How to Grant Consent Under Air Act, 1981

By
Dr. D.D. Basu
Former Additional Director, CPCB
Advisor, CSE

Legal Provisions on Granting Consent

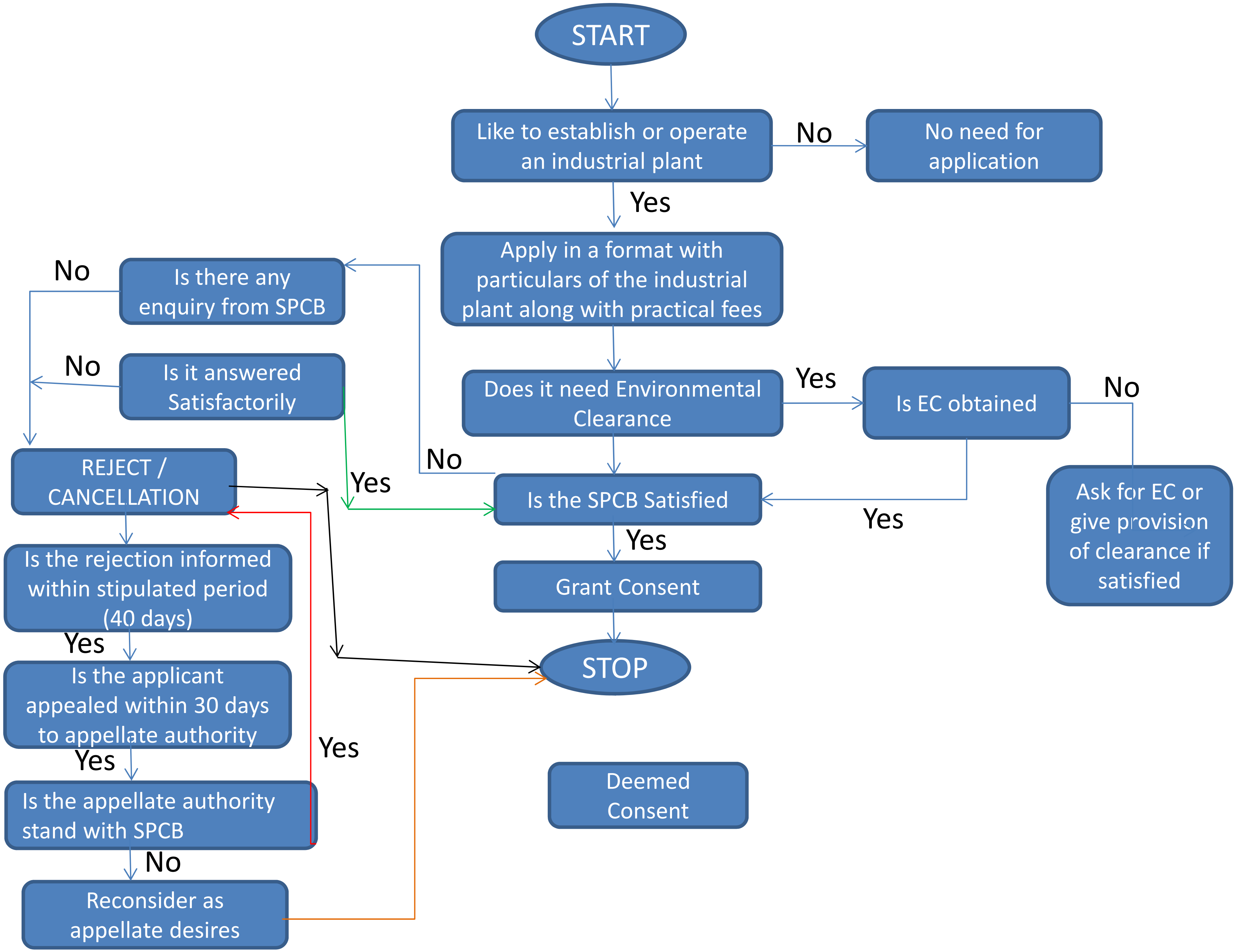
- **Under Section 21(1)**

  Subject to the provisions of this section, no person shall, without the previous consent of the State Board, establish or operate any industrial plant in an Air Pollution control Area.

- **Under Section 19(1)**

  The State government may, after consultation with the State Board, by notification in the Official Gazette declare in such manner as may be prescribed, any area or areas within the state as air pollution control area or areas for the purpose of this Act.

Algorithm for Procedure of Granting Consent

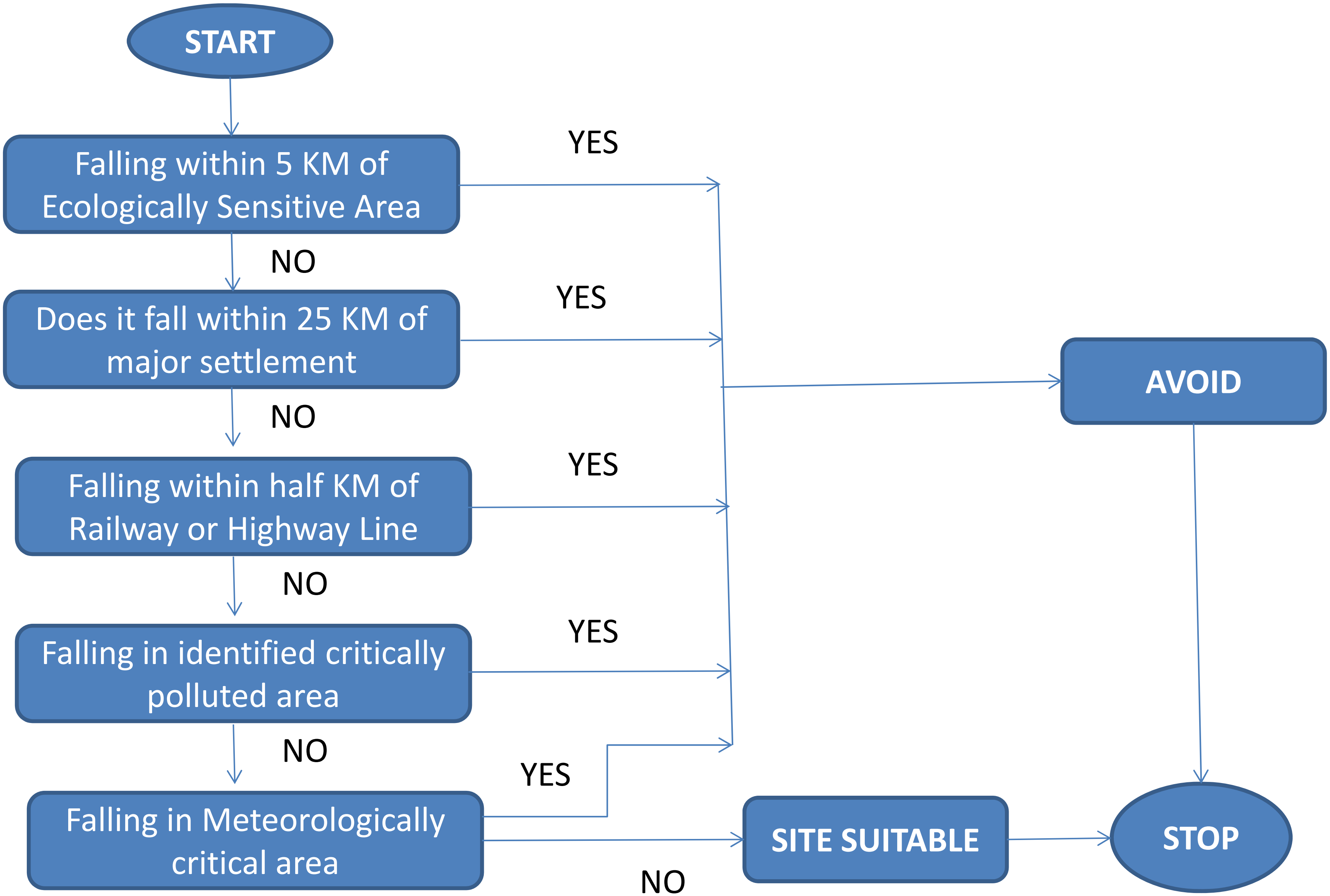


START
Like to establish or operate an industrial plant
No
No need for application
Yes
Apply in a format with particulars of the industrial plant along with practical fees
No
Is there any enquiry from SPCB
No
Is it answered Satisfactorily
Does it need Environmental Clearance
Yes
Is EC obtained
No
Ask for EC or give provision of clearance if satisfied
REJECT / CANCELLATION
Yes
No
Is the SPCB Satisfied
Yes
Yes
Grant Consent
Is the rejection informed within stipulated period (40 days)
Yes
STOP
Is the applicant appealed within 30 days to appellate authority
Yes
Yes
Deemed Consent
Is the appellate authority stand with SPCB
No
Reconsider as appellate desires

Consent Conditions Under Air Act

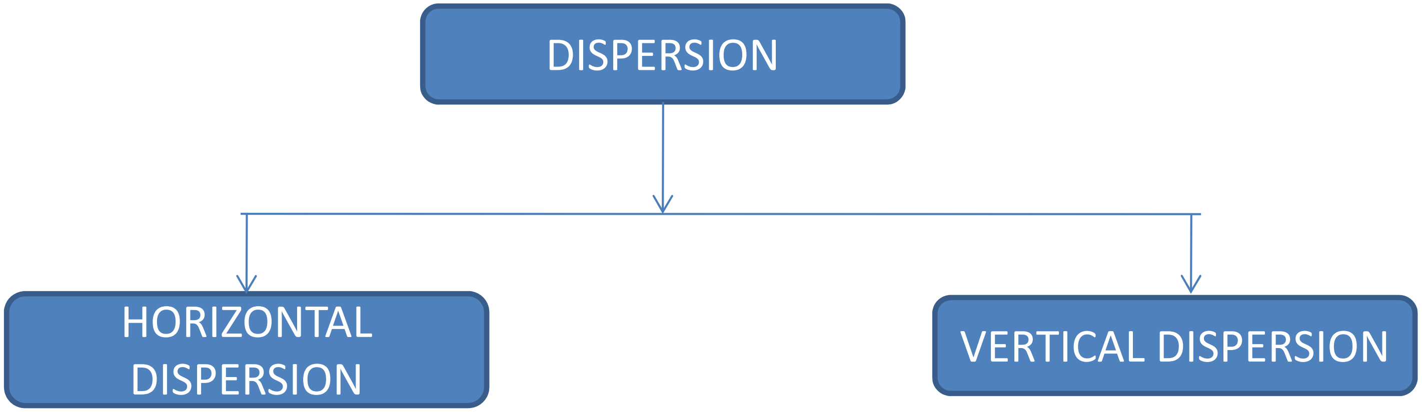
Sr. No.		Consent Condition	Provisions Under Air Act
1		Site Selection	17(h), 21(4)
2		Validity Period	21(4)
3		Approved Fuel	19(3) (4), 21(4)
4	a	Adequacy and Specification of control equipment	21(5) (1), 21 (4)
	B	Ensure control equipments running in good condition	17(9), 21(4)
5		Laying down Standard	21(4)
6		Product and Product Mix	21(4)
7		House Keeping (Loading and unloading of raw materials)	21(4)
8		Reduce fugitive emission including storage of raw material referred to farm tank area	21(4)
9		Self Regulation, Monitoring both ambient and stack and LDAR programme	21(4)
10		Chimney Height and specification	21(5) (iv)

SITE SELECTION – General Criteria



Meteorology and Site Selection

Dispersion of Air Pollutant By Variety of Meteorological Condition



- WIND SPEED
- WIND DIRECTION

- VERTICAL – Stability Turbulence
- MIXING HEIGHT

WIND

- What is wind ?
- How wind patterns are set ?

Wind and Wind Pattern

- Wind is simply air in motion.

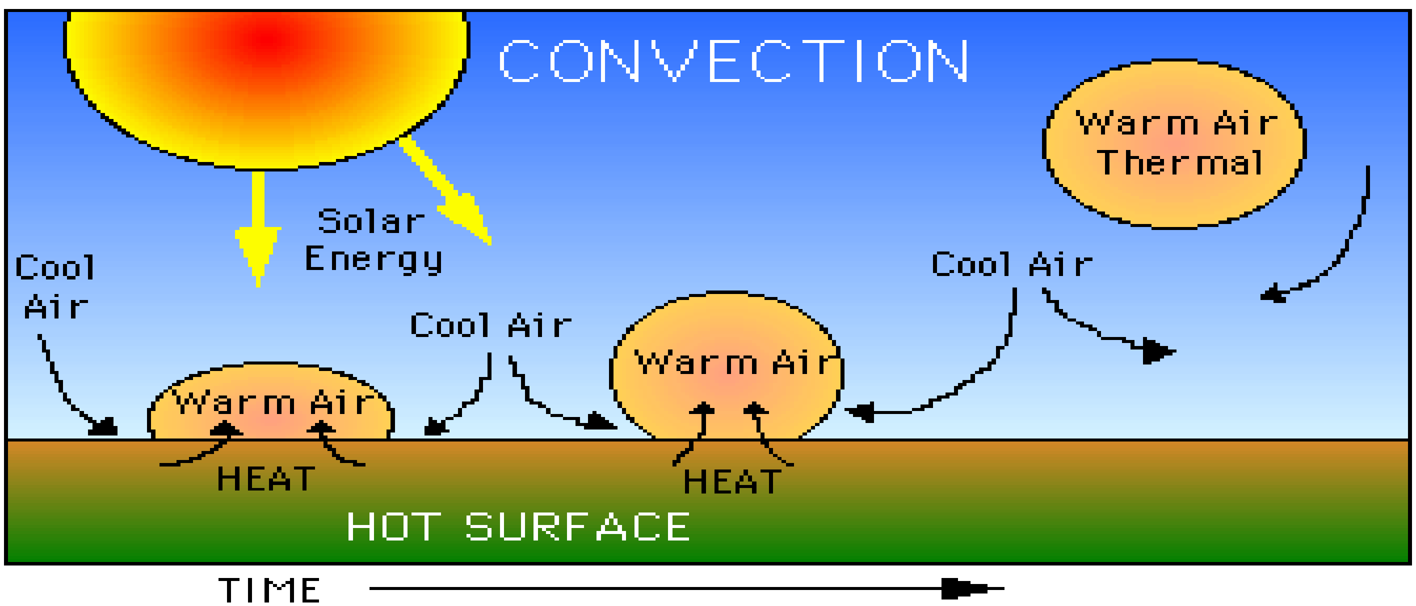
- Wind Patterns are set on three scales:
    a. Macro Scale
    b. Meso Scale
    c. Micro Scale

Energy and Heat – The Giant Machine

- The earth receives Light Energy at high frequency from the sun and converts this to heat energy at low frequency, which is then radiated back into the space.

- Heat is transferred from the earth's surface by Radiation, Conduction and Convection.

- ***RADIATION*** is direct transfer of energy and has little effect on the atmosphere.
- ***CONDUCTION*** is the transfer of heat by physical contact. (the atmosphere is a poor conductor since the air molecules are relatively far apart)
- ***CONVECTION*** is transfer of heat by movement of warm air masses.



Dolldrums Due to Rotation

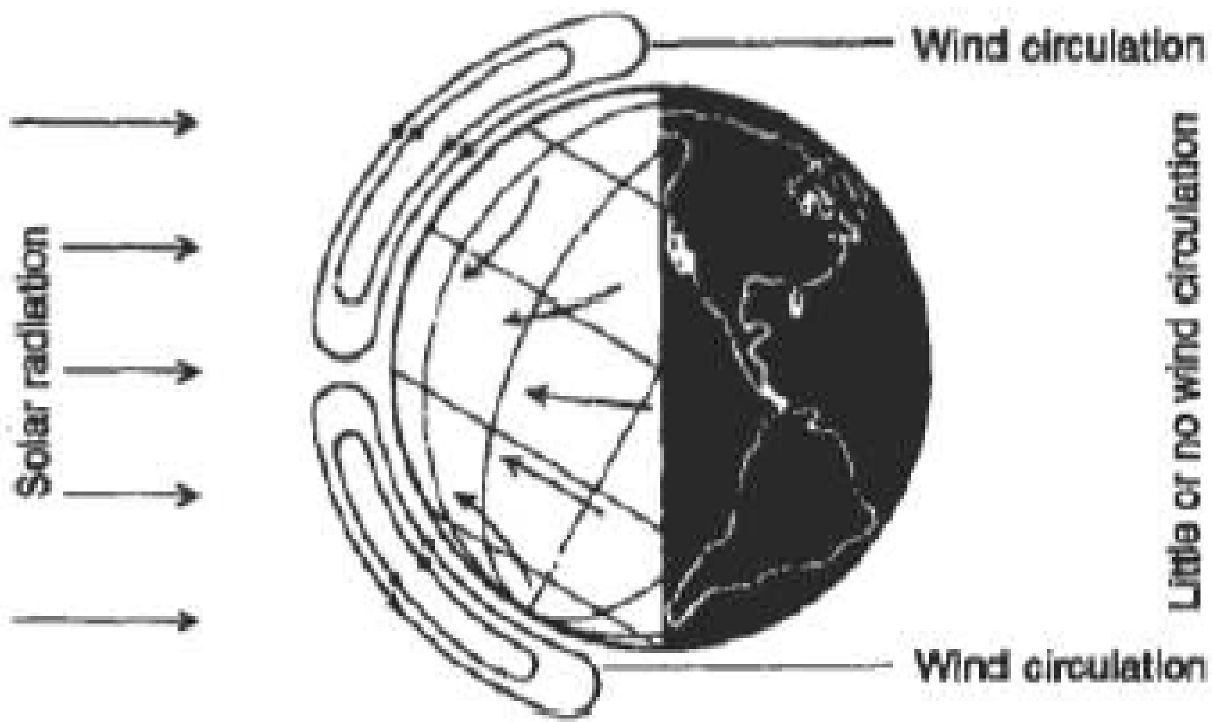
- Cause

  Solar radiation warms the earth and thus the air heats up. This heating is most effective at the equators and least at the poles.

- Effect

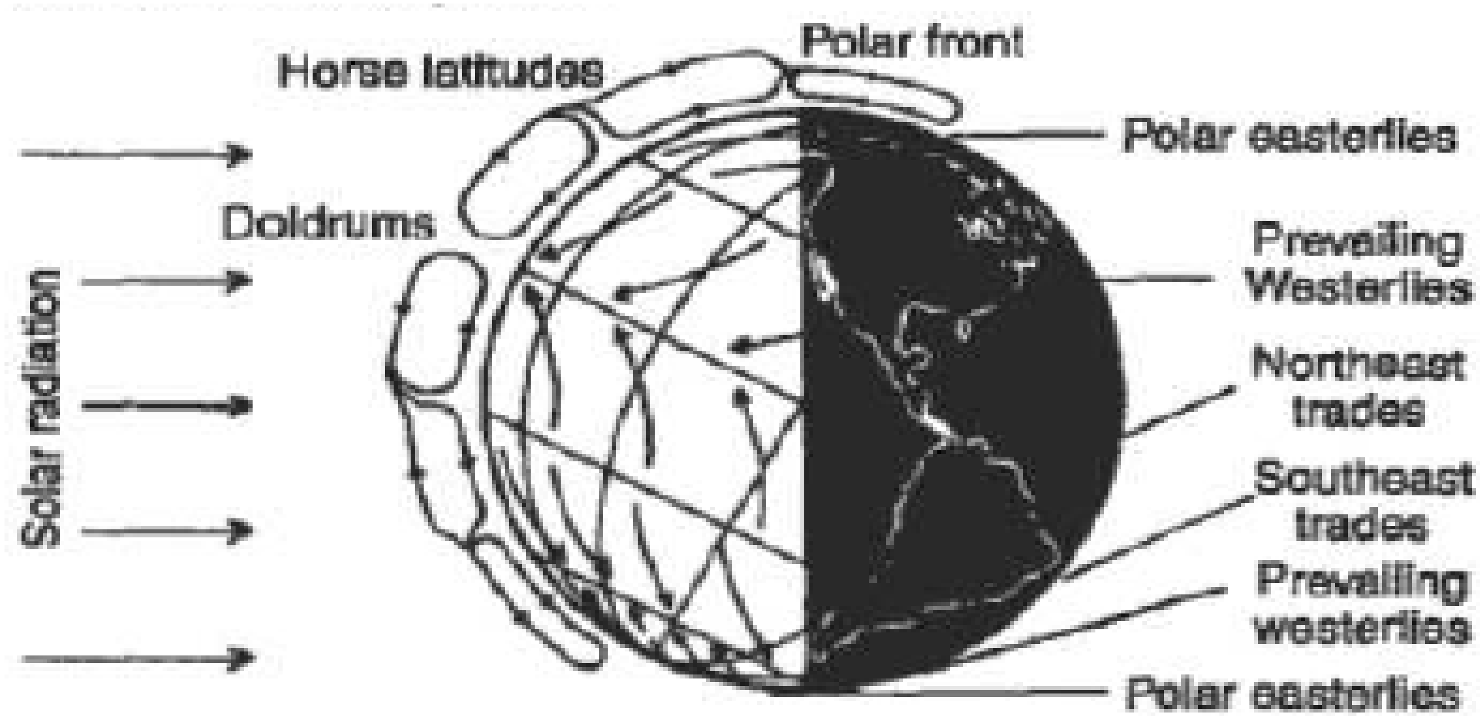
  The warmer, less dense air rises at the equator and cools becomes more dense and sinks at the poles.

If the earth did not rotate then the surface wind pattern would be from the poles to equator.



A. If the earth did not turn, the air would circulate in a fixed pattern

However, the rotation of the earth continually presents new surface to be warmed, so that a horizontal air pressure gradient exists as well as the vertical pressure gradient.



B. The earth turns, creating variable wind patterns

Wind Pattern in Meso Scale (Few Hundred Kilometers)

- Secondary or Meso Scale Circulation pattern develops due to local topography

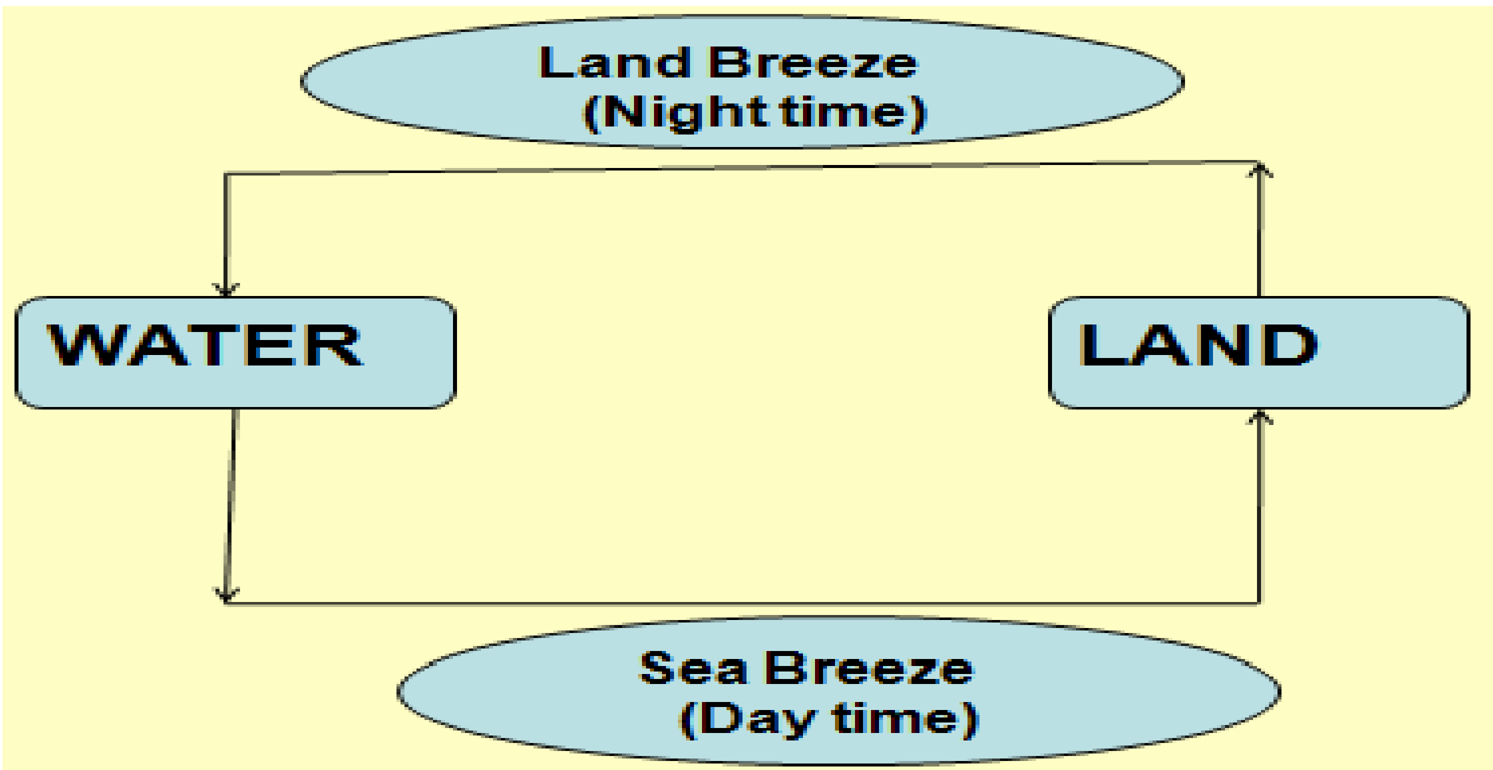
a. Mountain Range
b. Cloud Cover
c. Water Bodies/Deserts/Forestration

Land Sea Breezes (Meso)

- The two breezes occur along coastal areas or areas with adjacent water bodies.

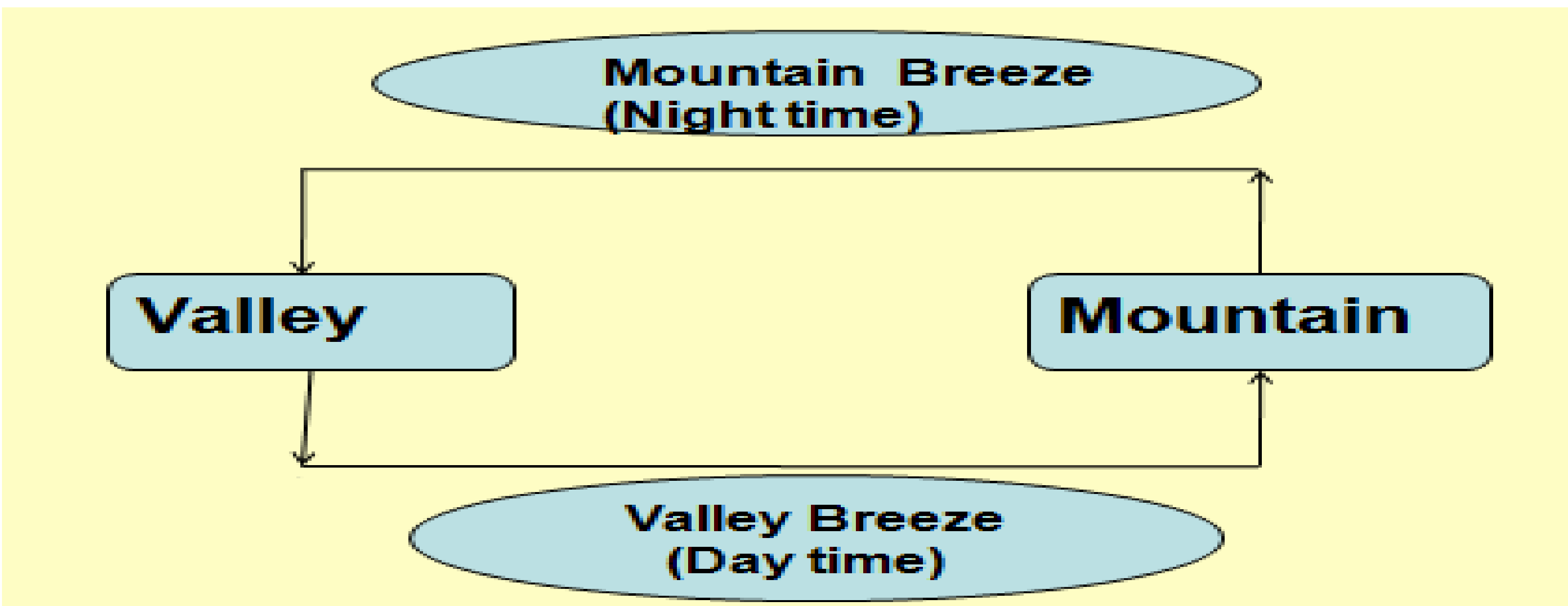
- Water and land having different heating abilities. Water takes a bit more time to warm up and is able to retain the heat longer than the land.

- In the day time, land heats up. The warm air over the land is less dense and begins to rise low pressure is created. Cool air from sea then enters to land and it is called sea breeze and reverse happens in night.



Mountain and Valley Breeze

- At day time the mountain heats up, less dense and warm air rises up and creates low pressure. High dense cool air of valley goes up.
- At night mountain's air cools off and get dense. At that time valley air is warmer goes up and cool air comes to the valley.



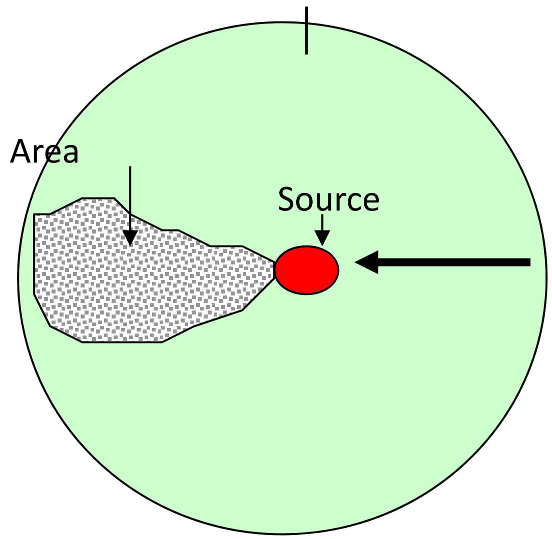
Micro scale phenomena occurs due to following criteria

- Rural Open Land
- Irregular Topography and Urban Development.
- Effect of Radiant Heat from Deserts and Cities.

Measurement of Micrometeorological parameters

Wind Direction

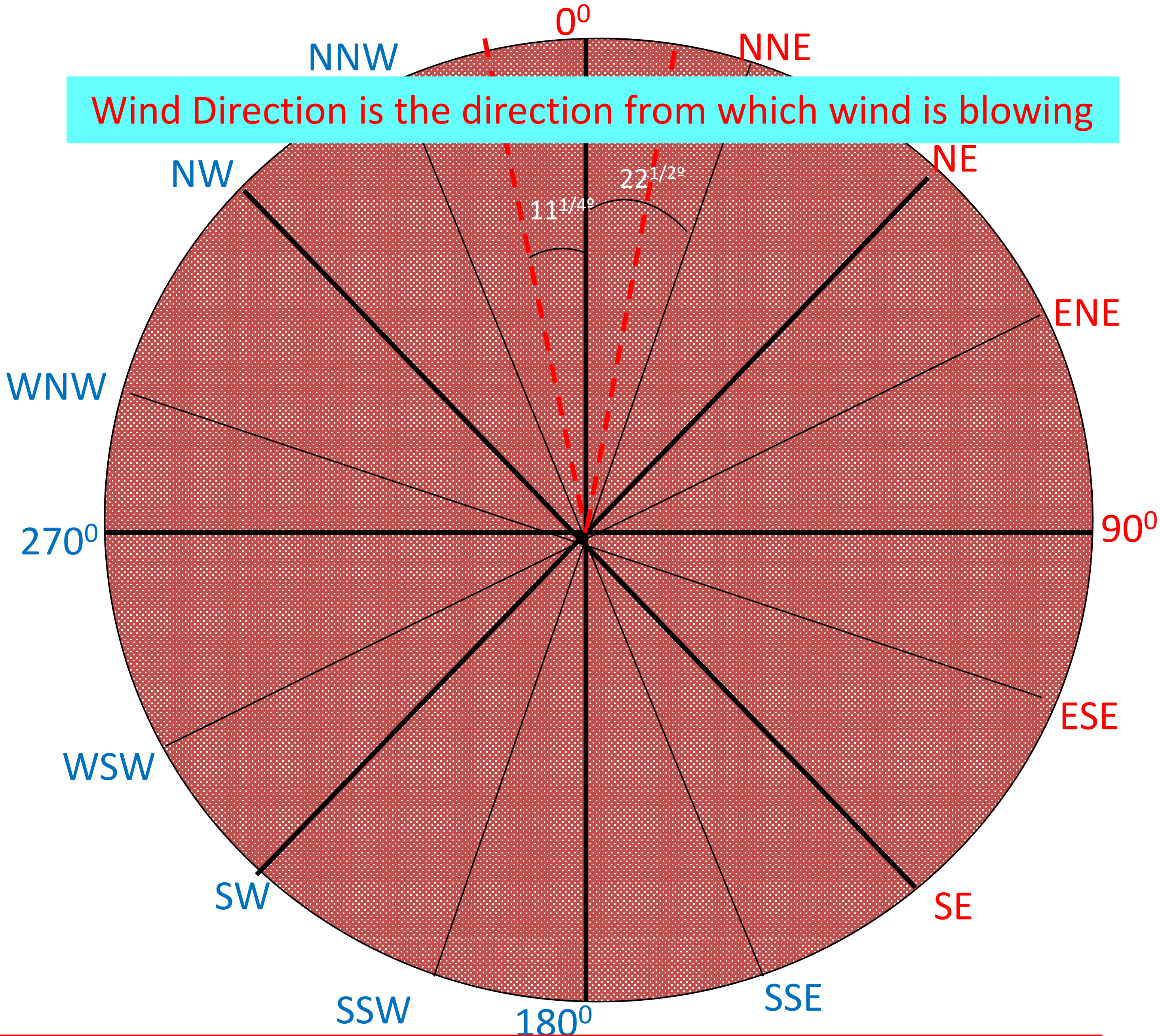
Wind vane set



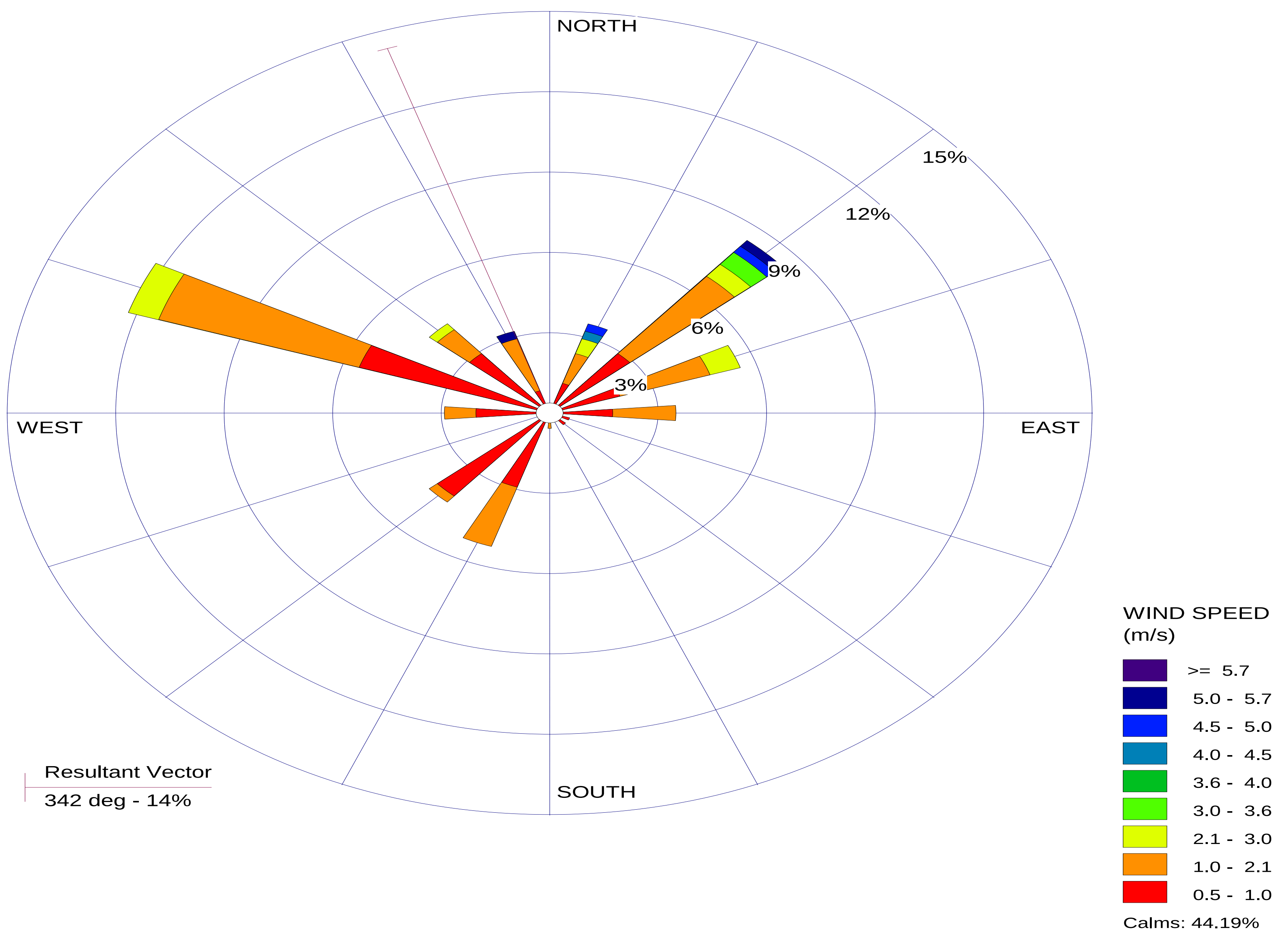
Wind Blowing from 'E' (90^{O})

Based on the wind direction the receptors in the down wind direction are identified

Wind Direction is the direction from which wind is blowing

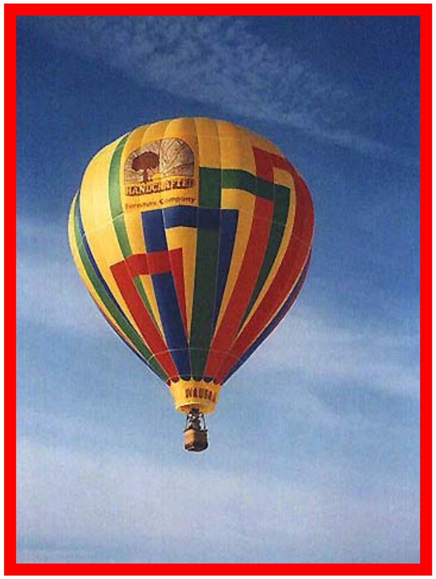


Question: What is wind direction, if instrument shows this as 78 deg?

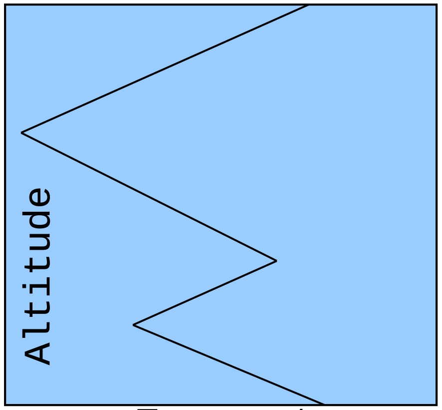

NORTH
SOUTH
WEST
EAST
3%
6%
9%
12%
15%
WIND SPEED
(m/s)
>= 5.7
5.0 - 5.7
4.5 - 5.0
4.0 - 4.5
3.6 - 4.0
3.0 - 3.6
2.1 - 3.0
1.0 - 2.1
0.5 - 1.0
Calms: 44.19%
Resultant Vector
342 deg - 14%

Vertical Structure of the Atmosphere

Imagine yourself in a balloon, traveling from the Earth's surface upwards

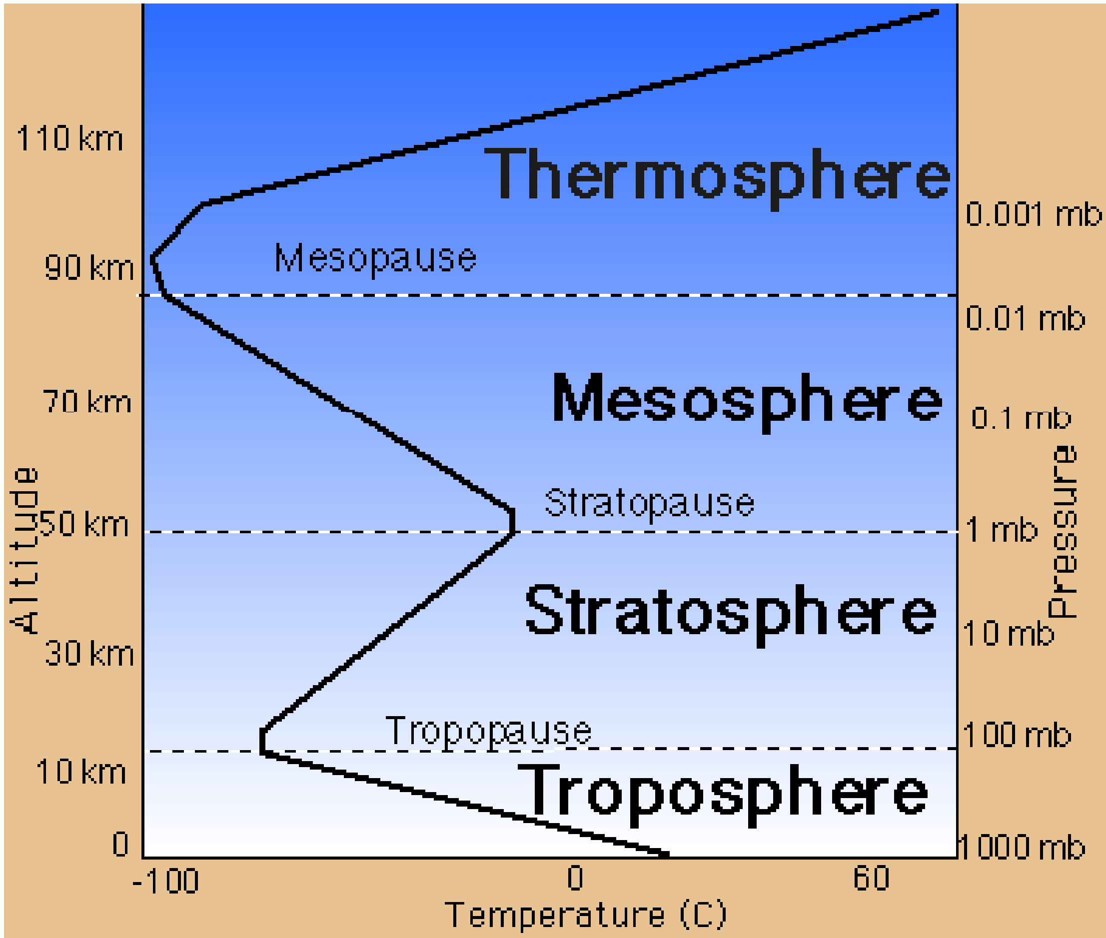


- As you rise, you will notice decrease in air density and air pressure.
- You may be surprised to discover that you may also feel both decrease and increase in air temperature.



These changes are associated with distinct layers in the atmosphere, each with individual properties and characteristics

Vertical Structure of the Atmosphere



Lapse rate is the change in temperature with height

Troposphere

- Lowest layer of the atmosphere where most weather takes place.
- Most thunderstorms don't go much above the top of the troposphere (about 10 km) .
- Pressure and density rapidly decrease with height, and temperature generally decreases with height at a constant rate.
- Troposphere is that it is well-mixed.

Regional scale pollutant transport occurs in troposphere

Adiabatic Expansion of Air

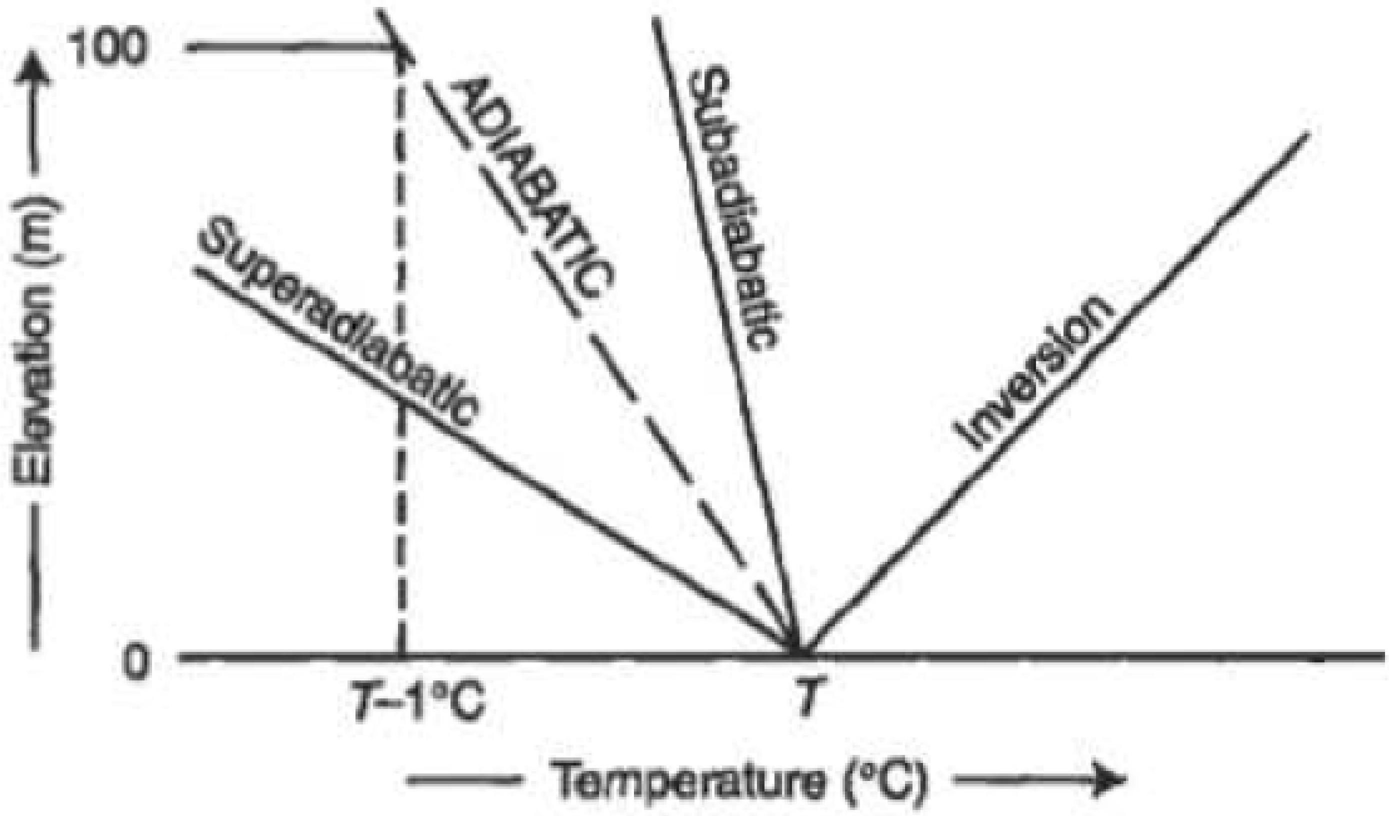
- When the warm air rises, it may cool adiabatically, meaning without the exchange of heat between the parcel and the surrounding air.

- The temperature drops in response to the change in pressure.

Ambient or Environment or Prevailing Lapse Rate

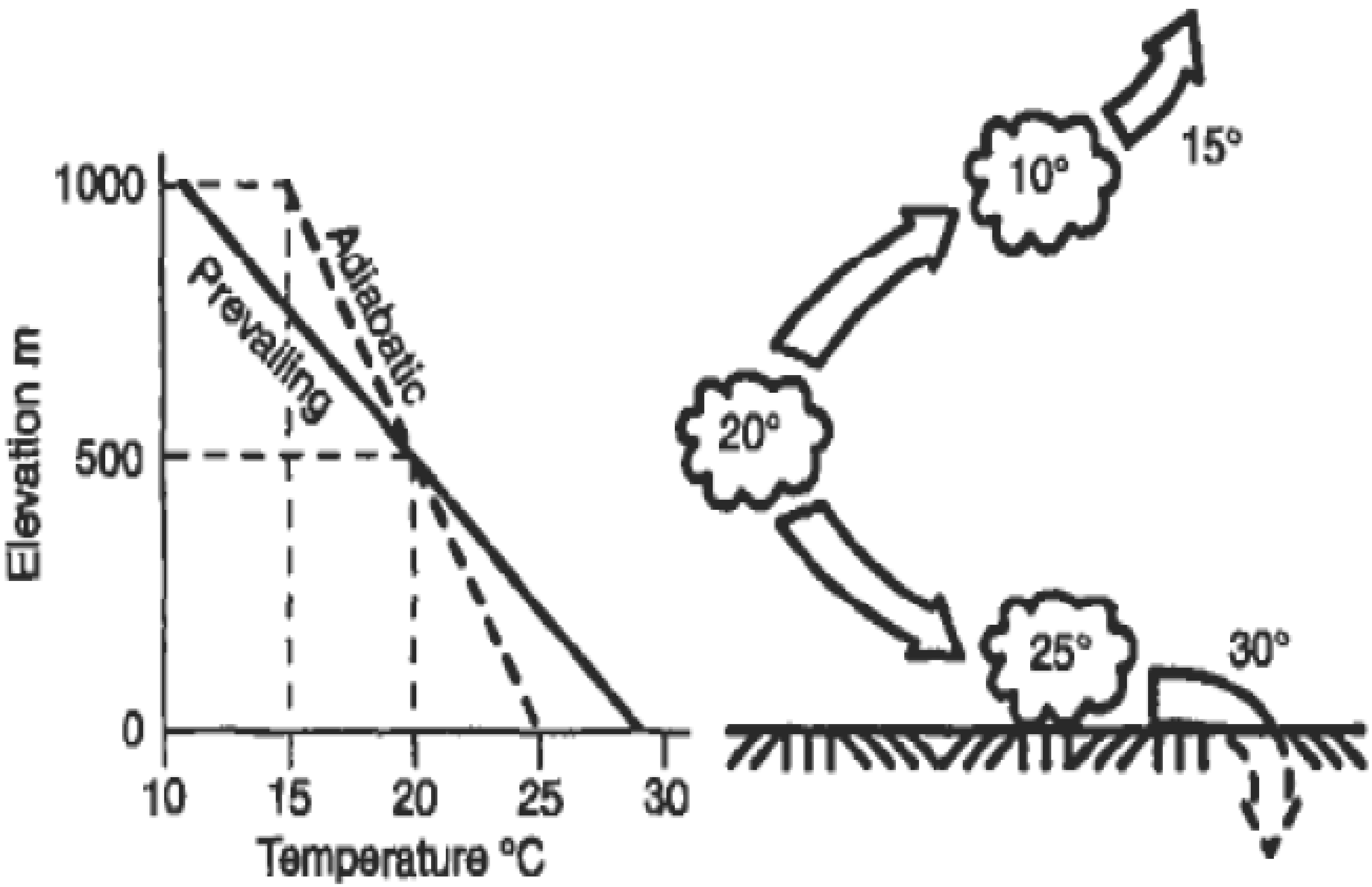
- The actual measured rate at which air cools as it rises is called the Environment or Ambient or Prevailing Lapse Rate.

The Relationship between the ambient lapse rate and dry adiabatic Lapse Rate



What happens when super adiabatic lapse rate occurs

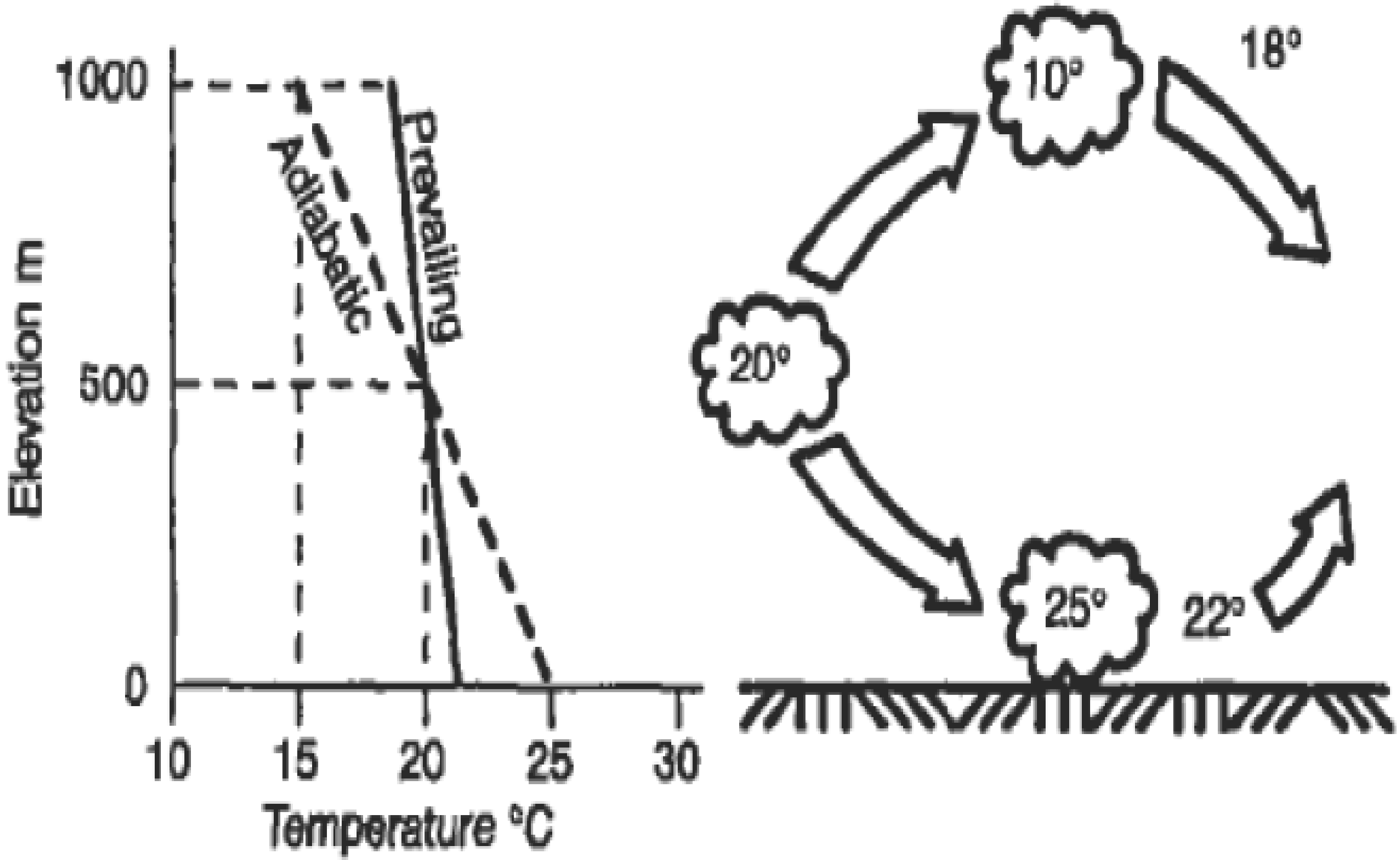
- If a parcel of air at 500 m elevation at 20 ^{o} C is pushed upward to 1000 m, its temperature will come down to 15 ^{o} C (according to adiabatic lapse rate). The prevailing temperature is however 10 ^{o} C at 1000 m. The parcel of air will be surrounded by colder air and therefore will keep moving up.



A. Super-adiabatic conditions (unstable)

What happens when sub-adiabatic lapse rate occurs

- The sub-adiabatic condition is by contrast a very stable system consider a parcel of air at 500 m elevation at 20^o C. If the parcel is displaced to 1000 m it will cool by 5^o C to 15^o C. But the surrounding air would be warmer, it will therefore fall back to its point of origin. Similarly if a parcel of air at 500 m is pushed down, it will become warmer than its surrounding and therefore will rise back to its original position. Thus such systems are characterized by very limited vertical mixing.



B. Sub-adiabatic conditions (stable)

Inversion

- An inversion is an extreme sub-adiabatic condition, are thus vertical air movement within the inversion is almost nil. The two most common kind of inversion are subsidence inversion and radiation inversion.

Maximum mixing depth

- The dispersion of pollutants in the lower atmosphere is greatly aided by the convective and turbulent mixing that takes place. The vertical extent to which this mixing takes place depends on the environmental lapse rate which varies diurnally, from season to season and is also affected by topographical features. The depth of the convective mixing layer in which vertical movement of pollutants is possible, is called the maximum mixing depth (MMD).

Maximum Mixing Depth (contd…)

- Figure below illustrates these MMDs for different lapse rate profiles. These profiles are usually measured at night or early in the morning. An air parcel at a temperature (maximum surface temperature for the month) warmer than the existing ground level temperature rises and cools according to adiabatic lapse rate. The level where its temperature becomes equal to the surrounding air gives the MMD value. Urban air pollution episodes are known to occur when MMD is 1500 m or less.

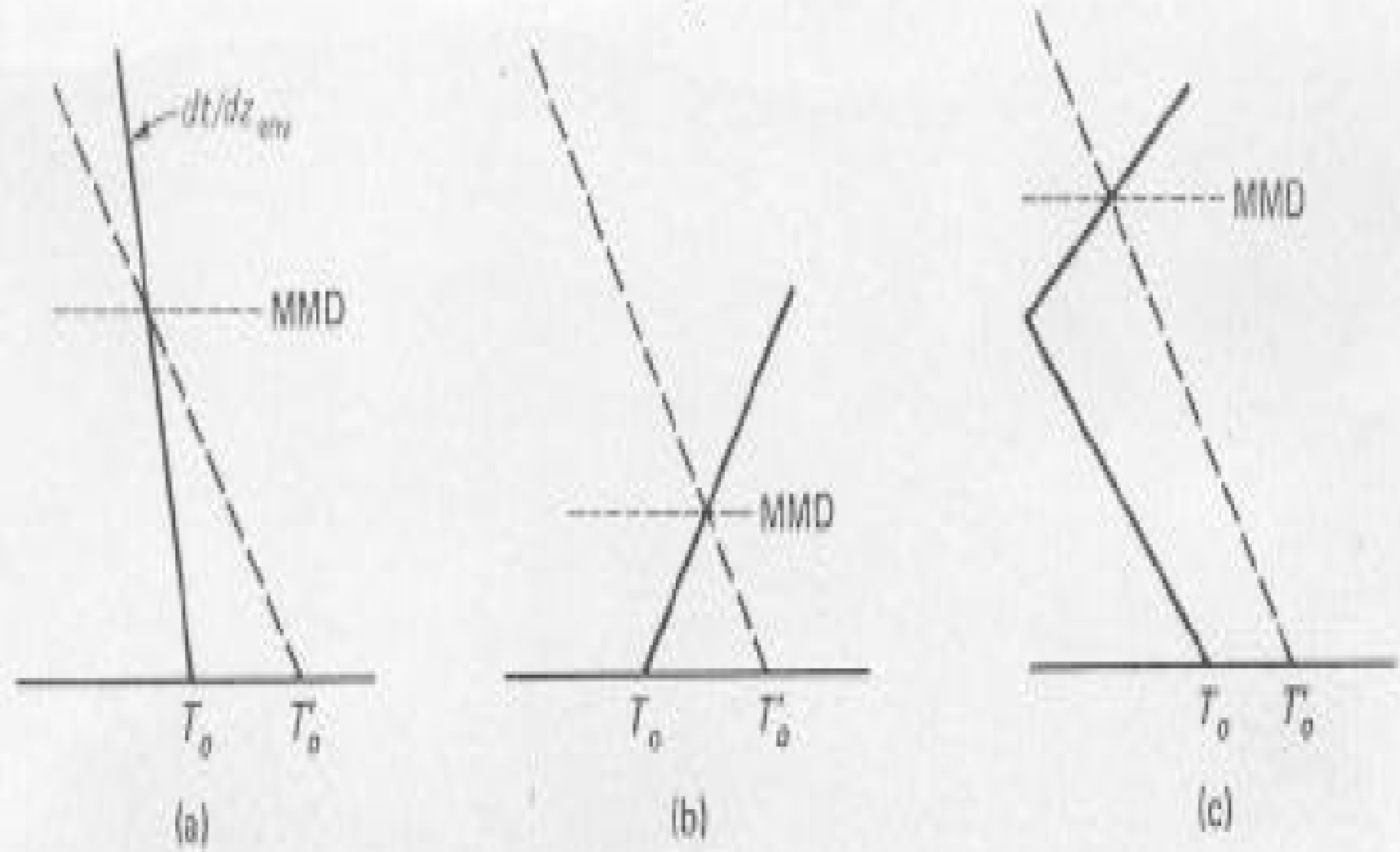
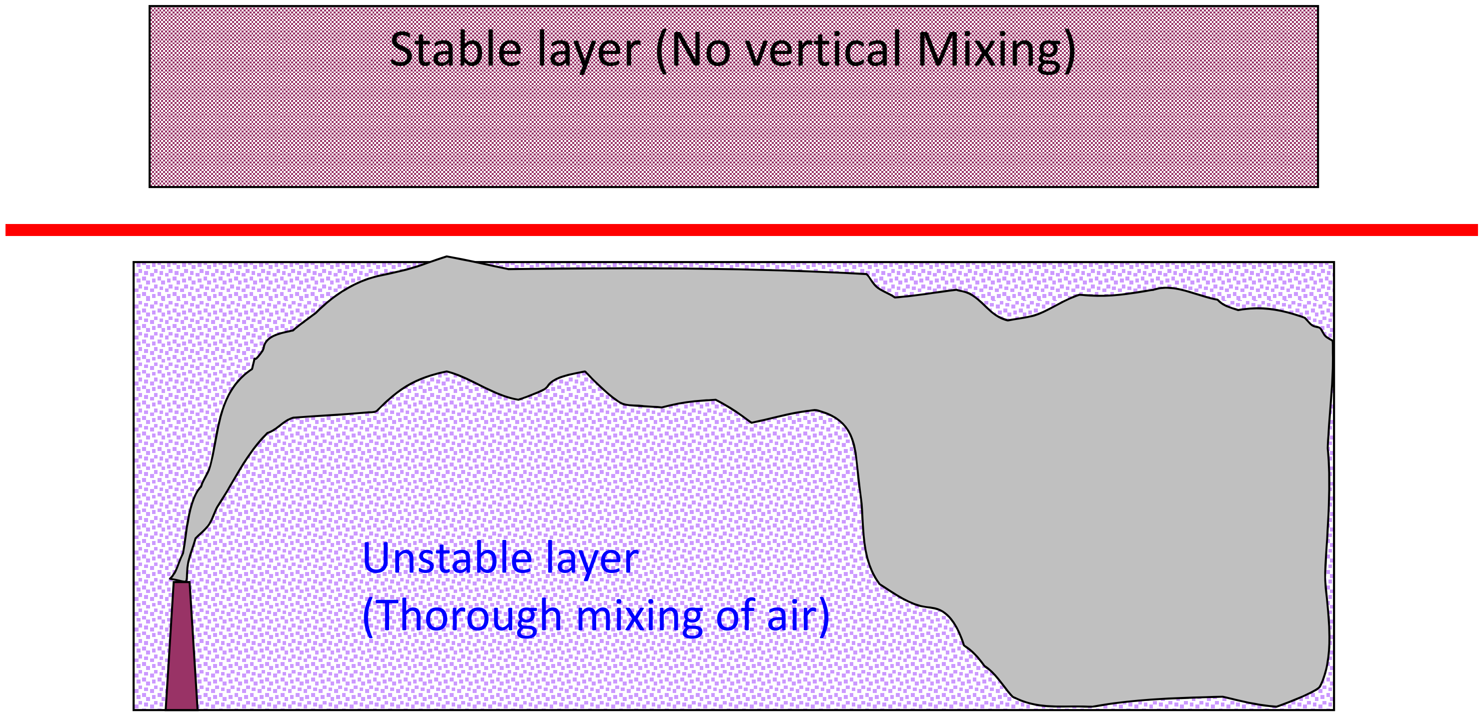


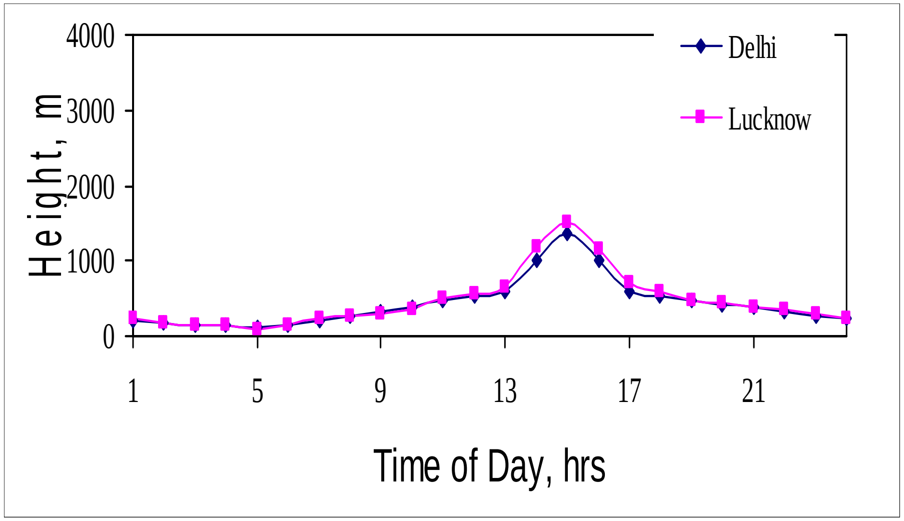
FIGURE MAXIMUM MIXING DEPTH (MMD) UNDER VARIOUS ATMOSPHERIC CONDITIONS, (ADIABATIC PROFILE -------, ENVIRONMENTAL PROFILE———).

Mixing Height

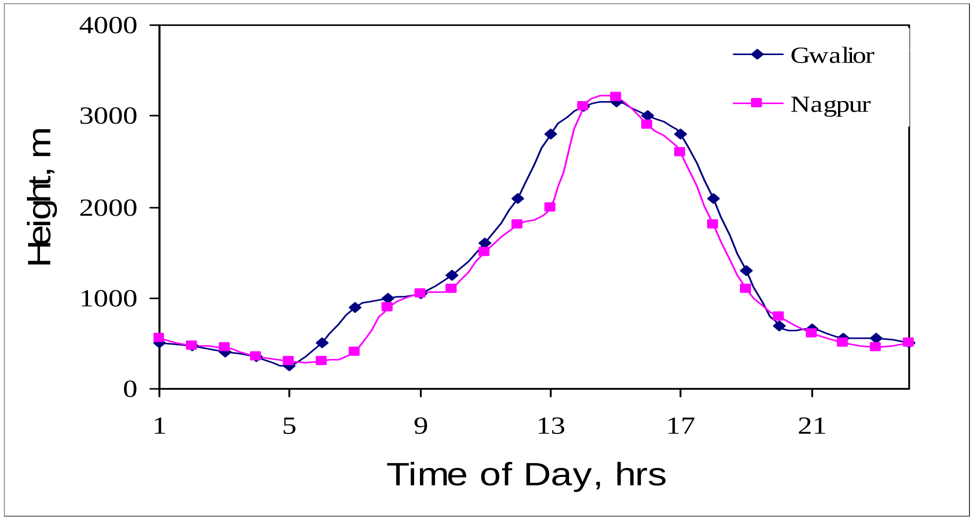
The layer within which the air parcel is thoroughly mixed



Variation in Mixing heights

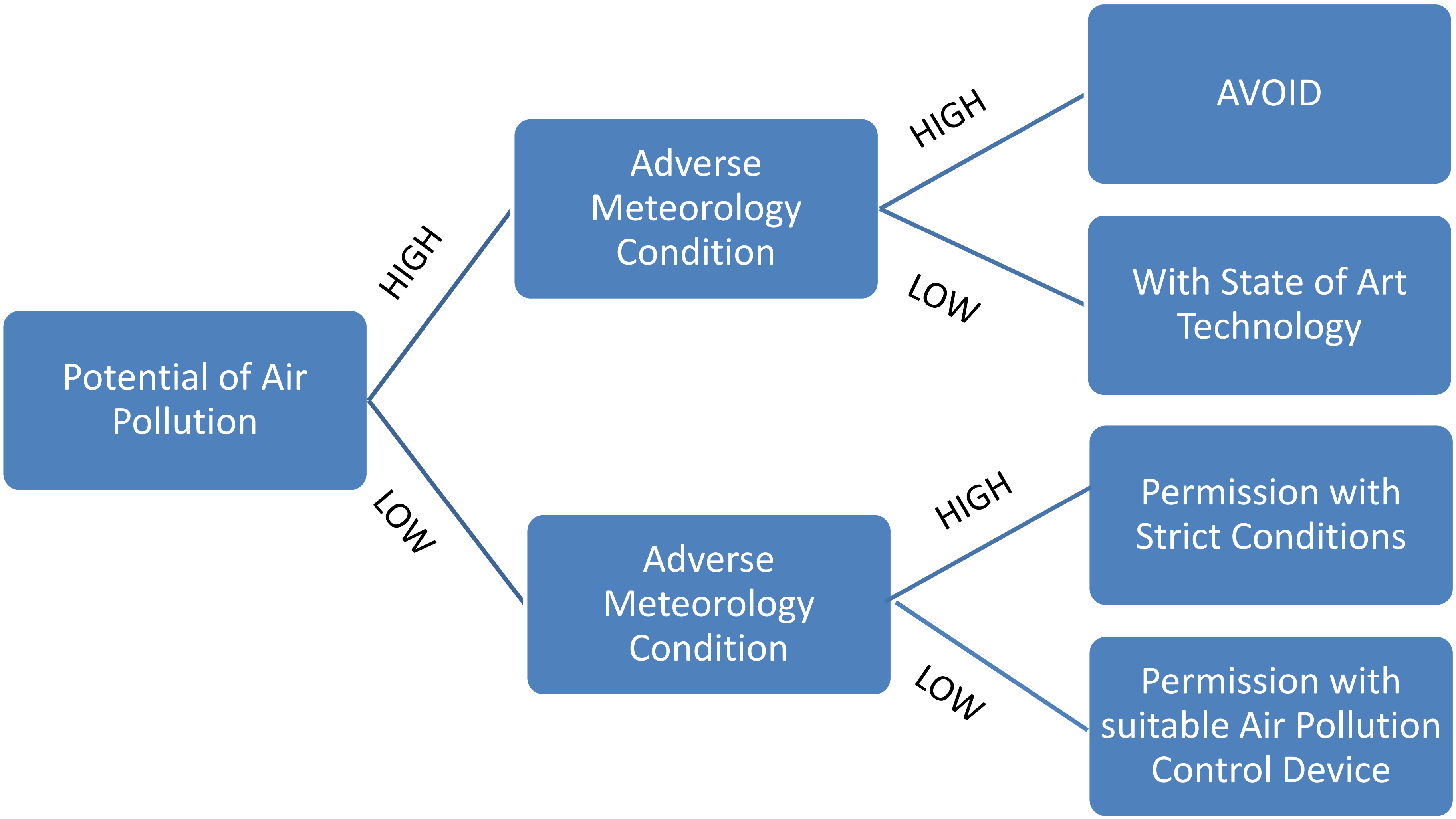


(January)



(May)

EVALUATION OF SITE SELECTION WITH RESPECT TO AIR COMPONENT



Adverse Meteorological Conditions

- Low Turbulence (relatively calm, low wind speed)
- Prevalent Wind Direction (down wind location)
- High Inversion
- High Coastal Fumigation
- Lower Mixing Height

APPROVED FUEL

FUEL	POLLUTANT	
	ASH CONTENT	**SULFUR CONTENT**
Natural Gas	Low	Low
Coal	14 - 20	0.5 – 1.0
Light Diesel Oil	0.02	1.8
Diesel Oil	0.01	1.0
Pet Coke	0.5 – 1.0	4 - 7

PRODUCT AND PRODUCT MIX

PRIORITY SECTOR

- Thermal Power Station
- Oil Refinery
- Petrochemical
- Integrated Iron and Steel
- Fertilizer

MEDIUM SECTOR

- Kiln – Cement, Brick
- Organic Chemical – Pesticide, Bulk Drug, Basic Organic Chemical Industry
- Furnace (Induction and Electric Arc) and Foundry
- Hot Mix Plant

Best approach to develop emission standard

(Example of Pesticide Industry)

- Identification of air pollutants coming out from common unit process and operation
- Availability of required technology and techno economic feasibility
- Risk reduction related to health, ecosystem and man made assets considering potential ground level

Common Air Pollutant in Pesticide

- Ammonia (NH_3)
- Chlorine (Cl_2)
- Hydrogen Bromide (HBr)
- Hydrochloric Acid (HCl)
- Hydrogen Sulfide (H_2S)
- Phosphorus pentaoxide (P_2O_5 as H_3PO_4 mist)
- Particulate Matter with pesticides compounds
- Methyl Chloride (CH_3Cl)

Product & Associated Air Pollutants

Sr. No.	Pesticide	Name of the Pollutants
1.	Acephate	HCl
2.	Aluminium Phosphide	P_2O_5 fumes (as H_3PO_4)
3.	Captafol	Cl_2 and HCl
4.	Captan	Cl_2 and HCl
5.	Cypermethrin	Cl_2, HCl and SO_2
6.	Dimethoate	H_2S
7.	2, 4 – D Acid	HCl and Cl_2
8.	Dichlorvos (D.D.V.P.)	CH_3Cl
9.	Ethion	H_2S and C_2H_5SH

Product & Associated Air Pollutants (contd…)

Sr. No.	Pesticide	Name of the Pollutants
10.	Endosulphan	HCl
11.	Fenvalerate	HCl, Cl_2 and SO_2
12.	Isoproturon	NH_3
13.	Malathion	H_2S
14.	Monocrotuphos	HCl and CH_3Cl
15.	Phosalone	NH_3, HCl and H_2S
16.	Phorate	H_2S and C_2H_5SH
17.	Phosphamidon	HCl and CH_3Cl
18.	Zinc Phosphide	P_2O_5 as H_3PO_4 mist

List of Solvent used in manufacturing process of pesticides

Sr. No.	Name of Solvents	Sr. No.	Name of Solvents
1.	Acetone	14.	Formaldehyde
2.	Acetonitrile	15.	Hexane
3.	Acetic Acid	16.	Isopropyl Alcohol
4.	Acetic Anhydride	17.	Methanol
5.	Benzene	18.	Methylene Chloride
6.	Butanol	19.	Methylene Dichloride
7.	Carbon Tetrachloride	20.	
8.	Dioxane	21.	
9.	Diethyl Amine	22.	
10.	Di Methyl Formamide (DMF)	23.	
11.	Ethanol	24.	
12.	Ethyl Acetate	25.	
13.	Ethylene Di Chloride	26.	

Identification of Best Practicable control technology

- Principle of Air Pollution Control Technology – broadly classified into following groups
  - Separation techniques
    - Gas solid separation
    - Liquid-liquid separation
    - Gas liquid separation
  - Conversation to harmless end product
  - Thermal destruction

Identification of Best Practicable control technology

- Separation techniques
  - Gas solid separation
    - Separator
    - Cyclone
    - Multiclone
    - Electrostatic precipitator
    - Wet dust scrubber
    - Fabric filter including ceramic filter
  - Liquid-Gas or liquid-liquid separation
    - Mist filter
    - Condensation
    - Adsorption
    - Wet scrubbing

Identification of Best Practicable control technology

- Conversion to harmless product – used for organic pollutants
  - Bio filtration
  - Bio scrubbing
  - Bio tricking

Identification of Best Practicable control technology

- Thermal Destruction: generally used when toxic and carcinogenic chemical are emitting from the process
  - Thermal oxidation
  - Catalytic oxidation
  - Flaring

AB/AT ratio for various pollution control measure

Pollutants	Control System	AB/AT Ratio
HCl & Cl_2	Water/Caustic Scrubber	0.02 – 0.7
CH_3Cl	Liquification & filling system	0.54
H_2S	Ventury Scrubber Three stage caustic scrubber	0.15 0.61
P_2O_5 & PH_3	Mist eliminator Water scrubber + Mist eliminator + Demister	0.004 0.10
NH_3	Two stage Water Scrubber	0.13

Identification of Best Practicable control technology

- Emission Standards (Based on questionnaire & reconnaissance survey)
  - Maximum volumetric flow rate as 5000 m^3/hr (because it is varying from 1000m^3/hr to 5000 m^3/hr in different pesticide units covered)
  - Wind velocity at stack height is 1m/sec
  - Plume rise = 0.5m (because the temperature & pressure of emission vents are observed as ambient temperature and atmospheric pressure respectively)
  - Ambient temperature – 25^0C
  - Stability condition – F = stable(through out 24 hours is constant)
  - Vent height 10 m to 22 m

Control system + 20m stack height + Max achievable concentration

Parameters	Concentration (mg/Nm^3)	Emission Rate x 10^{-6} (kg/sec)	Critical Distance (M)	Max GLC ($\mu g/m^3$)
HCl	17.5	12.6	354	3.72
Cl_2	0.5	0.36	354	0.11
H_2S	8.5	6.1	354	1.80
SO_2	3.01	2.2	354	0.65
P_2O_5 (as H_3PO_4)	12.64	9.1	354	2.69
NH_3	26.2	18.8	354	5.55
HBr	11.7	8.4	354	2.48

Emission Standards for Pesticides manufacturing industries

Sr. No.	Parameter	Indian Standard (mg/Nm^3)	Guidelines* of IEC & World Bank (mg/Nm^3)	US EPA ppmV	Proposed Standard (mg/Nm^3)
1.	HCl	20	30	≤20	20
2.	Cl_2	05	03	≤20	05
3.	H_2S	05	03	-	05
4.	P_2O_5 (as H_2PO_4)	10	-	-	10
5.	NH_3	30	30	-	30
6.	Particulate matter with pesticides compounds	20	20	< 10 mg/Nm^3	20
7.	CH_3Cl	20	-	-	20
8.	HBr	05	03	-	03
9.	Total Organic Carbon	-	50	≤20	50
10.	VOC	-	20	≤20	20
*The guidelines are developed on the basis EU Bat document, US EPA, UK Environmental guidelines					

Note: i. Since the processes are batch processes, monitoring shall be conducted at the beginning, middle and at the end of batch time. The maximum value record of the batch shall be considered for exceeding the limit or employ continuous monitoring.

ii. Since there is a considerable chance of leakages at valves, pipes, joints, pump seals, flanges with periodic intervals.

AIR EMISSIONS, SOURCE AND CONTROL TECHNOLOGIES

S. no.	Industry	Sources of Air pollution	Pollutant	Control Technology
1.	Zinc, Copper and Lead smelter	• Smelter • Sulfuric acid plant	Dust, Fumes, SO_2	• ESP • Alkali Scrubbres
2.	Aluminum	• Refinery • Bake oven • Pot Lining	• Dust • Fluoride • Dust, Fluoride	• Settling Chamber, bag house, ESP • Alumina Scrubber • ESP, Alumina Scrubber
3.	Thermal Power Station	• Boiler	• Particulate matter • SO_2 • Hg	• ESP • Dispersion through stack height • Control alongwith particulate matter
4.	Cement Plant	• Secondary crusher • Kiln • Klincker cooler	• Dust • Dust • Dust	• Bag Filter • ESP/Baghouse • ESP
5.	Fertiliser i)Nitrogenious ii)Complex including Sulfuric acid	•Urea •Sulfur Plant	•SO_2 •NOx •CO •Urea dust •NH_3 •Particulate matter •Fluoride •NH_3 •SO_2/Acid mist •NOx	•Scrubber •Scrubber •Stack height •Pilling tower height •Stack Height/Wet Scrubber •Scrubber

S.no.	Industry	Sources of Air pollution	Pollutant	Control Technology
6.	Iron & Steel	• Coke Oven • Sinter Plant • Blast Furnace • Hot metal Desulphurisation • Basic Oxygen Furnace • Rolling mill	• Dust, CO, H_2S, SOx, NOx • Dust • Flue gases, dust, SOx, NOx • Flue gases, dust, NOx, H_2S • Flue dust, fumes • Flue dust (high content of Iron, Zn) CO, Fumes	• Air cooled self sealing doors, hydro jet cleaning system, hermetically sealed charging sleeves and screw feeder in charging car, water sealed AP covers, luting charging holes with clay suspension, modified transfer/guide car with emission control system etc. • Bag filters, ESP • Bag filter, heat exchanger, Water Scrubber, GCP • Bag filter, ESP • Suction hood, Bag filters, ESP • Bag filter, ESP

S.no.	Industry	Sources of Air pollution	Pollutant	Control Technology
7.	Petro-Chemical i)Inorganic Pollutants	•EDC/VCM plant and incinerator •Process Vent(w.w. stripper) •Acrylonitrile plant(Incinerators) •Naptha pretreatment plant, olefin plant	•Chlorine, HCL •Ammonia, HCN •HCN •Hydrogen Sulphide	

7.	**Petro-Chemical ii)Fugitive Emission**	**•Pumps (EDC)** **•Valves (Chlorine)**		**•Single mechanical seal – (Unit-I)** **•Double mechanical/Tandem seal. Degassing vent to incinerator-(Unit-III)** **•Double mechanical/Tandem seal. Degassing vent to incinerator- (Unit-IV)** **•Bellow seal (control valve), Extended bonnet (isolation valves), Extended bonnet (isolation valves)-(Unit-I)** **•Bellow seal (control valve)** **•Extended bonnet (isolation valves)-(Unit-III)**

7.	Petro-Chemical ii)Fugitive Emission	•Valves (VCM) •Valves (EDC) •Flanges(EDC) •Flanges (VCM)		•Extended bonnet (control valves) •TOFLEEN valves with Teflon packing (Isolation valves) •Plug/Ball valve (with welded connections only)-(Unit-III) •Plug valve (with CAF packing)-(Unit-IV) •With Teflon/metal packing-(Unit-IV) •Metal Gaskets-(Unit-IV) •Spiral bound CAF-(Unit-IV)

S.no.	Industry	Sources of Air pollution	Pollutant	Control Technology
8.	Oil Refinery	• Furnace boiler • Catalytic cracking • Storage Tank • Loading/unloading • Sulfur recovery unit • Equipments leak • Wastewater treatment	• Carbon Monoxide • SO_2 • Hydrogen Sulphide • NO_2 • Nickel • Particulate matter • SOx • NOx • Nickel • VOC • VOC • NOx • CO • H_2S • VOC • VOC	• CO boiler • Sulfur recovery unit • Low/ultra NOx/ Selective catalytic reduction • Sulfur recovery unit • Low/ultra NOx • Floating roof tank and vapour control System • Submerges Loading followed by vapour balancing/recovery. • Low/ultra NOx • LDAR • Covered lines with vapour collection system.

CHIMNEY HEIGHT – THE LAST DEFENCE

Definition of chimney under the Air Act,1981

- "**chimney**" includes any structure with an opening or outlet from or through which any air pollutant may be emitted;

- Conditions :

➢ Chimney height

➢ Platform for sampling

Chimney height formula

- $H = 14 (Q)^{0.3}$
- H = Height of Chimney
- $Q = \frac{\text{Quantity of fuel (Kg/hr) X \% Surface content X 2}}{100}$

For example;

Sulphur content in Indian coal = 0.5%

Maximum coal utilised = 18.8 TPH = 18800

Thus, $H = \left(\frac{14*18800*0.5*2}{100}\right)^{0.3}$ = 67.4 m = **70 m**

HOUSE KEEPING AND REDUCING FUGITIVE EMISSION

EMISSION PROFILE

<table>
<tr><th colspan="3">Classification of pollutants</th><th>Sources of air pollutants</th></tr>
<tr><td rowspan="5">Emissions</td><td rowspan="7">Point Sources</td><td rowspan="4">Combustion</td><td>Cracking units</td></tr>
<tr><td>Incineration</td></tr>
<tr><td>Gen set etc.</td></tr>
<tr><td>Flare</td></tr>
<tr><td>Process</td><td>Channelised emissions</td></tr>
<tr><td rowspan="6"></td><td rowspan="2"></td><td>Vent off</td></tr>
<tr><td>Purge gases</td></tr>
<tr><td rowspan="4">Fugitive</td><td rowspan="4">VOCs</td><td>Equipment leaks</td></tr>
<tr><td>Loading</td></tr>
<tr><td>Storage tanks</td></tr>
<tr><td>ETP</td></tr>
</table>

AIR EMISSION ASSESSMENT

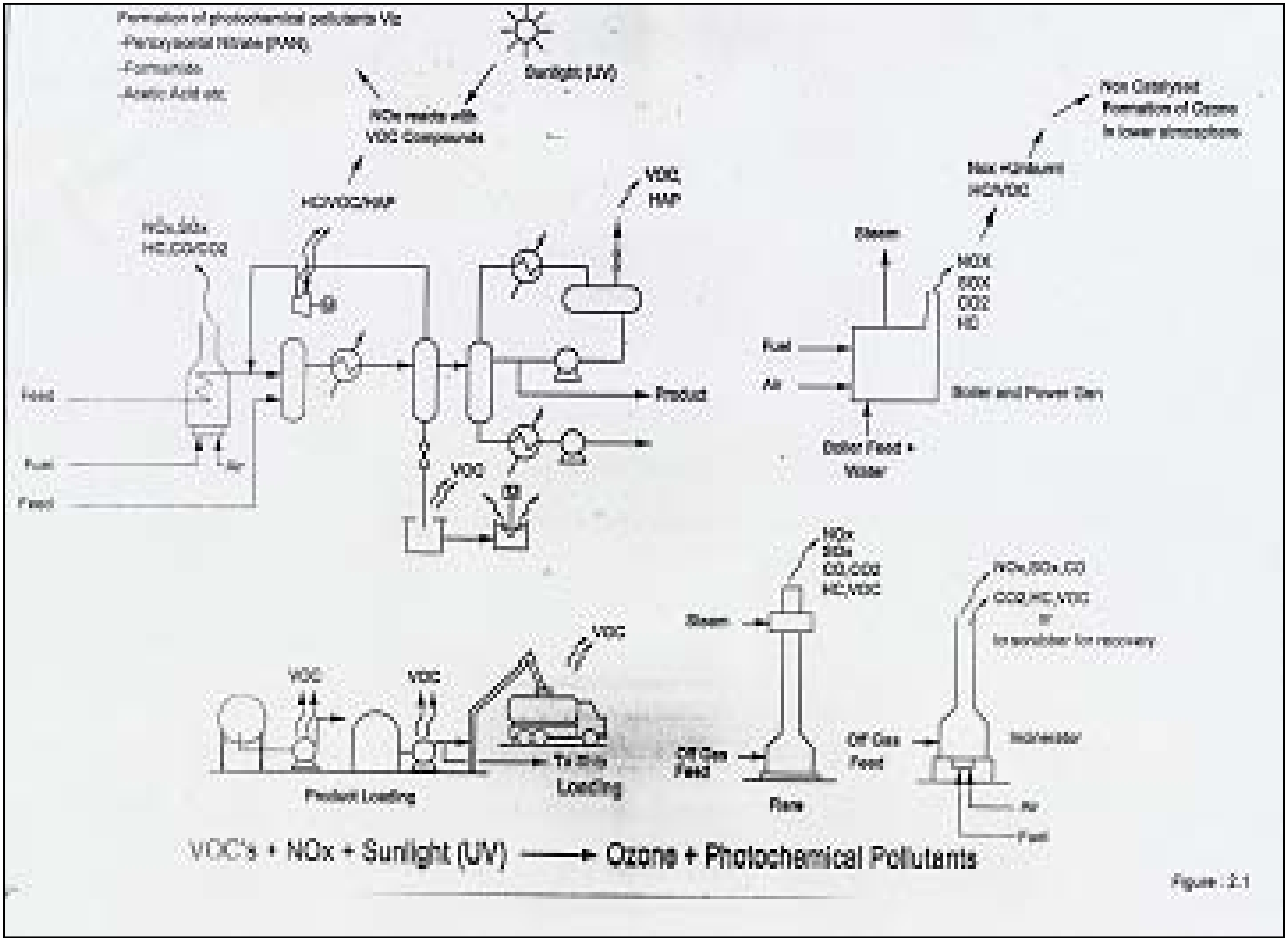
THE POSSIBLE INVENTORY

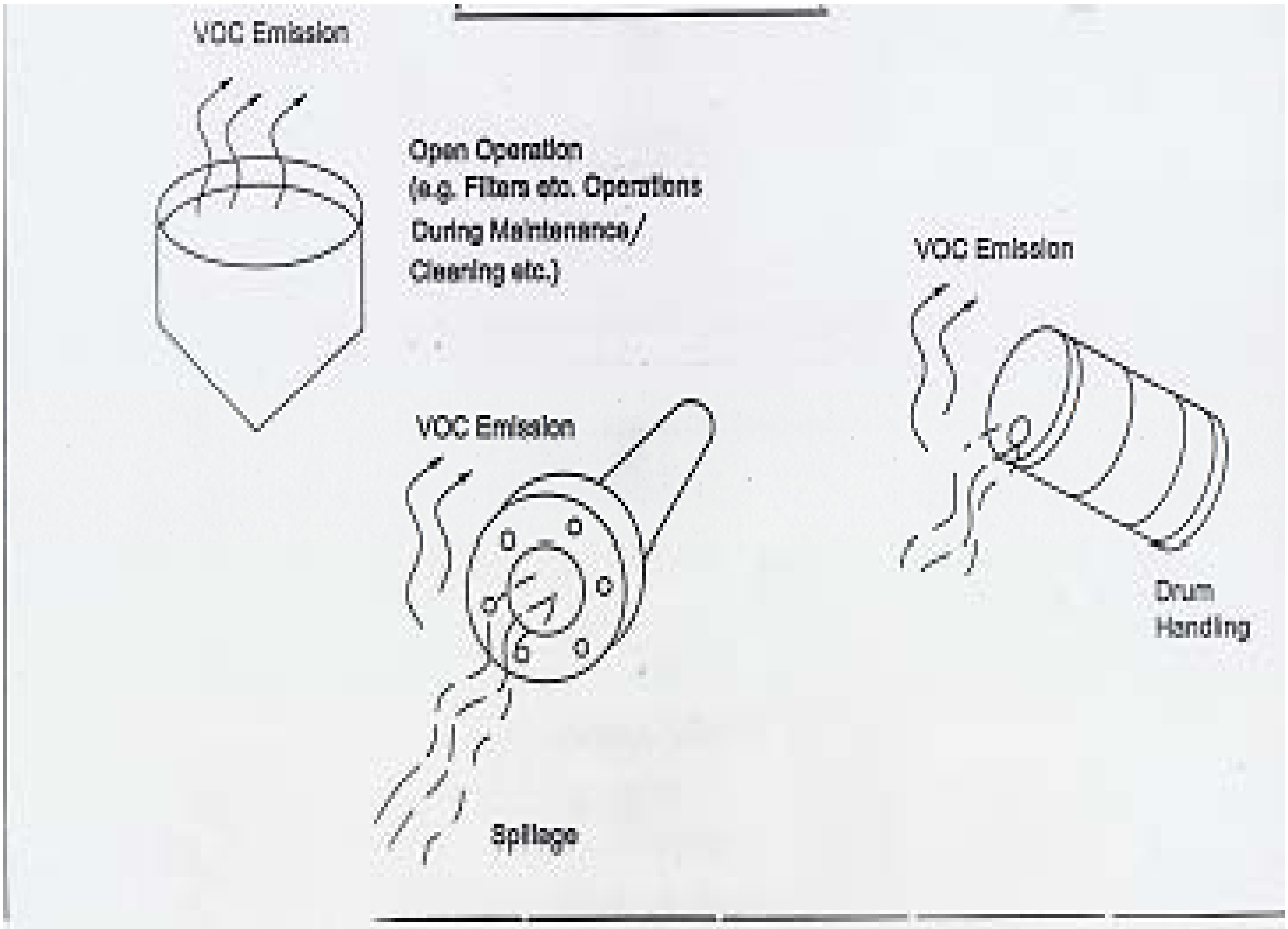
- What are the possible point sources (channelised) in the complex?
- What are the sources of combustion, how much load of particulate matter, sulfur dioxide, nitrogen oxides and carbon di-oxides are generated in terms of tonnes per day?
- What are the sources of conventional parameter from channelised sources of process?
- Identification of most probable pollutants from vent off and purge gases.
- Budget of fugitive emission.

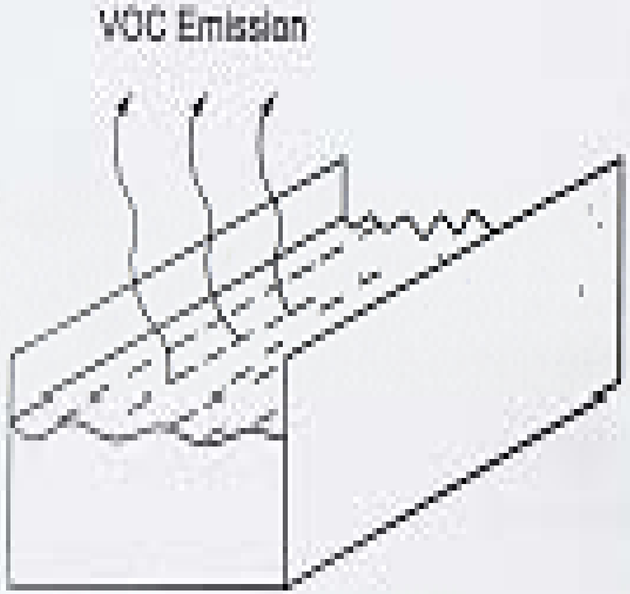
TYPICAL PERCENT SHARE OF EMISSIONS

S.NO	Source	% Typical
1	Fugitive emissions from equipment	40-60
2	Process vents	5-15
3	Storage tanks	5-15
4	Loading /unloading facilities	15-25
5	WWTP	10-20

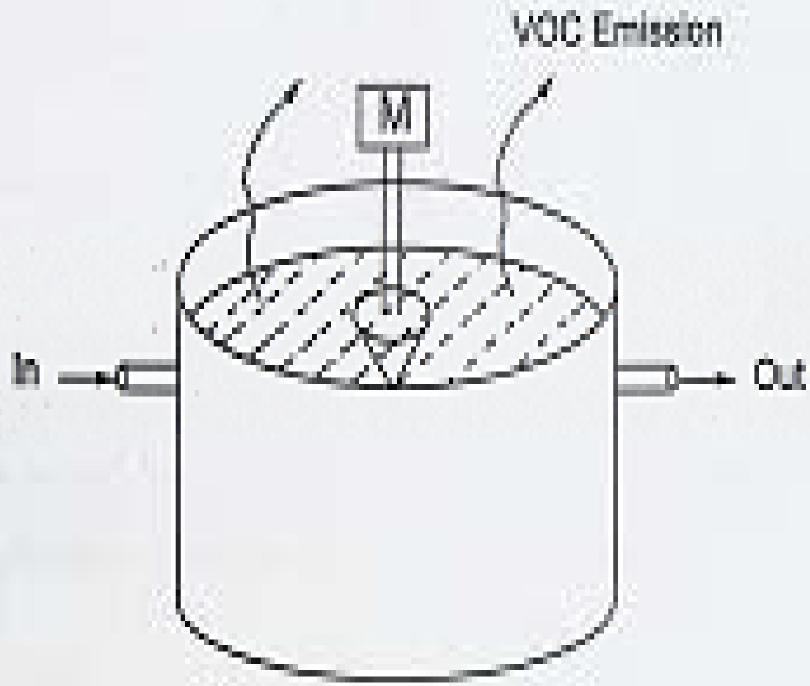
SOURCES OF EMISSIONS



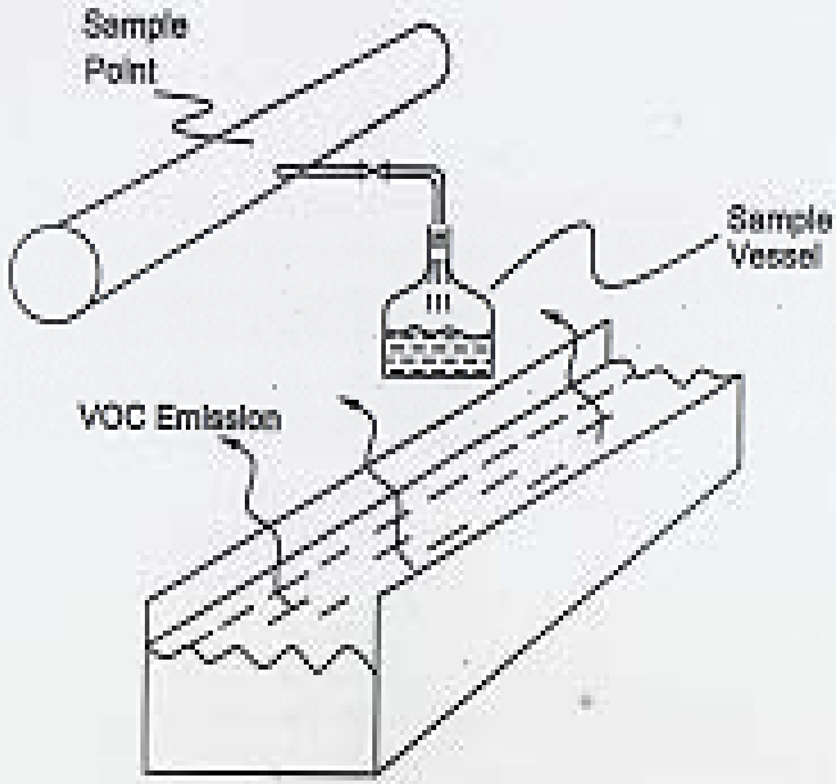

VOC Emission
Open Operation
(e.g. Filters etc. Operations
During Maintenance/
Cleaning etc.)
VOC Emission
VOC Emission
Drum
Handling
Spillage



Influent Collection Sewers



Effluent Treatment

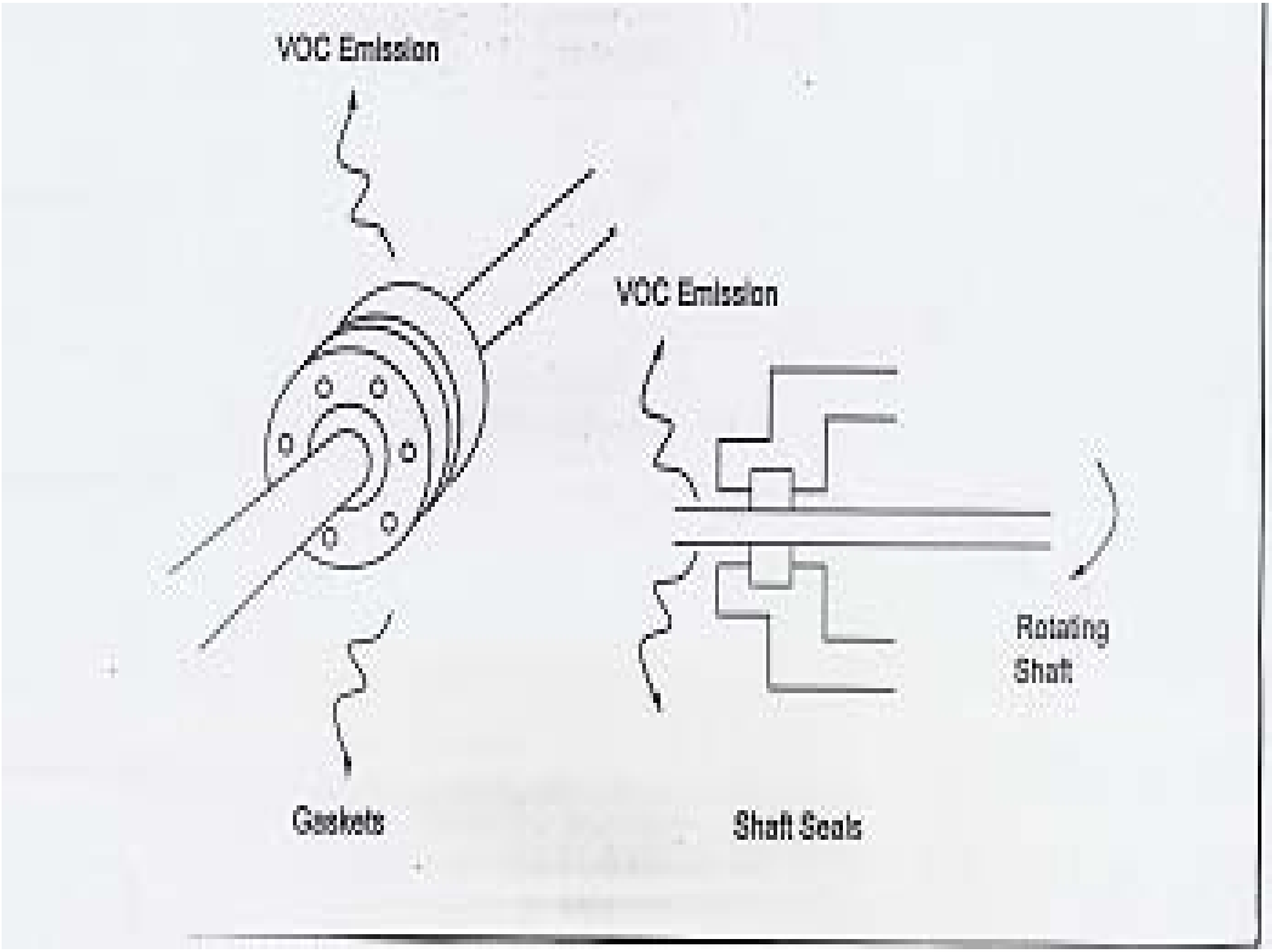


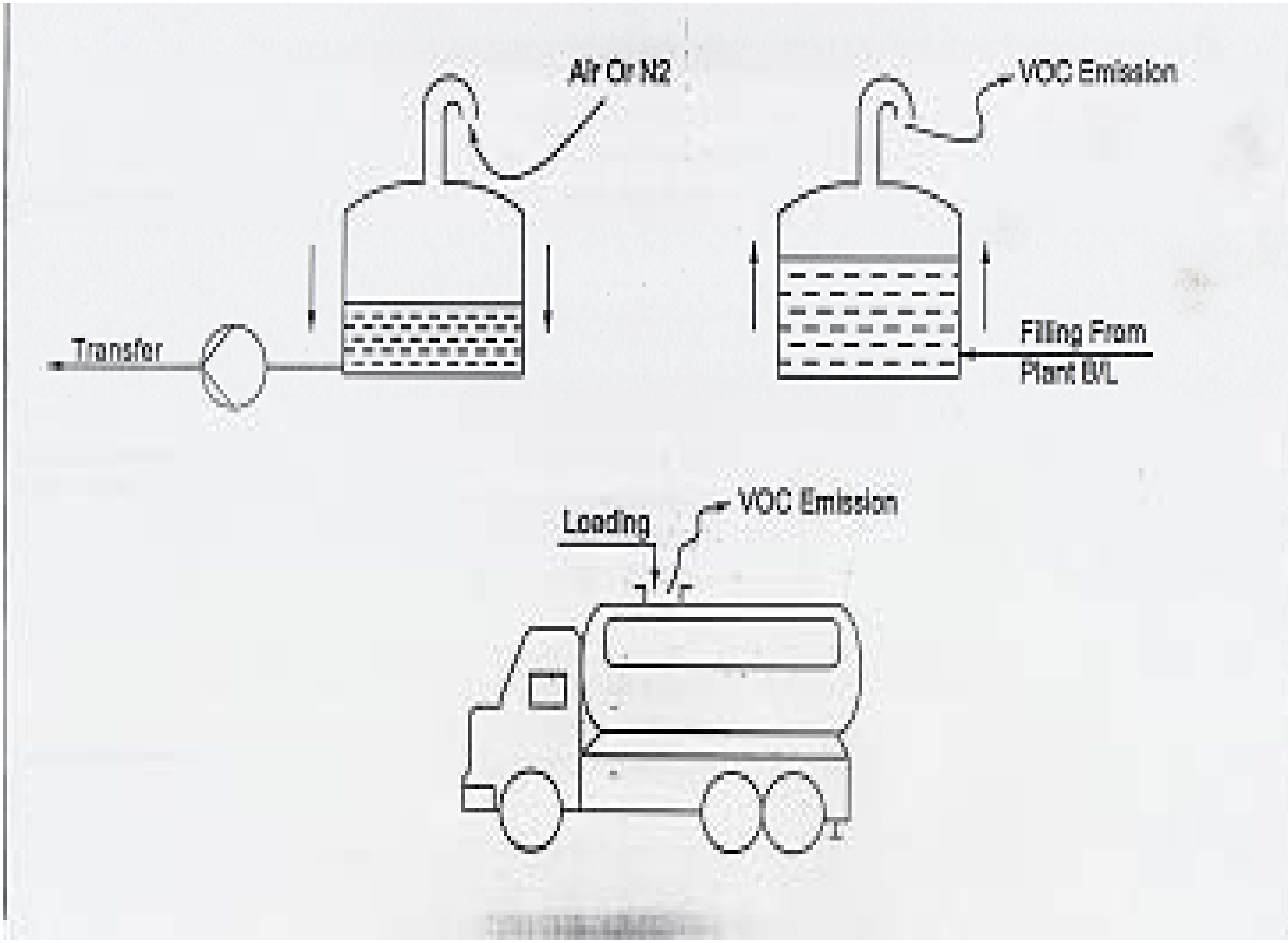
Notes

Sampling Waste

* First Flush The Sample Equipment, Then
  Taken The Sample

  (In Petrochemical Plants Sampling Can Be One Off The Significant Source Of Emission)


VOC Emission
VOC Emission
Rotating
Shaft
Gaskets
Shaft Seals


Air Or N2
Transfer
VOC Emission
Filling From
Plant B/L
Loading
VOC Emission

SELF REGULATION

- CEMS (Continuous Emission Monitoring System)
- LDAR (Leak Detection And Repair)
- AMBIENT Air Monitoring Programme

SOURCES OF AIR POLLUTANTS AND LIMITATIONS OF CONSENT MECHANISM

NON VEHICULAR SOURCES

COMBUSTION SOURCES

Point Source

- Cast iron furnace
- Fuel & oil combustion
- Incinerator
- Diesel generator
- Kerosene generator
- Petroleum refining
- Power plant (natural gas)
- Power plant (coal)
- Brick & clay product
- Coal combustion

Non Point Source

- LPG- Home
- Wood- stove/ restaurant
- Kerosene stove
- Agriculture waste burning
- Coal stove (tandoor)
- Cow dung
- Bagasse
- Plastic & leather waste burning
- Solid waste burning
- Refuse combustion

NON COMBUSTION SOURCES

Point Source

- Petroleum refining
- Fertilizer plant packaging
- Hot mix asphalt packaging
- Glass manufacturing
- Iron & steel production
- Cast iron
- Gray iron foundries
- Lead oxide and pigment production
- Earthen pot kiln
- Carbon black
- Paint & varnish

Non Point Source

- Paved road
- Unpaved road
- Soil dust
- Fugitive dust
- Asphalt paving operation
- Construction work

I Have yet to see any problem, however complicated, which when you look at it in the right way did not become still more complicated –

Paul Anderson