				
Desalinated Water/ Sea water				
Inter-Basin Transfer				
Ground Water (Dynamic)				
Treated Waste Water				
TOTAL (MCM)				

3(d) Previous Year/ Average Annual Demand, Supply (Source wise) and Consumption for Whole State:

Source of Water	Demand of all Units in the State	Supply/ Withdrawal for all Units	Consumptive Use of all Units	Gap/Remarks
Rain Water (Directly Harvested)				
Springs, Nallahs				
Major Projects				
Medium Projects				
Minor Projects				
Ponds, Tanks				
Wetlands				
Desalinated Water/ Sea water				
Inter-Basin Transfer				
Ground Water (Dynamic)				
Treated Waste Water				
TOTAL (MCM)				

3(e) Summary State Water Budget for Fertilizer

SECTOR	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
All Fertilizer units	xxx	xxx	xxx	xxx

4 Proportion of Water withdrawal and consumption by Fertilizer industries against total industries in the State

Fertilizer – Type based on product	Total Water Withdrawal by Fertilizer industries (%) (Refer 4(a) below)	Total water withdrawal by all the Industries in state	Total Water Consumption by all Fertilizer industries (%) (Refer 4(b) below)	Total water Consumption by all Industries in the state
Straight Nitrogenous (SN)				
Straight Phosphatic (SP)				
Complex Fertilizers (CF)				
Total				

4(a) Total Water Withdrawal/Abstraction by Fertilizer industries in the State as percentage of Total water withdrawal by all the industries in the State

$$\text{Total water withdrawal by Fertilizer Sector (\%)} = \frac{(\text{Total water withdrawal by all the Fertilizer units in the State}) \times 100}{(\text{Total water withdrawal by all the industries in the state})}$$

4(b) Total Actual Water Consumption by Fertilizer industries in the state as percentage of Total water consumption by all the industries in the State

$$\text{Total water consumption by Fertilizer Sector(\%)} = \frac{(\text{Total actual water consumption by all Fertilizer units in State}) \times 100}{(\text{Total water consumption by all the industries in the state})}$$

4(c) Total Freshwater Withdrawal and Total Actual Water Consumption by all Fertilizer industries in the State

	CY -11	CY -10	CY -9	CY -8	CY -7	CY -6	CY -5	CY -4	CY -3	CY -2	CY -1	CY / 2017
Total Fresh Water Withdrawal by all Fertilizer industries (MCM)												
Total Actual Water Consumption by all Fertilizer industries (MCM)												

5 Total Water Withdrawal (Abstraction) and Actual Water Consumption as percentage of total renewable freshwater resources

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Total Fresh Water Withdrawal by all Fertilizer industries (%) (Refer Annexure: Table 5(a))						
Total Actual Water Consumption by all Fertilizer industries (%) (Refer Annexure: Table 5(b))						

5(a) Total Water Withdrawal/Abstraction by Fertilizer industries in the State as percentage of Total available freshwater resources of the State

$$\text{Total water withdrawal by Fertilizer Sector (\%)} = \frac{(\text{Total water withdrawal by all the Fertilizer units in the State}) \times 100}{(\text{Total available freshwater resources of the state})}$$

5(b) Total Actual Water Consumption by Fertilizer industries in the state as percentage of Total available freshwater resources of the State

$$\text{Total water consumption by Fertilizer Sector (\%)} = \frac{(\text{Total actual water consumption by all Fertilizer units in State}) \times 100}{(\text{Total available freshwater resources of the state})}$$

6 Water Economics & Financing:**6(a) Water Tariff (Rs./m³)**

Source	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
GW						
Urban body						
Treated Waste Water for reuse						
Others						

6(b) Procurement Cost of Water (in Rs)

Year wise cost of procurement of Water				
CY-5	CY-4	CY-3	CY-2	CY-1

6(c) Expenditure on Water including Treatment and Management-Time trend at State level

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Total Capex by Fertilizer industries on water treatment and management (Lakhs)						
Total O&M Expenditure by Fertilizer industries on water treatment and management (Lakhs)						
Total						
O&M Expense (%)						

6(d) Expenditure by each industry for the Current Year- CY

Fertilizers	Capital Expenditure (Lakhs)	O&M Expenditure (Lakhs)	Total	O&M Expense (%)
UNIT 1				
UNIT 2				
UNIT 3				
UNIT 4				
UNIT 5				
UNIT 6				
Total				

7 Water Use Efficiency:

Water use efficiency in terms of Specific Water Consumption (SWC) viz. amount of water used/consumed per unit of product. In case of Fertilizer it can be represented as the total volume of water used/consumed (m³) per metric tonne of fertilizer produced.

Specific Water Consumption (SWC) of Fertilizer:

$$\text{Specific Water Consumption; (m}^3\text{/MT)} = \frac{\text{Volume of water consumed by the Fertilizer unit, (m}^3\text{)}}{\text{Total Fertilizer produced by the unit (tonne)}}$$

7(a) Specific Water Consumption (SWC) for Current Year

	Vol. of Water Consumed (m ³)	Total Fertilizer produced (tonne)	SWC (m ³ /tonne)
Unit 1			
Unit 2			
Unit 3			

7(b) Average SWC of Fertilizer units for the State – time trend (also represent through Graph)

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Average SWC of Fertilizer units in State						

7(c) Specific Water Consumption (SWC)

SWC of Fertilizer Sector in the State (in categories such as (Straight Nitrogenous (SN), Straight Phosphatic (SP), Complex Fertilizers (CF)); Decadal trends or 15 years trend to be provided.

Trend of average Specific Water Consumption (SWC) of Fertilizer industries at district level:

Percentage of industries having specific water consumption within the norms/bench marks/standards (if applicable)

8 Water productivity:

- **Water Productivity** as the total economic value created of the output/product by the Industry in the State per unit volume of water withdrawal or consumption

$$\text{Water Productivity (INR/m}^3\text{)} = \frac{\text{(Total economic value created of the output/product by the Industry), INR}}{\text{(Total Volume of freshwater withdrawn/consumed), m}^3}$$

OR

Water Productivity in terms of **GVA (Gross Value Added)**; (INR/m³)

$$= \frac{\text{(Total Value of Fertilizer Production – Value of inputs other than water), INR}}{\text{(Total Volume of freshwater consumed), m}^3}$$

8(a) Water Productivity in terms of GVA for Current Year

	Value of Fertilizer Production	Value of inputs other than water	Total Volume of freshwater consumed	(Gross Value Added); (INR/m ³)
Unit 1				
Unit 2				
Unit 3				
Total				

8(b) Average Water Productivity in terms of GVA for the State – time trend (also represent through Graph)

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Average Water Productivity (GVA); (INR/m³)						

9 Water Intensity:

$$\text{Water Intensity; (m}^3\text{/1000 Rs or m}^3\text{/US\$)} = \frac{\text{Volume of water consumed by the Industry, (m}^3\text{)}}{\text{(Unit value added by Fertilizer production), (1000 Rs or US\$)}}$$

9(a) Water Intensity for Current Year

	Volume of water consumed	Unit value added by Fertilizer production	Water Intensity; (m ³ /1000 Rs or m ³ /Rs)
Unit 1			
Unit 2			
Unit 3			
Total			

9(b) Average Water Intensity for the State – time trend (also represent through Graph)

	CY-5	CY-4	CY-3	CY-2	CY-1	CY/ 2017
Average Water Intensity (m³/1000 Rs or m³/Rs)						

10 Water Footprint:**Water Footprint for Fertilizer industries**

Water Footprint (WF) of Fertilizer production = Sum of WF of Operations of the plant and WF of Supply Chain

10(a) Water Foot print for Current Year

	WF Supply Chain	WF Operations	Total
Unit 1			
Unit 2			
Unit 3			
Total			

11 Waste Water

	Bench Mark/ Units (as applicable)	Unit 1	Unit 2	Unit 3
Total Waste Water Generated				
% Waste Water Treated				
% Waste Water Recycled				
• % Treated waste water used in Industrial activity				
• % Treated waste water used in Green belt				
• % Treated waste water used in others				
% Total quantum of wastewater discharged.				
Implementation/ achieved zero liquid discharge (ZLD).				

12 Water Quality

		Bench Mark/regulatory norms (as applicable)	UNIT 1	UNIT 2	
Water Quality	Installation of online water quality monitoring systems.				
	Compliance with the wastewater regulatory quality discharge norms.				
	Discharging wastewater into open area/ earthen nallah /open drain/ municipal sewer?				
	Notified for violating effluent discharge norms for discharge in natural resources (surface/ground).				

Water Quality Time trend- Graphs: Compliance to Waste water discharge Quality norms (E.g. BOD / PH /COD / TSS etc.)

13 Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/standards currently for each industrial sector in state. The benchmarks to be given category-wise as mentioned below:

13(a) Benchmark for Water Consumption, Waste Water Generation etc.

	Parameters	Unit	Indian Bench Mark	International Bench Mark
	Straight Nitrogenous			
1	Specific Water Consumption	m ³ /tonne		
2	Waste Water generation	m ³ /tonne		
3	Waste Water discharged	m ³ /tonne		
	Straight Phosphatic			
1	Specific Water Consumption	m ³ /tonne		
2	Waste Water generation	m ³ /tonne		
3	Waste Water discharged	m ³ /tonne		
	Complex fertiliser			
1	Specific Water Consumption	m ³ /tonne		
2	Waste Water generation	m ³ /tonne		
3	Waste Water discharged	m ³ /tonne		

13(b) Existing benchmarks/norms in certain sectors for reference

Fertilizer sector

Type of plant	Unit	Indian Bench Mark
Nitrogenous fertiliser plant	m ³ /tonne	5.0 - 20.0
Straight phosphatic plant	m ³ /tonne	1.4 - 2.0
Complex fertiliser	m ³ /tonne	0.2 - 5.4

Textile sector

	Parameters	Unit	Indian Bench Mark	International Bench Mark
1	Specific Water Consumption	m ³ /tonne	200-250	Less than 100
2	Waste Water generation	m ³ /tonne		
3	Waste Water discharged	m ³ /tonne	ZLD (draft)	

Pulp & Paper sector

	Parameters	Unit	Indian Bench Mark	International Bench Mark
1	Specific Water Consumption	m ³ /tonne	Wood based mills: 63 Waste paper based mills: 9 - 19	Wood based mills: 30 – 70 Waste paper based mills: 8 - 10
2	Waste Water generation	m ³ /tonne		
3	Waste Water discharged	m ³ /tonne	Wood based mills: 50	