



K E R A L A W A T E R A U T H O R I T Y

**Detailed Project Report for modifying Chemistry Labs of
Educational institutions for quality analysis of Drinking water**

QUALITY CONTROL DIVISION

KOZHIKODE

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PROJECT AT A GLANCE

Name of work	: Modifying chemistry Labs of Higher Secondary Schools/Educational institutes for Water Quality Analysis
<i>Scope of work</i>	: Setting up / modification of Labs at Higher Secondary Schools / Educational institutes for Water Quality analysis. Procurement of Equipments, Glassware and chemicals.
<i>Project cost</i>	: Rs. 2,05,260.00
Annual maintenance cost	: Rs. 20,000.00
Funding Agencies	: Government of Kerala/ LSGD/ MP fund/ MLA fund

Modifying Chemistry Labs of Schools for Water Quality analysis

ABSTRACT OF ESTIMATE

Up gradation of existing Laboratory for Physical, Chemical and Bacteriological analysis of water.

a. Procurement of Equipments	Rs.1,15,000.00
b. Procurement of Glassware	Rs.31,750.00
c. Purchase of Chemicals & FTK's	Rs. 23510.00
d. Miscellaneous and consumables	Rs. 5000.00
f. Computer with printer	Rs. 30000.00
Total Project cost	Rs. 2,05,260.00
Annual Maintenance cost	Rs. 20,000.00
Grand Total	Rs. 2,25,260.00

1. Introduction

1.1 General

Water is one of the most precious commodities in this world. Two third of the earth surface is covered by water but only a small amount of water can have used for human needs. Surface sources have contributed about one third of the drinking water requirements of the world. Unfortunately, these small amounts of potable water also have deterioration day by day due to human activities. This problem is intensified have been last few decades. The situations have so alarming in Kerala too.

Kerala is known as God's own country because of its abundant natural resources, that is water. The state has received a tremendous amount of rain water every year. That is about reasonably good value of 3000-3300 mm of rain. There is 44 rivers, and 34 backwaters mostly in the form of lakes and ocean inlets and others are fresh water lakes. Besides these this state is blessed with a numerous streams, about 18600 of ponds and over 65 lakhs dug wells. Kerala is one of the areas which is having most well density in the world.

1.2 Importance of testing quality of drinking water

Water quality monitoring and assessment is the foundation of water quality management; thus, there has been an increasing demand for monitoring water sources by regular measurements of various water quality variables. The quality of water identified in terms of its physical, chemical, and biological parameters has become of public interest in the world because not only developed countries but also developing nations suffer the impact of pollution due to disordered economic growth associated with exploration of virgin natural resources. Kerala is one of the most thickly populated state in India. As a result of the huge population, the water sources in Kerala have been increasingly polluted by various means. Because of the proximity to the waste sources, the majority of the water bodies including domestic open wells may get contaminated. So regular monitoring of water bodies not only prevents outbreak of diseases and the occurrence of hazardous materials but check the water from further deteriorations.

2. Water quality monitoring & surveillance (WQMS)

2.1 Quality Control

Recognizing the importance and urgency of addressing drinking water quality problems in the country, the Govt. of India is addressing the problem in an ambitious way, especially with the ultimate objective of institutionalizing community participation in all rural habitations in water quality monitoring and surveillance. The emphasis of WQMS is on regular testing and documentation of water sample to monitor water quality and take preventive and remedial

measures which would prevent outbreak of water borne diseases. Normally water samples are tested twice in a year for Bacteriological and once for Physical and Chemical contamination.

2.2 Jal Jeevan Mission - objectives for Drinking water quality

In many States/ UTs, drinking water supply agencies, i.e. PHE/ RWS department look after both supply of water and its surveillance. However, a separate cadre of employees (chemists) monitor the water quality and report to the engineers-in-charge of water supply. To build trust, the situation demands de-coupling of these two functions as well as funconaries and making water quality monitoring and surveillance an independent funcon with required autonomy, i.e., funds, funcons and funconaries at every level, i.e., State/ UT/ district/ sub-division/ block. This is required for upholding the accountability of the Department/ Agency/ Nigam/ Board to supply safe water. The exisng water quality tesng laboratories are to be equipped with the State-of-the-art automated tesng instruments that can test multiple parameters in such a way that involvement of manual operations during quality testing are minimal and the turn-around me for testing the samples is significantly brought down. This would also help to test more samples. This framework prepared after several discussions with States/ UTs and other stakeholders, aims to facilitate in water quality testing, monitoring and surveillance activities effectively. With flexibility given to States/ UTs, this document aims to provide handholding technical support to PHE/ RWS Departments as follows:

- i.) overall strategy to strengthen water quality monitoring and surveillance with a road map and collective vision of improving public health;
- ii.) setting-up, upgradation and strengthening of drinking water quality testing laboratories at State/ UT, District and Sub-division/ block level including mobile water quality testing laboratories;
- iii.) providing guidance to personnel at different managerial levels in water quality testing, monitoring, data interpretation and reporting;
- iv.) involving Panchayati Raj Institutions (PRIs)/ community and empowering community on water quality monitoring and surveillance issues;
- v.) generating awareness amongst community on importance of water quality testing and not to consume water for cooking and drinking purposes from the contaminated sources;
- vi.) empowering communities to conduct sanitary surveys and indicative testing of drinking water at the grassroots;

As per the JJM guidelines, the surveillance of water quality at grass roots will be responsibility of the GPs/ rural community. For this purpose, Grama panchayaths or rural communities can modify Chemistry Labs of Higher secondary scools/Educational institutions for quality analysis of Drinking water.

2.3 Objectives of Kerala Water Authority on quality of water.

We are dedicated to provide quality water

Kerala water authority was established on 1st April 1984 under the Kerala Water and Waste Water Ordinance 1984 to provide for the development and regulation of water supply and waste water collection and disposal.

- *Vision*

We will provide quality water and waste water services in an environmental friendly and sustainable manner.

- *Mission*

We will transform ourselves to a consumer friendly organisation providing services at the doorstep.

- *Strategy*

We will achieve this by being open and honest in our business dealings. Financially self-sufficient valuing and developing our employees continuously improving our work practices.

3. Water quality testing Laboratory

3.1. Quality Control Laboratories in KWA

Water quality monitoring and analysis involves testing of water samples collected from schemes and various domestic water sources of the state. Kerala water Authority has established a total of 85 Water quality Labs in all the districts of Kerala. A State Referral institute (SRI) is situated at Marad, Ernakulam is the head quarter for Quality wing in Kerala Water Authority. Under SRI, each and every district have a district lab and under district lab, five to six sub district labs are functioning in every districts. All the labs are accredited by NABL and extend their service to the public.

3.2. Modifying Chemistry Labs of Schools for Water analysis Laboratories

The setting up of water quality testing laboratories include the procurement of equipment, instruments, chemicals/ reagents, glassware, consumables, human resources. Necessary interior works for setting up of test areas as for chemical analysis, heating and instrumentation. Equipment like pH meter, Turbidity meter, Conductivity meter etc are to be purchased for the testing of various physical/ chemical parameters in drinking water. Bacteriological testing/preliminary microbial analysis can also be done by using H₂S strip vials obtained with FTK.

4. Detailed Project proposal

The School labs may be proposed to be upgraded for the analysis of drinking water by installed in existing chemistry labs and their facilities. The minimum area for water analysis is approximately 30 m².

Necessary interior works for setting up physical, chemical and bacteriological labs is the primary requirement and it should be provided by the schools. Procurement of all other required equipment, chemicals, glassware other than available from the school laboratory to analyse water samples are included in the proposal. The proposed up gradation is for equipping the laboratory for analysing of about 500 water samples per month.

4.1 Procurement of Equipment

Most of the school laboratories don't have Measuring Equipment like pH meter, Turbidity meter, Conductivity meter, weighing balance etc which are required for the testing of various physical and chemical analysis.

The estimate amount comes to Rs. 1,15,000.00. List is given in Appendix 2.

4.2 Procurement of Glassware

Glass wares required for water analysis are:

- a. Glassware used for volumetric measurements like flasks, pipettes, burettes etc.
- b. Glassware used for rough volume measurements such as measuring cylinders, weighing bottles, beakers, reagent bottles etc.
- c. Other lab accessories like Nessler tube, evaporating dish, tripod stand, spatula, wash bottle are also to be expected to available at the school laboratory.
- d. If it is not or sufficient, an estimate amount of Rs. 31,750.00 may also be expected.

List is given in Appendix 3.

4.3. Procurement of Chemicals

Analytical Reagent (AR) grade chemicals are to be procured for the analysis.

These include pH buffer solutions, standards for Turbidity, Conductivity, Water analysis kits for Iron, Nitrate, Ammonia and Fluoride, Chemicals and reagents for Chloride, Alkalinity, Hardness etc.

The cost of Kits, reagents and chemicals comes to Rs. 23510.00/-. Details are given in Appendix 4.

4.4. Procurement miscellaneous for laboratory activities.

A computer with a printer is required for the laboratory activity. It may be available at schools and if not, it is comes to Rs.30,000.000.

Some stationeries like tissue paper, rubber bulb, cotton, sticker, calculator, A4 paper, marker pen etc are procured for laboratory activities and the cost may come 5000.00.

4.5. Maintenance of equipment.

An annual maintenance of equipment may be required for the proper and smooth functioning of analysis and a minimum cost of Rs. 20,000.00 is to be allocated for this purpose.

5. Total Estimated cost

The total cost is estimated either as per the schedule of rates or as per the market rate. Total amount for all the procurement comes to Rs. 2,05,260.00/.

A consultancy fee of 10-20% of the total project cost may be applicable as per the decision of Kerala water authority at the time of implementation of the project.

6. Role of Water Authority.

Kerala Water Authority will provide technical knowledge in the field of water quality to the educational institutions who are interested for modifying their chemistry labs for assessing quality of drinking water. Quality Control District Labs in every district of KWA can give training to teachers and selected students for Quality estimation of drinking water. By empowering Higher Secondary School/ Educational Institution labs for Water Quality analysis, rural people can easily approach their nearby schools for water analysis. Remedial measures can also be done immediately.

Kerala water Authority is operating 81 Water Quality Labs all over Kerala with NABL accreditation. Laboratories under KWA is the widest drinking water quality control network in the State. All Labs are managed by experienced Engineers and Technical experts in the field of water analysis like Quality Managers and Technical Managers.

Even though there is a wide spread network of NABL accredited laboratories under KWA, since all the labs are located in District /taluk headquarters, the facility for water quality monitoring is not easily available in rural area. It may be noted that Higher Secondary Schools are working in all the Grama Panjayaths of Kerala. All these Schools have chemistry labs. By implementing slight modification, chemistry labs of the plus 2 schools can be upgraded for water quality analysis. Empowering school labs for Water Quality analysis may help the common peoples to the great extent. With the wide network of existing Laboratories, KWA is the best to lead and supervise the upgradation of plus 2 School chemistry Labs in Kerala. The project proposed along with education department using its infrastructure will help to create awareness and monitoring of water quality even in the grass root level.

Components of consultancy services proposed by KWA are:

1. Designing and modifying of proposed chemistry lab of higher secondary schools for water quality analysis.

2. Selection of appropriate instruments for the analysis of drinking water within the allocated fund.
3. Helping School authorities in the procurement of graded glass ware.
4. Educating students/teachers about the mode of operation and about the preventive maintenance of the instruments.
5. Training and periodic Retraining of selected students and Teachers of the school in lab works for estimation of quality parameters of drinking water. Theory and Practical training will be arranged from the nearest NABL accredited labs of KWA.
6. KWA Labs help Laboratory officials of Higher Secondary Schools to suggest remedial measures and following up of Water Quality issues if any.
7. A nominal consultancy fee in the order of 10-20% of the project cost will be charged by the KWA subject to the approval of Director Board.
8. Apart from this, Consultancy regarding NABL accreditation of School Labs, if required, can also be done by KWA District Labs.

Appendix 1

Equipment Required for Chemical , Physical and Bacteriology lab

Sl no	Equipments	Qty	Unit	Rate (Rs)	Amount (Rs)
1	pH Meter	1	No.	30000	30000
2	Conductivity /TDS/ Temp Meter	1	No.	30000	30000
3	Turbidity meter	1	No.	25000	25000
4	Weighing Balance	1	No.	30000	30000

Appendix 2

Glassware and other consumables required for physical chemical and bacteriology lab

Sl.No:	Item	Make	Capacity	Quantity (Nos)	Rate	amount
1	Volumetric Flaskwith stopper	Borosil	1000ml	2	865	1730
2	Volumetric Flaskwith stopper	Borosil	500ml	2	565	1130
3	Volumetric Flaskwith stopper	Borosil	250ml	2	415	930
4	Volumetric Flaskwith stopper	Borosil	100ml	10	575	5750
5	Pipette 0.1 division	Borosil	10 ml	10	230	2300
6	Burette	Borosil	50ml	5	750	3750
7	Measuring Cylinder with out stopper	Borosil	1000ml	1	2000	2000
8	Measuring Cylinder with out stopper	Borosil	500ml	2	1350	2700
9	Measuring Cylinderwithout stopper	Borosil	250ml	2	1080	2160
10	Measuring Cylinder with out stopper	Borosil	100ml	2	615	1230
11	Weighing bottle	Borosil	25ml	1	350	350
12	Conical Flask without stopper	Borosil	250ml	20	170	3400
13	Beaker	Borosil	1000ml	2	260	520
14	Beaker	Borosil	500ml	2	165	330
15	Beaker	Borosil	250ml	2	105	210
16	Beaker	Borosil	100ml	20	95	1900
17	Funnel	Borosil	75mm	2	165	330
18	Nessler's tube	Borosil	100 ml	4	310	1240
	TOTAL COST	Rs. 31, 750.00				

Appendix: 3

Chemicals & Reagents Required for Chemical , Physical and Bacteriological Analysis

Sl no	Equipments	Qty	Unit	Rate (Rs)	Amount (Rs)
1	Chemicals& Reagents			9850	9850.00
2	Test kit reagents for Iron, Nitrate, Flouride & Ammonia	5 each		7410	7410.00
3	Test Kit For Bacteriology	1000		6.25	6250.00
	TOTAL				23510.00

5.Conclusion:

In this project report, the expenses for constructing new laboratory is not considered. Most of the infrastructure shall be available at the Existing school laboratory. The wages of staff is also not considered. Hence the total project cost for setting up of drinking water analysing laboratory/Facilitating Labs by upgrading plus two school chemistry laboratories under including procurement of equipment, glass wares and chemicals is estimated about 2,10,260/.

Up gradation/ modification of chemistry labs in schools/Educational institutions will raise the confidence level of the students and teachers and it should be a great chance to follow campus without boundaries. For the students and teachers or the lab personnel it provides a continuous learning, good working environment and leadership. It should also enhances the community confidence and satisfaction and it also gives some revenue if needed.