Proposed Standards and Executive Summary of Comprehensive Industrial Document (COINDS) on Pesticide Industry

CPCB
IPC-I Division

PROPOSED STANDARDS AND EXECUTIVE SUMMARY

CONTENTS

1.0 INTRODUCTION

The word pest comes from the Latin word “pestis” which includes an animal or plant that occurs in such abundance as to present a distinct threat, economically or medically to man or his interest. A pest may be insect, fungus, weed, rodent, bacteria, virus, nematodes, acarid / mite, parasite and even animal or bird.

Comprehensive Industrial Document (COINDS) for Pesticide Industry was prepared in 1985-86 and revised during 1988-89. Further, status of pesticide Industry was prepared in the year 1993-94. In these documents, aspects of air pollution were not covered. Later, source emission standards for inorganic parameters like HCl, Cl_2, H_2S, P_2O_5, NH_3, HBr & PM and CH_3Cl (organic) were notified during year 2006 and also incinerator emission standards were notified in 2008 for pesticide industry. Last standards for pesticide industries was notified on June 13, 2011, Since then the sector has undergone changes in terms of raw material consumption, technological up-gradation, demand growth potential, and diverse product range. Also there is a need to re-look into the additional pollutants generated from pesticide industries other than the notified parameters & development of VOC emission standards. The existing standards/ document therefore needs to be upgraded to include new and developing technologies and their efficiancy to treat various pollutants, also to include status of pesticide industries.

The revision of COINDS is required to cover the status of pesticide industries with production details of different types of pesticides, number of units and their locations, type of pesticides and process adopted, raw materials used and effluent generation from different streams, segregation & its treatment presently adopted by industrial units, mode of disposal of wastewater, reduction & recycling of effluent, best treatment technologies available, by-product recovery / utilization, solvent recovery, identification of additional emission parameters (organic & inorganic) from process/ stack other than notified parameter.

Pesticides industry has developed substantially and has contributed significantly towards India’s agriculture and public health. Today, the domestic industry is characterized by over-capacity, low capacity utilization and unsustainable levels of production from many units and low investments in R&D.

With respect to chemical composition, pesticides can be classified into following four (4) categories:

(1) Organochlorine Pesticides

(2) Organophosphate Pesticides

(3) Carbamates

(4) Synthetic pyrethroids

2.0 INVENTORY DETAILS OF INDIAN PESTICIDE INDUSTRY

India is one of the most dynamic generic pesticide manufacturers in the world with more than 60 technical grade pesticides being manufactured indigenously by 125 producers consisting of large and medium scale enterprises (including about 10 multinational companies) and more than 500 pesticide formulators spread over the country.

The Indian agriculture sector remains the backbone of the nation's economy accounting for 15.35% of the country's Gross Domestic Product (GDP) as per the estimates of Central Statistics Office (CSO). Though the share of Indian agriculture in GDP has witnessed a decline over the years, a trend expected in a developing economy, the food grain production in India registered a CAGR of about 2% during the period FY2010-2011 and FY2016-2017.

Globally, India is the fourth largest global producer of pesticides with an estimated market size of around $4.9 billion in FY-17 after United States, Japan and China.

3.0 SELECTION OF PESTICIDE UNITS FOR IN-DEPTH STUDY

Seven (7) units were selected for In-depth study in consultation with Central Pollution Control Board (CPCB). While selecting the units, the following criteria were considered:

i) Type of pesticide being produced
ii) Chemical property of the pesticide
iii) Type of technology being used
iv) The age of the plant
v) Geographical location to make it a representative of the zone

Base line study is also carried out by direct field monitoring during the In-depth study in the seven (7) units.

a) Water Monitoring:

The water samples were collected at ETP inlet & ETP outlet for all units. The quality of all the samples is within the limit.

b) Stack Monitoring:

Monitored Value of Unit - 1

Results from Stack monitoring (Reactor Vent)

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.0052	0.0063
2)	Toluene	0.0026	0.0031
3)	Acetone	0.04906	0.0389
4)	Methanol	0.9874	0.8791
5)	Total VOC	1.0442	0.9274

Results from stack monitoring (Dryer Vent)

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Toluene	0.028	0.0196
2)	Acetone	0.358	0.2834
3)	Methanol	0.967	0.98
4)	Total VOC	1.35	1.29

Monitored Value of Unit - 2

Result from stack monitoring (Promic Amide)

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.049	BDL
2)	Toluene	0.005	0.038
3)	Acetone	0.37	0.36
4)	Methanol	0.87	0.87
5)	Total VOC	1.29	1.29

Result from stack monitoring

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.0052	0.0052
2)	Toluene	0.0027	0.0028
3)	Acetone	0.0498	0.050
4)	Methanol	0.99	0.98
5)	Total VOC	1.044	1.05

Monitored Value of Unit - 3

Result from stack monitoring

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.65	0.75
2)	Toluene	0.041	0.051
3)	Acetone	1.65	1.75
4)	Total VOC	2.35	2.55

Monitored Value of Unit - 4

Result from stack monitoring

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.21	0.21
2)	Toluene	0.0071	0.081
3)	Acetone	0.75	0.76
4)	Methanol	1.44	1.34
5)	Total VOC	2.41	2.33

Monitored Value of Unit - 5

Results from Cypermetric acid chloride stack

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.93	0.42
2)	Toluene	0.0094	0.10
3)	Xylene	0.007	BDL
4)	Acetone	1.09	1.05
5)	Methanol	0.29	0.68
6)	Total VOC	2.33	2.25

Results from Permethrin Process stack

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.33	0.48
2)	Toluene	0.043	0.08
3)	Xylene	BDL	BDL
4)	Acetone	1.09	0.71
5)	Methanol	0.92	0.887
6)	Total VOC	1.79	2.1604

Monitored Value of Unit - 6

Result from stack monitoring

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.85	0.75
2)	Toluene	0.041	0.04
3)	Acetone	2.65	2.55
4)	Total VOC	3.55	3.34

Monitored Value of Industry Unit - 7

Results from stack of metaphenoxy benzaldehyde unit

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.91	0.55
2)	Toluene	0.063	0.074
3)	Xylene	0.009	0.008
4)	Acetone	1.024	1.54
5)	Total VOC	2.012	2.182

Results from bromine recovery plant

Sl. No.	Parameters	Test Result 1 (µg/cm^3)	Test Result 2 (µg/cm^3)
1)	Benzene	0.56	0.63
2)	Toluene	0.04	0.041
3)	Acetone	1.033	1.053
4)	Total VOC	1.64	1.73

4.0 DEVELOPMENT OF STANDARDS

4.1 Existing Standard

The existing standard for Pesticide Industry is furnished below:

Emission Standards

Sl. No.	Parameter	Standard (Limiting Concentration in mg / Nm^3)
1)	HCl	20
2)	Cl_2	5
3)	H_2S	5
4)	P_2O_5 as H_3PO_4	10
5)	NH_3	30
6)	Pesticide Compounds in the form of particulate matter	20
7)	CH_3Cl	20
8)	HBr	5

Effluent Standards

Sl. No.	Parameter		Standard (Limiting Concentration)
All values are in mg/l except pH and Bioassay Test.			
i) Compulsory Parameters			
1)	pH		6.5 – 8.5
2)	BOD, 3 days, 27^0C	Formulation Unit	30
		Technical Grade Unit	100
3)	Oil and Grease		10
4)	Suspended Solids		100
5)	Bioassay Test		90 percent survival of fish after 96 hours in 100 % effluent*

Sl. No.	Parameter	Standard (Limiting Concentration)
ii) Additional Parameters		
1)	Arsenic (as As)	0,2
2)	Copper	1.0
3)	Manganese	1.0
4)	Mercury	0.01
5)	Antimony (as Sb)	0.1
6)	Zinc	1.0
7)	Nickel etc. (heavy metals individually)	Shall not exceed individually 5 times the drinking water standards as per Bureau of Indian Standards
8)	Cyanide (as CN)	0.2
9)	Nitrate (as NO_3)	50
10)	Phosphate (as P)	5.0
11)	Phenol & Phenolic Compounds as C_6H_5OH	1.0
12)	Sulphur	0.03
13)	Benzene Hexachloride (BHC)	0.01
14)	Carbonyl	0.01
15)	Copper Sulphate	0.05
16)	Copper Oxychloride	9.6
17)	DDT	0.01
18)	Dimethoate	0.45
19)	2,4D	0.4
20)	Endosulfan	0.01
21)	Fenitothrion	0.01
22)	Malathion	0.01
23)	Methyl Parathion	0.01
24)	Paraquat	2.3

Sl. No.	Parameter	Standard (Limiting Concentration)
25)	Phenathoate	0.01
26)	Phorate	0.01
27)	Proponil	7.3
28)	Pyrethrums	0.01
29)	Ziram	1.0
30)	Other Pesticide (individually)	0.10
	* Bioassay Test shall be carried out as per IS : 6582-1971.	
	Note :	
	1. The concerned State Pollution Control Board / Pollution Control Committee shall prescribe limits of Total Dissolved Solids (TDS), Sulphates and Chlorides depending on the usages of recipient water body in down stream, in which effluent shall be disposed off.	
	2. No limit for Chemical Oxygen Demand (COD) is prescribed but, COD in the treated effluent shall be monitored. If COD is persistently reported more than 250 mg/l, the industrial units discharging such an effluent shall be required to identify chemicals causing the same. In case, these are found to be toxic, as defined in Schedule I of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, the concerned State Pollution Control Board / Pollution Control Committee in such cases shall direct the industries to install tertiary treatment system by 31st March, 2012.	
	3. Parameters listed as “Additional Parameters” shall be prescribed depending upon the process and product, on a case to case basis.	

Sl. No.	Parameter		Standard (Limiting Concentration)	
	Emission Standards for Incinerator			
			Limiting concentration in mg/Nm^3, unless stated	Sampling Duration in minutes, unless stated
	Particulate Matter		50	30 or more (for sampling of 300 litres of emission)
	HCl		50	30
	SO_2		200	30
	CO		100	Daily average
	Total Organic Carbon		20	30
	Total Dioxins and Furans*	Existing Incinerator	0.2 ngTEQ/Nm^3	8 hours
		New Incinerator	0.1 ngTEQ/Nm^3	8 hours
	Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V and their compounds		1.5	2 hours
	* The existing plant shall comply with norms for Dioxins and Furans as 0.1 ngTEQ/Nm3 by 18th August, 2013.			
	Note : i. All monitored values shall be corrected to 11% oxygen on dry basis ii. The CO_2 concentration in tail gas shall not be less than 7%.			
	iii. In case, halogenated organic waste is less than 1% by weight in input waste, all the facilities in single			

Sl. No.	Parameter	Standard (Limiting Concentration)
		chamber incinerators shall be designed so as to achieve a minimum temperature of 1100°C in the incinerator. For fluidized, bed technology based incinerator, temperature shall be maintained at 950°C.
	iv.	In case halogenated organic waste is more than 1% by weight in input waste, waste shall be incinerated only in twin chamber incinerators and all the facilities shall be designed to achieve a minimum temperature of 850±25°C in primary chamber and 1100°C in secondary combustion chamber with a gas residence time in secondary combustion chamber not less than two seconds.
	v.	Scrubber meant for scrubbing emissions shall not be used as quencher.
	vi.	Incineration plants shall be operated (combustion chambers) with such temperature, retention time and turbulence, as to achieve. Total Organic Carbon (TOC) content in the incineration ash and residue less than 3% and their loss on ignition is less than 5% of the dry weight. In case of non-conformity, ash and residue as the case may be, shall be re-incinerated.
	vii.	The incinerator shall have a chimney of at least thirty meter height.
	D. Effluent from Incinerator	
	Note :	
	i)	Effluent from scrubber (s) and floor washings shall flow through closed conduit or pipe network and be treated to comply with the effluent standards mentioned at `B' above, read with Schedule VI : General Standards for Discharge of Environment

Sl. No.	Parameter	Standard (Limiting Concentration)
		Pollution (Part A : Effluents) notified under the Environment (Protection) Rules, 1986.
	ii)	The built up in TDS in wastewater or floor washings shall not exceed 1000 mg/l over and above the TDS of raw water used.
	E. Stormwater	
	Note :	
	i)	Stormwater shall not be allowed to mix with scrubber water and / or floor washings.
	ii)	Stormwater shall be channelized through separate drains passing through a HDPE lined pit having holding capacity of 10 minutes (hourly average) of rainfall.

4.2 Environmental, Health, and Safety (EHS) Guidelines / Standards of International Finance Corporation (World Bank Group) for Pesticide Industries.

Table 1. Air Emissions Levels for Pesticides

Pollutant	Units	Guideline Value
Particulate Matter	mg/Nm^3	20; 5[a]
Total Organic Carbon	mg/Nm^3	50
VOC	mg/Nm^3	20
Chloride	mg/Nm^3	5
Bromines (as HBr), Cyanides (as HCN), Fluorines (as HF), Hydrogen Sulfide	mg/Nm^3	3
Chlorine	mg/Nm^3	3
Ammonia, Gaseous Inorganic Chlorine Compounds (as HCl)	mg/Nm^3	30

Notes:
[a] Where very toxic compounds are present

Table 2. Effluents Levels for Pesticides

Pollutant		Units	Guideline Value
pH		S.U.	6-9
BOD_5		mg/l	30
COD		mg/l	150
TSS (Lower end for pesticide manufacturing. Higher end for pesticide formulation (monthly average) but in no case more than 50 mg/l)		mg/l	10-20[1]
Oil and Grease		mg/l	10
AOX		mg/l	1
Phenol		mg/l	0.5
Arsenic		mg/l	0.1
Chromium total		mg/l	0.5
Chromium (hexavalent)		mg/l	0.1
Copper		mg/l	0.5
Chlorinated organics		mg/L	0.05
Nitrorganics		mg/L	0.05
Mercury		mg/l	0.01
Zinc		mg/l	2
Active Ingredient (each)		mg/l	0.05
Bioassays Toxicity	Toxicity to: Fish Daphnia Algae Bacteria	TU	 2 8 16 8
Ammonia		mg/l	10
Total Phosphorus		mg/l	2

Table 3. Waste Generation / Emission Load		
Parameter	**Unit**	**Industry Benchmark**
Wastewater Total Organic Carbon effluents	Kg/batch mother liquor	180 (110 refractory)
Waste Manufacturing Formulation	Kg/ton of active ingredient manufactured	200
	Kg/ton of formulated product	3 - 4
Source: EU IPPC BREF (2006)		

Table 4. Load-Based Effluents Levels for Pesticides			
Pollutant	**Units**		**Guideline Value**
pH	S.U.		6-9
BOD_5	kg/t	Daily max	5.3
		Mo. avg	1.2
COD	kg/t	Daily max	9.4
		Mo. avg	6.5
TSS	kg/t	Daily max	4.4
		Mo. avg	1.3
Active Ingredient (each)	kg/t	Daily max	2.8 x 10-9 – 3.4
		Mo. avg	1.3 x 10-6 – 1.0
Source: U.S. EPA Effluent Guidelines for Pesticide Chemicals, Organic Pesticide Chemicals Manufacturing Subcategory, New Source Performance Standards, 40 CRF Part 455. Levels for specific active ingredients are listed in Table 3 of the regulation. kg/t = kg of pollutant per metric ton of organic active ingredients.			

4.3 Proposed Standard for Pesticide Industry

The existing Pesticide standard is based on concentration. The emission standards of the developed countries are based on concentration only. The proposed emission standard for the Pesticide Units of India will be based on concentration.

Inclusion of new parameters

From the in-depth study, it is noted that emission from the stack contains relevant solvent in trace amount other than VOC. Thus relevant solvents are proposed to be included in the new proposed standard.

Proposed Standards

A) Emission Standards

Sl No.	Parameter	Existing Standard (mg / Nm^3)	Proposed Standard (mg / Nm^3)
1.	Pesticide Compounds in the form of particulate matter	20	20, 5[a]
2.	Total Organic Carbon	-	50
3.	VOC	-	20
4.	Chlorine	5	3
5.	Chloride	-	5
6.	Bromines (as HBr), Cyanides (as HCN), Fluorines (as HF), Hydrogen sulfide	-	5
7.	P_2O_5 as H_3PO_4	10	5
8.	Ammonia	30	15
9.	Total Solvent – individually (industry specific)[b]	-	40
10.	a. If toxic substances are present. If toxic substances with Ceiling Limit greater than 5 mg / Nm3 are present. b. During stack monitoring of In - depth Study, it is noted that solvents are being emitted through the stack. When VOC emission through the stack is greater than or equal to 20 mg / Nm3		

B) Effluent Standards

The existing effluent standard on pesticide industry is in line with the International Standards. Considering these, only a few parameters are modified / introduced:

Sl. No.	Parameter		Existing Standard (mg / l)	Proposed Standard (mg / l)
i) Compulsory Parameters				
1)	BOD, 3 days, 27^0C	Formulation Unit	30	30
		Technical Grade Unit	100	
2)	COD		-	150
ii) Additional Parameters				
1)	Arsenic (as As)		0.2	0.1
2)	Copper		1.0	0.5

C) Emission Standards for Incinerator

The emission standard for incinerator is kept unchanged.

D) Waste Water Generation / Effluent Load

Analysis of data on water / waste water generation received from Pesticide Units of India reveal the following:

i) For all the units for which water / waste water generation data are available, a composite water balance is furnished based on which product wise effluent generation cannot be calculated.

ii) For some pesticide units, no data is furnished.

Thus an authentic data base is not available based on which a standard value can be arrived upon. Considering the same, it is better to set a value in line with International standards / practices as summarized below :

Parameter	Unit	Proposed Standard
Wastewater / Effluent	Kg / batch of mother liquor	200 180 (within next three years)*
Wastewater / Effluent	Kg / ton of active ingredient manufactured	220 200 (within next three years)*
	Kg / ton of formulated product	4 3 (within next three years)*

* A reduction in wastewater / effluent generation will be achieved within three (3) years of implementation of the new standard by improving system efficiency.

5. COMPARATIVE CHART OF EXISTING AND PROPOSED STANDARD FOR EMISSIONS W.R.T MONITORING DATA AND INTERNATIONAL STANDARDS

SL. NO	PARAMETERS	STANDARD (Limiting Concentration in mg /Nm^3)		REMARKS	MONITORING DATA ($\mu g/cm^3$)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA#	WORLD BANK (In mg/Nm^3)
COMPULSORY PARAMETERS								
1	Pesticide Compounds in the form of particulate matter	20	20, 5[a]	The new limit for toxic particulate matter proposed as per International Standard.	Not Available	Not Available	Not to exceed 0.01 gr/dscf or 22.9 mg/m^3	20, 5[a]
2	Total Organic Carbon	-	50	Proposed as per International Standard.	Not Available	Not Available	≤20 ppmv	50
3	VOC	-	20	Proposed as per International Standard	0.93	2.33	-	20

SL. NO	PARAMETERS	STANDARD (Limiting Concentration in mg /Nm^3)		REMARKS	MONITORING DATA ($\mu g/cm^3$)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA#	WORLD BANK (In mg/Nm^3)
4	Chlorine	5	3	Limit is made stringent as per International Standard	Not Available	Not Available	≤20 ppmv (2.8 mg/Nm^3)	5
5	Methyl chloride	20	20	Kept unchanged	Not Available	Not Available		
ADDITIONAL PARAMETERS								
1	Hydrogen Bromide	5	5	Kept unchanged	Not Available	Not Available		3
2	Bromines (as HBr), Cyanides (as HCN), Fluorines (as HF), Hydrogen sulfide	Not present	5	Proposed as per International Standard	Not Available	Not Available	Hydrogen sulfide ≤20 ppmv (30.41 mg/Nm^3)	3
3	P_2O_5 as H_3PO_4	10	10	Kept unchanged	Not Available	Not Available		
4	Ammonia	30	15	Proposed as per International Standard	Not Available	Not Available	≤20 ppmv (15.2 mg/Nm^3)	30

<table>
<tr><th rowspan="2">SL. NO</th><th rowspan="2">PARAMETERS</th><th colspan="2">STANDARD (Limiting Concentration in mg /Nm^3)</th><th rowspan="2">REMARKS</th><th colspan="2">MONITORING DATA (µg/cm^3)</th><th colspan="2">EXISTING STANDARD</th></tr>
<tr><th>EXISTING</th><th>PROPOSED</th><th>Minimum</th><th>Maximum</th><th>USEPA#</th><th>WORLD BANK (In mg/Nm^3)</th></tr>
<tr><td>5</td><td>HCl</td><td>20</td><td>20</td><td>Kept unchanged</td><td>Not Available</td><td>Not Available</td><td>≤20 ppmv (2.8 mg/Nm^3)</td><td>30</td></tr>
<tr><td>6</td><td>Relevant (total) Solvent – individually (industry specific)[b]</td><td>-</td><td>40</td><td>Proposed as per Monitoring Result</td><td colspan="2"><table><tr><th rowspan="2">Parameters of Stack Monitoring</th><th colspan="2">Concentration (µg/cm^3)</th></tr><tr><th>Min i</th><th>Max</th></tr><tr><td>Benzene</td><td>BDL</td><td>0.65</td></tr><tr><td>Toluene</td><td>0.0027</td><td>0.063</td></tr><tr><td>Acetone</td><td>0.04</td><td>1.09</td></tr><tr><td>Methanol</td><td>BDL</td><td>0.98</td></tr><tr><td>Total VOC</td><td>0.93</td><td>2.33</td></tr></table></td><td></td><td>Not available</td></tr>
<tr><td colspan="9">a. If toxic substances with Ceiling Limit greater than 5 mg / Nm3 are present.
b. When VOC emission through the stack is greater than or equal to 20 mg / Nm^3</td></tr>
</table>

Subpart MMM. National Emission Standards for Hazardous Air Pollutants for Pesticide Active Ingredient Production. Section 63.1362. Standards

COMPARATIVE CHART OF EXISTING AND PROPOSED STANDARD FOR EFFLUENT DISCHARGE W.R.T MONITORING DATA AND INTERNATIONAL STANDARDS

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
COMPULSORY PARAMETERS								
1	pH	6.5 to 8.5	6.5 to 8.5	Kept unchanged	6.74	7.58	6-9	6-9
2	BOD, 3 days, 27^0C For Formulation Unit	30	30	Proposed as per International Standard	BDL	250	1.6 Kilogram pollutant/1,000 kg of total organic active ingredients (for BOD_5) ###	30 mg/l (for BOD_5)
	BOD, 3 days, 27^0C For Technical Grade Unit	100	30	Proposed as per International Standard	BDL	250	1.6 Kilogram pollutant/1,000 kg of total organic active ingredients (for BOD_5) ###	30 mg/l (for BOD_5)
3	Oil and Grease	10	10	Kept unchanged	BDL	21	Not provided	10 mg/l

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
4	Suspended Solids	100	100	Kept unchanged	Not Available	Not Available	1.8 Kilogram pollutant/1,000 kg of total organic active ingredients###	10-20 mg/l
5	Bioassay Test	90 percent survival of fish after 96 hours in 100 % effluent*	90 percent survival of fish after 96 hours in 100 % effluent*	Kept unchanged	100% Survival at 28oC for 48 hrs in as such sample	60% Survival in as such sample at 28oC for 48 hrs	Not provided	Toxicity to: Fish 2TU Daphnia 8TU Algae 16TU Bacteria 8TU
6	COD	-	150	Proposed as per International Standard	832	BDL	9 Kilogram pollutant/1,000 kg of total organic active ingredients###	150 mg/l
ADDITIONAL PARAMETERS								
1	Arsenic (as As)	0.2	0.1	Proposed as per International Standard and as per Monitoring	BDL	BDL	No discharge of process wastewater pollutants	0.1 mg/l

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
2	Copper	1.0	0.5	Proposed as per International Standard and as per Monitoring Result	0.12	3.26	No discharge of process wastewater pollutants	0.5 mg/l
3	Manganese	1.0	1.0	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
4	Mercury	0.01	0.01	Kept unchanged	BDL	BDL	No discharge of process wastewater pollutants	0.01 mg/l
5	Antimony (as Sb)	0.1	0.1	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
6	Zinc	1.0	1.0	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	2.0 mg/l
7	Nickel etc. (heavy metals individually)	Shall not exceed individually 5 times the drinking water standards as per BIS norms	Shall not exceed individually 5 times the drinking water standards as per BIS norms	Kept unchanged	BDL	BDL	No discharge of process wastewater pollutants	Not provided
8	Cyanide (as CN)	0.2	0.2	Kept unchanged	Not Available	Not Available	220 mg/l (total cynide)##	Not provided
9	Nitrate (as NO_3)	50	50	Kept unchanged	17.07	353.26	No discharge of process wastewater pollutants	Not provided

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
10	Phosphate (as P)	5.0	5.0	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	2 mg/l
11	Phenol & Phenolic Compounds as C_6H_5OH	1.0	1.0	Kept unchanged	BDL	2.28	19 mg/l##	Not provided
12	Sulphur	0.03	0.03	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
13	Benzene Hexachloride (BHC)	0.01	0.01	Kept unchanged	Not Available	Not Available	37 mg/l##	Not provided
14	Carbonyl	0.01	0.01	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
15	Copper Sulphate	0.05	0.05	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
16	Copper Oxychloride	9.6	9.6	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
17	DDT	0.01	0.01	Kept unchanged	Absent	Absent	No discharge of process wastewater pollutants	Not provided
18	Dimethoate	0.45	0.45	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
19	2,4D	0.4	0.4	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
20	Endosulfan	0.01	0.01	Kept unchanged	Absent	Absent	No discharge of process wastewater pollutants	Not provided
21	Fenitothrion	0.01	0.01	Kept unchanged	Not Available	Not Available	9.55×10^{-3} Kilogram pollutant/1,000 kg of total organic active ingredients#	Not provided

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
22	Malathion	0.01	0.01	Kept unchanged	Not Available	Not Available	9.55×10^{-5} Kilogram pollutant/1,000 kg of total organic active ingredients#	Not provided
23	Methyl Parathion	0.01	0.01	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
24	Paraquat	2.3	2.3	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
25	Phenathoate	0.01	0.01	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
26	Phorate	0.01	0.01	Kept unchanged	Absent	Absent	9.37×10^{-5} Kilogram pollutant/1,000 kg of total organic active ingredients#	Not provided

SL. NO	PARAMETERS	STANDARD (In mg/l) Except pH and Bioassay Test		REMARKS	MONITORING DATA (mg/l)		EXISTING STANDARD	
		EXISTING	PROPOSED		Minimum	Maximum	USEPA (As per 40 CFR Part 455)#	WORLD BANK
27	Proponil	7.3	7.3	Kept unchanged	Not Available	Not Available	4.84 x 10^{-4} Kilogram pollutant/1,000 kg of total organic active ingredients #	Not provided
28	Pyrethrums	0.01	0.01	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided
29	Ziram	1.0	1.0	Kept unchanged	Not Available	Not Available	1.87 x 10^{-3} Kilogram pollutant/1,000 kg of total organic active ingredients #	Not provided
30	Other Pesticide (individually)	0.10	0.10	Kept unchanged	Not Available	Not Available	No discharge of process wastewater pollutants	Not provided

#Table 2 to Part 455 - Organic Pesticide Active Ingredient Effluent Limitations Best Available Technology Economically Achievable (BAT) and Pretreatment Standards for Existing Sources (PSES)
Table 4 to Part 455 - BAT and NSPS Effluent Limitations for Priority Pollutants for Direct Discharge Point Sources That use End-of-Pipe Biological Treatment
As per Part 455 clause no. 455.22 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Note: Comments on the proposed standards may be forwarded by email on pesticide.cpcb@nic.in / ashbirsingh@gmail.com / abu.huzaifa37@gmail.com / dinabandhu.cpcb@nic.in, by April 15, 2019.