



## Comparative Assessment of Physico-Chemical Results of Air, Water and Soil Samples Tested at Accredited and Non-accredited Laboratories

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There are thousands of results produced by the environmental testing laboratory for the air, water and soil parameters. The results produced by the environmental testing laboratories are always basis of the policy decision on various occasions. The results produced by the environmental testing laboratory provide the basis for the water whether it is fit for drinking purposes or not. The soil of a particular area is fit for specific agriculture or not. Similarly, the air of a specific location is under the permissible limit of the required component or not. Over some time the environmental testing laboratories are increasing in our county and these laboratories can be segregated broadly into two categories namely accredited laboratories and non-accredited laboratories. The accreditation is done by the independent authoritative body as per the international standard ISO/IEC 17025. It is believed that the accredited laboratory has a quality management system and proven technical competence to perform a specific type of testing. This work presents the comparative studies of the physico-chemical results of air, water and soil samples tested by accredited and non-accredited laboratories. In case of soil, the pH and sulfate is tested by the accredited and non-accredited laboratories in the specific environment. Similarly, construction water and drinking water are tested for various parameters as per the relevant standard. The air samples were collected from the same site and analysis was done for the various parameters like PM<sub>2.5</sub>, PM<sub>10</sub> and other toxic gases present in air. It is observed that there is a considerable difference between the results produced by the accredited and non-accredited laboratories. It is believed that the results produced by the accredited laboratory are more reliable in comparison to the non-accredited laboratory.

**Keywords:** Accreditation body, Accredited laboratory, Non-accredited laboratory, Sampling, Assessment, Quality management.

### INTRODUCTION

The decision related to the environment is always based on the results produced by the available environmental testing laboratories. The environmental testing laboratories are available with the government, ministries, associations and private sector organizations. All the laboratories conduct environmental testing in the field of air, water and soil as per the requirement of their organization and the stakeholders. The testing of environmental parameters is very essential and there are many laboratories available in the country for the testing of soil and water. The results which are produced by the laboratory are used for decision-making from various angles. Sometimes farmers may use the results of soil for farming the

various crops [1,2]. Similarly, water samples can be tested by the laboratory and the results can be used for industrial as well as domestic purposes. There are various standards available based on these standards the ranges for various parameters are given. The test results on which various strategic decisions are taken by the government or individual organization should be reliable. The reliability of the results always needs to be assured and these results should be comparable whenever they are tested by some other laboratory at different times. In India, there are two types of options are available for testing the various parameters of the environment like air pollution, soil and water, accredited laboratory and non-accredited laboratory [3,4]. Also, the testing of air parameters confirms whether the air of the particular site is good for the health of human beings

or not. The availability of various components of gases in the air is under the permissible limit or not that can be decided only based on test results.

The concept of the accredited and non-accredited laboratory is available in the government as well as non-governmental systems. The governmental system means a laboratory that is working under the organization of government, like ministries, boards and government undertakings, *etc.* Similarly, in the non-governmental system, there are many organizations like a laboratory, laboratories of some industry or laboratories of some NGO, *etc.* In governmental as well as the non-governmental system there are accredited and non-accredited laboratories are available. In the governmental system, there are ministries and boards which are having testing laboratories but only very few laboratories are accredited, whereas in the recent past the number of accredited laboratories is increasing slowly [5,6].

On the other hand, in private system, accredited and non-accredited laboratories are available. In certain organizations, some laboratories test environmental parameters and they are not accredited. Other examples can be a partially accredited laboratory, the partial accredited means that the laboratory is accredited for the testing of other parameters like mechanical testing food testing but not accredited for air, water and soil testing. In present study, we have reported a comparative analysis of results by an accredited and non-accredited laboratory for water, soil and air samples.

## EXPERIMENTAL

**Collection of water and soil and air samples:** The soil and construction water samples were collected as per the guidelines of IS 3025. Fifteen soil samples were collected from village Bhaira Bakipur, Sonapat, Haryana state, samples were collected within the periphery of one kilometer. Coded samples send to the accredited and non-accredited laboratories. Fifteen samples of water used for construction purposes were collected from the village, Dostpur Mangroli. All coded samples were given to the accredited and non-accredited laboratories.

The drinking water samples were collected from the industrial site located at Lucknow, India. There were seven sites identified and drinking water samples were collected from the site as per IS 10500 and samples were tested for the physico-chemical testing.

The air samples were collected from the two locations by air sampler for PM<sub>2.5</sub> and PM<sub>10</sub> and for gases of the air the samples were collected in the bladder.

**Analysis of soil sample:** All soil samples were analyzed for pH value and water-soluble sulphate as per IS 10500 [7].

**Analysis of water sample:** For water samples various parameter such as pH value @ 25 °C, chloride (mg/L), organic impurities determined at 105 °C (mg/L), inorganic impurities determined at 105 °C, (mg/L), total suspended solids determine at 105 °C, 5 mL of 0.02 N NaOH used for 100 mL water (acidity), 5 mL of 0.02 N H<sub>2</sub>SO<sub>4</sub> used for 100 mL water (alkalinity), sulphates (mg/L). IS standard methodology have been used for the analysis [8-13].

**Analysis of air samples:** The air samples were tested in the laboratory by the gravimetric method for PM<sub>2.5</sub> and PM<sub>10</sub>. Similarly, the gases were tested in the laboratory as per the relevant guidelines.

## RESULTS AND DISCUSSION

The results of comparative analysis of results by accredited and non-accredited laboratories for air, water and soil samples are summarized in Tables 1-8.

The considerable difference between the results of accredited and non-accredited laboratories can be seen for the air, water and soil samples. For soil samples, the pH and SO<sub>4</sub><sup>2-</sup> the results of accredited laboratory are comparatively less than the result of non-accredited laboratory (Tables 1 and 2). The result produced by the accredited laboratory are more reliable in comparison of non-accredited laboratory as the competence of the non-accredited laboratory needs to be strengthened for various quality components laid down in the standard [6,7]. The range of difference in case of pH measurement is more

TABLE-1  
COMPARATIVE ANALYSIS DATA OF SOIL SAMPLES FOR pH AND SULPHATE  
VALUE BY THE ACCREDITED AND NON-ACCREDITED LABORATORIES

S. No.	Sample identification	pH results			Water soluble sulphate (SO <sub>4</sub> <sup>2-</sup> ) %		
		ACL	NACL	Difference	ACL	NACL	Difference (%)
1	Soil/A/01 & Soil/NA/01	6.36	7.48	-1.12	0.41	0.85	-0.44
2	Soil/A/02 & Soil/NA/02	7.42	6.68	0.74	0.04	0.68	-0.64
3	Soil/A/03 & Soil/NA/03	6.61	7.51	-0.9	0.06	0.65	-0.59
4	Soil/A/04 & Soil/NA/04	7.05	7.68	-0.63	0.06	0.78	-0.72
5	Soil/A/05 & Soil/NA/05	6.88	7.54	-0.66	0.08	0.66	-0.58
6	Soil/A/06 & Soil/NA/06	7.12	7.89	-0.77	0.06	0.61	-0.55
7	Soil/A/07 & Soil/NA/07	6.90	7.66	-0.76	0.07	0.66	-0.59
8	Soil/A/08 & Soil/NA/08	7.20	7.67	-0.47	0.06	0.64	-0.58
9	Soil/A/09 & Soil/NA/09	6.85	7.81	-0.96	0.05	0.60	-0.55
10	Soil/A/10 & Soil/NA/10	6.65	7.69	-1.04	0.07	0.56	-0.49
11	Soil/A/11 & Soil/NA/11	7.08	7.85	-0.77	0.08	0.60	-0.52
12	Soil/A/12 & Soil/NA/12	7.09	7.90	-0.81	0.07	0.57	-0.50
13	Soil/A/13 & Soil/NA/13	6.98	7.66	-0.68	0.04	0.61	-0.57
14	Soil/A/14 & Soil/NA/14	6.90	7.71	-0.81	0.06	0.55	-0.49
15	Soil/A/15 & Soil/NA/15	6.76	7.56	-0.80	0.08	0.71	-0.63

ACL = Accredited lab; NACL = Non-accredited lab.

TABLE-2  
COMPARATIVE ANALYSIS DATA OF WATER FOR pH VALUE AT 25 °C [Ref. 7] AND  
CHLORIDE VALUE (mg/L) [Ref. 8] BY ACCREDITED AND NON-ACCREDITED LABORATORIES

S. No.	Sample identification	pH values at 25 °C			Chloride (mg/L)		
		ACL	NACL	Difference	ACL	NACL	Difference
1	CW/A/01 & CW/NA/01	7.2	6.2	1.0	33.8	78.4	-44.6
2	CW/A/02 & CW/NA/02	8.2	5.8	2.4	58	58.5	-0.5
3	CW/A/03 & CW/NA/03	8.3	6.1	2.2	111.1	120.8	-9.7
4	CW/A/04 & CW/NA/04	7.5	6.3	1.2	14.5	90.7	-76.2
5	CW/A/05 & CW/NA/05	7.4	6.1	1.3	14.5	120.8	-106.3
6	CW/A/06 & CW/NA/06	7.4	6.2	1.2	97	81	16
7	CW/A/07 & CW/NA/07	7.9	6.3	1.6	67	88	-21
8	CW/A/08 & CW/NA/08	7.6	6.3	1.3	33.4	54.3	-20.9
9	CW/A/09 & CW/NA/09	7.3	6.4	0.9	35.7	66.2	-30.5
10	CW/A/10 & CW/NA/10	7.8	6.4	1.4	102.4	131.2	-28.8
11	CW/A/11 & CW/NA/11	7.6	6.5	1.1	12.3	76.3	-64
12	CW/A/12 & CW/NA/12	7.6	6.4	1.2	45	70.3	-25.3
13	CW/A/13 & CW/NA/13	7.3	6.1	1.2	89.4	121.2	-31.8
14	CW/A/14 & CW/NA/14	7.2	6.3	0.9	76	94	-18
15	CW/A/15 & CW/NA/15	7.6	6.3	1.3	75	98.3	-23.3

ACL = Accredited lab; NACL = Non-accredited lab.

TABLE-3  
COMPARATIVE ANALYSIS DATA OF ORGANIC IMPURITIES AND INORGANIC IMPURITIES AT 105 °C BY  
ACCREDITED AND NON-ACCREDITED LABORATORIES USING IS 3025 (PART 11): 1983 METHODOLOGY [Ref. 9]

S. No.	Sample identification	Organic impurities (mg/L) at 105 °C			Inorganic impurities (mg/L) at 105 °C		
		ACL	NACL	Difference	ACL	NACL	Difference
1	CW/A/01 & CW/NA/01	68	120	-52	68	120	-52
2	CW/A/02 & CW/NA/02	88	60	28	88	60	28
3	CW/A/03 & CW/NA/03	102	90	12	102	90	12
4	CW/A/04 & CW/NA/04	48	106	-58	48	106	-58
5	CW/A/05 & CW/NA/05	24	90	-66	44	120	-76
6	CW/A/06 & CW/NA/06	95	72	23	407	342	65
7	CW/A/07 & CW/NA/07	120	153	-33	398	320	78
8	CW/A/08 & CW/NA/08	67	78	-11	234	300	-66
9	CW/A/09 & CW/NA/09	61	90	-29	175	375	-200
10	CW/A/10 & CW/NA/10	98	87	11	345	223	122
11	CW/A/11 & CW/NA/11	55	97	-42	98	145	-47
12	CW/A/12 & CW/NA/12	83	76	7	325	289	36
13	CW/A/13 & CW/NA/13	78	87	-9	311	275	36
14	CW/A/14 & CW/NA/14	73	45	28	312	267	45
15	CW/A/15 & CW/NA/15	79	135	-56	390	243	147

ACL = Accredited lab; NACL = Non-accredited lab.

TABLE-4  
COMPARATIVE ANALYSIS DATA OF WATER FOR TOTAL SUSPENDED SOLIDS VALUE [Ref. 10] AND  
SULPHATE IONS [Ref. 11] BY THE ACCREDITED AND NON-ACCREDITED LABORATORIES

S. No.	Sample identification	Total suspended solids at 105 °C			Sulphate (SO <sub>4</sub> <sup>2-</sup> )*		
		ACL	NACL	Difference	ACL	NACL	Difference
1	CW/A/01 & CW/NA/01	4	60	-56	21	45	-24
2	CW/A/02 & CW/NA/02	2	140	-138	24.6	98.6	-74
3	CW/A/03 & CW/NA/03	2	80	-78	55.2	76	-20.8
4	CW/A/04 & CW/NA/04	7	56	-49	30.5	60.6	-30.1
5	CW/A/05 & CW/NA/05	2	80	-78	11	76	-65
6	CW/A/06 & CW/NA/06	20	98	-78	45.0	102.4	-57.4
7	CW/A/07 & CW/NA/07	6	92	-86	35.2	63.4	-28.2
8	CW/A/08 & CW/NA/08	4	56	-52	14.2	63.4	-49.2
9	CW/A/09 & CW/NA/09	8	45	-37	18	39	-21
10	CW/A/10 & CW/NA/10	4	56	-52	48.4	69.8	-21.4
11	CW/A/11 & CW/NA/11	5	48	-43	45	64.3	-19.3
12	CW/A/12 & CW/NA/12	4	34	-30	33.4	63.5	-30.1
13	CW/A/13 & CW/NA/13	3	32	-29	35.4	59.7	-24.3
14	CW/A/14 & CW/NA/14	3	89	-86	23.4	77.6	-54.2
15	CW/A/15 & CW/NA/15	5	112	-107	29.3	112.8	-83.5

\*Estimated by gravimetric method; ACL = Accredited lab; NACL = Non-accredited lab.

TABLE-5  
COMPARATIVE ANALYSIS DATA OF WATER FOR ACIDITY VALUE [Ref. 12] AND  
ALKALINITY VALUE [Ref. 13] BY ACCREDITED AND NON-ACCREDITED LABORATORIES

S. No.	Sample identification	Acidity			Alkalinity		
		ACL	NACL	Difference	ACL	NACL	Difference
1	CW/A/01 & CW/NA/01	< 0.47	< 1.2	-0.73	5.3	15.3	-10.0
2	CW/A/02 & CW/NA/02	< 0.1	< 4.8	-4.7	18.8	10.9	7.9
3	CW/A/03 & CW/NA/03	< 0.1	< 3.4	-3.3	24.7	6.4	18.3
4	CW/A/04 & CW/NA/04	< 0.27	< 3.2	-2.93	2.7	12	-9.3
5	CW/A/05 & CW/NA/05	< 0.2	< 3.4	-3.2	2.4	6.4	-4.0
6	CW/A/06 & CW/NA/06	< 0.3	< 3.5	3.2	20.4	15.9	4.5
7	CW/A/07 & CW/NA/07	< 0.3	< 2.5	-2.2	16.7	11.2	5.5
8	CW/A/08 & CW/NA/08	< 0.2	< 3.4	3.2	12.3	13.7	-1.4
9	CW/A/09 & CW/NA/09	< 0.15	< 1.9	-1.75	7.2	11.4	-4.2
10	CW/A/10 & CW/NA/10	< 0.2	< 3.0	-2.8	22.3	14.3	8
11	CW/A/11 & CW/NA/11	< 0.17	< 3.5	-3.33	2.5	9.4	-6.9
12	CW/A/12 & CW/NA/12	< 0.2	< 2.7	2.5	15.8	23.9	-8.1
13	CW/A/13 & CW/NA/13	< 0.1	< 2.7	-2.6	20.3	15.3	5
14	CW/A/14 & CW/NA/14	< 0.2	< 3.2	-3.0	15.3	11.2	4.1
15	CW/A/15 & CW/NA/15	< 0.2	< 3.4	3.2	20.3	10.9	9.4

ACL = Accredited lab; NACL = Non-accredited lab.

TABLE-6  
COMPARATIVE ANALYSIS DATA OF DRINKING WATER (SOURCE: LUCKNOW CITY) FOR ORGANOLEPTIC & AND  
OTHER PHYSICO-CHEMICAL PARAMETERS BY ACCREDITED AND NON-ACCREDITED LABORATORY AS PER IS:10500

	WQ-1		WQ-2		WQ-3		WQ-4		WQ-5		WQ-6		WQ-7	
	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL
Colour, Hazen Unit	< 5	< 3	< 5	< 2	< 5	< 2	< 5	< 3	< 5	< 4	< 5	< 3	150	< 4
Odour	AGA	AGA	AGA	AGA	AGA	AGA	AGA	AGA	AGA	AGA	AGA	AGA	**	AGA
Turbidity, NTU	< 1	< 2	< 1	< 2	< 1	< 1	< 1	< 1	8	5	3	1	100	10
pH	7.7	6.3	7.6	6.6	7.3	6.9	7.0	6.8	7.5	6.3	7.5	6.4	7.4	6.4
TDS (mg/L)	410	450	402	554	590	680	768	910	335	447	441	554	662	776
Aluminium	< 0.02	< 0.05	< 0.02	< 0.04	< 0.02	< 0.05	< 0.02	< 0.05	< 0.02	< 0.05	< 0.02	< 0.06	< 0.02	< 0.07
NH <sub>3</sub> (as total ammonia-N)	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	< 0.1	< 0.2	0.1	0.3	0.1	0.3	16	34
Anionic detergents (as MBAS)	< 0.01	< 0.04	< 0.01	< 0.03	< 0.01	< 0.04	< 0.01	< 0.04	< 0.01	< 0.05	< 0.01	< 0.06	0.05	0.05
Barium	< 0.05	< 0.07	< 0.05	< 0.06	< 0.05	< 0.09	0.3	0.5	0.09	1.4	0.06	1.1	1.7	2.4
Boron	< 0.1	< 0.4	< 0.1	< 0.3	< 0.1	< 0.3	< 0.1	< 0.3	< 0.1	< 0.4	< 0.1	< 0.4	0.2	0.6
Calcium	36	49	47	93	30	102	54	133	43	59	28	57	54	59
Chloramines (as Cl <sub>2</sub> )	< 1	< 2	< 1	< 2	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 2	0.7	< 2
Chlorides	9	22	11	28	28	48	88	112	8	11	6	12	99	112
Copper	< 0.01	< 0.04	< 0.01	< 0.05	< 0.01	< 0.05	< 0.01	< 0.05	< 0.01	< 0.05	< 0.01	< 0.06	0.09	< 0.06
Fluoride	0.5	0.7	0.5	0.7	0.2	0.6	0.3	0.5	0.8	1.5	0.6	1.3	0.7	1.3
Iron	0.02	0.05	0.04	0.06	0.04	0.06	0.02	0.05	0.2	0.7	0.05	0.7	3.5	0.9
Magnesium	39	21	32	17	60	43	102	88	33	56	36	67	2	35
Manganese	0.02	0.08	0.01	0.08	0.01	0.07	0.03	0.07	0.01	0.7	0.02	0.06	0.3	0.09
Mineral oil	< 0.01	< 0.05	< 0.01	0.06	< 0.01	< 0.06	< 0.01	< 0.07	< 0.01	< 0.05	< 0.01	0.04	< 0.01	< 0.06
Nitrate	< 2	< 4	< 2	< 5	< 2	< 5	64	35	16	24	8	20	18	23
Phenolic compounds (as phenol)	< 0.001	BDL	< 0.001	BDL	< 0.001	BDL	< 0.001	BDL	< 0.001	BDL	< 0.001	BDL	< 0.001	BDL
Selenium	< 0.005	BDL	< 0.005	BDL	< 0.005	BDL	< 0.005	BDL	< 0.005	BDL	< 0.005	BDL	< 0.005	BDL
Silver	< 0.01	< 0.04	< 0.01	< 0.04	< 0.01	< 0.05	< 0.01	< 0.05	0.01	< 0.06	< 0.01	< 0.06	< 0.01	< 0.05
Sulphate	< 1	2	1	7	52	34	66	32	5	3	1	5	24	47
Sulphide	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.09	< 0.05	< 0.08	< 0.05	< 0.07
Total alkalinity	358	532	344	548	408	740	441	770	262	347	379	440	330	543
TH	252	132	250	112	327	145	561	334	244	443	218	456	144	356
Zinc	0.01	0.04	0.02	0.06	< 0.01	0.05	0.01	0.05	0.01	0.06	0.03	0.06	0.1	0.05

\*\* Objectionable; ACL = Accredited lab; NACL = Non-accredited lab.

than  $\pm 1$  and this value is considerable. The results are not comparable at all. For water-soluble sulphate, as  $\text{SO}_4^{2-}$  the difference is lying between 0.5% to 0.8%, which indicates the requirement of accreditation and assessment system. Similarly, for the water sample, construction water and drinking water the difference between the measurement values of the accredited and non-accredited laboratory is very high (Tables 3-5).

Similarly in case of the air samples, the difference in the results of accredited laboratory and non-accredited laboratory is also considerable (Table-6). The results of  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$  are not comparable and the difference between the results is considerable. It can be seen at many place the results where

the results of accredited laboratory is BDL at same place the non-accredited laboratory is giving finite value (Tables 7 and 8) and it shows the capability of the non-accredited laboratory is under question mark [14].

## Conclusion

The differences in the physico-chemical results of various samples of air, water and soil tested at the accredited and non-accredited laboratories are could be due to the equipment and concentrate used by the non-accredited laboratory. On the basis of comparative analysis of various samples by the accredited and non-accredited laboratory, one may say that accreditation

TABLE-7  
COMPARATIVE ANALYSIS DATA OF AIR SAMPLES FOR POLLUTANT GROUND LEVEL CONCENTRATION  
BY ACCREDITED AND NON-ACCREDITED LABORATORIES OF LOCATION AAQ-1

S. No.	Sample identification	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )		SO <sub>2</sub> (µg/m <sup>3</sup> )		NO <sub>2</sub> (µg/m <sup>3</sup> )		CO (µg/m <sup>3</sup> )		O <sub>3</sub> (µg/m <sup>3</sup> )	
		ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL
1	AAQ-1/A/01 & AAQ-1/NA/01	66	134	33	76	3	9	21	45	1.2	1.3	63.4	98.5
2	AAQ-1/A/02 & AAQ-1/NA/02	104	223	39	56	8	7	24	43	1.4	1.2	70.7	98.0
3	AAQ-1/A/03 & AAQ-1/NA/03	61	98	42	79	4	9	25	45	1.3	1.3	78.6	94.6
4	AAQ-1/A/04 & AAQ-1/NA/04	76	112	60	87	4	9	20	44	1.2	1.2	81.6	98.2
5	AAQ-1/A/05 & AAQ-1/NA/05	133	212	72	98	BDL	3	27	39	1.0	1.4	65.9	97.3
6	AAQ-1/A/06 & AAQ-1/NA/06	234	345	54	69	BDL	2	26	45	1.1	1.3	77.3	98.2
7	AAQ-1/A/07 & AAQ-1/NA/07	211	332	76	98	BDL	2	19	36	1.1	1.3	79.5	98.5
8	AAQ-1/A/08 & AAQ-1/NA/08	193	354	60	91	BDL	2	24	45	1.3	1.3	71.2	98.3
9	AAQ-1/A/09 & AAQ-1/NA/09	52	112	77	112	3	2	31	44	1.3	1.2	70.6	112.1
10	AAQ-1/A/10 & AAQ-1/NA/10	248	453	76	98	BDL	2	26	46	1.4	1.2	83.0	96.4
11	AAQ-1/A/11 & AAQ-1/NA/11	119	234	41	78	BDL	4	33	39	1.4	1.3	75.7	97.5
12	AAQ-1/A/12 & AAQ-1/NA/12	63	231	49	95	3	6	26	45	1.1	1.2	71.1	98.0
13	AAQ-1/A/13 & AAQ-1/NA/13	54	113	38	89	BDL	2	26	44	1.4	1.3	71.8	94.6
14	AAQ-1/A/14 & AAQ-1/NA/14	70	132	33	78	3	3	21	45	1.5	1.3	62.1	99.2
15	AAQ-1/A/15 & AAQ-1/NA/15	56	165	39	87	BDL	2	22	49	1.3	1.2	72.5	93.7

TABLE-8  
COMPARATIVE ANALYSIS DATA OF AIR SAMPLES FOR POLLUTANT GROUND LEVEL CONCENTRATION  
BY ACCREDITED AND NON-ACCREDITED LABORATORIES OF LOCATION AAQ-2

S. No.	Sample identification	PM <sub>10</sub> (µg/m <sup>3</sup> )		PM <sub>2.5</sub> (µg/m <sup>3</sup> )		SO <sub>2</sub> (µg/m <sup>3</sup> )		NO <sub>2</sub> (µg/m <sup>3</sup> )		CO (µg/m <sup>3</sup> )		O <sub>3</sub> (µg/m <sup>3</sup> )	
		ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL	ACL	NACL
1	AAQ-2/A/01 & AAQ-2/NA/01	90	132	59	110	3	5	22	34	1.5	1.4	54	79
2	AAQ-2/A/02 & AAQ-2/NA/02	93	140	52	123	3	7	13	32	1.2	1.3	59	78
3	AAQ-2/A/03 & AAQ-2/NA/03	69	123	66	112	3	6	11	34	1.3	1.2	56	81
4	AAQ-2/A/04 & AAQ-2/NA/04	74	125	41	119	4	8	13	36	1.4	1.3	53	75
5	AAQ-2/A/05 & AAQ-2/NA/05	126	156	80	143	BDL	3	12	31	1.0	1.3	47	89
6	AAQ-2/A/06 & AAQ-2/NA/06	165	234	82	134	BDL	5	20	36	1.1	1.2	44	84
7	AAQ-2/A/07 & AAQ-2/NA/07	132	212	80	156	3	7	19	42	1.1	1.2	182	87
8	AAQ-2/A/08 & AAQ-2/NA/08	103	168	55	123	3	6	18	34	1.0	1.3	51	91
9	AAQ-2/A/09 & AAQ-2/NA/09	92	134	43	111	BDL	4	23	29	1.1	1.3	50	98
10	AAQ-2/A/10 & AAQ-2/NA/10	90	146	51	98	BDL	5	18	34	1.1	1.2	54	92
11	AAQ-2/A/11 & AAQ-2/NA/11	74	135	42	132	3	7	22	32	1.0	1.3	61	90
12	AAQ-2/A/12 & AAQ-2/NA/12	79	112	32	89	BDL	3	20	33	1.1	1.3	49	112
13	AAQ-2/A/13 & AAQ-2/NA/13	58	109	38	80	4	5	23	39	1.1	1.2	52	132
14	AAQ-2/A/14 & AAQ-2/NA/14	61	106	30	78	BDL	6	18	33	1.2	1.4	51	111
15	AAQ-2/A/15 & AAQ-2/NA/15	69	108	39	98	BDL	7	19	30	1.0	1.2	54	95

can be the tool of quality improvement in the case of environmental testing but this statement can not be absolute because there are still many laboratories in the government and reputed private organizations, which can produce comparable results without accreditation, still accreditation is essential to maintain and assure the quality of the testing results [14].

### CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this article.

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