Information requested for Conference of Laboratory heads of State Pollution Control Board/Pollution Control Committees

Sl. No.	Information requested	Details of the information
1	Accreditation status of Board's Laboratories	Karnataka State Pollution Control Board is having Central environmental Laboratory at Bengaluru and 8 Regional laboratories at Mysuru, Mangaluru,Dharwad, Kalaburgi, Raichuru, Davangere, Hassan and Belagavi. Details of Acccreidtation status of these laboratories is Enclosed as annexure "A"
2	Present status/capability of laboratory in monitoring and analyses of notified parameters in air, water and solid waste.	Capability of laboratory in monitoring and analysis in Air, water and solid waste parameters as per E(P)A approval is enclosed as annexure "B"
3	Future plan for expansion of scope of laboratory including modern instrumentation	The Central environmental Laboratory, KSPCB Bengaluru is intends to expand Hazardous Waste characterization laboratory with required infrastructure and instrumentation in the same premises. List of required instruments to be procured is enclosed as annexure "C".
4	Special expertise or instrumentation in Laboratories	At present experienced staff for instrumentation (Metal and Pesticides analysis) are available. Central laboratory is equipped with ICP-MS and GC-MS. Training on analysis of VOC, PCB and PAH compounds is required.
5	Capability of laboratory to organize specific hands-on training programme for the SPCB/PCC laboratory officials	At present laboratory has capability to organize in-house training programme for KSPCB laboratory staff. In future laboratory will develop capability to organize for other Board laboratory staff also.

Annexure "A"

Details of achievements/Accreditation/Certification/ recognition obtained for Board Laboratories:

1. The Central Environmental Laboratory, Bengaluru has got upgraded and recognised as **Environmental Laboratory** under E(P)A Act, 1986 as per Govt. Of India Gazette Notification dated 7.12.2016 and valid up December 2021

2. The Central Environmental Laboraoty, Bengaluru has acquired ISO/IEC 17025:2005 Accreditation from NABL in the year 2014 and valid up to april 2017.

3. The Central Environmental Laboratory, Bengaluru is certified for ISO 9001:2008 valid up to May 2017.

4. The State Government has noticed the Central Environmental Laboratory as a 'State Water Laboratory' under the water (Prevention and Control of Pollution) Act, 1974 and 'State Air Laboratory' under the Air (Prevention and Control of Pollution) Act, 1981.

5. The Central Environmental Laboratory, Bengaluru is certified for IS 18001:2007 (OHSAS) during the year 2015 and valid up to September 2018.

6. The Laboratory has Obtained DSIR Certificate from the Department of Science and Technology, Delhi and valid up August 2019

7. The Regional Laboratories of Mysore,,Mangaluru and Dharwad has got Certified for ISO 9001:2008, BS 18001:2008 (OHSAS) standard and valid up to May 2017 and December 2019 respectively.

8. ISO 9001:2008 and BS 18001:2007 (OHSAS) certification process (Integrated management system) have been initiated for the Regional Laboratories of Hassan, Belagum, Davangere, Raichur and Kalburgi.

Annexure - B

APPENDIX `B`

LIST OF PARAMETERS BEING ANALYSED AS PER E(P)A RECOGNISION.

A) Physical Tests : [Please mark Yes(√)/No (x)]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Conductivity	✓	1.	Flocculation test (Jar test)	x
2.	Colour	✓	2.	Odour	✓
3.	pH	✓	3.	Salinity	✓
4.	Fixed & volatile solids	✓	4.	Settleable solids	✓
5.	Total solids	✓	5.	Sludge volume index (SVI)	✓
6.	Total dissolved solids	✓			
7.	Total suspended solids	✓			
8.	Turbidity	✓			
9.	Temperature	✓			
10.	Velocity & discharge Measurement of industrial effluent stream	✓			

Minimum required - All 10 nos. of parameters

Minimum required 3 parameters

B) Inorganic [Please mark Yes (√)/No (x)]

(i) General & Non-metallic

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Acidity	✓	1.	Bromide	x
2.	Alkalinity	✓	2.	Carbon dioxide	✓
3.	Ammonical nitrogen	✓	3.	Chlorine demand	✓
4.	Chloride	✓	4.	Iodine	x
5.	Chlorine residual	✓	5.	Sulphite	x
6.	Dissolved oxygen	✓	6.	Silica	x
7.	Fluoride	✓	7.	Cyanide	✓
8.	Total hardness	✓	8.	Sulphide	✓
9.	Total kjehldal nitrogen (TKN)	✓			
10.	Nitrite nitrogen	✓			
11.	Nitrate nitrogen	✓			
12.	Phosphate	✓			
13.	Sulphate	✓			

Minimum required – All 13 parameters

Minimum required– Atleast 3 parameters

(ii) Trace Metals [Please mark Yes(√)/No (x)]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Boron (B)	✓	1.	Arsenic (As)	✓
2.	Cadmium (Cd)	✓	2.	Aluminium (Al)	✓
3.	Calcium (Ca)	✓	3.	Beryllium (Be)	X
4.	Chromium (Cr) Total	✓	4.	Barium (Ba)	✓
5.	Chromium (Cr) Hexavalent	✓	5.	Lithium (Li)	X
6.	Copper (Cu)	✓	6.	Manganese (Mn)	✓
7.	Iron (Fe)	✓	7.	Selenium (Se)	✓
8.	Lead (Pb)	✓	8.	Silver (Ag)	X
9.	Magnesium (Mg)	✓	9.	Strontium (Sr)	X
10.	Mercury (Hg)	✓	10.	Tin (Sn)	X
11.	Nickel (Ni)	✓	11.	Antimony (Sb)	X
12.	Potassium (K)	✓	12.	Cobalt (Co)	✓
13.	Sodium (Na)	✓	13.	Vanadium (V)	X
14.	Sodium absorption ratio (SAR)	✓			
15.	Zinc (Zn)	✓			

Minimum required – All 15 parameters

Minimum required – Atleast 4 parameters

(C) Organics (General) and Trace Organics [Please mark Yes(√)/No (x) and give details at Appendix J for Trace organics]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Bio-chemical oxygen demand (BOD)	✓	1.	Total organic carbon (TOC)	✓
2.	Chemical oxygen demand (COD)	✓	2.	Adsorbable organic halide (AOX)	✓
3.	Oil & Grease	✓	3.	Surfactants	✓
4.	Phenol	✓	4.	Tannin & lignin	X
5.	Pesticide (each)	✓	5.	Poly-chlorinated biphenyl (PCB's) each	X
	(i) Organo-chlorine (BHC, DDT, Aldrin, Endosulphan)	✓	6.	Polynuclear aromatic hydrocarbon (PAH) each	X
	(ii) Organo nitrogen-phosphorous (Malathion, methyl parathion, Chloropyriphos)	✓	7.	Organic Carbon (in solid)	✓
			8.	Carbon/Nitrogen ratio	✓

Minimum required – All 5 parameters

Minimum required – Atleast 3 parameters

D) Microbiological Tests [Please mark Yes(√)/No (x)]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Total Coliform	✓	1.	Total plate count	✓
2.	Faecal Coliform	✓	2.	Enterococcus	X
3.	Faecal Streptococci	✓	3.	Coliphage	X
4.	E. Coli	✓			

Minimum required – All 4 parameters Minimum required – Atleast 1 parameters

E) Toxicological Tests [Please mark Yes(√)/No (x)]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Bioassay method for evaluation of toxicity using fish (90% survival of fish after 96 hrs in 100% effluent)	✓	1.	Bio-accumulation, bio magnification and bio-transformation studies	X
			2.	Estimation of the effect at tissue level	X
			3.	Measurement of toxicity using Daphnia or other organism	X
			4.	Measurement of toxicity factor using zebra fish (dimensionless toxicity test	✓

Minimum required – 1 parameter Minimum required – 1 parameter

F) Biological Tests [Please mark Yes(√)/No (x)]

S. No.	Parameter		S. No.	Parameter	
1.	Benthic organism identification and count	✓	5.	Saprobity Index	✓
2.	Macrophytic identification	✓	6.	Chlorophyll	X
3.	Planktonic identification count	X	7.	Primary productivity	X
4.	Measurement of various diversity index	✓	8.	P/R Ratio	X

Minimum required – Atleast 3 parameter

G) Characterization of Hazardous Waste [Please mark Yes(√)/No (x)]

S. No.	Parameter	
1.	Preparation of Leachate (TCLP extract/water extract)	✓
2.	Corrosivity	✓
3.	Ignibility (Flash point)	✓
4.	Reactivity	X
5.	Toxicity	X
6.	Measurement of heavy metals/pesticides in the waste/leachate	✓

Minimum required – Atleast 3 parameters

H) Soil/Sludge/Sediment and Solid Waste [Please mark Yes(√)/No (x)]

S. No.	Mandatory parameter		S. No.	Secondary parameter	
1.	Boron	✓	1.	Ammonia	✓
2.	Cation Exchange Capacity (CEC)	✓	2.	Bicarbonate	✓
3.	Electrical Conductivity (EC)	✓	3.	Calcium	✓
4.	Nitrogen available	✓	4.	Calcium carbonate	✓
5.	Organic carbon/matter (chemical method)	✓	5.	Chloride	✓
6.	pH	✓	6.	Colour	✓
7.	Phosphorous (available)	✓	7.	Exchangeable sodium percentage (ESP)	X
8.	Phosphate (ortho)	✓	8.	Gypsum requirement	X
9.	Phosphate (total)	✓	9.	H. Acid	✓
10.	Potassium	✓	10.	Heavy metal	✓
11.	SAR in soil extract	✓	11.	Magnesium	✓
12.	Sodium	✓	12.	Mechanical soil analysis	X
13.	Soil moisture	✓	13.	Nitrate	✓
14.	TKN	✓	14.	Nitrite	✓
15.	Calorific value	✓	15.	PAH	X
			16.	Pesticide	✓
			17.	Potash (available)	✓
			18.	Sulphate	✓
			19.	Sulphur	✓
			20.	TOC	✓
			21.	Total water soluble salt	✓
			22.	Water holding capacity	X

Minimum required: All 15 parameters

Minimum required: Atleast 10 parameters

Remarks: Besides minimum instruments/equipment facilities laboratory must qualify minimum 5 essential groups i.e. A to E for water and similarly A to D for air analysis.

CHAPTER 8 Annexure 'C'

INSTRUMENTS REQUIRED/USED FOR ANALYSIS AND CHARACTERIZATION OF HAZARDOUS WASTE

8.0 INSTRUMENTS REQUIRED/USED FOR ANALYSIS AND CHARACTERIZATION OF HAZARDOUS WASTE

In addition to the routine laboratory equipment/instruments, chemicals and glassware required for general environmental laboratory, the list of special/additional equipment and instruments are detailed in this chapter. The instruments required for carrying out analysis and characterization as per the rules can be classified into 3 groups as follows.

A. Analytical Instruments
B. Digestion Equipment
C. Extraction/Distillation

A. Analytical Instruments

1. Atomic Absorption Spectrophotometer (AAS): estimation of trace metals in waste samples.

2. Gas Chromatography-Mass spectrometer (GC/MS): Estimation of volatile and semi volatile organic compounds. This is a coupled technique used for estimation of organic compounds in which both chromatograms with retention times, and mass/electron ratio will be obtained for exact identification of organic compounds.

3. Gas chromatography: with different detectors like ECD, FID, NPD, and FPD etc.

Note: Other Instruments/Equipment are listed in the following table 6.1

TABLE 8.1

List of Digestion Equipment, Extraction/distillation apparatus, and instruments required for characterization/analysis Of Hazardous Waste.

S.N.	Instruments required for Analysis and Characterization	Applications
	Group-A Digestion Equipment	
1.	Hot plate	Conventional digestion apparatus-All heavy metal digestions can be conducted at 105^0c.
2.	Microwave digestion	This is a sophisticated digestion apparatus. Both closed and open type of digestions can be conducted without any loss of analytes under investigation. Digestion can

S.N.	Instruments required for Analysis and Characterization	Applications
		be done at a time for 12 samples and it is very faster than ordinary digestion.
3.	Digesdhal	Useful for digestion of soil contaminated soil, water wastewater samples with in short periods.
4.	Bomb digestion.	
	Group-B Extraction/distillation apparatus	
5.	Soxhlet extraction apparatus.	
6.	Cyanide distillation apparatus	Designed exclusively for reactive cyanide distillation.
7.	Sulfide distillation apparatus.	Designed exclusively for reactive sulfide distillation.
8.	K.D apparatus with Snyder columns	Designed for Pre concentration of the sample with only Solvent evaporation through spiral Snyder column leaving the sample under investigation. Conversion of sample into gaseous phases and back condensation into liquid state takes place.
9.	Fractional distillation apparatus	Distillation of solvents.
10.	Rotavapor.	For solvent recovery.
11.	TCLP Agitator	Shaking or extraction apparatus for leachate generation- Useful for estimation of semi volatile organics and heavy metals from the leachate.
12.	ZHE (Zero Head Space Extractor).	Designed for extraction of leachate without any head space- useful for estimation of volatile organic compounds from leachate.
	Group-C Analytical instruments	
13.	pH meter	Elcrometric measurement of ph.
14.	Karl-fisher moisture content meter.	Estimation of moisture content up to 100% in field waste samples.
15.	Conductometer	Measurement of electrical conductivity.
16.	Flash point apparatus	To find flash point of liquid or solvent wastes.
17.	Bomb calorimeter	To find calorific value of the waste.
18.	Uv-Visible spectro-photometer (Preferably Double-beam)	Colorimetric estimation of metals, anoins, phenols etc.,
19.	Atomic Absorption Spectrophotometer. (AAS)	Useful for estimation of trace metal/element analysis. Using this instrument more than 65 elements of the periodic table can be estimated.
20.	AAS/Hydride Vapour Generation system (AAS/GH)	It is an accessory to AAS, and is required to estimate metals like Arsenic, Selenium and Mercury through cold vapor generation.
21.	Elemental Analyser	Useful for estimation of total Organic Carbon, Hydrogen, Nitrogen, Sulphur, and total Oxygen.
22.	Gas Chromatography (GC)	Useful for estimation of semi volatile, and volatile organic constituents present in the waste by specific detectors like FID, FPD, ECD, etc.,