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GUIDELINES FOR RECOGNITION OF ENVIRONMENTAL LABORATORIES UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

CENTRAL POLLUTION CONTROL BOARD

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FOREWORD

All living organisms and environment are inter-related. The environment influences the life of human beings and also human beings modify their environment as a result of their growth, dispersal, activities, death and decay etc. All living beings including man and their environment are mutually reactive affecting each other in a number of ways and a dynamic equilibrium is created in between the two, i.e. human beings (society) and environment. Thus it is very important to assess the activities of mankind that disturb this equilibrium through continuous monitoring by survey identification and quantification of factors affecting the environment.

An Environmental Laboratory plays a key role in identification and quantification of the components present in the environment created due to natural as well as the anthropogenic activities. The environmental laboratory, process the samples taken from the environmental media (air, water, soil, biota) both from the environment as well as from sources disposing into the environment (industries, domestic and agriculture sources, automobiles etc.).

Large number of environmental laboratories have been established or recognized under Air and Water Act to perform its functions to safe guard the environmental concerns including the analysis of water and air samples. Under the Environment (Protection) Act also, the Central Government has made a provision to establish or recognize environmental laboratories by notification, to carry out the functions entrusted to an environmental laboratory under this Act.

Central Pollution Control Board prepared a guidelines during 1994-95 for establishment and recognition of the laboratories which was revised in 2008. Further in 2022 it feels necessary to further revise it, as with due course of time there have been many developments underwent with respect to the new environmental parameters, standards and technologies.

The information contained in the revised guidelines has been updated collated by Ms. Namita Mishra, Sc. D, Dr. Yogita Kharayat, Sc. C and Dr. K. Ranganathan, Sc. E of CPCB under the overall guidance of Dr. Prashant Gargava, Member Secretary, CPCB and me.

Contributions made by Dr. C. S. Sharma, Retd. Sc.E from CPCB and other expert members are highly significant and appreciable.

I hope that the information contained in this revised guidelines will prove to be useful for the regulatory bodies, research institutes and laboratories for monitoring of environmental quality.

(Tanmay Kumar)
Chairman

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ADDENDUM

Sampling and analysis charges applicable at CPCB laboratories for Environmental Samples (Please refer Gazette Notification No. 163, dated 23rd Feb 2022).

CHAPTER 1.0

INTRODUCTION

1.1 Environmental Laboratory

An environmental laboratory plays predominant role in assessing the status of environment comprising both abiotic (soil, water and air) and biotic (flora, fauna and human being) components. Environmental laboratory is a laboratory, processing samples taken from the environmental media (air, emissions, water, waste water, soil, sludge, sediments biota etc.) both from the ambient as well as from sources disposing the polluting substances into the environment. The environmental laboratory is also responsible for monitoring of industrial solid waste, municipal solid waste, hazardous waste, biomedical waste etc. that affect the environment, humans and wildlife.

The environmental laboratories are the essential corner stones of any effective pollution control programme, that provide qualitative as well as quantitative data for appropriate decision making. For generating this valuable data with a desired accuracy and to quantify concentration of the constituents present in the samples, the laboratory should have the desired facilities, trained manpower and capabilities to achieve the above goals. The qualifications and experience of laboratory technicians / personnel, plays a significant role in generating standardized protocols, proper techno- scientific sampling of environmental matrices and their accurate and quality analysis to produce highly accurate analytical data.

“For successful implementation of environmental protection programme, it is essential to identify and quantify the pollution sources, pollutants, conduct baseline survey, lay down standards and build-up monitoring systems”., A competent laboratory is required to meet out these requirements with all necessary instruments, equipment, expertise, capabilities etc.

Present Guidelines intend to provide a comprehensive manual describing about the complete requirements that has to be fulfilled by the environmental laboratories seeking for Recognition under The Environment (Protection) Act, 1986. This guideline also explains the complete procedure of recognition right from the registration to the publication of gazette notification.

1.2 Legal Provisions of Recognition of Environmental Laboratory

The need for laboratories in implementation of the various pollution control Acts laid down for the protection of the environment is essential under the following sections of various Acts.

1.2.1 The Water (Prevention and Control of Pollution), Act, 1974

Under Section 16 (3) & Section 17 (2)

Under Section 16 (3) and Section 17(2), of this Act, the Central and State Boards may establish or recognize a laboratory or laboratories to enable the Board to perform its functions under this Section efficiently, including the analysis of samples of water from any stream or well or of samples of sewage or trade effluents.

Under Section 25 & 26

Any person desirous of discharging any effluent (domestic or industrial) into a stream or well has to obtain the consent of the pollution control board before discharging the same. The consent application is supported by an analysis report obtained from a recognized laboratory of the Board.

Under Section 51 & 52

Central/State Government may establish a Central/State Water Laboratory and under section 53 subsection (i) and (ii), a government analyst (Central/State) is appointed to analyze the samples.

Under Section 53 Subsection (iii)

The Central/State Board is required to appoint a Board Analyst(s) to any laboratory established or recognized under section 16 or 17 of the Water Act, 1974. The analysis report signed by a Government/Board Analyst is used as an evidence for the legal matters.

1.2.2 The Air (Prevention and Control of Pollution) Act, 1981

Under Section 16 (3) and Section 17 (2)

Under Section 16 (3) and Section 17(2) of The Air (Prevention & Control of Pollution) Act, 1981, the Central and State Boards may establish or recognize a laboratory or laboratories to enable the Board to perform its functions under this Section efficiently.

Under Section 21

No person can operate any industrial plant in an air pollution control area without the previous consent of the Board. The analysis report obtained by the recognized laboratory in respect of the quantity of emissions is to be enclosed with the consent application.

Under Section 28 & 29 Subsection (i)

State Government should establish or specify one or more State Air Laboratories for the analysis of the samples of air. Also under Section 29 sub-section (1), the State Govt. shall appoint the Government Analysts for the purpose of analyzing the samples received by the Government Laboratory under Section 28.

Under Section 29 Sub-section (ii)

The State Government is required to appoint the Board Analyst(s) for analysis of the air samples under section 17.

1.2.3 The Environment (Protection) Act, 1986

Under Section 12 (1)
The Central Government may, by notification in the Official Gazette-

- establish one or more laboratories,

- Recognize one or more laboratories or institutes as environmental laboratories to carry out the functions entrusted to an environmental laboratory under this Act.
- The Central Government may, by notification in the Official Gazette, make rules specifying-
- the functions of the environmental laboratory
- the procedure for the submission to the said laboratory of samples of water, air, soil or other substance for analysis or tests, the form of the laboratory report there on and the fees payable for such report;
- such other matters as may be necessary or expedient to enable that laboratory to carry out its functions.

Under Section (13)
The Central Government may by notification in the official Gazette, appoint or recognize such persons as it thinks fit and having the prescribed qualification to be Government Analysts for the purpose of analysis of samples of water, air, soil or other substances sent for analysis to any environmental laboratory established or recognized under sub-section (1) of section 12 of The Environment (Protection) Act, 1986.

1.2.4 Functions of Environmental Labs as specified under Rule 9 of The Environment (Protection) Rules, 1986

i. To evolve standardized methods for sampling and analysis of various types of environmental pollutants.
ii. To analyze samples sent by the Central Government of the officers empowered under sub-section (1) of section 11 of E(P)A, 1986
iii. To carry out such investigations as may be directed by the Central Government to lay down standards for the quality of environment and discharge of environmental pollutants, to monitor and to enforce the standards laid down.
iv. To send periodical reports regarding its activities to the Central Government.
v. To carry out such other functions as may be entrusted to it by the Central Government from time to time.

1.3 Objectives for Recognition of the Laboratory under the Environment (Protection) Act, 1986

The main objective of recognition of Environmental laboratory under the Environmental Protection Act, 1986, is to develop a laboratory equipped with all the facilities and infrastructure capable to analyze the environmental quality parameters of major concern. Since the recognition has been granted in line of the guidelines and the laboratories are notified under the Government of India Gazette following the approved procedure along with periodical surveillance, stands the credibility of these laboratories.

The up-to-date list of Environmental laboratories recognized under The Environment (Protection) Act, 1986 are posted and updated periodically on the CPCB Website along

with its scope, so that the organizations working for various projects in the fields of environment may utilize the services of these recognized laboratories.

There are very limited number of well-developed laboratories in Govt. sector all over the country, which are well equipped in terms of comprehensive infrastructure and analytical facilities. Any time, when there is a need to carry out the projects especially in those environmental areas, where the Government sector laboratory with required analytical facilities does not exist, in that case these Environment (Protection) Act recognized laboratories in private sector, educational and research institutions may provide their services towards sustenance of the environment.

1.4 Delegation of powers for Recognition of Environmental Laboratories under the Environment (Protection) Act, 1986 to Central Pollution Control Board (CPCB) by MoEF&CC

In exercise of the powers conferred under section 23 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government delegated the powers to CPCB by issuing the Gazette Notifications with respect to grant of recognition to environmental laboratories as follows: -

Gazette Notification No. S.O.145 (E), Dated 21st February, 1991 (Addendum-1), the powers delegated for recognition of the laboratories are reproduced as below:

1. The Central Government hereby delegates the powers with respect to grant of recognition to laboratories or institutes as environmental laboratories and to appoint or recognize Analysts as Government Analysts, as conferred by clause (b) of Sub-section (i) of Section 12 and section 13 respectively of the Environment (Protection) Act, 1986 to the Central Pollution Control Board.
2. Recognition of private laboratories under clause (b) of sub-section (i) of section 12 of the Environment (Protection) Act, 1986 as well as recognition of their Analysts as Government Analysts under section 13 of the Environment (Protection) Act, 1986, will continue to be done by the Central Government.
3. The laboratories recognized under clause (b) of sub-section (i) of section 12 of the Environment (Protection) Act, 1986 shall be specified as Government/ Autonomous/ Public Sector Undertaking/Educational Institution/ State or Central Pollution Control Board Laboratories.

Gazette Notification No. S.O. 2340 (E) dated 16th June 2021 (Addendum-2), The powers delegated for recognition of the laboratories are as below:

Recognition of private laboratories under clause (b) of subsection (1) of section 12 of the said act as well as recognition of their Analysts as Government Analysts under section 13 of the Environment (Protection) Act, 1986, shall be done by the Central Pollution Control Board.

1.5 Benefits of Recognition and Accreditation to the Laboratory

The Recognition granted to an eligible environmental laboratory signifies that the laboratory has all the major requisites for assessing the quality of environment by analyzing all the concerned parameters under its scope. The recognition also provides many other benefits, some of these are as below

- EPA recognition is a Mandatory requirement by some of the SPCBs / PCCs for empanelment of laboratories under The Water Act, 1974 and Air Act, 1981
- Recognition/Accreditation is not about who the best is, but identifies the laboratory which has a system of standard procedures with aim to improve the analytical quality and safety.
- The Accreditation/Recognition of labs improves facilitation of accurate analysis, efficiency of treatment and reduction of errors in the laboratory process.
- The Recognition and Accreditation increases operational efficiency and productivity.
- Increase of confidence in testing/calibration data and personnel performing work.
- Savings in terms of time and money due to reduction or elimination of the need for re-testing of analysts/products.
- Better control of laboratory operations and feedback to system that the concerned laboratory is technically competent. Thus it boosts reputation of the laboratory among analytical services seekers.
- Potential increase in business due to enhanced customer confidence

Following paragraphs of this guideline describe the prerequisite, mandatory and other requirements and detailed procedure for seeking recognition under environmental Protection Act, 1986 by any Environmental Laboratory

CHAPTER 2.0

REQUISITE GUIDELINES FOR APPLICATION FOR RECOGNITIONOF ENVIRONMENTAL LABORATORIES UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

2.1 Recognition under the Environment (Protection) Act, 1986

The environmental laboratories shall be granted recognition (Fresh/Renewal) under Section 12 and 13 of the Environment (Protection) Act, 1986 only for the period up to the current validity date of National Accreditation Board for Testing and Calibration Laboratories Accreditation (ISO 17025:2017) or the validity of having valid certification for Occupational Health and Safety Management System (IS/ISO 45001:2018), whichever is earlier, under the provisions of the said Act, for-

i. Fresh or renewal of recognition of laboratory;
ii. Changes in the name of Government Analysts;
iii. Shifting and Name change of laboratory premises.

2.2 Who can apply for Recognition - Category of the Laboratory

The Environment laboratories of any of the following organizations shall be eligible to apply for recognition:

- Autonomous & Govt. Dept./Institutions including Pollution Control Boards/ Committees
- Public Sector Undertaking
- Educational Institutes (Govt./Govt. Aided/Private)
- Private Laboratories
- Non Govt. Organization (NGO)
- Cooperative Sector Laboratories
- Public Private Partnership (PPP) Laboratories
- Others

2.3 Application Fees for Recognition

Following fee for processing of applications with respect to grant of recognition to Environmental laboratories under the Environmental (Protection) Act, 1986, will required to be paid along with the application by applicant laboratory

Application	Application Fee

Fresh Application ➢ **Applying for the first time** ➢ **Applying after the expiry of current recognition** ➢ **Name or Address change of Laboratory**	**Rs. 50,000/- + GST as applicable** *(In case application is rejected on account of not fulfilling mandatory requirement only 50% of fee will be refunded)*
Renewal of Recognition/ Changes in the name of Govt. Analysts	**Rs. 25,000/- + GST as applicable**

The Laboratories applying for EPA recognition are required to submit fee through payment gateway at the time of filing the application via Web-portal in the designated Account.

2.4 How to Apply for Recognition

The Laboratory (Private or Government), seeking recognition (Fresh/Renewal) *for the first time*, may apply through dedicated Web-Portal specific for Laboratory Recognition under the Environment (Protection) Act, 1986 namely "http://cpcbepalab.in/epalab" available at CPCB Website by filling up all the desired information and submitting the prescribed fee as per the following steps.

Step-1 Registration: This is the initial step which covers the basic information of laboratory like name, address and contact details of the laboratory. The login ID and the password will be generated in this step by sending SMS or creating one-time password (OTP) for verification at the end of CPCB. After the login through registered ID, the portal system will take the laboratory to the next section.

Step-2 Type of recognition: In this step laboratory has to select the type of recognition for which it is applying for whether new/ renew/ other.

Step-3 Pre-Requisite: In this step laboratory has to fill/upload all the information as a pre-requisite requirement as mentioned at para 2.9. If the laboratory fails to comply with any of the pre-requisites, the application will not be accepted by the system. This information has to be filled at the time of fresh recognition or first time registration in the portal.

In case laboratory changes its Name, it has to apply afresh as new registration with new name.

Step-4 After completing the first three steps the web-portal will take the laboratory to the new window, where the laboratory has to fill the complete details of laboratory, scope of recognition, Quality control Activities and GPS location of the laboratory

Step-5 The applicant laboratory has to complete the required information at various sections of the application and also upload relevant supporting document as required by the system

Step-6 The laboratory has to self-check, whether all the documentation required as in the documentation checklist at para ahead have been uploaded at relevant para of online application. until the entire application is filled up, completed and ready for online submission

In case of Renewal, where there is any change in application, laboratory has to follow the steps 4 - 6.

2.5 Duration of Recognition

Environment laboratory will be recognized up to the current validity date of ISO 17025:2017 accreditation or ISO 45001:2018, whichever is earlier.

2.6 Expiry of Recognition

Laboratory shall liable to be de-recognized after the validity period.

2.7 Renewal of Recognition

If there is no change with respect to the following, (An undertaking in this regard has to be submitted)

- Name and premises of the laboratory
- Scope of the recognition
- Government Analyst
- Infrastructure, or
- Any other

the laboratory can apply for renewal with the prescribed fee, by submitting the **Valid renewal certificates of ISO 17025:2017 or IS/ISO 45001:2018, the updated details of CRM, Existing Manpower and calibration details of instruments/ equipment.**

Note: In case there is any change on the above the laboratory has to be filled fresh complete application with prescribed fee

2.8 Submission of application for Renewal of Recognition

Laboratories presently with valid recognition, are advised to apply for renewal of recognition atleast one month before the expiry of their existing recognition with valid ISO:17025:2017 and IS/ISO 45001:2018 to avoid discontinuation of recognition. The applications submitted after the expiry of recognition shall be treated as a fresh recognition.

2.9 Pre-requisite Requirements for application

Laboratories has to fulfil the following pre-requisites applying for the New/ Renewal of Recognition, failing which the laboratory cannot move to next step of application:

- Laboratory Legal Entity/ Certificate of incorporation/ Registration/ Authorization
- Whether laboratory situated in authorized area
- Valid Certificate of Laboratory Accreditation as per ISO 17025:2017

- Valid Certificate of Occupational Health and Safety Management System as per ISO 45001:2018
- Number of Man-Power: Laboratory has to fulfill minimum requirement of total number of 9 manpower
- Area of the Laboratory: The laboratory has to fulfill the criteria of minimum requirement of 150 Sq.mt. excluding administration and accounts.

2.10 Complete details of Mandatory Requirements of EPA Recognition

2.10.1 Laboratory Legal Entity/Certificate of Incorporation/Registration/Authorization

The laboratory (Private/NGOs) under consideration for Recognition under the Environment Protection Act 1986 must be legally identifiable and duly registered with an appropriate statutory body i.e. local govt., state govt. or central govt. For certification of Legal Identity of the laboratory – any one or more of the following documents/Registration Certificate needs to be submitted along with the application for New/Renewal of recognition. The copy of registration certificate must be uploaded while applying through Web-portal. In case laboratory changes its premises or Name, it has to apply afresh with new registration of the new premises/ New Name whatever is the case.

i) Certificate of Registration by Company Registrar and Memorandum of Articles in case the laboratory belongs to a Limited Company
ii) Document issued as per Societies Registration Act or Indian Trust Registration Act
iii) Partnership Deed and copy of registration under the Limited Liability Partnership Act 2008
iv) In case of Government Body; Gazette or Government Notification or self-Declaration on Letter head by Head of the organization

Note: In case the document(s) of address proof and legal identity is (are) in the local language, then their authenticated English Translation may preferably be provided

2.10.2 Laboratory Site / Location in designated authorized area

Laboratory must be situated in designated authorized area as certified by the registering authority. Authenticating the premises of laboratory - any one or more of the following document needs to be submitted

i) Certificate from Registrar of Firms or Directorate of Industries or Industries Centre
ii) Municipal Corporation / Local Body / Pollution Control Board or any such document indicating premises of the applicant laboratory

2.10.3 Mandatory Accreditation & Certification

The laboratory has to submit details of mandatory accreditation as per ISO 17025 along with its validity as well as for ISO 45001. The copies of these certificates should be uploaded with the application, wherever required. The application received without having mandatory ISO 17025 Accreditation and ISO 45001 Certification will be summarily rejected.

2.10.4 Submission of Detailed Scope of ISO 17025 Accreditation

The laboratory has to provide information regarding each parameter whether it is under scope of ISO/IEC 17025:2017 and also a copy of Scope of ISO 17025 Accreditation depicting various parameters and discipline for which the accreditation has been granted needs to be submitted with the application.

All the parameters applied for recognition should cover under the ISO:17025 Accreditation (NABL Accreditation) Scope.

2.10.5 Laboratory Total Work Area

The laboratory should have sufficient working area to accommodate all its analytical and supporting activities. There should be total minimum floor space of 150 Sq excluding the area allotted to Administration and Accounts meter as detailed ahead in Table 7.1

Table 2.1 Laboratory Minimum area/Floor space section wise requirement

S. No.	Laboratory Sections	Minimum Space in Sq.mt.
1.	Water Analysis Section (Potable water, Ground Water, Natural water (Lakes, Rivers, Wetlands, Estuaries)	60 sq m
2.	Waste Water Analysis Section (Sewage, Industrial Effluents, other waste waters)	
3.	Soil, Sediments, Sludge & Slurry Analysis Section	
4.	Microbiological & Biological Analysis Section	15 sq. m
5.	Ambient Air & Source Emission Monitoring & Analysis Section	25 sq m
6.	Instrumentation Section (Common instruments/ equipment and supporting for other analytical sections)	30sq m
7.	Instrumentation Section (Sophisticated Instruments)	
8.	Sampling Equipment, Storage area including compressed gas storage area, Common library, Committee Room & Staff area	20 sq m
Total Area		**150 sq m**

Note The dimensions of individual section may vary but Minimum covered area of the Environmental laboratory should not be less than 150 sq. mt.

The applicant environmental Laboratory shall upload its detailed layout plan with dimensions at the time of submitting application for the recognition

2.10.6 Man-Power-Details

The Laboratory must have sufficient skilled manpower according to the Work load of the laboratory. The Manpower employed must be capable of doing specific works allotted to them. The laboratory shall submit the details of all the existing manpower including with the top and senior management as per hierarchy with their Name, Age, Qualifications,

Experience details, working at the laboratory since, job responsibilities, emoluments drawn per annum etc. in the format given in **Annexure II**.

The laboratory should have atleast following skilled manpower;

Table 2.2: Indicative list of the Typical Manpower for an Environmental Laboratory

S. No.	Position	Qualifications	Experience	Nature of Work
1.	Director / Head of Laboratory	Ph.D./M.Sc./ M.Tech	>10 years	Laboratory Management, & Supervisory
2.	Environmental Scientist	M.Sc./Ph.D.	>5 years	Supervision & Analysis
3.	Junior Scientist (Chemical)	M.Sc. (Chemistry)	> 3 years	Instrumental Analysis
4.	Junior Scientist (Microbiology)	M.Sc. (Microbiology)	>3 years	Microbiological Analysis
5.	Technical Officer/Assistant	B.E./ B.Tech./Dip. Engg	>3 years	Sampling and Analysis
6.	Laboratory Analysts	M. Sc./B.Sc.	.>2 years	Laboratory Analysis
7.	Laboratory/Field Assistants	B.Sc. Chemistry, Zoology., Botany	>2 years	Sampling and Analysis
8.	Laboratory Attendant/Multitasking Staff (MTS)	12th/Matriculate	-	Assistance in Sampling & analysis
11	Administration / Accounts	B.Com/BA/BSc	>2 years	Accounts& Administrative matters

The desired qualification of the personnel involved in the laboratory activities should possesses the below mentioned qualification.

Table 2.3: Recommended qualifications of laboratory and field monitoring personnel:

S. No	Activity	Minimum Educational Qualification
1.	Analysis of Air/ Water	Graduates/Post Graduates in Chemistry/Environmental Sciences
2.	Analysis of Soil/hazardous wastes	Graduates/Post Graduate in Chemistry/Environmental Sciences/ Agricultural Sciences
3.	Analysis of Microbiological parameters & Biomonitoring	Graduates/Post Graduates in Biochemistry/Microbiology/Biology Environmental Sciences/ Agricultural Sciences
4.	Water & Soil sampling	Graduates in Chemistry/Environmental Sciences/Agricultural Sciences/ Graduate/Diploma in Engineering 10+2 with science
5.	Air sampling	Graduates in Chemistry/Environmental Sciences/ Engineering/ Physical sciences/ Diploma in Engineering
6.	Assistance in Laboratory	10+2 with Science/Diploma
7.	Field Assistant	Diploma in engineering/ITI

2.10.7 Laboratory Organization Structure

The applicant laboratory while submitting the application for new/renewal of recognition has to attach the respective Laboratory's Organization Chart clearly depicting all positions, the

hierarchy, the names of present incumbents, analysts and their brief responsibilities with the application.

2.10.8 Work Allotment Details

The Laboratory has to provide work allotment details of the personnel involved in the various activities of the laboratory in prescribed column of application

2.10.9 Training Details of Man power

The officials involved in various laboratory activities must be well trained and aware with the work assigned to them therefore the laboratory is required to provide the training details of all the laboratory personnel

2.10.10 Code of Ethics & Integrity of Analytical Reports

The undertaking for maintaining Code of Ethics & to maintain Integrity of Analytical reports at the laboratory shall be furnished, in the specified format (**Annexure I**) on the laboratory's official Stationery (Laboratory/organization letterhead) duly signed and sealed by the Proprietor or Director or Head of the applicant laboratory for Government sector labs, the undertaking may be furnished by the Head of the Laboratory.

2.10.11 GST/PAN Registration

The laboratory should have registered under Goods & Services Tax Act and secured GST number, which needs to be mentioned in the application. Similarly, the Income Tax PAN number, also to be indicated in the application.

2.10.12 Geo tagging Details

Laboratories are required to provide their location in terms of Latitude and Longitude. For that laboratories are to pin their location in the map provided in the Web-portal to create latitude and longitude for showing exact location of the lab in the map.

2.10.13 Laboratory Photographs

Laboratory has to upload the digital photographs of various sections of the laboratory to depict clear picture of the working status of laboratory. All the major analytical and other areas should be covered while taking the photographs. Photographs of following area but not limited to, are to be uploaded on web-portal at the time of submission of application for recognition.

1. Outer View of the laboratory, Building Front Elevation structure
2. Water Analysis Section (Potable water, Ground Water, Natural water (Lakes, Rivers, Wetlands, Estuaries)
3. Waste Water Analysis Section (Sewage, Industrial Effluents, other waste waters)
4. Microbiological & Biological Analysis Section
5. Ambient Air & Source Emission Monitoring & Analysis Section
6. Soil, Sediments, Sludge & Slurry Analysis
7. Wastes (Industrial Solid Waste, Municipal Solid waste) Analysis Section
8. Hazardous Waste Analysis Section
9. Miscellaneous Analysis Section

10. Instrumentation Section
11. Library & Conference/Committee room
12. Laboratory Staff Sitting area
13. Laboratory Waste Collection, Segregation and disposal
14. Gas storage and distribution area

2.10.14 Laboratory Video Clipping

The Laboratory has to prepare one short video covering all its activities relevant to the EPA Recognition and to provide its link while submitting the application

2.10.15 Environmental Parameters Analyzed and details of their Analytical Method, Range of analysis, MDL etc.

The laboratory has to provide complete information about various parameters analysed matrix wise, details of their Analytical methods, Range of Analysis, Minimum Detection limit in the relevant column of the application. The complete list of parameters is given at **Annexure –IV** The laboratory may apply for all or any of these parameters. However, there are minimum number of analytical parameters are required for Recognition under the Environment (Protection) Act, 1986 under each matrix as per **Annexure –III. These parameters have been summarized in the table as** given below.

Table: 2.4 ANALYTICAL PARAMETERS FOR RECOGNITION

	Discipline/ Group: WATER AND WASTEWATER	
S.No.	**Category**	**Mandatory parameters**
W(A)	Physical Tests	8
W(B) Inorganic	(i) General& Non-metallic	11
	(ii) Trace Metals	14
W(C)	Organics (General) and Trace Organics	3
W(D)	Microbiological Tests	3
W(E)	Toxicological Tests	1
W(F)	Biological Tests	0
	Discipline/ Group: SOLID/SOLID WASTE	
S(A)	Soil/Sludge/Sediment and Solid Waste	13
S(B)	Hazardous Waste Characterization/Analysis	0
S(C)	Plastic Waste	0
	Discipline/ Group: AIR	
A(A)	Ambient Air / Fugitive Emissions	12
A(B)	Stack gases/source emission	10
A(C)	Noise level	2
A(D)	Meteorological Monitoring	5

Criteria for Evaluation of the Laboratory

Laboratory seeking recognition should compulsorily have comprehensive analytical facilities for all the parameters for which the recognition is applied in a particular group and all the parameters should be covered under the scope of accreditation as per ISO 17025: 2017.

The recognition shall be granted only for those parameters which are covered under the scope of accreditation as per ISO 17025: 2017.

2.10.16 Use of Validated Analytical Methods

The analytical testing at the environmental laboratory should be performed by using only validated methods prescribed internationally/nationally are envisaged. While submitting application for Fresh/Renewal of recognition under the Environment (Protection) Act, 1986, the laboratory has to submit details about the methodology used for analysis of respective analytes. The list of parameters with suggestive methods has been given at **Annexure V**.

2.10.17 List of Reference Material/Certified Reference Material

The laboratory has to fill-up the complete information about availability of various Reference Material (RM) as well as Certified Reference Material (CRM) in the relevant column of the application. The expiry date of each should also be mentioned.

2.10.18 Technical Infrastructure and Equipment

The laboratory should have quality infrastructure in conformity with the analytical services requirement expected from a reputed environmental laboratory. The laboratory shall maintain sufficient sampling and sample processing equipment, analytical and support instruments/equipment to conduct required analytical operations. The laboratory shall maintain up-to-date inventory of all instruments/equipment. The laboratories submitting their application of New/Renewal of Recognition under the Environment (Protection) Act 1986 must fill up the information about the availability of various sampling, sample processing and Analytical instruments/equipment (as per **Annexure VI & VII**) at their laboratory in the prescribed column in the application while submitting the application.

2.10.19 Calibration status of important instruments / equipment with accepted validity

While completing information in the application, the laboratory has to provide all the details of instruments and equipment including with range accuracy and calibration details in the relevant column of web-portal with indication of validity of calibration of respective instrument/equipment.

2.10.20 Maintenance of Laboratory Instruments/Equipment

The applicant laboratory has to submit details of Instrument/Equipment under warranty, after sales service/ Maintenance contract (AMC, breakdown contract or other type) in the relevant column in the application.

2.10.21 Participation in Inter-Laboratory Analytical Quality Control (IQC) / Proficiency Testing (PT)

The laboratories desirous to seek recognition under the Environment (Protection) Act, 1986 have to compulsorily participate in the Proficiency Testing Program for covering all the parameters under the scope or Recognition bi-annually as mentioned in Para 7 of the MoEF&CC Gazette Notification No. 2340 dated 16th June 2021 through accredited/reputed National/International PT provider organizations or the PT providers as empanelled by CPCB. The Laboratory should achieve Z-Score less than 3.0 for all the parameters and the parameters for which the desired score could not be achieved have to be re participated in

the PT through an authorized PT provider and submit the report. And during that period the particular parameter/s shall not be allowed to analyse and produce the test report. The performance Report of the past two or three years of PT / ILC Exercise has to be uploaded during filing of the online application for Fresh/Renewal recognition.

2.10.22 Compulsorily Participation in Inter-Laboratory Analytical Quality Control (AQC) conducted by CPCB

The environmental laboratories recognized under The Environment (Protection) Act, 1986 have to compulsorily participate in Analytical Quality Control exercises organized by Central Pollution Control Board as per the plan posted on CPCB official website. CPCB may also send dummy environmental samples to the recognized laboratory to keep constant check over the analytical results generated by the recognized laboratory and results will be provided to the Central Government.

2.10.23 CPCB-AQC Performance of Environmental laboratory

The performance of recognized environmental laboratory in Analytical Quality Control Exercise should be satisfactory (should not be less than 70%) during the recognition period. In case, the performance of the laboratory has been found below the desired standard, the laboratory has to take immediate necessary action to maintain the analytical quality at the laboratory.

Past three Results of compulsory participation in Analytical Quality Control conducted by CPCB have to be submitted by the laboratory in the application. If the performance of the laboratory is not found satisfactory in any two Analytical Quality Control (AQC) out of the last three AQC in past, the renewal of recognition of the laboratory will not be granted.

2.10.24 CPCB AQC Participation Fees

For participation in the CPCB AQC programme, Environmental Laboratories have to submit participation fees in the respective Inter-laboratory AQC Exercise. The fee submission details have to be provided timely to the concerned Laboratory Head at Central Pollution Control Board, Delhi for ensuring the participation in the AQC. **(Annexure IX)**

2.10.25 Government Analyst

A person shall not be qualified for appointment or recognized as a Government analyst unless he or she is possessing following age, qualification and experience.

Age: The Government Analyst under nomination should not be attained the age of 60 yrs.

Qualification & Experience: graduation in science from a recognized university with five year experience in environmental investigation, testing and analysis; or

Post-graduation in science/ environmental science or a graduate in engineering or a graduate in medicine or equivalent with two years' experience in al laboratory engaged in environmental investigation, testing and analysis.

The applicant laboratory should recommend the names of senior officials involved in analytical operation in the laboratory and fulfilling the criteria for govt. analyst in the application proforma in the Web-portal.

The notification of the Government analyst shall deemed be cancelled either he/she leaves the job or the recognition of laboratory gets expired. The laboratory shall apply for his/ her replacement atleast one month before his/ her leaving the job.

2.10.26 Nomination for proposed Govt. Analysts

The laboratory (Pvt. Lab) has to nominate maximum three senior level analysts for consideration as Govt. Analyst at the laboratory, in case it is recognized under the Environment (Protection) Act 1986 as per Section 13 of Environment (Protection) Rules 1986.

2.10.27 Submission of Bio Data by respective nominated Govt. Analyst

The nominated personnel from the laboratory for consideration of Govt. Analyst have to upload their detailed bio-data/Resume including with training details in the specified format at **Annexure XII** for consideration of Recognition under The Environment (protection) Act 1986.

2.10.28 Terms & Conditions for Recognition of Government Analyst

The analysts recommended by the laboratory in the application will be considered and selected by CPCB as Government Analyst. These selected analysts will have to submit Acceptance of Terms &Conditions by Govt. Analyst unconditionally, as specified in the application as per **Annexure XI**.

2.10.29 Substitution of Govt. Analyst during the period of recognition

The Laboratory should appoint their analyst atleast for the period of validity of Recognition. Even though, if any of the recognized govt. analysts by Central Govt. vacates his position due to superannuation / death / resignation from the services of the concerned laboratory, the recognized laboratory may nominate substitute, which will be considered by CPCB. And, if found qualified as per laid guidelines will be accepted and notified as Govt. analyst.

2.10.30 Authorized Signatory of Analysis Reports issued by recognized lab

The analysis report depicting analytical results of environmental samples will be issued by the recognized environmental laboratory under signature of concerned analyst, supervisor analyst and have to be countersigned by any one of government analysts designated by the Central Govt or authorized signatory of NABL. The government analyst recognized with the environmental laboratory will be the authorized signatory of analysis reports generated by the concerned laboratory.

2.10.31 Acceptance of Terms & Conditions for Recognition of Laboratory under the Environment (Protection) Act 1986 by Head of Laboratory

While submitting application for Fresh/Renewal of recognition under the Environment (Protection) Act, 1986, the laboratory has to upload acceptance of Terms & Conditions for

Recognition of Laboratory under the Environment (Protection) Act 1986 in the specified format as given at **Annexure X**.

2.10.32 Bio-Metric Attendance System

Laboratories are required to install Bio-Metric Attendance system at the entrance of Laboratory to ensure the daily attendance of all the employees as well as the Govt. Analysts to provide the Biometric attendance information of all the laboratory officials for past two months. Instructions for uploading the information on the Web-portal to be followed.

2.10.33 Laboratory Waste generation (Liquid waste, Solid waste, Spent Solvents, Bio-hazardous waste) collection and Disposal practices

The laboratory has to submit the write up about approx. quantity of various types of Laboratory waste generated, their segregation, adequate collection and disposal practices

2.10.34 Other Requirements for Best Laboratory Practices

Laboratories have to furnish details of following requirements, whenever asked or at the time of Surveillance visit/ audit or surprise inspection.

- **Electricity Supply Load and Power Back up (DG set & UPS system)**

Information of Electric supply load for the laboratory operation, Power back up arrangement such as Diesel Generator set with its capacity and details of UPS system their capacities and nos.

- **Laboratory Environmental Condition, Air Handling Unit & HVAC system**

Details of AHU & HVAC system their capacity/tonnage

- **Water Supply & Distilled / Deionized Water source**

The laboratory should have provision for continuous raw water supply either from a direct supply source or through storage tanks. Details of water supply whether bore well water, piped water or water supplied through tankers. Similarly, the details of Distilled/deionized water availability through in house water purification system or glass distillation system or water softening system or quantity of deionized water purchased from the supplier to be mentioned.

- **Quality of Glassware/Labwares and Chemicals used**

Information about the makes/quality of Glassware/Labwares and Chemicals.

- **Record of Evidence for Intra Laboratory Analytical Quality Control**

The applicant Laboratory will have to adopt all the steps and procedures of Intra laboratory Analytical Quality Control required for checking the precision and accuracy of analytical results within laboratory but not limited to as per the clause 7.7.1 of the ISO 17025 and systematically maintain its record.

- **Use of Laboratory Signage & Symbols**

The laboratory should adopt and provide the globally harmonized Laboratory signage and symbols, wherever these are required, within the laboratory operation area.

- **Laboratory Safety/Protection Equipment**

The laboratory should provide information in the relevant para in the application about the list of available numbers of various Laboratory safety and protection equipment. List of few such equipment is given at **Annexure-VIII**

- **Maintenance of Customer Service Feedback, Complaints and their Resolution**

The laboratory should have adequate mechanism for Customer Service feedback, to register their appreciation as well as complaints and procedure for the resolution of complaints and should be shown to the inspection/ surveillance team at the time of visit.

2.11 Documentation Checklist for fulfilment of requirement of Recognition- Documents Checklist for completeness of Application (New/Renewal) for Recognition of the Laboratory under The Environment (Protection) Act, 1986

S. No.	Requirements as per the Guidelines for Recognition of Laboratory under the E (P) Act 1986	Adequate/ Inadequate
1.	Legal identity of Laboratory Certificate of Incorporation / Registration / Authorization	
2.	GST/PAN Registrations	
3.	Location details of the laboratory in Authorized Area (indicate in Google Map)	
4.	Video clip of laboratory (link) to be provided by the laboratory	
5.	Laboratory Covered Area, dimensions of various sections	
	Laboratory Layout Map showing different sections	
7.	Laboratory Photograph including with External Photograph with front elevation of building	
8.	Undertaking by Laboratory Head to follow Code of Ethics in the specified format	
9.	Laboratory Organization Structure/Chart	
10.	Details of Senior Management of Laboratory	
	List of total Manpower with Qualifications, Designation, Experience, Work responsibilities and Present Emoluments	
12.	Biometric Attendance of all laboratory officials (past three months)	
13.	Work allotment Details of Laboratory Personnel	
14.	Training Details/Record of Laboratory Personnel	
15.	Write up/SOP of Laboratory Waste Management Practices	
16.	List of Sampling Instruments/Equipment	
17.	List of sample processing instruments / Equipment	
18.	List of Analytical Instruments, details of their date of purchase, Authorization for operation	
19.	Calibration status of important instruments / equipment with accepted validity.	
20.	Details of Maintenance of Instrument/Equipment	
	List of Instrument/Equipment Calibration, and Maintenance Service Contracts	
22.	Water Supply & Distilled/deionized water	
23.	Quality of Glassware/Labware and Chemicals used including with their brands and grading	
24.	Environmental Parameters Analyzed and details of their Analytical Method, Range of analysis, MDL etc	
25.	List of Reference Material/Certified Reference Material	
26.	Record of Evidence for Intra Laboratory Analytical Quality Control	

27.	Record of Evidence for External AQC/PT participation during preceding three years	
28.	Past three Results of compulsory participation in Inter-laboratory Analytical Quality Control conducted by CPCB	
29.	Copy of Certificate for NABL Accreditation (17025:2017) along with detailed Scope with accepted validity at least 1½ years prior from the expiry date	
30.	Copy of ISO 45001 Certification Certificate with validity & Expiry	
31.	Copy of Scope of ISO 17025 Accreditation highlighting the mandatory parameters required for The E(P)Act 1986 recognition included in the scope	
32.	Acceptance of Terms & Conditions for Recognition of Laboratory under the Environment (Protection) Act 1986	
33.	Nomination of Proposed Govt Analysts (Maximum three)	
34.	Bio data of proposed Government Analysts in prescribed proforma with photograph, records of qualification, Training, Experience, Salary, etc.	
35.	Acceptance of Terms & Conditions by the nominated personnel for consideration of Govt. Analysts	
36.	Latest Schedule of Analytical charges, levied by the laboratory for various analysis	
37.	Any other relevant documents in support of application	

2.12 Submission of Duly Completed Application

As per the clause 2.4 How to apply for recognition after the acceptance of pre-requisite from the system the Application format for Recognition has to be completed online. After filling up all the required information online as per requirement of EPA Guidelines, preparing all the enclosures as per the information sought beforehand the duly completed application have to be uploaded through the Web portal. The successful payment of Application Fees as applicable has also to be submitted online,

2.13 Amendments/changes with application proforma and evaluation criteria

If felt necessary CPCB may amend / change application proforma and criteria

2.14 Scrutiny / processing of Application

The applications received from applicant laboratories for consideration of recognition through Web-portal will be scrutinized at first instance by concerned section of CPCB as per the criteria laid down in the guidelines. If the application is found with major shortcoming related with infrastructural requirement or not fulfilling the application will liable to be rejected and laboratory has to apply afresh after fulfilling the desired requirement.

2.15 Communication of shortcomings in the infrastructure facilities of the laboratory

If minor deficiencies have been found in the proposal with respect to laid down criteria for recognition, the same will be communicated to concerned laboratory by CPCB with detailed statement of deficiencies for clarification/rectification through web-portal within the defined time limit, failing which the laboratory has to apply for Fresh recognition.

2.16 Rejection of Application (if found incomplete or non - fulfilment of pre-requisite criteria).

If the laboratory fails to fulfill the pre-requisite or mandatory requirements as per this requirement the application will be rejected and only 50 percent of application fee will only be refunded. The laboratory has options to apply fresh, once it fulfills all the requirements

2.17 Meeting all the requirements as per the Checklist on Web-portal

When the Laboratory finds complying with all the requirement of this document before or after taking all the action taken within the stipulated time limit against the shortcomings as communicated to the laboratory the compliance status of the application is forwarded to the member of Expert committee.

2.18 Expert Committee

Expert Committee has been constituted at CPCB to review all the Recognition cases of Government Sector and Private Sector laboratories, under the Environment (Protection) Act 1986. The Expert Committee will comprise of members from (i) MoEF&CC (ii) State Pollution Control Board (iii) NABL (iv) NEERI (v) CPCB Expert, (vi) CPCB Member Convener

Educational Qualification and experience of Expert Committee Members: Master Degree in Science or equivalent or Bachelor's Degree in Engineering / Technology or equivalent having minimum 15 years of experience preferably in operation and management of environmental laboratory

2.19 Expert Committee Recommendation

Final comments of the laboratory shall be placed before the members of Expert Committee either through web-portal or by virtual/ physical meeting for its recommendation and if the committee found the laboratory fulfilling the requisite requirements as per the criteria laid down in the guidelines for recognition of Environmental Laboratories, final recommendation of the committee then forwarded to the competent authority CPCB for the approval of recognition constituted.

2.20 Grant of Recognition and Gazette Notification

The Environmental Laboratory and Govt. Analyst found qualified, recommended by the Expert Committee, approved by the competent authority, and finally on unconditional acceptance of Terms & condition by the laboratory may be Gazette notified in Govt. of India Gazette

2.21 Procedure for Processing and Evaluation of Environmental Laboratory for Consideration of Recognition under the Environment (Protection) Act 1986

As per the revised Guidelines to grant recognition to Private laboratories as well as Government laboratories under the Environment (Protection) Act 1986, the procedural steps for evaluation of the application are summarized below:

Procedural Steps followed for Processing of Application

Step-I Scrutiny / Processing of the application based on the criteria for Evaluation & Assessment of Application submitted for recognition by CPCB Team, as detailed in various paras at Chapter 7.0

Step-II Verification of the information, documents and all the requirement as submitted in the application form by CPCB Team as detailed in various paras at Chapter 7.0.

Step-III Status of the application (Accepted / Rejected) with the Observations/comments of CPCB will be reflected on web-portal.

Step-IV In case of the incomplete information in the application, the application will be send back to the laboratory for completing the information**.**

Step-VI The complete application with comments shall be forwarded to Expert committee for final recommendation

Step-V Based on the recommendation of expert committee, approval from the Competent Authority of CPCB for consideration of Environmental Laboratory for Recognition under the Environment (Protection) Act 1986.

Step-VI Generate and issue the Provisional Certificate for Recognition after approval.

Step-VII Gazette Notification of approved environmental laboratory and Govt. Analysts.

Step VIII The list of approved recognized Environmental laboratories under the Environment (Protection) Act 1986 will be posted on CPCB Website (www.cpcb.nic.in).

2.22 Time limit for Disposal of application

After receiving of complete application including with all the desired documents/ information on the web-portal minimum one moth shall be required to get it approved by the competent authority.

2.23 Use of Phrase "Recognized under the Environment (Protection) Act, 1986"

The recognized environmental laboratory under The Environment (Protection) Act, 1986 may use the phrase "Recognized under The Environment (Protection) Act, 1986" on the analysis report, official stationary, signboards etc. However, the validity period of recognition has also to be mentioned alongwith the phrase.

2.24 Obligation of the Laboratory during the period of Recognition

The laboratories recognized under The Environment (Protection) Act, 1986 will have jurisdiction to function as Environmental laboratory in any state of the country. However, sample collection, preservation and transport protocol will have to be adopted and maintained by the laboratory as per standard references.

The laboratories recognized under The Environment (Protection) Act, 1986 are intended to be simultaneously recognized under the Water Act, 1974 for carrying out the functions as per provisions of the Water (Prevention & Control of Pollution) Act, 1974 and also under the Air Act, 1981 for carrying out the functions as per provisions of The Air (Prevention and Control of Pollution) Act, 1981.

2.25 Desktop Audit, Surveillance, and Surprise Inspection of recognized laboratories

Laboratory should willingly ready and affirm any surprise surveillance/inspection either physically or virtually, by the joint inspection team of MoEF&CC, CPCB and SPCB, any time during the period of recognition. In case joint inspection team find/observe any major

shortcomings, hiding of facts by laboratory, inadequate supporting documents for respective analytical work undertaken, or laboratory reportedly indulged in gross manipulation of analytical data may lead to revoking/withdrawal of recognition granted.

2.26 Inspection Team

The joint inspection team of MoEF&CC, CPCB and SPCB,will comprise of atleast two/three officers with not less than rank of Group A or equivalent having experience of aleast 3 years in the relevant field

2.27 Actions to be taken against non-compliance

Following actions may be taken against the non-compliance/ Shortcomings found by the inspection team during the visit.

S.No.	Shortcomings	Action to be taken	Reversal of action after taking corrective action by the laboratory
01.	Pre-requisite requirements	Revoking of recognition	To apply a fresh after fulfilling the requirement
Mandatory Requirements			
02.	Use of standard/ Validated Analytical Methods:	Recognition for concerned parameter(s) shall be cancelled	To submit the documentary evidence after the standard/ validated method adopted.
03.	Availability of Reference Material/Certified Reference Material with accepted validity	Until the valid CRM is purchased the analysis of concerned parameters shall be stopped	To submit certificate of valid CRM.
04.	Technical Infrastructure and Equipment:	Revoking of recognition if any Instrument / equipment not available for mandatory parameter(s)	To apply a fresh after fulfilling the requirement
		Recognition for concerned parameter(s) shall be cancelled if shortcoming is for secondary parameter	To submit supporting document after fulfilling the requirement
05.	Calibration status of important instruments / equipment with accepted validity:	Until the valid Calibration certificate is submitted, analysis of concerned parameters shall be stopped	To submit valid calibration certificate.
06.	Participation in Inter-Laboratory Analytical Quality Control (AQC) / Proficiency Testing (PT):	Suspension of Recognition if not participated in the PT exercises for mandatory parameters	To participate in the PT/ AQC for the said parameter and submit satisfactory report
		Recognition for concerned parameter(s) shall be cancelled if shortcoming is for secondary parameter	
07.	Compulsorily Participation in Inter-Laboratory AQC conducted by CPCB	Suspension of Recognition if not participated in at least 2 out of last 3 AQCs conducted by CPCB	To participate in the same parameter/s from any authorized PT Provider with satisfactory performance and send the report
		Recognition shall be withdrawn for those unsatisfactory parameters	

		in the last 3 AQC for which corrective action was not taken	
08.	Qualification and competency of Government Analyst	The laboratory shall be derecognized till the laboratory appoints another competent Govt. Analyst with accepted qualification	To submit record of newly appoint Govt. Analyst and the revival of recognition will be based on verification of records
09.	Training Details/Record of Analysts for performing Environmental Analysis:	The analyst may be stopped for analysis till he/she gets the proper training	To submit training record for the concerned analyst
10.	Photographs provided with the application not matching with the original location	The recognition shall be suspended at least for 3 months on false reporting	To apply afresh application after 3 months
11.	Complaints	On verification of the complaint, if it is found to be correct and/or any violation or non-compliance committed by the laboratory, the recognition shall be cancelled for 3 months	After taking corrective action the laboratory will intimate to CPCB and apply a fresh after verification from CPCB.

2.28 Penalty for contravention of the provisions of the Act and rules, orders and directions

Any Such activity which fails to comply with the or contravenes any of the provisions of the Act or Rules made or orders or directions issued thereunder penalties may be imposed on the laboratories as per the Environment (Protection) Act, 1986;

2.29 Show Cause Notice & Revoking of Recognition

The CPCB reserves its right to de-recognize/revoke its recognition or issue show cause notice at any time in public interest without assigning any reason, if it is deemed necessary by the Central Govt./CPCB. The recognition will also be revoked during following events:

- In case, the laboratory indulges in malpractices and issuing fraudulent reports.
- There are complaints against the laboratory regarding analytical malpractices.
- The laboratory violates the accepted terms & conditions for recognition of environmental laboratory under the Act.
- The laboratory not complying the rules and regulations notified under The Act.

Annexure I

UNDERTAKING TO FOLLOW CODE OF ETHICS

I……the Laboratory Head / authorized signatory of Environmental Laboratory of M/s_____

Address_____

_____

Submitting application for recognition under The Environment (Protection) Act, 1986 as we understood to have fulfilled the Laboratory Recognition mandatory and optional Criteria as stipulated by Central Pollution Control Board / Ministry of Environment, Forest & Climate Change do hereby undertake that:

1. Integrity: We shall have a professional behaviour, be straightforward and honest in all professional and business practices and maintain absolute integrity of analytical data/information.
2. Objectivity: We shall not allow bias, conflict of interest or undue influence of others including clients in our professional testing and reporting activity.
3. Professional competence and due care: It is our continuing duty to maintain professional knowledge, skill and testing facilities at the level required to ensure that the customer receives competent professional services based on current technological advancements, revision/amendment in the analytical procedures, standards etc.
4. Our laboratory will not indulge in deliberate falsification of analytical results, where failed method requirements are made to appear acceptable during reporting. An intentional gross deviation from specified analytical method and practices, combined with the intent to conceal the true analytical value
5. The following practices shall be strictly discouraged:
   - Sharing of test results with the customer/client before completion of testing as well as before final issue of report.
   - Reporting the test results without proper/actual testing on the environmental sample
   - The intentional recording or reporting of incorrect analytical information
   - Giving any undue favor to the customer/client in terms of testing and reporting of results
6. Confidentiality: We shall maintain adequate confidentiality with respect to the sample under test and the test results.
7. Professional behaviour: We shall comply with relevant laws and regulations and should avoid any action that discredits the profession

:
Date

: Laboratory Head / Authorized Signatory

Place

Name & Designations

Seal of Laboratory:

Note: The undertaking shall be furnished, signed and sealed by the Proprietor or Director or Partner of the applicant laboratory on laboratory's official stationery (letter-head). For Government sector labs, the undertaking may be furnished by the senior most head of the Lab.

Annexure II

Details of Laboratory Personnel at the Laboratory as per Organization chart

S. No	Name	Designation	Qualifications	Total experience (years & months)	Working at the laboratory Since	Emoluments drawn per annum
Top Management Officials						

Laboratory Personnel						

Training attended in the field of environmental sampling and analysis and quality control systems may be included

Annexure III

LIST OF MANDATORY ANALYTICAL PARAMETERS FOR RECOGNITION

Discipline/ Group:

WATER AND WASTEWATER

(A) Physical Tests:

S. No.	Parameter
1.	Temperature
2.	Colour
3.	pH
4.	Turbidity
5.	Conductivity
6.	Total solids
7.	Total dissolved solids
8.	Total suspended solids

(B) Inorganic (i) General& Non-metallic

S. No.	Parameters
1.	Alkalinity
2.	Chloride
3.	Nitrite nitrogen
4.	Nitrate nitrogen
5.	Ammonical nitrogen

6.	Fluoride
7.	Hardness (Total)
8.	~~Hardness (Calcium)~~
9.	Calcium
10.	Magnesium
11.	Phosphate
12.	Sulphate

(ii) Trace Metals

S. No.	Parameter
1.	Chromium (Cr) Hexavalent
2.	Chromium (Cr) Total
3.	Cadmium (Cd)
4.	Copper (Cu)
5.	Iron (Fe)
6.	Lead (Pb)
7.	Mercury (Hg)
8.	Nickel (Ni)
9.	Potassium (K)
10.	Sodium (Na)
11.	Zinc (Zn)
12.	Aluminium (Al)
13.	Arsenic (As)
14.	Manganese (Mn)

(C) Organics (General) and Trace Organics

S. No.	Parameters
1.	Biological Oxygen Demand (BOD)
2.	Chemical oxygen demand (COD)
3.	Oil & Grease

(D) Microbiological Tests

S. No.	Parameters
1.	Total Coliform
2.	Faecal Coliform
3.	Faecal Streptococci

(E) Toxicological Tests

S. No.	Parameter
1.	Bioassay method for evaluation of toxicity using fish (90% survival of fish after 96 hrs in 100% effluent)

Discipline/ Group: SOLID/SOLID WASTE

(A) Soil/Sludge/Sediment and Solid Waste

S. No.	Parameter
1.	Cation Exchange Capacity (CEC)
2.	Electrical Conductivity (EC)
3.	Organic carbon/matter (chemical method)
4.	pH
5.	Soil moisture
6.	Exchangeable sodium percentage (ESP)
7.	Exchangeable Calcium as Ca
8.	Exchangeable Magnesium as Mg
9.	Sodium (Exchangeable)
10.	Moisture Content

Discipline/ Group: AIR

(A) Ambient Air / Fugitive Emissions

S. No.	Parameters
1.	Nitrogen dioxide as NO_2
2.	Sulphur dioxide (SO_2)
3.	Respirable suspended particulate matter (PM_{10})
4.	Respirable suspended particulate matter ($PM_{2.5}$)
5.	Carbon monoxide
6.	Ozone
7.	Benzene
8.	Ammonia
9.	Metals in Particulate Matter, Pb
10.	Metals in Particulate Matter, As
11.	Metals in Particulate Matter, Ni
12.	Particulate Benzo-a-Pyrene (BaP)

(B) Stack gases/source emission

S. No.	Parameter
(i)	**Mandatory Parameters**
1.	Particulate matter
2.	Sulphur dioxide
3.	Velocity
4.	Carbon dioxide
5.	Carbon monoxide
6.	Temperature
7.	Moisture
8.	Oxygen
9.	Oxides of nitrogen
10.	Hydro-chloric acid

(C) Noise level

S. No.	Parameters
1.	Ambient Noise level measurement (20 to 140 dB(A)
2.	Source Noise Level Measurement (20 to 140 dB(A)

(D) Meteorological Monitoring

S. No.	Parameters
1.	Ambient Temperature
2.	Wind direction
3.	Wind speed

4.	Relative Humidity

Annexure IV

List of all the other parameters may be applied for Recognition

S. No.	Physical Tests
1.	Salinity
2.	Odour
3.	Free Chlorine
4.	Flocculation test (Jar test)
5.	Fixed & Volatile solids
6.	Settleable solids
7.	Sludge volume index (SVI)
8.	Velocity & discharge Measurement of industrial effluent stream
	Inorganic (i) General& Non-metallic
1.	Acidity
2.	Bromide
3.	Chlorine demand
4.	Chlorine residual
5.	Cyanide
6.	Dissolved Carbon dioxide
7.	Dissolved oxygen
8.	Iodine
9.	Silica
10.	Sulphide
11.	Sulphite
12.	Total Kjeldhal Nitrogen (TKN)
13.	Total Phosphate
	Trace Metals
1	Beryllium (Be)
2	Antimony (Sb)
3	Barium (Ba)
4	Boron (B)
5	Cobalt (Co)
6	Lithium (Li)
7	Selenium (Se)
8	Silver (Ag)
9	Sodium absorption ratio (SAR)
10	Strontium (Sr)
11	Tin (Sn)
12	Vanadium (V)
	Organics (General) and Trace Organics
1.	Total organic carbon (TOC)
2.	Adsorbable organic halide (AOX)
3.	Surfactants
4.	Tannin & lignin
5.	Polynuclear aromatic hydrocarbon (PAH) each
6.	Organic Carbon (in solid)
7.	Carbon/Nitrogen ratio
8.	Poly-chlorinated biphenyl (PCB's) as enviro indicator

	2,4,4'-trichlorobiphenyl (PCB-28)
	2,2',5,5'-tetrachlorobipheny (PCB-52)
	2,2',4,5,5'-pentachlorobiphenyl(PCB-101)
	2,3',4,4',5-pentachlorobiphenyl(PCB-118)
	2,2',3,4,4',5'-hexachlorobiphenyl(PCB-138)
	2,2',4,4',5,5'-hexachlorobiphenyl(PCB-153)
	2,2',3,4,4',5,5'-heptachlorobipheny (PCB-180)
9.	Synthetic Pyrethroids (SPs)
	Deltamethrin
	Fenpropethrin
	Fenvalerate
	α-Cypermethrin
	β-Cyfluthrin
	λ-Cyhalothrin
10.	Phenolic Compounds
	Phenol
	4-nitrophenol
	2,4-dinitrophenol
	2-nitrophenol
	2-chlorophenol
	2,4-dimethylphenol
	2-methyl,4,6-dinitrophenol
	4-chloro,3-methylphenol
	2,4-dichlorophenol
	2,4,6-trichlorophenol
	Pentachlorophenol
11.	Pesticide (each)
11.1	**Organo-chlorine**
	Aldrin
	Alpha Endosulphan
	BHC
	p,p'-DDT
	Alpha-HCH
	Beta Endosulphan
	Beta HCH
	Gama-HCH
	o,p'-DDT
	p,p'-DDE
11.2	**Organo nitrogen-phosphorous**
	Chloropyriphos
	Malathion
	methyl parathion
	Dimethoate
	Ethion
	Microbiological Tests
	E. Coli
	Total plate count
	Enterococcus
	Coliphage
	Toxicological Tests
1.	Measurement of toxicity factor using zebra fish (dimensionless toxicity test
2.	Bio-accumulation, bio magnification and bio-transformation studies
3.	Estimation of the effect at tissue level
4.	Measurement of toxicity using Daphnia or other organism
	Biological Tests
1.	Diversity Score (Benthic macro-invertebrates)
2.	Benthic organism identification and count
3.	Macrophytic identification

4.	Planktonic identification count
5.	Measurement of various diversity index
6.	Saprobity Index
7.	Chlorophyll
8.	Primary productivity
9.	P/R Ratio
	Soil/Sludge/Sediment and Solid Waste
1.	Ammonia
2.	Bicarbonate
3.	Calcium
4.	Calcium carbonate
5.	Calorific value
6.	Chloride
7.	Colour
8.	Exchangeable sodium percentage (ESP)
9.	Gypsum requirement
10	H. Acid
11.	Heavy metals (Fe, Mn, Cu, Ni, Pb, Cd, Cr, Hg, Cr (VI), As, Se, V, Al, Zn, B)
12.	Magnesium
13.	Mechanical soil analysis
14.	Nitrate
15.	Nitrite
16.	Nitrogen available
17.	PAH
18.	Pesticides (OCP, OPP, ONP)
19.	Phosphate (ortho)
20.	Phosphate (total)
21.	Phosphorous (available)
22.	Potash (available)
23.	Potassium
24.	SAR in soil extract
25.	Sodium
26.	Sulphate
27.	Sulphur
28.	TKN
29.	TOC
30.	Total water soluble salt
31.	Water holding capacity
	Hazardous Waste Characterization/Analysis
01.	Corrosivity
02.	Ignitability (Flash point)
03.	Reactivity
04.	Toxicity
05.	Preparation of Leachate (TCLP extract/water extract)
06.	Measurement of heavy metals/pesticides in the waste/leachate
	Ambient Air / Fugitive Emissions
01.	Hydro sulphide
02.	Anions in Particulate Matter, Bromide
03.	Anions in Particulate matter, Chloride
04.	Anions in Particulate matter, fluoride
05.	Anions in Particulate matter, Nitrate
06.	Anions in Particulate matter, Nitrite
07.	Anions in Particulate matter, Phosphate
08.	Anions in Particulate matter, Sulphate
09.	Benzene Toluene Xylene (BTX)
10.	Cations in Particulate matter, Ammonium
11.	Cations in Particulate matter, Barium
12.	Cations in Particulate matter, Calcium

13.	Cations in Particulate matter, Lithium
14.	Cations in Particulate matter, Magnesium
15.	Cations in Particulate matter, Potassium
16.	Cations in Particulate matter, Sodium
17.	Cations in Particulate matter, Strontium
18.	Chlorine
19.	Fluoride (gaseous)
20.	Fluoride (Particulate)
21.	Hydrogen chloride
22.	Metals in Particulate Matter, Cd
23.	Metals in Particulate Matter, Cr
24.	Metals in Particulate Matter, Cu
25.	Methane
26.	Non methane hydrocarbon
27.	Polycyclic aromatic hydrocarbon (PAH)
28.	Volatile Organic Carbon
	Stack gases/source emission
01.	Acid mist
02.	Ammonia
03.	Chlorine
04.	Fluoride (Particulate)
05.	Fluoride (Gaseous)
06.	Total Hydro carbon
07.	Hydrogen Sulphide
08.	Carbon disulphide
09.	Mercaptan
10.	Flue Gas Discharge
11.	Sample processing and analysis for Dioxin-Furan(PCDDs-PCDFs)congeners(Isotope Dilution method using GC-HRMS)
	Noise level
01.	DG Set Noise Leq
	Meteorological Monitoring
01.	Solar radiation
02.	Rain fall

ANNEXURE V

Analytical Methods

As stipulated in ISO 17025, clause 7.2 the analytical testing at the environmental laboratory should be performed by using only validated methods prescribed internationally/nationally are envisaged. Following are the prescribed methods to be adopted by the laboratories for designated parameters;

A. Methods for Analysis of Water, Wastewater and Groundwater

For waters, wastewaters and ground waters, methods selected from the standard references listed below should be used.

International:

1. American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition.
2. US Environmental Protection Agency SW846 Online, Methods for Chemical Analysis of Water and Wastes, www.epa.gov/epawaste/hazard/testmethods/sw846/online/index.htm#table
3. American Society for Testing and Materials (ASTM), Water and Environmental Technology.
4. US Environment Protection Agency 1978, Microbiological Methods for Monitoring the Environment, Water and Wastes.

National

1. Bureau of Indian Standard (BIS), Drinking Water Standard IS 10500:2012
2. IS 3025: Part 1: 2019· Methods of sampling and test (Physical And Chemical) for water and wastewater: Part 1 sampling (First Revision) ·
3. IS: 3025. (Various Parts i.e. from Part 2 to Part 78) Method of Sampling and Test (Physical and Chemical) for Water and Wastewater

B. Trace Metals Analysis in Water, Waste water, Soil, Sediments, Solid and Hazardous waste.

The sample preparation is a crucial step which ensures the quality of the whole analytical process. Before assessing the metal contents in several environmental matrices, the samples need to be pre-treated and digested with single acid or acid mixture or sometimes in aqua-regia. to eliminate the majority of organic matrix components that can interfere in obtaining results.

Various digestion methods are available, such as wet acid, dry ash, and microwave acid digestion, which can be appropriately utilized as each method has its own advantages and disadvantages, however for soil, sediments, solid waste, the microwave digestion is the most appropriate and quick method for preparing trace metals samples ready for instrumental analysis as well as Microwave digestion is the most reliable sample digestion method.

Though colorimetric analytical techniques are also available, where metals can be analysed calorimetrically using UV Visible spectrophotometer, but the lower detection limit of colorimetric methods is much higher (in ppm and in percentage) Hence the colorimetric analysis of trace metals is not suitable for use in environmental matrices.

A variety of instrumental techniques can be used to measure trace elements in water and waste water including flame atomic absorption spectrometry (FAAS) and graphite furnace (or electrothermal) atomic absorption spectrometry (GFAAS or ETAAS), inductively coupled plasma optical emission spectrometry (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS), Energy Dispersive X-ray Fluorescence (EDXRF) and Wavelength Dispersive X-ray Fluorescence (WDXRF) etc.

For elemental analysis**,** each instrument has its own limitations and advantages with respect to the efficiency and effectiveness of sample analysis, both qualitative and quantitative point of view. Depending upon the number of elements to be determined, cost, sensitivity/ detection limit, expected concentration range of analytes, matrices and regulation requirements, and the number of samples to

be run, the environmental laboratories can choose the most suitable technique for environmental applications

The summary of various instrumental techniques used for trace metals analysis in environmental matrices are presented in Table 5.1 above.

Table 5.1: Summary Instrumental Analytical Techniques for Trace Metals Analysis in Environmental samples

	FAAS	GFAAS	HGAAS & CVAAS	ICP-OES	ICP-MS
Detection limits	Very good for some elements Ppm	Excellent for some elements Ppb	Excellent for hydride forming metals ppb	Very good for most elements ppb	Excellent for most elements ppb
Sample throughput	10-15 secs per element	5-6 mins per Element	30-50 secs per element	60 elements in < 1 minute	All elememts in< 1minute
Interferences					
Spectral	Few	Few	Very few	Many	Few
Chemical (matrix)	Many	Very few	Very few	Few	Some
Sample volume required	Large	Very small	Large	Medium	Very small to medium
Cost	Moderate	Moderate to High	Moderate to high	High	Very high

HGAAS =Hydride generator Atomic absorption spectrometer; CVAAS= Cold Vapour Atomic Absorption spectrometer

ICP-OES could be used for samples with high total dissolved solids (TDS) (up to 30%) and more robust for analysing ground water, wastewater, soil, and solid waste. It can be used for drinking water analysis as well. But in general, ICP-OES is used to measure contaminants for environmental safety assessment and elements with a higher regulatory limit. On the other hand, ICP-MS, is especially useful for analysing samples with low regulatory limits. It has much lower tolerance for TDS (about 0.2%) although there are ways to increase the tolerance. Although both ICP-OES and ICP-MS can be used for high matrix samples, sample dilution is often necessary required in case of ICP-MS. In addition, if a sample contains analyses of great difference in concentration, ICP-OES has wider dynamic linear range, so the sample may not be diluted to detect these elements at the same time.

Table 5.2 Methods (International) for Trace Metal Analysis in Environmental matrices

S. No.	Element	Environmental matrices	Range of analysis	Methods	Instrument
1	Calcium	In all matrix	Parts per Million (ppm)	APHA 3500-Ca B IS 3025	
2	Magnesium	In all matrix	Parts per Million (ppm)	APHA- 3500-Mg B IS 3025	--
3	Sodium Absorption Ratio (SAR)	Water and Waste water	Ratio	USEPA-SW 846 1S11624	--
		Soil/ Sediment		USEPA-6020A, 7000B	
4	Boron	In all Matrix	Parts per Million (ppm)	APHA 4500 B, 4500 B-C IS 3025	Spectrophotometer
5	Chromium Hexavalent	Drinking water, Surface Water and Ground Water	Parts per Million (ppm)	APHA 3500-Cr B, 3500- Cr C 1S 3025	Spectrophotometer

S. No.	Element	Environmental matrices	Range of analysis	Methods	Instrument
		Wastewater and Industrial discharge etc.	Parts per Million (ppm)		Ion Chromatograph
6	Sodium, Potassium	In all Matrix	Parts per Million (ppm)	APHA 3500 NaB, 3500- K B IS 3025	Flame Photometer
7	Cadmium, Chromium (T), Copper Iron, Lead, Nickel, Zinc	Drinking water, Surface Water and Ground Water	Parts per Billion (ppb) to Parts per Million (ppm).	APHA, 3111, 3113,3120 and 3125.	Selection of instruments (AAS, ICP-OES and ICP-MS etc.) as per parameter-wise applicable methods.
		Wastewater and Industrial discharge etc.	Parts per Billion (ppb) to Parts per Million (ppm).	APHA, 3111, 3120 and 3125.	
		Soil, Sediment, Solid waste and Hazardous Waste etc.	Parts per Billion (ppb), Parts per Million (ppm) and % level.	USEPA 3050-B, 6010, 6020 and APHA, 3125.	
8.	Arsenic	Water and wastewater	Parts per Billion (ppb) to Parts per Million (ppm).	APHA, 3113, 3114,3120 and 3125.	
		Soil, Sediment, Solid waste and Hazardous Waste etc.	Parts per Billion (ppb) to Parts per Million (ppm).	USEPA 3050-B, 6010, 6020 and APHA, 3125.	
9	Mercury	Water, Wastewater and Industrial discharge etc.	Parts per Billion (ppb) to Parts per Million (ppm).	APHA, 3112 and 3125.	AAS and ICP-MS or equivalent dedicated instruments.
		Soil, Sediment, Solid waste and Hazardous Waste etc.	Parts per Billion (ppb) to Parts per Million (ppm).	EPA 7471, 7473 and 6020.	
10	Aluminium, Beryllium, Barium, Lithium, Manganese, Selenium, Strontium, Tin, Antimony, Cobalt, Vanadium	Drinking water, Surface Water and Ground Water	Parts per Billion (ppb) to Parts per Million (ppm).	APHA, 3111, 3113,3120 and 3125.	AAS, ICP-OES and ICP-MS.
		Wastewater and Industrial discharge etc.			
		Soil, Sediment, Solid waste and Hazardous Waste etc.	Parts per Billion (ppb), Parts per Million (ppm) and % level.	USEPA 3050-B, 6010, 6020 and APHA, 3125.	

Indian Standard Methods

1. Bureau of Indian Standards, IS 10500 (2012): Drinking Water with latest amendments.
2. IS 3025 (Part 2):2004 Method of Sampling and Test (Physical and Chemical) for Water and Wastewater, Determination of 33 Elements by Inductively Coupled Plasma Atomic Emission Spectroscopy

Remarks: The BIS methods documented for Spectrophotometric analysis of heavy metals/trace metals are mostly not suitable for environmental matrices analysis as they are only for analysis in PPM and percentage range, while in environment the presence of trace metals are expected in PPB and Sub PPB levels,

C. Trace Organics in Water, Waste Water, Soil, Sediments, Solid waste and Hazardous waste

Trace organics in environment include a range of compounds which, due to a combination of their physico-chemical properties and toxicological implications, have been described as a potential threat to environmental components. The term trace organic refers to a diverse and expanding array of natural as well as anthropogenic substances including industrial chemicals, leachate from organics waste, chemicals used in households, agriculture, compounds and their metabolites excreted by people and by-products formed during water and waste water treatment, Several of trace organics are Persistent Organic Pollutants (POPs) once released in environment remain persistent and available in environmental matrices for several decades without biodegradation, The presence of several common Trace organics compounds is imminent therefore their highly comprehensive analysis is obviously required.

The Investigations about these trace organic chemicals has been considered a growing necessity in environmental matrices such as environmental waters, drinking waters, municipal & Industrial wastewaters, industrial processing waters and solid waste using an array of analytical instruments examples include Gas Chromatograph with Electron capture Detector (GC-ECD), Gas Chromatograph with Flame Photometric Detector (GC-FPD), Gas chromatography-Mass spectrometry (GC-MS and GC-MS/MS), High Performance Liquid Chromatography (HPLC),High Performance Liquid Chromatography-Mass Spectrometry (HPLC- MS and HPLC-MS/MS) and a multitude of UV-Vis Spectroscopy applications.

The suggestive analytical methods to be followed for analysis of these compound groups in environmental matrices are presented in the Table 5.3 below

Pre-treatment of Trace Organics Samples

The preservation techniques aim to minimize the sample degradation occurring between collection and analysis, which is caused by physical processes, like volatilization, adsorption, or diffusion, or chemical processes, like photochemical or biochemical degradation.

In order to apply an analytical method to trace organics analysis sample, it is compulsory to avoid interferences between the analyte and the components of the matrix. Therefore, most of the time, the analysis begins with the separation of the components from the sample matrix. The results of the organic pollutants analysis depend on the scientific preparation/extraction steps.

Extraction of Trace Organics from Liquid Samples

Extraction is a common technique used in organic chemistry to isolate the target trace organic compound. In the extraction process, a solute is transferred from one phase to another to separate it from unreacted starting materials or impurities. When choosing between Liquid- Liquid extraction or Solid-phase extraction for a particular sample, technical aspects of sample and economical consideration are the deciding factors.

Liquid – Liquid extraction (LLE)

Liquid–liquid extraction (LLE), also known as solvent extraction and partitioning, is a method to separate compounds or metal complexes, based on their relative solubility in two different immiscible liquids, usually water (polar or aqueous phase) and an organic solvent (Non-polar or organic phase). The Liquid-Liquid Extraction technique requires a solvent or a solvent mixture, able to solve all the trace organic pollutants in the sample. The easiest method is to extract the water pollutants by mixing the sample with the organic solvent in a separation funnel. This technique is long lasting and uses toxic solvents. Sometimes emulsions are formed making the water/organic phase separation very difficult. Therefore, many times the separating funnels have to be replaced by extraction columns filled with a special material with a large pores volume. The extract received from this column can be vaporized and the extracted trace organics pollutants are analyzed.

Solid-Phase Extraction (SPE)

Solid-phase extraction is an extractive technique by which compounds that are dissolved or suspended in a liquid mixture are separated from other compounds in the mixture according to their physical and chemical properties. Solid-Phase Extraction replaces the liquid-liquid extraction and is based on the principle that the organic analytes can be adsorbed on a specific substrate, in a micro column. On this route, the interfering compounds from the matrix are avoided. The micro columns contain adsorbents with different particle dimensions that allow the use of low pressures, forcing the sample and the eluting agent to pass through it. Solid-phase extraction for liquid samples becoming a widely adopted laboratory technique with the introduction of disposable sorbent cartridges containing porous siloxane-bonded silica particles, sized to allow sample processing by gentle suction.

Purge and Trap Extraction

Purge and Trap Extractionis used for organic non-polar volatile compounds extraction for GC analysis. An inert gas is bubbled in the water sample moving the organic volatiles into the vapor phase. These are trapped in active carbon and/or condensed. The trap containing the adsorbent is passed into a heated desorption chamber that allows desorption of the retained compounds. It is very important to use highly pure purge gas.

Extraction from Solid Samples

The common trace organics extraction techniques for solid matrices (Soil, Sediment, Solid waste, Hazardous waste etc.) include

- Solvent Extraction-Solvent extraction is the process of removal of a solute component from the solid by using a liquid solvent; it is called leaching or solid-liquid extraction
- Soxhlet Extraction- Soxhlet extraction is a procedure for extracting non-volatile and semi-volatile organic compounds from solids such as soils, sludge, and wastes. The Soxhlet extraction process ensures intimate contact of the sample matrix with the extraction solvent

- Ultrasound Extraction (sonication)-Ultrasonic-assisted extraction is rapid and effective extraction technique that uses ultrasound to generate rapid movement of solvents containing solid particles, resulting in a higher mass transfer speed as well as acceleration of extraction.
- Accelerated-Solvent Extraction (ASE)-Accelerated solvent extraction (ASE) is a method for extracting organic compounds from a complex solid and semisolid sample matrix using liquid solvents.
- Microwave-assisted Extraction (MAE)-Microwave-assisted extraction (MAE) is a process of using microwave energy to heat solvents in contact with a sample in order to partition organic analytes from the sample matrix into the solvent.

Clean-up of extracted Trace Organics samples

The extracted sample clean-up refers to the process of removing organic compound that can interfere with the analytical results of trace organics compound being analysed. The sample clean-up has two functions: first the removal of gross levels of co-extractants, and second to separate the various organics analyte groups based on their solid/liquid adsorption characteristicsThe need for Sample clean-up procedure ranges with wide range of matrix types and many times extract of highly organic contaminated sample may have to be processed for a variety of clean-up/separation procedures as per the analytical methodology adopted. The clean-up procedures are usually undertaken through columns of either deactivated silica, multilayer silica or by using florisil column

Pre-treatment Methods for Trace Organics Analysis

1. USEPA method 3500c Organic Extraction and Sample Preparation
2. USEPA Method SW-846Hazardous Waste Test Methods Compendium
3. USEPA method 3510C Separatory Funnel Liquid-Liquid Extraction
4. USEPA method 3535 Solid Phase Extraction
5. USEPA Method 3540C Soxhlet Extraction
6. USEPA Method 3550B Ultrasonic Extraction

Table 5.3: Trace Organics Analytical Methods in various Environmental Matrices (Water, Waste water, Soil and Sediments).

S. No.	Trace Organic Compounds	Instrument	Analytical Method
Mandatory Trace Organics Analysis			
1	Organochlorine pesticides (HCH, DDT, Aldrin, Endosulphan)	Gas Chromatograph with capillary column and Electron Capture Detector (ECD)	USEPA Methods – 508 & 8081 using GC-ECD USEPA Method 608
2	Organophosphorus/ Organonitrogen pesticides (Malathion, methyl parathion, chlorpyriphos)	Gas Chromatograph with capillary column and Nitrogen Phosphorus Detector (NPD) / Flame photometric Detector (FPD)	USEPA Methods – 507 & 8141B using GC-NPD / GC-FPD
3	Polychlorinated Biphenyls (PCBs)	Gas Chromatograph with capillary column and Electron Capture Detector (ECD) / Mass Spectrometer Detector (MSD)	USEPA Methods – 3540, 3610, 3630, 3660, 8082 & 8280 using GC-ECD / GC-LRMS USEPA Method 608

S. No.	Trace Organic Compounds	Instrument	Analytical Method
4	Polyaromatic hydrocarbons (PAHs)	High Pressure Liquid Chromatograph (HPLC) with UV-VIS / UV-DAD Detector or Gas Chromatograph with capillary column and Flame Ionisation Detector (FID) / Mass Spectrometer Detector (MSD)	USEPA Method 610
5	Volatile Organic Compounds (VOCs)	Purge & Trap System (Aqueous Samples) or Head Space System (Solid Samples), Gas Chromatograph with capillary column and Mass Spectrometer Detector (MSD)	USEPA Method – 524.2 using Purge & Trap with GC-LRMS USEPA Method 1624
6	Trihalomethanes (THMs)	Gas Chromatograph with capillary column and Electron Capture Detector (ECD) / Mass Spectrometer Detector (MSD)	USEPA Method – 501.1 (Archive method) US EPA Method – 551.1
7	Carbamates	High Pressure Liquid Chromatograph (HPLC) with UV-VIS / UV-DAD Detector	USEPA Method – 531.1 USEPA Method – 632 USEPA Method – 632.1
8	Herbicides	Gas Chromatograph with capillary column and Electron Capture Detector (ECD) or High Pressure Liquid Chromatograph (HPLC) with UV-VIS / UV-DAD Detector	USEPA Method – 515.1 USEPA Method – 8151A USEPA Method – 8321B

D. Microbiological Analysis

Microbiological analysis is a method of analyzing drinking water, natural waters, waste waters to estimate the numbers of bacteria present and to allow for the recovery of microorganisms in order to identify them. Routine microbiological testing of drinking water supplies, recreational waters, and environmental waters is essential for the protection of public health. For correct assessment of bacterial contamination, it is envisaged that correct sampling procedures along with scientific analysis as instructed by international standard protocols must be followed by environmental laboratories.

Microbiological analysis in environmental samples is performed through a range of test methods designed for that purpose. Instead of carrying out specific tests for each of the harmful bacteria and potential pathogens in water/ wastewater, the environmental microbiological methods analyses indicator bacterial groups, that are always present along with enteric pathogens. Coliform is a term used to denote a group of gram-negative bacteria that can ferment lactose with a production of gas within 48 hours at either 35ºC±0.5^{0}C or 44.5ºC±0.2^{0}C. These characteristics allow for easy isolation, detection, and enumeration of microbial organism during microbiological testing. The presence of high 'total coliform' count doesn't necessarily mean the presence of faecal contamination and requires a second step to identify them. *Escherichia, Enterobacter, Klebsiella* are the faecal coliforms, and *Citrobacter* and *Serratia* are found in plants and soil, contribute to Total coliforms

The faecal coliforms, also known as thermotolerant coliforms, can survive at temperatures of 44ºC and 44.5ºC, which allows simple differentiation between the two types. The microbiologist will be looking for counts of faecal coliforms such as E. coli, whose only habitat is the intestine, and whose life outside it is short-lived; is seen as the ideal indicator organism. Its presence in a sample of drinking water and natural surface water means that the water is unsafe from microbiological contamination viewpoint.

Table 5.4: Microbiological Analysis in environmental samples of Drinking water, Natural waters and waste waters

S. No.	Parameter	Method	Method Reference
1.	Total coliform and	a. Multiple tube technique	American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition. Bureau of Indian Standards; (BIS) Methods for Microbiological examination of water
		b. Membrane filter technique	
2.	Faecal Coliform	a. Multiple tube technique	
		b. Membrane filter technique	
3.	*Faecal streptococci*	a. Multiple tube technique	
		b. Membrane filter technique	
4.	*Enterococcus*	a. Multiple tube technique	
		b. Membrane filter technique	
5.	Total plate count	a. Pore plate method	
		b. Spread plate method	
		c. Membrane filter method	
6	*E. Coli*	a. Multiple tube technique	
		b. Membrane filter technique	

The presence of faecal streptococci/Enterococci is evidence of faecal contamination. Faecal streptococci tend to persist longer in the environment than thermo tolerant or total coliforms and are highly resistant to drying. It is, therefore, possible to isolate Faecal streptococci from water that contains few or no thermo tolerant coliforms. For analysing microbiological parameters in environmental samples following methods are used;

For the estimation of Total and Faecal coliforms in waste water samples and the samples with high suspended particles, MPN method (Multiple tube technique) is more suitable

Indian Reference Methods (BIS):

1. IS 1622: 1981 (Re-affirmed 2019) Methods of sampling and Microbiological Examination of water
2. IS 15188:2012 Water quality — General guide to the Enumeration of micro-organisms by culture
3. IS 5401 (Part 1): 2012 (Re-affirmed 2022) Microbiology – General guidance for enumeration of coliforms; Part 1 Colony count technique (first revision)
4. IS 5887(Part 1):1976 (Re-affirmed 2022) Isolation, identification and enumerationof *Escherichia coli* (first revision)
5. IS 5887 (Part 2) :1976 (Re-affirmed 2022) Isolation, identification and enumeration of *Staphylococcus aureus* and *Faecalstreptococci* (first revision)

6. IS 15185: 2016 (Re-affirmed 2021) Water Quality — Detection and Enumeration of *Escherichia coli* and Coliform bacteria — Membrane FiltrationMethod

E. Toxicological and Biological Analyses

Toxicology is the science of determining health risks from the exposure to chemicals laden waste water. There are many sources of environmental toxicity that can lead to the presence of toxicants in our environmental matrices. These sources include organic and inorganic pollutants, pesticides and biological agents, all of which can have harmful effects on living organisms and its community by reducing its species diversity and abundance. Such changes in population dynamics affect the ecosystem by reducing its productivity and stability. Acute toxicity testing requires test materials to be given to animals for a finite but short period of time, usually as a single exposure. During acute toxicity test, the test organism fish are exposed to the test substance preferably for a period of 96 hours. Mortalities are recorded at 24, 48, 72 and 96 hours and the concentrations which kill 50 per cent of the fish (LC50) are determined where possible.

Table 5.5 Methods for Toxicological Analysis in Environment

S. No	Toxicological Test	Reference method
1.	Bioassay method for evaluation of toxicity using fish (90% survival of fish after 96 hrs in 100% effluent)	American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition. IS 6582 (Part 1) 1971 Bio-Assay Methods for Evaluating Acute Toxicity of Industrial Effluents and Waste Waters
2	Measurement of toxicity factor using zebra fish (dimensionless toxicity) test	IS 6582 : (Part 2) : 2001 (Reaffirmed Year : 2019)Bio-assay methods for evaluating acute toxicity of industrial effluents and wastewaters : Part 2 Using Toxicity Factor to Zebra Fish
3	Measurement of toxicity using Daphnia or other organism	American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition.
4	Bio-accumulation, bio-magnification and bio-transformation studies	

Bio-monitoring of biological parameters has significant advantages over traditional analysis of abiotic matrices (water, sediments). Besides providing information on the bio availability of contaminants, it simplifies the chemical analysis, eliminating the problem of the assessment of very low levels of contaminants; it prevents the risk of misinterpretations caused by sudden fluctuations in the environmental parameters at the time of sampling; thus, providing a measurement over time of the level of environmental contamination.

Bio monitoring is the introduction of biological variables for assessment of the structural and functional aspects of aquatic ecosystems Bio-monitoring can be used as a cost-effective

means for supplementing the physico-chemical techniques. Bio-monitoring can help in determining the impacts of aquatic ecosystem. For Biological Monitoring or Bio-monitoring following are the important studies undertaken apart from toxicological studies.

Table 5.6 Methods for Bio-Monitoring/ Biological Analysis parameters in the Environment

S.No	Biological Monitoring	Reference Method
1.	Benthic macro-invertebrates sample collection	American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition; Benthic macro-invertebrates part 10500; PP 10-67 to 10-81
2.	Benthic macro-invertebrates identification and count	D. de Zwart and R.C. Trivedi, 1995Manual on Integrated Water Quality Evaluation, CPCB Report
3	Measurement of Diversityindex	
4	Measurement of Saprobity Index	
5	Macrophytic identification	American Public Health Association (APHA), 2017 Standard Methods for the Examination of Water and Wastewater. 23rd Edition; A) Aggregate Organic Constituents, Part 5000; P5-1; Inorganic non-metallic constituents Part 4500, P4-114 B) Archieve.epa.gov/wattarchieve/web/html/ ch03main.html
6	Planktonic identification count	
7	Chlorophyll	
8	Primary Productivity	
9	P/R Ratio	

Other References

1. USEPA, 2002Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms Fifth Edition.
2. USEPA, 2002 Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms Fourth Edition.
3. USEPA, 2021 Elements of Bio Monitoring/Bio Assessment, Chapter 3.

F. Hazardous Waste Analysis

Hazardous waste is the waste that poses substantial or potential threats to public health or the environment. Hazardous waste can be the discarded commercial products, like cleaning fluids, solids, chemical waste, or the by-products of manufacturing processes. These wastes may be found in different physical states such as gaseous, liquids, or solids.

Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, reprocessing, collection, conversion, and offering for sale, destruction and disposal of Hazardous Waste. These Rules came into effect in the year 1989 and have been amended later so many times and with final notification of the Hazardous Waste (Management, Handling and Trans-Boundary Movement) Rules, 2016 in supersession of former notification. These rules were further

amended in the years 2016, 2017, 2018&19 for proper management and handling of hazardous waste in the country.

As per Hazardous and other Waste Management Rules, “Hazardous waste” is any waste, which by reason of characterises as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other waste or substances and shall include:

i. Wastes specified in column (3) of Schedule-I;
ii. Wastes having equal to or more than the concentration limits specified for the constituents in Class A and Class B of Schedule-II or any of the characteristics as specified in Class C of Schedule II; and
iii. Wastes specified in Part-A of Schedule-III in respect of import or export of such wastes or the wastes not specified in Part A but exhibits hazardous characteristics specified in Part-C of Schedule-III

Hazardous waste is recognized as a solid waste that exhibits at least one of the characteristic property viz. ignitability, corrosively, reactivity and toxicity. They can be combustible, or have a flash point less than 60 °C (140 °F). These characteristics have been defined under Class 'C' of Schedule II and Part 'C' of Schedule III of Hazardous and Other wastes, Rules, 2016.

Characterization and Identification of waste as hazardous is a first and foremost aspect in hazardous waste management. The hazardous waste producers and environmental laboratories dealing with hazardous waste have two options when identifying the waste, First the process knowledge or information about the raw material and processes generating the waste or they should have to conduct laboratory analyses on the waste post generation. Though such characterization analysis provides a definitive basis for classification but expensive to perform.

With the above in view, the hazardous waste analysis for waste characterization is the first step by Environmental laboratories. Environmental laboratories need to strengthen their analytical facilities for analysis of hazardous wastes (HW). Analytical methods are required to be standardized for characterization of wastes specialized training for the concerned personnel is also required.

Table 5.7 Hazardous waste Characterization Analysis at Hazardous Waste at Environmental laboratories

S. No.	Hazardous waste Test	Characteristics	Reference method
1.	Ignitability	Ignitable wastes can create fires under certain conditions, are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents	USEPA 1010-1986 USEPA 1020-1986
		Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal	USEPA SW-846 Test Method 1110A:

2	Corrosivity	containers, such as storage tanks, drums, and barrels. Battery acid is an example	Corrosivity toward Steel
3	Reactivity	Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulphur batteries and explosives	USEPA40 CFR Section 261.23 includes 8 different properties of a waste identifying characteristics of reactivity.
4	Toxicity	Toxic wastes are harmful or fatal when ingested or absorbed When toxic wastes are disposed, the toxic constituents may leach from the waste and pollute ground water. Example include wastes containing mercury, lead, DDT, PCBs, etc.	USEPA 1311-1992 & APHA 2017 -3120B

Toxicity Characteristics Leaching Procedure (TCLP)

The Toxicity Characteristic Leaching Procedure (TCLP) is designed to simulate the leaching, a waste will undergo, if disposed of in a sanitary landfill. Toxicity Characteristic Leaching Procedure is a chemical analysis process used to determine whether there are hazardous elements present in a waste. The test involves a simulation of leaching through a landfill and can provide a rating that can prove if the waste is dangerous to the environment or not. The extraction fluid employed is a function of the alkalinity of the solid phase of the waste. A subsample of a waste is extracted with the appropriate buffered acetic acid solution for 18 + 2 hours. The extract obtained from the TCLP (the "TCLP extract") is then analysed to determine if any of the thresholds established for the Toxicity Characteristic (TC) constituents have been exceeded the standards established for the constituents listed in Schedule II Class A.

TCLP Method:

1-USEPA SW-846 Method 1311 Toxicity Characteristic Leaching Procedure

2-Testing Procedure for Analysis of Hazardous Waste Samples, SCHEDULE II [See rule 3 (1) (17) (ii)] of HOWM Rules, 2016.

Table 5.8 Hazardous Waste Constituents, Concentration limits and Analytical Methods

Class A: Based on leachable concentration limits [Toxicity Characteristic Leaching Procedure (TCLP) or Soluble Threshold Limit Concentration (STLC)]

Class	Constituents	Concentration (mg/L)	Analytical Method
A1	Arsenic	5.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3114B; 2017)
A2	Barium	100.0	AAS Method APHA 3111B :2017
			AAS Method APHA 3120 B :2017
A3	Cadmium	1.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A4	Chromium and/ or Chromium (III)	5.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A5	Lead	5.0	AAS Method (APHA 3111B : 2017)

			ICP Method (APHA 3120B : 2017)
A6	Manganese	10.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A7	Mercury	0.2	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3112B; 2017)
A8	Selenium	1.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3114B; 2017)
A9	Silver	5.0	ICP Method (APHA 3120B :2012)
A10	Ammonia	50*	Distillation followed by Titrimetric Method (APHA 4500- NH_3 B/C :2012)
A11	Cyanide	20*	Distillation followed by Titrimetric Method (APHA 4500-C N^- C/D: 2012)
A12	Nitrate (as nitrate-nitrogen)	1000.0	UV-Vis Screening Method (APHA 4500-NO3-B: 2012
A13	Sulphide (as H2S)	5.0	Iodometric Method (APHA 4500-S^{2-} F :2012)
A14	1,1-Dichloroethylene	0.7	USEPA Method 8260 B Volatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC-MS)
A15	1,2-Dichloroethane	0.5	
A16	1,4-Dichlorobenzene	7.5	
A17	2,4,5-Trichlorophenol	400.0	
A18	2,4,6-Trichlorophenol	2.0	
A19	2,4-Dinitrotoluene	0.13	
A20	Benzene	0.5	
A21	Benzo (a) Pyrene	0.001	USEPA Method 8310: Poly nuclear Aromatic Hydrocarbons
A22	Bromodicholromethane	6.0	USEPA Method 524.2 Measurement of Purgeable organic compounds in water by Capillary Column Gas chromatography/Mass Spectrometry (GC-MS)
A23	Bromoform	10.0	
A24	Carbon tetrachloride	0.5	
A25	Chlorobenzene	100.0	USEPA Method 8260 B Volatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC-MS)
A26	Chloroform	6.0	USEPA Method 524.2 Measurement of Purgeable organic compounds in water by Capillary Column Gas chromatography/Mass Spectrometry (GC-MS)
A27	Cresol (ortho+ meta+para)	200.0	USEPA Method 8260 B Volatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC-MS)
A28	Dibromochloromethane	10.0	USEPA Method 524.2 Measurement of Purgeable organic compounds in water by Capillary Column Gas chromatography/Mass Spectrometry (GC-MS)
A29	Hexachlorobenzene	0.13	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A30	Hexachlorobutadiene	0.5	
A31	Hexachloroethane	3.0	
A32	Methyl ethyl ketone	200.0	NIOSH Method 2500 by Gas Chromatography
A33	Naphthalene	5.0	USEPA Method 8310: Polynuclear Aromatic Hydrocarbons
A34	Nitrobenzene	2.0	Gas Chromatography Mass Spectrometry Method (APHA 6410B : 2012)
A35	Pentachlorophenol	100.0	USEPA Method 8260 B Volatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC-MS)
A36	Pyridine	5.0	
A37	Tetrachloroethylene	0.7	
A38	Trichloroethylene	0.5	
A39	Vinyl chloride	0.2	
A40	2,4,5-TP (Silvex)	1.0	USEPA Method 8321B Herbicides by High Pressure Liquid Chromatography (HPLC)
A41	2,4-Dichlorophenoxyacetic	10.0	

	acid		
A42	Alachlor	2.0	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A43	Alpha HCH	0.001	
A44	Atrazine	0.2	Method 8141B: Organophosphorus Compounds by Gas Chromatography
A45	Beta HCH	0.004	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A46	Butachlor	12.5	
A47	Chlordane	0.03	
A48	Chlorpyriphos	9.0	USEPA Method 8141B: Organophosphorus Compounds by Gas Chromatography
A49	Delta HCH	0.004	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A50	Endosulfan (alpha+ beta+ sulphate)	0.04	
A51	Endrin	0.02	USEPA Method 8141B: Organophosphorus Compounds by Gas Chromatography
A52	Ethion	0.3	
A53	Heptachlor (& its Epoxide)	0.008	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A54	Isoproturon	0.9	USEPA Method 532 by Gas Chromatography
A55	Lindane	0.4	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A56	Malathion	19	USEPA Method 8141B: Organophosphorus Compounds by Gas Chromatography
A57	Methoxychlor	10	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A58	Methyl parathion	0.7	USEPA Method 8141B: Organophosphorus Compounds by Gas Chromatography
A59	Monocrotophos	0.1	
A60	Phorate	0.2	
A61	Toxaphene	0.5	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A62	Antimony	15	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3112B; 2017)
A63	Beryllium	0.75	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3114B; 2017)
A64	Chromium (VI)	5.0	Colorimetric Method (APHA 3500-Cr^- B: 2017)
			IC method (APHA 3500-Cr^- C: 2017)
A65	Cobalt	80.0	AAS Method (APHA 3111B : 2017)
			ICP Method (APHA 3120B : 2017)
A66	Copper	25.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A67	Molybdenum	350	AAS Method (APHA 3111D; 2017)
A68	Nickel	20.0	AAS Method (APHA 3111B : 2017)
			ICP Method (APHA 3120B : 2017)
A69	Thallium	7.0	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A70	Vanadium	24.0	AAS Method (APHA 3111B : 2017)
			ICP Method (APHA 3120B : 2017)
A71	Zinc	250	ICP Method (APHA 3120 B : 2017)
			AAS Method (APHA 3111B; 2017)
A72	Fluoride	180.0	SPANDS method (APHA 4500-F^- D :2017)
A73	Aldrin	0.14	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A74	Dichlorodiphenyltrichloroethane (DDT), Dichlorodiphenyldichloroethylene (DDE),	0.1	

	Dichlorodiphenyldichloroethane (DDD)		
A75	Dieldrin	0.8	
A76	Kepone	2.1	USEPA Method 8260 B Volatile Organic Compounds by Gas Chromatography Mass Spectrometry (GC-MS)
A77	Mirex	2.1	USEPA Method 8081B Organochlorine Pesticides by Gas Chromatography
A78	Polychlorinated biphenyls	5.0	USEPA Method 8082A Polychlorinated Biphenyls by Gas Chromatography
A79	Dioxin (2,3,7,8-TCDD)	0.001	USEPA Method 1613B Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution by HRGC-HRMS
			USEPA Method 8081B Organochlorine Pesticides byGas Chromatography

Class B: Based on Total Threshold Limit Concentration (TTLC)

Class	Constituent	Concentration (mg/Kg)	Test method
B1	Asbestos	10,000	**USEPA method 100.1** Analytical Method for Determinationof AsbestosFibers inwater
B2	Total PetroleumHydrocarbons (TPH)(C5 - C36)	5,000	**USEPA Method 8015C**Non-halogenated Organics by GasChromatography (C6 – C28)

Note:

The testing method for list of constituents at A1 to A61 in Class-A, shall be based on Toxicity Characteristic Leaching Procedure (TCLP) and for extraction of leachable constituents, USEPA Test Method 1311 shall be used.

The testing method for list of constituents at A62 to A79 in Class- A, shall be based on Soluble Threshold Limit Concentration (STLC) and Waste Extraction Test (WET) Procedure given in Appendix II of section 66261 of Title 22 of California Code regulation (CCR) shall be used.

In case of ammonia (A10), cyanide (A11) and chromium VI (A64), extractions shall be conducted using distilled water in place of the leaching media specified in the TCLP/STLC procedures*.

A summary of above specified leaching/extraction procedures is included in manual for characterization and analysis of hazardous waste published by Central Pollution Control Board and in case the method is not covered in the said manual, suitable reference method may be adopted for the measurement.

In case of asbestos, the specified concentration limits apply only if the substances are in a friable, powdered or finely divided state.

The hazardous constituents to be analysed in the waste shall be relevant to the nature of the industry and the materials used in the process.

Wastes which contain any of the constituents listed below shall be considered as hazardous, provided they exhibit the characteristics listed in Class-C of this Schedule:

Class-C

S. No.	Constituent	Test Methods
1.	Acid Amides	**USEPA METHOD 8316** Acrylamide, Acrylonitrile and Acrolein by High Performance Liquid Chromatography (HPLC)
2.	Acid anhydrides	**USEPA METHOD 8270D** Semi-volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
3.	Amines	
4.	Anthracene	

S. No.	Constituent	Test Methods
5.	Aromatic compounds other than those listed in Class-A	
6.	Bromates, (hypo-bromites)	**USEPA METHOD 300** Determination of Inorganic anions in Drinking Water by Ion Chromatography
7.	Chlorates (hypo-chlorites)	
8.	Carbonyls	**USEPA METHOD 8315A** Determination of Carbonyl Compounds by HPLC
9.	Ferro-silicate and alloys	
10.	Halogen- containing compounds which produce acidicvapours on contact with humid air or water e.g. silicontetrachloride, aluminum chloride, titanium tetrachloride	**USEPA METHOD 9023** Extractable Organic Halides (EOX) in Solids
11.	Halogen- silanes	
12.	Halogenated Aliphatic Compounds	**USEPA METHOD 8121** Chlorinated Hydrocarbons by Gas Chromatography: Capillary Column Technique
13.	Hydrazine (s)	
14.	Hydrides	
15.	Inorganic Acids	**USEPA METHOD 9056A** Determination of Inorganic Anions by Ion Chromatography
16.	Inorganic Peroxides	
17.	Inorganic Tin Compounds	
18.	Iodates	
19.	(Iso- and thio-) Cyanates	
20.	Manganese-silicate	
21.	Mercaptans	
22.	Metal Carbonyls	**USEPA METHOD 207-2** Analysis for Isocyanates By HPLC:
23.	Metal hydrogen sulphates	
24.	Nitrides	
25.	Nitriles	**USEPA METHOD 8316** Acrylamide, Acrylonitrile and Acrolein by HPLC
26.	Organic azo and azooxy Compounds	**USEPA METHOD 8321B** Solvent-Extractable Non-volatile Compounds by High-Performance Liquid Chromatography/ Thermospray/Mass Spectrometry (HPLC/TS/MS) Or Ultraviolet (UV) Detection
27.	Organic Peroxides	**ASTM E298** Standard Method for Organic Peroxides
28.	Organic Oxygen Compounds	
29.	Organic Sulphur Compounds	
30.	Organo- Tin Compounds	**USEPA METHOD 8323** Determination of Organotins by Micro-Liquid Chromatography- Electrospray Ion Trap Mass Spectrometry

S. No.	Constituent	Test Methods
31.	Organo nitro- and nitroso compounds	**USEPA METHOD 8270D** Semi-volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
32.	Oxides and hydroxides except those of hydrogen carbon, silicon, iron, aluminum, titanium, manganese, magnesium, calcium	
33.	Phenanthrene	**USEPA METHOD 8270D** Semi-volatile Organic Compounds by GC/MS
34.	Phenolic Compounds	**USEPA METHOD 8041A** Phenols by Gas Chromatography
35.	Phosphate compounds except phosphates of aluminum, calcium and iron	**USEPA METHOD 365.3** Phosphorous, all forms
36.	Salts of pre-acids	
37.	Total Sulphur	
39.	Tellurium and tellurium compounds	
40.	White and Red Phosphorus	**USEPA Method 7580** White Phosphorus (P4) by Solvent Extraction and **USEPA METHOD 8270D** Semi-volatile Organic Compounds by GC/MS
41.	2-Acetylaminofluorene	
42.	4-Aminodiphenyl	
43.	Benzidine and its salts	
44.	Bis (Chloromethyl) ether	
45.	Methyl chloromethyl ether	
46.	1,2-Dibromo-3- chloropropane	
47.	3,3'-Dichlorobenzidine and its salts	
48.	4- Dimethylaminoazobenzene	
49.	4-Nitrobiphenyl	
50.	Beta-Propiolactone	**USEPA METHOD 8260C** Volatile organic compounds by GC/MS

G. Soil, Sludge, Sediment and Solid Waste Analysis

Soil analysis is a set of various chemical processes that determine the chemical, physical, and biological soil properties important for plant nutrition, or “Soil health” Soil contamination, soil pollution, or land pollution as a part of land degradation is caused by the presence of xenobiotic chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals or improper disposal of waste.

There are several standards methods issued by various organizations world over, which may be standardized and adopted at the environmental laboratory for analysis of soil, sediments and solid waste. Following are some of standard references for analytical methods for analysis of Soil, Sludge, Sediment and Solid Waste.

International:

1. American Society for Testing and Materials (1992): Standard test method for determination of the composition of unprocessed municipal solid waste. ASTM Method D 5231 – 92 (September)
2. ASTM D8064 Standard Test Method for Soil and Solid Waste

3. USEPA 1999 Characterization of Municipal Solid Waste in the United States Internet: www.epa.gov
4. Environmental Protection Agency EPA Ireland (1996): Municipal Waste Characterization, ISBN 1 899965 32 7, Ireland
5. EPA Method 3050B: Acid Digestion of Sediments, Sludges, and Soils

Indian

1. Bureau of Indian Standard (BIS), IS: 2720 (Part 1) - 1983. Indian Standard. Methods Of Test For Soils. Part 1 Preparation. Of Dry Soil. Samples for various Tests. (Second Revision)
2. Bureau of Indian Standard (BIS), IS: 2720 (various parts such as Part 2 to 9) - 1983. Indian Standard Methods of Test for Soils. (2nd Revision)

Table 5.9 Ambient Air (Manual & Continuous Analysers), Indoor Air & Fugitive Emission Analysis

S.No.	Analytes	Methods of Analysis	
		Chemical Method	Continuous Analyzers
1.	Sulphur Dioxide (SO2), µg/m^3	• Improved West and Gaeke	• Ultraviolet fluorescence
2.	Nitrogen Dioxide (NO2), µg/m^3	• Modified Jacob &Hochheiser (Sodium-Arsenite)	• Chemiluminescence
3	Particulate Matter (size less than 10 µm) or PM10 µg/m^3	• Gravimetric	• TOEM • Beta attenuation
4	Particulate Matter (size less than 2.5 microns) or $PM_{2.5}$ µg/m^3	• Gravimetric	• TOEM • Beta attenuation
5	Ozone (O^3) µg/m^3	• Chemical method	• UV photometric • Chemiluminescence
6	Lead (Pb) µg/m^3	• AAS / ICP method after sampling on EPM 2000 or equivalent filter paper • ED – XRF using Teflon filter	–
7.	Carbon Monoxide (CO) mg/m^3	• Non Dispersive Infra Red (NDIR) Spectroscopy	
8.	Ammonia (NH_3) µg/m^3	• Indophenol blue method	• Chemiluminescence
9.	Benzene (C6H6) µg/m^3	• Adsorption and desorption followed by GC analysis	• Gas chromatographybased Continuous analyser
10.	Benzo (a) Pyrene (BaP) – particulate phase only ng/m^3	• Solvent extraction followed by HPLC / GC analysis	–
11.	Arsenic (As) ng/m^3	• AAS / ICP method after sampling on EPM 2000 or equivalent filter paper AAS / ICP method after sampling on EPM 2000 or equivalent filter paper	–
12.	Nickel (Ni) ng/m^3	• AAS / ICP method after sampling on EPM 2000 or equivalent filter paper AAS / ICP method after sampling on	–

		EPM 2000 or equivalent filter paper	

International Methods

1. Methods of Air Sampling and Analysis, 2020 , By James P. Lodge Jr, 3rd Edition June 30, 2020 by CRC Press, 784 Pages
2. USEPA Procedures for Collecting Ambient Air Samples, Ambient Air Sampling (3/28/2016, SESDPROC-303-R5)
3. Handbook of Air Toxics - Sampling, Analysis, and Properties, Lawrence H. Keith, Mary Walker, CRC Press, 640 Pages

Indian Methods

1. CPCB Guidelines "Methods for Measurement of Air Pollution- Guidelines for Manual Sampling and Analysis, National Ambient Air Quality Series: NAAQMS/36/2012-13
2. CPCB Methods and Standard Operating Procedures of Emission Testing in Hazardous Waste Incinerator, LATS series
3. IS 5182IS 5182: Part 1: 2006Methods for measurement of air pollution may 2006: Part 1 dust fall (First Revision)
4. IS 5182: Part 2: 2001 (1 Revision) Methods for measurement of air pollution: Part 2 sulphur dioxide (First Revision)
5. IS 5182: Part 2: Sec 2: 2018Methods for measurement of air pollution: Part 2 sulphur dioxide: Sec 2 ultraviolet fluorescence method
6. IS 5182: Part 4: 1999 (1 Revision) Methods for measurement of air pollution: Part 4 suspended - Particulate matter (First Revision)
7. IS 5182: Part 5: 2020 (1 Revision) Methods for Measurement of Air Pollution Part 5 Sampling of Gaseous Pollutants (First Revision)
8. IS 5182: Part 6: 2006 (1 Revision) Method for measurement of air pollution: Part 6 oxides of nitrogen (First Revision)
9. IS 5182: Part 6: Sec 2: 2018Methods for measurement of air pollution: Part 6 oxides of nitrogen: Sec 2 chemiluminescence method
10. IS 5182: Part 7: 2021 (1 Revision) Methods For Measurement of Air Pollution Part 7 Hydrogen Sulphide FIRST REVISION
11. IS 5182: Part 10: 1999 (1 Revision) Methods for measurement of air pollution: Part 10 carbon monoxide (First Revision)
12. IS 5182: Part 11: 2006 (2 Revision) Methods for measurement of air pollution: Part 11 benzene, toluene and xylene (BTX) (Second Revision)
13. IS 5182: Part 12: 2004 (1 Revision) Method for measurement of air pollution: Part 12 Polynuclear Aromatic Hydrocarbons (PAHs) in air particulate matter (First Revision)
14. IS 5182: Part 13: 1991Methods of measurement of air pollution: Part 13 total fluorides in ambient air
15. IS 5182: Part 15: 1974Methods for measurement of air pollution: Part 15 mass concentration of particulate matter in the atmosphere
16. IS 5182: Part 15: Sec 2: 2018/ISO 10473: 2000Methods for Measurement of Air Pollution Part 15 Mass Concentration of Particulate Matter Section 2 Beta-ray absorption method
17. IS 5182: Part 19: 2022(1 Revision) Methods For Measurement Of Air Pollution Part 19 Chlorine First Revision
18. IS 5182: Part 20: 1982Methods for measurement of air pollution: Part carbon disulphide

19. IS 5182: Part 21: 2001Methods for measurement of air pollution: Part 21 non methane hydrocarbons in air by gas chromatography
20. IS 5182: Part 22: 2004Methods for measurement of air pollution: Part 22 lead
21. IS 5182: Part 23: 2006Methods for measurement of air pollution: Part 23 respirable suspended particulate maiter (PM 10), cyclonic flow technique
22. IS 5182: Part 24: 2019Methods for Measurement of Air Pollution Part 24 Fine Particulate Matter ($PM_{2.5}$)
23. IS 5182: Part 25: 2018Methods for measurement of air pollution: Part 25 ammonia
24. IS 5182: Part 26: 2020 Method For Measurement of Air Pollution Part 26 Nickel

H. Source Emissions Sampling & Measurement

Emissions measurement is the process of measuring the amount of pollutants, in a gaseous or particulate form, being emitted to the air from a specific source, such as an industrial process. Source Emission Monitoring is the experimental study of flue gas, Temperature, Molecular weight, Moisture, Flow rate, concentration of Particulate Matter and Gaseous Pollutants by way of collecting representative sample from the source. Stationary source emissions monitoring collects and uses measurement data (or other information) at individual stationary sources of emissions (i.e. stacks, facilities, manufacturing plants, processes, stack emissions, air pollution control device (APCD) performance, or to verify work practices).; The stack is the chimney used to disperse the flue gases/emissions at a desirable height from the emissions source such as boiler, furnaces, brick kilns, Diesel Generators and other combustion sources etc.).Stationary source emissions monitoring (Stack Monitoring) is required to be conducted periodically with following objectives.

1. To determine the quality and quantity of air pollutants emissions by the source or stack
2. To measure the effectiveness of air pollution control devices (APCD) before and after APCD
3. To measure the effectiveness of air pollution control devices (APCD) for the given regulatory conditions
4. To compare source emission analytical results with prescribed emission standards to take required corrective actions
5. To compare changes in emission with the changes in processes or raw materials
6. To demonstrate that the particular source is meeting the Emission criteria prescribed by regulatory agencies.
7. Performance information to the APCD operators, so that corrective action can be taken.

The source emission monitoring requirements can necessitate periodic manual monitoring/measurements or through Continuous Emission Monitoring Systems (CEMS) related to consent terms or conditions (e.g., emission limits, work practice requirements, equipment design and operating requirements) that result from regulations. For Manual Source Emission Monitoring following international or Indian Emission measurement methods have to be adopted for systematic monitoring.

Table 5.10 Source Emission Sampling & Measurement

S.No.	Source Emission Sampling & measurement	Test Method
1.	Composition of Flue Gas & Molecular Weight Determination	USEPA Test Methods
2.	Stack Gas Static pressure determination	
3	Stack gas velocity& temperature determination	
4	Stack gas volumetric fl ow/Discharge	

5	Flue Gas Moisture determination	CPCB Emission Regulations Bureau of Indian Standard (BIS) Methods of Measurement of Stationary Sources
6	Stack Sampling Port and Traverse point	
7	Sulfur Dioxide in Emissions	
8	Sulphuric Acid Mist	
9	Nitrogen Oxides in Emissions	
10	Particulate Matter (PM) emissions	
11	Hydrogen Halides and Halogens	
12	Metals and Non Metals in Emissions	

International Methods

1. USEPATest Method 1— Sample and Velocity Traverses for Stationary Sources(40 CFR Part 60, Appendix A) 4-28-2020
2. USEPA Test Method 2 –Determination of Stack Gas Velocity and Volumetric Flow Rate-S-type Pitot, 8-2-2017
3. USEPA Test Method 3 – Gas Analysis for Determination of Dry Molecular weight
4. USEPA Test Method 4—Determination of Moisture Content in Stack Gases 10-7-2020.
5. USEPA Test Method 5 Determination of particulate matter emissions from stationary sources 12-7-2020
6. USEPA Test Method 6 Determination of Sulfur dioxide emissions from stationary sources 8-3-2017
7. USEPA Test Method 7 Determination of Nitrogen oxide emissions from stationary sources 1-14-2019
8. USEPA Test Method 8 Determination of SO2 and sulphuric acid mist
9. USEPA Test Method 10 Determination of Carbon Monoxide- NDIR
10. USEPA Test Method 29 Determination of metals emissions from stationary sources 8-2-2017
11. USEPA Test Method 201A Determination of PM10 and PM2.5 Emissions From Stationary Sources (Constant Sampling Rate Procedure) 10-7-2020

Indian Methods

1. Guidelines on Methodologies for Source Emission Monitoring" Central Pollution Control Board, LATS / 80 / 2013-14
2. CPCB Emission Regulation (Part III) Comprehensive Industry Document Series COINDS/20/1984-85
3. CPCBGuidelines for Continuous EmissionMonitoring Systems (CEMS), July 2017
4. IS 11255 : Part 1 : 1985Methods for measurement of emissions from stationary sources: Part 1 particulate matter
5. IS 11255 : Part 2 : 1985Methods for measurement of emissions from stationary sources: Part 2 sulphur dioxide
6. IS 11255 : Part 3 : 2008(1 Revision)Methods for measurement of emissions from stationary sources: Part 3 flow rate (First Revision)
7. IS 11255 : Part 4 : 2006(1 Revision)Method for measurement of emission from stationary sources: Part 4 hydrogen sulphide and carbon disulphide (First Revision)
8. IS 11255 : Part 5 : 1990Methods of measurement of emissions from stationary sources: Part 5 total fluoride
9. IS 11255 : Part 6 : 1999Methods of measurement of emissions from stationary sources: Part 6 ammonia

10. IS 11255 : Part 7 : 2005Methods for measurement of emission from stationary sources: Part 7 oxides of nitrogen
11. IS 17133 : 2019/ISO 10396 : 2007Sampling from Stationary Sources for Automated Determination of Gas Emission Concentration Using Permanently Installed Monitoring Systems

I. Noise/Sound level Monitoring

Noise pollution is unwanted and unpleasant sound which can deteriorate human health and other living organisms present in the Environment. Noise or sound level monitoring or measurement is a process to measure the magnitude of Noise in residential, commercial and industrial areas. Data collected from Noise level helps us to understand trends and action required to be taken to reduce noise pollution.

Ambient Noise Level

Ambient Noise measurement includes Residential area noise measurements, Noise measurement in vicinity of Road traffic, Industrial Noise or Noise generated within Industry.

Source Generated Noise level

Source generated Noise is the loud sound generate continuously from a defined source, running machinery noise, hammering, drilling, heavy duty motors, lathe machine work, grinding, fabrication, forging, compressing, breaking, pumping, packing, transporting etc. The intensity of noise generated is quite high and may cause serious and large scale Noise related problems for workers and those people who are in vicinity

Table 5.11 Noise Measurement

S.No.	Noise measurement parameters	Method
1.	Noise Level, dBA	Measurement by Sound Level Meter Department of Environment and Resource Management (2000) "Noise Measurement Manual", 3rd Edition,Queensland, Australia. IS-9989:1981·Assessment of Noise with respect to Community Response
2.	Equivalent Continuous Sound Pressure Level (L_{EQ})	
3	Sound Exposure Level (LAE or SEL)	
4	Percentile sound pressure level exceeded for 90% of the measurement period, (L90)	
5	Percentile sound pressure level exceeded for 50% of the measurement period, (L50)	

J. Plastic waste Management Rules – Plastic carry Bag Thickness measurement

The Union Ministry of Environment, Forest & Climate Change (MoEFCC) has notified the Plastic Waste Management Amendment Rules, 2021, ondated 12th August 2021 that makes it mandatory for the thickness of plastic carry bags to be increased to 120 microns by December, 2022, and prohibit the manufacture, import, stocking, distribution, sale and use of several products with low utility but high littering potential.The permitted thickness of the plastic bags, 50 microns, has been increased to 75 microns from September 30, 2021, and

will be increased to 120 microns from the December 31, 2022, according to the gazette notification. The basic behind the polybags measurements is that the larger the micron/gauge/millimeter of polybag, the thickness of the polybag increases.

Table 5.12 Plastic carry Bag Thickness measurement

S.No.	Plastic Poly bags	Method
1.	Plastic Poly Bag Thickness	Digital Micro Meter Method Non-Contact Capacitance Thickness Gauge IS:2508-1984 Specifications for Low Density Polythene Films ASTM D6988 – Guide for Determination of Thickness of Plastic Film Test Specimens ASTM D8136 – Standard Test Method for Determining Plastic Film Thickness and Thickness Variability Using a Non-Contact Capacitance Thickness Gauge
2.	Bio-degradability	ISO-14855-2, 2018-07; Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting condition – Method by analysis of evolved carbon di-oxide

ANNEXURE VI

List of Sampling Instruments/Equipment at Environmental Laboratory

S. No.	Name of Instruments/ Equipment	Nos. Available	S. No.	Name of Instruments/ Equipment	Nos. Available
Sampling Equipment/items- Water (Ground water, River water & Lake water); Waste water (sewage, industrial effluents)					
1.	Antiseptic Hand wash / soap		23	Ice packs	
2.	BOD/DO Bottles		24	Measuring Tape 25 mtrs	
3.	Borosilicate Glass Sample bottles (Transparent & Amber coloured		25	Nylon Rope 20 mtrs	
4.	Bottom Sampler		26	Oil & Grease sampler	
5.	Buckets (Stainless steel) 10 litres separate for water and waste water sampling		27	Packing tape	
6.	Chloroscope for residual chlorine		28	Permanent Marker Pen Black/Blue	
7.	Depth sampler		29	pH strips/pH meter pen type	
8.	Disposable Gloves & Rubber gloves		30	Plastic Beaker/plastic Mug / Volumetric Cylinder	
9.	Dissolved Oxygen meter hand held type		31	Plastic bucket	
10.	Dissolved Oxygen Sampler		32	Plastic Storage bags	
11.	Distilled Water Bottle		33	Polypropylene Bottles	

12.	Drinking water storage insulated Jug		34	Polypropylene/Polyethylene Carboys (various capacities)	
13.	Electrical Conductivity meter pen type		35	Sampling Rod / Bamboo stick maximum 2.5 mtrs length	
14.	Field Aprons		36	Self-stick Cotton Tape for Labelling of carboys/bottles	
15.	Field Multiparameter Water Testing Kit		37	Stainless steel Mug	
16.	Field Notebook		38	Stainless steel scale	
17.	First Aid Kit		39	Stop Watch	
18.	Float Balls (For Flow measurement		40	Thermometer	
19.	Flow meter		41	Turbidity Meter pen type	
20.	GPS		42	Wash Bottles	
21.	Gum Boots & Waders		43	Water sampler, Vandorn or equivalent (Automatic sampler when composite sampling to be done)	
22.	Ice boxes with ice block				
Sampling Equipment/items - Microbiological and Biological					
1	Bottom Sampler		13	Match box	
2	Cotton Roll for swab		14	Narrow mouth Polypropylene sample bottle	
3	Cotton tape for labelling		15	Permanent Marker	
4	Dark & light Bottles		16	Plankton Net	
5	Ekman Dredge		17	Rectified Spirit	
6	Field Note book		18	Rope	
7	Fine sieves large size for collecting benthos		19	Safety Glasses/Lab goggles	
8	Gum boot		20	Soft Brushes 1 inch & ½ inch	
9	Hand gloves		21	Sterilized microbiological glass bottle with ground glass cap	
10	Hand shovel		22	Tweezers broad/fine	
11	Ice box with ice block		23	Wide mouth glass sampling bottles	
12	Large Container for Bulk sample for Toxicity testing sample		24	Wide mouth polypropylene sampling bottles	
Sampling Equipment/items - Soil, Sediment, Sludge					
1.	Antiseptic hand wash		9	Plastic tray for compositing the sample	
2.	Bucket		10	Polyethylene Bags	
3.	Coring devices/core catchers		11	Rubber Gloves	
4.	Disposable gloves		12	Sampling Auger & shovel	
5.	Distilled water		13	Stainless steel Hand Shovel	
6.	Measuring tape		14	Stainless steel large spatula/spoon	
7.	Permanent marker pen		15	Wash Bottle	
8.	pH strips/pH meter for field measurement of pH		16	Wide mouth Sampling Jars (Plastic/glass)	

Sampling Equipment/items- Industrial solid waste, Hazardous waste & Municipal Solid waste, Plastic waste					
1	Antiseptic Hand wash		16	Rubber Gloves	
2	Bucket		17	Sampling Auger & shovel	
3	Coliwasa (Composite Liquid waste sampler) Glass & Plastic		18	Sampling Auger	
4	Coring devices/core catchers		19	Sampling Bags (Polythene)	
5	Disposable gloves		20	Sampling Trier	
6	Distilled water		21	Sieves set	
7	Double Protection Filter Chemical Gas Respirator		22	Stainless steel Hand Shovel	
8	Field Note Book		23	Stainless steel large spatula/spoon	
9	Grain sampler		24	Stainless steel Scoop/Trovel	
10	Measuring tape		25	Tray for compositing the sample	
11	Permanent Marker pen		26	Veihmeyer sampler	
12	Polythene bags thickness Gauge (Digital)		27	Wash Bottle	
13	Pond Sampler		28	Waste pile sampler	
14	PP/PE Plastic bottles		29	Weighted Bottle Sampler	
15	PPE Kit including safety goggles/face mask		30	Wide mouth Glass Bottles /Jars	
Sampling Equipment/items- Ambient Air/Fugitive Emissions (Manual)					
1	Absorbing solutions separate for separate gases to be monitored		18	Laboratory safety goggles	
2	Air Flow meter		19	Low Volume Sampler (LVS)	
3	Air pollution mask		20	Maximum Minimum Thermometer	
4	Air Sampling Data sheet		21	Permanent Marker	
5	Anemometer				
6	Breathing apparatus		22	Personal Air Samplers	
7	Dichotomous Sampler (PM2.5 and PM10)		23	Polyuretahane Foam (PUF) Sampler	
8	Disposable gloves		24	PP/PE Sampling bottles narrow mouth leak proof	
9	Double Protection Filter Chemical Gas Respirator		25	Pre weighed & coded EPM 2000 Filter paper (Air Monitoring)	
10	Drager's Pump and Dragers Detection tubes for specific air pollutants		26	Pre weighed & coded Glass Fibre (GFA) Filter paper (Air monitoring)	
11	Dust Fall Sampler		27	Rain Gauge	
12	Envelops for filter paper storage		28	Respirable Dust Sampler (RDS)	
13	Glass adsorption tubes		29	Spare carbon brushes	
14	Glass Impingers 35 ml		30	Tedler bags	
15	Handy Sampler with set of glass impingers		31	Top loading orifice kit (For calibration of HVS)	
16	High Volume Sampler (HVS)		32	Weather Monitoring system	
17	Laboratory Coat		33	Wind speed/wind direction monitor	
Sampling & Analytical Instrument/Equipment/items- Continuous Ambient Air Monitoring					
1	Continuous Ambient Air Monitoring System (Fixed)		13	Continuous Ambient Air Monitoring System (Mobile)	
2	Continuous PM_{10} Analyser		14	Continuous $PM_{2.5}$ Analyser	
3	Continuous PM_{10}& $PM_{2.5}$		15	Ambient Sulphur Dioxide	

	Monitoring Analyser (TEOM system)			Analyser	
4	Ambient Nitrogen Oxides (NO-NO_2-NO_x) Analyser		16	Ambient Carbon Monoxide & Carbon dioxide Analyser	
5	Ambient Ozone Analyser		17	Total Hydrocarbon Analyser	
6	Ambient BTEX Analyser		18	Ambient Ammonia Analyser	
7	Multipoint Gas Calibration system		19	Zero Gas Generator	
8	19 inch Rack mounting system for air analysers		20	Air Sampling Probe Mast	
9	Meteorological tower (All in one telescopic Mast) with sensors comprising wind speed, wind direction, ambient temp., Relative humidity, Solar radiation, rainfall etc.		21	Calibration Gas Cylinders (SO_2, NO, CO, NH_3. Benzene and Toluene (One each) with stainless steel Regulators	
10	Synthetic Air Cylinder		22	Nitrogen Cylinder	
11	Permeation tubes (SO_2, NO-NO_2-NOx,NH_3, BTX		23	Air Conditioners (Split type) 1.5 ton & 2.0 ton	
12	Computer Station with Modem		24	UPS system 5 KVA & UPS system 15 KVA	
Sampling Equipment/items- Source Emissions					
1	Activated Charcoal tubes		13	Isokinetic Stack Monitoring Kit (complete with Stack monitoring instrument panel with inclined cum vertical manometer, Cold Box, Vacuum pump, Glass assembly impingers	
2	Asbestos gloves		14	Metal braided Flexible umbilical cord	
3	Barometer (digital)		15	Modified S type Stainless steel Pitot tube (Standard length) with Assembly	
4	Continuous emission monitoring equipment		16	Monoblock type, rotary design vacuum pump	
5	Dry Gas Meter		17	Orsat Apparatus	
6	Electricity Generator		18	Pre weighed and coded cellulose and fibre glass thimbles	
7	Face Shield & helmet		19	Protective apron	
8	Fire Extinguisher		20	Soap Bubble meter	
9	First Aid box		21	Source emission monitoring Impingers train set with spare impingers (100 ml & 225 ml capacity)	
10	Flue Gas Analyser		22	Stainless steel heated Sampling Probes with thimble holders (short and long)	
11	Gas Mask		23	Stop watch	
12	Isokinetic Nozzles (Different sizes nozzles set)		24	Thermocouple probe	
Sampling & Analytical Equipment - Vehicular Emission					
1	Carbon Dioxide Analyser		4	Multigas Analyser (petrol, CNG, LPG)	
2	Diesel Exhaust Analyser		5	Opacity meter (Diesel)	
3	Exhaust CO/HC Analyser with Sampling Probe		6	Smoke Density meter	

Sampling & Analytical Equipment- Ambient Noise/Source Noise					
1	Automated Noise Monitoring System		3	Digital Sound level (Noise) Meters	
2	Calibrator for Noise Meters		4	Integrating Sound level meter	

List of Environmental sample processing instruments / Equipment (alphabetically arranged) at Environmental Laboratory

S.No.	Name of Instruments/ Equipment	Nos. Available	S.No.	Name of Instruments/ Equipment	Nos. Available
Environmental Sample Processing Equipment					
1	Accelerated Solvent Extraction (ASE) System		31	Laboratory Pestle mortar	
2	Aerosol Generator		32	Laboratory Ball Mill	
3	Ammonia distillation assembly			Laboratory Grinder	
4	Analytical Balance (Digital)		33	Laminar Flow bench for Microbiological analysis	
5	Aquarium for Toxicity bioassay test		34	Magnetic Stirrer with or without heating system	
6	Arsenic Estimation assembly		35.	Mechanical Shaker	
7	Autoclave		36	Membrane Filtration assembly with vacuum pump	
8	Bacteriological bottles 300 ml		37	Microbial culture refrigerator	
9	Bacteriological Incubators-(Stainless steel)		38	Microwave Digester	
10	Bio safety cabinets		39	MPN Bacteriological tubes with stand	
11	BOD Incubators		40.	Muffle Furnace	
12	Centrifuge		41	Multi-parameter Kit for pH, Temperature, DO and Conductivity	
13	COD Digestion heated Blocks		42	Petri Dishes	
14	Cyanide Distillation Assembly		43	Phenol distillation assembly	
15	Deep Freezer (Horizontal)		44	Plate counter (Manual/Automatic)	
16	Deep Freezer (Vertical)		45	Precision Digital Balance (Top loading	
17	Digestion Chambers		46	Refrigerators Big Size 300 ltrs or more	
18	Digital Thermometer		47	Rotary Evaporator (Buchi type) with water recirculating chiller	
19	Dispensers (Various capacities)		48	Separating funnel shaker	
20	Filtration Assembly with vacuum pump		49	Separating Funnels for Liquid Liquid extraction	
21	Fluoride Distillation Assembly		50	Soxhlet Apparatus	
22	Glass Distillation assemblies (Arsenic/ Fluoride/)		51	SPE/SPME Extraction system	
23	Glass Double Distillation Assembly		52	Spirit lamp/burner	
24	Heating mantles		53	Thermometer	
25	Hot Air Ovens		54	Thermometer (Dry & wet bulb)	
26	Hot plates (small, Medium and Large)		55	Toxicity characteristic leaching procedure (TCLP) extractor	

27	Hygrometer		56	Ultra sonic water bath	
28	Imhoff Cone		57	Vacuum Pump with filtration assembly	
29	Inoculation loop		58	Water Bath with temperature control	
30	Kjeldhal Apparatus				

ANNEXURE VII

Analytical Instruments at Environmental laboratories

S. No.	Name of Instrument	Nos Available	Installation Date/s	Working / Non-working
1.	Atomic Absorption spectrometer (AAS)			
2.	Automatic Titration Assembly			
3.	Binocular Microscope			
4.	Binocular Stereo Zoom Microscope			
5.	Bomb Calorimeter			
6.	BTX Analyzer with BTX calibrator			
7.	Carbon, Hydrogen, Nitrogen and Sulphur (CHNS) Elemental Analyzer			
8.	Colony counter			
9.	Conductivity meter			
10.	Digestion chamber			
11.	Digital Burettes			
12.	Digital Mercury Analyser			
13.	Dissolved Oxygen Meter (Bench model)			
14.	EDXRF Analyser			
15.	Flame Photometer			
16.	Flash Point Apparatus			
17.	Flocculator (Jar testing apparatus)			
18.	Fourier-transform infrared Spectrometer (FTIR)			
19.	Gas Chromatograph Mass Spectrometer with Head Space analyser			
20.	Gas Chromatograph Mass Spectrometer with Purge & Trap			
21.	Gas Chromatograph TOF-MS			
22.	Gas Chromatograph with Electron capture detector and Flame photometric Detector GC-ECD/FPD			
23.	Gas Chromatograph with Flame ionization detector GC-FID			
24.	Gas Chromatograph with Mass Spectrometer (GC-MS)			
25.	Gas Chromatograph with Mass Spectrometer (GC-MS-MS)			
26.	Graphite Furnace Atomic Absorption Spectrometer (GFAAS) with Vapour			

S. No.	Name of Instrument	Nos Available	Installation Date/s	Working / Non-working
	Generation Assembly			
27.	High Performance Liquid Chromatograph (HPLC)			
28.	High Resolution Mass Spectrometer (HRGC-HRMS)			
29.	Inductively Coupled Plasma (ICP) Spectrometer-OES			
30.	Inductively Coupled Plasma Mass (ICP-MS) Spectrometer			
31.	Ion Chromatograph Anion & Cations			
32.	Liquid Chromatograph with Mass Spectrometer (LC-MS-MS)			
33.	Methane and Non Methane (NMHC) Analyser			
34.	Microscope			
35.	Microscope Inverted			
36.	Microscope Binocular Research			
38	Moisture Content Meter			
37.	CO (NDIR based) analyser			
38.	Nephelometer (Turbidity Meter)			
39.	Noise level Meter			
40.	Organic halogen (AOX/TOX) Analyser			
41.	pH-Meter with combined electrode			
42.	Specific ion Analyser with ion selective electrodes			
43.	Spectrophotometer (Visible)			
44.	Stereoscopic Microscope			
45.	TKN Analyser semi-automatic with aluminium block digester			
46.	TOC Analyser			
47.	Toxic Gas Analyser			
48.	UV-Vis Spectrophotometer			
49.	Wavelength Dispersive X-ray Fluorescence (WDXRF)			
50.	X Ray Fluorescence (XRF) Spectrometer (Portable)			
51.	Zero Head Space Extractor (ZHE)			

ANNEXURE VIII

Laboratory Safety / Protection Equipment

S. No	Safety/Protection Equipment	Nos Available	Remarks
1.	Lab Coats with name plate		

2.	Full body Aprons		
3.	Gloves heat protecting non absorbent gloves (Insulated)		
4.	Acid and Alkali proof gloves		
5.	Gloves (Latex examination gloves , Non sterile)		
6.	Gloves (Nitrile examination gloves , Non sterile)		
7.	Gloves (Nitrile examination gloves , sterile)		
8.	Hard toed shoes (for transportation of cylinders)		
9.	Gum Boots		
10.	Safety Goggles		
11.	Tongs (big size)		
12.	Tongs (small size)		
13.	Hand Truck for transporting cylinders		
14.	Sample trollies		
15.	First Aid Boxes		
16.	Gas Masks (Plastic) N-95		
17.	Masks (particulate respire)		
18.	Safety hand shower		
19.	Stretcher		
20.	Fire blanket		
21.	Safety storage cabinet		
22.	Chemical splash apparel		
23.	Safely belts		
24.	Rope (thick)		
25.	Knee caps		
26.	Helmets		
27.	Fire proof jackets		
28.	Shoe cover		
29.	Slippers		
30.	Shoe rack		
31.	Safety Harness		
32.	Wadding suit		
33.	Hand Protector grip		
34.	Fire extinguisher		
35.	Solvent cabinets		
36.	Chemical spill kits		
37.	Segregated Waste disposal containers for broken glass, chemical waste, plastic ware, paper. Electronic waste / batteries etc.		

ANNEXURE IX

CPCB Inter-laboratory AQC Participation Fees

Environmental Laboratories have to participate mandatorily in the Inter Laboratory Proficiency Testing program conducted by CPCB Annually as per the plan posted on CPCB official website. Environmental Laboratories have to submit participation fees for participation in respective Inter-laboratory AQC Exercise. The fee shall be submitted only through online transfer as per the details below (no other means of deposit shall be accepted).

S. No.	Particulars	Details
1.	**Bank & Branch**	**Punjab National Bank, Vivek vihar, Delhi**
2.	**Account No.**	**1849101100000063**
3.	**Account Name**	**CPCB AQC Participation fee**
4.	**IFSC Code no.**	**PUNB0184910**
5.	**MICR Code**	**110024722**

The Inter Laboratory AQC Fee Structure for Environmental laboratories is given below:

Laboratories	Inter laboratory AQC Participation Fee
Private Laboratories	Rs.30,000/= per year as per revised Gazette Notification
Laboratories of Govt./ Semi Govt./ Public Sector undertaking/ Autonomous	Rs.20,000/= per year as per revised Gazette Notification

ANNEXURE X

TERMS & CONDITIONS FOR RECOGNITION OF LABORATORIES UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

The following terms and conditions shall be observed for recognition of laboratories under Section 12 (1) (b) of the Environment (Protection) Act, 1986.

1. The laboratory (Private/NGOs) shall be legally identifiable and registered with an appropriate statutory body i.e. local govt., state govt. or central govt.

2. The laboratory shall perform all the functions as mentioned in Rule 9 of the Environment (Protection) Rules, 1986.

3. It shall carry out the tests by using only validated methods prescribed internationally/nationally are envisaged

4. The test report shall be recorded in the standard format in triplicate. It shall be signed by the Government Analyst and be sent to the officer from whom the sample is received by the laboratory.

5. It shall carry out those tests, which are specified in the application and it shall not carry out any other test on the samples given.

6. The laboratory shall charge rates not exceeding those fixed by Central Pollution Control Board under Schedule of Analysis Charges as per the gazette Notification no. S.O./42(3)/87 dated 23rd February 2022.

7. The laboratory shall not charge rates higher than the rates they charge to any other Government or Public Sector organization.

8. The laboratory shall ensure that a Legal sample submitted to it for testing will only be tested by the authorised person and supervised by the `Government Analyst' by Central Government under provisions of the Environment (Protection) Act and as notified in the official gazette from time to time.

9. When a Government Analyst ceases to be in the services of the Laboratory, the Head of the Laboratory shall report this fact to the CPCB within fifteen days and simultaneously take steps for filling up this vacancy.

10. Any report signed by the Government Analyst may be used as evidence of facts in a court of law as per Section 14 of the Environment (Protection) Act, 1986. The laboratory shall provide all facilities to the `Government Analyst' for giving evidence in a court of law, if it becomes necessary.

11. It shall maintain complete secrecy in respect of the test results. These shall not be divulged to any person or authority other than the Officer empowered under Section 11 of the Act of the court having jurisdiction.

12. Laboratory shall remain open for all working days except weekly off, Central & State Govt. holidays. Environmental laboratory of an educational institute/college will make arrangement of acceptance of samples and their analysis during any vacation exceeding more than 5 days i.e. summer/winter vacation etc.

13. It shall maintain proper records and registers and the calculations and test results in respect of tests conducted by them.

14. The laboratory and the Government Analysts employed by the laboratory shall participate in (Inter Laboratory- Analytical Quality Control Exercises) organized by the Central Government/ CPCB or an organization designated by it to test the capabilities of the recognized laboratories and analysts from time to time. The fee for participation in Inter Laboratory Analytical Quality Control exercise has to be paid by the participating laboratory to the designated organization.

15. If feel necessary, Central Government will send dummy environmental samples to the laboratory to keep constant check over the laboratories of the results of the sample, which are to be analysed, free of cost by the laboratory and results will be provided to the Central Government.

16. If the laboratory is sent samples from an establishment with which it has got connections through ownership or other means which make it improper for the laboratory to carry out the tests with respect to that sample, it shall disclose the fact to the empowered officers or authority sending the sample and shall refuse the samples.

17. It shall be the responsibility of the laboratory to maintain properly the necessary infrastructure for conducting tests successfully.

18. In case the laboratory desires to make a mention of its recognition as environmental laboratory in its letter heads, printed material, signboards, etc., it shall specify the period of recognition and such mention of the recognition shall cease immediately after the expiry of recognition.

19. The laboratory shall comply with all the rules and regulations notified under the Environment (Protection) Act, 1986.

20. The recognition shall become effective from and to the date stated in provisional certificate issued by Central Government.

21. The Central Government / CPCB shall have the right to revoke the recognition or de-recognize the laboratory at any time in public interest without assigning any reason, if it is deemed necessary by the Central Government/ CPCB.

22. The laboratory shall maintain complaint register (bounded and numbered)

23. The recognition accorded to Government Analysts in an environmental laboratory ceases along with the de-recognition of that environmental laboratory.

24. In case there is any change in Location or name of the laboratory for which it has been granted recognition earlier the laboratory will inform Central Govt./CPCB regarding the change as well as apply afresh for recognition.

25. In case of takeover of a recognized private laboratory, its ownership changes; occurrence of such changes must be communicated to the recognition body Central Government/CPCB within one month. Through, an appropriate mechanism that the laboratory continues to comply with the criteria against which recognition was originally granted will be verified.

26. After recognition, laboratory can be re-inspected at any time for its periodic surveillance/assessment/performance.

The aforesaid terms and conditions are acceptable to us.

Dated:

Signature _____
(Head of Laboratory)

Full Name _____
(in capital letters)

Address _____

ANNEXURE XI

TERMS AND CONDITIONS ACCEPTANCE BY PROPOSED GOVERNMENT ANALYSTS UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

1. A person working as analyst in a laboratory recognized as Environmental Laboratory under the Environment (Protection) Act, 1986 may be recognized as a Government Analyst if he has the qualifications and experience as prescribed in the Rule 10 of the Environment (Protection) Rules, 1986.

2. The recognition of a Government Analyst is with respect to the laboratory where he is employed at the time of recognition and which is recognized as an environmental laboratory under Section 12 of the Environment (Protection) Act, 1986. If he ceases to be in the services of the said laboratory, his recognition ceases forthwith from the date of termination of his service with the laboratory.

3. The recognition accorded to the Government Analyst in an Environmental Laboratory ceases along with the expiry of recognition/ revoking of recognition/de-recognition of that environmental laboratory.

4. The Government Analyst shall participate in any `Round Robin Test' organized by the Central Government or an organization designated by it for testing his capabilities for conducting various environmental tests.

5. It shall be the responsibility of the Government Analyst to see that the instruments necessary for conducting various environmental tests are properly maintained and calibrated.

6. The test report by the Government Analyst submitted to the appropriate authority shall bear the logo/ seal of the laboratory/ Organization.

7. The Government Analyst shall appear in a court of law for giving evidence, If required by the appropriate court / Central Govt.

8. The Government Analyst shall maintain complete secrecy in respect of test results.

9. The Government Analyst shall comply with the rules and regulations notified under the Environment (Protection) Act, 1986.

11. The Central Government/ CPCB shall have the right to derecognize the Government Analyst any time in public interest without assigning any reason.

The undersigned accept the above terms and conditions for consideration of recognition as Government Analyst as per Section 13 of Environment (Protection) Rules, 1986

S. No	Name of proposed Govt Analyst	Designation	Qualifications	Signature
1.				
2.				
3.				

Countersignature Head of Laboratory

SEAL of LABORATORY

ANNEXURE XII

BIO-DATA PROFORMA FOR CONSIDERATION OF RECOGNITION AS GOVT. ANALYST UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

1. Name in full (In block letters) : _____

2. Father's name : _____

3. Date of birth : _____

4. Nationality : _____

5. Permanent Address : _____

_____

_____

_____

6. Tel No. _____ Fax _____ E-Mail _____

7. Educational qualification (Give detail in chronological order from graduation & onward):

S. No.	Exam passed	Name of Board/ University/ Institution	Year of passing	Subjects taken	Division
1.					
2.					
3.					

8. Professional Training taken during last 3 years:

S. No.	Organization	Period of training		Subject of the training
		From	To	

9. Previous and current employment records:

S. No.	Name & address of employer	Type of organization Govt./Semi-Govt./ Public Sector/ Private/ NGO	Period of service		Post held	Salary drawn	Job nature	Reason for leaving
			From	To				

Note: Please attach separate sheet, if space is inadequate.

10. Experience in Analysis of Environmental Samples _____ years.

11. Please provide details if earlier appointed / recognized as Govt. Analyst under The Environment (Protection) Act, 1986:

12. Declaration:

I declare that the foregoing information is correct and complete to the best of my knowledge and belief and nothing has been concealed / distorted. Documents in support of my educational qualification and experience will be provided, if required so.

Place:

(Signature of candidate)

Date:

Signature of the Head of the Laboratory

SEAL OF THE LABORATORY

ANNEXURE XIII

Draft Gazette Notification

TO BE PUBLISHED IN THE GAZETTE OF INDIA EXTRAORDINARY
PART ……. SECTION ……SUB-SECTION……..
CENTRAL POLLUTION CONTROL BOARD
MINISTRY OF ENVIRONMENT & FORESTS

NOTIFICATION

New Delhi, Dated ……..

No. _____ In exercise of the powers conferred by clause (b) of Sub-section 1 of Section 12 and Section 13 read with clause 1 of the Notification No. 145(E), dated 21st February, 1991, issued under Section 23 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Pollution Control Board, PariveshBhawan, East Arjun Nagar, Delhi - 110032 hereby recognizes, (a) the laboratories specified in column (2) of the Table below as 'Environmental Laboratories' to carry out the functions entrusted to the environmental laboratories under the said Act, and the rules made thereunder, and (b) specified persons in column (3) of the Table as the Government Analysts for the purposes of analysis of samples of air, water, soil or other substances sent for analysis, specified for respective groups of parameters mentioned in Column (4).

After Sr. No._____ of the Notification No. _____, dated _____, and the entries relating thereto, the following Serial Nos. and entries shall be added namely:-

S. No.	Name of Laboratory	Name of the Govt. analysts	Recognized for parameter groups
1.	2.	3.	4.

The Environmental Laboratories and the Govt. Analysts so mentioned shall remain valid for a period of five years from the date of issue of Notification.

Authorized Signatory
CPCB / MoEF

Foot Note:

The principal notification was published in the Gazette of India vide SO NO. 728(E), dated 21.7.1987 and subsequently amended vide:-

(I)SO 838(E), dated 23.9.87 (2) SO 989(E) dated 17.11.87 (3) SO 489(E) dated 17.5.88 (4) SO 156 (E) dated 24.2.89 (5) SO 846(E) dated 24.10.89 (6) SO 375(E) dated 26.4.1990 (7) SO 803(E) dated 23.9.92 (8) SO 97(E) dated 5.12.1994 (9) SO 418(E) dated 31.3.1996 (10) SO 889 (E) dated 31.8.1996 (11) SO 452 (E) dated 31.5.97 (12) SO 631 (E) dated 31.5.1998 (13) SO (E) 336 dated 1.1.1999(14) SO.44(E), dated 15.1.2001, (15) S.O.No.490(E), dated 1.6.2001, (16) S.O. No. 532(E), dated 1.1.2002, (17) S.O. No.1168(E), dated 1.6.2002, (18) S.O.No.888(E), 1.6.2003, (19) No.Legal/42(3)/87/, dated 1.6.2004, (20) Legal/42(3)/87, dated 1.3.2005, (21) Legal42(3)/87, dated 1.9.2005, (22) Legal 42(3)/87, dated 15.12.2005 and (23) Legal 42(3)/87, dated 1.5.2006.

ANNEXURE XIV

REPORT OF SURPRISE INSPECTION/ EVALUATION OF THE LABORATORY RECOGNIZED UNDER ENVIRONMENT (PROTECTION) ACT, 1986

Name of the Laboratory : _____

Address of the Laboratory :_____

Category of the Laboratory : Government/ Private.

Date of Surprise Inspection : _____

Inspection undertaken by : _____

_____

_____

(A) Verification of Documents as provided with the application for recognition of laboratories (Fresh/ Renewal) under the Environment (Protection) Act, 1986

S. No.	Requirements as per the Guidelines for Recognition of Laboratory under the E (P) Act 1986	Adequate/Inadequate (if inadequate, mention Reason)
38.	Certificate of Incorporation / Registration / Authorization for Legal identity	
39.	GST/PAN Registrations	
40.	Location details for confirming Authorized Area (indicate in Google Map)	
41.	Laboratory Organization Structure/Chart	
42.	Details of Senior Management of Laboratory	
	Manpower with Qualifications, Designation, Experience, Work responsibilities and Present Emoluments	
44.	Training Details/Record of Analysts performing Environmental sampling and Analysis	
45.	SOP of Laboratory Waste Management Practices	
46.	Copy of Certificate for NABL Accreditation (17025:2017) with validity and detailed Scope highlighting the mandatory parameters required for The E(P)Act 1986 recognition	
47.	Copy of ISO 45001 Certification Certificate with validity	
48.	Acceptance of Terms & Conditions for Recognition of Laboratory under the Environment (Protection) Act 1986	
49.	Nomination of Proposed Govt. Analysts (Maximum three)	
50.	Bio data of proposed Government Analysts in prescribed proforma with photograph, records of qualification, Training, Experience, Salary, etc.	
51.	Acceptance of Terms & Conditions by the nominated personnel for consideration of Govt. Analysts	
52.	Latest Schedule of Analytical charges, levied by the laboratory for various analysis	
53.	Any other relevant documents in support of application	

(B) Facilities for Water & Solid Matrix Quality Parameters

S. No.	Facilities	Parameters	Expertise	Remarks if any
		Adequate/ Inadequate	Adequate/ Inadequate	
A	Physical Parameters			
B	Inorganic (General & non-metallic)			
C	Inorganic (Metals)			
D	Organic tests			
E	Microbiological Tests			
F	Toxicological Tests			
G	Biological Tests			
H	Soil, sludge, sediment test			
I	Characterization of hazardous wastes			

essential groups i.e. A to E for water and similarly A to D for air analysis.

(C) Facilities for Air Quality Parameters

S. No.	Facilities	Parameters	Expertise	Remarks if any
		Adequate/ Inadequate	Adequate/ Inadequate	
A	Ambient Air / Fugitive Emissions			
B	Stack gases/ Source emission			
C	Noise level			
D	Meteorological Monitoring			
E	Vehicular Emission Monitoring			

(D) LIST OF INSTRUMENTS, EQUIPMENTS AND CALIBRATION STATUS

(I)AVAILABLE SOPHISTICATED INSTRUMENTS

S. No.	Name of the instrument	Annual Maintenance Contract / emergency call basis	Validity of Calibration (Yes/ No)	Whether sufficient spares available
1.	AAS (Flame & Flameless)			
2.	ICP-OES			
3.	ICP-MS			
4.	AOX Analyzer			
5.	Total Organic Carbon Analyzer			
6.	Gas Chromatograph with suitable detectors			
7.	Water purification system			
8.	Analytical balance			
9.	Precision balance			
10.	Specific ion meter			
11.	Mercury analyzer			

12.	UV-Visible spectrophotometer			
13.	TOC Analyzer			
14.	Bomb Calorimeter			
15.	Elemental analyzer			
16.	Flash Point Apparatus			
17.	X ray fluorescence spectrometer			
18.	Ion Chromatograph			
19.	CO analyzer			
20.	Ozone Analyzer			
21.	Flue Gas Analyzer			
22.	Sound Level Meter			
23.	Microscope			
24.	Any other			

(ii) AVAILABLE OTHER MANDATORY INSTRUMENTS/EQUIPMENTS

S. No.	Name of the instrument	Total number	Validity of Calibration (Yes/No)	Whether sufficient spares available
1.	Filtration Assembly			
2.	Heating Mantle			
3.	Hot Plate			
4.	Muffle Furnace			
5.	Water Bath			
6.	Autoclave			
7.	Colony counter			
8.	BOD Incubator			
9.	Bacteriological incubator			
10.	COD Digester			
11.	DO Meter			
12.	pH Meter			
13.	Conductivity Meter.			
14.	Mechanical Shaker			
15.	Spectrophotometer (portable)			
16.	Water Distillation Unit			
17.	Distillation Assemblies for Phenol, F, CN and NH3			
18.	TKN Analyzer			
19.	Turbidity Meter			
20.	Rotary Evaporator			
21..	TCLP/Zero Head Extractor			
22.	High Volume Sampler			
23.	Handy Air Sampler			
24.	RSPM Samplers (PM_{10})			
25.	$PM_{2.5}$ Samplers			
26.	Stack Monitoring Kit			
27.	Whether Station			

(E) REFERENCE MATERIAL (RMS) AND CERTIFIED REFERENCE MATERIAL (CRMS)

S. No.	Parameters	Availability of RMS/CRMS	
		(√/X)	Nos. of standards
1.	Trace Metals		
2.	Organo-chlorine pesticides		
3.	Organo-nitrogen phosphorous pesticides		
4.	Polychlorinated Biphenyls (PCB's)		
5.	Polycyclic aromatic hydrocarbon (PAH)		
6.	Benzene, Ethylene, Toluene & Xylene		
7.	Dioxins and Furans		
8.	CRMs for anions		
9.	CRMs for cations		
10.	CRMs for pH, Conductivity		
11.	Bacteriological parameters (Reference cultures)		

(F) Record of Evidence for External AQC/PT participation during preceding three years

AQC by CPCB, WHO and PT providers accredited by NABL/ any other agencies	Period (Month / year)	Parameter covered	Percentage of performance

Past three Results of compulsory participation in Inter-Laboratory Analytical Quality Control conducted by CPCB

AQC Exercise Number	Period (Month / year)	Parameters covered	Percentage of performance

(G) GENERAL INFORMATION ABOUT THE LABORATORY

1. Proper coding of samples during sampling and handling at laboratory and availability of adequate storage facilities (Yes/No)

_____

2. Which methods are being followed for
   (i) Water and wastewater sampling and Analysis :
   (ii) Ambient/Fugitive Air Quality Analysis work :
   (iii) Stack Monitoring and analysis :
   (iv) Hazardous wastes/Soil sampling and analysis :
   (v) Others : Please mentioned

(APHA, BIS, USEPA, ASTM , ISO, CPCB, Any other)

3. Check the procedures, followed for Analytical Quality Control (AQC) for Air Pollutants Analysis.

_____

4. Verify biometric attendance of all employees for the past three months

_____

5. Whether the laboratory has any / adequate provisions for firefighting and fire escape:

_____

_____

6. Please procure a lay-out plan from the laboratory with the positions of instrument, equipment, work benches, sanitary fittings etc., marked on it.

_____

_____

7. Electricity Supply - frequencies of failure and duration. Provision of generators and its capacity

_____

8.. Water supply - continuous or irregular. Alternative arrangements if any:

_____

_____

9. General cleanliness of the laboratory:

_____

10. Provisions for First - Aid:

11. Checking of Electrical fittings, sanitary fittings, (Wash - basin, drainage system etc.) etc.

12. (a) Distilled Water - whether prepared in the laboratory or procured from outside:

(b) If prepared in laboratory, specify the methods:

(i) Metal distillation (ii) Glass distillation
(iii) Double distillation (iv) Nano pure system
(v) Any other

(c) Whether quality of the distilled water is checked regularly

13. Whether water and wastewaters are being analyzed in the same laboratory using the same glassware and reagents or any separate arrangement:

14. Whether library facilities are available with the laboratory, if yes, brief description of Journals, Periodicals, etc., available may be given:

15. Research and Development activities carried-out in last few years and being carried -out presently, if necessary enclose a separate sheet:

16. Provision for future expansions:

17. Make and quality of glassware used in the laboratory:

18. Check accuracy of balances:

19. Name the organizations from which the laboratory has been already recognized:

_____

20. Documentation (water & air)

(i) Maintain of records, registers, calculations and test results in respect of tests conducted
(ii) Calibration of instruments/equipment records available/not available.
(iii) Stock registers for procurement of chemical, glassware, instruments and equipment available/not available.
(iv) Procurement records/bills of instruments/equipment:

21. Available working area of Environmental Laboratory is approx. _____ sq. m. for water lab _____ for Air Lab _____ for Microbiology Lab, say approx. total _____ sq. m (Adequate/Inadequate)

22. Performance of the laboratory for the past three years (matrix wise number of samples tested in the laboratory with parameters).

OBSERVATIONS & RECOMMENDATIONS OF INSPECTION COMMITTEE:

Name	_____	_____	_____
Designation	_____	_____	_____
Dept./Organization	_____	_____	_____

ACKNOWLEDGEMENT

Certified that vide letter No. _____ dated _____ through which the recognition has been granted to the laboratory under The Environment (Protection) Act, 1986. In this regard, today as on _____ our laboratory (name & address) _____ was inspected by the team / representatives from MOEF (Govt. of India)/Central Pollution Control Board/_____State Pollution Control Board/ _____ Pollution Control Committee.

Dated: (Head of Laboratory)

Place: Full Name:

Seal of Laboratory

रजिस्ट्री सं. डी. (डी.एन.)-127 REGISTERED NO. D. (D.N.) 127

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-Section (ii)

प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 128] नई दिल्ली, बुधवार, फरवरी 27, 1991/फाल्गुन 8, 1912
No. 128] NEW DELHI, WEDNESDAY, FEBRUARY 27, 1991/PHALGUNA 8, 1912

इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह अलग संकलन के रूप में रखा जा सके
Separate Paging is given to this Part in order that it may be filed as a separate compilation

पर्यावरण और वन मंत्रालय

(पर्यावरण, वन तथा वन्यजीव विभाग)

अधिसूचना

नई दिल्ली, 21 फरवरी, 1991

का. आ. 145(अ):—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 23 के द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, निम्नलिखित आदेश जारी करती है, अर्थात्:—

1. केन्द्रीय सरकार, प्रयोगशालाओं या संस्थानों को पर्यावरण प्रयोगशालाओं के रूप में मान्यता देने तथा विश्लेषकों को सरकारी विश्लेषकों के रूप में नियुक्त करने अथवा

मान्यता देने की बाबत पर्यावरण (संरक्षण) अधिनियम, 1986 की क्रमशः धारा 12 की उपधारा (i) के खण्ड (ख) और धारा (13) द्वारा प्रदत्त शक्तियों को केन्द्रीय प्रदूषण नियंत्रण बोर्ड को प्रत्यायोजित करती है।

2. पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 12 की उपधारा (i) के खंड (ख) के अधीन प्राईवेट प्रयोगशालाओं की मान्यता और पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 13 के अधीन उनके विश्लेषकों को, सरकारी विश्लेषकों के रूप में मान्यता, केन्द्रीय सरकार द्वारा दी जाती रहेगी।

3. पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 12 की उपधारा (i) के खण्ड (ख) के अधीन मान्यताप्राप्त प्रयोगशालाओं को सरकारी/स्वायत्त/पब्लिक सेक्टर उपक्रम/शैक्षिक संस्था/राज्य या केन्द्रीय प्रदूषण नियंत्रण बोर्ड की प्रयोगशालाओं के रूप में विनिर्दिष्ट किया जाएगा।

4. पर्यावरण (संरक्षण) अधिनियम, 1986 के अधीन मान्यताप्राप्त प्रत्येक प्रयोगशाला द्वारा किया गया कार्य केन्द्रीय प्रदूषण नियंत्रण बोर्ड की वार्षिक रिपोर्ट में सम्मिलित किया जाएगा।

5. यह अधिसूचना राजपत्र में प्रकाशन की तारीख से लागू होगी।

[सं. क्यू-15013/1/89-सीपी डब्ल्यू]

मुकुल सनवाल, संयुक्त सचिव

MINISTRY OF ENVIRONMENT AND FORESTS

(Department of Environment, Forests and Wildlife)

NOTIFICATION

New Delhi, the 21st February, 1991

S.O. 115 (E).—In exercise of the powers conferred under Section 23 of the Environment (Protection) Act, 1986, (29 of 1986), the Central Governmen hereby issue the following orders, namely :—

1. The Central Government hereby delegates the powers with respect to grant of recognition to laboratories or institutes as environmental laboratories and to appoint or recognize Analysts a Government Analysts, as conferred by clause (b) of sub-section (i of section 12 and section 13 respectively of the Environmen (Protection) Act, 1986 to the Central Pollution Control Board.

2. Recognition of private laboratories under clause (b) of sub-section (i) of section 12 of the Environment (Protection) Act, 1986 as well as recognition of their Analysts as Government Analysts under section 13 of the Environment (Protection) Act, 1986, will continue to be done by the Central Government.

3. The laboratories recognized under clause (b) of sub-section (i) of section 12 of the Environment (Protection) Act, 1986 shall be specified as Government|Autonomous|Public Sector Undertaking| Educational Institution|State or Central Pollution Control Board Laboratories.

4. The work done by each Laboratory recognised under the Environment (Protection) Act, 1986, shall be included in the Annual Report of the Central Pollution Control Board.

5. This notification shall come into force on the date of its publication in the Official Gazette.

[No. Q-15013|1|89-CPW]

MUKUL SANWAL, Jt. Secy.

Printed by the Manager, Govt. of India Press, Ring Road, New Delhi-110064
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रजिस्ट्री सं. डी.एल.- 33004/99 REGD. No. D. L.-33004/99

भारत का राजपत्र
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असाधारण
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)

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पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 16 जून, 2021

का.आ. 2340(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) (जिसे इसके पश्चात अधिनियम कहा गया है) की धारा 23 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए और भारत सरकार के तत्कालीन पर्यावरण, वन और वन्यजीव मंत्रालय संख्या का.आ. 145(अ), तारीख 21 फरवरी, 1991, की अधिसूचना के अधिक्रमण में उन बातों के सिवाय जिन्हें ऐसे अधिक्रमण से पहले किया गया है या करने का लोप किया गया है,निम्नलिखित आदेश करती है, अर्थात् :-

1. उक्त अधिनियम की धारा 12 की उप-धारा (1) के खंड (ख) के अधीन निजी प्रयोगशालाओं की मान्यता, के साथ-साथ पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा 13 के अधीन सरकारी विश्लेषकों के रूप में उनके विश्लेषकों की मान्यता केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा की जाएगी।

2. सभी पर्यावरण प्रयोगशालाओं को

(i) प्रयोगशाला की मान्यता का ताजा या नवीनीकरण;

(ii) सरकारी विश्लेषकों के नाम में परिवर्तन; और

(iii) प्रयोगशाला परिसर का स्थानांतरण

के लिए उक्त अधिनियम के उपबंधों के अधीन उक्त आवेदन पर विचार करने के लिए केंद्रीय प्रदूषण नियंत्रण बोर्ड को आवेदन जमा करने से पहले व्यावसायिक स्वास्थ्य और सुरक्षा प्रबंधन प्रणाली (आईएसओ 45001:2018) के प्रमाणीकरण के साथ केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा यथापरिभाषित सभी मानदंड के परीक्षण मानकों के लिए राष्ट्रीय परीक्षण और अंशांकन प्रयोगशालाओं के प्रत्यायन बोर्ड (आईएसओआई 7025: 2017) से प्रत्यायन प्राप्त करना होगा।

3. प्रयोगशाला की मान्यता आईएसओ 17025:2017 के अधीन प्रत्यायन की वैधता अवधि और उसमें प्रत्यायन प्राप्त परीक्षण मानकों के लिए दी जाएगी।

4. प्रयोगशाला की मान्यता किसी मान्यताप्राप्त एजेंसी से आईएसओ 45001:2018 प्रमाणीकरण की वैधता अवधि के लिए दी जाएगी और इसके संचालन के उसी परिसर के लिए वैध होगी जिसके लिए आवेदन किया गया है।

5. केंद्रीय प्रदूषण नियंत्रण बोर्ड यह सुनिश्चित करेगा कि पर्यावरण प्रयोगशालाओं या सरकारी विश्लेषकों की मान्यता के लिए आवेदनों की प्रास्थिति के बारे में जानकारी के प्रसार सहित आवेदन के प्रसंस्करण के लिए एक वेब आधारित पोर्टल, इस अधिसूचना के प्रकाशन की तारीख से तीन महीने के भीतर प्रचालित हो गया है और मान्यताप्राप्त प्रयोगशाला द्वारा प्रस्तुत अनुपालन रिपोर्ट को ऑनलाइन जमा करने का उपबंध भी इस पोर्टल के माध्यम से किया जाएगा।

6. प्रयोगशाला या सरकारी विश्लेषक की मान्यता अपेक्षाओं के अनुपालन की स्वघोषणा और केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा मान्यता प्रदान करने के लिए केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा निर्धारित सभी अपेक्षित जानकारी के लिए सहायक दस्तावेज प्रस्तुत करने पर आधारित होगी और केंद्रीय प्रदूषण नियंत्रण बोर्ड द्वारा यथापरिभाषित के रूप में अनुपालन रिपोर्ट मान्यताप्राप्त प्रयोगशाला द्वारा नामित वेब-पोर्टल पर द्वि-वार्षिक प्रस्तुत किया जाएगा।

7. केंद्रीय प्रदूषण नियंत्रण बोर्ड या तो स्वयं या राष्ट्रीय पर्यावरण इंजीनियरिंग अनुसंधान संस्थान या ऐसे अनुसंधान संस्थानों के सहयोग से सभी मान्यताप्राप्त प्रयोगशाला के लिए वार्षिक रूप से सभी मानकों को कवर करने के लिए, इस तरह के प्रयोग करने के लिए सिद्ध क्षमता वाले दक्षता परीक्षण और अंतर-प्रयोगशाला तुलना प्रयोग आयोजित करेगा और इस तरह के प्रयोग के संचालन से जुड़ी लागत भाग लेने वाली प्रयोगशालाओं द्वारा वहन की जाएगी, और इस तरह के प्रयोग के रिकॉर्ड और रिपोर्ट सार्वजनिक क्षेत्र में उपलब्ध कराई जाएगी।

8. केंद्रीय प्रदूषण नियंत्रण बोर्ड, पर्यावरण (संरक्षण) अधिनियम, 1986 के अधीन मान्यताप्राप्त पर्यावरण प्रयोगशालाओं पर लगाई गई शर्तों के सत्यापन के लिए पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय (एमओईएफसीसी), केंद्रीय प्रदूषण नियंत्रण बोर्ड और संबंधित राज्य प्रदूषण नियंत्रण बोर्ड या प्रदूषण नियंत्रण समितियों के सदस्यों की एक संयुक्त समिति का गठन करके आकस्मिक निरीक्षण का उपबंध करेगा और निरीक्षण रिपोर्ट सार्वजनिक क्षेत्र में उपलब्ध कराई जाएंगी।

9. केंद्रीय प्रदूषण नियंत्रण बोर्ड प्रयोगशाला मान्यता के लिए विद्यमान दिशानिर्देशों की समीक्षा और संशोधन करने के लिए एक विशेषज्ञ समिति का गठन करेगा जिसमें पर्यावरण वन और जलवायु परिवर्तन मंत्रालय, राज्य प्रदूषण नियंत्रण बोर्ड, राष्ट्रीय परीक्षण और अंशांकन प्रयोगशालाओं के लिए प्रत्यायन बोर्ड और राष्ट्रीय पर्यावरण इंजीनियरिंग अनुसंधान संस्थान के सदस्य और विशेषज्ञों को उपयुक्त समझा जाएगा जिसके अंतर्गत परिभाषित मानदंड परीक्षण पैरामीटर, प्रवीणता परीक्षण और अंतर-प्रयोगशाला तुलना प्रयोग के लिए प्रक्रिया, प्रक्रिया और लागत अनुमान, मान्यता के लिए अनुपालन शर्त और प्रयोगशालाओं, आदि द्वारा अनुपालन रिपोर्ट ऑनलाइन जमा करने के लिए अपेक्षित संबंधित जानकारी सम्मिलित है। इस अधिसूचना के प्रकाशन के तीन महीने के भीतर और विशेषज्ञ समिति की सिफारिश के आधार पर, केंद्रीय प्रदूषण नियंत्रण बोर्ड उक्त अधिनियम के अधीन प्रयोगशाला और सरकारी विश्लेषकों को मान्यता देगा ।

10. विशेषज्ञ समिति वार्षिक रूप से प्रक्रियाओं, दिशानिर्देशों और अन्य प्रक्रिया की समीक्षा और पुनर्मूल्यांकन करेगी और केंद्रीय प्रदूषण नियंत्रण बोर्ड के विचार के लिए आवश्यक सिफारिश करेगी।

11. यह अधिसूचना राजपत्र में इसके प्रकाशन की तारीख से प्रवृत्त होगी।

[फा. सं. क्यू.-15018/13/2020-सीपीडब्ल्यू]

नरेश पाल गंगवार, संयुक्त सचिव

MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 16th June, 2021

S.O. 2340(E).—In exercise of the powers conferred by section 23 of the Environment (Protection) Act, 1986 (29 of 1986) (thereinafter referred to as the Act.) and in supersession of the notification of the Government of India, in the erstwhile Ministry of Environment, Forests and Wildlife number S.O 145 (E), dated 21st February, 1991, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following orders, namely: -

1. Recognition of private laboratories under clause (b) of sub-section (1) of section 12 of the said Act, as well as recognition of their Analysts as Government Analysts under section 13 of the Environment (Protection) Act, 1986, shall be done by the Central Pollution Control Board.

2. All environmental laboratories shall obtain accreditation from the National Accreditation Board for Testing and Calibration Laboratories Accreditation (ISO17025:2017) for all criteria testing parameters as defined by Central Pollution Control Board along with certification for Occupational Health and Safety Management System (ISO 45001:2018) before submission of application to the Central Pollution Control Board for consideration of the said application under the provisions of the said Act, for-

(i) fresh or renewal of recognition of laboratory;

(ii) changes in the name of Government Analysts; and

(iii) shifting of laboratory premises.

3. The recognition of laboratory shall be granted for the validity period of accreditation under ISO17025:2017 and for the testing parameters accredited therein.

4. The recognition of laboratory shall be granted for the validity period of ISO45001:2018 certification from a recognised agency and shall be valid for the same premises of its operation for which the application is made.

5. The Central Pollution Control Board shall ensure that a web based portal, for processing of application including disseminating the information on status of applications for recognition of environmental laboratories or Government Analysts, is made operational within three months from the date of publication of this notification, and the provision for online submission of compliance report submitted by the recognised laboratory shall be also made through this portal.

6. The recognition of laboratory or Government Analyst shall be based on self-declaration of compliance of the requirements and submission of supporting documents for all requisite information as stipulated by the Central Pollution Control Board for grant of recognition by the Central Pollution Control Board, and Compliance report as defined by Central Pollution Control Board shall be submitted by the recognised laboratory bi-annually on designated web-portal.

7. The Central Pollution Control Board shall conduct proficiency test and inter-laboratory comparison exercise either of its own or in collaboration with National Environmental Engineering Research Institute or such research institutes having proven capabilities for undertaking such exercise, for all recognised laboratory bi-annually, covering all parameters annually, and the cost associated in conducting such exercise shall be borne by the participating laboratories, and records and reports of such exercise shall made available in public domain.

8. The Central Pollution Control Board shall make provision for surprise inspection for verification of conditions imposed on the environmental laboratories recognised under the Environment (Protection) Act, 1986 by constituting a joint committee comprising members of the Ministry of Environment, Forest and Climate Change (MoEFCC), the Central Pollution Control Board and concerned State Pollution Control Boards or Pollution Control Committees, and the inspection reports shall be made available in public domain.

9. The Central Pollution Control Board shall constitute an expert committee comprising of members from the Ministry of Environment Forests and Climate change ,State Pollution Control Boards, National Accreditation Board for Testing and Calibration Laboratories and National Environmental Engineering Research Institute and experts as deemed appropriate, to review and revise the existing guidelines for laboratory recognition including defined criteria testing parameters, procedure, process and cost estimate for proficiency test and inter-laboratory comparison exercise, compliance condition for recognition and corresponding information required for online submission of compliance report by laboratories, etc., within three months of publication of this notification, and based on the recommendation of expert committee, the Central Pollution Control Board shall recognise the laboratory and the Government Analysts under the said Act.

10. The expert committee shall review and reassess the procedures, guidelines and other process annually and make necessary recommendation for consideration of the Central Pollution Control Board.

11. This notification shall come into force from the date of its publication in the Official Gazette.

[F. No. Q-15018/13/2020-CPW]

NARESH PAL GANGWAR, Jt. Secy.

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Addendum III

GLOSSARY OF TERMS - LABORATORY QUALITY ASSURANCE (QA) AND QUALITY CONTROL (QC) SYSTEM

1.	**Accreditation**	Formal recognition of the competence of a body or an organization for a well-defined purpose. It is the procedure by which a laboratory is assessed to perform a specific range of test or measurements
2.	**Accuracy**	The closeness of agreement between the "true" value and the measured value. The smaller the systematic error of the analysis is, the more accurate is the analytical procedure. It is assessed by means of reference samples and percent recoveries
3.	**Audit Sample**	Prepared reference sample inserted into the sample processing procedure as close to the beginning as possible.
4.	**Background Sample**	A sample taken from a location on or proximate to the site of interest and used to document baseline or historical information
5.	**Bias**	Systematic error, consistent deviation of measured values from the true value.
6.	**Calibration**	In chemical measurement, Calibration refers to the process by which the response of a measurement system is related to the concentration or the amount analyte of interest
7.	**Calibration Laboratory**	Laboratory that performs calibration.
8.	**Calibration Method**	Defined technical procedure for performing a calibration.
9.	**Calibration Standards**	A series of known standard solutions used by the analyst for calibration of instrument (i.e. preparation of the analytical curve).
10.	**Certified Reference Material (CRM)**	A certified reference material is a material or substance whose property or properties can be defined so exactly that it may be used for the calibration of measuring instruments, the check of results obtained from measuring, testing and analytical processes, and for the characterization of substance properties.
11.	**Chain of Custody (COC)**	Documentation of the history of the sample. The components of chain of custody are sample seals; log book, record and sample analysis request sheet and the procedures used for estimation.
12.	**Confidence Interval**	Set of possible values within which the true value will lie with a specified level of probability.
13.	**Confidence Limit**	One of the boundary values defining the confidence interval
14.	**Contamination**	Something inadvertently added to the sample during the sampling or analytical process.
15.	**Control**	Type of sample against which the results of a procedure are judged.
16.	**Conventional true value**	Value attributed to a particular quantity and accepted, sometimes by convention, as having an uncertainty appropriate for a given purpose
17.	**Data Quality Objectives (DQOs)**	Statements on the level of uncertainty that a decision-maker is willing to accept in the results derived from environmental data.

18.	**Environmental sample**	An environmental sample or field sample is a representative sample ofany material (aqueous, no aqueous or multimedia) collected from anysource for which determination of composition of contamination isrequested or required.
19.	**Error**	Difference between a measured value and the true value.
20.	**Good Laboratory Practice(GLP)**	Good laboratory Practice(GLP) is concerned with the organizational process and the conditions under which laboratory studies are planned, monitored, recorded and reported
21.	**Gross error**	Which makes it necessary to begin a new analysis (Ex. using a wrong reagent, taking a wrong pipette, measuring at a wrong wavelength. instrument breakdown, heavily contaminated glassware etc.). These errors should easily be recognized.
22.	**Instrumentation Detection Limit**	The concentration equivalent to a signal due to the analyte which is equal to three times the standard deviation of a series of 7 replicate measurements of a reagent blank's signal at the same wave length
23.	**Inter Laboratory Precision**	(Reproducibility) Variation associated with two or more laboratories or organizations using the same measurement method.
24.	**Inter Laboratory Test**	A series of measurements of one or more quantities performed independently by a number of laboratories on samples of a given material (other terms: Round robin test, Collaborative trial, Collaborative reference program, Collaborative analytical study, ring test).
25.	**Interferences**	Compounds whose presence obscures the measurement of the analyte of interest by the introduction of an unrelated analytical signal where the analyte is measured.
26.	**Internal Quality Control**	Internal quality control encompasses all measures, which are planned, ordered and executed by a laboratory itself.
27.	**Intra-laboratory Precision**	(Repeatability) Variation associated with a single laboratory or organization.
28.	**Limit of detection (LOD)**	The LOD of an individual analytical procedure is the lowest analytical amount of an analyte in a sample, which can be detected but not necessarily quantified as an exact value. For many purposes, the LOD is arbitrarily taken to be $3s_b$ or 3 x the standard deviation of the blank value or of background
29.	**Limit of determination**	The lower level where measurements become arbitrarily meaningful and is defined arbitrarily as LOQ-$10s_b$ (10 x the standard deviation of the blank value or of background) At this concentration, the relative confidence in the measured value is ± 30% at the 95% confidence level.
30.	**Limit of Quantitation (LOQ)**	The constituent concentration that produces a signal sufficiently greater than it can be detected within specified limits by good laboratories during routine operating conditions. Typically it is the concentration that produces a signal time 10s above the reagent water blank signal.
31.	**Matrix**	The matrix of a material is the totality of all parts of a material and their chemical and physical properties including mutual influences.
32.	**Matrix /Spike Duplicate Analysis**	In matrix/spike duplicate analysis, predetermined quantities of stock solutions of certain analytes are added to a sample matrix prior to sample extraction/digestion and analysis. Samples are split into

		duplicates, spiked and analyzed. Percent recoveries are calculated for each of the analytes detected. The relative percent difference between the samples is calculated and used to assess analytical precision. The concentration of the spike should be at the regulatory standard level or the estimated or actual method quantification limit. When the concentration of the analyte in the sample is greater than 0.1% no spike of the analyte is necessary.

33.	**Method Detection Limit (MDL)**	The minimum concentration of a substance that can be measured and reported with 99 % confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample in given matrix containing analyte which has processed through the pre-operative procedure
34.	**Method Quantification Limit (MQL)**	The Method Quantification Limit is the minimum concentration of a substance that can be measured and reported.
35.	**Optimum Concentration Range**	A range defined by limits expressed in concentration, below which scale must be used and above which curve correction should be considered. This range varies with the sensitivity of the instrument and the operating conditions employed.
36.	**Outlier data**	The data, which are suspected to be extremely low or high from the expected value or mean.
37.	**Precision**	The closeness of agreement between the results obtained by applying the experimental procedure several times under prescribed conditions. (The smaller the random part of the experimental errors, which affect the results, the more precise is the procedure). Within run and between day precisions have to be considered. (See repeatability and reproducibility)
38.	**Proficiency Testing**	Determination of the laboratory calibration or testing performance by means of inter-laboratory comparisons.
39.	**Protocol**	Thorough written description of the detailed steps and procedures involved in the collection of samples.
40.	**Quality Assessment**	Procedure for determining the quality of laboratory measurements by use of data from internal and external quality control measures.
41.	**Quality assurance**	All those planned and systematic actions necessary to provide adequate confidence that a product or a service will satisfy given requirements for quality
42.	**Quality Assurance Programme Plan (QAPP)**	An orderly assemblage of management policies, objectives, principles and general procedures by which an organization involved in environmental data generation activities outlines how to produce data of known quality.
43.	**Quality Assurance Project Plan (QAPP)**	An orderly assemblage of detailed procedures designed to produce data of sufficient quality to meet the DQOs for a specific data collection activity.
44.	**Quality Characteristic**	The characteristics and characteristic values (or expressions) of something (e.g. a method, a piece of equipment, a measurement result etc.) in relation to their suitability to fulfill set requirements.
45.	**Quality Control**	Set of measures within a sample analysis methodology to assure that the process is in control.
46.	**Quality Control Charts**	A Quality control chart is a sequential plot of some quality characteristic. It may be a day-by –day measurement of any interest of analyte (e.g. COD or BOD or Nitrate). The Chart consists of central line and two pairs of limit lines, the Upper and Lower Warning Limits (UWL, LWL)and Upper and Lower Control Limits (UCL., LCL) Example : Shewart's Quality Control Chart
47.	**Quality Manual**	A document stating the quality policy, quality system and quality practices of an organization.
48.	**Quality System**	The organizational structure, responsibilities, procedures, processes and resources for implementing quality management.

49.	**Random Errors**	Random errors are indicated by the scatter of the results of repeated measurements on the aliquot of same sample about the mean value. The sign and magnitude of the error of any particular result varies at random and cannot be known exactly. Random errors arise from uncontrolled variations in the conditions of the analytical system (factors like analyst, equipment, instrument, method, quality of glassware and chemicals, reagents etc.,) during different analysis.
50.	**Range**	Spread of values calculated by subtracting the lowest value from the highest value
51.	**Reagent Blank**	A reagent blank is an aliquot of analyte –free water or solvent analysed with the analytical batch.
52.	**Reference material**	A material or substance one or more of whose property value are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning value to materials
53.	**Reference Standard**	A standard, generally of the highest meteorological quality available at a given location, from which measurements made at that location, is derived.
54.	**Relative Standard Deviation (RSD)**	Estimate of the average error in the measurement due to unassignable causes and usually expressed as a percentage of the average sample concentration.
55.	**Repeatability**	The closeness of agreement between successive results obtained with the same method on identical test material under the same condition. (Same operator, same apparatus, same laboratory and short intervals of time) can also be interpretable as within – run precision.
56.	**Replicate Sample**	A replicate sample is a sample prepared by dividing a sample into two or more separate aliquots. Duplicate sample is considered to be two replicates.
57.	**Reproducibility**	The closeness of agreement between individual results obtained with the same method and on identical material but under different test conditions (different operator, different time's etc.) Can also be interpreted as "Between-run precision".
58.	**Sample Holding Time**	The storage time allowed between sample collection and sample analysis when the designated preservation and storage techniques are employed.
59.	**Sampling**	Attempt to choose and extract a representative portion of a physical system from its surroundings.
60.	**Sensitivity**	Sensitivity describes the ability of an experimental method to differentiate between related values (e.g. concentrations). It indicates to which degree value changes depending upon the signal of the measuring system and can be quantified using the slope of the calibration curve.
61.	**Standard Curve**	A standard curve is a curve, which plots concentrations of known analyte standard versus the instrument response to the analyte.
62.	**Standard Deviation**	Square root of the variance (statistical analysis).
63.	**Standard Methods**	A standard method is an acknowledged analytical method according to an international or national standard or guidelines or to a given legal statue.
64.	**Standard Operating procedure (SOP)**	Standard Operating procedure (SOP) means written procedure, which describes how those routine laboratory operations, are to be performed.

65.	**Stratified Random Sampling**	Sampling technique in which estimates of strata means are combined to yield estimates of the population mean.
66.	**System Blank**	(Instrument Blank): Measure of the instrument background or baseline response in the absence of a sample.
67.	**Systematic Error**	Systematic errors are indicated by a unidirectional tendency of results, which could be greater or smaller than the true value. When systematic error is present, the result are said to be biased (bias = systematic error) Systematic errors in analytical results may occur when method used is not specific for the analyte; due to presence of some interfering substances; improper performing of the analysis, instability of samples between sample collection and analysis.
68.	**Test**	A technical operation that consists of the determination of one or more characteristics or performance of a given product, material equipment organism, physical phenomenon, process or service according to a specified procedure.
69.	**Test Method**	Defined technical procedure for performing a test
70.	**Traceability**	The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons.
71.	**True value**	Real amount or concentration of an analyte in a certain sample. It is an ideal value, which could be arrived at only if all causes of measurement error was eliminated. The amount or concentration given for an analyte in a certified reference material is a good substitute for the true value.
72.	**Trueness**	The closeness of agreement between the average value obtained from a large series of test results and an accepted reference value
73.	**Uncertainty of measurement**	Parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measured
74.	**Validation**	Validation is the total testing procedure if an analytical method is free of random and systematic error, not only within calibration but also and especially frees of interference when analyzing real samples.
75.	**Variance**	Measure of the variability in a population / set of analytical data. It is the square root of the standard deviation