Environmental quality objectives – Rationale on environmental standards

Concentration & mass standards -
(Qualitative & Quantitative)

Effluent & stream standards –
(Sewage & rivers/ocean)

Emmission & ambient standards –
(from vehicle & air quality around us)

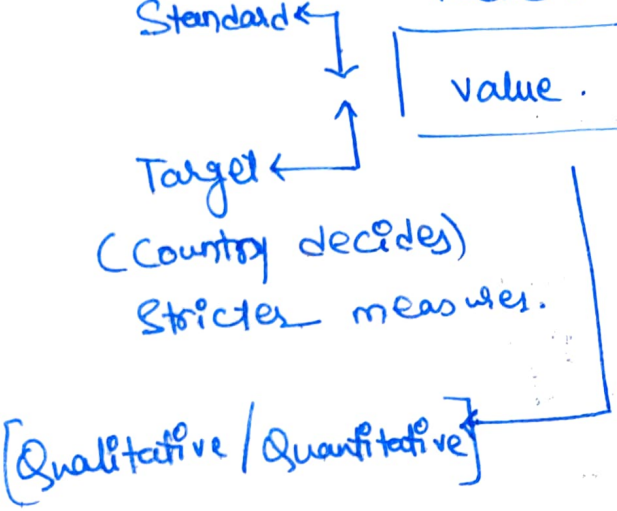
Minimum National standards –

To provide basis and rationale for the development & subsequent adaptation of environmental quality standards

To provide the users & professionals with permissible limit of different parameters of effluents that interact with environment.

to avoid adverse health effects which might happen from exposure to high pollution levels, protecting environmental quality or supporting sustainable development.

Guide. → Research, case studies, Past history, Medical records



Rationale.

Feasibility
Necessity
Implementability
Enforceability
Legality.

Qualitative — the amount of cadmium in fresh water should not be higher than 0.2 µg/l

Environmental problems are manifold & complex.

for eg: Air pollution is linked to high tropospheric ozone concentration, precipitation of acidifying substances or even the green house gases → climatic change

Then, water pollution

Food that we eat.

So it becomes necessary to set values indicating levels which should not be exceeded to guarantee health, environmental quality & other policy targets → Standards

Standards are actually the policy instruments.

group of physical instruments for environmental policy.

↓

State of environment studies.
environmental planning
environmental impact studies.
life cycle analysis

For environmental standards, the environmental components can have two meaning.

— To the extent that standards aim to avoid negative health consequences of exposure to pollution.

— the environmental standards should not only protect human health, but should rather protect the environment

— Also, to support sustainable development. target of environment policy. Avoiding adverse health impact from high pollution level, protecting environment & contributing sustainable development.

Guidelines — Safety factor

Standard ↔ takes account into technical, economic, social, cultural or political aspects.

water quality - pesticide free.

then Europes standards on concentration of NO_3 in drinking water. The natural concentration of NO_3 is less than 1 mg/l.

Now pollution mainly stems from manure & inorganic fertilizers from agriculture WHO guide lines of 45 mg/l but European directive suggests 50 mg/l.

→ higher value in economic.

It is not feasible according economy to reduce which is normally 50 mg/l. but Union recommends to bringing down to 25 mg/l.

Therefore it can be said 50 mg/l (Max admissible concentration) & 25 mg/l (Guide Level) or (Objective level)

⇓

is the political target to be reached to avoid health issues. or environmental issues

for number of pollutants, the use of guidelines & standards are aimed at avoiding negative impact to human health & environment has become unrealistic.

for eg:. tropospheric ozone concentration in many countries exceeds WHO guidelines of 200 µg/m³ of air for 1hr. or 65 µg/m³ for 24 hours

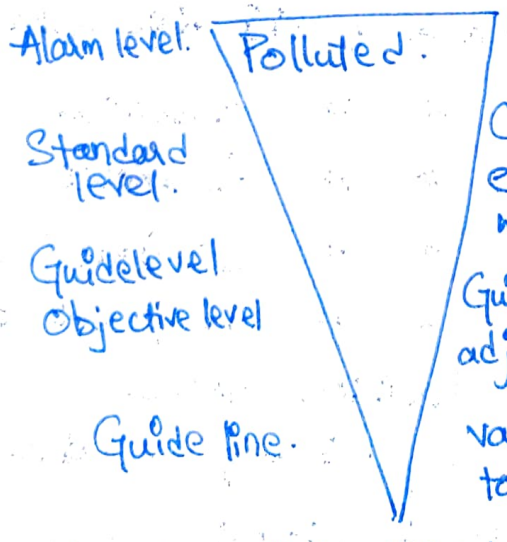
No safety factor built into this guideline.

Resulting during sunny days regularly impact human health.

Thus it is advocated to establish alarm levels. based on — specification of what effects ( ) the authorities avoid.

Specification of pollutant concentrations causing these ~~few~~ effects.

Thus alarm level, as a rule will be higher than guideline level values. taken into account of seriousness of damage



Key characteristics of standards used in environmental polic

1. Set a general rule for specific aspect.
2. Address health, environment, materials or pollution sources.
3. Set purely quantitative values for pollutants which should not be exceeded.
4. Be targeted towards eco systems or pollutions rather than to individuals.
5. Preferably they should have legal force.

Advantages – Pollution prevention measures
Pollution control decisions.
Revisions
Guide lines.

Disadvantages – Lack of scientific data
" " Research
" " Technology
" " Credible data.
" " Standardization.
Revision norms.
Dynamically changing world.

No correlation between epidemiological data with toxicology Studies / mechanism: Contemporary ~~data~~ shows that the results of observational epidemiology studies shows ~~there is~~ can be eg:
a seriously biased particularly when estimated risks are small as in case with studies of air pollution

Summary:

1. Environmental standards are administrative regulations or civil law rules implemented for treatment & maintenance of environment.
Environmental ~~rules~~ standards should preserve nature & environment, protect against damages & repair the past damage caused by human activity.

2. Environmental quality standard is a concept for which there is no uniform definition in the legislative systems around the world. In any case, when set in legislation they are legally binding limits & then translated into concentration of individual substances.

3. The basis on which a standard is set can vary according to type of standard, but to the extent that standards are aimed in to protecting human health or environ. based upon guide lines.

4. A "standard" is value "fixed by authorities".
In general it is enshrined in a legal regulation and thus has a "legal force"

5. Although ~~leg~~ standard is based upon guide line, it takes into account of technical, economical, social, cultural or political aspects
Feasibility is one of the important criterion

6. Economic aspects will invariably look at the cost of standard application. In certain circumstances, reasons are accepted to pursue policies which result in above or below (pollutant conc.) guide lines.

Various Environmental Standards

1. Drinking water standards

Parameters	Standard value (s_i)	Permissible values	Unit weight factor (w_i)
Ph	6.5–8.5	No relaxation	0.219
Turbidity (NTU)	5	25	0.08
TDS (mg/l)	500	2000	0.00370
Total hardness (mg/l)	300	600	0.00618
Sulphates (mg/l)	200	400	0.01236
Magnesium (mg/l)	30	100	0.0618
Nitrates (mg/l)	45	No relaxation	0.0412
Chloride (mg/l)	250	1000	0.00741
Calcium (mg/l)	75	200	0.02472
Sum of unit weight factor			$\sum W_i$ = 0.74638

2. Fresh water classification

Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1.Total Coliforms OrganismMPN/100ml shall be 50 or less 2.pH between 6.5 and 8.5 3.Dissolved Oxygen 6mg/l or more 4.Biochemical Oxygen Demand 5 days 20°C 2 mg/l or less
Outdoor bathing (Organised)	B	1.Total Coliforms Organism MPN/100ml shall be 500 or less 2.pH between 6.5 and 8.5 3.Dissolved Oxygen 5mg/l or more 4.Biochemical Oxygen Demand 5 days 20°C 3 mg/l or less

Drinking water source after conventional treatment and disinfection	C	1.Total Coliforms Organism MPN/100ml shall be 5000 or less 2.pH between 6 to 9 3.Dissolved Oxygen 4 mg/l or more 4.Biochemical Oxygen Demand 5 days 20°C 3 mg/l or less
Propagation of Wild life and Fisheries	D	1.pH between 6.5 to 8.5 2.Dissolved Oxygen 4 mg/l or more 3.Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	1.pH betwwn 6.0 to 8.5 2.Electrical Conductivity at 25°C micro mhos/cm Max.2250 3.Sodium absorption Ratio (SAR) Max. 26 4.Boron Max. 2mg/l
	Below -E	Not Meeting A, B, C, D & E Criteria

3. Effluent Disposal Standards

S.No.	Parameter	Standards for disposal of treated effluent in			
		Inland surface water	Public Sewer	Land for irrigation	Marine coastal areas
1.	2.	3.			
		(a)	(b)	(c)	(d)
1.	Colour and odour	See Note-1	---	See Note-1	See Note-1
2.	Suspended Solids, mg/l, Max	100	600	200	(a) For process waste water-100 (b) For cooling water effluent-10 per cent above total suspended matter of influent cooling water.
3.	Particle size of suspended solids	Shall pass 850 micron IS Sieve	---	---	(a) Floatable solids, Max 3 mm (b) Settleable solids Max 850 microns.

26.	Residual sodium carbonate, mg/l, Max.	---	---	5.0	---
27.	Cyanide (as CN), mg/l, Max.	0.2	2.0	0.2	0.2
28.	Chloride (as Cl), mg/l, Max.	1000	1000	600	(a)
29.	Fluoride (as F), mg/l, Max.	2.0	15	---	15
30.	Dissolved Phosphates (as P), mg/l, Max.	5.0	---	---	---
31.	Sulphate (as SO_4), mg/l, Max.	1000	1000	1000	---
32.	Sulphide (as S), mg/l, Max.	2.0	---	---	5.0
33.	Pesticides	Absent	Absent	Absent	Absent
34.	Phenolic compounds (as C_6H_5OH), mg/l, Max.	1.0	5.0	---	5.0
35.	Radioactive materials (a) Alpha emitters MC/ml, Max. (b) Beta emitters uc/ml, Max.	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}	10^{-7} 10^{-6}

4. National air quality standards

NATIONAL AMBIENT AIR QUALITY STANDARDS (2009)

Pollutants (µg/m³)	Time Weighted Average	Concentration in Ambient Air	
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by GOI)
Sulphur Dioxide (SO_2)	Annual * 24 Hours **	50 80	20 80
Nitrogen Dioxide (NO_2)	Annual * 24 Hours **	40 80	30 80
Particulate Matter, Size less than 10 µm (PM_{10})	Annual * 24 Hours **	60 100	60 100
Particulate Matter, Size less than 2.5µm ($PM_{2.5}$)	Annual * 24 Hours **	40 60	40 60
Ozone (O_3)	8 Hours * 1 Hour **	100 180	100 180

5. Noise Standards

Land use and land cover		Noise level (dB[A])	
		Daytime	Nighttime
Roadside	Green space and residential area	65	55
	Commercial area	70	60
	Industrial area	75	70
Non-roadside	Residential area	55	40
	Commercial area	65	55
	Industrial area	70	65
	Green space	50	45

6. Others:

Substance	Permissible limits	
	New standards	Old standards
Cadmium and its compounds	0.1 mg/l	0.1 mg/l
Cyanide compounds	1 mg/l	1 mg/l
Organic phosphorous compounds (parathion, methylparathion, methyldemeton and EPN only)	1 mg/l	1 mg/l
Lead and its compounds	0.1 mg/l	1 mg/l
Sexivalant chrome compounds	0.5 mg/l	0.5 mg/l
Arsenic and its compounds	0.1 mg/l	0.5 mg/l
Total-mercury	0.005 mg/l	0.005 mg/l
Alkyl-mercury compounds	not detected	not detected
PCB_s	0.003 mg/l	0.003 mg/l
Trichloroethylene	0.3 mg/l	0.3 mg/l
Tetrachloroethylene	0.1 mg/l	0.1 mg/l
Dichloromethane	0.2 mg/l	—
Carbon tetrachloride	0.02 mg/l	—
1,2-dichloroethane	0.04 mg/l	—
1,1-dichloroethylene	0.2 mg/l	—
cis-1,2-dichloroethylene	0.4 mg/l	—
1,1,1-trichloroethane	3 mg/l	—
1,1,2-trichloroethane	0.06 mg/l	—
1,3-dichloropropene	0.02 mg/l	—
Thiram	0.06 mg/l	—
Simazine	0.03 mg/l	—
Thiobencarb	0.2 mg/l	—
Benzene	0.1 mg/l	—
Selenium and its compounds	0.1 mg/l	—

7. Drinking water standards

Drinking Water Standards of US EPA

Primary Standards MCL (maximum contaminant level)

Contaminant	Limit
Total coliforms (av. Number/ 100 mL)	1
Total coliforms (max number/ 100 mL)	5
Turbidity (ntu)	1-5
Inorganic chemicals (mg/L)	
Arsenic	0.05
Cadmium	1.0
Chromium	0.01
Fluoride	0.07-2.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.00
Selenium	0.01
Silver	0.05
Radionuclides (pCi/L)	
Gross alpha	15
Ra-226 + Ra-228	5
Gross beta	50
H-3	20,000
Sr-90	8
Organic Chemicals (µg/L)	
Endrin	0.2
Lindane	40

Contaminant	Limit
2,4_D	100
2,4,5-TP	10
Trihalonethanes	100
Benzene	0.05
Carbon trtrachloride	0.05
1,2 Dichloroethane	0.05
Trichloroethylene	0.05
Para-dichlorobenzene	0.75
1,1 Dichloroethylene	0.07
1,1,1 Trichloroethane	2.0
Vinyl chloride	0.02

Secondary Standards RCL (recommended contaminant level)

Contaminant	Limit
Chloride	250 mg/L
Color	15 units
Copper	1 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor	3 TON
pH	6.5-8.5
Sulfate	250 mg/L
Total Dissolved Solids	500 mg/L
Zinc	5 mg/L

*Parameter	FEPA[a] Standards	WHO[b] Standards
pH	6-9	6.5-9.2
Total Hardness	-	300
Total Dissolved Solid	2000	500
Electrical conductivity	-	300[c]
Total Coliform Count (100ml)	0	0
Sulphate	20	200
Sodium	-	200
Ammonium	0.01	1.5
Zinc	5.0	5.0
Iron	0.05	0.3
Lead	0.01	0.05
Cadmium	0.05	0.01

*All values in mg/L, except pH, EC (µS/cm) and Total coliform count (CFU/ml); [a] FEPA (1991), [b] WHO (1997), [c] WHO (2003).

8. Emission Standards

Emission standards for light commercial vehicles

European emission standards for light commercial vehicles ≤1305 kg (Category N_1-I), g/km

Tier	Date	CO	THC	NMHC	NO_x	HC+NO_x	PM	P
Diesel								
Euro 1	October 1994	2.72	-	-	-	0.97	0.14	-
Euro 2	January 1998	1.0	-	-	-	0.7	0.08	-
Euro 3	January 2000	0.64	-	-	0.50	0.56	0.05	-
Euro 4	January 2005	0.50	-	-	0.25	0.30	0.025	-
Euro 5	September 2009	0.500	-	-	0.180	0.230	0.005	-
Euro 6	September 2014	0.500	-	-	0.080	0.170	0.005	-
Petrol (Gasoline)								
Euro 1	October 1994	2.72	-	-	-	0.97	-	-
Euro 2	January 1998	2.2	-	-	-	0.5	-	-
Euro 3	January 2000	2.3	0.20	-	0.15	-	-	-
Euro 4	January 2005	1.0	0.10	-	0.08	-	-	-
Euro 5	September 2009	1.000	0.100	0.068	0.060	-	0.005*	-
Euro 6	September 2014	1.000	0.100	0.068	0.060	-	0.005*	-
* Applies only to vehicles with direct injection engines								

Philippine Motor Vehicle Emission Standards By Year 2003

Tailpipe Emission Pollutants	Light Vehicles	Light Commercial Vehicles Category 1 <1250 kgs. Cat.2 bet. 1250 &1700 Category 3 >1700 kgs.	Heavy Duty Vehicles (g/KwHr.)
Carbon Monoxide- CO (g./Km.)	2.72	Category 1 = 2.72 Category 2 = 5.17 Category 3 = 6.90	4.5
Hydrocarbon + Nitrogen Oxides (g/km.)	0.97	Category 1 = 0.97 Category 2 = 1.40 Category 3 = 1.70	H.C. = 1.1 NOx = 8.0
Particulate Matter –PM10 (g./km.)	0.14	Category 1 = 0.14 Category 2 = 0.19 (1) Category 3 = 0.25	0.36 (2)

Note(1) : PM10 emission limits for compression ignition engines only.
Note(2) : PM10 emission limits multiplied by coef. of 1.7 for engines 85 Kw or less.

9. Noise Standards

Area	Noise Limit, Leq, dB(A)	
	Day Time	Night Time
Silence zone	50	45
Residential area	55	45
Commercial area	65	55
Industrial area	75	65

Area	Category of area/ zone Day time	Limits in dB(A) Night time
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence zone	50	40