

BEFORE THE HON'BLE WESTERN BENCH OF NATIONAL GREEN
TRIBUNAL AT PUNE

O.A No 91 of 2023

IN THE MATTER OF:-

Mr. Aditya Singh Chauhan
Applicant

..... Petitioner/

AND

Gujrat Pollution Control Board (CPCB)

..... Respondents

OBJECTIONS TO THE REPORT BY THE APPLICANT BY WAY OF
AFFIDAVIT

I, Aditya Singh Chauhan, S/o Roop Singh Chauhan Aged about 46 years having office at 25 Jay Shree Shopping Centre, Vatva GIDC Road, Vatva, Ahmedabad, do hereby solemnly affirm and state as under:

1. That I am the petitioner/ applicant in the above noted case and as such I am well conversant with the facts of the case and competent to depose the present affidavit.
2. That the report is not a consensus report and has not been signed by Ahmedabad Municipal Corporation and thus is not in consonance with order dated 18.09.2023 of this Hon'ble Tribunal.
3. That the report points out that there are 672 industries in the area who are members of CETP, Ahmedabad Hand Screen Printing Association (AHSPA) but the report mischievously pertains to only

SR. No. 817-A/2023

P. B. Trivedi
PRIYANKABEN B. TRIVEDI
NOTARY
GOVT. OF INDIA

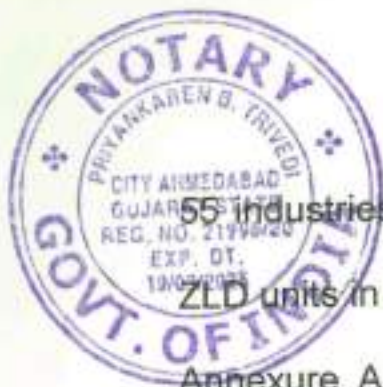
10/10/23

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10 OCT 2023



Handwritten text in Gujarati script, including the name "પ્રિયાંકબેન ટ્રિવેડી" (Priyankaben Trivedi) and other illegible characters.



55 industries and therefore it conceals more than it reveals. The ZLD units in the area in question as given by GPCB was 55 units (Annexure A-6) only; whereas to the best of knowledge of the Applicant total ZLD units in this area is more than approx 200.

4. The fact regarding the number of industries with ZLD permission in the area can be verified from the numbers of Notices issued by the GPCB for submitting no drainage pipeline connection in the month of July 2023. To the best of knowledge of the Applicant not a single unit have submitted any certificate from AMC in compliance of the Notices that there is no drainage pipeline connection. These industries are continuously discharging the industrial effluent and violating the conditions prescribed under ZLD permissions.
5. That GPCB despite the knowledge has not taken any action to withdraw the CTE/CCA of any of the erring units; rather have all along allowed them to operate at the cost of environment on one pretext or the other so much so that it has not issued any direction against the said units to close the illegal discharge of effluent and production activities of the units which they are running on the basis ZLD permissions.

Maulan



6. The Joint Committee Report makes it evident that the units permitted under ZLD are not in compliance of the conditions prescribed under which permission has been granted by the state pollution control board. The GPCB Instead of issuing closure orders or directions to stop the illegal discharge and production of effluent, are finding escape goat and are shifting their entire responsibility and diverting it on AMC on pretext of monitoring / disconnection of illegal drainage connections from the sewage / storm water drainage lines.

7. That GPCB is having knowledge of such blatant violation but its inaction in the matter makes it complicit in the crime and injury that the erring industries are causing to the environment in general and to the river Sabarmati in particular. GPCB has from the very beginning tweaked its policy to permit these industries to operate but has never bothered to ensure compliance of the terms and conditions (of the permission) and has turned blind eye to blatant violation of the environmental laws and rules by these industries. When the bluff of these erring industries with ZLD permission has been caught, GPCB for reasons best known to them is advocating amending the ZLD; which again is another pretext to ensure continued operation of these erring industries.

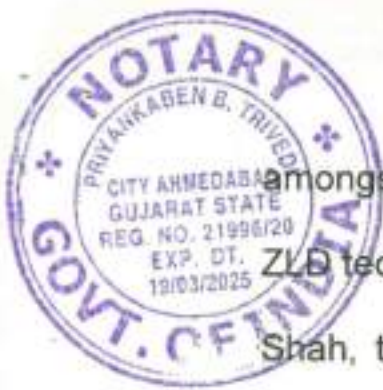
Abulau



It is baffling that in present litigation before Hon. NGT, on the issue of ZLD violations, when it is established by the Joint Committee Report that all the industries with ZLD permission are violating the terms and conditions of the ZLD permission and are discharging untreated or partially treated effluent and are causing heavy Pollution in the Sabarmati River, how can the GPCB officials think to continue to allow such offensive activities and propose to amend the conditions from ZLD to River discharge through CETP of 30 MLD only.

9. That the proposal to amend the ZLD condition to River discharge through CETP will prove to be the last nail to kill River Sabarmati and cause irreversible harm and injury to the environment. The proposal is totally vague and without proper study and detailed analysis of quantity of effluent generation and its treatability.
10. GPCB themselves have admitted that ZLD is a progressive technology and only way of sustainable development in a presentation made by its Member Secretary, which stands uploaded on its website. GPCB has been consistently advocating use of ZLD for textiles as well as other industry and lists out Arvind Mills Limited, Katraj; Century Textiles Limited, Jhagadia; Welspun Industries Limited, Kutch; S Kumar Limited, Jhagadia

Tharlan



amongst the Textile industry who have successfully adopted the ZLD technology. True copy of the ZLD presentation by Sri Hardik Shah, then Member Secretary, GPCB, as downloaded from the official website of GPCB is annexed hereto as **Annexure A-1/1.**

11. That it is widely accepted that going ahead ZLD is the way for sustainable development and GPCB have themselves been advocating and encouraging the use of ZLD and there are some presentation regarding ZLD on the website of GPCB, which are important and material for the present case, contents of which may be treated as part and parcel of the present affidavit and same are not being repeated herein for the sake of brevity. A presentation titled " Approach to ZLD – special reference to textile and paper sectors" as downloaded from the website of GPCB is annexed here to as **Annexure A- 2/1.** A presentation titled " An overview of case studies on liquid discharge – Indian experience" as downloaded from the website of GPCB is annexed here to as **Annexure A- 3/1.**

12. That Hon'ble High Court of Gujrat took suo moto cognizance of news article regarding STP Pirana published in Ahmedabad Mirror on 4.08.2021 titled " STP at Pirana flouts norms, Sewage not treated as per norms", wherein it was reported that parameters for

Abhakar



water treatment was not being adhered to by STP Pirana and polluted water was being released into river Sabarmati and the penalty on the company operating the STP was being continuously waived by GPCB. Taking suo moto cognizance the Hon'ble High Court of Ahmedabad instituted a Writ Petition (PIL) No. 98 of 2021. Copy of the order dated 6.08.2021 of the Hon'ble High Court of Ahmedabad in Writ Petition (PIL) No. 98 of 2021 is annexed hereto as **Annexure A- 4/1.**

13. That during the course of the hearing of the aforesaid case by Hon'ble High Court of Ahmedabad, a large number of industries were found to be discharging their industrial effluent in the drainage/ storm water drain pipelines of AMC. These effluent were either untreated or partially treated and not as per stipulated norms as a result eroding the STP machinery, rendering the STP ineffective as a result the STP was discharging untreated or partially treated effluent into river Sabarmati as a result about 120 km stretch of the river was found to be dead. The Hon'ble High Court held such discharge of industrial effluent into the pipelines of AMC to be violative of Law and such industries were directed by the authorities to close and were sealed.
14. That on being forced to not to operate and sealed, case was made

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by these industries for permission to operate under ZLD condition.

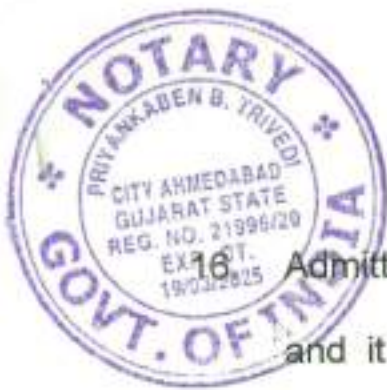
The Hon'ble High Court gave its in principle approval to the progressive ZLD system as the way for sustainable development, following which a number of industries approached GPCB for amendment to its CCA / CTE under ZLD, which was granted.

15. It is the case of the Applicant that the industries, particularly the Respondent Nos 9 to 62 which were allowed to operate under ZLD are violating the terms and conditions of ZLD permission and therefore be sealed and penalized. The Hon'ble High Court of Ahmedabad vide its order dated 18.08.2023 in Writ Petition (PIL) No. 98 of 2021 has directed as hereunder:

"30. We, therefore, call upon Ahmedabad Municipal Corporation (AMC), Gujarat Pollution Control Board (GPCB) and Ahmedabad MEGA Clean Association (AMCA) to submit their response to bring before us their vision / planning / decisions / and concrete actions, to be taken to ensure zero wastewater discharge into river Sabarmati. The action plan prepared by them in order to achieve their objectives to curb discharge of contaminated / sewage water both from domestic and industrial front, shall be placed."

True copy of the order dated 18.08.2023 of the Hon'ble High Court of Ahmedabad in Writ Petition (PIL) No. 98 of 2021 is annexed hereto as Annexure A-5/1.

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16. Admittedly there are 672 member industries of the AHSPA- CETP and it is common knowledge that the industries operate much beyond their respective permissible limits and under report the quantity of water used and effluent generated. The GST details of the 672 industries would give some idea of actual production being done by these industries and consequently a rough estimate of effluent generation can be arrived at by applying the industry standard of effluent generation.

17. There is no justifiable ground for discarding a progressive technology such as ZLD and reverting to old system which is difficult to monitor and ensure compliance and as such is regressive and ineffective to control pollution. Some industries cannot be permitted to enrich themselves at the cost of the environment. It is to be remembered that Sabarmati-river water is being used by large number of people for their domestic needs as well as by farmers.

Abhayan

Deponent

Verification:-

Verified at Ahmedabad on this ____ day of October 2023 that the contents of the above affidavit are true and correct to my knowledge, no part of it is incorrect and nothing material has been concealed there from.

Abhayan

Deponent



SOLEMNLY AFFIRMED
BEFORE ME

P. B. Trivedi
PRIYANKABEN B. TRIVEDI
NOTARY
GOVT. OF INDIA

20/10/23

10 OCT 2023



Overview of Industrial Pollution Management Policies in India and Context of ZLD



Hardik Shah
Member Secretary
Gujarat Pollution Control Board

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Zero liquid discharge (ZLD)

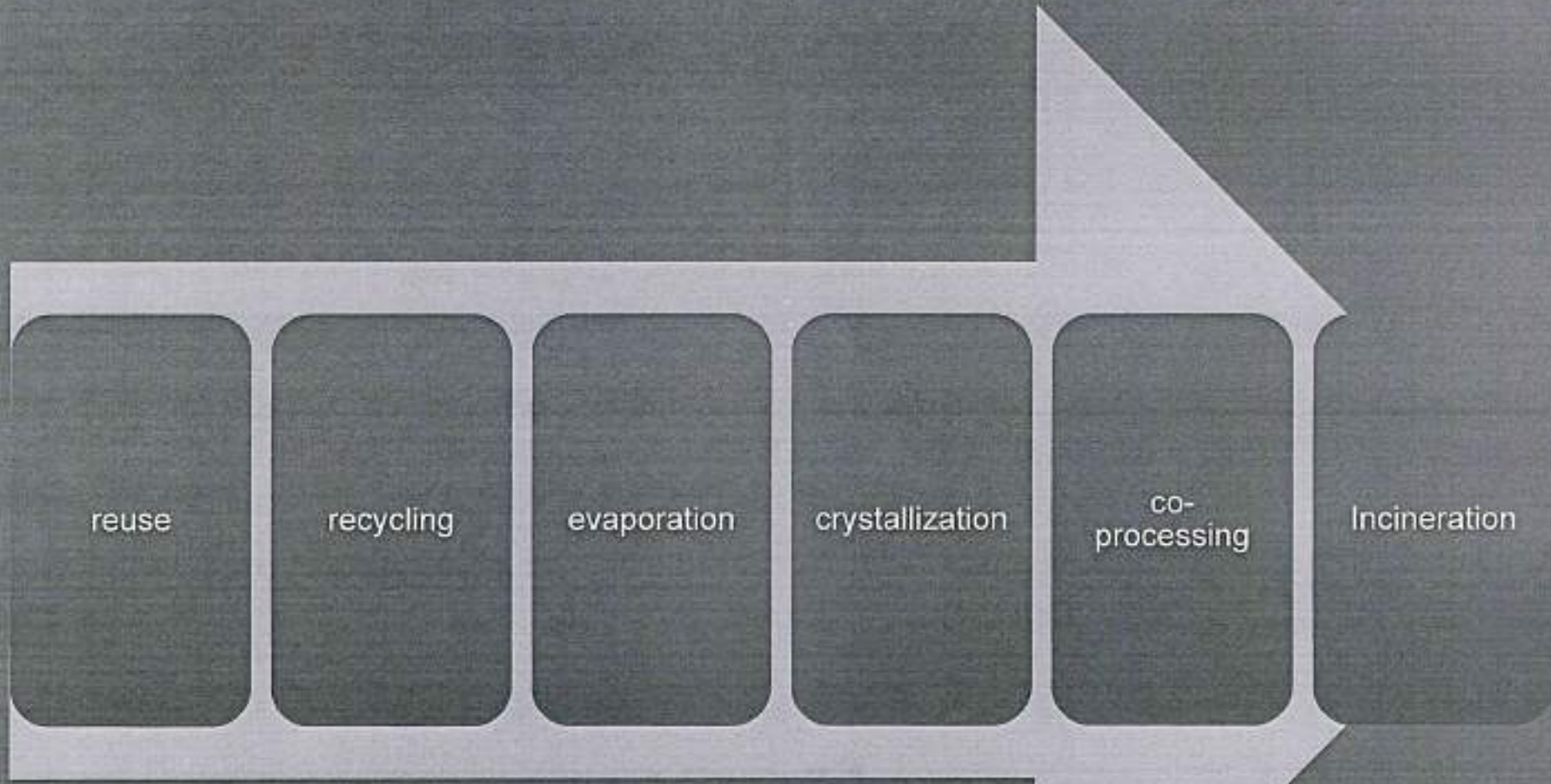
ZLD

- An industrial plant without discharge of waste waters

ZLD

- Broadly defined as the separation of an aqueous waste to its water and solids components
- Wherein, the water is reused and solids (usually with some moisture) are disposed as a waste or by-product

Zero liquid discharge (ZLD)



reuse

recycling

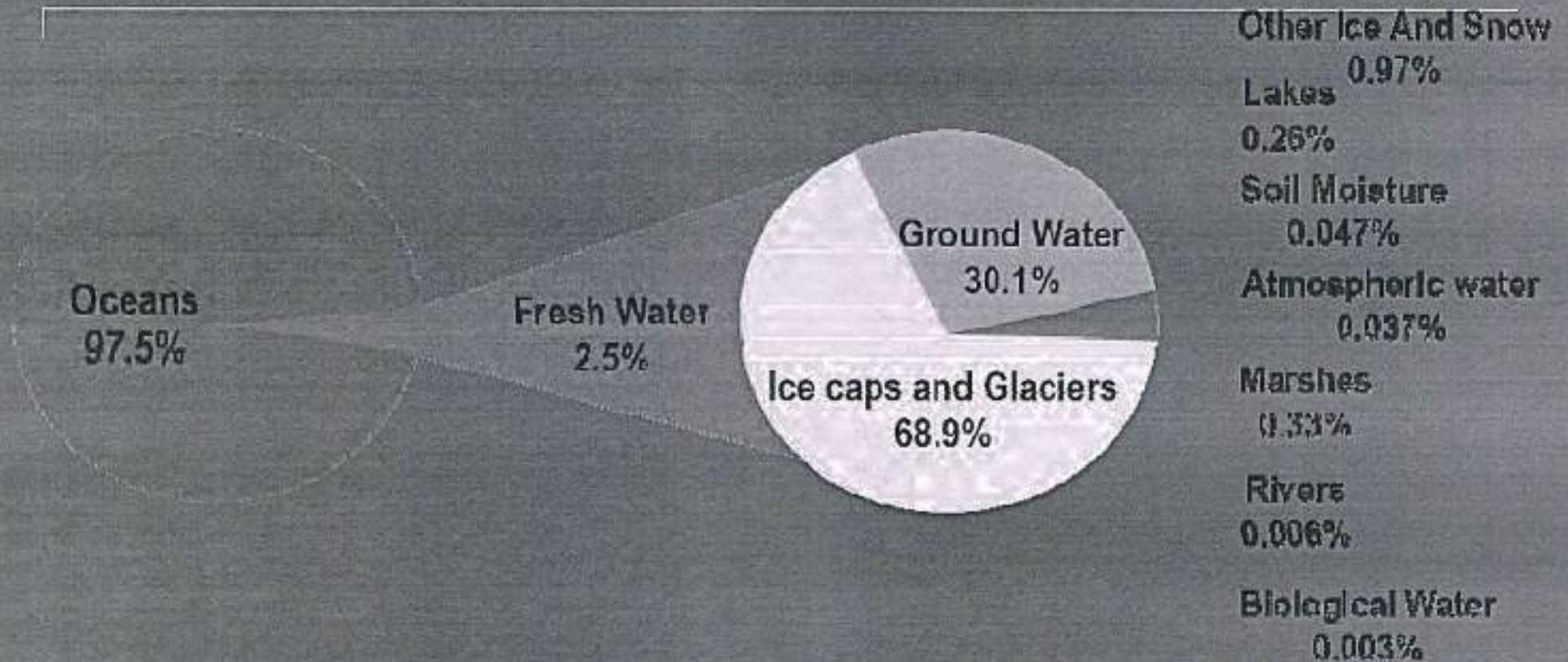
evaporation

crystallization

co-
processing

Incineration

Water Conservation



- Water is a finite resource and cannot be replaced/duplicated
- Water resources are theoretically 'renewable' through hydrological cycle, but pollution, contamination, climate change, temporal and seasonal variations have affected the water quality and reduced the amount of 'usable water'
- The ground water levels are declining very fast
- Rainfall is unevenly distributed over time and space

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Need for Water Conservation

Water is fundamental to life, livelihood, food security and sustainable development.

It is a scarce resource.



India has more than **18 percent of the world's population**, but has **only 4 percent of world's renewable water resources** with **2.4 percent of world's land area**.

India With a growing population and rising needs of a fast developing nation as well as the given indicators of the **impact of climate change**, per capita availability of water is likely to go down from 1545 cubic metre per year in 2011 to 1341 cubic metre per year in **2025**.

Also region wise it varies from **10 cm rainfall in Rajasthan to 1000 cm in North Eastern Region**.

There are further limits on utilizable quantities of water owing to uneven distribution over time, as 75 percent of annual rainfall is received in just four months.

The increasing demand of water for various purposes will further strain with the possibility of deepening water conflicts among different user groups as drinking water need is going to rise by 44 percent, irrigation need by 10 percent, **industry need by 81 percent** respectively by 2025.

Praveen

Need for ZLD

Environmental constraints



Water scarcity

Strong enforcement of environmental regulations : Moratorium / CEPI, 18 (1) (b) directions under Water Act

No disposal point available or land-lock area

Highly polluting Industrial activity i.e dyes and dyes intermediates, pharmaceuticals, pesticide, etc.

Industrial effluent having very high TDS and/or Organic matter

Limited hydraulic capacity of the CETPs

CETPs are not compliant

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Benefits of ZLD

Water Conservation / Generates make up water (reduces demand of fresh water)

Reduces the wastewater discharge i.e. reduces water pollution

Preferred option for industry where disposal of effluent is major bottleneck

Prevents exploitation of hydraulic capacity of disposal system

Reduces cost of disposal at common infrastructure

Separation of salts / residual solvents improve efficiency of ETP and CETP

Separated solids valuable by-product which helps in reducing the pay back period

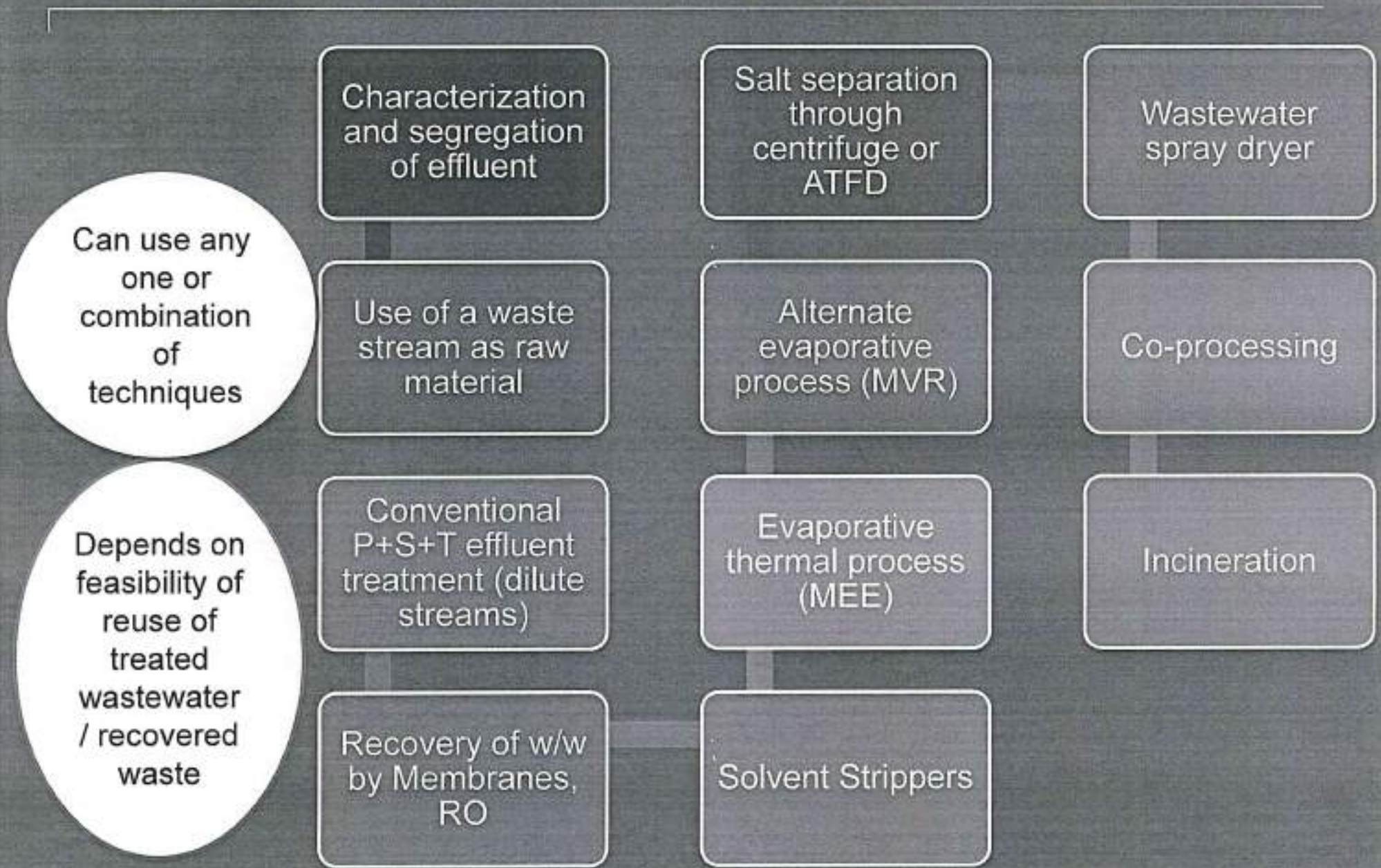
Mixed solvent separated in stripper can be reused or used as AFR / Co-processing

Ease in getting environmental permissions

More focus on production/ business rather than tracking after regulatory authorities

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ZLD Options



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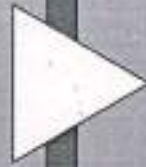
Segregation of effluents

Mother Liquor Streams:

- Solvent washing streams
- High COD
- High TDS
- High Hardness
- Ammonical Nitrogen


Lean Stream:

- Plant Washing effluent
- Utility waste
- Moderate COD
- Moderate TDS
- Moderate Hardness




The ZLD process: key steps

Involves a range of advanced water treatment technologies




Pre-treatment:

Waste water is filtered using membranes technologies such as ultra-filtration. Separated water is reused and a concentrate (polluted stream) is further treated




Evaporation:

The concentrate then enters a brine concentrator which is a mechanical evaporator using a combination of heat and vapor compression, resulting in a wet sludge

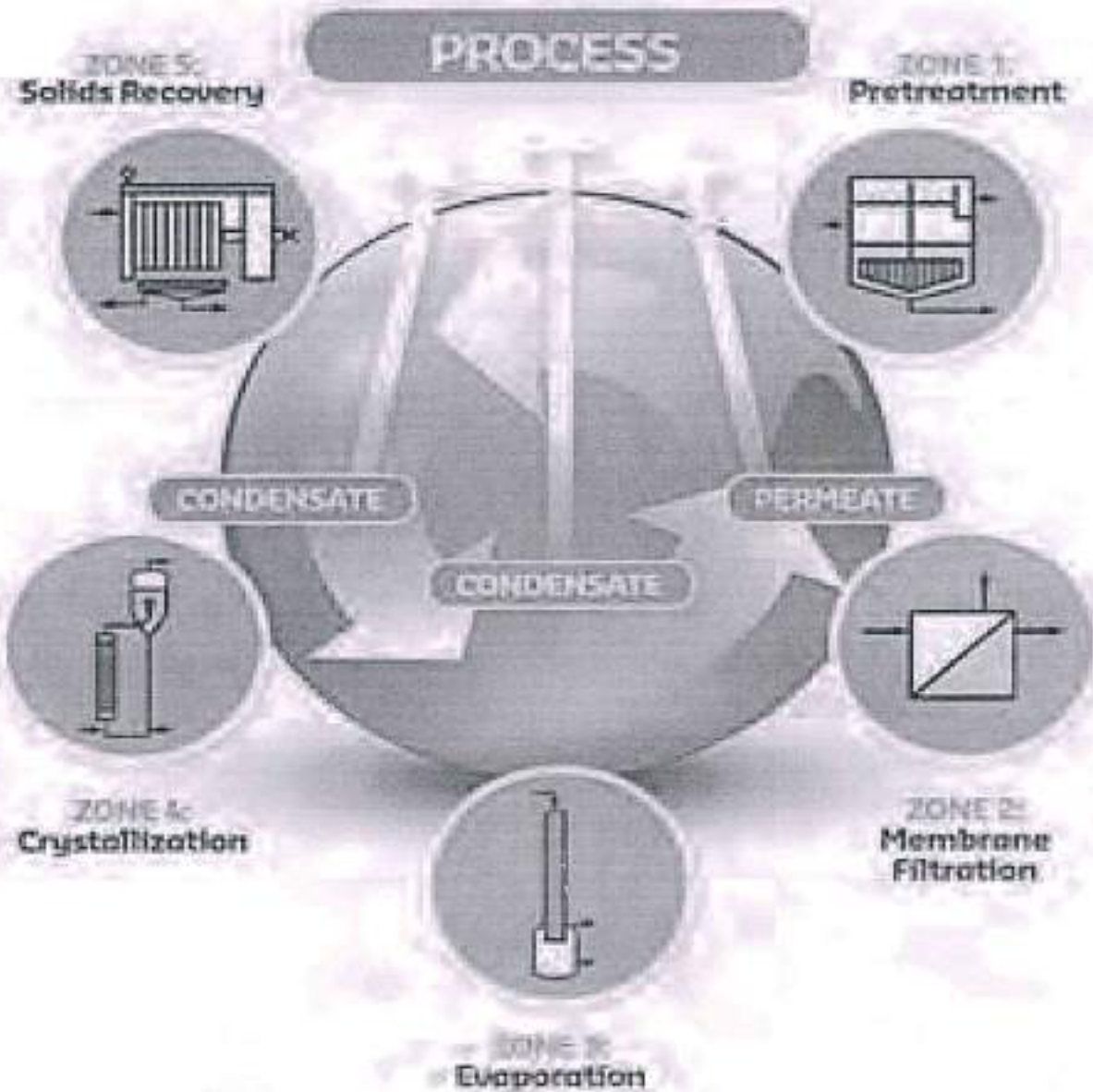


Crystallization:

Converts the sludge to solid waste using high pressure steam. Any remaining water is clean enough for reuse

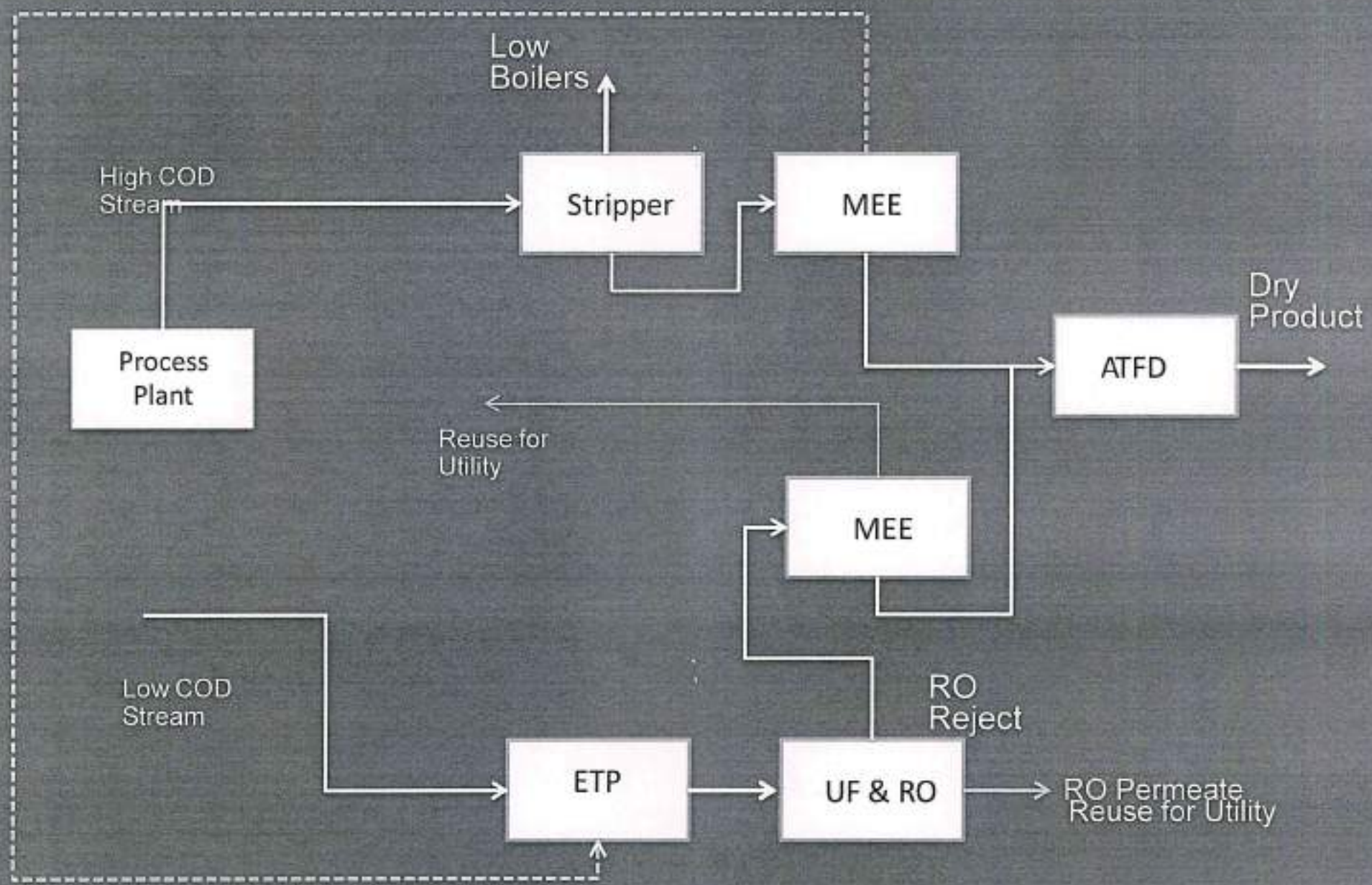


The ZLD process: key steps



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Typical ZLD Scheme



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Applications of treated waste water

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The potential applications for reuse of treated wastewater

Industrial cooling especially in large industrial enterprises

Reuse in watering lawns, parks, play grounds and trees

Flushing toilets

Scrubbing media in water scrubbers

Preparation of lime slurry for ETP

Mechanic seal of pumps

Industrial washing operations & decontamination of drums/ barrels / plastic bags etc

Boiler feed water (particularly for generating steam for MEE)



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High energy consumption - costly

Complexity in segregating waste streams due to complex product profiles

Regulatory constraints i.e USFDA constrains use of recovered water / solvent in process of bulk drugs

Challenges in ZLD

Designing ZLD : contamination of water (feed chemistry), flow rate and purity demand of products are important

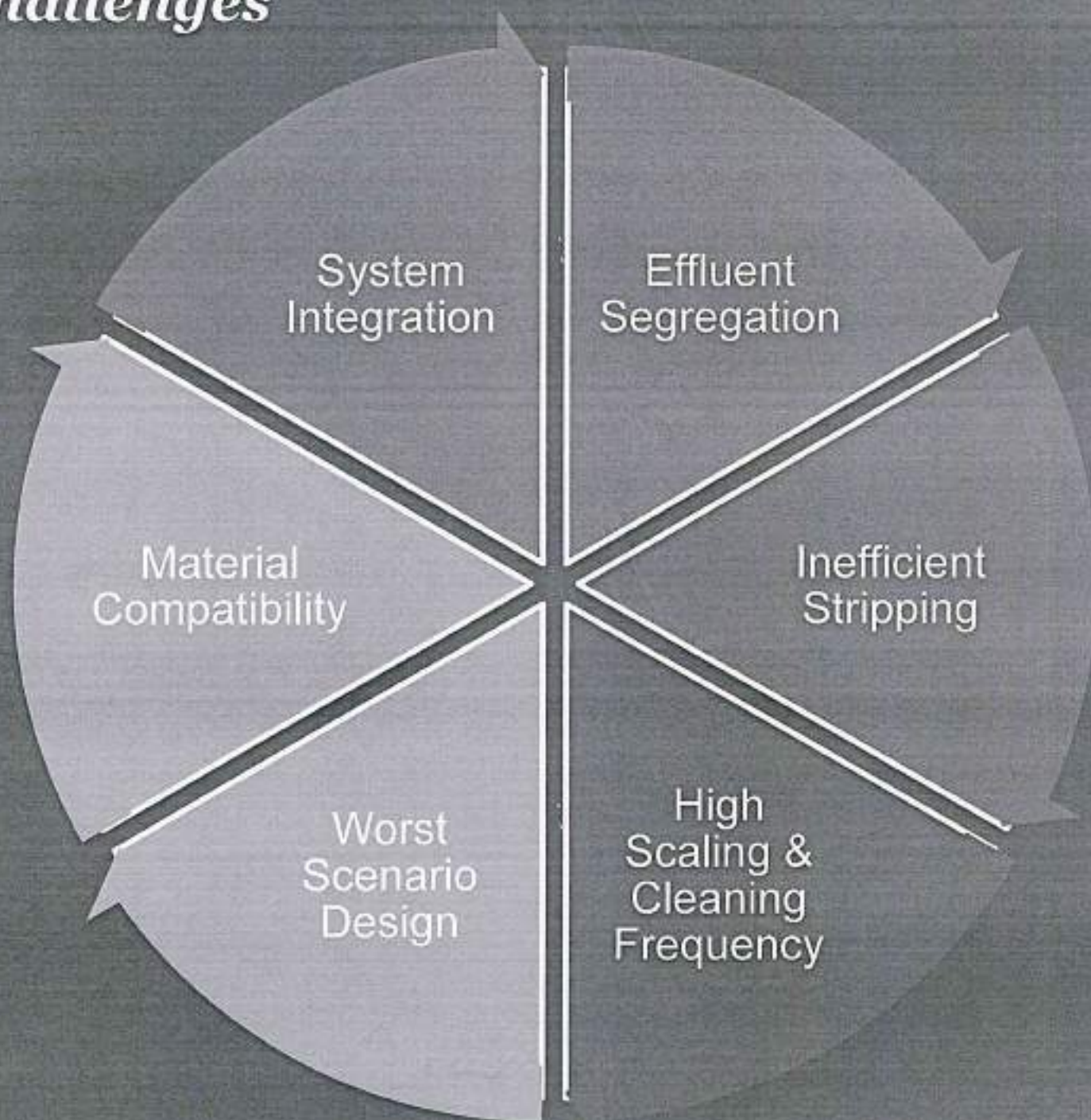
Due to varying nature of waste streams, it is impossible to design a general ZLD

Every ZLD-system is unique and has to be customized each time

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Other Challenges

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Solutions

Efficient Effluent Segregation

Properly Designed Strippers

Optimum Design of MEE

MOC Selection as per Compatibility

Efficient System Integration

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Initiative by GPCB to achieve ZLD in Pharma (Bulk Drug) & Pesticide industries

Typical segregation & treatment scheme to achieve ZLD in pharma & Pesticide industries

Typical matrix guidelines for operation of MEE

Few Cases of ZLD

Following industries have succeeded in achieving ZLD

Textile

- Arvind Mills Limited, Khatraj
- Century Textiles Ltd, Jhagadia
- Welspun Industries Limited, Kutch
- S. Kumar Limited, Jhagadia

Bulk Drug (Pharma)

- Tonira Pharma Limited, Ankleshwar
- Sun Pharmaceutical Ind. Ltd, Ankleshwar
- Sun Pharmaceutical Ind. Ltd, Panoli

Dyes Intermediate

- H-Acid plants
- Vinyl Sulphone plants

Few Cases of ZLD

Contd...

Organic Chemical Industries:

- Arti Chemical Industries Limited, Jhagadia

Other Industries:

- Galaxy Surfactants Ltd, Jhagadia

In-pipeline Units

- Atul Limited, Ankleshwar (Aromatic Chemical Industry)
- United Phosphorous Limited – Unit-2, Ankleshwar (pesticide)
- Asian Paints Limited, Ankleshwar

Where are we heading?

70 MEEs with cumulative installed capacity of 6 MLD and

48 RO Plants with cumulative installed capacity of 9 MLD at Ankleshwar

+

under installation

Recovery of valuable products / by-products from waste

Green Chemistry / Cleaner processes

Co-processing

Incentives to industries having ZLD?

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Innovative Instruments of GPCB

XGN – Environmental Management through e-Governance

Environmental Audit Scheme

Help Desk in all the Regional Offices

Environment Clinic for industry

A role of doctor –Diagnosis, Prognosis, Treatment & Therapeutics
(Providing Solutions & Advising) than merely as police

“Pollution Control”- A Sector of the Employment generation

Recognised Research Centre of the Gujarat Forensic Science University-A
World renowned Forensic Institute.

Research and Development Scheme

Extended Consents for ISO 14001 and Responsible Care

Auto-renewal of consent through fast-track mode for compliant industries

REDUCE

RECOVER

**Because
Tomorrow
Matters....**

REUSE

RECYCLE

Malan

Thank You



Hardik Shah
Member Secretary
 Gujarat Pollution Control Board
 "Paryavaran Bhavan" Sector 10-A,
 Gandhinagar, Gujarat, India
 Phone- 07923232152
 (M) 9978407260
 E-Mail: ms-gpcb@gujarat.gov.in
 Website: gpcb.gov.in

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Approach to ZLD – Special reference to Textile and Paper Sectors

Debajit Das
Technical Advisor, GIZ
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Indo German Environment Partnership (IGEP) Programme



PHILOSOPHY of WATER

- Water is a fixed or dwindling resources and most of our Water Resources is polluted (River, lakes/ponds, ground water, estuary etc)
- We differentiate as water and waste water, Nature does not.
- "Water – Waste water" : Ecologically same, but Economically different.
- "Time – Space" decides the FATE of receiving water body quality.
- Why treat the waste only to comply the disposal norm? Why not add-on additional steps and close the "Water Extraction & Disposal Loop"
- ZLD Closely associated Reject Management and Sludge Management systems

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SECTORAL WATER WITHDRAWAL – INDIA'S POSITION

COUNTRIES	PER CAPTIA WATER RESOURCES	PER CAPTIA WITH DRAWAL	SECTORAL WITH DRAWAL (%)		
			D	I	A
WORLD	7690	660	8	23	69
AFRICA	6460	294	7	5	88
N & C AMERICA	16260	1692	9	42	49
S. AMERICA	34960	476	18	23	29
ASIA	3370	526	6	8	86
INDIA	1850	612	3	4	93
EUROPE	4660	726	13	54	33
U.S.S.R	15220	1330	6	29	65
OCEANIA	75960	907	18	16	76

D- DOMESTIC; I – INDUSTRY; A- AGRICULTURE

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SECTORAL FOCUS

- **Municipal Sector Account For > 75%** of the water consumed; plenty small to tiny clusters (needs support); fortunately reuse/recycle is easier than other sectors
- **Industrial & Commercial Users Account For < 25%** of the water consumed, but contribute greater level of pollution; complexity is more; reuse/recycle cannot be generalized; do have necessary infrastructure and financial resources.
- **Thus Focus should be on-** non-biodegradable wastewater from industrial & commercial users, with cluster approach to near zero discharge concept



DRIVING FORCES FOR ZLD

- Poor Availability or Non-availability Of Water
- High Cost Of Water
- Restriction on disposal to any recipient media
- Competitive users in the proximity

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WHAT GOES DOWN THE DRAIN

- Water Required for Hosiery processing, say 12000 Kgs/day @ 70 Litre/Kg = 840 KLD
- Water cost @ Rs 60/KL = Rs 50400/day
- Sodium Sulphate required: At M:L of 1:8, process liquor required = 96000 Litres/day; Sodium Sulphate required @ 40 grams/lit = 3840 Kg/day
- Salt Cost @ Rs 6/Kg = Rs 23040
- Total cost going down the drain = Rs 73440/day
- How should the situation be looked at : "Resource loss" or "Environmental damage"?
- Obviously, "Pricing of Resources" will only save the "Environment"



SECTORAL PROSPECTS OF ZLD and MEASURES

Market Segment	Application Potential
CETPs'	Techno-managerial & financial repayment improvement by inducing recovery of water (and may salt additionally) for reuse.
Municipal Sector: Industrial townships, isolated dwellings cluster, resorts, hotels etc.	Retrofitting of water/wastewater treatment systems for reclamation of water for Toilet flushing & gardening
Textile	Dye recovery (Vat , indigo, acid & disperse); Size composition recovery (PVA, Polyester etc); Salt & Reactive dye separation & reclamation; Wastewater recycle & salt recovery.
Dye & Intermediates	COD compliance, Isolation/purification/yield improvement & recovery, Wastewater recycle & salt recovery
Bulk drugs	COD compliance, Isolation/purification/yield improvement & recovery, Wastewater recycle & salt recovery
Electroplating/PCB	Plating bath recovery, Wastewater recycle
Sugar/distillery	Acetic acid recovery; Spent yeast recovery; COD compliance; Product/intermediate purification



SECTORAL PROSPECTS OF ZLD and MEASURES

Market Segment	Application Potential
Metallurgical industry	Wastewater recycle, water recovery
Food & Beverage	In process improvement; Wastewater recycle
Tannery	Chrome recovery; Salt separation & Crystallisation; Wastewater recycle & salt recovery
Pulp & Paper	Lignin & Poly-Saccharide separation; Bleach plant improvement; other in plant improvements and recycle
Chemical	Product purification; Recovery of valuables; Concentration; Wastewater recycle
Oil refinery	Wastewater Recycle
Engineering Industry	Cutting & Coolant oil treatment & reclamation In process improvement(like degreasing, phosphating) Wastewater recycle
Industrial Estates and Small & Medium Towns	Conversion of sewage into Industrial grade water and promotion of sanitation improvement and Industrial development simultaneously

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About GIZ

- Owned by the German Federal Government (German Federal Ministry for Economic Cooperation and Development)
- Operating in about 130 countries, has over 17,000 employees, annual turnover \approx 1.2 billion EUR (\approx Rs 8,500 crores)
- In India, implementing Development Cooperation for over 50 years.

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Indo German Environment Partnership (IGEP) Programme

MoEF is official partner from Govt. of India and GIZ is official partner from Govt. of Germany



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SID Initiative

The IGEP Programme, which is implemented jointly by the Ministry of Environment and Forests (MoEF) of the Government of India and GIZ, has a thrust area on Sustainable Industrial Development (SID). Following core topics are identified.

- “Environment-friendly Techniques in Identified Industry Sectors”
- “Planning of New Industrial Parks and Investment Zones”
- “Waste Water Management”



Cooperation Activities in Gujarat

- **Planning of new industrial parks – co-operation with GIDB, GIDC**
- **Waste water management – cooperation with VWEMCL**
- **Environment friendly techniques in pulp & paper sector and textiles sector – cooperation with industries and industries associations**
- **Capacity building of GPCB to promote state-of-the-art environmental management and pollution control in the state of Gujarat – cooperation with GPCB**
- **Cooperation with GCPC**



GIZ initiative on Textile and Pulp & Paper Sector

- **Identify the environmental issues** related to Textile and Paper sector (perspectives of the industry, regulatory agencies, people, government...)
- **Highlight the immediate need** of the sector in order to do their business in sustainable manner
- Identify **best available** environment-friendly **technologies and techniques** (most effective – e.g. reduces pollution, allows implementation - technically feasible, economically)
- **Demonstrate** the use in selected Textile and Pulp & paper industries
- Develop an **up-scaling strategy** and supportive policy documents/instruments



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Textile Sector

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INDIAN TEXTILE INDUSTRY

- Earns around 27% of the foreign exchange from exports of textiles.
- Contributes about 14% of the total industrial production of India.
- Involves around 35 million workers directly and it accounts for 21% of the total employment generated in the economy.
- Contributes 4% to the GDP





TEXTILE PROCESS

The production processes in textile and garment industries involve following five stages:

- Manufacturing of yarn,
- Knitting or weaving of yarn into grey cloth,
- Processing of grey cloth into processed fabric,
- Manufacturing of garment from the processed fabric, and
- Distribution of the ready-to-wear garment.

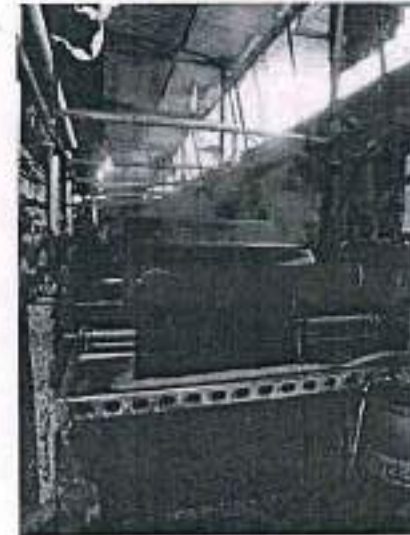


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Environmental Implications of the Textile Industry

- Water consumption for chemical processing 50-300 l/kg of fibre
- Depends on nature of fibre and processing steps.
- 1-2 million litres per day for 50000 metres daily production
- Large quantity of water gets polluted with various dyes, chemicals and textile auxiliaries
- Discarded in the form of effluents in river, lake, sea, sippage in ground water stream
- Increase in salinity affecting agriculture produce





Wastewater-Related Issues

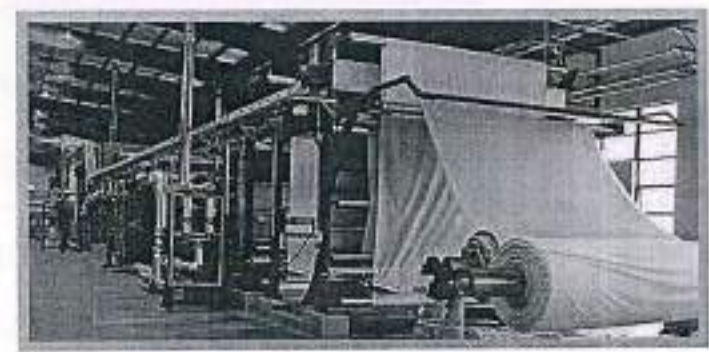
- Industry-specific wastewater effluents are related to wet operations
- Pollutants in textile effluents
 - High suspended solids
 - Mineral oils (e.g. antifoaming agents, grease, spinning lubricants)
 - Non-biodegradable or low biodegradable surfactants [alkylphenol ethoxylates, nonylphenol ethoxylates],
 - Other organic compounds including phenols from wet finishing processes (e.g. dyeing),
 - Halogenated organics from solvent use in bleaching.
 - Effluent streams from dyeing processes are typically hot and colored and may contain significant concentrations of heavy metals (e.g. chromium, copper, zinc, lead, or nickel).





Pollution prevention/ Cleaner Production

- Replace chemicals with less-polluting ones.
- Process Modification
 - Use low-liquor ratio dyeing machines.
 - Use countercurrent washing to reduce water use.
- Optimize process conditions.
- Combine processes.
- Process Water Reuse and Recycle
 - Reuse dyebaths.
 - Reuse rinse baths.
- Install automated dosing systems and dye machine controllers.



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BAT for Textile Industry

- **Measures for reduction of water consumption :**
 - Water re-use/recycling in batch dyeing processes
 - Efficient washing processes
- **Process improvements for dyeing :**
 - Minimisation of dye liquor losses in pad dyeing techniques
 - Exhaust dyeing with low-salt reactive dyes
 - Use of high-fixation polyfunctional reactive dyestuffs
 - Carrier-free dyeing techniques or use of optimised carriers
 - Automated preparation and dispensing of chemicals



Paper Sector

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Paper Sector Profile

- There are 653 paper mills in India.
- Out of 653, As of date, about 550 mills in India use waste paper as primary fibre source for paper, paperboard and newsprint production.
- There are 70 industries in Gujarat and all are recycle paper mill,
- 40 Small and Medium scale PAPER & PAPER BOARD Manufacturers are from Vapi, Gujarat.
- India's paper manufacturing capacity is expected to grow at a Compounded Annual Growth Rate (CAGR) of 7.4 percent from 8.4 million MT per annum to 11.2 million MT per annum between 2008 and 2010.
- The per capita consumption of India stands at only 9.3 kg as against 42 kg in China, 22 kg in Indonesia, 25 kg in Malaysia, 247 Kg in Japan and 312 kg in the US.



Environmental Issues of Pulp & Paper Sector

- Optimising freshwater consumption (e.g., average 57 m³/tonne; European average 10 m³/tonne).
- Resource losses due to material handling practices and lack of good house keeping
- Energy efficiency (e.g., energy losses in drying section)
- Discharge of black liquor - contains highly polluting constituents lignin and cooking chemicals; difficult to treat in effluent treatment plants as lignin is not easily bio-degradable
- High TDS in the waste water (e.g. use of alum, rosin)
- Wastes generated
- Fuels used in boilers
- Compliances with environmental standards and other legal requirements
- Efficiencies, reliable operations, overall control



BAT for Paper

- BAT for efficient fibre and filler recovery
- Cleaning and recycling of white water - Dissolved Air flotation (DAF)
- Associated environmental performance levels for the waste water flow at the point of discharge: facilitates reduction of fresh water consumption



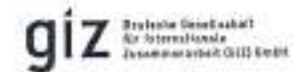
Path to ZLD for Paper Industry

- **Counter current flow and separation of water cycles** is state of the art in Europe
- **Recycling of process water** is possible, extent depends on paper grade and required quality.
- **Closed water circuits** are possible for certain paper grades (brown packaging)
- Closed water circuits perform better if in-line white water treatment is applied
- From German experience a combination of anaerobic and aerobic treatment works well
- Solutions for calcium deposits are available
- Membrane technology



Alankar

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TYPICAL SUSTAINABLE IMPLEMENTATION OPTIONS

- Input Substitutions: Extent of virgin pulp usage, use of non-toxic dyes, better retention aids for fines agglomeration etc
- On-site recovery: Whitewater looping linked with process
- Equipment modifications: Install efficient showers, have a dedicated broke pulper, review Paper machine approach system for enhanced white water & fibre recovery
- Technology Changes: Review consistency handled in Hydro-pulper and opt for right choice, review preparation & dosing system of various chemicals and modernize; Save-all systems like DAF, Screens, MF etc not exploited/contemplated
- Better process control: Explore hot refining, install consistency controller/regulator, high solids sludge dewatering etc
- House-keeping: inspect periodically steam traps, check various water showers for its integrity



ZERO LIQUID DISCHARGE – WASTE PAPER MILL

- In Kraft grade paper mills, the circulating water in the system have high content of COD and other associated contaminants.
- Units only circulating wastewater/process water loop system, without any on-line/offline treatment
- Units having on-line treatment via primary clarifier
- On-line treatment via primary clarifier and off-line biological treatment, and purge wastewater to CETP

Aravind



MACRO ISSUES

- Showcasing technology with all required techno-commercial information to the industries to adopt such technology.
- Transparency in data recording and collection
- Customization of technology
- Need for development of a financial model

675



giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) AG

THANKS

Aboula



For any further information, Contact

Debajit Das

Indo-German Environment Partnership (IGEP) Programme
Technical Advisor

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
B-5/2, Safdarjung Enclave
New Delhi 110029

Tel: +91 11 4949 5353 ext. 2353

Fax: +91 11 4949 5391

E-mail: debajit.das@giz.de

Websites: www.giz.de, www.igep.in



AN OVERVIEW OF CASE STUDIES ON ZERO LIQUID DISCHARGE – INDIAN EXPERIENCE

27th January, 2014

**I. Sajid Hussain, Chief Operating Officer
Tamilnadu Water Investment Company Limited.
www.twic.co.in
sajidhussain@twic.co.in**

Sajid Hussain



Abbreviation.. 1

ZLD	Zero Liquid Discharge
CETP	Common Effluent Treatment Plant
TWIC	Tamilnadu Water Investment Company Limited
GoTN	Government of Tamilnadu
Gol	Government of India
O&M	Operation & Maintenance
ZWD	Zero Waste Disposal
TDS	Total Dissolved Solids
MLD	Million Litre per Day
MoEF	Ministry of Environment & Forest

Arulav



Abbreviation.. 2

PMC	Project Management Consultant
TNPCB	Tamilnadu Pollution Control Board
OCD	Optionally Convertible Debentures
MEE	Multiple Effect Evaporator
BDTRF	Brine Discharge Through Resin Filter
MVR	Mechanical Vapour Recompression
UF	Ultra Filtration
DST	Department of Science & Technology

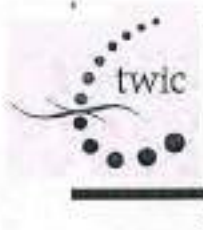
Abulhasan



CONTENTS

- **Section A :** Introduction to TWIC
- **Section B :** Concept of ZLD
- **Section C :** Case studies in Textile Dyeing and Pulp & Paper mill effluents
- **Section D :** Challenges with ZLD

Abhayan



Section A: Introduction to TWIC

Abigail



Genesis

- TWIC was formed to promote the first PPP in water Sector, namely the New Tirupur Water Project (185 MLD, 1000 Crore)
- Promoted by Infrastructure Leasing and Financial Services Limited (IL&FS) [54%] and Government of Tamil Nadu (GoTN) [46%]
- Over the last few years, TWIC has been in the forefront of a number of initiatives both in the urban water space as well management of industrial effluent

Abhinav



Focus Areas

Water Reuse

- Industrial Effluent
- Sewage Reuse
- Desalination

Urban Water

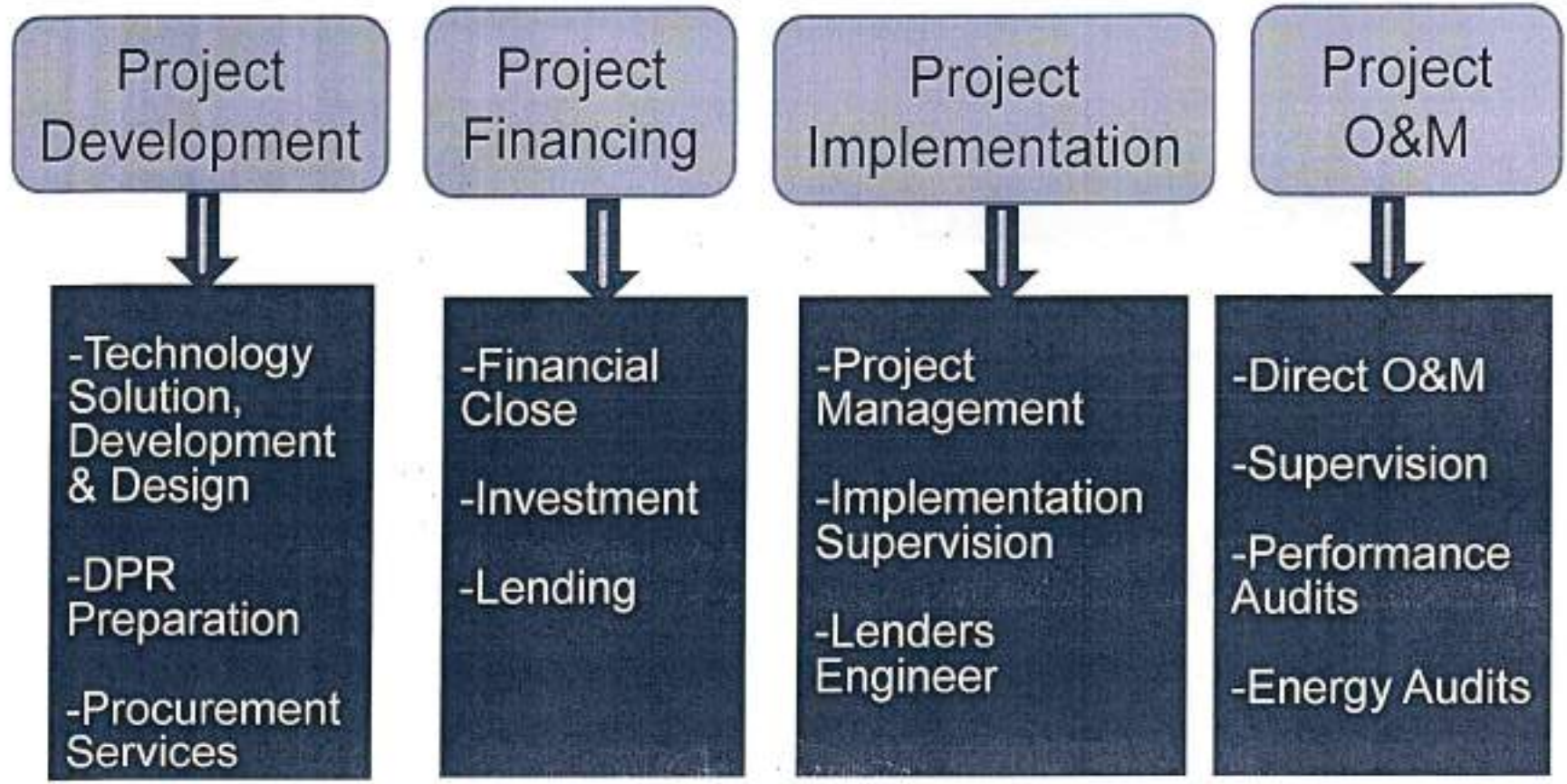
- Treatment Plants
- Urban Water Distribution

Abulhasan



Life Cycle Approach to Projects

- Emphasis on Life Cycle Costs and Benefits (technology, O&M)
- Ability to structure and implement projects on a commercial basis



Alabar



Recognition

■ Government of Tamilnadu (G.O 132 dtd 31.12.12)

- Has nominated TWIC as PMA for implementing on behalf of the government for the following:
 - Dedicated agency for development and O&M of CETPs for GoTN
 - Industrial water supply through Reuse of Sewerage water and Desalination.



■ Government of India



Government of India

- TWIC's technology for ZLD recognized by Ministry of Textiles and has been evaluated & accepted by the Dept. of Science and Technology (DST).
- TWIC has been a Knowledge partner to the Ministry of Textiles.

Attal



Section B: Concept of ZLD

Abulhasan



Concept of ZLD

- ZLD – meaning zero discharge of wastewater from Industries.
- A ZLD system involves a range of advanced wastewater treatment technologies to recycle, recovery and re-use of the 'treated' wastewater and thereby ensure there is no discharge of wastewater to the environment.
- A typical ZLD system comprises of the following components:
 - Pre-treatment
 - Reverse Osmosis
 - Evaporator & Crystallizer

Alaulan



Need for ZLD .. 1

- Most polluting industries such as Pharma, Pulp & Paper, Tanneries, Textile Dyeing, Chemicals, Power Plants etc generate wastewater with high salinity/TDS.
- Conventional 'Physico-chemical-biological' treatment does not remove salinity in the treated effluent. The TDS content is well above the statutory limit of 2100 mg/l.
- Discharge of saline but treated wastewater pollutes ground and surface waters.
- Several states in India including Tamilnadu are water stressed. Competing demands for water from agriculture and domestic use has limited industrial growth.

Abulhasan



Need for ZLD .. 2

- TN has taken a lead on ZLD due to absence of fully flowing perennial river. Most rivers originate from neighboring states and water sharing is enmeshed in disputes. Several landmark pollution cases and court battles have hastened this, such as the Vellore and Tirupur court cases. Other states such as Gujarat and Karnataka also are now considering ZLD.
- Location of industries in 'Inland areas' and issues related to sea discharge of 'treated' wastewater.
- High cost of water (> Rs. 40) and statutory regulations are prime drivers for ZLD.
- **MAIN MOTIVATORS- Water Scarcity, water economics, regulatory pressure.**

Arulan



International Context .. 1

- In the early seventies, increased salinity of the United States Colorado River, due to Power Plant discharges, created the regulatory context to push for ZLD in the US.
- For new industrial projects, where gaining an approval for a discharge agreement might traditionally take five years, with ZLD it could be a matter of 12 months. As a result, ZLD technology effectively evolved in the US and later grew globally.
- In Germany, stringent regulation in the 1980's resulted in ZLD systems for Coal Fired Power Plants.

■ (Source GWI)

Abalain



International Context .. 2

- In China, a chemical company Yunnan Yuntianhua (YTH Group) for a Coal-to-Chemicals plant in an environmentally sensitive location, one of the largest grasslands in China (inner Mongolia) has gone in for ZLD. This is paving the way for more such projects in the region.
- ZLD system for the tanning sector in Lorca, Spain is based on membrane techniques, designed to lower the water salinity to levels suitable for re-use at an agricultural and industrial level.

Abdullah



Benefits of ZLD

- Installing **ZLD** technology is beneficial for the plant's water management; encouraging close monitoring of water usage, avoiding wastage and promotes recycling by conventional and far less expensive solutions.
- High operating costs can be justified by high recovery of water (>90-95%) and recovering of several by products from the salt.
- A more sustainable growth of the industry while meeting most stringent regulatory norms.
- Possibility of use of **sewage** for recovery of water, for Industrial and municipal use, using ZLD technologies.
- Reduction in water demand from the Industry frees up water for Agriculture and Domestic demands.

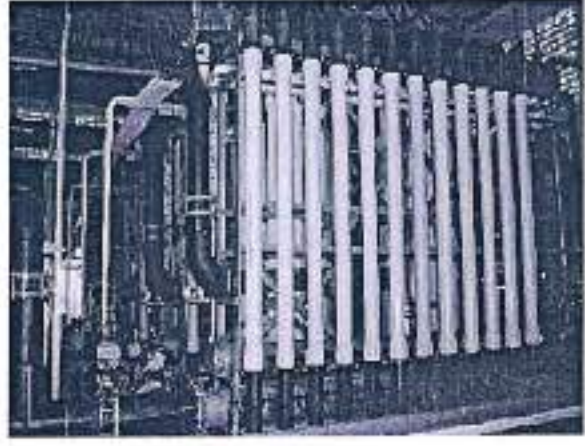
Abulhasan



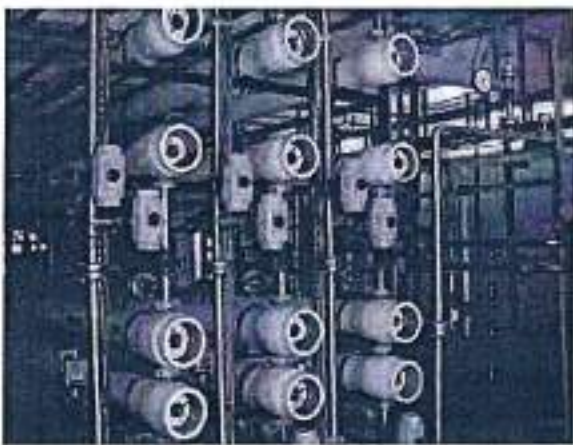
Challenges in ZLD

- “Is the Holy Grail of Industrial wastewater Treatment...” Global Water Intelligence.
- ZLD results in generation of hazardous solid wastes creating disposal challenges- need to think of Zero Waste Disposal (ZWD) Plants. Generate products/ by-products out of the waste.
- Economic viability- cost and availability of water, regulatory pressure are the real driving force.
- High Carbon foot print- is this environmentally sustainable?
- High Operating cost and financial impact on the industry and its Regional/ National/Global competitiveness.
- Technology shortcomings.

Atul



Section C- Case Studies for ZLD in Textile , Paper and Pulp



Abalan



Tirupur Textile Effluent Management Project, Tirupur.. 1

- Project: TWIC has developed and established 9 Textile dyeing CETPs with a capacities ranging from 3 MLD to 11 MLD(Combined Capacity 53 MLD) in Tirupur based on Zero Liquid Discharge. The major components are BIOT, RO, Evaporator and Pipeline.
- Project Cost : Rs 540 Crores
- TWIC Role : TWIC has supported the Client in the following areas,
 - Preparation of Detailed Project Report
 - Selection of Technology & Preparation of Project Specification
 - Design Engineering, Procurement of contractor
 - Arranging Finance for the project
 - Implementation Supervision
 - O&M for 15 yrs as Independent Operator as advised by GoTN.

Barlan



Tirupur Textile Effluent Management Project, Tirupur.. 2

▪ Benefits of this Project:

The project for ZLD is perhaps the first of its kind in the world. Key benefits of the project are

- Recycling >98% of the water.
- Reuse of > 90% of the salt.
- Cleaning of the local environment

▪ Current status

- TWIC has also developed an alternate technology called “Treated Brine Reuse Technology” which substantially reduces the dependence on the evaporators.
- Technology demonstration has enabled reopening of the dyeing units after closure by high court.
- This has been successfully demonstrated at Arulpuram CETP and is now being implement in the remaining 6 TWIC developed CETPs. Modification cost of 7 CETP is Rs. 117.5 Crores.

Abhilash



Tirupur Textile Effluent Management Project, Tirupur.. 3



Pretreatment



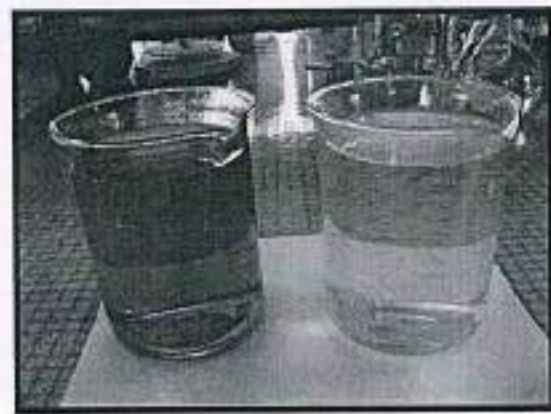
Biological Treatment



Reverse Osmosis



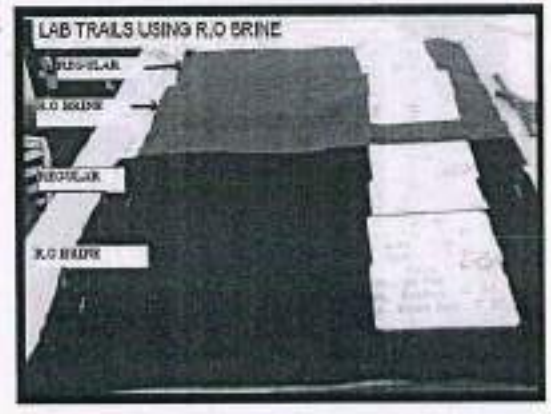
Untreated & Treated Effluent



R.O reject - before treatment



R.O reject - after treatment



Lab trails using RO brine

Arulian



O & M of Tirupur Textile CETP at Tirupur



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Combined Effluent Characteristics

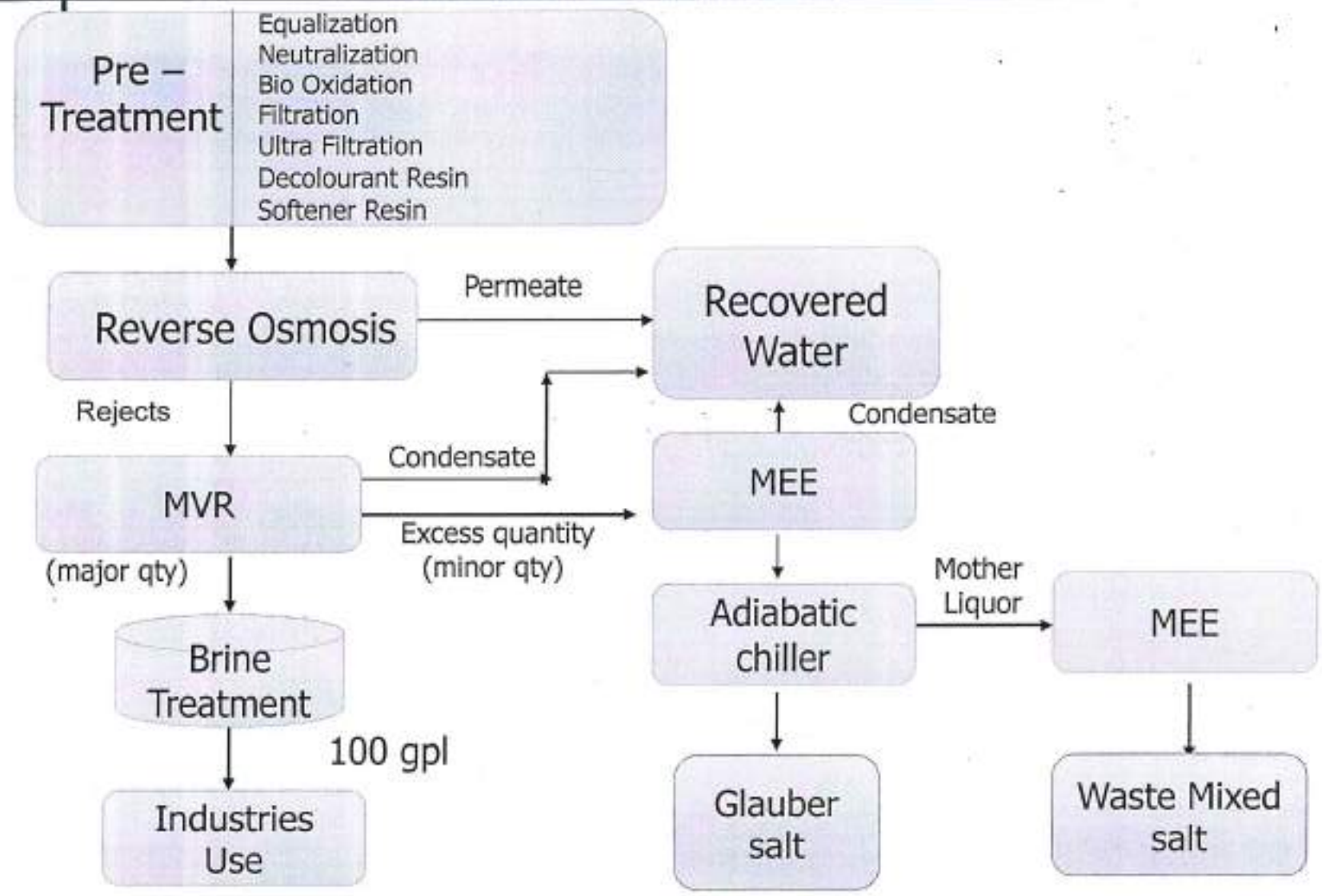
Sl.No	Parameters	Range
1	pH	8.5 - 10
2	BOD	400 - 500
3	COD	1000 - 1200
4	TSS	200 - 300
5	TDS	6000 - 7000
6	Cl ⁻	400 - 700
7	SO ₄ ²⁻	2500 - 3100
8	Total Hardness as CaCO ₃	100 - 150

All values are expressed in mg/l except pH

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Process Flow diagram of Textile CETPs



Abalau



Brief Summary Performance of Arulpuram CETP

Raw effluent received (m3/month)	Recovered water sent to member units (m3/month)	Brine solution sent to member units (m3/ month)	Total recovery (m3/ month)	Wastage to solar pans (m3/ month)	Total Recovery %
85225	78708	3041	81749	453	95.9%

Average Raw effluent concentration (gpl)	Raw Salt concentration (gpl)	Average Brine concentration (gpl)	Salt received (Raw effluent received X Raw effluent concentration) (Tones/month)	Salt sent to member units as Brine (Brine solution sent to member units X Brine concentration) (Tones/month)	Salt in recovered water sent to member units (Recovered water sent to member unit X Recovered water concentration) (Tones/month)	Glauber salt produced with 55 % moisture (Total Glauber salt X 45%) (Tones/month)	Total Salt recovered (Tones/ month)	Salt recovery (Brine solution salt + Salt in recovered water + Salt without moisture) (%)
6.74		104	575	316	13	131	460	80%

Arulam



Stage wise Quality Details .. 1

S.No	Parameter	Units	Influent	Recovered Water	Brine Solution (MVR Concentrate)
1	pH @ 25°C		9.0	7.0	5.5
2	TDS	mg/l	6744	170	103972
3	Chloride as Cl ⁻	mg/l	734	34	11976
4	Sulphates as SO ₄ ²⁻	mg/l	3142	19	56459
5	BOD @ 20°C	mg/l	251	BDL	NA
6	COD	mg/l	1034	BDL	1820
7	TH as CaCO ₃	mg/l	111	BDL	129
9	Total Alkalinity as CaCO ₃	mg/l	1538	48	178

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Stage wise Quality Details .. 2

Quality of Recovered Glauber Salt:

S.NO	Parameter	Recovered Glauber Salt
1	Purity (%) as Sodium Sulphate @ 105°C	98.5%
2	TH as CaCO ₃ (mg/l)	Nil

Atalari



Approvals & Inspections done for the Arulpuram Demo .. 1

- DPR Approved by CES, Anna University
- Evaluation of the demonstration done by Anna University and report dated 31st Oct'11 Submitted to TNPCB.
- Evaluation also done by Secretary DST, GoI, who submitted his recommendation to MoT, GoI.
 - Also two members of the Technical committee constituted by MoT also visited and have submitted their satisfactory recommendations to MoT.
 - Following the above MoT advised all CETPs to follow TWIC Technology with TWIC as the Operator.

Arulian



Approvals & Inspections done for the Arulapuram Demo .. 2

- Inspections were also done by court appointed Monitoring Committee and the Flying Squad and other officials of TNPCB.
- **Monitoring by PCB:** 24 hrs online Flow metering of raw, recovered water, brine and freshwater (4 Nos) in each dyeing member units & over 20 flow meters in the CETP uploaded continuously to a dedicated website / CETP Server.

Abulau



Monitoring With SCADA – Arulpuram CETP., 1

Client Web - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Home Search Favorites

Address http://27.51.29.194/CITECT/nceds.htm?DeployCo=ARIL&CETP=22WED&CwdName=arul_cetp_17092011&Client=CAD=710/C&Site=CAD&WebClient_7_10_0_258.cab&AccessMode=BW

Google Search More

11/10/2011 04:09:16 PM

SYSTRO AUTOMATION **ARULPURAM CETP, TIRUPUR**

CETP FLOW METERS

PRE-TREATMENT SECTION

NAME	FLOW	UNIT/DAY
INLET TO CETP	288.18	67826
MT FLOW METER	107.96	1092
THICKENER FEED	0.00	16460
THICKENER OVER FLOW & FILTER PRESS FILTRATE	0.01	856
F.F. FILTRATE BACKWARD	16.49	7171

WATER SECTION

NAME	FLOW	UNIT/DAY
R.F.F. FEED	101.40	36599
H.O. DRAIN PRODUCT	82.36	29660
R.O. REJECT	-0.03	8609
H.O. RW AND FLUSHING	0.06	2659

EVAPORATOR/CRYSTALLIZER

NAME	FLOW	UNIT/DAY
MVR I FEED	14.95	9018
MVR I CONDENSATE	11.22	7127
MVR I CONCENTRATE	4.48	2483
MVR II FEED	0.00	1754
MVR II CONDENSATE	-0.03	1314
MVR II CONCENTRATE	-0.01	607
CRYSTALLIZER FEED	8.17	2113
CRYSTALLIZER CONDENSATE	4.11	3161
CRYSTALLIZER CONCENTRATE FOR MOTHER LIQUID TO DEAR PLANT	2.35	673

BIODIGESTION TREATMENT SYSTEM

NAME	FLOW	UNIT/DAY
BIODIG TO MEMBRANCE UNIT	175.50	1317

MEMBER UNITS CETP

Done

Telnet - 192.168.0.111

192.168.0.111

Syspro

192.168.0.111

Client Web - 192.168.0.111

Arulban

709



Monitoring With SCADA – Arulpuram CETP.. 2

Microsoft Internet Explorer
 File Edit View Favorites Tools Help
 Back Forward Stop Home Search Favorites
 Address http://27.251.29.194/CITECT/scada.htm?DeployDir=ARUL%20CETP%20WEB&ProjectName=arul_cetp_17092011&ClientCAC=710/CitectSCADAWebClient_7_10_0_256.exe&AccessMode=RW
 Google Search More

SYSPRO AUTOMATION **ARULPURAM CETP, TIRUPUR** 11/10/2011 04:02:09 PM

MEMBER UNIT	RAW EFFLUENT TO CETP		RECOVERED WATER FROM CETP		BRINE SOLUTION FROM CETP		BRINE SOLUTION TO DYEING MACHINE	
	FLOW (m ³ /hr)	TOTALIZER (m ³)	FLOW (m ³ /hr)	TOTALIZER (m ³)	FLOW (m ³ /hr)	TOTALIZER (m ³)	FLOW (m ³ /hr)	TOTALIZER (m ³)
AANKI PROCESS	40	4621	0	3134	0	95	0	121
JAL VISUWI PROCESS	0	10404	12	6692	0	104	0	89
ARI ARUL PROCESS	35	4101	3	4305	0	104	0	97
KONDUR PROCESS	0	7879	10	6712	0	190	0	89
BBB PROCESS	33	7281	10	6911	4	62	0	64
EVERGREEN PROCESS	28	2323	0	2279	-6912	6	-6912	6
DIVYAN PROCESS	36	3947	5	3037	0	78	0	29
SHARADH PROCESS	59	3336	1	1939	0	67	0	56
AT PROCESS	0	4642	9	3950	0	56	0	47
HOOPA PROCESS	0	5235	15	3568	10	60	0	10
DEKORAL PROCESS	0	5276	6	3063	0	44	0	19
SIRUBA PROCESS	0	3770	0	3833	0	71	0	51
JUNIBH PROCESS	0	6631	9	4470	0	87	0	70
EMS PROCESS	0	6118	10	4597	0	67	0	78

MEMBER UNITS CETP

Done

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O&M Cost (Rs/m³) for 5.5 MLD capacity

S.No	Description	Operating Cost
I	Variable Cost (Power, Diesel, Chemicals, Cartridge Filter, Sludge Handling Charges, Maintenance & Firewood Cost)	125-150
II	Fixed Cost (Power, Manpower Cost, Replacement, Standard Maintenance, Lab Chemicals, Admin & Statuary)	25-50
	Total Operating Cost (Rs/m³) (Excluding Depreciation & Finance Cost)	150 - 200
III	Recovery Cost (Rs/m³)	
1	Cost of recovered Water(Including brine), Rs.70/Kl @98% recovery	68.6
2	Cost of recovered Sodium Sulphate salt @ Rs.10/Kg for 90% recovery of salt	63.0
	Total Recovery Cost (Rs /m³)	131.6
	Net Operating Cost (Rs/m³)	30 - 70

(Signature)



Financial Impact of ZLD for a Textile CETP

S.NO	Items	Value
1	Capacity of CETP	5500 m3/d
2	Water consumption for dyeing	50 L/Kg of Fabric
3	Total production capacity per day	110 tonnes
4	Processing cost of dyed fabric	80 Rs/Kg
5	Processing Cost per day	Rs. 88Lakhs
6	Cost of ZLD system @ Rs. 30 - 70 Rs/KL net for 5.5 MLD	Rs. 1.65 - 3.85 Lakhs
7	Cost of ZLD per Kg of dyed fabric	1.5 to 3.5 Rs/ Kg
8	% of ZLD cost on Processing Cost of dyed fabric	1.9 - 4.37%

Basis			
Liquor Ratio	1:3.5	1:5	1:8
Water Consumption	40	50	80
Hrs of Operation	6-8	8-10	10-12

Shade	L	M	D
Processing Rs/Kg	40-60	80	100

Signature



LARGE PULP & PAPER ETP

Charan



Technical and Commercial Feasibility for Development, Financing, Implementation and Operation of Zero Liquid Discharge Effluent Project for A Pulp & Paper Mill ..1

- Project: In order to meet its environmental obligations, a major paper and newsprint manufacturer in South India has decided to implement a 10 MLD project for reuse of water.

- TWIC Role : Implementation and operation of the pilot plant and preparation of technical and commercial feasibility report as a precursor to development, financing, implementation and operation of Zero Liquid Discharge facility

- Benefits of this Project:
The project would enable the Pulp mill in reducing its water consumption and further improve on the quality of treated wastewater used for irrigation.

- Current Status: Currently the 120 m³/day pilot plant has been successfully demonstrated. A full scale plant is now proposed.

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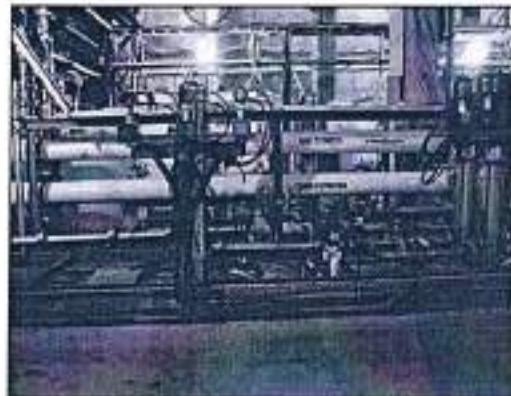
Technical and Commercial Feasibility for Development, Financing, Implementation and Operation of Zero Liquid Discharge Effluent Project for a Pulp & Paper mill ..2



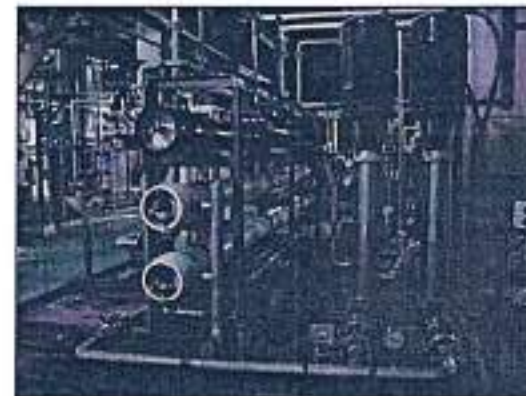
Aeration Tank



Ultra Filtration



Nano Filtration



Reverse Osmosis

Alau



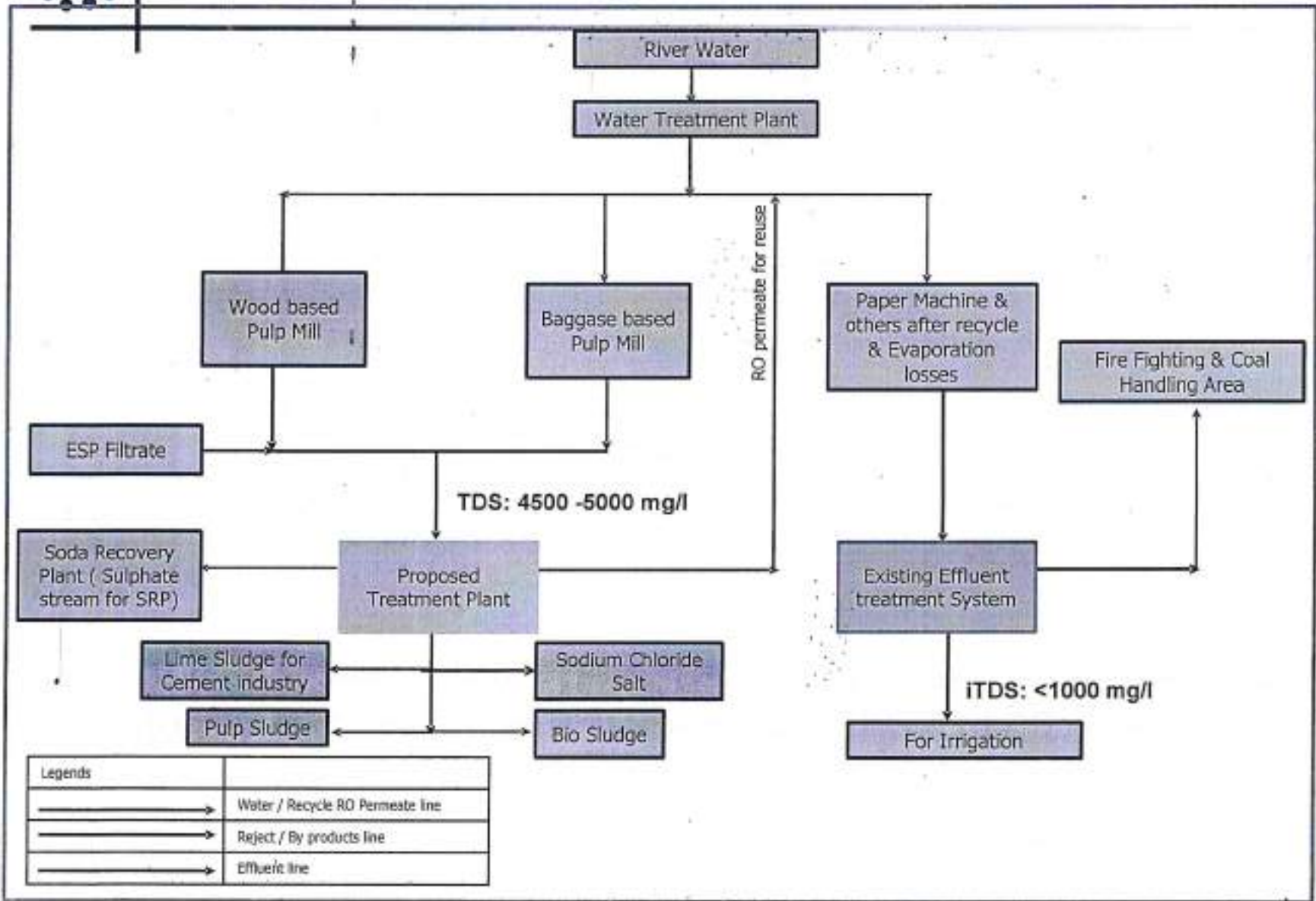
Background of The Project

- The Pulp & Paper Mill entered into a contract with TWIC with a view to improve the overall characteristics of the treated effluent being discharged. The Mill also was desirous of exploring the possibility of using treated water in the process
- TWIC recommended the setting up of a pilot plant for this purpose in order to evaluate various options
- The pilot plant was designed and commissioned in October 2011 and was operated for a period of 8 months

Alshau



Proposed Treatment Scheme for Bleaching Effluent & Existing ETP



Legends	
	Water / Recycle RO Permeate line
	Reject / By products line
	Effluent line

Alhambra



Effluent characteristics of Bleach Liquor at the Pulp & Paper Mill

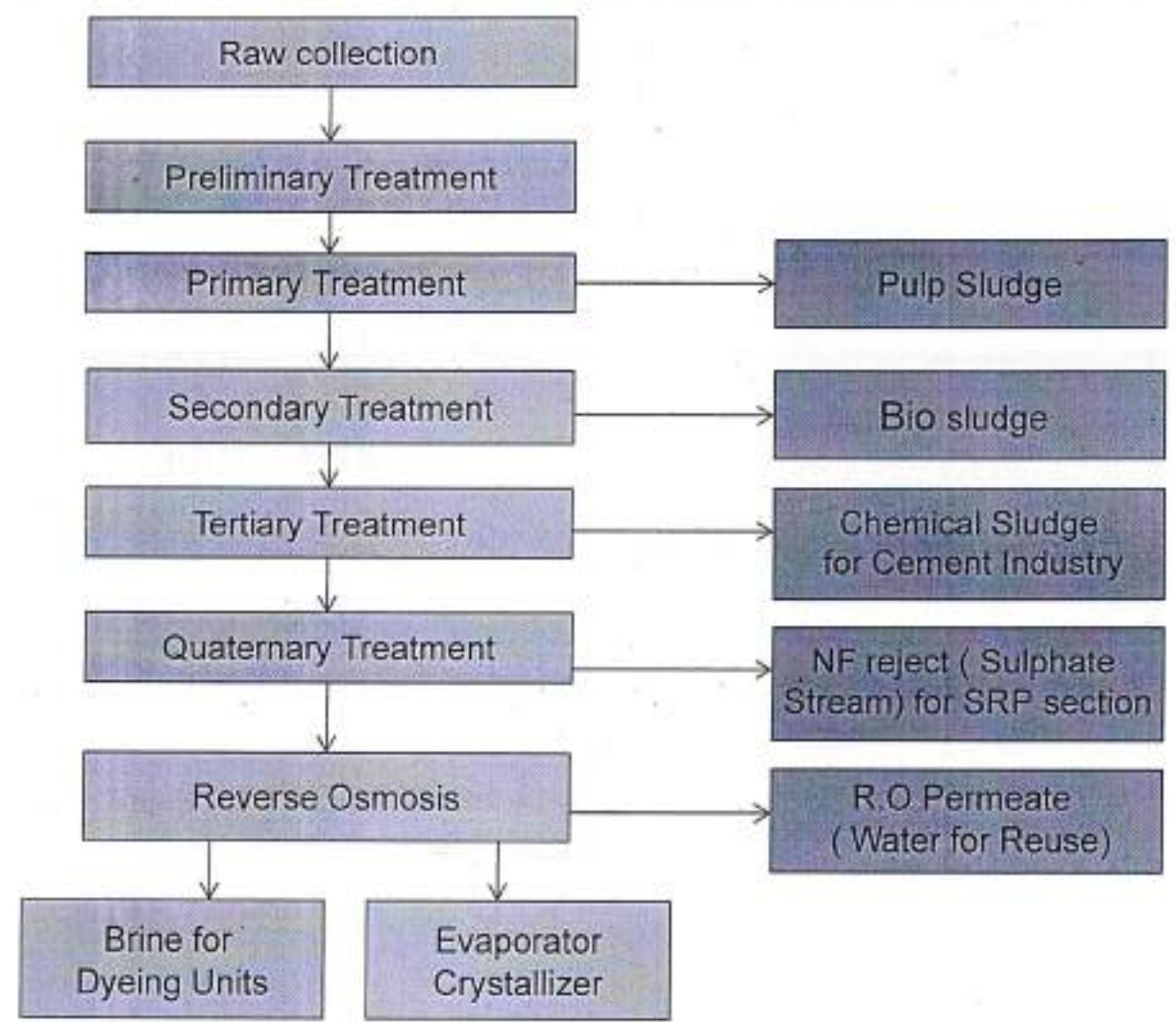
Sl.No	Parameters	Range
1	pH	5.0 – 6.0
2	BOD	900-1100
3	COD	2000 - 3400
4	TSS	450 - 1000
5	TDS	4500 - 5800
6	Cl ⁻	1500 - 2000
7	SO ₄ ²⁻	500 - 600
8	Total Hardness	900 - 1200

All values are expressed in mg/l except pH.

Aban



Simple Schematic of Proposed Process



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Demonstration of Concept through a Pilot Plant

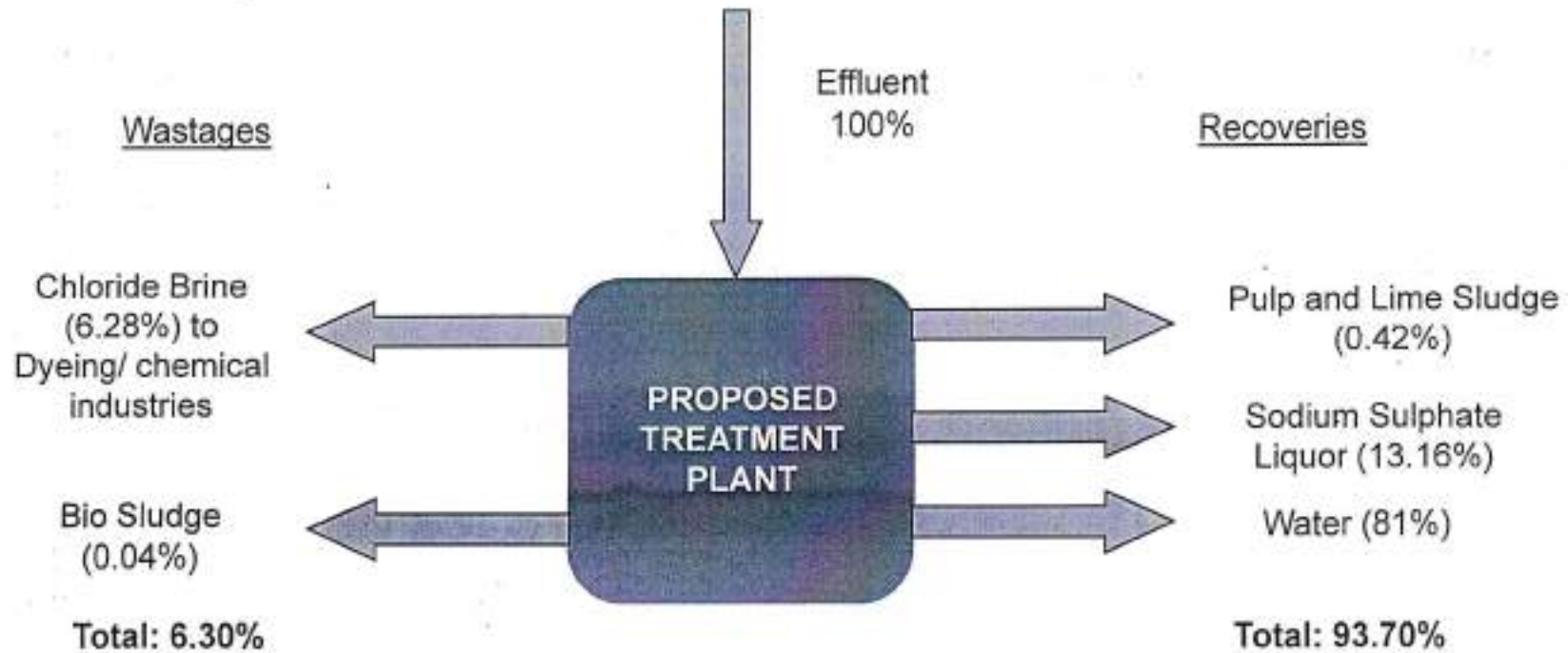
717

- ▶ Based on the schematic and discussions with client ,a detailed design & engineering was undertaken by TWIC
- ▶ The pilot plant was erected & commissioned in October 2011
- ▶ Pilot plant performance were evaluated for 6 months with hard wood bleach effluent ,further evaluations were carried out for another 2months
- ▶ Data generated based on the piloting provided inputs for designing of full scale plant

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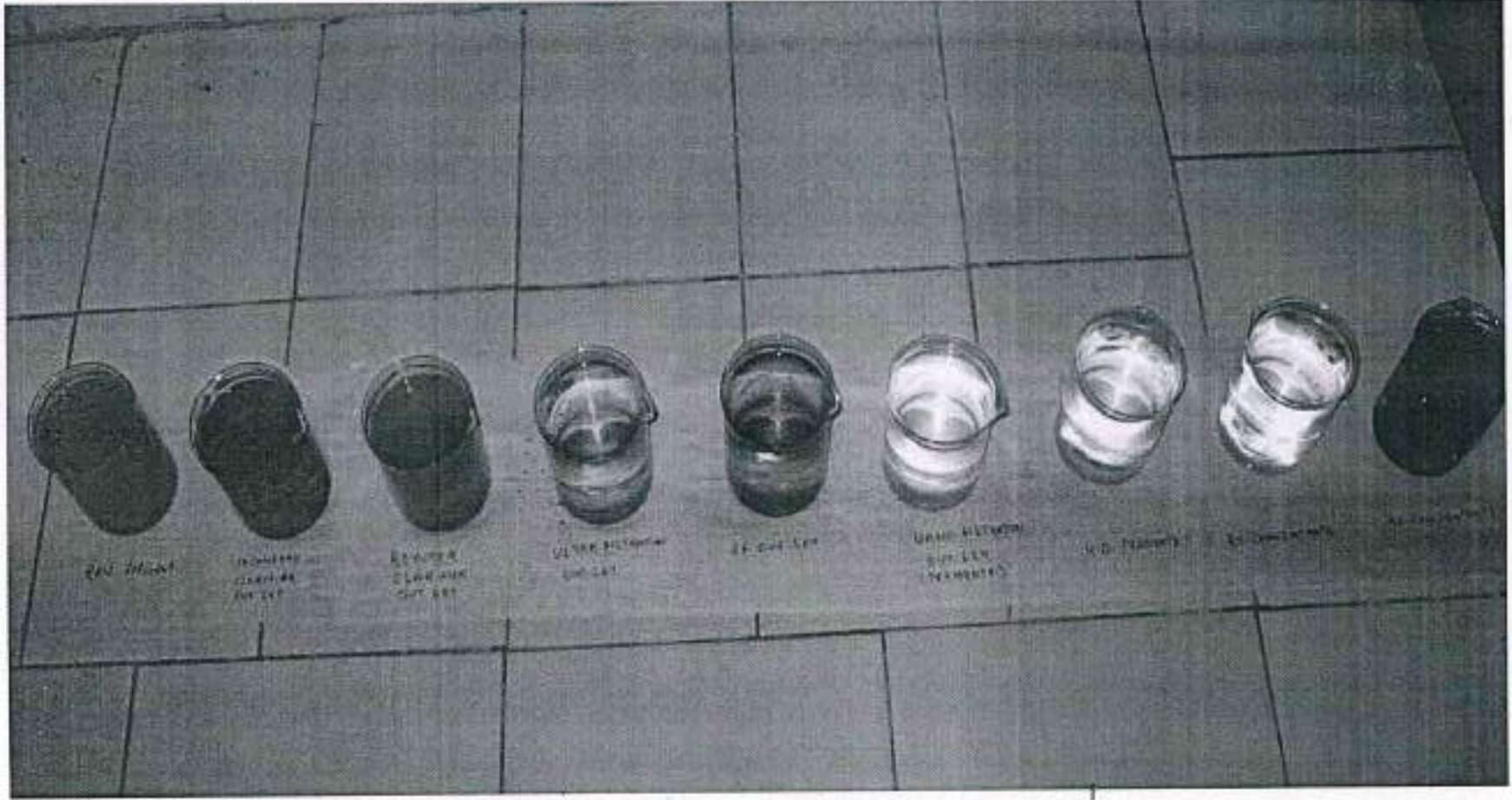
Summary of recoveries and wastages



Aloular



Pilot Plant Stage wise Samples



Samples collected at different Point

Aban



Quality Of Various Recovered By-products

S. No	Parameters	units	Recovered Water (RO Permeate)	Sulphate stream (NF Reject)
1	pH		6	7.1
2	TSS	mg/l	0	21
3	TDS	mg/l	177	31328
4	Turbidity	NTU	0	8
5	COD	mg/l	1	1587
6	BOD	mg/l	1	3
7	Total Hardness	mg/l	0	51
8	NaCl	mg/l	134.4	5286
9	Total Silica	mg/l	0	29
10	Na ₂ SO ₄	mg/l	0	16543

Lime sludge for cement plant

Description	Composition in % (Dry wt basis)
CaCO ₃	75%
MgCO ₃	12.6%
SiO ₂	0.7%
Organic matter	9.15%
Moisture	1.8%

Quality of Chloride brine

Parameters	Purity in %
NaCl	90% - 95%
Na ₂ SO ₄	3% - 4%
Inert	1%

Araban



Robustness of the Technology

- ▶ During the piloting quality was changed due to change in the production process from high acidic bleaching process to low acidic bleaching process, which again reversed after a short period and then again low acidic pulping process was established.
- ▶ Parameters such as pH, sulphates, chlorides, hardness, etc, varied drastically during this period.
- ▶ However the performance of the pilot was more or less stable which proves the flexibility and robustness of the technology.

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Benefits of the Project

Reduced TDS load

TDS level of the treated discharge effluent will be reduced

Production of high quality R.O Water

About 81 % of the effluent will be recovered as R.O permeate which saving water considerably

Generation of useful by products

By-products generated, such as, Sulphate and Lime sludge can be used within the paper mill. The high quality brine generated can be sold off to other industries, such as, dyeing industries or industrial salt manufacturers. For a 10 MLD plant 21.8 Tonnes/day of Na_2SO_4 and 36.3 Tones/day of lime sludge is expected.

Improving effluent Management Efficiency

Due to segregation, treatment & recycling of these waste streams, the pollution load on the remaining composite effluent will be reduced. Therefore, performance of the existing ETP will also improve.

Water Conservation

Due to recovery of about 81% of influent to ZLD plant, water consumption of the pulp mill will come down from 50 m³/ MT to 43 m³/ MT.

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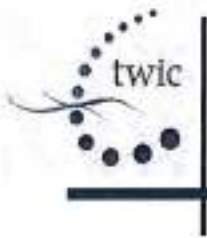


Estimated O&M Cost for 10 MLD ZLD Plant at Pulp Mill

S.No	Description	Operating Cost
I	Variable Cost (Rs /m3)	
	Energy, Steam, Chemicals & Consumables	59
II	Fixed Cost (Rs /m3)	
	Energy Cost, Manpower Cost, Lab Chemicals & Consumables, Maintenance Cost, Replacement Cost for Resins & Membranes	28
	Total Operating Cost (Rs/m3)	87
III	Recovery Cost (Rs/m3)	
1	Recovered Water	4.92
2	Pulp	0.40
3	Lime Sludge	2.16
4	Sodium Sulphate to Soda recovery	11.68
5	Chemical sludge to Cement Manufacturing	8.76
	Recovery Cost (Rs /m3)	28
	Net operating cost (Rs/m3)	59

Note: Depreciation and Financial costs not included. Cost of brine transportation extra.

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Section D : Challenges with ZLD

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Technology issues with thermal evaporation in ZLD systems for industrial wastewater

While the technology for conventional treatment and wastewater recycling R.O has more or less stabilized, the major issue has been with evaporation of R.O rejects in thermal evaporators. In fact several ZLD CETPs have failed due the failure of these Evaporators.

The major issues are:

- Very high evaporation costs (highly energy intensive 20-40 kWh/m³ as against 2-4 kWh/m³ for desalination):
- Technical limitations in evaporating mixed salts, which is typical for such industrial wastewaters due to problems in crystallization.
- The mixed salt is contaminated due to concentration of pollutants in the R.O rejects and even further during the Evaporation process. The mixed salts are unfit for reuse and create a serious storage and disposal issue. Typical contaminants which make it unfit for reuse are purity of salts, colour, organics (COD), nutrients, silica, heavy metals, hardness caused by calcium and Magnesium salts etc. The salt cake in most cases cannot be disposed off to landfills and require hazardous waste disposal facilities.
- Corrosion and scaling of the evaporators resulting reduced life and efficiency.
- Frequent interruptions and downtime affect processing capacity.

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Some technology options and need for further research

- Extensive pre-treatment (preferably before R.O) to reduce hardness, silica, Colour and organics to reduce scaling and improved efficiency of Evaporator systems. Removal of contaminants will also make the salt crystallized fit for reuse.
- Segregation or separation of salts improving crystallization and possibility of reuse. E.g. separation of Chloride and Sulphate salts from a mixed wastewater.
- Possible reuse of salts within the same industry (e.g. salt in Textile dyeing) or as raw material for other industries (sulphate for pulp & paper industries).
- As Sodium Chloride (typically present in most wastewaters) is cheap and easily available disposal or transportation to the other industries is not cost effective. Production of by-products such as caustic, hypochlorite, Chlorine etc could be an option. However, the quality of salt required for such production is very high and therefore would require further research and implementation in pre-treatment technologies.
- Removal of nutrients, through biological methods, from the saline R.O concentrates brine could be tried before sea disposal. Possible options could be through Nitrification and denitrification, however limitations due to salinity concentrations and contaminants need to be understood and researched well for industrial application. Possibilities of use of algae for brine treatment also exist and could also be source of bio fuel.
- Other alternatives to thermal evaporation including solar evaporation (land area could be a limitation) needs to be explored further. Deep well disposal is an option so far not considered in India. This too may be worth studying as there are several such cases abroad.
- Need for the ZLD technology's O&M cost to be low, typically less than one \$.

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Approach to ZLD.. 1

■ Technology

- Need for extensive piloting before implementation to demonstrated Techno-commercial feasibility.
- One Size does not fit all: Need to remember “not all Textile dyeing effluent are same” or “not all Tannery effluent are same” or “not all paper industries are same” or “not all ZLD are same”.
- Since almost no EPC company provides ‘in-house’ all components of ZLD, there is an extensive need for integrating the complete process components to avoid problems. Therefore the Consultant should assure process performance guarantees.
- Not just water balance but material balance for several critical parameters (not just TDS!) a must for correct process design.
- Internal recirculation: Quality and quantity of backwash/ regeneration/ CIP /cleaning on the entire treatment process to be carefully accounted for in process design.
- System design should be based on high ‘Reliability Index’.
- High Process Flexibility to be built in for various components to handle variations in effluent quality/ individual component performance. Design should be based on multiple process streams including standby and downtime.

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Approach to ZLD...2

- Must focus on reduction of brine concentrate to reduce the need for evaporation and crystallization. Higher recovery in R.O possible subject to osmotic pressure limitations, but with elimination of Hardness, silica, foulants. High Pressure R.O systems available and are cost effective such as DTRO (90 – 160 bar).
- Avoid Evaporator usage due to high Carbon foot print (cannot justify the environmental gains of ZLD) and associated technical issues with evaporation of mixed salts in wastewater, as far as possible.
- Think "Zero Waste Discharge" to achieve Zero Liquid Discharge". Focus on salt recovery and reuse, salt separation and reduced sludge generation.
- O&M
 - Need for independent (for CETPs) and Professional O&M.
 - Most CETPs /ETPs are poorly managed and there is complete lack of certified ETP operator courses and dearth of well trained manpower.
 - Expenditure on O&M is an issue.
- Role of regulator
 - The PCB has essentially been a regulator without offering any "Technical Solutions" or advice. In some cases instead of applying standards based on 'Best Available Technology', the environmental standards have exceeded them. The result is that the PCB is not only battling against pollution but is also facing a slew of court cases. Monitoring 'round-the-clock' such a large number of industries are also not practical. Unequal application of law results in shifting of pollution to neighboring states or even districts.

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CONCLUSIONS

- ZLD is a Technological Challenge, and the focus must be on Zero Waste Disposal (ZWD).
- Extensive research and piloting necessary for every single case for Technology selection and financial viability.
- Brine Concentration, Evaporation and Crystallization and disposal still a major issue. Focus must be on recovery and reuse of salts.
- Water Scarcity, Water economics and regulatory pressure are the main drivers of ZLD and will determine financial viability.

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Name : I. Sajid Hussain
Designation : Chief Operating Officer
Contact address : Tamilnadu Water Investment
Company Ltd,
"Polyhose Towers"(SPIC Annex BLDG)
1st Floor, No.86, Mount Road,
Guindy, Chennai – 600 032
Email : sajidhussain1@twic.co.in
Phone : 044 – 223561890/ 91
Mob : +91 9940676679
Website : www.twic.co.in



THANK YOU

31/01/2014

International Conference on "Green Enterprises and Green Industrial Parks"

A handwritten signature in black ink, appearing to read "I. Sajid Hussain", written in a cursive style.

IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

R/WRIT PETITION (PIL) NO. 98 of 2021

SUO MOTU

Versus

AHMEDABAD MUNICIPAL CORPORATION THROUGH THE MUNICIPAL
COMMISSIONER, AHMEDABAD & 3 other(s)

Appearance:

SUO MOTU(25) for the Applicant(s) No. 1
for the Opponent(s) No. 1,2,3,4CORAM: **HONOURABLE MR. JUSTICE J.B.PARDIWALA**
and
HONOURABLE MS. JUSTICE VAIBHAVI D. NANAVATI

Date : 06/08/2021

ORAL ORDER

(PER : HONOURABLE MR. JUSTICE J.B.PARDIWALA)

The news item reported by the 'Ahmedabad Mirror' in its article dated 4th August 2021 as regards the STP at Pirana, Ahmedabad, has come to our notice.

The reporting is as under :

"STP at Pirana flouts parameters

Sewage not treated as per norms

Company has not been following parameters set for COD-BOD treatment, and yet gets away without penalty

"Polluted water being released into Sabarmati : The AMC is spending crores of rupees for the cleaning of Sabarmati river but the fact is it is not releasing properly treated water into the river. The parameters of water

treatment are not followed at the Pirana STP and penalties are being waived off. The plant has also not been upgraded for the past nine years since its inception."

"Nine years ago, the AMC built a 180 MLD capacity STP at Pirana at a cost of Rs.58 crore. But gutter water is not being treated according to set rules since the beginning.

Every time a tender is put out for operation and maintenance of the STP, provisions for penalties are mentioned if COD-BOD treatment parameters are not maintained. However, even though the parameters are not adhered to, the operating company is never penalised.

Curiously, the same company also gets the contract to run the STP every time. Indeed, many companies don't participate in the tender process due to the specific clause of penalties, so this one company keeps winning the contract.

A proposal has been put up to award a two-year contract for the STP to DNP Infrastructure Private Limited on a single tender in the standing committee meeting to be held on August 5.

According to the proposal, a three-year contract tender had been put out for the STP but not a single tender offer was received. That is why a two-year tender had been put out which states that the company awarded the contract would have to maintain the condition of the plant as also the clarifiers, aeration systems, sludge handling systems there. The only qualified company in this tender was DNP Infrastructure.

The company was supposed to begin work on July 1 after the approval of Rs.6 crore as cost was approved. However, the water and sewerage committee had approved that the company would work till the time the pumping upgrade is complete.

The plant was built at a cost of Rs.58 crore. It was built between 2008 and 2012 after which the maintenance operations were given to a company named Enviro Control. However, since then DNP Infrastructure Private Limited has been running the plant.

A civic official on condition of anonymity said, "Gutter water is not getting treated as per set parameters at Pirana. In spite of this, the company's penalties are being waived off each time. They have been running the plant for nine years now."

Thus, it appears, as reported, that the gutter water is not being treated in accordance with the set norms, rules and regulations since the time the contract came to be awarded in favour of the company named in the newspaper report.

WEB COPY

We take notice of the fact, as reported, that despite flagrant violations at the end of the company, the Ahmedabad Municipal Corporation keeps on awarding the contract in favour of the company, namely, DNP Infrastructure Private Limited, and that too, on a single tender.

It is very shocking to learn that polluted water is being directly released into the Sabarmati river.

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This Court is of the view that the attention of the State Government and the Ahmedabad Municipal Corporation should be immediately drawn to the aforesaid, and in such circumstances, we propose to take *suo motu* cognizance of the above news item in public interest.

The registry is directed to register a writ petition by giving a regular 'pucca' number. Once the same is registered, the registry shall issue NOTICE to the following respondents, returnable on 20th August 2021 :

- (1) Ahmedabad Municipal Corporation (Notice to be served through the Municipal Commissioner, Ahmedabad)
- (2) DNP Infrastructure Private Limited (As the address of the DNP Infrastructure Private Limited is not available, the notice to the company shall be served by the Ahmedabad Municipal Corporation)
- (3) Gujarat Pollution Control Board;
- (4) State of Gujarat (Notice to be served through the Principal Secretary, Gujarat Water Supply and Sewerage Board).

(J.B. PARDIWALA, J.)

(V.D.NANAVATI, J.)

/MOINUDDIN

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IN THE HIGH COURT OF GUJARAT AT AHMEDABAD

R/WRIT PETITION (PIL) NO. 98 of 2021

With

CIVIL APPLICATION (FOR DIRECTION) NO. 4 of 2022

In R/WRIT PETITION (PIL) NO. 98 of 2021

With

MISC. CIVIL APPLICATION (FOR CLARIFICATION) NO. 8 of 2022

In R/WRIT PETITION (PIL) NO. 98 of 2021

With

CIVIL APPLICATION (FOR JOINING PARTY) NO. 9 of 2022

In R/WRIT PETITION (PIL) NO. 98 of 2021

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SUO MOTU

Versus

AHMEDABAD MUNICIPAL CORPORATION THROUGH THE MUNICIPAL
COMMISSIONER, AHMEDABAD & 3 other(s)

=====

Appearance:

MR HEMANG M SHAH(5399), AMICUS CURIAE for the Applicant(s) No. 1
SUO MOTU for the Applicant(s) No. 1

for the Opponent(s) No. 15

MR. JITENDRA MALKAN, ADVOCATE WITH DEVANSHI P MALKAN(9307)
for the Opponent(s) No. 10

MS NIKITA C GANDHI(11570) for the Opponent(s) No. 6

MS RUMI M GANDHI(3472) for the Opponent(s) No. 6

MS. KRUTI M SHAH(2428) for the Opponent(s) No. 5

SINGHI & CO(2725) for the Opponent(s) No. 11,12,7,8

MR. R.S. SANJANWALA, SENIOR ADVOCATE WITH MS. TANAYA G
SHAH(8430) for the Opponent(s) No. 14

VATSAL M PARIKH(9340) for the Opponent(s) No. 10

MR. MIHIR JOSHI, SENIOR ADVOCATE WITH MR. G H VIRK(7392) for the
Opponent(s) No. 1,15

GOVERNMENT PLEADER for the Opponent(s) No. 4

MR CHINMAY M GANDHI(3979) for the Opponent(s) No. 6

MR DEVANG VYAS(2794), SENIOR ADVOCATE for the Opponent(s) No. 3

MR KH BAXI(150) for the Opponent(s) No. 4

MR MRUGEN K PUROHIT(1224) for the Opponent(s) No. 13

MR RUTUL P DESAI(6498) for the Opponent(s) No. 2

MS MEGHA JANI(1028) for the Opponent(s) No. 9

MR. PRAKASH JANI, SENIOR ADVOCATE WITH MR. SHIVANG P JANI,
ADVOCATE FOR the applicant in Civil Application No. 9 of 2022MR. AALAY SHAH, ADVOCATE FOR Gandhi Law Associates in Civil
Application No. 4 of 2022

CORAM: **HONOURABLE THE CHIEF JUSTICE MRS. JUSTICE
SUNITA AGARWAL**
and
HONOURABLE MS. JUSTICE VAIBHAVI D. NANAVATI

Date : 18/08/2023

ORAL ORDER

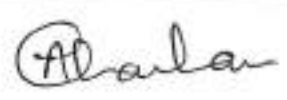
(PER : HONOURABLE THE CHIEF JUSTICE MRS. JUSTICE SUNITA
AGARWAL)

1. Additional affidavit filed on behalf of respondent No. 1 - Ahmedabad Municipal Corporation (in short 'AMC') in respect to the report dated 22.06.2023 of the learned Amicus Curiae filed in the Court, is taken on record.
2. We have heard Mr. Hemang Shah, the learned Amicus, Mr. Mihir Joshi, the learned senior counsel, assisted by Mr. Gurusharan Virk, the learned counsel appearing for the Ahmedabad Municipal Corporation, and Mr. Devang Vyas, the learned senior counsel, assisted by Mr. Siddharth Dave, the learned advocate appearing for the GPCB.
3. The report dated 22.06.2023 circulated by learned Amicus Curiae highlights violations with regard to illegal connections in MEGA pipeline; Sewage treatment plants (in short 'STP') and flow from the storm water drain behind the Riverside School,

Shahibaug resulting into creating of a cess pool due to the blockage created by Ranjit Buildcon Ltd. It is brought on record by means of the said report that Ahmedabad Mega Clean Association (in short 'AMCA') has been addressing its concern about illegal domestic connections found by them in MEGA pipeline, by sending e-mails to Gujarat Pollution Control Board (in short 'GPCB') and Ahmedabad Municipal Corporation (AMC). The details of illegal connections reported by AMCA has been given therein along with the copy of e-mails addressed to the concerned authorities.

4. The concern raised in the report of the Amicus is about a joint exercise undertaken by GPCB and AMC to identify illegal connections. It is stated that 500 illegal connections have been identified and have been sealed as recorded in the orders dated 10.12.2021 and 24.12.2021 in the instant petition, but detail of such sealed connections has yet not been placed.

5. With regard to the Sewage treatment plants ('STP' for short), it is stated that under the order passed by the Municipal Commissioner, sewage water samples from 14 STPs in the city.



have been collected and checked in its Central laboratory, 50 per cent of the treated water samples had failed the tests. This shows that the STPs within Ahmedabad city are not functioning to their optimum level. By the order dated 10.12.2021, this Court had directed GPCB to seek bank guarantee from the AMC in reference to their STPs, the contention is that GPCB may be directed to clarify as to whether the said amount has been deposited by AMC and for failure on the part of AMC, what steps have been taken to impose proper fine and recovery of the same from the bank guarantee. The contention is that the STP situated at Vinzol, constructed in around August, 2021-21, at the cost of Rs. 103 crores, is not meeting the required standards. The Notice of direction and show-cause notice issued by GPCB have been brought on record to demonstrate that there is large scale shortcomings in the functioning of STPs.

6. With regard to the Storm water drain behind Riverside School, Shahibaug, it is stated that said drain is meant for carrying Storm water during the rainy seasons, it is, however, overflowing with contaminated sewage (domestic and

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industrial). This shows that illegal connections are existing on the spot.

7. It is stated that Sabarmati River Front Development Corporation Limited Project, Ahmedabad (SRFDCL) has appointed Ranjit Buildcon Ltd. to carry out construction of certain portions of Riverfront Phase-II. It is found that contaminated sewage flowing from the storm water drain would normally flow and mix into the river water. However, Ranjit Buildcon Ltd. has created an artificial cess pool due to which the contaminated sewage is getting collected in the cess pool and the flow into the river has been stopped. However, huge quantity of contaminated sewage within a small area would result into percolation of the contaminants directly into the underground water table. Hence, this creation of artificial cess pool in order to curb the flow of sewage into the river water, flow of sewage from the storm water drain into the river water, is resulting into destruction of ecological balance of the area.

8. The submission is that AMC should be directed to locate illegal connections to the Storm water drain and disconnect

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them so that no sewage flows through the storm water drain except rain water.

9. On the presentation of the aforesaid report, on 28.07.2023, we have directed the learned counsels for AMC and GPCB to file their affidavits to bring on record the rectification measures taken by them over the period of time, to ensure compliance of the directions issued by this Court from time to time. Specific reply to the report with respect to the sewage water being flown from the storm water drain was sought for.

10. In the additional affidavit filed on behalf of GPCB dated 17.08.2023, it is stated that on the e-mails received from the AMCA, show cause notices have been issued to AMC in reference to illegal domestic connections in the MEGA pipeline, directing them to make an alternative arrangements for disposal of the domestic wastewater into nearby STP through sewerage network of AMC. Action has also been taken against industrial units found causing direct or indirect pollution into river Sabarmati. The details of the action taken by the Board, since 01.03.2023 to 14.08.2023, have been brought on record to

assert that 64 Closure Directions and 49 Notice of Directions have been issued by it.

11. With regard to the analysis result of the final outfall of MEGA pipeline during January, 2023 to July, 2023, it stated that the water quality at final outlet of MEGA pipeline is still not meeting with the outlet norms. GPCB is carrying out monitoring of CETPs for reviewing the compliance status. It is regularly carrying out inspection of STPs and collecting samples for checking quality of the treated sewage. Out of 10 STPs in Ahmedabad City, which are discharging treated sewage in the river Sabarmati, the Board had issued directions under the Water Act, 1974 to 7 STPs of AMC based on non-compliance, on 28.07.2021. Rs. 10,00,000/- (Rupees Ten Lakhs) as bank guarantee for each of the STPs has been deposited by AMC on 20.12.2021. For renewal of the bank guarantee, which lapsed on 26.12.2022, the Board has called upon AMC. The Notice of Direction to 9 STPs and show-cause notice to one STP of AMC under the provisions of the Water Act, 1974 on 21-22.06.2023 for non-compliance have been attached with the said affidavit. The response of AMC vide letter dated 17.07.2023 with respect

to compliance of norms have been summarized in the affidavit of GPCB in the following manner :-

Sr. No.	Name of STP	Major Points of Response from AMC
1.	106 MLD- Pirana	<ul style="list-style-type: none"> • Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. • AMC has planned STP of 240 MLD (NEW) to replace plants of 60 MLD and 106 MLD. • The DPR of the project is under preparation.
2.	180 MLD - New Pirana	<ul style="list-style-type: none"> • Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. • AMC has planned STP of 420 MLD (NEW) with NGT standards. • The DPR of the project is under preparation.
3.	126 MLD Vasna	<ul style="list-style-type: none"> • Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. • The tender for 375 MLD (NEW) STP was invited in the year 2022 but due to higher financial bids, the tender will be invited again soon. • Till the finalization of this project, AMC has also invited tender for repairing of the STP and tender is under final approval.

4.	240 MLD- Vasna	<ul style="list-style-type: none"> Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. AMC has planned up-gradation of the STP with NGT standards under World Bank funding project. Tender for repairing/retrofitation of the SIP till the finalization of World Bank tender is under preparation.
5.	60 MLD- Old Pirana	<ul style="list-style-type: none"> Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. AMC has planned STP of 240 MLD (NEW) to replace plants of 60 MLD and 106 MLD. The DPR of the project is under preparation
6.	155 MLD - Pirana	<ul style="list-style-type: none"> STP of 255 MD was proposed in the NRCP but due to non-availability of enough funds, STP of 155 MLD has been approved and commissioned. Now for the remaining flow of pumping station, 420 MLD STP is planned under World Bank funded project. DPR of the project is under approval.
7.	48 MLD- Vasna	<ul style="list-style-type: none"> Under World Bank funding project, STP of 375 MLD STP in the premises of 126 MLD STP will be constructed to cater the entire quantity of sewage from Vasna Terminal Sewage Pumping Station. The tender for 375 MLD (NEW) STP was invited and technical and financial

		proposals are received but due to very high quoted rates, it is decided to re-invite the tender.
8.	60 MLD-Vadaj - - - -	<ul style="list-style-type: none"> • 60 MLD STP at Vadaj is commissioned in the year 2019. • The plant is based on SBR technology and designed discharge norms are BOD 10 mg/l, COD-50 mg/l and TSS-10 mg/l
9.	35 MLD-Vasna	<ul style="list-style-type: none"> • Without up-gradation of technology, it is not possible to achieve NGT standards in the plant. • AMC has planned upgradation of 240 MLD under World Bank funding project. Tenders are invited. • Tender for repairing/retrofitation of the STP till the finalization of World Bank tender, is under preparation. Many electrical and mechanical machinery need to be changed so tender for repairing is under preparation.

12. It is stated that the analysis result shows that majority of STPs are found not meeting with the prescribed outlet norms.

13. it is further stated that during the visit of Joint Task Force to the place behind Riverside School on 28.07.2023, wastewater was found being discharged from the outfall behind Riverside

School into Sabarmati river and eutrophication was observed due to untreated wastewater ponding in the stretch of river Sabarmati. During the said visit, one wastewater sample was collected from the outfall behind Riverside School and the analysis report indicates presence of sewage. The site photographs taken during visit are appended with the affidavit which substantiate the contentions in the report of learned Amicus Curiae.

14. The Notice of Direction issued to AMC dated 14.08.2023 has been brought on record to assert that the response from the AMC is still awaited.

15. One of the reply to such Notice of Direction by the AMC dated 17.07.2023 placed before us by the learned Amicus Curiae demonstrates that the AMC has admitted that its 106 MLD STP is not equipped with Biological Nutrient Removal (BNR) technology and cannot meet the NGT's norms compliance. It is stated therein that it is not possible to achieve NGT's standards without upgradation of technology.

16. The AMC has planned STP of 240 MLD to replace plants of 60 MLD and 106 MLD with NGT's standards under World Bank Funding Project. It was admitted therein that flow meter at the outlet during the visit was not working and it was later made operational.

17. In the additional affidavit filed on behalf of AMC, in reply to the aforementioned report of the learned Amicus Curiae, it is stated that the issue of illegal connections in the MEGA pipeline is the responsibility of AMCA. It is stated that AMC has been diligently cooperating with AMCA by providing necessary support for carrying out disconnection in MEGA pipeline to curb the menace of illegal domestic and industrial connection in AMC's drainage network. Periodically inspection are being carried out to disconnect illegal connections. Massive disconnection drive has been carried out in the areas forming part of the South Zone of the Ahmedabad City and approximately 220 illegal connections have been stopped, so as to curb illegal discharge of 500 illegal industries. 16 teams of Officers of AMC have been constituted to conduct the drive. As regards efficiency and efficacy of treatment in STPs, it is stated

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that the said STPs are designed to handle domestic sewage, however, acidic discharge which originate from industries, untreated or partially treated, industrial effluents, cause hurdles in the treatment process of STPs of AMC. To overcome the hurdle, AMC has taken the following steps :-

"5.1 To curb the menace of illegal connections sprouting on a daily basis, AMC has removed approximately 597 illegal connections from various drainage lines, in turn disrupting the illegal activities of 5800 industries.

5.2 It is respectfully submitted that the sample collection drive is carried out on every third-day to check the performance of the STPs. It is further submitted that most of the physical and chemical parameters meet the acceptable and stipulated range, except for the Total Suspended Solids (TSS) parameter in some cases.

5.3 AMC has taken steps to submit bank guarantees for 10 STPS to GPCB, in compliance of the order dated 10.12.2021 passed by this Hon'ble Court.

5.4 The Commissioner, AMC is personally overseeing any and all issues related to the preservation and conservation of the Sabarmati River. Recently, during a surprise visit to the 100 MLD STP at Vinzol, it was discovered that the sensor of the outlet was not showing proper results. Hence, the Municipal Commissioner, ordered a vigilance inquiry of the plant. Pursuant to the said vigilance inquiry, the Municipal Commissioner imposed a penalty of Rs. 5.71 crores."

18. With regard to the water collected in the area falling in the zone of extension of Riverfront Phase-II, it is stated that

AMC is personally exploring environmentally viable modalities to discharge the said water that has been collected in the area.

19. A brand new STP at Kotarpur which has a handling capacity of 60 MLD is in the final stage of commissioning. For the water emerging from the storm water drain near Riverside School, it is stated that the same will be diverted for treatment of STP and in progressive manner the discharge of the sewage in and around Dafnala area, would be effectively addressed by this exercise undertaken by AMC.

20. From the report of the learned Amicus Curiae and the affidavits of GPTC and AMC, it is evident that AMC has not been able to achieve its objective of providing drainage system and treatment facility for the domestic wastewater generated from the various residential societies and commercial complexes within its jurisdiction.

21. MEGA pipeline which is managed and operated by the Special Purpose Vehicle (SPV) called as Ahmedabad MEGA Clean Association (AMCA), has not achieved its object of

conveyance of industrial wastewater generated from its member units and disposal into river Sabarmati. There is admission of illegal connections in MEGA pipeline. Illegal connections have been reported and found in the draining system for disposal of domestic wastewater of the AMC. The concern raised in the report of the learned Amicus about the flow of sewage water, contaminated sewage (domestic and industrial), from the storm water drain behind Riverside School, Shahibaug, which is meant to carry Storm water during rainy season, is admitted.

22. We may note and reiterate the directions issued by this Court in the orders dated 24.12.2021 and 23.09.2021 as under :-

"Order dated 24.12.2021 -

7. In the aforesaid context, we direct the Ahmedabad Municipal Corporation to keep a close vigil on all such residential societies and other localities so as to ensure that there is no discharge of the sewage directly into the river Sabarmati. We direct the Ahmedabad Municipal Corporation as well as the Gujarat Pollution Control Board to take strictest of the action against all the office bearers of such societies including criminal prosecution and if need be, even any individuals indulging in such activities.

Order dated 23.09.2021 -

9. The Joint Task Force members are hereby empowered to publish in the newspapers the details of the set-up/industry along with the name of the owner running such set-up guilty of releasing untreated effluent wastewater into the sewer line maintained by the Ahmedabad Municipal Corporation. The cost incurred for the publication of the name of such defaulter shall be borne by the Ahmedabad Municipal

Corporation and the same shall be recovered from the erring defaulter by way of arrears under the land revenue at the earliest. If such erring defaulter is outside the limits of the Ahmedabad Municipal Corporation, then the name of such erring defaulter shall be published by the Collector, Ahmedabad, in the newspapers. The expense that may be incurred for such publication of the name of such defaulter shall be borne by the Collector, Ahmedabad, and the same shall be recovered from the erring defaulter by way of arrears under the land revenue at the earliest."

23. We may further note the observations of this Court in the order dated 22.04.2022, wherein it was noted that with the efforts of AMC, the World Bank (under the Gujarat Resilient Cities Programme - GRCP) has agreed to render financial assistance for the upgradation of 126 MLD Vasna STP. It was noted that this project will go a long way in curbing the pollution that has been caused in the Sabarmati river. Apart from various directions issued by the Court to AMC with regard to the identification of illegal connections, flow of contaminated in storm water drains, treatability studies of all STPs as regards their scientific functioning, the GPCB and AMC were directed to ensure the process of strengthening and capacity building of their respective departments and officials to assess, monitor, investigate and understanding the performance of all the relevant environmental infrastructure facilities so that non-

compliance or compliance can be correlated with the contributing factors to a reasonable extent while carrying out the inspections / visits / monitoring. GPCB was directed to address all the anomalies in the CCAs within the ambit of applicable rules and Acts and make necessary corrections / amendments and submit a summary report before the Court. It was further directed to avail the services of the Gujarat Environment Management Institute (GEMI), a Government Institute, to carry out studies related to groundwater quality along the river stretch from Gandhinagar to the location where the river meets the Gulf of Khambhat. AMC and GPCB were directed to share the progress and updates on the directions therein with the Joint Task Force (JTF) members from time to time to facilitate submission of the status report before the Court.

24. It was directed that a methodology needs to be devised by AMC to put a check on the issue of illegal / unauthorized wastewater being discharged into the storm water drains.

25. Considering the importance of the actual quantification

and characterization of the outfall / drains for clear road map for improvement, GPCB along with AMC was directed to submit a comprehensive report of pollution load, based on the actual quantities of industrial effluent, sewage and other wastewater discharged in the Sabarmati river through known outfalls and drains as well as those identified through the drone survey.

26. Taking note of the above directions, and the report with regard to non-compliance and violations on the part of AMC, we raised a pointed query to the learned Senior Counsel appearing for AMC to place before us a methodology / road map prepared by AMC to achieve its objectives, to ensure zero discharge of sewage / contaminated water into river Sabarmati. No concrete reply came before us though it was submitted by the learned Senior Counsel that details have been brought on record in various affidavits filed in the instant petition, on earlier dates.

27. Similarly, when we asked the learned counsel appearing for GPCB to place before us the concrete action taken by it in the matter of closure direction and notice of directions issued by

it in the month of March, April, May, June, 2023, no proper answer could be given.

28. From the above, it seems that though some paper-work have been done by the GPCB and the AMC has made some efforts under the orders of this Court to curb the menace of direct or indirect pollution into river Sabarmati, but nothing concrete could be placed before us to bring any positive solution to the problems, admittedly subsisting.

29. Evacuation of contaminated water in the river Sabarmati, inefficiency and inefficacy of STPs in the treatment of contaminated water and the flow of sewage water from the Storm water drain meant to overflow storm water during rainy season, is admitted. It seems that the directions contained in the order dated 22.04.2022 passed by this Court have not been complied within their true letter and spirit.

30. We, therefore, call upon Ahmedabad Municipal Corporation (AMC), Gujarat Pollution Control Board (GPCB) and Ahmedabad MEGA Clean Association (AMCA) to submit their

response to bring before us their vision / planning / decisions / and concrete actions, to be taken to ensure zero wastewater discharge into river Sabarmati. The action plan prepared by them in order to achieve their objectives to curb discharge of contaminated / sewage water both from domestic and industrial front, shall be placed.

31. The flow of contaminated / sewage water through storm water drain shall be curbed immediately by taking all necessary steps by AMC and report in this regard shall be placed on the next date. AMC shall make all possible efforts to ensure clearing of contaminated / sewage water / collected in the cess pool behind Riverside School, Shahibaug and place the compliance report on the next date.

32. All three authorities are required to act in coordination to ensure compliance of the directions of this Court in the order dated 22.04.2022 and submit compliance by filing their affidavits, separately, on the next date fixed. On behalf of AMC, personal affidavit of Municipal Commissioner shall be filed.

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33. Put up on 15.09.2023 .

(SUNITA AGARWAL, CJ)

AMAR SINGH —

(VAIBHAVI D. NANAVATI, J)

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