CE102: Environmental Studies

By

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Environmental Legislations and Standards

Environmental Legislations and Standards

Constitutional Duty

For every citizen:

According to the sub-clause (g) of Art. 51-A - "It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for the living creatures".

For State:

Article 48 – A (42nd Amendment) - Cast a duty on State in the Directive Principles of the state policy for taking steps for the protection and improvement of the environment.

Environmental Legislations and Standards

The Fourth Five Year Plan (1968-73)

Environmental Dimensions in Planning and Development

Pitambar Pant Committee – Country Paper on Human Environment

National Committee on Environmental Planning and Coordination (NCEPC) (February, 1972)

UN Conference on Human Environment, Stockholm, 1972

Preservation of Natural Resources Preservation of Env. Quality

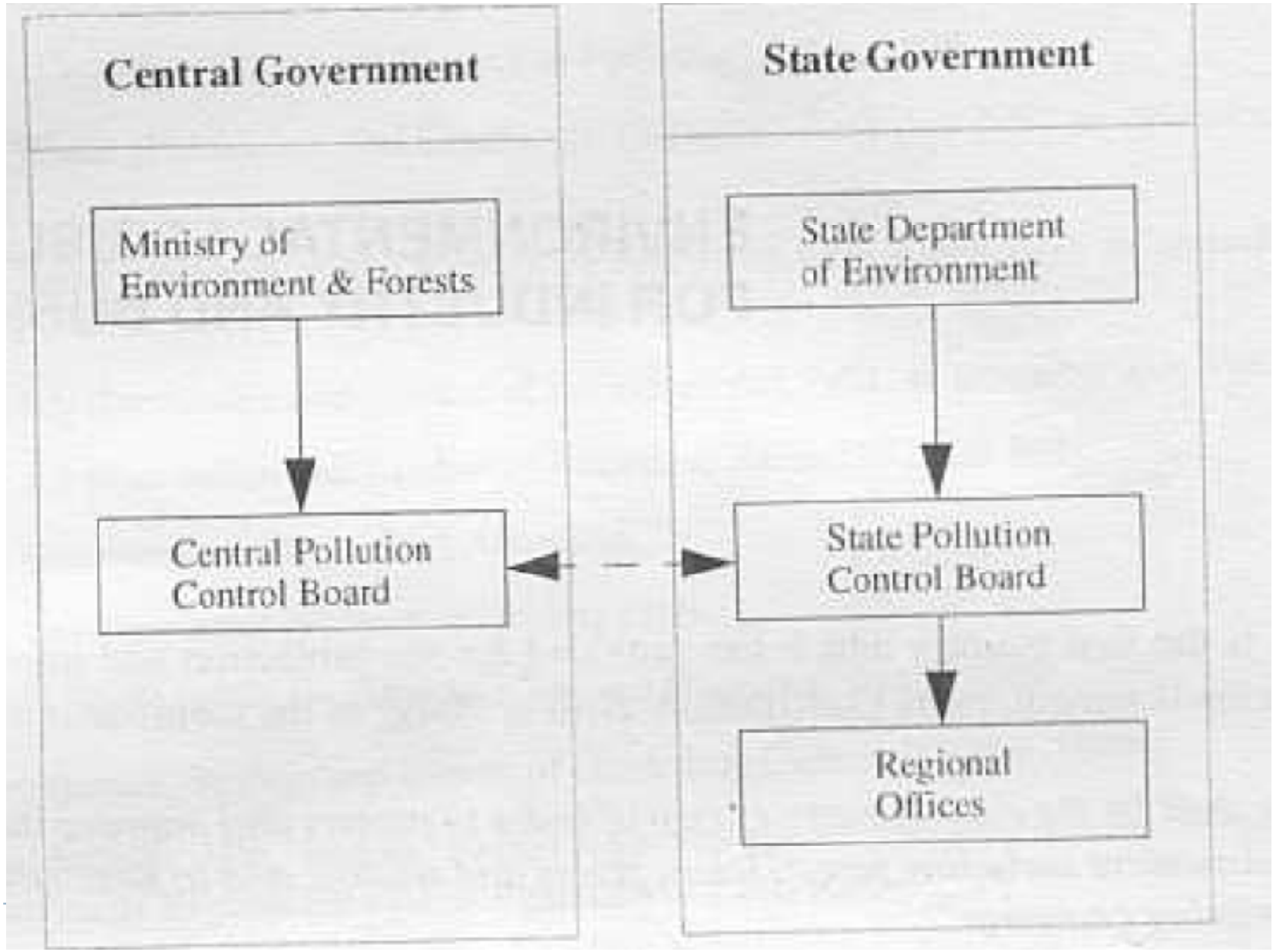
Polluter Pays Principle (PPP)

Water Pollution (Prevention and Control) Act, 1974

Department of Environment, 1980

Ministry of Environment and Forests, 1985

Environmental Legislations and Standards



*Now it is called: Ministry of Environment, Forest and Climate Change

Environmental Legislations and Standards

Name of the Agency	*Key Functions*
Ministry of Environment and Forests	• Environmental Policy Planning • Ensure effective implementation of legislation • Monitoring and Control of Pollution • Eco-Development • Environmental Clearances for Industrial and Development Projects • Environmental Research • Promotion of the Environmental Education, Training and Awareness • Coordination with concerned agencies at the national and international levels • Forest Conservation, Development and Wildlife Protection • Biosphere Reserve Programme
Central Pollution Control Board	• Promote cleanliness of streams and wells • Advise the Central Government on the matters concerning prevention, control and abatement of Water and Air pollution • Co-ordinate and provide technical and research assistance to State Boards • Information dissemination, training and awareness • Lay down, modify or annul the standards for a stream or well, and for air quality • Planning and execution of nation wide programmes for the prevention, control or abatement of Water and Air pollution. • Ensure compliance with the provisions of the Environment (Protection) Act, 1986
State Pollution Control Boards	• Planning and execution of state wide programmes for the prevention, control or abatement of Water and Air pollution • Advise the State Government on prevention, control and abatement of water and air pollution and siting of industries • Information dissemination, training and awareness • Ensure compliance with the provisions of the relevant Acts. • Lay down, modify or annul the effluent and emission standards • Ensure legal action against defaulters • Evolve techno-economic methods for treatment, disposal and utilisation of the effluent.

Table: Environmental Legislations in India

- The Water (Prevention and Control of Pollution) Act, 1974 (amended 1988)
- The Water (Prevention and Control of Pollution) Rules, 1975
- The Water (Prevention and Control of Pollution) Cess Act, 1977 (amended 1991)
- The Water (Prevention and Control of Pollution) Cess Rules, 1978 (amended 1992)
- The Air (Prevention and Control of Pollution) Act, 1981 (amended 1987)
- The Air (Prevention and Control of Pollution) Rules, 1982 and 1983
- The Environment (Protection) Act, 1986
- The Environment (Protection) Rules, 1986
- The Hazardous Wastes (Management and Handling) Rules, 1989 (amended 2003)
- Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms, Genetically Engineered Micro-organisms or Cells Rules, 1989
- Environmental (Protection) Rules, 1992 and 1993 – “Environmental Statement”
- Environmental (Protection) Rules, 1993 – “Environmental Standards”
- Environmental (Protection) Rules, 1994 – “Environmental Clearance”
- The National Environmental Tribunal Act, 1995
- The National Environmental Appellate Authority Act, 1997

Table: Environmental Legislations in India

- Bio-medical Waste (Management and Handling) Rules, 1998 (amended 2003)
- Noise Pollution (Regulation and Control) Rules, 2000
- Batteries (Management and Handling) Rules, 2001 (amended 2010)
- The Plastics (Manufacture, Usage and Waste Management) Rules, 2009
- E-waste (Management) Rules, 2016
- Municipal Solid Wastes (Management and Handling) Rules, 2016

Drinking Water Standards

As per IS 10500-2012>>

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, *Max*	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	*p*H value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, *Max*	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, *Max*	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Drinking Water Standards

As per IS 10500-2012>>

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, *Max*	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, *Max*	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MBAS) mg/l, *Max*	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, *Max*	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, *Max*	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, *Max*	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl_2), mg/l, *Max*	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, *Max*	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, *Max*	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, *Max*	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, *Min*	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, *Max*	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, *Max*	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, *Max*	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, *Max*	0.5	No relaxation	Clause 6 of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO_3), mg/l, *Max*	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C_6H_5OH), mg/l, *Max*	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, *Max*	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, *Max*	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO_4) mg/l, *Max*	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H_2S), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, *Max*	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as $CaCO_3$), mg/l, *Max*	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, *Max*	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Drinking Water Standards

As per IS 10500-2012>>

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Cadmium (as Cd), mg/l, *Max*	0.003	No relaxation	IS 3025 (Part 41)	—
ii)	Cyanide (as CN), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 27)	—
iii)	Lead (as Pb), mg/l, *Max*	0.01	No relaxation	IS 3025 (Part 47)	—
iv)	Mercury (as Hg), mg/l, *Max*	0.001	No relaxation	IS 3025 (Part 48)/ Mercury analyser	—
v)	Molybdenum (as Mo), mg/l, *Max*	0.07	No relaxation	IS 3025 (Part 2)	—
vi)	Nickel (as Ni), mg/l, *Max*	0.02	No relaxation	IS 3025 (Part 54)	—
vii)	Pesticides, µg/l, *Max*	See Table 5	No relaxation	See Table 5	—
viii)	Polychlorinated biphenyls, mg/l, *Max*	0.000 5	No relaxation	ASTM 5175[a] or APHA 6630	—
ix)	Polynuclear aromatic hydro-carbons (as PAH), mg/l, *Max*	0.000 1	No relaxation	APHA 6440	—
x)	Total arsenic (as As), mg/l, *Max*	0.01	0.05	IS 3025 (Part 37)	—
xi)	Total chromium (as Cr), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 52)	—
xii)	Trihalomethanes:				
	a) Bromoform, mg/l, *Max*	0.1	No relaxation	ASTM D 3973-85[a] or APHA 6232	—
	b) Dibromochloromethane, mg/l, *Max*	0.1	No relaxation	ASTM D 3973-85[a] or APHA 6232	—
	c) Bromodichloromethane, mg/l, *Max*	0.06	No relaxation	ASTM D 3973-85[a] or APHA 6232	—
	d) Chloroform, mg/l, *Max*	0.2	No relaxation	ASTM D 3973-85[a] or APHA 6232	—

NOTES

1 In case of dispute, the method indicated by "a" shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Sl No.	Organisms	Requirements
(1)	(2)	(3)
i)	*All water intended for drinking*:	
	a) *E. coli* or thermotolerant coliform bacteria[a, b]	Shall not be detectable in any 100 ml sample
ii)	*Treated water entering the distribution system*:	
	a) *E. coli* or thermotolerant coliform bacteria[b]	Shall not be detectable in any 100 ml sample
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample
iii)	*Treated water in the distribution system*:	
	a) *E. coli* or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample

[a]Immediate investigative action shall be taken if either *E.coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause shall be determined by immediate further investigation.

[b]Although, *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests shall be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

[c]It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for progressive improvement of water supplies.

Environmental Discharge and Emission Standards

Effluent Discharge Standards:

Industry-specific Standards are available at:
http://cpcb.nic.in/Industry_Specific_Standards.php

[N1 = shall not exceed 5oC above the receiving water temperature, N2 = all efforts should be made to remove colour and unpleasant odour as far as practicable, N3 = 90% survival of fish after 96 hours in 100% effluent, N4 = applicable to DDT, endosulfan, carbaryl, malathion, phenothoate, methyl parathion, phenitrothion, phorate, pyrethrum and BHC, N5 = floatable solids 3 mm and settleable solids 850 micron]

Sl	Parameter and Unit	Into surface water	Into public sewers	Into irrigation water	Into coastal water
1	Temperature	N1	--	--	N1
2	Odour	N2	--	N2	N2
3	Colour (True) (Hazen unit)	N2	--	N2	N2
4	pH (max) (min : 6.5)	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.0
5	BOD (3d, 27oC) (mg/L)	30	350	100	100
6	COD (mg/L)	250	--	--	250
7	TSS (mg/L)	100	600	200	*100
8	TDS (mg/L)	2100	--	2100	--
9	Oil and Grease (mg/L)	10	20	10	20
10	Chlorides (mg/L as Cl)	1000	1000	600	--
11	Sulfates (mg/L as SO4)	1000	1000	1000	--
12	Nitrates (mg/L as NO3)	10	--	--	20
13	Total Residual Chlorine (mg/L)	1	--	--	1
14	Free NH3 (mg/L as N)	5	--	--	5
15	Ammoniacal Nitrogen (mg/L N)	50	50	--	50
16	TKN (mg/L as N)	100	--	--	100
17	Fluorides (mg/L as F)	2	15	--	15
18	Sulfide (mg/L as S)	2	--	--	5
19	Dissolved Phosphates (mg/L P)	5	--	--	--
20	Copper (mg/L)	3	3	--	3
21	Iron (mg/L)	3	3	--	3
22	Manganese (mg/L)	2	2	--	2
23	Zinc (mg/L)	5	15	--	15
24	Nickel (mg/L)	3	3	--	5
25	Boron (mg/L as B)	2	2	2	--

Environmental Discharge and Emission Standards

Effluent Discharge Standards:

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Sl	Parameter and Unit	Into surface water	Into public sewers	Into irrigation water	Into coastal water
26	Arsenic Total (mg/L)	0.2	0.2	0.2	0.2
27	Mercury (mg/L)	0.01	0.01	0.01	0.01
28	Lead (mg/L)	0.1	1	--	1
29	Cadmium (mg/L)	2	1	--	2
30	Chromium (VI) (mg/L)	0.1	2	--	1
31	Chromium Total (mg/L)	2	2	--	2
32	Selenium (mg/L)	0.05	0.05	--	0.05
33	Vanadium (mg/L)	0.2	0.2	--	0.2
34	Cyanide (mg/L as CN)	0.2	2	0.2	0.2
35	Phenols (mg/L)	1	5	--	5
36	Pesticides (ug/L) (N4)	10	10	--	10
37	Alpha emitters (10^{-6}uC/mL)	10^{-7}	10^{-7}	10^{-8}	10^{-7}
38	Beta emitters (10^{-6}uC/mL)	10^{-6}	10^{-6}	10^{-7}	10^{-6}
39	Percent Sodium (%)	--	60	60	--
40	Residual Sodium Carbonate(mg/L)	--	--	5	--
41	Bio-assay (% 96 hour survival)	N3	N3	N3	N3
42	SS particle size (pass IS sieve)	850	--	--	N5

* For cooling water effluent 10% above TSS of influent.

Environmental Discharge and Emission Standards

Effluent Discharge Standards (Pesticides):

Sl	Pesticide	Into surface water (ug/L)	Into public sewers (ug/L)	Into Irrigation water(ug/L)	Into coastal water (ug/L)
1	Benzene hexachloride	10	--	10	10
2	Carbaryl	10	--	10	10
3	DDT	10	--	10	10
4	Endosulfun	10	--	10	10
5	Diamethoate	450	--	450	450
6	Penitrothion	10	--	10	10
7	Malathion	10	--	10	10
8	Phorate	10	--	10	10
9	Methyl parathion	10	--	10	10
10	Phenthoate	10	--	10	10
11	Pyrethrums	10	--	10	10
12	Copper oxychloride	9600	--	9600	9600
13	Copper sulphate	50	--	50	50
14	Zirum	1000	--	1000	1000
15	Sulphur	30	--	30	30
16	Paraquat	2300	--	2300	2300
17	Proponil	7300	--	7300	7300

Environmental Discharge and Emission Standards

Surface Water Quality Criteria based on Designated Best-use Classification:

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH betwwn 6.0 to 8.5 • Electrical Conductivity at 25°C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l

Environmental Discharge and Emission Standards

National Ambient Air Quality (NAAQ) Standards:

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	- UV photometric - Chemilminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
		24 hours**	1.0	1.0	- ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

Environmental Discharge and Emission Standards

National Ambient Air Quality (NAAQ) Standards:

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

Environmental Discharge and Emission Standards

Noise Standard:

Area code	Category of Areas	Noise limits in dB(A) as L_{eq}	
		Day Time	Night Time
(A)	Industrial	75	70
(B)	Commercial	65	55
(C)	Residential	55	45
(D)	Silence zone	50	40

Note:
1. Daytime is reckoned in between 6 A.M and 10 P.M.
2. Nighttime is reckoned in between 10 P.M. and 6 A.M.

Silence zone is defined as area up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent Authority. Use of vehicular horns, loud speakers and bursting of crackers shall be banned in these zones.