Concept of Self Regulation

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Can state pollution control board inspect all Industries at regular interval?
While...

- Number of industries have gone up significantly
- Board’s scope of responsibilities has gone up manifold – more legislations

BUT...

- The number of employees remain unchanged
- Difficulties in attracting right kind of manpower
- Existing technically qualified staff leaving for better opportunities
Report Card – Manpower crunch

- No or minimal increase in sanctioned positions even though number of industries going up
- In Karnataka PCB, number of sanctioned posts dropped by 6.5 per cent while the number of industries went up by 156 per cent
Report Card – Manpower crunch

• Not only less manpower, the state boards also do **NOT** have right kind of manpower
• Most boards dominated by **administrative staff**
Dimension of Law

LAW

REACTIVE

COMMAND CONTROL

CONSENT

NORM

VIGILANCE

ENVIRONMENTAL AUDIT

TECHNICAL UPGRADATION

CAPACITY BUILDING

PRO-ACTIVE

SELF REGULATION
Proactive measures

• Industry shall be an effective partner on pollution control
• Introduction of self monitoring and assessment and appraise to SPCB periodically
• Conduct environmental audit by accredited auditor, self rectification and appraise
• Encourage to adopt ISO 9000 and ISO 14000 for integrated environmental management system
Right to have information: Develop monitoring network

- Power to have information for PCB
  - Under 20 (2) (3) under Water Act
  - Under 31 (1) under Water Act

- Power to obtain information under section 23, 25

- Specify self Monitoring protocol and reports to PCB under section 25 (3), of water act 21 (4) under Air Act as consent condition and under 6 of hazardous and other waste (management and trans-boundary Movement) Amendment Rules, 2016.
PARADIGM SHIFT ON POLLUTION CONTROL

Treatment of pollutant – At end on pipe – command and control

or

Prevention of pollutant generation – understanding process – self regulation
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Consent condition</th>
<th>Provision under water Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Validity of consent</td>
<td>25 (4) (iii)</td>
</tr>
<tr>
<td>2.</td>
<td>Quantity of Water consumption and wastewater generation</td>
<td>25 (4) (ii)</td>
</tr>
<tr>
<td>3.</td>
<td>Quantity of wastewater</td>
<td>25 (4) (ii)</td>
</tr>
<tr>
<td>4.</td>
<td>Defined outlet</td>
<td>25 (8) (a) (b)</td>
</tr>
<tr>
<td>5.</td>
<td>Validity of effluent treatment scheme</td>
<td>25 (4) (i) (ii)</td>
</tr>
<tr>
<td>6.</td>
<td>Specify the production/quantity per day</td>
<td>25 (4) (i) (ii)</td>
</tr>
<tr>
<td>7.</td>
<td>Specify self monitoring protocol and reports to PCB</td>
<td>20 (2) (3) 25 (3)</td>
</tr>
<tr>
<td>8.</td>
<td>Laboratory Procedure</td>
<td>20 (2) (3) 25 (3) 31 (1) (2)</td>
</tr>
<tr>
<td>9.</td>
<td>Facilities for Inspection</td>
<td>23</td>
</tr>
<tr>
<td>10.</td>
<td>Receiving water body</td>
<td>25</td>
</tr>
<tr>
<td>11.</td>
<td>Housekeeping</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Ensuring separation of control equipments in good running condition</td>
<td>25 (4) (iii)</td>
</tr>
<tr>
<td>Sr. No</td>
<td>Consent Condition</td>
<td>Provisions Under Air Act</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Site Selection</td>
<td>17 (h), 21 (4)</td>
</tr>
<tr>
<td>2</td>
<td>Validity period</td>
<td>21 (4)</td>
</tr>
<tr>
<td>3</td>
<td>Approved fuel</td>
<td>19 (3) (4), 21 (4)</td>
</tr>
<tr>
<td>4 A</td>
<td>Adequacy and specification on control equipment</td>
<td>21 (5) (1), 21 (4)</td>
</tr>
<tr>
<td>4 B</td>
<td>Ensure control equipments running in good condition</td>
<td>17 (9), 21 (4)</td>
</tr>
<tr>
<td>5</td>
<td>Laying down standard</td>
<td>21 (4)</td>
</tr>
<tr>
<td>6</td>
<td>Product and product mix</td>
<td>21 (4)</td>
</tr>
<tr>
<td>7</td>
<td>Housekeeping (Loading and unloading or raw materials)</td>
<td>21 (4)</td>
</tr>
<tr>
<td>8</td>
<td>Reduce fugitive emission including storage of raw material referred to farm tank area</td>
<td>21 (4)</td>
</tr>
<tr>
<td>9</td>
<td>Self regulation, monitoring both ambient and stack and LDAR programme</td>
<td>21 (4)</td>
</tr>
<tr>
<td>10</td>
<td>Chimney height and specification</td>
<td>21 (5) (iv)</td>
</tr>
</tbody>
</table>
COMPONENTS OF SELF REGULATION

- Organizational and policy
- Pollution assessment – monitoring data and management
- Waste minimization
- Transparency and report writing
COMPONENTS OF POLICY

• Ensure pollution control norms
• Conservation of resources
• Environmental impact assessment in operation phase
• Develop Environmental Management System
• Integration of all departments on Environmental Management
• Database creation and action plan
• Training and awareness
ORGANIZATION – AN EXAMPLE

- President
- VP Finance
- VP HR
- VP Technical
- VP Marketing
- General Manager
- R & D
- Production
- Quality Control
- Utility
- SHE
Task to be performed

- Assessment of pollution
- Performance of pollution control devices
Assessment of pollution

• **Monitoring** is a programme for a systematic observation in order to draw inference (prediction) about the experiment or the phenomena for which it is designed.

• By systematic observation means a periodic observation with regular intervals.
  ➤ When (how often) to observe?
    ➤ frequency of observation

• By observation in science means measurement
  ➤ What to measure?
    ➤ parameters to be defined

• The third component of monitoring is the location
  ➤ Where to sample?
Pollution Assessment

- Unit operation / process wise
- Plant wise
PICTORIAL REPRESENTATION OF UNIT OPERATION/PROCESS

Raw materials
Catalyst
Water / Air
Power

PLANT PROCESS/UNIT OPERATION

Gaseous Emissions
Product
By-product
Catalyst

Recover from waste
Wastewater
Liquid wastes for storage and / or
off site disposal
Solid wastes for storage and / or
off site disposal

Reusable waste in another operation

Recycle
ASSESSMENT OF POLLUTION LOAD IN WATER AND WASTEWATER

- How much wastewater generated per unit of each product or per plant basis?

- How much pollution load is generated per unit of each product (in terms of BOD, COD, Oil & Grease)?

- How much wastewater is blow-down from cooling tower and boiler blow-down per day basis?

- How much wastewater and waste load generated in terms of BOD, COD, TDS and Oil & Grease for sanitary purpose?

- How much water is consumed from bore well and canal separately TSS, TDS load determination from each cases heavy metals and chlorinated pesticides?
POLLUTION LOAD ASSESSMENT PROGRAMME IN PETROCHEMICAL COMPLEX - WHERE TO SAMPLE? (PLANT WISE)
<table>
<thead>
<tr>
<th>PLANT</th>
<th>TYPE OF DISCHARGE</th>
<th>FREQUENCY</th>
<th>PARAMETER</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU</td>
<td>Continuous / intermittent</td>
<td>3 hours composite for a day (3 days in week) once in each discharge (grab) (3 days in week)</td>
<td>pH, BOD, COD, TDS, O &amp; G, Flow</td>
</tr>
<tr>
<td>HDPE</td>
<td>Continuous / intermittent</td>
<td>-do-</td>
<td>pH, BOD, COD, TDS, O &amp; G, Flow</td>
</tr>
<tr>
<td>LLDPE</td>
<td>Continuous / intermittent</td>
<td>-do-</td>
<td>pH, BOD, COD, TDS, O &amp; G, Flow</td>
</tr>
<tr>
<td>DM PLANT</td>
<td>Continuous / intermittent</td>
<td>3 hours composite (once in a week) once in each discharge (once in week)</td>
<td>pH, TDS, O &amp; G, Flow</td>
</tr>
<tr>
<td>CT BLOW DOWN</td>
<td>Intermittent</td>
<td>Once in each discharge</td>
<td>pH, TDS, O &amp; G, COD, BOD, Flow</td>
</tr>
<tr>
<td>COMBINED WASTEWATER</td>
<td>Continuous</td>
<td>Once in a week (2 hours composite, grab)</td>
<td>Flow, pH, TDS, O &amp; G, COD, BOD, Heavy metals</td>
</tr>
</tbody>
</table>
OUTCOME FOR POLLUTION ASSESSMENT

- COD, TDS, BOD, O & G balance
- Load assessment
- Quality control chart and costing, fine
- Comparison between predicted load and actual load
- Waste minimization programme
MONITORING NETWORK DESIGN FOR EFFLUENT TREATMENT PLANT PERFORMANCE

| M1   | pH, BOD, COD, O & G, TDS, TSS (2 hours grab & 24 hours composite, every day) |
| M2   | TSS (grab, once in a week) |
| M3   | pH, BOD, COD, O & G, TSS (grab, once in a day) |
| M4   | BOD, COD, O & G (once in a day) |
| M5   | BOD, COD, O & G (once in a day) |
| M6   | BOD, COD, O & G (once in a day) |
| M7   | pH, BOD, COD, O & G, TSS (2 hours grab, 25 hours composite, every day) |

Aeration Tank - DO, MLSS, MLVSS
AIR EMISSION ASSESSMENT – THE POSSIBLE INVENTORY

• What are the possible point sources (channelized) in the complex?

• What are the sources of combustion, how much load of particulate matter, sulfur dioxide, nitrogen oxides and carbon di-oxides are generated (in terms of tonnes per day)?

• What are the sources of conventional parameter from channelized sources of process?

• Identification of most probable pollutants from vent off and purge gases.

• Budget of fugitive emission.
# Emission Profile

<table>
<thead>
<tr>
<th>Classification of pollutants</th>
<th>Sources of air pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions</td>
<td></td>
</tr>
<tr>
<td>Points sources</td>
<td>Cracking units</td>
</tr>
<tr>
<td></td>
<td>Incineration</td>
</tr>
<tr>
<td></td>
<td>Gen set etc.</td>
</tr>
<tr>
<td></td>
<td>Flare</td>
</tr>
<tr>
<td>Process</td>
<td>Channelized emissions</td>
</tr>
<tr>
<td></td>
<td>Vent off</td>
</tr>
<tr>
<td></td>
<td>Purge gases</td>
</tr>
<tr>
<td>Fugitive</td>
<td>Equipment leaks</td>
</tr>
<tr>
<td></td>
<td>Loading</td>
</tr>
<tr>
<td></td>
<td>Storage tanks</td>
</tr>
<tr>
<td></td>
<td>ETP</td>
</tr>
</tbody>
</table>
## TYPICAL PERCENT SHARE OF FUGITIVE DUST EMISSIONS

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Source</th>
<th>% Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fugitive emissions from equipment</td>
<td>40-60</td>
</tr>
<tr>
<td>2</td>
<td>Process vents</td>
<td>5-15</td>
</tr>
<tr>
<td>3</td>
<td>Storage tanks</td>
<td>5-15</td>
</tr>
<tr>
<td>4</td>
<td>Loading /unloading facilities</td>
<td>15-25</td>
</tr>
<tr>
<td>5</td>
<td>WWTP</td>
<td>10-20</td>
</tr>
</tbody>
</table>
### ASSESSMENT OF FUGITIVE EMISSIONS

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Equipment type</th>
<th>Process Fluid Service</th>
<th>Average Emission factor in (kg/hr/source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valves</td>
<td>Gas</td>
<td>0.0056</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light liquid</td>
<td>0.0071</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heavy liquid</td>
<td>0.00023</td>
</tr>
<tr>
<td>2</td>
<td>Pump Seal</td>
<td>Light liquid</td>
<td>0.0494</td>
</tr>
<tr>
<td></td>
<td>Pump Seal</td>
<td>Heavy liquid</td>
<td>0.0214</td>
</tr>
<tr>
<td>3</td>
<td>Compressor Seal</td>
<td>Gas / Vapour</td>
<td>0.228</td>
</tr>
<tr>
<td>4</td>
<td>Pressure Relief Valves</td>
<td>Gas / Vapour</td>
<td>0.104</td>
</tr>
<tr>
<td>5</td>
<td>Flanges</td>
<td>Gas / Light liquid / Vapour</td>
<td>0.00083</td>
</tr>
<tr>
<td>6</td>
<td>Open ended piping</td>
<td>Gas / Light liquid / Vapour</td>
<td>0.0017</td>
</tr>
</tbody>
</table>
Local Meteorology & Topography such as Hillocks should be considered.

**Location of Stations**

UPWIND & DOWNWIND of a source.

1. UPWIND / BACKGROUND STATION.
2. STATIONS in AFFECTED area.
3. MAX GLC expected.
4. At least one Crosswind Station is recommended.
ULTIMATE OUTCOME: THE BALANCE

Consumption ➔ Yield + Waste

**Consumption**
- Raw Materials
- Energy
- Water

**Yield**
- Product

**Waste**
- Non-consumption of raw material
- Wastewater
- Waste heat
- Emission of gases, unburned fuel
- Un-recovered product

**Balances**
- Water balance
- Material balance
- Energy balance
Feedback System for Self Regulatory Mechanisms

Loss Assessment
- Initial Survey
- Design of Monitor
- Monitoring

Information

Planning for control
- Assessment of Technology
- Cost Benefit Ratio and Payback
- Action on Strategy for engineering Modification
- Improvement on Monitoring

Goal Target

Control measures for waste reduction
- Implant Control
- Maintenance
- Training

Input

Continuous Feedback

Waste
21st century compliance assurance

• Roles and responsibility will increase further: *Need for innovative solutions*

• No thief-police game

• Nation-wide deliberation on self-regulation

• Falsification of data should be dealt seriously
Thank you

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