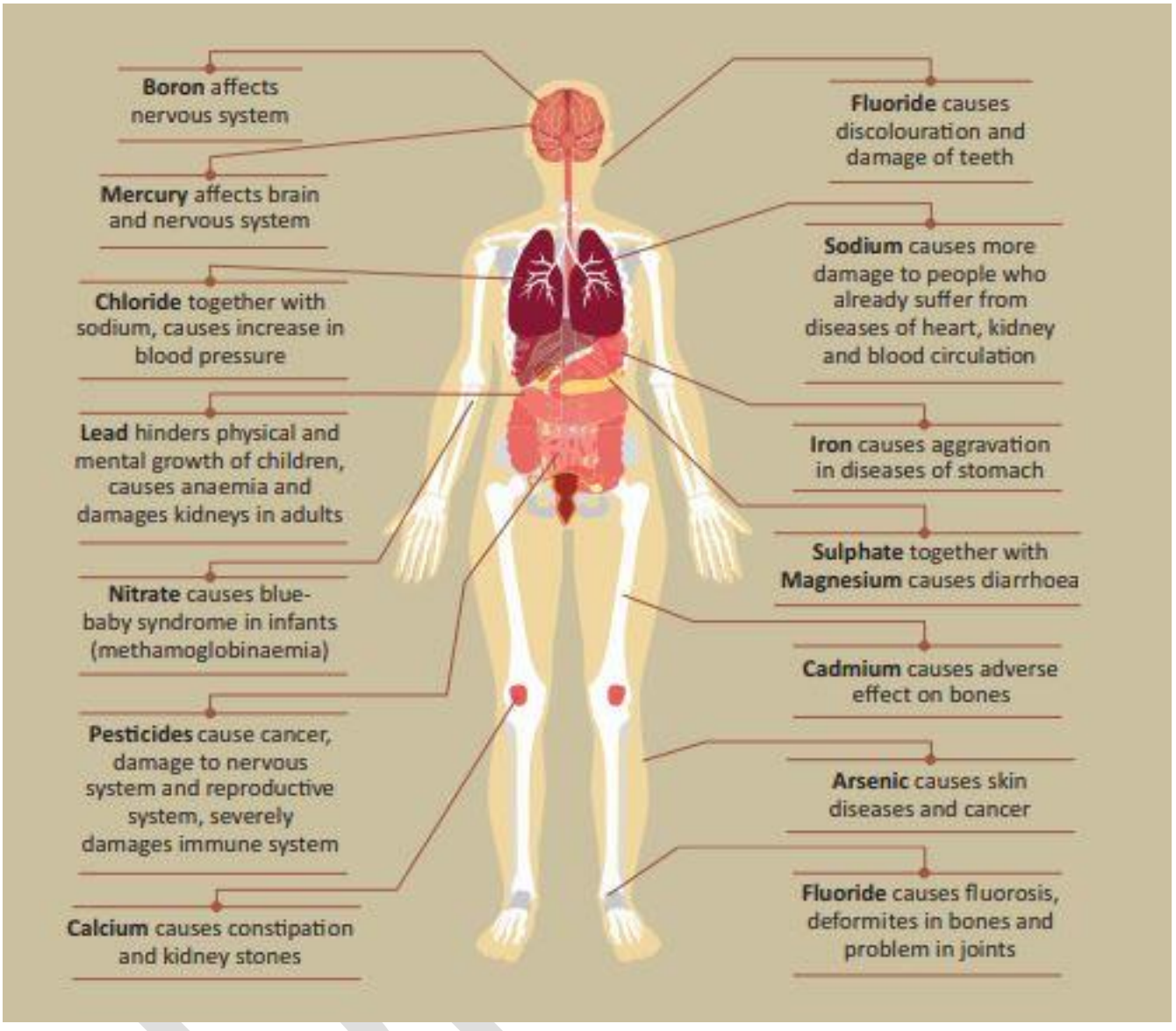
Jal Jeevan Mission

Har Ghar Jal

Drinking water quality testing, monitoring and surveillance framework and guidelines

Government of India
Ministry of Jal Shakti
Department of Drinking Water and Sanitation
National Jal Jeevan Mission
New Delhi 110 003
February, 2021

Health impacts due to intake of contaminated water


Boron affects nervous system
Mercury affects brain and nervous system
Chloride together with sodium, causes increase in blood pressure
Lead hinders physical and mental growth of children, causes anaemia and damages kidneys in adults
Nitrate causes blue-baby syndrome in infants (methamoglobinaemia)
Pesticides cause cancer, damage to nervous system and reproductive system, severely damages immune system
Calcium causes constipation and kidney stones
Fluoride causes discolouration and damage of teeth
Sodium causes more damage to people who already suffer from diseases of heart, kidney and blood circulation
Iron causes aggravation in diseases of stomach
Sulphate together with **Magnesium** causes diarrhoea
Cadmium causes adverse effect on bones
Arsenic causes skin diseases and cancer
Fluoride causes fluorosis, deformites in bones and problem in joints

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Abbreviations

ADD	Acute Diarrheal Disease
AMC	Annual Maintenance Contract
APHA	American Public Health Association
ASTM	American Society for Testing and Materials
BCC	Behavioural Change Communication
BIS	Bureau of Indian Standards
CAMC	Comprehensive Annual Maintenance Contract
CGWB	Central Ground Water Board
CWPP	Community Water Purification Plant
DDWS	Department of Drinking Water and Sanitation
DWSM	District Water and Sanitation Mission
FHTC	Functional Household Tap Connection
FTK	Field Test Kit
GeM	Government e-Marketplace
GP	Gram Panchayat
HR	Human Resource
ICMR	Indian Council of Medical Research
IEC	Information, Education and Communication
IMIS	Integrated Monitoring Information System
IoT	Internet of Things
ISO	International Organization for Standardisation
ISA	Implementation Support Agency
JE/ AES	Japanese Encephalitis/ Acute Encephalitis Syndrome (JE/ AES)
JJM	Jal Jeevan Mission
LPCD	Litres Per Capita per Day
NABL	National Accreditation Board for testing & calibration of Laboratories
NGO	Non-Governmental Organization
NJJM	National Jal Jeevan Mission
NRDWP	National Rural Drinking Water Programme
NTU	Nephelometric Turbidity Units
O&M	Operation & Maintenance
P/ A	Presence/ Absence
PH	Public Health
PHE	Public Health Engineering
PPP	Public Private Partnership
PRI	Panchayati Raj Institutions
RWS	Rural Water Supply
SoP	Standard Operating Procedures
SO	Support Organisation
SLSSC	State Level Scheme Sanctioning Committee
SWSM	State Water and Sanitation Mission
UT	Union Territory
VWSC	Village Water and Sanitation Committee
WQM&S	Water Quality Monitoring & Surveillance
WQMIS	Water Quality Information Management System

1. Introduction

1.1. Availability of safe drinking water in adequate quantity of prescribed quality on a regular basis in every household and institutions is directly linked with the public health and economic well-being of the people. When it is supplied on a long-term basis, it improves the ease of living of people, and can also result in greater personal safety, reduced drudgery to collect water, especially in isolated, forested and hilly areas. For children, safe and assured water supply results in better school attendance, with positive long-term health benefits in their lives.

1.2. Government of India & State Governments have taken several preventive measures to contain the spread of CoViD-19 disease. Frequent washing of hands with soaps is recognised as one of the most efficient and effective measures in controlling the spread of the virus. Thus, from this perspective also, there is an urgent need to ensure adequate quantity of potable water is available to all households and public institutions, viz. schools, anganwadi centres, ashramshalas (tribal residential hostels), etc.

1.3 The Jal Jeevan Mission (JJM) announced on 15th August 2019 and currently under implementation in partnership with States, targets to provide safe and regular water supply through a Functional Household Tap Connection (FHTC) to every rural household by 2024. Under the Mission, the functionality of the tap is defined in terms of quantity & quality of water and regularity of supply.

1.4 JJM emphasises a particular focus on water quality monitoring and surveillance. Water quality testing is important for constant monitoring to ensure the potability of drinking water supplied; as a validation process; monitoring the operation of water supply systems; investigation of disease outbreaks; and undertaking preventive measures. Surveillance activities for the purpose of water quality management are undertaken to identify and evaluate factors associated with drinking water which could pose a health risk. It is also both about

detecting & preventive risks, so that, remedial action can be taken before public health problems occur and identifying the contaminated water sources to take prompt corrective action. This document, which is suggestive in nature, details a policy framework and guidelines for water quality testing, monitoring and surveillance to assure that supplied water to every rural household is safe, and water can be consumed directly from a tap instead of using point-of-use treatment systems available in the market.

1.5 The document provides a technical advisory in guiding and supporting the States/ UTs to set up water quality labs, conduct water quality testing & monitoring and take up surveillance activities effectively.

2. Public Health & Water Quality Standards, Testing and Surveillance

2.1 Public health, water contamination and prevalence

2.1.1 Public health refers[1] to all organised measures (whether public or private) to prevent disease, promote health, and prolong life among the population. A Public Health official is responsible for providing conditions in which people can live a healthy life. Consumption of contaminated water is one of the largest public health issues as it exposes individuals to health risks[2]. Hence, drinking water, contaminated with either geo-genic or anthropogenic or both has a bigger influence in determining the health of individuals and communities.

2.1.2 Groundwater meets 85%[3] of the rural drinking water requirement. As per an assessment by the Central Ground Water Board in 2018[4], 52% of all the blocks in the country have *inter alia* any one of the geogenic contaminants, viz. Arsenic, Chloride, Fluoride, Iron, Nitrate and Salinity. States like Telangana and Gujarat have provided safe drinking water to the majority of the population by changing the rural water source from groundwater to treated surface water. The Surface water use is on the rise and presently, meets 15% of the Indian rural drinking water requirement. However, surface water supply infrastructure is vulnerable to

[1] WHO definition
[2]Pictorial representation is at the back of the cover page.
[3]National Compilation of Dynamic Groundwater Resources of India, 2017 by Central Ground Water Board, DOWR,RD&GR.
[4]Groundwater quality in shallow aquifers in India, 2018.

bacteriological and chemical contamination due to leakage in the distribution system, including intermittent storage.

2.1.3 Further, due to the intermittent water supply adopted in the country, there is a loss of pressure leading to a fall in hydraulic integrity[5]. Because of this, contaminants can enter the water supply distribution network. At the time of water supply, the positive pressure in the network is preventing contaminants from getting into the network. But, if the scheme is not operational 24x7, and illegal pumps are used to drawwater from the network, then, the water in the pipe gets contaminated through leaky joints from surrounding seepage.

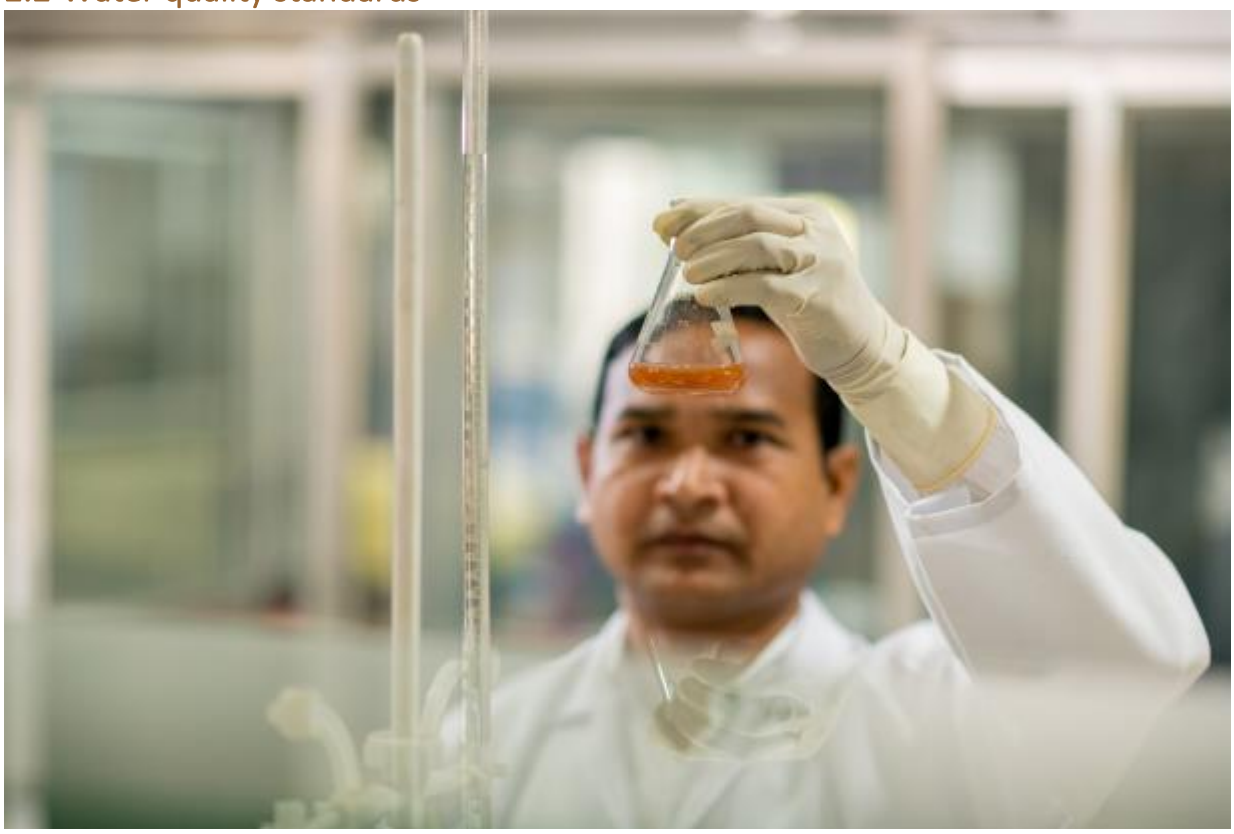
2.1.4 Under JJM, all States/ UTs have been advised to prioritise the provision of safe drinking water to quality-affected areas. As reported by the States/ UTs in the Department of Drinking Water and Sanitation's Integrated Management Information System (IMIS), currently, **groundwater sources** in 49,232[6] habitations in India are having water quality issues. Nearly 20 States in India *inter alia* have drinking water source contaminated with Arsenic, Fluoride, Nitrate, Iron, Salinity or Heavy metals etc. Apart from these contaminants, there are 61 priority districts identified by the Ministry of Health & Family Welfare as affected by Japanese Encephalitis - Acute Encephalitis Syndrome (JE-AES) across five States.

2.1.5 Chemical and biological contaminations have variable health impacts. A higher concentration of heavy metals can lead to poisoning. An excessive amount of Fluoride in drinking water exposes people to risks of crippling skeletal and/ordental Fluorosis. Long-term water intake contaminated with the Arsenic leads to Arsenic poisoning or Arsenicosis, with cancer of skin, bladder, kidney, lung or diseases of the skin (colour changes and hard patches on palms and soles), or blood vessels of legs and feet. Biological (pathogens, bacteria, etc.) contamination leads to various water-borne diseases like cholera, typhoid, dysentery, diarrhoea etc.

2.1.6 In 2018, as per the National Bureau of Health Intelligence, 2,439 people died because of four major water-borne diseases —Cholera, Acute Diarrhoeal Diseases (ADD), Typhoid and viral Hepatitis. In all, more than 1.3 Crore people were diagnosed with these diseases.

[5]The hydraulic integrity of a water distribution system represents the capacity to provide reliable quantities of water at acceptable pressures.
[6]As on 18th January, 2021

2.2 Water quality standards



2.2.1 Water quality refers to chemical, physical, biological and radiological characteristics of water. The Bureau of Indian Standards (BIS) has specified drinking water quality standards (IS 10500:2012) to provide safe drinking water. These standards have two limits[7], i.e. *acceptable limits* and *permissible limits in the absence of an alternate source*. If any parameter exceeds the permissible limit, the water is considered unfit for human consumption. It is pertinent that drinking water source(s) be tested, as prescribed, to ensure that the supplied water meets the prescribed standards. Remedial action is required to be taken if the parameters tested are outside the limits prescribed.

2.2.2 For all new/ existing piped water supply schemes, design requirements of water treatment plants/ community water treatment plants should take care of supplying drinking water with quality parameters within the prescribed limits. For more details, BIS Standard quoted above may be referred to.

2.3 Water quality monitoring and surveillance (WQM&S)

2.3.1 Water quality monitoring is a fundamental tool in the management of safe drinking water supply. Water quality monitoring is defined[8] by the International Organization for Standardization (ISO) as: "the programmed process of sampling, measurement and subsequent

[7]Except pesticide residue and bacteriological quality.

[8] Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes, accessed online on 13 February 2021.

recording or signalling, or both, of various water characteristics, often with the aim of accessing conformity to specified objectives". Surveillance is continuous, specific measurement and observation for the purpose of water quality management and operational activities.

2.3.2 In order to pre-empt the issues arising out of poor water quality, if a database of water testing is created, maintained and regularly analysed, it can provide vital clues in investigating disease outbreaks, verifying the safety of drinking water and assist in taking preventive measures. Specific focus has to be given to testing procedures, using advanced instruments to strengthen water testing, accountability, and obtain NABL accreditation for lab testing. The State's PHE/ RWS Department has to test the water quality of sources at least twice a year, i.e. before and after the monsoon for bacteriological parameters and at least once for chemical parameters.

2.3.3 Surveillance involves the active participation of Gram Panchayat and/ or its sub-committee (VWSC/ Paani Samiti/ User Group) and the local community to regularly test water quality using Field Test Kits (FTKs) meant for the purpose. Five persons, preferably women, have to be identified and trained in every village to undertake surveillance activities. In this way, the GPs and/ or its sub-committees are expected to perform with the responsibility of a 'public utility' at the village level. Even though FTK gives an indicative result, it can still ascertain whether a water supplier is fulfilling mandated obligations.

2.3.4 As a part of surveillance activity, a sanitary inspection[9]needs to be undertaken. It is an on-site inspection of a water supply facility to identify actual and potential sources of chemical and biological contamination. The physical structure and operation of the system and external environmental factors (such as toilet location) are evaluated. This information can be used to decide appropriate remedial action to improve or protect the drinking water source and supply system. Sanitary inspections should be carried out for all new and existing sources of water.

2.3.5 The National Rural Water Quality Monitoring & Surveillance Programme launched in February 2005 focused on water quality monitoring and surveillance. Water quality testing laboratories at the State, district and sub-district levels were established[10]under the programme.

2.3.6 In the context of JJM, the activities of water quality monitoring and surveillance include setting up/ strengthening of State, district/ sub-divisional level laboratories including under PPP mode, upgrading of existing water quality testing laboratories standards which *inter alia* include procurement of equipment; instruments; chemicals/ reagents; glassware; consumables; hiring of outsourced human resources (excluding regular staff); hiring of vehicles for transportation of water samples collected from the field to the laboratory and expenses incurred for NABL accreditation process (consultant fee, audit cost, application fee and annual fees). Further, additional activities viz., presumptive testing of water quality at Gram Panchayats/ Anganwadis/ Schools using Field Test Kits (FTKs) and to refer the positively tested samples to the nearby water testing laboratory for confirmation; and systematic programme

[9]Please refer Jal Jeevan Mission Guidelines Chapter 10, page 60 for description.

[10]Till date, 2,033 nos. drinking water quality testing laboratories at various level have been set up by the States/ UTs as on 10.2.2021.

of surveys including sanitary inspection, building capacity of various stakeholders; IEC on importance of consuming safe drinking water; and awareness generation amongst communities are also included.

2.3.7 Up to 2% of the overall fund allocated to the States/ UTs (both Central and State share under the mission) is provided to *inter alia* carry out the activities[11] mentioned below:

i.) presumptive testing of water quality in Gram Panchayats/ Anganwadi centres/ Schools, etc. using Field Test Kits (FTKs);
ii.) engage communities in regular sanitary inspection:
iii.) building capacity of various stakeholders with regards to the importance of consuming safe drinking water;
iv.) awareness generation amongst communities;
v.) strengthening of water quality testing laboratories by setting-up or up-gradation of State/ district/ sub-division/ block/ mobile laboratories and monitoring by undertaking laboratory testing of samples collected;
vi.) accreditation/ recognition of water quality testing laboratories as per IS/ISO/IEC:17025 for parameters as per Annexure VIII;
vii.) cross-verification of water quality data and integration with other laboratories of State/ Central government agencies, etc.
viii.) setting up a system to procure/ refill FTKs/ bacteriological vials and monitoring their utilisation;
ix.) expenses incurred for NABL accreditation process (consultant fee, audit cost, application fee and annual fee;

[11] Para 10.2, page 62 of the Jal Jeevan Mission guidelines may also be referred.

3. Strategy for planning and implementation of Water Quality Monitoring and Surveillance (WQM&S)

3.1 Vision and Mission Statements

3.1.1 **Vision Statement** - Every rural household provided with a functional household tap connection that supplies safe drinking water, adhere to the prescribed quality; and ensuring that all drinking water sources in all villages are continuously surveilled, monitored &tested for assuring the safety of water thereby leading to an improvement in health standards of rural communities.

3.1.2. **Mission Statement** - Jal Jeevan Mission *inter alia* would assist, empower and facilitate States/ UTs:

i.) to ensure that water quality tests are carried out for all drinking water sources in all villages as per the monitoring requirements;

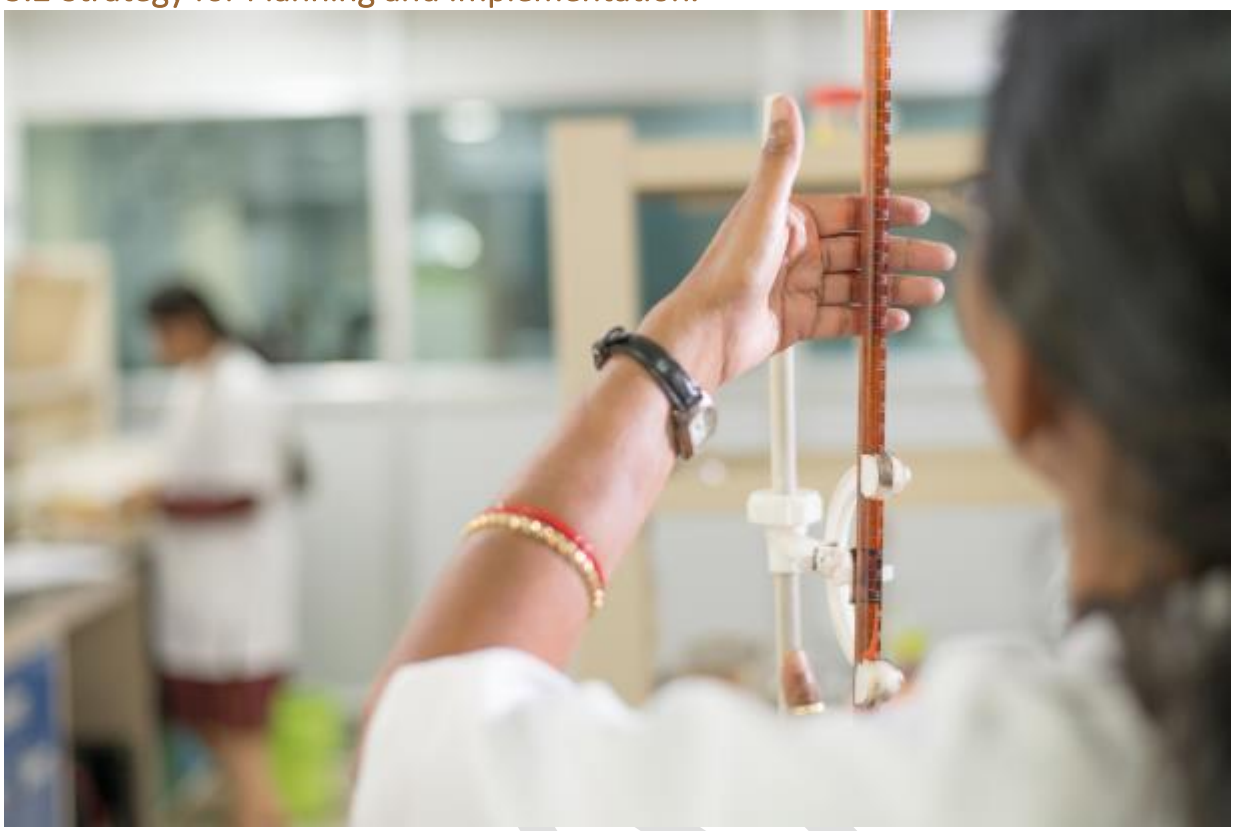
ii.) that the test results are captured and analysed for finding out deviations from prescribed values and take remedial measures, wherever necessary;

iii.) by providing financial assistance for water quality testing, surveillance and up-gradation of laboratories *inter alia* their NABL accreditation;

iv.) to capacitate all stakeholders for performing their assigned WQMS duties efficiently; and

v.) to enable Gram Panchayats/ VWSCs to undertake water quality testing using FTKs and sanitary inspection in their villages, especially involving women.

3.2 Strategy for Planning and Implementation.



3.2.1 Water quality laboratories are the backbone of water quality monitoring and surveillance activities. Provision of safe drinking water necessitates a strong well spread and well-equipped laboratory network within the State for quality assessment. At present, the network of such water quality testing laboratories has a hierarchy, based on laboratories at State, district, sub-divisional and block level. A certain number of Mobile laboratories are also in operation, in hilly and far-flung areas as per the necessity of States/UTs. To date[12], 2,033 nos. drinking water quality testing laboratories at various levels have been reported as set up by the States/ UTs. To ensure that no village is left out of the water quality sampling, the States/ UTs need to identify/ map the service area of each laboratory up to village[13] level for service delivery. **Services of these laboratories have to be made available for the public to test their samples in addition to the departmental samples to be tested**.

3.2.2 **Re-verification and firming up of baseline data of water quality contamination of all drinking water sources, laboratory assessment, the status of FTKs in villages**: Under the Jal Jeevan Mission, during the finalisation of Annual Action Plan (AAP) 2020-21 exercise, a gap in water quality data was realised, especially in the number of drinking water sources, laboratory functionality and status of FTKs. A campaign mode exercise is to be carried out to test all drinking water sources and update the data in JJM-IMIS. Similarly, a laboratory gap assessment is to be carried out to identify infrastructure, human resource (HR), inventory management,

[12]As on 10.2.2021

[13]Census coded village as adopted under the Jal Jeevan Mission.

data sharing etc. across all laboratories and prepare a laboratory improvement plan inorder to strengthen the network at speed and scale. Further, many GPs have been distributed with FTKs and Hydrogen Sulphide (H_2S) vials for ascertaining presence/ absence (P/ A) of bacteria in water. The multi-parameter FTK is used for examination of physico-chemical contamination as an initial screening. The H_2S vials are used to indicate the presence or absence of coliforms in water samples, following a prescribed testing procedure. Separate Arsenic FTK is also provided in areas with arsenic contamination. Situation analysis is to be undertaken to assess the status of availability and usage of these kits in all villages, which will help in better planning and implementation. Sector partners and ISAs need to be engaged in this activity.

3.2.3 At the State level, the State laboratory should be able to provide testing services to test at least 5% of the total drinking water samples across all district level laboratories with a random and uniform geographical spread including positively tested samples referred by district/ sub-division/block/ mobile labs. If the number of districts in any State/ UT is large (>50), then the testing of samples/ sources may be restricted to 3% for the State lab. Remaining 2% may be integrated withother regional/ district laboratories.

3.2.4 At the district level, there should be a district laboratory that can test about 250 water sources/ samples per month (i.e. 3,000 in a year as per the target of roster available as per IMIS), with even geographical spread over the district including the samples showing deviations from the prescribed values referred by the sub-division/ block laboratory/ mobile laboratory on at-least water quality parameters as specified in **Annex I**. The district laboratory will also act as a referral to the State laboratory. In the case of large districts, academic institutions/ private labs can be involved in PPP mode for testing water samples.

3.2.5 **States/ UTs may tie-up with Diagnostic labs, which are in the private sector for undertaking water quality tests. Further, water quality testing facilities may be set up in chemistry laboratories of schools/ colleges, and all such laboratories may be brought under the water quality testing network**.

3.2.6 It is recommended that there may be at least one block-level laboratory in each block testing water quality parameters of all sources as per the **Annex I**. In case of large blocks, depending on the sample loads, more laboratories can be added to the network by tying up with existing institutions in the block as mentioned in para 3.2.5. In this case, proper one-to-one mapping of the laboratories has to be done with villages, so that common public and others are aware of the laboratory to be approached for availing the services. Detailed sampling and the logistic plan need to be prepared for the area to be covered. Further, the sub-divisional lab may cover multiple small blocks instead of setting up separate labs in each such block.

3.2.7 At Gram Panchayat/ Village level, the GP and/ or its sub-committee, i.e. VWSC/ PaaniSamiti / User Group, etc. will ensure testing of all drinking water sources including private sources under its jurisdiction using FTKs and conduct a sanitary inspection, for which they would be provided adequate training by the PHE/ RWS Department. **These two activities have to be carried out every month.**The FTK test results and sanitary inspection report shall be uploaded in WQMIS by registered users.

3.2.8 Parameters to be tested for assuring the potability of water depends on the type of contamination at the source, which may be either geogenic or anthropogenic or both. The State/ UT Government can adopt suggested minimum testing facilities for laboratories at each level, as mentioned in **Annex I**.

3.2.9 If the laboratory already has sophisticated equipment for testing a certain number of water quality parameters, it is to be fully utilised to test as many parameters as possible (as in Annex I for the specific lab level) using that equipment. For example: **If a laboratory has an ICP-MS (Inductively Coupled Plasma Mass Spectrometry)/ Spectrophotometer, it is to test all the parameters possible using it and not restrict to only a few parameters**. However, in the case of the latter (Spectrophotometer), reagents have to be procured for multiple parameters testing.

3.2.13 There may be water sources where the **concentration of chemical contaminants is found to be at borderline, i.e. a little lower than the prescribed limit as per BIS:10500**. To ensure that the water supply through FHTC is of prescribed quality, villages using such water sources have to be periodically monitored and may be enlisted as 'hot spots sources[14]'. The list of such 'hot spots sources' is to be updated by the PHE/ RWS Department and prioritise regular water quality testing in these areas. Corrective measures need to be taken immediately, as and when required.

3.2.14 States/ UTs may also encourage & promote rural entrepreneurship and enterprises for water quality testing at the local level. The local enterprises could be responsible for a cluster of villages, or block(s) and make water quality testing easy to access for general public.

[14]This is different from 'hot spots' as per Central Water Commission where hot spots are defined as having values of parameters beyond permissible levels.

4. Institutional mechanism

4.1 The overall responsibility of WQM&S activities is handled by Rural Water Supply/ Public Health Engineering Departments and other institutions at various levels. They play a major role in ensuring the implementation and monitoring of WQM&S activities.

4.1 DDWS-National level

The National Jal Jeevan Mission (NJJM), Department of Drinking Water and Sanitation (DDWS), Ministry of Jal Shakti is responsible for the following activities:

i.) provide policy guidance, financial assistance and technical support to States/ UTs;
ii.) issue necessary guidelines/ advisories from time to time;
iii.) facilitate the planning of WQM&S activities and handholding of State officials including chemists for NABL Accreditation of laboratories;
iv.) create a separate Water Quality Management Information System (WQMIS) for monitoring and implementation of activities in States/ UTs;
v.) ensure regular updation of WQM&S activities data on IMIS/ WQMIS and to take corrective actions if required;
vi.) organise national consultations, workshops, seminars, etc. and facilitate capacity building of State officials including chemists and other human resources through cross-learning and sharing of best practices, success stories, etc.;
vii.) promote innovation, research, use of advanced mobile apps to verify proper collection of samples and geo-tagging of the same including technological development activities;

viii.) cross-verification/ third-party verification of laboratories and data entered by States/ UTs on IMIS and WQMIS.

4.2 Separation of water supply delivery and water quality testing services

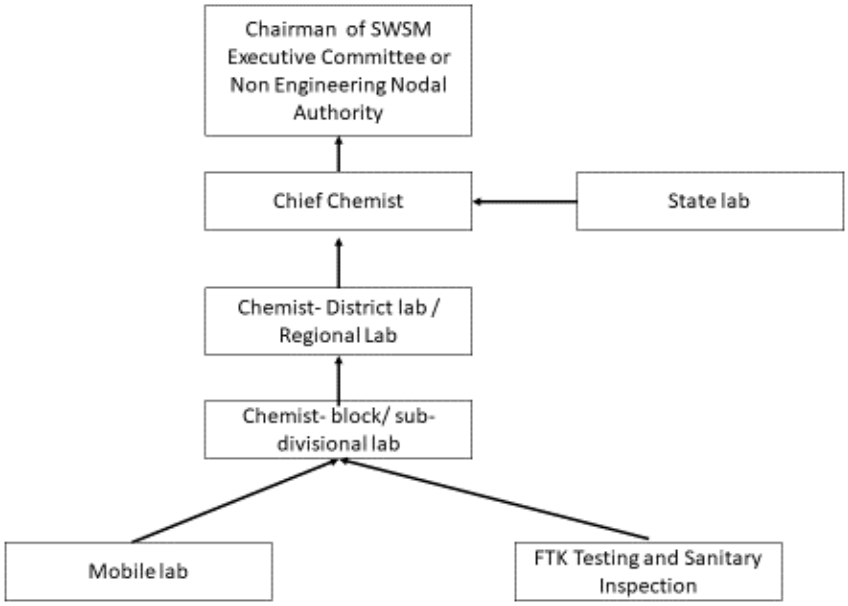
4.2.1 A lot of trust deficit exists among the general public who avail the water supply services about the quality of water supplied, and many a time they adopt a point of the use treatment device. To develop trust and transparency on the water testing results, the State/ UT should give autonomy to the PHE/ RWS Department operating water quality testing laboratories within the State/ UT and designate the Chief Chemist to oversee the functioning of laboratories at all levels. In the States, the drinking water supply agency is looking after both supply of water and its quality. In many States, a separate cadre of employees (chemists) exists in this agency to monitor the water quality. These employees report to the engineers who are responsible for water supply.

4.2.2 The situation demands de-coupling of these two functions and make water quality monitoring an independent function with required autonomy, i.e. funds, functions and functionaries at every level, i.e. State/ district/ Sub-division/ block. To achieve this, the Chief Chemist (Water Quality) of the State/ UT is to be designated as a nodal officer. She/ he would directly report to the Chairman of the Executive Committee of the SWSM, i.e. Secretary or Pr. Secretary of the Department responsible for the rural water supply on all matters relating to water quality. **She/ he shall monitor/ guide the effective implementation of WQM&S activities in the State**. **Chief Chemist needs to be financially empowered to meet the financial requirements to maintain all types of labs in the State, and he/ she may be vested with financial powers at par with the Head of the Department of Public Health Engineering/ Rural**

Water Supply Department. he/He needs to be provided with a vehicle (Government or hired vehicle) as per State Government norms.

4.2.3 The Chief Chemist must have the necessary authority and communicate with the concerned line departments. He should assure that all the laboratories in the State/ UT are providing adequate service levels and meeting all standards for laboratory quality and safety. **This major transition needs to be completed by States in one-year time.**

Figure 1 Suggestive institutional framework



4.3 SWSM -State level labs

The State Water and Sanitation Mission (SWSM) is responsible for overall water quality monitoring and surveillance activities at the state level. **The Chief Chemist/ Head of the State Water Quality Lab would report to the Chairman of the Executive Committee of the SWSM. The State Mission would ensure** the proper functioning of laboratories set up at various levels. The mission, through State labs would carry out the following functions:

i.) plan and guide for the strengthening of water quality testing laboratories by setting-up/ up-gradation of State/ district/ sub-division/ block/ mobile laboratories and monitoring by undertaking laboratory assessment and improvement plans;
ii.) plan, guide and monitor NABL accreditation of all laboratories set up in the State;
iii.) Get the capacity building plan/ Information Education and Communication (IEC) material/ Behavioural Change Communication (BCC) strategy prepared for training all stakeholders involved in WQM&S activities through workshops, seminars, etc. and generate awareness on various aspects of water quality; it's importance, waterborne diseases, health effects, safe handling, storage, etc.;

iv.) explore Public-Private- Partnership following all codal formalities prescribed in Government procedures.
    - wherein the PHE/ RWS Department will collaborate with other suitably accredited private firms as Support Organisation (SO) and utilise their strengths;
    - Wherein the PHE/ RWS Department will collaborate with the private diagnostic/ water quality testing laboratories or NGO or academic institutes;
    - Designate any NABL/ ISO/ other suitably accredited Public or Private water quality testing laboratories/ firms on a turnkey basis;

v.) analyse the data entered by various level laboratories in the State and take corrective action, if required;

vi.) monitor and ensure updating of WQM&S activities data on IMIS and WQMIS regularly;

vii.) explore convergence/ data sharing for cross verification with other State/ Government agencies/ laboratories;

viii.) identify the hotspots and guide district authorities to take appropriate action;

ix.) setting up a system to procure/ refill FTKs/ bacteriological vials on time;

x.) prepare policy for identifying and paying an honorarium to persons at GP level for ensuring water quality tests through FTKs/ bacteriological vials in the prescribed time and submit data to higher authorities. The honorarium may be fixed on per sample basis or other guiding principle;

xi.) recognise well-performing Districts, Gram Panchayats and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Group, etc., ISAs from time-time and develop a policy to reward them;

xii.) sharing of reports, success stories, best practices and disseminate through State social media accounts;

xiii.) opening the laboratories to the general public for getting water samples collected by them tested at a nominal rate as suggested in **Annex- VII**;

xiv.) generate and update State-level maps on different types and intensity of contamination and place them in the state laboratory and PHE/ RWS department offices;

xv.) finalisation of remuneration structure for contractual/ outsourced staff working at various levels in drinking water quality testing laboratories in the State;

xvi.) monitor & ensure water quality grievances are addressed on priority;

xvii.) empanelling the FTK suppliers which can be procured by DWSM and monitoring of the FTK procurement at DWSM level;

xviii.) monitoring the performance of laboratories set up in the State.

4.4 DWSM - District level labs

The District Water and Sanitation Mission (DWSM) is responsible for overall water quality monitoring and surveillance activities at the district level*, inter alia* as given below. The district mission through district labs, would carry out the following functions:

i.) monitoring of the implementation of WQM&S activities in the district and to take corrective action;
ii.) awareness generation and capacity building of all stakeholders on various aspects of water quality, its importance, waterborne diseases, health effects, safe handling, storage, etc.;
iii.) encourage & promote rural entrepreneurship and enterprises for water quality testing at the local level;
iv.) utilise master trainers and agencies for capacity building plan to train all stakeholders involved in WQMS activities;
v.) analyse the data entered by various level labs in the district and take corrective action, if required;
vi.) monitor and ensure updation of WQM&S activities data on IMIS and WQMIS regularly;
vii.) plan and guide for the strengthening of water quality testing laboratories by setting-up/ up-gradation of district/ sub-division/ block/ mobile laboratories and monitoring by undertaking laboratory assessment and improvement plans;
viii.) plan, guide and monitor NABL accreditation of all laboratories set up in the District;
ix.) monitoring of the functionality of laboratories set up in the district and ensure the prescribed number of samples are being tested & the results being shared with district nodal concerned officer/ concerned officer;
x.) cross-verification of water quality data and integration with other laboratories of State/ government agencies;
xi.) explore the possibility of engaging laboratories established in colleges/ universities/ polytechnic institutes/ private pathological labs for water quality testing on nominal payment basis mutually agreed between DWSM and the concerned institution;
xii.) Rural Water Supply Department/ Public Health Engineering Department, being the Member Secretary of the DWSM is responsible for the proper functioning of various level labs within the district. **The Chemist in-charge of the district lab is responsible for the performance of the laboratories in their jurisdiction**;
xiii.) Procurement of Field Test Kits (FTKs)/ refills / bacteriological vials and their distribution/utilisation from the suppliers empanelled by the State;
xiv.) take responsive actions on a plan for strengthening and monitoring community-based water quality surveillance and sanitation activities prepared by SWSM;
xv.) facilitate third-party verification of functioning of laboratories setup in the district;
xvi.) put up district map of water quality-affected areas indicating type and intensity at the district collectorate;
xvii.) keep a close watch on hotspots, undertake field visits to hotspots/ quality-affected areas, etc.;
xviii.) monitor & ensure water quality grievances are addressed on priority.

4.5 Sub-division/ Block level labs

RWS/ PHE departments of the sub-divisional/ block level are responsible for the implementation of WQM&S activities at sub-division/ block level, *inter alia* as given below.

i.) implementation of WQM&S activities in the sub-division/ block level and to take corrective action;
ii.) awareness generation and capacity building of all stakeholders on various aspects of water quality, its importance, waterborne diseases, health effects, safe handling, storage, etc.;
iii.) strengthening of water quality testing laboratories by setting-up/ up-gradation of sub-division/ block level laboratories;
iv.) **the chemist incharge of the sub-division/ block level is responsible for the performance/ functionality of the laboratories setup in their jurisdiction**;
v.) regular feedback and awareness generation of quality of drinking water being supplied to the local communities;
vi.) regular updation of WQM&S activities data on WQMIS and IMIS;
vii.) identify hotspot and to take necessary action;
viii.) enable, support and assist Gram Panchayat and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Groups in WQM&S activities including creating awareness and education programmes on water quality in schools, anganwadi centres, health centres, GPs/ PRIs, etc.;
ix.) engage communities in surveillance activities such as mandatory sanitary inspections and enable them to undertake presumptive testing of water quality using FTKs/ bacteriological vials;
x.) share the results of water quality testing within the community through SMS/ /Whatsapp /email to all the major stakeholders in community viz. Sarpanch, deputy (upa)-Sarpanch, GP members/ VWSC/ Paani Samiti members, etc. and ensuring the display of water quality testing results at GP level;
xi.) support in undertaking laboratory gap assessment and implement the laboratory-wise improvement plans;
xii.) conduct regular monitoring of differentparameters, report to district level laboratory and share the results with the community;
xiii.) put up respective sub-division/ block map of water quality-affected areas indicating type and intensity of contamination in sub-division/ block offices;
xiv.) ensure regular drinking water quality testing using Field Test Kits (FTKs)/ bacteriological vials in all schools/ anganwadis and test results are communicated to the concerned authority.
xv.) responsible for testing 100% water sources under its jurisdiction; once for chemical parameters and twice for bacteriological parameters (pre and post monsoon) in a year, covering all sources of a block at least for water quality parameters as specified in Annex I. The positively tested samples will be referred to the district laboratory immediately. The other parameters may be tested as per local contamination. In case, block level

laboratories are not available, services of laboratories of nearby educational institutionsor universities may be explored and availed.

4.6 Gram Panchayat -GP level

The Gram Panchayat and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Group, etc. is responsible for the following activities:

i.) ensure participation of Village Water and Sanitation Committees (VWSCs)/ Paani Samiti/ User Group/ community in water quality surveillance activities;

ii.) ensure communities to undertake presumptive testing of water quality using FTKs/ bacteriological vials and reports are regularly submitted to RWS/ PHE Department at Sub-Division/ Block level lab as the case may be;

iii.) identify, train and appoint five women from the local community to conduct water quality tests using FTKs/ bacteriological vials and report the results;

iv.) undertake sanitary inspection, once every month and submit the report to RWS/ PHE Department;

v.) ascertain drinking water safety and quality at the household level;

vi.) ensure to test all drinking water sources including private sources and sanitary inspection under its jurisdiction using FTKs/ bacteriological vials;

vii.) ensure to test all drinking water sources/ supplied drinking water in all schools/ angwandis regularly, and test reports are submitted to RWS/ PHE Department. **The responsible person among the VWSC for uploading the data would be nominated by Block/ Sub-divisional level chemist**;

viii.) support awareness generation in schools, anganwadi centres, health centres, GPs/ PRIs on various aspects of water quality, it's importance, waterborne diseases, health effects, safe handling, storage, etc.;

ix.) involve ISAs to support communities in the use of FTKs/ bacteriological vials and sanitary inspections.

x.) wall writings promoting tap water as- 'it is free from contamination'.

5. Implementation

5.1 Setting up of laboratories

5.1.1 State Level Water Quality Testing Laboratory

There should be a State level drinking water quality testing laboratory in every State with the capacity to analyse all physical, chemical and microbiological parameters as mentioned in BIS IS 10500: 2012 and its subsequent amendments. It should be headed by a senior-level experienced Chief Chemist/ Chief Water Analyst/ Chief Microbiologist. **In case of large States, two or three (depending on requirement) regional labs at par with State-level lab need to be set up so that State-level lab is not overloaded. The in-charge of the regional labs would report to the Chief Chemist at State level lab.**

The State labs would assist the SWSM to carry out the functions of the State Mission. In addition, other functions of the State laboratory are as under:

i.) shall be a referral institute to analyse specific or newly/ emerging water quality problems;
ii.) preparation of State and district annual action plans on WQM&S activities;
iii.) identification of newly emerging contaminants as well as instruments/ equipments required for that;
iv.) responsible for testing at least 5% of the total drinking water samples across all district level laboratories with random and uniform geographical spread including positively tested samples referred by district/ sub-division/ block/ mobile lab. If the number of districts in any State/ UT is large (>50), then the testing of samples/ sources may be restricted to 3% for the State lab. Remaining 2% may be integrated with other regional/ district laboratories.
v.) to monitor the performance of the district, sub-divisional/ block/ mobile laboratories and ensure Quality Assurance & Quality Control (QA & QC) in these laboratories;
vi.) ensure proper AMC/ CAMC/ calibration of all instruments/ equipment's using Certified Reference Material (CRM) as per "IS/ISO/IEC17025:2017";
vii.) analysis of targeted samples of State lab including the positively tested samples of the district, sub-divisional/block/mobile labs;
viii.) preparation of documents/ manuals related to water quality testing, monitoring and SOPs for treatment of laboratory wastewater and safe disposal of laboratory wastewater;
ix.) preparation Standard Operating Procedures (SOPs) for proper sampling techniques, i.e. collection, preservation, transportation, analysis, reporting and data interpretation of test results;
x.) ensure timely procurement of chemicals/ glassware/ consumables adopting procedural formalities as per State Government rules. Render guidance to the chemist at district/block level laboratories;
xi.) to establish a mechanism for Proficiency test (cross-verification of test results) carried out by different labs in the State;
xii.) undertake regular assessment of laboratories set up in the State and prepare improvement plans for Strengthening of water quality testing laboratories in the State;
xiii.) communication of results to the concerned Engineer-in-Chief/Chief Engineer at State level and coordination with similar laboratories of other departments in the State/ Central Government agencies; recommend corrective actions to Engineer-in-Chief/ Chief Engineer of the department;
xiv.) data analysis and follow-up corrective action for ensuring safe drinking water;
xv.) determine the risk of pollution from various sources and delineate areas of contamination (hotspots);
xvi.) recommend corrective actions in case of contaminations detected;
xvii.) analyse the data entered by various level labs in the State and take corrective action, if required;
xviii.) preparation of Water Quality Map indicating type and intensity of contamination under their jurisdiction. ensuring supervision and monitoring of results carried out by Gram Panchayats (GPs) and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Group, etc.

using Field Test Kit, sanitary surveillance and strengthening community in water quality monitoring and surveillance;

xix.) state-specific Research & Development (R&D)/ innovative interventions related to water quality;

xx.) networking and coordination with Department of Atomic Energy (DAE) approved laboratories / NABL accredited laboratories for monitoring radioactive and virological parameters;

xxi.) conduct training on WQM&S activities for all stakeholders through workshops, seminars, etc. and generate awareness on various aspects of water quality, it's importance, waterborne diseases, health effects, safe handling, storage, etc.;

xxii.) organise training, workshops, seminars for ISAs on WQM&S activities;

xxiii.) support SWSM for setting up a system to procure/ refill FTKs/ bacteriological vials on time;

xxiv.) Support SWSM/ concerned authority in procurement of instruments/ equipments for laboratories in the State.

5.1.2 District and sub-divisional/ block level Water Quality Testing Laboratories

The district labs would assist the DWSM to carry out the functions of the District Mission. In addition, other functions of the State laboratory are as under. **District Chemist in-charge of the district lab would report to the Chief Chemist for all matters on water quality labs and its functioning and is responsible for WQMS activities in the district**. **The Sub-Division/ Block level lab Chemist in-charge would report to the District Chemist incharge of district lab for water quality**. **He/She is responsible for WQMS activities in the sub-division/ block level**.

i.) The drinking water quality testing laboratories at district/ sub-divisional/ block levels are the core agencies to test water quality parameters of local importance. The major functions of these laboratories include: drinking water quality testing of all sources, monitoring & surveillance of the sources under their jurisdiction;

ii.) closely monitor hotspots, undertake field visits to hotspots/ quality-affected areas;

iii.) preparation of Water Quality Map indicating type and intensity of contamination under their jurisdiction

iv.) support in undertaking laboratory gap assessment and implement the laboratory-wise improvement plans;

v.) conduct regular monitoring of water quality parameters of local importance, report to district level laboratory and share the results with the community;

vi.) DWSM shall purchase consumables and non-consumable items to ensure the proper functioning of labs;

vii.) coordination and sharing of data with State lab and other relevant stakeholders in the State and district, e.g. health department;

viii.) strengthening PRIs, GP and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Groups and involving the community in water quality monitoring and surveillance activities including sanitary inspections;

ix.) training and awareness generation activities about water quality in rural areas and grass root level WQ workers;

x.) implementation of quality assurance and quality control procedures;

xi.) communication of testing results to the Executive Engineer, Zila Parishad, Assistant Executive Engineer/ Sub-Divisional Engineer, Assistant Engineer, Junior Engineer and to Gram Panchayats GP and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Groups for corrective actions at district and sub-divisional level and ensuring the display of water quality testing results at GP level;

xii.) ensure regular drinking water quality testing using Field Test Kits (FTKs)/ bacteriological vials in all schools/ anganwadis and test results are communicated to concerned authority;

xiii.) monitoring of utilisation of Field Test Kits (FTKs)/ refills / bacteriological vials in GPs and schools/ anganwadis and sharing the results with concerned authority;

xiv.) support DWSM/ concerned authority in procurement for FTKs/ refills/ bacteriological vials and distribution;

.) District labs are responsible for testing 250 water sources/ samples per month (i.e.3,000 in a year as per the target of roster available on Department/ National Mission IMIS) covering allsources randomly spread geographically includingthe positively tested samples referred by the subdivision/block laboratory/ mobile laboratory on atleast for water quality parameters as specified in Annex I. The district lab will also refer to the positively testedsamples to the State laboratory immediately. The other parameters may be tested as per localcontamination at the district level.

5.1.3 Mobile Drinking Water Quality Testing Laboratory

The mobile water quality testing laboratories may be set up to test specified endemic parameters, congregation areas of local communities, inaccessible areas etc. The major functions of a mobile laboratory include:

i.) water quality monitoring and surveillance in remote areas/ hot spot areas;
ii.) cross-verification of results with other laboratories;
iii.) water quality testing and management during disasters and natural calamities;
iv.) awareness generation amongst the PRIs and community;
v.) any specially assigned task.

Strengthening of water quality laboratories involves up-gradation of laboratories, meeting the suggested laboratory infrastructure requirements, *viz*. laboratory accommodation & environment, instruments, equipment's, etc.

To strengthen water quality labs, following suggestive requirement lists are attached as Annexes:

i.) Standard methods and chemicals required for testing of parameters -**Annex–II. States/ UTs are also requested to** refer Standard methods for the examination of water and waste water, 23rd edition, published by APHA (American Public Health Association).
ii.) Suggestive infrastructure requirements for setting up of a laboratory -**Annex- III**
iii.) Suggestive list of instruments required in laboratories at different levels -**Annex- IV**
iv.) Suggestive quantity list of glassware required at different level laboratories -**Annex-V**

5.1.4 Public-private partnerships and other possibilities

JJM encourages building partnership with all stakeholders. Towards this, the States/ UTs can explore **Public-Private Partnership** wherein the PHE/ RWS Department may collaborate with NABL accredited private firms **i.e.those labs having diagnostic testing facilities** with NABL accreditation as Support Organisation (SO) and utilise their strengths following all SoPs as per government procedure. Additionally, the **Public-Public Partnership** may also be explored with the water quality testing laboratories of other similar State/ Central Government agencies, i.e., Central Pollution Control Board/ Central Water Commission, Central Ground Water Board etc. Further, States/ UTs may also designate any NABL accredited Public or Private water quality testing labs by firms/ NGOs as S.O.s for water quality testing, following all formalities prescribed in Government procedures. Under JJM, States/ UTs can encourage & promote rural entrepreneurship and enterprises for water quality testing at the local level. These could be responsible for a cluster of villages or block(s) and ease the access to water quality testing for general public.

The footprint of the water quality testing can further be increased by engaging laboratories set up in colleges/ universities /higher secondary schools/ polytechnic institutes for water quality testing on agreed payment basis. The laboratories in these institutions can be used for testing water samples and also can be made accessible to all the stakeholders, for which an agreed sum can be paid on per sample basis.

Example: Public-Private Partnership in Water Quality Monitoring in West Bengal

In West Bengal, out of two hundred and seventeen (217) rural drinking water quality testing laboratories, seventy-nine (79) are jointly managed by NGOs. UNICEF supported PHE in identifying potential NGO partners who can collaborate with the Department to set up water quality monitoring laboratories.

These laboratories are housed in buildings owned by the respective NGOs. Basic infrastructure, including the laboratory furniture and refrigerator, is provided by the NGO. Laboratory staff are engaged by the NGO, remunerated and trained by PHED. Whereas, laboratory instruments and equipment, chemicals, reagents etc. are procured by the respective water supply Divisions and supplied on need basis. A Memorandum of Understanding is signed between PHED and the concerned NGO, which entails details on infrastructure to be provided and maintained by both PHED and NGO, utilisation of O&M funds and other related activities.

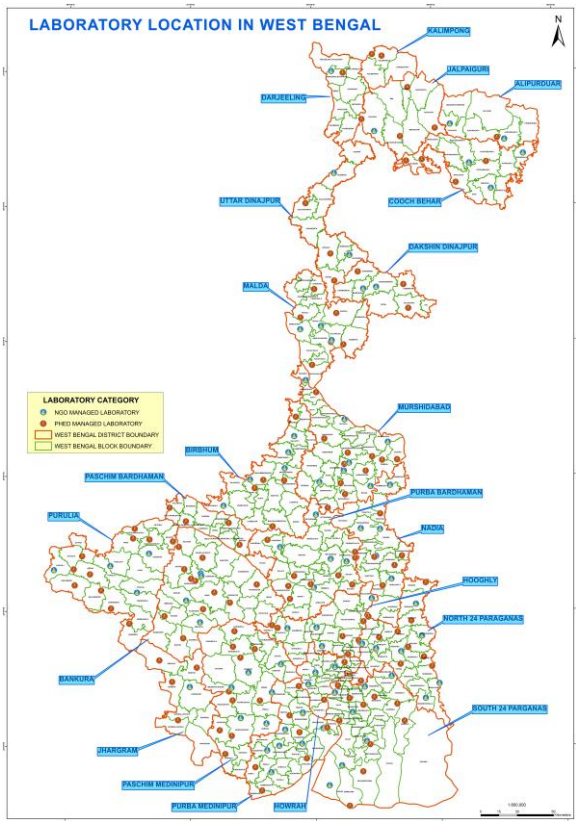
Samples collected from spot sources (hand pump tube-wells, wells, springs, etc.) as well as piped water supply schemes are tested for location-specific chemical parameters. All laboratories do not test for all types of contaminants. District and sub-district level laboratories have been categorised and set-up based on location-specific contaminants. Laboratories categorised based on location-specific chemical contaminants are as follows:

i.) General,
ii.) Arsenic,
iii.) Fluoride,
iv.) Salinity,
v.) Arsenic and Fluoride,
vi.) Arsenic and Salinity and
vii.) Arsenic, Fluoride and Salinity.

Water quality laboratories in West Bengal

Laboratory Type	Managed by	
	PHED	NGO
Arsenic	32	24
Fluoride	26	18
Salinity	15	10
Arsenic & Fluoride	11	0
Arsenic & Salinity	8	10
Arsenic, Fluoride & Salinity	3	0
General	43	17

West Bengal: Laboratory location map



Total	138	79
Grand total	217	

5.2 Collection of water samples

5.2.1 Departmental samples

To collect and bring water samples to the laboratory, the laboratory staff may either be provided with a departmental vehicle or a suitable hired vehicle. The task-based Field Assistant may be given suitable remuneration per sample collected from the source.

5.2.2 Water samples from public

At present, the water quality tests are carried by the PHE/ RWS Department at delivery points or drinking water sources or pre/ post-treated water from the water treatment plant but not at the point of use or consumption. Also, few options are available for a consumer to get their water tested through laboratories or FTKs. Many households install a point-of-use treatment unit incurring additional expenditure, on the suspicion about the quality of water supplied. Even after installing such households water treatment plants, people cannot ascertain whether the treated water from such plants is potable.

While NJJM is in the process of providing safe water to all rural households, focus on assuring the safe water supply is required from the public health perspective which can also go a long way in preventing the water-borne disease and promote a healthy environment. To improve the ease of living and to empower individuals, there should be an easy and quick means for the

general public to test the water quality at affordable prices. To achieve this, it is necessary to make all the water quality laboratories operated/ engaged by the Public Health Engineering/ Rural Water Supply Department accessible to rural households and all other concerned stakeholders for testing the supplied water. The test results of the samples should be communicated in a seamless way to all stakeholders for follow-up action/ analysis, thus building trust in the public water supply. By making the quality of piped water known to the public, there will be increased accountability on the part of the supplier for providing continuous safe drinking water. The public can create an account in WQMIS portal (Annex X) and can choose a lab to test the water sample for the desired parameters.

5.3 Centralised supply chain

i.) The State should put in place a robust supply chain with preferably an online inventory management system. The State should make such an arrangement for prior information/ requirement of chemicals, instruments, glassware etc. so that in the meantime supply chain management can be done uninterruptedly;

ii.) The centralised state-level agency should procure all reagents. The consumables procured must have a similar quality as a few top brands available in India. Reagents and consumables should meet the technical specifications including the technology, sensitivity and specificity criteria etc.;

iii.) The vendors or authorised channel partner(s) of the vendors should deliver the reagents and consumables directly to the districts (FOR). But the billing should be done by the primary vendors, and the payments should be made to their accounts only; All payments should be made through PFMS only;

iv.) It should be ensured that the central district stores have the requisite infrastructure for

receiving the supply from the vendors; and

v.) The State should ensure that water quality testing should not be interrupted because of non-availability of consumables.

5.4 Human resource management

5.4.1 Staff needs for an effective water quality assessment laboratory varies a great deal. To estimate needs in terms of human resources, the following factors may be considered:

i.) total workload;
ii.) schedule of on-site analysis/ off-site analysis[15] and laboratory analysis;
iii.) geomorphology/ terrain of the area;
iv.) demographic conditions;
v.) size and complexity of the supply system;
vi.) the distance of sampling points and water supply systems;
vii.) population density.

It should be ensured that all outsourced/ contract staff has to be paid their salary regularly every month on the stipulated date without fail. **Non-receipt of Central share under JJM support fund should not be cited as a reason for non-payment of salaries to the staff**.

5.4.2 Staffing and the institutional laboratory patterns mentioned here are suggestive and may be modified according to State Government needs and norms. A suggestive staff requirement for various levels of laboratories is as below:

[15] Off-site Analysis- The samples are collected from various sites and tested at a common place.

Table 1 State Level Water Quality Testing Laboratory

S. No.	Position	Numbers
1.	Chief Chemist/ Chief Water Analyst	01
2.	Senior Chemist/ Senior Water Analyst/ Senior Microbiologist	01
3.	Chemist/ Water Analyst	02
4.	Microbiologist/ Bacteriologist	01
5.	Laboratory Assistant	02
6.	Data Entry Operator	02
7.	Lab Attendant	02
8.	Field Assistant (task/ need-based field staff)	04

Table 2 District Level Water Quality Testing Laboratory

S. No.	Position	Numbers
1.	Chemist/ Water Analyst	01
2.	Microbiologist/ Bacteriologist	01
3.	Laboratory Assistant	02
4.	Lab Attendant	01
5.	Data Entry Operator	01
6.	Field Assistant (task/ need based field staff)	02

Table 3 Sub-Divisional /Block Level Water Quality Testing Laboratory

S. No.	Position	Numbers
1.	Junior Chemist	01
2.	Junior Microbiologist	01
3.	Laboratory Assistant	01
4.	Lab Attendant	01
5.	Data Entry Operator[16]	01
6.	Field Assistant (task/ need based field staff)	01

Table 4 Mobile Water Testing Laboratory

S. No.	Position	Numbers
1.	Junior Chemist/ Microbiologist	01
2.	Field Assistant (task/ need based field staff)	01
3.	Driver	01
4.	Helper	01

[16] Subject to availability of IT facilities to enter data.

5.4.3 The incumbent with Chemistry/ Microbiology qualification at any level of the laboratory may be allotted chemical or microbiological analytical work as per workload/human resources available in the laboratory. As different states have a different designation for water quality professionals such as Water Analyst/ Chemist/ Assistant Chemist/ Junior/ Sr. Scientific Assistants/ Scientific Officer/ Research Officer etc. hence, above mentioned designation titles are suggestive and may be equated as per State Government norms, and it is the prerogative of State Governments.

5.4.4 These positions can be filled with regular/ contractual personnel or from outsourcing agencies following all procedural formalities as per State Government rules. **However, all States/ UTs are to ensure that atleast one regular post for Water Analyst/ Chemist is made available in each district drinking water quality testing laboratory.**

5.4.5 Keeping in view the pattern of different State Governments, the following educational qualifications & experience is suggested for inviting competitive applications:

Table 5 Educational qualification and experience required for various position in lab

S. No.	Designation	Educational qualification	Experience	Suggestive Remuneration
1.	Chief Chemist / Chief Water Analyst	Post-graduation in Sciences with Chemistry/ Environmental Sciences/ Microbiology/ Biotechnology/ Biological Sciences as one of the subjects	Minimum of 15 years' experience in laboratory water quality analysis and monitoring	Appropriate pay scale should be decided by the state.
2.	Sr. Chemist / Sr. Water Analyst	Graduation in Sciences with Chemistry/ Environmental Sciences as one of the subjects	Minimum 10 years' experience in laboratory water quality analysis and monitoring	
3.	Sr. Microbiologist	Graduation in Sciences with Microbiology/ Biotechnology/	Minimum 10 years' experience in laboratory water quality analysis and monitoring	

		Biological Sciences as one of the subjects		
4.	Microbiologist	Graduation in Sciences with Microbiology/ Biotechnology/ Biological Sciences as one of the subjects	Minimum of 5 years' experience in laboratory water quality analysis and monitoring	
5.	Jr. Chemist / Jr. Water Analyst	Graduation in Sciences with Chemistry/ Environmental Sciences as one of the subjects	Candidate with higher qualification in the cited subjects shall be preferred	
6.	Jr. Microbiologist	Graduation in Sciences with Microbiology/ Biotechnology/ Biological Sciences as one of the subjects	Candidate with higher qualification in the cited subjects shall be preferred	
7.	Lab Assistant	10+2 in Science Group	Candidates with one-year experience in water quality laboratory may be preferred	
8.	Data Entry Operator (DEO)	10+2 with skills in computer fundamentals	Candidates with 1-year computer course may be preferred.	
9.	Field Assistant	10th pass	Candidates with one-year experience in water quality laboratory may be preferred	
10.	Lab Attendant	8th pass	Minimum one-year experience in water testing lab and 10th pass may be preferred	

5.4.6 The remuneration to the laboratory human resources may be fixed according to the State standard schedule of rates. **Alternatively, the remuneration may be fixed at par with the best in the sector so as to attract most competent personnel. The aim is to get the best possible and competent personnel for working in the laboratories.** The human resource, qualification & experience required & remuneration to be fixed etc. should be approved by the competent authority in State with information to SLSSC. A suggestive list of remuneration[17] is given below:

Water Analyst/ Chemist		Microbiologist		Lab Assistants		Sampling Assistants		Lab Attendant		Data Entry operator	
Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
24,600	33,000	16,400	24,700	13,200	16,500	10,000	13,200	6,600	10,000	10,000	13,200

5.4.7 State may hire an agency to provide staff services for carrying out analysis of drinking water sources for physico-chemical and microbiological testing. All costs of outsourced staff for laboratories including mobility allowances as well as engagement of outsourced agencies are allowed under WQM&S Funds. The financial terms and conditions of the outsourcing agency should have the approval of the SLSSC duly following the procedural formalities as per Government rules. Salary of the regular staff should be met from State Government funds.

5.4.8 The overall responsibility of smooth functioning of drinking water quality testing laboratories at all levels lies with the Secretary, PHE/ RWS Department in his capacity as Chairman of the Executive Committee of SWSM. The major role and responsibilities of laboratory personnel are at **Annex IA**:

[17]Should not be lower than the renumeration (wage) fixed by the appropriate State Authority.

5.5 Water Quality Analysis Requirements

5.5.1 Methodology for sampling

There are many important factors for accurate analysis of the sample. These factors include:

i.) proper collection of the samples;
ii.) transportation;
iii.) storage and procedures for microbial and chemical analysis;
iv.) data analysis and interpretation.

The general precautions in the Bureau of Indian Standards, i.e. IS-3025/1622 and/ or 'Standard Methods for the Examination of Water & Wastewater'- latest edition [published jointly by American Public Health Association (APHA), and American Society for Testing and Materials (ASTM)] may be referred to for detailed information on sampling and testing procedures.

The Department of Drinking Water and Sanitation, Ministry of Jal Shakti, Government of India has introduced the concept of a pre-planned roster of sources to be sampled for water quality testing every month. The roster is to be generated on the basis of data of drinking water sources uploaded by the States/ UTs on JJM IMIS. The objective is to ensure temporal and spatial random sampling and testing of all sources evenly spread geographically. The sources/ sampling points are to be selected on JJM IMIS based on the monthly target of the district drinking water quality testing laboratories, i.e. 250 number of sources/ delivery points per month out of which 75% sources/ delivery points to be generated from the roster while the remaining 25% to be selected by the States/ UTs based on local environmental conditions.

5.5.2 General guidelines and precautions for drinking water sampling

The general guidelines and precautions to be followed for drinking water sampling are as follows:

i.) all sources/ delivery points selected for sampling and analysis to be linked to scheme ID in the JJM IMIS;

ii.) collect a sample that conforms to the requirement of the sampling programmes and handle it carefully so that it does not deteriorate or get contaminated during its collection, preservation and transportation to the laboratory;

iii.) before filling up the container, rinse it two or three times with the water being collected for physical and chemical examination and do not rinse for microbiological examination;

iv.) while collecting a sample from the distribution system, flush lines adequately, taking into consideration the diameter and length of the pipe to be flushed and the velocity of flow;

v.) collect samples from tube-wells only after sufficient pumping (purging) to ensure that the sample represents the groundwater source;

vi.) when samples are to be collected from a river or stream, analytical results may vary with depth, flow, distance from the banks. In surface water bodies, water samples may preferably be collected at 0.2 times the depth of the water body from the surface water level;

vii.) once the sample is collected, login into WQMIS and choose the laboratory where the sample needs to test as per the roaster and generate the automated reference number which will be used as the label. Labelling is an important part ofthe sampling programme;

viii.) The state may undertake a one-time survey for recording GPS coordinates of drinking water sources through a suitable agency;

ix.) all samples collected in specified sampling containers/ bottles are to be transported in proper 'Ice Box' within 24 hours to the chosen water quality testing laboratory.

5.5.3 Quantity of sample to be collected

i.) Samples for chemical & microbiological analysis are to be collected separately as the method of sampling and preservation is completely different from each other. The interval between collection and analysis of the sample is to be the shortest possible. However, the holding time of the samples and their preservation varies from parameter to parameter. The non-conservative parameters which change rapidly with time and cannot be stabilized (e.g. pH, conductivity, turbidity, residual chlorine, temperature, etc.) are to be measured immediately in the field after sampling.

Table 6 Quantity of sample to be collected

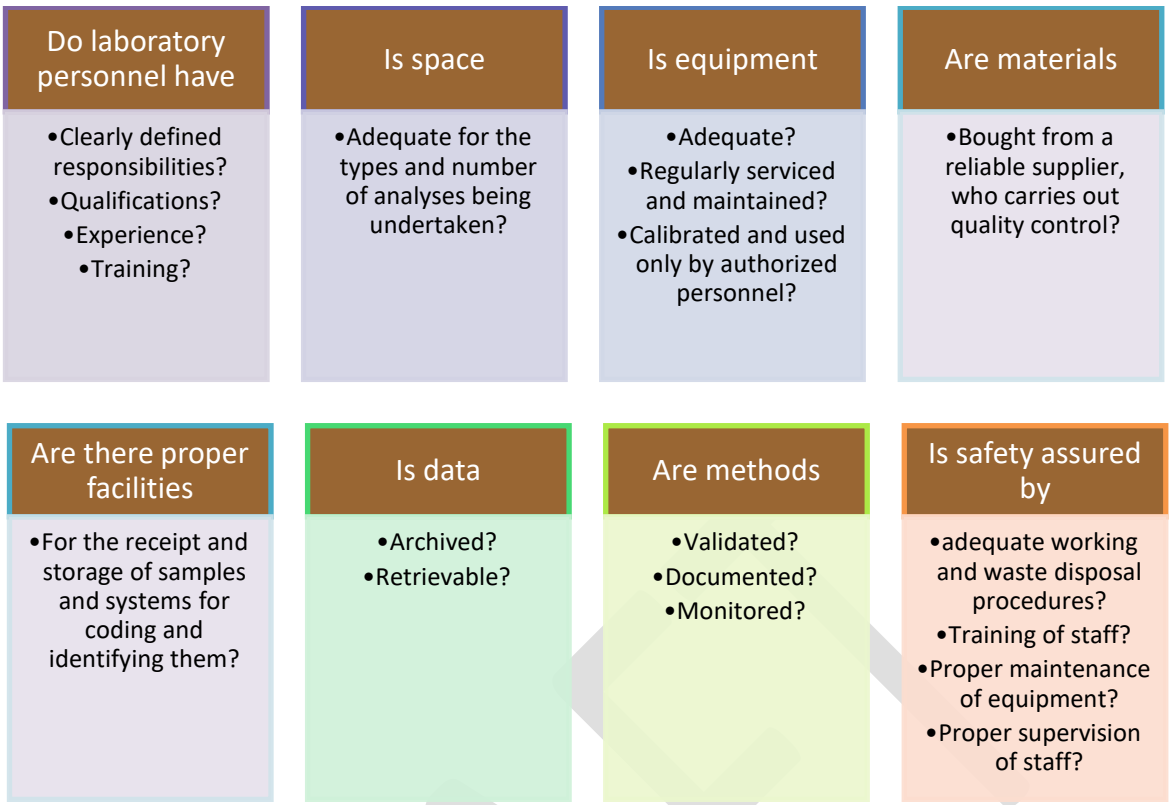
S.No.	Analysis type	Quantity
1.	Physical and Chemical Analysis	1000 ml (non-acidified)
2.	Microbiological Analysis	250 ml in pre-sterilized glass bottles
3.	Metals Analysis	1000 ml (acidified)

ii.) Sampling may be done by Field Assistants. If they are not available, staff working in District/ sub-divisional/ block laboratory should identify VWSC member/ students and train them in sampling procedures for a different type of parameters (chemical and microbiological). After training, they may be allocated cluster of GP's to bring the samples in a planned manner. Laboratory staff should also ensure that the sample collectors are provided with polyethene bottles/ Amber coloured glass bottles and sterilized borosilicate glass bottles (BOD bottles), icebox and necessary chemicals for preservation of samples. The sample collector should take the signature of water supply operator/ GP member or any household member to verify his presence for a collection of samples in the area concerned. Alternatively, the rural water supply departments may use advance technological intervention like geo-fencing/ geo-tagging of sources to be sampled.

5.5.4 Analytical quality assurance and quality control

i.) In the context of analytical work, the terms quality assurance and quality control are often treated as synonymous. In fact, they are different concepts. Analytical quality control is the generation of data for the purpose of assessing and monitoring how good an analytical method is and how well it is operating. This is normally described in terms of within-day and day to day precision.

Figure 2 Analytical quality assurance and quality control/ model inspection reporting format



Analytical quality assurance by contrast, comprises all the steps taken by a laboratory to assure those who receive the data, that the laboratory is producing valid results. Quality assurance thus encompasses analytical quality control but also includes many other aspects such as proving that the individuals who carried out the analysis were competent to do so, and ensuring that the laboratory has established and documented analytical methods, equipment calibration, procedures, management lines of responsibility, system for data retrieval, sample handling procedures and so on. A checklist for effective analytical quality assurance/ sample inspection report is given in figure 2 above which is of “Yes”/No” type, if the answer is no for any of the below items, necessary improvements has to be done.

5.5.5 Water Quality Testing using Field Test Kit (FTK) at Gram Panchayat level

Figure 3 Jal Sahiya performing field tess, Jharkhand

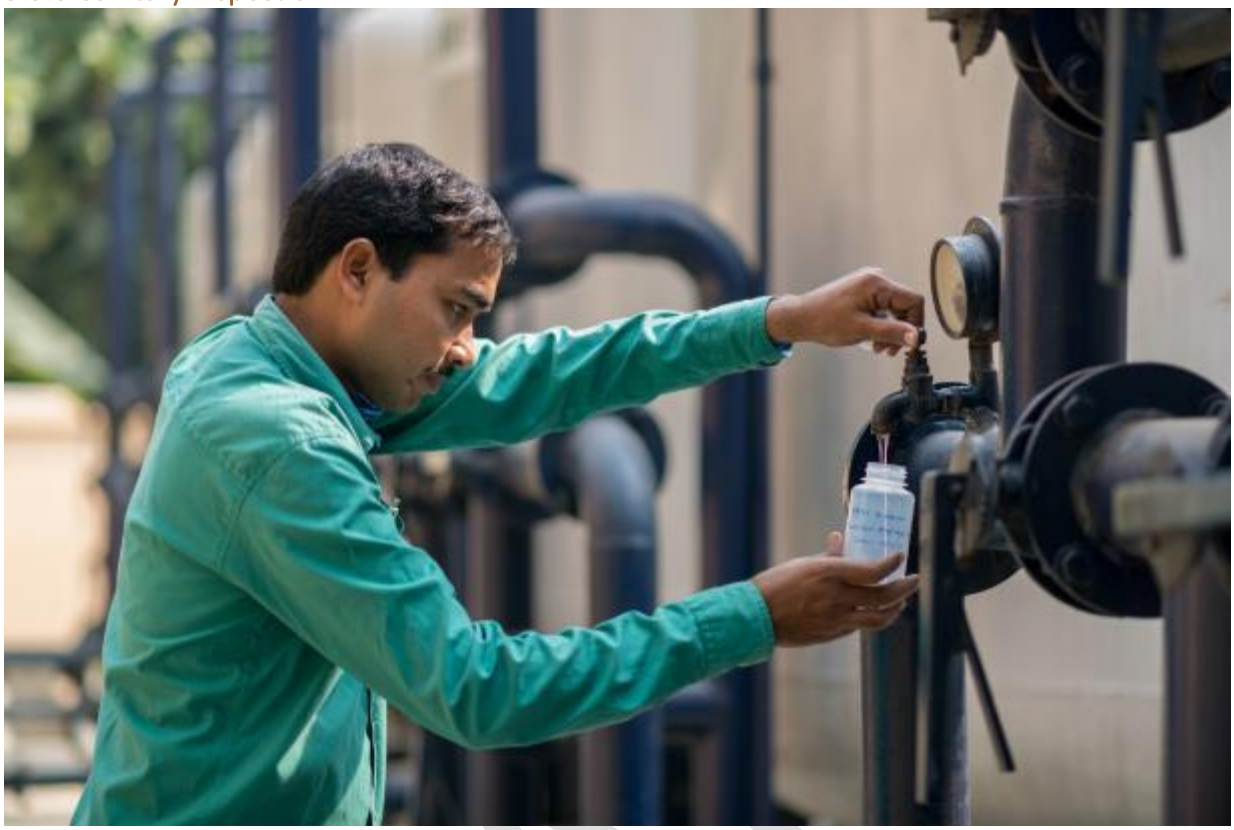
The Field Test Kits (FTKs) for the examination of physio-chemical contamination not only serves the purpose of the initial screening of contamination but also is an effective tool for generating awareness amongst the community to consume safe drinking water. The Kits are for use at grass root level i.e. Gram Panchayats/Village Water and Sanitation Committees for indicative

test results, however, water quality testing laboratories may also use the same for primary investigation. The kit is used in conjunction with tablet/ reagents and colour charts to test different parameters. The kit is portable, easy to carry, easy to operate and do not require any kind of energy or power. This kit can carry out tests for the parameters listed below:

i.) Turbidity by visual comparison method
ii.) pH by pH strips colour comparison method
iii.) Total Hardness by Titrimetric method
iv.) Total Alkalinity by Titrimetric method
v.) Chloride by Titrimetric method
vi.) Ammonia by visual comparison method(Optional)
vii.) Phosphate by visual comparison method(Optional)
viii.) Residual Chlorine by visual colour comparison method
ix.) Iron by visual colour comparison method
x.) Nitrate by visual colour comparison method
xi.) Fluoride by visual colour comparison method
xii.) Bacteriological vials (Presence/ Absence) water test kit (H2S vial test)

A separate Arsenic field test kit is also available in the market, which could be used in States where Arsenic is detected in drinking water sources.Gram Panchayat and/ or its sub-committee, i.e. VWSC/ Paani Samiti/ User Group, etc.will ensure to test 100% drinking water sources including private sources & water quality testing at Schools/ Anganwadis under its jurisdiction using FTKatleast once in a month. The test results can be uploaded online in WQMIS.

5.5.6 Sanitary Inspection



Sanitary inspections should be carried out for all new and existing sources of water by the community once every month and twice in a year by concerned laboratory officials. **The sanitary inspection forms are given in Annex- VI.** These forms consist of a set of questions which have "yes" or "no" answers. The questions are structured so that the "yes" answers indicate that there is the risk of contamination, and "no" answers indicate that the particular risk is absent. Each "yes" answer scores one point and each "no" answer scores zero points. At the end of the inspection, the points are added up, and the higher the total of identified risks, the greater the risk of contamination.

The sanitary inspections have to be carried out monthly, and results of sanitary inspections and the remedial actions that need to be taken to improve conditions should also be reported. All the sanitary inspections done by the community can then be sent to the block/ Sub-divisional/ district/ State level lab, which should also undertake a minimum of two sanitary inspections in a year along with microbial water quality monitoring to check the reliability of the information. In Japanese Encephalitis/ Acute Encephalitis Syndrome (JE/AES) and Acute Diarrheal Diseases (ADD) affected districts, the sanitary inspection must be undertaken twice in a year especially during the monsoon and post-monsoon seasons. Strict surveillance and remedial action by the Water Supply agency is also mandatory during this period.

5.6 Infrastructure Requirements

A suggestive list of standard methods & chemicals required is given at **Annex-II**. The suggestive list of minimum infrastructure requirements for setting-up a drinking water quality testing laboratory is provided in **Annex III**. These requirements are only suggestive in nature, and the State Government may decide on the appropriate infrastructure facility to be provided in laboratories to carry-out drinking water analysis and for getting accreditation from NABL/ISO).

5.6.1 Specification for laboratory and other infrastructural requirements

i.) **Physical facility**: The design of the laboratory at the state, district and sub-divisional level shall depend upon the volume of analytical work required to be done respectively. In deciding the requirement of space, due attention should be given to the space needed for permanently installed equipments and smooth performance of analytical work by the laboratory personnel. While constructing the new laboratory, or modifications being made in the existing laboratory, provision for future expansion should also be made. The State/district level labs should preferably be in Government owned buildings,

ii.) **Location of the laboratory**: The location and contact details of all laboratories should be prominently displayed by sign boards, posters, wall paintings etc. near bus stations, railway stations, Gram Panchayat offices, Schools and other important public places. The location of all laboratories shall be given wide publicity so that the common man can be aware where water quality analysis could be done. The location of laboratories should be at State, district, sub-division/block HQ level. The location of all laboratories should be geo-tagged, and details should be available on State department & DDWS website also. The location should be such that adequate natural lighting and ventilation should be available. A standard design of laboratories may be prepared.

iii.) **Renovation/ Upgradation of existing laboratories and establishment of new laboratories:**States/ UTs can utilize WQM&S funds for strengthening of water quality testing Laboratories by setting-up/ up-gradation of State/district/ sub-division/ block/ mobile laboratories. Payments of rental charges of various level laboratories are allowed under WQM&S. In case of State-level laboratories, construction of the building is also permitted provided adequate land is made available by the State Government.

iv.) **Floor space:** Floor space for the laboratory is mentioned in **Annex-III.** Use of smooth tiles on floors should be avoided, and anti-skid measures should be taken up.

v.) **Walls of the laboratory**: The walls should be finished smoothly in a light colour and should have sufficient thickness and provision for built-in cabinets. A Standard Do's and Don'ts chart should be placed in a clearly visible manner. Standard practices as per the Bio-Safety Level (BSL) and Chemical Safety Level (CSL) for specific parameters should be followed.

vi.) **Lighting:** All workrooms, including passages in the laboratory, should be well lighted. There should be enough windows provided in the laboratory area (except the microbiological lab) with transparent window glasses. Translucent roofs are now available to facilitate adequate illumination during the daytime. This may be thought of while planning the roof of the laboratory. Adequate provision of artificial lighting should be provided to supplement natural light. Additional plug points should be provided for extra lighting if needed. (online voltage stabilizer may be considered).

vii.) **Fuel gas supply:** Provision for supply of fuel gas and gas burners on the workbenches shall be provided wherever required.

viii.) **Balance room:** The digital balance shall be placed on a separate table in a cubicle or enclosure in the laboratory.

ix.) **Media preparation and sterilization room:** For microbiological/ bacteriological analysis, additional facilities for media preparation, centrifuging, sterilization by autoclaving etc.are mandatory and separate enclosure for accommodating these facilities needs to be provided.

x.) **First Aid Box:** All laboratories must ensure that they have adequately equipped first aid box with proper medicines/ bandages/ eyewash. The first aid box should be placed such that it is easily accessible to all staff members. The laboratory should also invariably have First AidChart. First Aid material should be reviewed for its shelf life in every three months, and expired material should be disposed of in a proper manner.

xi.) **Library:** Each State Laboratory shall have a computerized library facility having all Standard Operating Procedures (SOPs) and books/ journals/ periodicals related to drinking water quality, water-related diseases and water quality monitoring and surveillance. An adequate number of IEC material on consumption of safe drinking water, personal and environmental hygiene may be kept for distribution to rural people who visit the laboratories.

xii.) **Computers and Printers :** Each laboratory shall have required number of computers, printers and other consumables.

5.6.2 Worktables and benches

Suitable laboratory furniture shall be procured by State, District or Sub-division/ block level laboratories as per local requirement and should be such that they can be easily maintained and cleaned. Preferably, it should be vibration-free/shock resistant. Adequate provision should be kept for storing chemicals and reagents as per guidelines/ standards.

5.6.3 Instruments

The list of instruments required is provided in **Annex-IV**. (These are only suggestive in nature and addition/ deletions with the advancement in technology may be made as deemed appropriate by the State Government)

5.6.4 Maintenance

The States shall develop an appropriate Annual Maintenance Contract (AMC)/ Comprehensive Annual Maintenance Contract (CAMC) policy for maintenance, calibration, repairs of instruments/ equipment available in the laboratories. However, it is suggested that for instruments/ equipment of value less than Rs.10 lakh, preferably Annual Maintenance Contract (AMC) should be adopted and for sophisticated instruments/ equipment's of value, more thanRs. 10 lakh preferably Comprehensive Annual Maintenance Contract (CAMC) may be adopted. The AMC/CAMC may be one of the terms & conditions of bid document while procuring instruments and equipments of the laboratory. **The States may also frame a policy for procurement of reagents, chemicals, glasswares and other related consumables required for the drinking water quality testing. Government e-Market (GeM) platform may be used widely for procurement purposes.**

5.6.5 Glassware

The suggestive list of glassware required is provided in **Annex-V**. The quality of glassware's should be Borosilicate Class B in general and Class A for NABL accredited laboratories. Subsequent procurement could be based on actual needs.

5.6.6 Chemicals for State, District and Subdivisional/ block laboratories

The suggestive list of chemicals for State,District and Sub-divisional/block laboratories is provided in **Annex II & II A**. Any additional chemicals if required may also be procured. This may vary with the routine parameters that are intended for testing. Subsequent procurement could be based on actual needs. Laboratories should have at least 3 months back up of chemicals. Also States should ensure that only Analytical Reagent (AR)/Guaranteed Reagent (GR) grade chemicals are used for water quality testing. This is also suggested that each laboratory should keep sufficient stock of disinfectants like bleaching powder, Potassium permanganate and unhydrated lime with adequate precautions so that these can be used by the trained laboratory professionals for disinfection purpose. Chemicals used for Field Test Kit shall invariably include date of manufacture, batch number and expiry date.

5.7 Safety Measures

5.7.1 Safety measures for hazardous chemicals

i.) All containers must be clearly labelled and read before opening. If dispensing into another container, put label along with warning;

ii.) Minimal stocks not exceeding 500 ml of corrosive or flammable solvents only may be kept in the workroom. Keep rest of the volume/quantity in a safe place;

iii.) Glacial acetic acid must be regarded as a flammable solvent;

iv.) Ether and low boiling point flammable liquids must not be kept in the fridge;
v.) Large containers of corrosive or flammable liquids should never be put on high shelves or where they can be knocked down or fall. Also, never put liquids that react violently together closely;
vi.) Never carry bottles by neck alone. Open bottles with care;
vii.) When diluting concentrated sulphuric acid or other strong acids, it should be added to water in a heat resistant vessel. Gloves and safety glasses should be used at such times;
viii.) Paint circles on shelves for keeping bottles in the right places;
ix.) All hazardous chemicals should be kept in safe custody.

5.7.2 Safety measures for Spillage of hazardous chemicals

i.) If the amount/volume of spillage is small, dilute with water or detergent;
ii.) If the amount is large, protective aprons, rubber gloves and boots should be worn, and treatment carried out according to the wall chart showing how to manage chemical spillage;
iii.) Hydrochloric acid and sulphuric acid can be neutralized with anhydrous sodium carbonate then shovel into a plastic bucket which is subsequently diluted by water and run to waste;
iv.) Ammonia solution, ethanol, methanol and formalin are best treated by diluting with water, collection and running to waste.
v.) Windows must be opened;
vi.) Phenols must be diluted with at least 20 times the volume of tap water before draining.

5.7.3 Safety measures for operating the equipment

i.) Only trained staff should operate the equipment;
ii.) Operating instructions should be available foreach instrument;
iii.) Check the autoclave filled with water to correct level before loading;
iv.) If fire breaks out, nearby electrical equipment should immediately be switched off and disconnected;
v.) Take care to avoid live wires;
vi.) When not in use, switch off and withdraw the plug from the socket;
vii.) Avoid the use of multi-adaptors. If necessary, to use they must be fitted with fuses;
viii.) Phone numbers/ Persons to be contacted during an emergency or in the case of accidents to be displayed prominently in the lab.

5.7.4 Using fire extinguishers

i.) Water extinguishers are suitable for fires involving ordinary combustible materials, e.g. wood, paper, textile, upholstery. Never use electrical wires or liquids that will catch fire;
ii.) Dry powder extinguishers or sand are suitable for liquids on fire, electrical fires and burning metals.

5.7.5 First Aid

i.) First Aid Chart should be mounted on a nearby wall in the laboratory;
ii.) First Aid box must always be equipped and should be accessible to Laboratory Staff. An emergency eyewash bottle with a bottle of sterilized water should be readily available;

iii.) A Universal poison antidote is useful. Activated aluminium oxide or a tin of evaporated milk should be readily available. A tin opener and some waterproof dressing material should also be readily available;

iv.) The information regarding the availability and location of the First Aid Box must be informed to all employees in the lab.

5.7.6 Additional safety/hygiene requirements

i.) Safety instructions and precautions to be followed in the laboratory must be displayed inside the laboratory;

ii.) BIS specifications (IS 10500:2012)-Drinking Water Specification, IS 3025 -Method of Sampling & Test-Physical & Chemical, IS 1622- Methods of Sampling & Microbiological examination of water and APHA Manual should be made available in each laboratory. JJM Support fund may be used for procurement of these specifications;

iii.) Date of preparation of reagent solutions and date of expiry for each solution prepared should be clearly mentioned on bottles wherein chemical solution is kept;

iv.) Under no circumstances, the sanctity of the laboratory should be violated. Unauthorized persons should not enter the laboratory. Eating should not be allowed in laboratory space meant for analysis;

v.) A clean and well-maintained toilet MUST be attached/ available in the laboratory premises with handwashing facility and soap;

vi.) Facilities such as foot-operated eye shower, safety/water shower, washbasins, foot-operated dust bins shall be available;

vii.) The laboratory should also have AC fitted when significant numbers of the test are required to be done. OR air conditioner/heater/humidifier may be provided to maintain specified temperature/Relative Humidity conditions for carrying out the tests;

viii.) Personal hygiene is a must for all staff of the laboratory, especially for Microbiologists. All laboratory staff should wear aprons/ caps/ gloves during the preparation of the solution and testing (requirement is parameter specific) and should be washed at regular intervals;

ix.) Drinking water samples should only be tested after proper calibration of the instruments.

5.8 Waste management at water quality testing laboratories

5.8.1 Wastewater from chemical laboratories is generally composed of organic and inorganic matter, and a wide range of chemicals and heavy metals, and is one of the most difficult wastewaters for treating. If a chemical waste cannot be transported safely without treatment, it needs to be treated at its present site. If the chemical waste originates in a laboratory, it should be treated there.

5.8.2 In some cases, on-site treatment has been performed under special permits issued by the regulatory agency. A good safety program requires constant care in the disposal of laboratory waste. Corrosive materials should never be poured down in a sink or drain. These substances can corrode the drainpipe and/or trap. Corrosive acids should be poured down in corrosion-resistant sinks and sewers using large quantities of water to dilute and flush the acid. Hazardous chemicals/ substances must be disposed of by methods that comply with local

environmental regulations. Check/ confirm the local requirements before disposal. Laboratories should maintain a comprehensive listing of wastewater discharges that includes sources and locations of the discharges, analytical or other data characterizing the nature and volume of the discharge.

5.8.3 After careful consideration, management can determine that limited drain disposal of non-hazardous substances is acceptable. USEPA, 2000 provides the following general guidelines:

i.) Use drain disposal only if the drain system flows to a wastewater treatment plant and not into a septic tank system or a stormwater sewer system that potentially flows directly into surface water;
ii.) Make sure that the substances being disposed of are compatible with each other and with the piping system;
iii.) The discharge only those compounds that are soluble in water (such as aqueous solutions) that are readily biodegradable are low in toxicity and contain no metals that can make the sludge toxic.

5.8.4 Laboratory wastewater neutralization is significant before discharge. Therefore, the discharge of weak corrosive solutions (5.5<pH<12.0) to the laboratory sinks in small quantities (less than one litre per hour) is permissible. Corrosive solutions with pH ranges (2.0<pH<5.5) and 12.0<pH<12.5) must be neutralized before sink/drain disposal. Corrosive solutions with pH ranges (pH<2.0) and (pH>12.5) at the conclusion of the lab process must be managed as hazardous waste. The coagulation-flocculation (CF) process is a versatile method used either alone or combined with biological treatment, in order to remove suspended solids and organic matter as well as providing high color removal in wastewater. Likewise, coagulation followed by flocculation process is an effective way of removing high concentration of organic pollutants. Ozonation is one of the chemical processes in which the mechanism of ozone is used to transform harmful chemicals into less harmful compounds. However, chlorination may also be adopted if the ozonation facility is not available. It has been used for the disinfection, oxidation of inorganic and organic compounds, including taste, odour, colour and particle removal. In this technology, the treatment is carried out in a batch process. In this process pH is adjusted followed by ferric sulphate dose, stirring time is 2 minutes at 500 rpm, and after settling of flocs, ozonation/ chlorination is carried out of clarified water for 1.

5.9 Turnaround time

5.9.1 Timely results of tests are key in the timely and comprehensive management of testing the water samples. The state government should measure and monitor turnaround time of test reports. For an accurate analysis of the turnaround time for laboratory services, the starting point should be the time of sample collection at the water quality laboratories where the tests are prescribed. The endpoint should be the printing of reports at the laboratories or receipt of electronic report at the laboratories (if printing facility not available at the laboratories). **It is recommended that the turnaround time for testing the chemical parameters should not**

exceed more than 24 hours, whereas for testing the biological parameters, the turnaround time should not exceed more than 48 hours.

5.9.2 It is recommended that the state government keeps a close watch on the turnaround time for each kind of test at a different level of laboratories. The State/ UT government should also ensure that a root cause analysis for delays in test results for a particular and take necessary actions to plug those gaps.

5.9.3 The online application will also be used to monitor the turnaround time, which tracks the sample status almost instantaneously. For overcoming delays in the turnaround time, the State/ UT government should ensure that the laboratories continually work on improving operational efficiency and monitor turnaround time at every level.

5.10 Tariff for testing the water samples

5.10.1 NJJM intends to create an inclusive and equitable water quality testing system where stakeholders can test their water sample at an affordable cost. A suggestive list of cost for testing the parameters is given in **Annex VII**.

5.11 IEC activities

5.11.1 The state government should hire an appropriate agency to carry out IEC activities for

creating awareness about water quality among the public. The State should get the information, education and communication (IEC) plan prepared (materials for TV, radio, newspaper advertisements, banners, handouts etc.) for enabling the public to get their water quality tested in the labs. Also, standardised display boards/signage for water quality parameters list of tests, timings of services etc. to be designed which should be installed in prominent places near the lab.

5.11.2 In order to assure about the quality of water supply, the State to make such an arrangement that raw water quality and treated water quality may be displayed digitally in prominent places. If the water is taken from the surface water, the quality index of that raw water may also be displayed.

5.11.2 Other suggestive list of training and IEC activities are as under

i.) display of details of nearest water quality testing lab in prominent locations in villages/ blocks/ districts;
ii.) water quality training of departmental stakeholders, Gram Panchayat and/ or its subcommittee, i.e. VWSC/ Paani Samiti/ User Group, etc., ISAs, PRIs, village level technicians, etc.;
iii.) awareness generation on water quality issues, water-borne diseases and health impacts;
iv.) water safety planning;
v.) behavioural change communication on 'strictly avoiding water from quality-affected source';
vi.) inter-personal communication (door to door contact) on the importance of good quality drinking water in nutrition;
vii.) audio-visual publicity on ill effects of consuming contaminated water, the importance of sanitary inspection, the process of getting private water quality sources tested, etc.;
viii.) wall writings promoting tap water as- 'it is free from contamination';
ix.) slogans, group meetings, street play, etc.;
x.) to sensitize public on water quality issues, maps indicating block-wise groundwater quality to be put up on display in GP buildings, block and district offices;
xi.) in areas with Fluoride and Arsenic contamination, it has been observed that lack of nutrition and health further compounds the problem. Convergence with departments handling nutrition and health in rural areas to be explored and efforts to be made to raise awareness on contamination-wise Dos and Donts. IEC material in vernacular language to be prepared and disseminated.

5.12 NABL accreditation

5.12.1 Out of 2,033 different level of laboratories in the country, only 66 laboratories are NABL accredited. Under JJM, all the laboratories are to be NABL accredited. The infrastructure and processes of water testing laboratories should comply with NABL standards and protocols. The details are in the **Annex-VIII**.

5.12.2 NABL has developed a Jal Prayogashaala Accreditation Portal (JPAP) (https://nablwp.qci.org.in/Account/RegisterWaterScheme) for government water testing laboratories under Ministry of Jal Shakti, Government of India. This portal for the accreditation of government water testing laboratories as per ISO/ IEC 17025: 2017, on the one hand, will provide ease of access in terms of convenience in submitting an application for parameters which are very basic to any water testing laboratory such as pH, taste, colour, odour, turbidity, Calcium, Magnesium, total hardness, total alkalinity, Coliform, E. coli etc. and on the other hand has windows for scaling up whereby laboratories can opt for more typical parameters as relevant for a region. The aim is to help laboratories even at district and sub-district level in the country to establish their competence at par with any laboratory at the national level. Government laboratories while applying through this portal will have access to standard formats in terms of test methods, certified reference materials, instruments etc. as relevant to each parameter.


National Accreditation Board for Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

CERTIFICATE OF ACCREDITATION

DAKSHIN RAIPUR WATER TREATMENT PLANT LABORATORY

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

Dongaria, South 24 Paraganas, West Bengal

in the field of

TESTING

Certificate Number TC-7290

Issue Date 13/05/2018

Valid Until 12/05/2020

Signed for and on behalf of NABL

Anil Dalia
Chief Executive Officer

5.12.3 The accreditation will ensure a seamless improvement in terms of resources and competence of the laboratories in years to come and help laboratories generate valid results and finally ensure that drinking water supplied in every household in India is safe for consumption. The process will encourage this sector to come forward so that the general public has access to accredited laboratories in every nook and corner of the country with ease.

6. Integration of Laboratories with Water Quality Management Information System

The Indian Council of Medical Research (ICMR) has developed a robust online portal on CoViD-19 test monitoring information system with a clear data flow protocol. Using the system, the CoViD-19 testing laboratories transfer the test results to the tested person, State and National databases and concerned local official for surveillance and record. Similarly, NJJM, in partnership with ICMR, has developed an online portal on Water Quality Information Management System(WQMIS). The benefits of WQMIS are as follows:

i.) automated data flow of water sample test results which can help in assuring the safe supply of drinking water;
ii.) initiate remedial action in case if samples tested are beyond prescribed values;
iii.) easy management of inventories, human resources and financial transaction of the laboratories;
iv.) Obtaining NABL accreditation online;
v.) access to all stakeholders to the nearest laboratories through online mode.

The major features of this portal are as follows:

i.) all the laboratories in the State/ UTs will be registered and mapped in the portal;
ii.) every State/ UT shall have a 'Super Admin' who will do the registration of all the laboratories (State/ District/ Block/ Sub-divisional/ Mobile level laboratories) and also nominate a laboratory in-charge;
iii.) one among the five women trained to perform the FTK test in every village would be registered in the online portal by the block / sub-divisional laboratory in-charge to upload the FTK test results;
iv.) uploading the details of the water sample and the test results;
v.) uploading the inventory, human resources and fees collected by the respective laboratory;
vi.) if the water sample tested is found to be contaminated, an automated alert will be sent to concerned State PHED official to initiate remedial action;
vii.) in case of repeated/ severe contamination of test samples, an automated alert will send to concerned district health officer to initiate public health risk assessment.

Figure 4 Workflow for FTK test

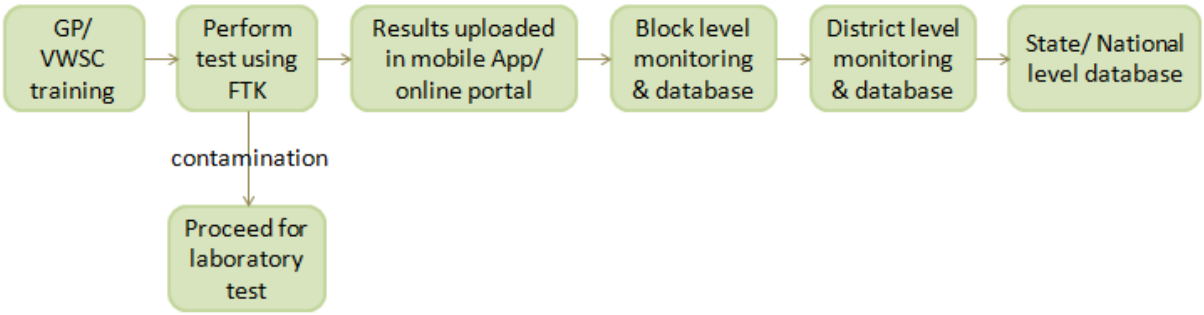
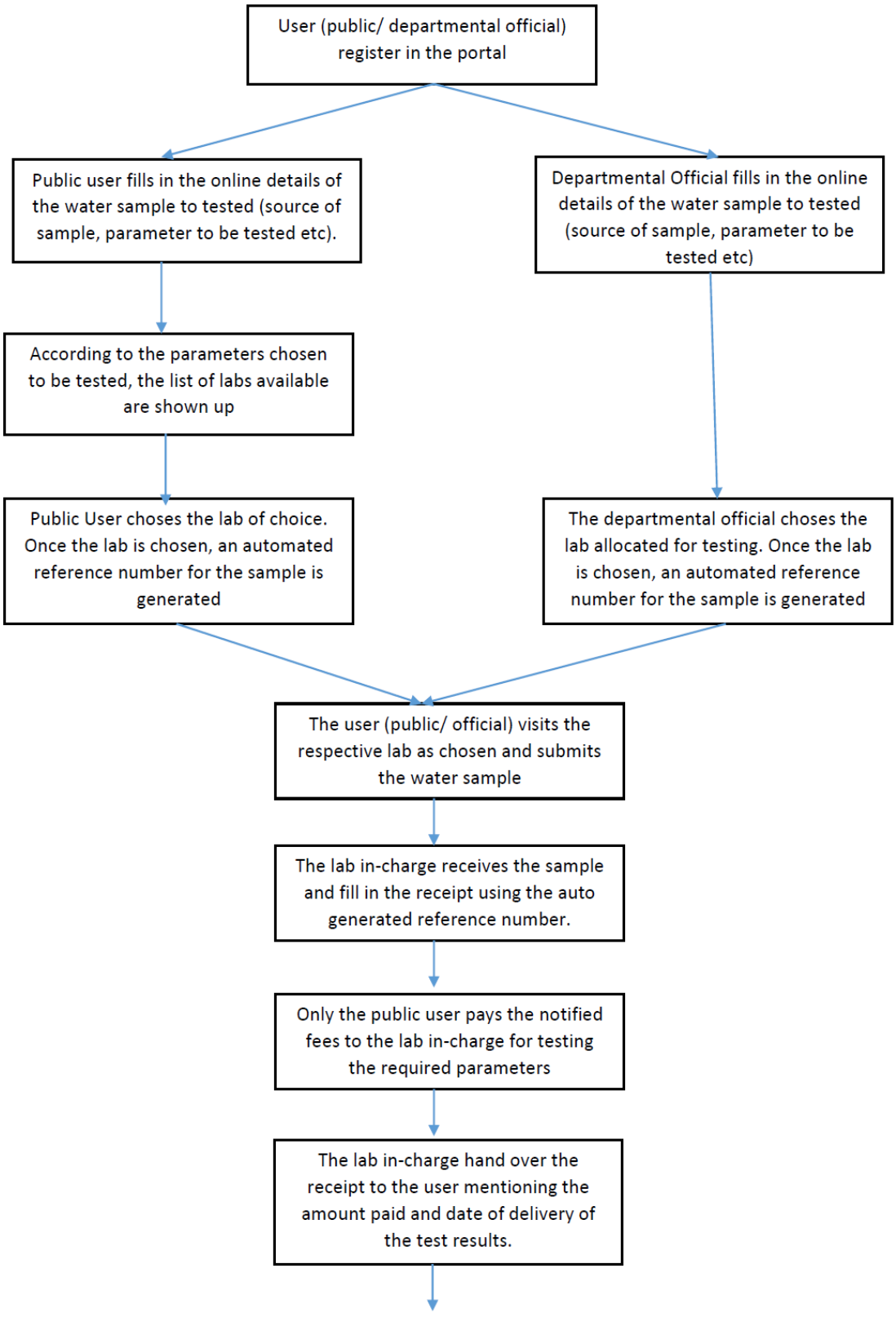
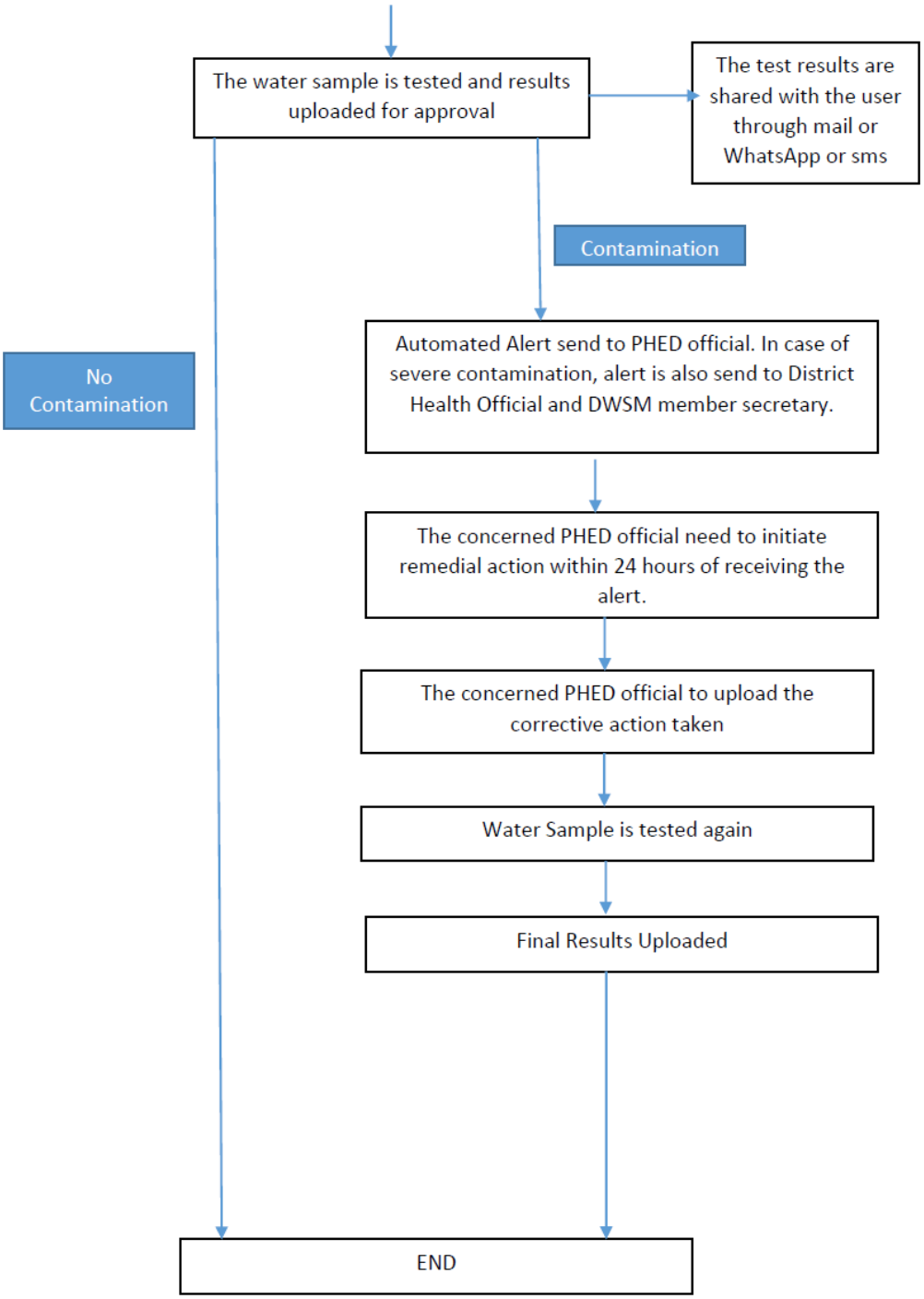


Figure 5 Workflow for laboratory testing

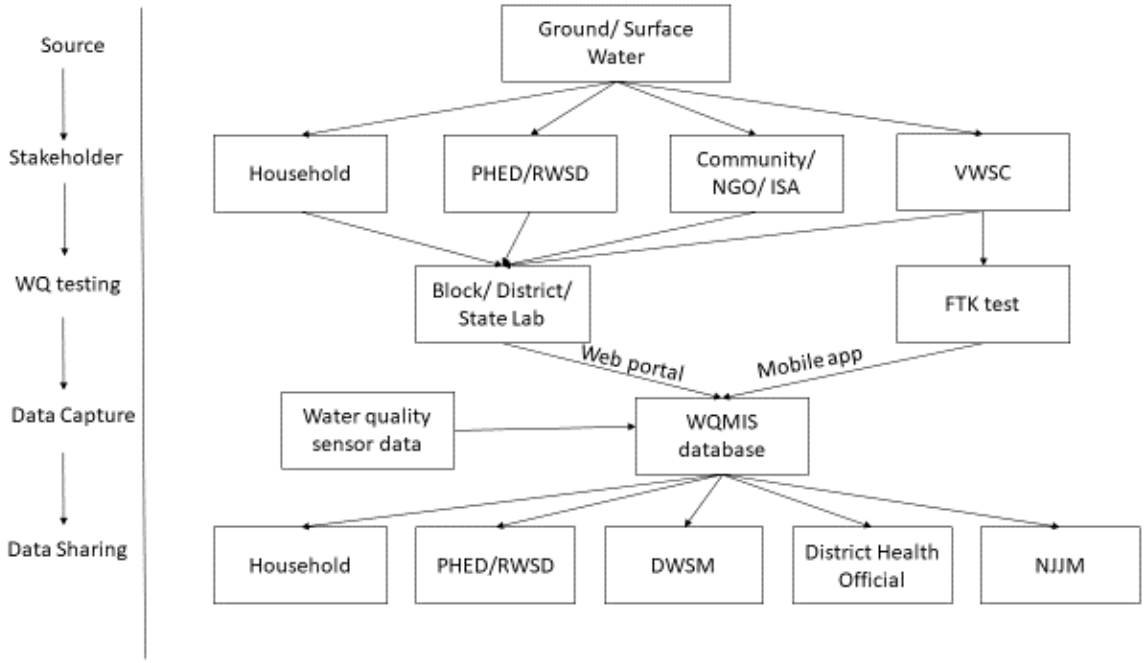

User (public/ departmental official) register in the portal
Public user fills in the online details of the water sample to tested (source of sample, parameter to be tested etc).
Departmental Official fills in the online details of the water sample to tested (source of sample, parameter to be tested etc)
According to the parameters chosen to be tested, the list of labs available are shown up
Public User choses the lab of choice. Once the lab is chosen, an automated reference number for the sample is generated
The departmental official choses the lab allocated for testing. Once the lab is chosen, an automated reference number for the sample is generated
The user (public/ official) visits the respective lab as chosen and submits the water sample
The lab in-charge receives the sample and fill in the receipt using the auto generated reference number.
Only the public user pays the notified fees to the lab in-charge for testing the required parameters
The lab in-charge hand over the receipt to the user mentioning the amount paid and date of delivery of the test results.


The water sample is tested and results uploaded for approval
The test results are shared with the user through mail or WhatsApp or sms
Contamination
No Contamination
Automated Alert send to PHED official. In case of severe contamination, alert is also send to District Health Official and DWSM member secretary.
The concerned PHED official need to initiate remedial action within 24 hours of receiving the alert.
The concerned PHED official to upload the corrective action taken
Water Sample is tested again
Final Results Uploaded
END

6.1 Data sharing and remedial action

Once WQMIS is integrated, there will be generation of considerable volume of data on water quality of different drinking water sources. These data can be standardised, which will enable the integration of collected drinking water quality data. The FTK test data, water quality sensor data from smart water supply system (if available) and water sample test results collected from different laboratories can be integrated to derive a comprehensive picture of the water quality of water sources. Also, if the water quality data of a particular sample shows severe contamination levels[18], an alert will be sent to concerned district health official so that immediate medical attention is given to the affected population. Also, alert to the concerned Executive Engineer of PHE department will be sent for detection of source of contamination , to take immediate remedial measures on time.

Figure 6 Data Sharing framework



The data sharing can help in taking the following actions:

i.) **Information action**: The Laboratory in-charge will perform the data analysis of the test results to map the contaminated water sources. All such identified contaminated water sources information will be available for all the stakeholders.

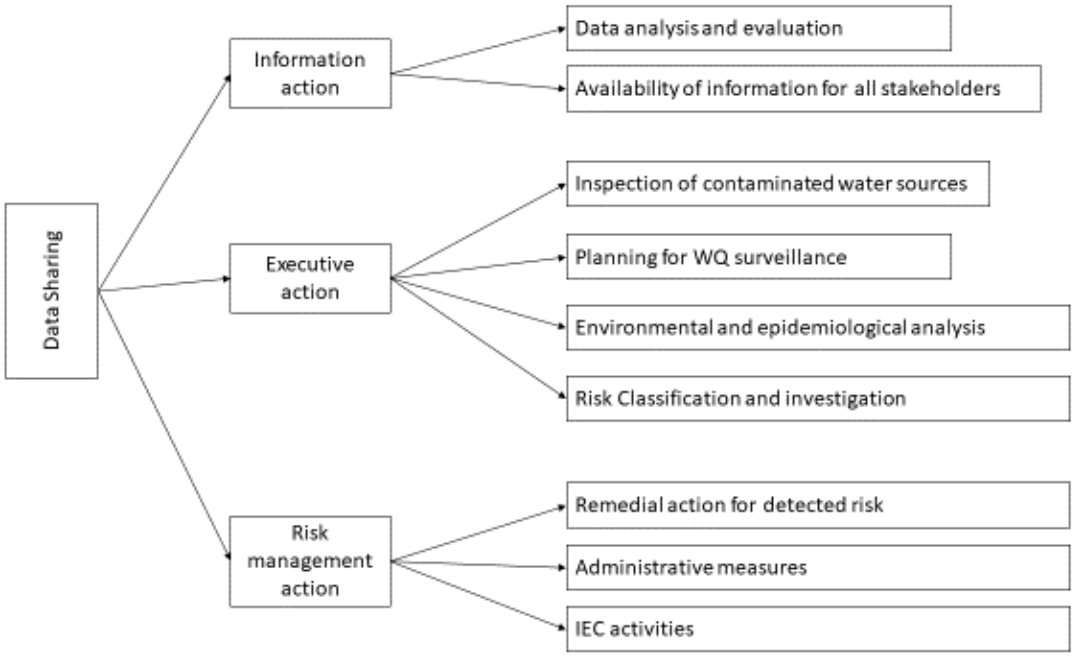
ii.) **Executive action**: Remesial action by the concerned Executive Engineer of PHE or Rural Water Supply department. The respective VWSC should undertake water quality surveillance activity of such contaminated water sources. If severe biological and chemical contamination is identified, the district health official should undertake a detailed environmental and epidemiological analysis and classify the risk accordingly for initial remedial actions.

iii.) **Risk Management action**: In order to manage the risk emanating due to water quality, it is necessary to classify the health risk with the assistance of health department. Once

[18]To be defined separately

the classification of the risk is done, suitable remedial action in the form of alternate safe water source need to be identified . In case if the contamination caused by an individual or by industrial bodies etc., necessary administrative measures need to be taken as per the legislation in vogue to stop such contaminations immediately. If the community causes the contamination due to their lifestyle habits (leading to spread of JE-AES), appropriate IEC activities should be taken up to raise awareness.

Figure 7 Risk Management framework



7. Monitoring and evaluation

7.1 National Jal Jeevan Mission

Under WQMIS, a centralised dashboard will be created at the National level to monitor all the laboratory operations and to visualise the testing result data.

7.2 State-level

A dashboard for the Super Admin at the State/ UT level has been developed in WQMIS. Following are the features of the dashboard:

i.) list of water samples received and test done at all the laboratories;
ii.) the status of the remedial action taken to provide safe drinking water;
iii.) a real-time map showing the status of potability of each water source in the State/ UT;
iv.) generation of daily, weekly, and monthly MIS data analytics and reports (in the form of statistical reports, charts and data summary visuals) for better monitoring and supervision;
v.) the operational status of every laboratory (working/ non-working/ condition of equipment's/ quantity of reagents/ human resources);
vi.) status of NABL accreditation of the laboratories.

7.3 District level

The WQMIS dashboard for district lab in-charge would enable to monitor all the block/ Sub-divisional level laboratories. The dashboard will have the following features:

i.) list of water sample received and test done at each district/ block/sub-divisional laboratory as well as FTK test conducted at village level;

ii.) the status of the remedial action taken to provide safe drinking water within the district jurisdiction;
iii.) a real-time map showing the status of potability ofeach water source in the district will be displayed;
iv.) the operational status of all block/ sub-divisional laboratory (working/ non-working/ condition of equipment's/ quantity of reagents/ human resources);
v.) status of NABL accreditation of laboratories under it's jurisdiction.

7.4 Block/ sub-divisional level

The WQMIS dashboard for the block/ sub-divisional level laboratory will be created in WQMIS. The dashboard will have the following features:

i.) list of water sample received and test done at each block/sub-divisional laboratory as well as FTK test conducted at village level;
ii.) the status of the remedial action taken to provide safe drinking water within the block jurisdiction will be displayed;
iii.) a real-time map showing the status of potability ofeach water source in the block;
iv.) the operational status of all block/ sub-divisional laboratory (working/ non-working/ condition of equipment's/ quantity of reagents/ human resources);
v.) status of FTK at each village within the Block;
vi.) status of NABL accreditation of all the of laboratories under it's jurisdiction.

7.5 Village level

A dashboard for the VWSC or Paani Samiti in WQMIS will have the following features:

i.) status of FTK testing at the village;
ii.) health Status of the drinking water sources;
iii.) number of samples tested from the village (both departmental and Public).

7.6 Star Ratings of laboratories

The mission would undertake star rating of laboratories and award the labs that have performed well in the previous year. The criteria for the rating are at **Annex IX.**

7.7 Financial Monitoring

Up to 2% of the overall fund allocated to the States/ UTs (both Central and State share under the mission) is provided for water quality monitoring and surveillance activity. As of now, this fund is disbursed along with the coverage component. In future, WQMS fund will be disbursed separately. The Annual Action Plan under Jal Jeevan Mission will have a separate focus on WQMS.

8. Futuristic water quality management

In most of the rural areas, the primary source of drinking water is groundwater. However, due to the depleting groundwater level, surface water use is on the rise. For both groundwater and surface water-based rural drinking water schemes, it is vital to measure the biological and chemical contaminations to ascertain the safety of the water quality. Also, in groundwater based schemes, it is critical to measure the geogenic contaminations like Arsenic, Fluoride etc. It is observed that people do chlorination to eradicate biological contaminations, and further, they add alum to bring down the total dissolved solids.

Presently, households who are getting piped water in their home hardly have any means to test the potability of the piped water easily and quickly. In the health sector, to improve the ease of living and to empower individuals, many devices are in useto check various health parameters like blood sugar, blood pressure, pulse-oximeter and pregnancy kit etc. However, a portable

device to test the water quality for parametersis not commonly available in the open market. To facilitate people to test the piped water at home and assure potability of water, there is a need for suitable devices which households can use to test the quality of tap water. JJM has launched a challenge to encourage start-up and reputed firms to develop portable devices to test the quality of piped water quickly and accurately.

To capture the functionality, it is proposed to implement 'sensor-based monitoring system' that collects data from field locations, transmits to the central server that can be used to monitor the functionality at a central location in States. From this, the data is to be pulled up at Mission level in GoI. The idea is to monitor KPIs, ensure a quick response, minimum service delivery outage, minimum water loss, and monitor the quantity and quality on a long-term basis. The additional advantage of this data would be to analyse the demand pattern of the user groups over time and use this information for demand management at the aggregate level, minimise non-revenue water, ensure proper management and effective operation and maintenance of water supply systems in the villages . IoT based remote monitoring would benefit all stakeholders (government, utility, and citizens) across multiple dimensions like economic, social, environmental and health & safety.

Additionally, the mission guidelines highlight the importance of "developing a utility mindset to focus on service delivery". This shift can be achieved by designing "sustainable O&M of the systems, undertaking water budgeting and audits at regular intervals, cost recovery, reducing the energy charges by adopting conjunctive use of water as well as the use of conventional and non-conventional energy specifically solar, measuring the water withdrawal and accounting for the same, addressing the grievances proactively, etc. The utility approach would enable the States to adapt the entrepreneurship model for water quality management.

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Annex I

List of Parameters to be monitored at each level of labs

Parameters	State Lab	District lab	Sub- divisional/ Block Lab
Physical Parameters			
Temperature	Yes	Yes	Yes
Colour	Yes	Yes	Yes
Odour	Yes	Yes	Yes
Taste	Yes	Yes	Yes
Turbidity	Yes	Yes	Yes
*p*H	Yes	Yes	Yes
Chemical Parameters			
TDS/Elect.Conductivity	Yes	Yes	Yes
TotalAlkalinity	Yes	Yes	Yes
Chloride	Yes	Yes	Yes
Fluoride	Yes	Yes	Area Specific*
Ammonia	Yes	Yes	No
Nitrate	Yes	Yes	Yes
Nitrite*	Yes	No	No
Sulphate	Yes	Yes	Yes
Silica	Yes	No	No
Potassium	Yes	Area Specific*	No
Boron*	Yes	No	No
Calcium(asCa)	Yes	No	No
Magnesium (asMg)	Yes	No	No
TotalHardness	Yes	Yes	Yes
Sulphide	Yes	No	No
Chloramines ($asCl_2$)	Yes	No	No
Heavy Metals			
Iron	Yes	Yes	Area Specific*
Manganese	Yes	Area Specific*	Yes
Copper	Yes	Area Specific*	No
TotalChromium(asCr)	Yes	Area Specific*	No
Cadmium	Yes	No	No
Lead	Yes	Area Specific*	No
Nickel	Yes	Area Specific*	No
TotalArsenic(asAs)	Yes	Yes	Area Specific*
Mercury	Yes	Area Specific*	No
Barium	Yes	Area Specific*	No
Zinc	Yes	Area Specific*	No
Aluminum*	Yes	Area Specific*	No
Selenium	Yes	Area Specific*	No
Silver	Yes	Area Specific*	No

Molybednum(asMo)	Yes	No	No
Biological Contaminations			
Totalcoliformbacteria	Yes	Yes	Yes
E.coli/Thermotolerant coliformbacteria	Yes	Yes	Yes
Virus:*V.cholera, S.typhi, S.dysentrae, Staphiloccocus, F.streptococci, G.lamblia*	***	No	No
Specific Parameters			
Total PesticideResidue	Yes	No	No
Radioactiveelements	**	No	No
Cyanide	Yes	No	No
PolyAromaticHydrocarbons (PAH)	Yes	No	No
FreeResidualChlorine	Yes	Yes	Yes
PolychlorinatedBiphenyls	Yes	No	No
N-Nitrosodimethylamine (NDMA)	Yes	No	No
AnionicDetergents (asMBAS)	Yes	No	No
Oils&Grease	Yes	Yes	No
DissolvedOxygen(DO)	Yes	Yes	No
BiochemicalOxygen Demand(BOD)	Yes	Yes	No
Chemical OxygenDemand (COD)	Yes	Yes	No
Mineraloil	Yes	No	No
PhenolicCompound (asC_6H_5OH)	Yes	No	No
Trihalomethanesa.Bromoform b.Dibromomethane c.Bromodichloromethaned.Chloroform	Yes	No	No
Individual Pesticide			
Alachlor	Yes	No	No
Atrazine	Yes	No	No
Aldrin/Deildrin	Yes	No	No
AlphaHCH	Yes	No	No
BetaHCH	Yes	No	No
Butachlor	Yes	No	No
Chloropyriphos	Yes	No	No

DeltaHCH	Yes	No	No
2,4-Dichlorophenoxyacetic acid	Yes	No	No
Dichlorodiphenytri-chloroethane(DDT)	Yes	No	No
Endosulfan(alpha,betaand sulphate)	Yes	No	No
Ethion	Yes	No	No
Gamma–HCH(Lindane)	Yes	No	No
Isoproturon	Yes	No	No
Malathion	Yes	No	No
Methyl parathion	Yes	No	No
Monocrotophos	Yes	No	No
Phorate	Yes	No	No
Uranium	Yes	No	No
TotalOrganicCarbon(TOC)	Yes	No	No
Total number of parameters to be monitored	**73**	**23 + 12 Area Specific***	**16 + 03 Area Specific***

*Area Specific parameter is to be tested on past history of occurrence / district water quality profile prepared by central and/or state agency / Water quality reports prepared by reputed institutions viz academic / research / NGOs etc, Scientific journals indexed under Science Citation Index (SCI).

**TobeconvergedwithAtomicMineralsDirectorate/BARC/PRL/BRITandotherDAEapprovedlaboratories.Alternatively,BARC/ BRIT can be requested to provide technical supporting providing uranium testing facility by upgrading existing laboratories.

*** Viral parameters may be got analysed at any NABL accredited lab/at anyinstitute of repute.

The suggestion of "No" above is only general in nature.Depending upon the occurrence of different parameterslocally,thesamemaybemonitoredregularly.Theabovelistofparametersissuggestivein nature.Statemaytherefore; analyses suchparameterswhichareof localimportance.

#StatelaboratoriesmaymonitorDissolvedOxygen (DO),BiochemicalOxygenDemand (BOD)and ChemicalOxygenDemand (COD)insurfacewaterifeutrophicationisobserved/reported.These parametersmayalsobeofimportanceatthedownstreamofindustrialareas/discharge oftreated/ partiallytreated/untreatedsewagefromurbanlocalbodies.

Annex IA

Role and responsibilities of laboratory personnel

S.No.	Role/ designation	Responsibilities
1.	Chief Chemist / Chief Water Analyst	i.) Overall, in-charge of all the drinking water quality testing laboratories set up in the State; ii.) Plan, guide & support for NABL Accreditation of laboratories in the State/ District/ Sub-Division/ Block levels; iii.) Upkeep of the central repository of water quality analysis manual, and other related documentation for smooth functioning State laboratories; iv.) Prepare Standard Operating Procedures (SOPs) for proper sampling techniques, i.e. collection, preservation, transportation, analysis, reporting and data interpretation of test results; v.) Prepare Annual Action Plan for an effective WQM&S, both for basic and newly emerging parameters; vi.) Ensure proper AMC/ CAMC of instruments/ equipment following approval from competent authority duly adopting procedural formalities as per State Government rules; vii.) Ensure timely procurement of chemicals/ glassware/ consumables after approval from the competent authority and adopting procedural formalities as per State Government rules. Render guidance to the chemist at district/block level laboratories; viii.) Ensure proper calibration of all instruments/ equipment using Certified Reference Material (CRM) as per "IS/ISO/IEC 17025:2017"; ix.) Communicate the test results regularly and recommend corrective actions to Engineer-in-Chief/ Chief Engineer of the department; x.) Ensure compilation/ validation of water treatment technologies and corrective actions. Ensure the same is carried out district/block level laboratories. xi.) Ensure cross-verification of test results, quality control and safety in labs at all levels. Render support/trainings to other concerned in the laboratory at frequent intervals.

S.No.	Role/ designation	Responsibilities
		xii.) Supervise and guide reporting staff on sampling, water quality analysis, data analysis, identification of standard corrective actions based on water quality analysis data. xiii.) Ensure correctness of data uploaded on JJM IMIS. xiv.) any other task in the interest of ensuring safe drinking water supply.
2.	Sr. Chemist / Sr. Water Analyst/ Sr. Microbiologist	i.) Render proper assistance to the Chief Chemist in proper upkeep of the laboratory as stated above; ii.) Provide guidance to the Chemists and microbiologists at district and sub-divisional/ block level labs; iii.) Handling of advanced water testing instrumentation in the State level laboratory; iv.) Ensure testing of targeted samples of State laboratory; v.) Analyse sanitary surveillance data after selective field checks; vi.) Any other task in the interest of proper water quality management in the State.
3.	Chemist/ Water Analyst/ Microbiologist	i.) Render proper assistance to the concerned reporting officer for achieving the targets set for water quality testing; ii.) Implementation of proper sampling techniques, i.e. collection, preservation, transportation and analysis of physio-chemical and microbiological parameters; iii.) Up-dation of water quality data on IMIS regularly; iv.) Fumigate periodically to maintain the sanctity of the microbiological laboratory; v.) Any other task in the interest of proper water quality management in the State.
4.	Jr. Chemist/ Jr. Microbiologist	i.) Render proper assistance to the concerned reporting officer for achieving the targets set for water quality testing; ii.) Implementation of proper sampling techniques as collection, preservation, transportation and analysis of physio-chemical and microbiological parameters; iii.) Ensure proper upkeep of the lab; iv.) Any other task in the interest of proper water quality management in the state.
5.	Laboratory Assistant	i.) Prepare reagent solutions and assist Chemist and Microbiologist in carrying out analysis; ii.) Any other task assigned by the Chemist/ Microbiologist.
6.	Data Entry Operator	i.) Timely entry of water quality data into the IMIS formats;

S.No.	Role/ designation	Responsibilities
		ii.) He/ She is to keep a record of all of the samples collected and analysed in the laboratory on computer; iii.) Any other task assigned by the Chemist/ Microbiologist.
7.	Field Assistant	i.) Collection, preservation, transportation, proper labelling and storing of samples in the laboratory; ii.) Any other task assigned by the Chemist/ Microbiologist.
8.	Laboratory Attendant	i.) Cleaning of glassware and help in maintaining the laboratory in clean condition; ii.) Any other task assigned by the Chemist/ Microbiologist.

Annex II

Standard methods and chemical required

S. No.	Parameters	Standard Methods	Chemical Required
Physical Parameters			
1.	Temperature		
2.	Colour	Visual comparison method	Potassium ChloroplatinateCrystallised Cobaltous Chloride Conc. Hydrochloric acid
3.	Odour	Threshold water rest	
4.	Taste	Flavour Rating Assessment	NaCl
5.	Turbidity	Nephelometric method	Hydrazine sulphate Hexamethylenetetramine
6.	pH	Electrometric method	pH 4 buffer tablet pH 7 buffer tablet pH 9.2 buffer tablet
7.	TDS/Elect. Conductivity	Instrumental method	Potassium Chloride
8.	Total Alkalinity	Titration method	Sulphuric acid Phenolphthalein indicator Mixed indicator
9.	Chloride	Argentometric method	Sulphuric acid Phenolphthalein indicator Sodium Chloride
10.	Fluoride	Ion selective electrode method Sodium 2- (parasulphophenylazo)-1,8-dihydroxy-3,6-naphthalene disulphonate (SPADNS) method	Sodium Fluoride Total Ionic Strength Adjustment Buffer (TISAB) CDTA Ammonium Acetate Conc. Hydrochloric acid Conc. Sulphuric acid Silver sulphate SPADNS solution Zirconyl acid reagent: Zrocl2.8h2o & Conc. HCL Sodium arsenite

S. No.	Parameters	Standard Methods	Chemical Required
11.	Ammonia(as total ammonia-N) mg/l (Analysis required for surface water only)	As mentioned in IS 3025 (part34) Distillation followed by analysis by Phenate method on visible Spectrophotometer at 640nm with a light path of cm or greater as mentioned in IS 3025(part340). The Nesslerization method which has also been mentioned in IS 3025(part 34) should be avoided due to use of Mercury salt.	Phenol solution Sodium Nitroprusside Trisodium citrate Sodium Hydroxide Anhydrous Ammonium Chloride
12.	Nitrate	1. Chromotropic acid method 2. Devarda's alloy reduction method	Urea, Anhydrous sodium sulphate, Antimony metal, Choromotropic acid, Sulphuric acid concentrated, Kjeldahl assembly, Sodium Hydroxide, Devarda's alloy Borate buffer
13.	Nitrite*	Colorimetric method	Sulphanilamide reagent: sulphanilamide& conc. HCL 500 mg N-(1-napthyl)-ethylenediamine Sodium Oxalate Sodium nitrate
15.	Sulphate	Turbidimetric method	Barium chloride crystals, 20-30 mesh. Anhydrous sodium sulphate Magnesium chloride Sodium acetate Potassium Nitrate Glacial Acetic Acid Glycerol
16.	Silica	Molybdosilicate Method	Sodium metasilicate Nano hydrate Sodium Bi-carbonate Sodium Bi-sulphate Sulphuric acid Hydrochloric acid Ammonium Molybdate Sodium sulphate

S. No.	Parameters	Standard Methods	Chemical Required
			1 Amino 2 Nepthy 4 Sulphonic Acid Sodium sulphate Sodium Hydroxide Oxalic acid Potassium chromate Sodium borate deca-hydrate
17.	Sodium	Flame emission photometric method	Sodium chloride
18.	Potassium	Flame photometric method	Potassium chloride
19.	Boron*	Carmine method or ICP method	Sulphuric acid Hydrochloric acid Carmine reagent
20.	Calcium (as Ca)	EDTA Titrimetric method	Sodium hydroxide Murexide indicator/Patton Reeders indicator Eriochrome Blue Black R indicator Disodium ethylenedi-amineterraacetate
21.	Magnesium (as Mg)	Preferable to calculate by Difference of total hardness and calcium hardness	
22.	Total Hardness	EDTA Titrimetric method	Buffer Solution Eriochtome black T indictor/Calgamite indicator Calcium carbonate Methyl Red Disodium salt of EDTA Conc HCI Nacl Murexide indicator. Sodium hydroxide 2N
Toxic Metals			
24.	Iron	Phenanthroline method or as per IS 15303:2002 Electrothermal atomic absorption method UV/Visible Spectrophotometer	Conc. Hydrochloric acid Hydroxylamine hydrochloride Ammonium acetate Conc. (glacial) acetic acid Sodium acetate 1, 10 – phenanthroline monohydrate

S. No.	Parameters	Standard Methods	Chemical Required
			Ferrous ammonium sulphate Conc. Sulphuric acid
25.	Manganese	AAS/ICP method/UV/Visible Spectrophotometer Persulphate Method	Mercuric sulphate Conc. Nitric acid 85% phosphoric acid Silver nitrate Ammonium persulphate Potassium permanganate Hydrogen peroxide: 30% Conc. Nitric acid Conc. Sulphuric acid Sodium nitrite Sodium oxalate Sodium bisulphate
26.	Copper	ICP/AAS/UV/Visible Spectrophotometer	Standard metal solution
27.	Total Chromium (as Cr)	ICP/AAS/ Spectrophotometer UV/Visible Spectrophotometer	Potassium dichromate Standard metal solution
28.	Cadmium	ICP/AAS/ Spectrophotometer UV/Visible Spectrophotometer	Standard metal solution
29.	Lead	ICP/AAS/ Spectrophotometer	Standard metal solution
30.	Nickel	ICP/AAS/ Spectrophotometer UV/Visible Spectrophotometer	Ammonium Sodium acetate Citric Acid Dymethylglyoxime Chloroform
31.	Total Arsenic	Silver diethyldithiocarbamate(SDDC) method using spectrophotometer (for sub district laboratory only) UV/Visible Spectrophotometer ICP/AAS/ Spectrophotometer	Anhydrous Sodium acetate Acetic acid Sodium acetate trihydrate Sodium borohydride Sodium Hydroxide Conc. Hydrochloric acid Lead acetate Silver diethyldithiocarbamate Morpholine Chloroform

S. No.	Parameters	Standard Methods	Chemical Required
			Sodium arsenite Sodium arsenate
32.	Mercury	Cold-vapor Atomic Absorption Spectrometric method / Mercury Analyser	Standard metal solution
33.	Barium*	As per IS 15302:2002Atomic absorption method ICP/AAS/ Spectrophotometer	
34.	Zinc		
35.	Aluminium*	As per IS 15303: 2002 Electrothermal atomic absorption method Eriochrome cyanine R method	Aluminium potassium sulfate Sulphuric acid Ascorbic acid Sodium acetate Acetic acid Eriochrome cyanine: R Methyl orange indicator Bromocresol green indicator EDTA (sodium salt of ethylenediamine-tetraactic acid dihydrate) Sodium hydroxide:
36.	Antimony*	As per IS 15303: 2002 Electrothermal atomic absorption method	
37.	Selenium	Spectrophotometric method (2-3 Diammino-napthalatemethod) for district laboratory AAS (hydride generation method) / ICP method	Sodium selenite Hydrogen Peroxide 3. Ammonium Hydroxide 4.DAN Solution 5.Hydroxylamine +EDTA solution Ammonium or potassium persulphate Sodium Borohydride

S. No.	Parameters	Standard Methods	Chemical Required
38.	Silver	ICP/AAS method Dithiozonemethod	Carbon tetrachloride Dithiozone solution Ammonium Thiocyanate Urea Hydroxylamine sulphate solution AgNO3 Anhydrous
39.	Molybdenum	ICP/AAS method	
40.	Barium	ICP/AAS method	
Microbiological			
41.	Total coliforms	Multiple Dilution Technique Membrane Filtration Technique Plate Count with the colony counter	M-Endo Agar Ethyl Alcohol BGLB Peotone
42.	Thermotolerant coliforms/ E.coli	MPN (Most Probable Number) or (Membrane Filtration Method)	M-FC Agar Rosolic Acid EMB Agar MacConkey Agar/Broth
43.	MS2 phase (Virological contamination)	Polymerase Chain Reaction (PCR) Method (as mentioned in Annex B, Clause 4.2.7, IS10500:2012)	Aluminium chloride HCl/NaOH (extra-pure) Sodium phosphate dibasic Sodium dihydrogen phosphate monohydrate Citric Acid L-Arginine Urea-Arginine Phosphate Buffer Magnesium Chloride McIlvaines Buffer (pH 5.0)
44.	V.cholra, S.typhi, S.dysentrae, Staphiloccocus, F.streptococci, G.lamblia testing – Optional, may be included in the State level Laboratory	1. MultipleDilutionTechnique 2. Membrane Filtration Technique	TCBS Agar XLD Agar Bismuth Sulphite Agar Salmonella Shigella Agar KF Streptococcus Agar Mannitol Salt Agar Lactose Lauryl Tryptose broth
Specific parameters			
45.	Pesticide Residues	HPLC/GC-MS USEPA method	

S. No.	Parameters	Standard Methods	Chemical Required
46.	Radioactive elements	To be analysed by outsourcing to GOI approved laboratory as per IS 14194 for following: Gross beta activity measurement (Part 1: 1994) Gross alpha activity measurement (Part 2: 1994)	
47.	Cyanide	Cyanide-Selective Electrode method	Potassium cyanide Sodium hydroxide Potassium nitrate Potassium hydroxide
48.	Poly aromatic Hydrocarbons (PAH)*	HPLC/GS-MS	
49.	Polychlorinated Biphenyls (PCB)	HPLC/GS-MS	
50.	Chloramine	HPLC	
51.	Residual Chlorine	Iodometric method Ortho toludene method	Acetic acid, conc. (glacial) Potassium iodide Sodium thiosulphate Starch indicator Anhydrous potassium biiodate Sulphuric acid Potassium dichromate Orthotoludene
52	Phenolic compounds*	Chloroform extraction method	Phosphoric acid 5% Methyl orange Sulphuric acid Sodium chloride Chloroform Ethyl ether:, AR grade Sodium hydroxide Anhydrous Potassium bromated Potassium bromide crystals Hydrochloric acid: Sodium thiosulphate Starch solution Ammonium hydroxide Potassium monohydrogenphosphate Potassium Hydrogen phosphate

S. No.	Parameters	Standard Methods	Chemical Required
			4-aminoantipyrine Potassium ferricyanide Sodium sulphate Potassium iodide
53.	Anionic Surfactant/ Detergents/MBAS *	Metyhylene Blue Active Substances (MBAS)	Alkylbenzenesulfonate LAS) Solution Phenolphthalein Indicator solution, alcoholic Sodium Hydroxide Sulphuric acid Chloroform Methylene Blue Sodium phosphate, monobasic monohydrate, Methanol Hydrogen Peroxide
54.	Oils & Grease*	Partition-gravimetric method	Hydrochloric acid n-hexane Petroleum ether Anhydrous sodium sulphate
55.	Thihalomethanes: a. Bromoform b. Dibromomethane c. Bromodichloram-ethance	GC/MC method	Methyl Alcohol Standard solutions of Bromoform, Dibromomethane, Bromo-dichloromethane and Chloroform

S. No.	Parameters	Standard Methods	Chemical Required
	d. Chloroform		
56.	NDMA (N-NitrosodiethylAmine)	EPA Method 1625/ Isotope dilution technique and liquid–liquid extraction followed by analysis on GC/MS, Alternatively EPA Method-521	Standard Isotopic Solution of NDMA
57.	Dissolved Oxygen (DO)	Winkler Method as mentionedinIS3025(Part 38)	ManganousSulphate OtassiumFluoride Sodium Iodide Sodium thiosulphate Sodium Azide Aluminium Potassium Sulphate Starch indicator
58.	Biological Oxygen	AsmentionedinIS3025(Part 44)	All chemicals mentioned for DO analysis
59.	Chemical Oxygen Demand (COD)	AsmentionedinIS3025(Part 58)	Potassium dichromate Silver Sulphate Ferrous Ammonium Sulphate Mercury Sulphate Ferroin indicator

Annex IIA

Suggestive list of Chemicals Required at different levels of labs.

S No	Name of Chemical	State Lab	District Lab	Block/ Sub – divisional Lab
1	Acetic acid,glacial	(15x500ml)	(10x500ml)	**(6x500ml)**
1	Acetic acid,glacial	(15x500ml)	(10x500ml)	**(6x500ml)**
2	Alizarin RedS	(2x500g)	(1x500g)	**(1x500g)**
3	Ascorbicacid	(5x100g)	(3x100g)	**(2x100g)**
4	Absolutealcohol	(10x500ml)	(7x500ml)	**(5x500ml)**
5	AluminiumPotassium Sulphate	(5x500g)	(3x500g)	**(2x500g)**
6	AmmoniumAcetate	(10x500g)	(7x500g)	**(5x500g)**
7	AmmoniumChloride	(10x500g)	(7x500g)	**(5x500g)**
8	AmmoniumHydroxide	(15x500g)	(10x500g)	**(7x500g)**
9	AmmoniumPurpurate/Muroxide	(7x100g)	(5x100g)	**(3x100g)**
10	ArsenicTrioxide	(5x500g)	(4x500g)	**(2x500g)**
11	BariumChloride	(15x500g)	(12x500g)	**(10x500g)**
12	Bromocresolgreenindicator	(5x100g)	(3x100g)	**(2x100g)**
13	BoricAcid	(4x500g)	(3x500g)	**(2x500g)**
14	CalciumChloride(fused)	(7x500g)	(5x500g)	**(5x500g)**
15	CalciumChloride	(4x500g)	(3x500g)	**(2x500g)**
16	EthyleneDiamineTetraaciticAcid(EDTA)	(7x500g)	(7x500g)	**(7x500g)**
17	ErichromeBlackT	(5x10g)	(5x10g)	**(5x10g)**

18	Eriochromecyanine:R	(5x10g)	(3x10g)	----
19	FerrousAmmoniumSulphate	(5x500g)	(3x500g)	**(2x500g)**
20	HydrochloricAcid	(7x2.5L)	(5x2.5 L)	**(3x2.5 L)**
21	HydroxylamineHydrochloride	(5x500g)	(3x100g)	**(2x500g)**
22	HydrogenPeroxide	(5x500ml)	(3x500ml)	**(2x500ml)**
23	Electrolyticlron	(3x100g)	(2x100g)	**(1x100g)**
24	LeadAcetate	(3x500g)	(2x500g)	**(1x500g)**
25	MethylOrangeIndicator/Methyl Red indicator	(7x100g)	(5x100g)	**(5x100g)**
26	PhenolphthaleinIndicator/P&R indicator	(7x100g)	(5x100g)	**(5x100g)**
27	Potassium Hydroxide	(10x500g)	(7x500g)	**(5x500g)**
28	1-10,Phenanthroline,Monohydrate	(10x10g)	(7x10g)	**(7x10g)**
29	Potassium permanganate	(5x100g)	(3x100g)	**(2x100g)**
30	**Potassium Iodide**	**(5x500g)**	**(3x500g)**	**(2x500g)**

S No	Name of Chemical	State Lab	District Lab	Block/ Sub – divisional Lab
31	Potassium Chromate	(5x500g)	(3x500g)	**(2x500g)**
32	PotassiumHydrogenPhthalate	(3x500g)	(2x500g)	**(1x500g)**
33	StannousChloride	(5x100g)	(3x100g)	**(2x100g)**
34	Silverdiethyl-dithio-carbamate	(5x100g)	(3x100g)	-----
35	SodiumHydroxide	(10x500g)	(7x500g)	**(5x500g)**
36	SilverNitrate	(10x250g)	(7x250g)	**(5x250g)**
37	SodiumAcetate	(5x500g)	(3x500g)	**(2x500g)**
38	SodiumThiosulphate	(10x500g)	(7x500g)	**(5x500g)**
39	Starch(Soluble)	(10x500g)	(7x500g)	**(5x500g)**
40	SodiumFluoride(Anhydrous)	(5x500g)	(3x500g)	**(2x500g)**
41	SodiumArsenate	(4x100g)	(3x100g)	**(2x100g)**
42	SPADNS	(3x100g)	(2x100g)	**(2x100g)**
43	ZirconylOxychloride,Octohydrate	(5x100g)	(3x100g)	**(2x100g)**
44	SodiumSulphate(anhydrous)	(5x500g)	(3x500g)	**(2x500g)**
45	Sulphuricacid	(7x2.5L)	(5x2.5 L)	**(3x2.5 L)**
46	Sulphuricacid(Fuming)Oleum(ifspecifically required)	(5x250g)	(3x250g)	**(2x250g)**
47	SodiumChloride	(5x500g)	(3x500g)	**(2x500g)**
48	Potassium Dichromate	(5x500g)	(3x500g)	**(2x500g)**
49	CalciumCarbonate(anhydrous)	(7x500g)	(5x500g)	**(4x500g)**

50	Phenol,white	(5x500g)	(3x500g)	**(2x500g)**
51	Potassium Nitrate	(5x500g)	(3x500g)	**(2x500g)**
52	SodiumSulphate,	(5x500g)	(3x500g)	**(2x500g)**
53	pHIndicatorpaper,Range2-	(5rolls)	(3rolls)	**(2rolls)**
54	Methylatedspirit	(10x500ml)	(7x500ml)	**(5x500ml)**
55	MacConkeybroth,dehydrated(Hi-media)	(10x500ml)	(7x500ml)	**(5x500ml)**
56	TotallonicStrengthAdjustmentBuffer(TISAB)	(15x500ml)	(10x500ml)	**(7x500ml)**
57	Oxalicacid	(5x100g)	(3x100g)	**(2x100g)**
58	Silversulphate	(5x100g)	(3x100g)	**(2x100g)**
59	Sodiumarsenite	(4x100g)	(3x100g)	**(2x100g)**
60	Potassium dihydrogenphosphate	(5x100g)	(3x100g)	**(2x100g)**
61	Ammoniummolybdate	(7x100g)	(5x100g)	**(3x100g)**
62	Nitricacid	(7x2.5L)	(5x2.5 L)	**(3x2.5 L)**
63	Ammoniummetavanadate	(7x100g)	(5x100g)	**(3x100g)**
64	Anhydrouspotassiumnitrate	(5x100g)	(3x100g)	**(2x100g)**
65	Sulphanilamide	(5x100g)	(3x100g)	**(2x100g)**
66	Sodiumnitrite	(5x100g)	(3x100g)	**(2x100g)**
67	**Sodiumoxalate**	**(5x100g)**	**(3x100g)**	**(2x100g)**

S No	Name of Chemical	State Lab	District Lab	Block/ Sub – divisional Lab
68	Sodiummetasilicatenanohydrate	(5x100g)	(3x100g)	(2x100g)
69	Sodiumbicarbonate	(5x100g)	(3x100g)	(2x100g)
70	Sodiumboratedecahydrate	(5x100g)	(3x100g)	(2x100g)
71	SodiumTetraborate	(5x100g)	(3x100g)	(2x100g)
72	Glycerol	(7x100ml)	(3x100ml)	(2x100ml)
73	Potassium chloride	(5x100g)	(3x100g)	(2x100g)
74	Carmine reagent	(5x100gm)	(3x100gm)	------
75	Ammoniumsolution	(10x100ml)	(7x100ml)	(5x100ml)
76	MercurySulfate	(5x100g)	(3x100g)	(2x100g)
77	SilverNitrate	(10x250g)	(7x250g)	(5x250g)
78	Sodiumbisulphate	(5x100g)	(3x100g)	(2x100g)
79	SodiumAcetate	(10x500g)	(7x500g)	(4x500g)
80	Zincmetal	(5x100g)	(3x100g)	-----
81	Potassiumferricyanide	(5x100g)	(3x100g)	(2x100g)
82	Zincon(2-carboxy-2-hydroxy-5-sulfoformazylbenzene)	(5x100g)	(3x100g)	----
83	Methanol	(5x500ml)	(2x500ml)	(2x500ml)
84	Phosphoricacid	(5x100ml)	(3x100ml)	(2x100ml)
85	Anhydrouspotassiumbi-iodate	(5x100g)	(3x100g)	(2x100g)
86	Chloroform	(7x500ml)	(3x500ml)	(2x500ml)

87	Ethyl ether	(5x500ml)	(5x500ml)	(3x100ml)
88	Anhydrouspotassiumbromide	(5x100g)	(3x100g)	-----
89	Potassiumferricyanide	(5x100g)	(3x100g)	(2x100g)
90	AlkylbenzeneSulfonate(LAS)solution	(10x100ml)	(4x100ml)	----
91	MethyleneBlue	(5x10g)	(3x10g)	(2x10g)
92	Sodiumphosphate,monobasicmonohydrate	(5x100g)	(3x100g)	(2x100g)
93	N-hexane	(5x100ml)	(3x100ml)	(2x100ml)
94	Petroleumether	(5x100ml)	(3x100ml)	(2x100ml)
95	M-EndoAgar	(3x500gm)	(2x500gm)	(1x500gm)
96	M-FCAgar	(3x500gm)	(2x500gm)	(1x500gm
97	EMBAgar	(3x500gm)	(2x500gm)	(1x500gm)
98	MacConkeyAgar	(3x500gm)	(2x500gm)	(1x500gm)
99	TCBSAgar	(4x500gm)	(3x500gm)	(2x500gm)
100	XLDAgar	(3x500gm)	(2x500gm)	(1x500gm)
101	BismuthSulphiteAgar	(3x500gm)	(2x500gm)	(1x500gm)
102	SalmonellaShigellaAgar	(3x500gm)	(2x500gm)	(1x500gm)
103	KFStreptococcusAgar	(3x500gm)	(2x500gm)	(1x500gm)
104	MannitolSaltAgar	(5x500gm)	(3x500gm)	(3x500gm)

S No	Name of Chemical	State Lab	District Lab	Block/ Sub – divisional Lab
105	Lactose Lauryl Tryptosebroth	(3x500gm)	(2x500gm)	(1x500gm)
106	Ethyl Alcohol	(10x500ml)	(7x500ml)	(4x500ml)
107	RosolicAcid	(5x100ml)	(3x100ml)	(2x100ml)
108	Bromocresolpurple	(5x100ml)	(3x100ml)	(2x100ml)
109	TTCsolution	(5x100ml)	(3x100ml)	(2x100ml)
110	BrilliantGreenBileGrowth	(5x100ml)	(3x100ml)	(2x100ml)
111	E.C.Broth	(5x100ml)	(3x100ml)	(2x100ml)
112	LuarylSulphateBroth	(5x100ml)	(3x100ml)	(2x100ml)
113	Phosphoricacid5%H_3PO_4	(10x500ml)	(5x500ml)	----
114	Anhydrous $KBrO_3$	(3x500gm)	(2x500ml)	----
115	Sodiumarsenite($NaAsO_2$)	(4x500gm)	(2x500gm)	(2x500gm)
116	Urea	(10x500gm)	(5x500gm)	-----
117	Antimonymetal	(5x1gm)	(3x1gm)	(2x1gm)
118	Choromotropicacid	(5x100 gm)	(3x100 gm)	(2x100 gm)
119	Devarda'salloy	(10x10gm)	(5x10gm)	(3x10gm)
120	Boratebuffer	(10x500ml)	(5x500ml)	(2x500ml)
121	Anhydroussodiumsulphate	(10x500gm)	(5x500gm)	(3x500gm)
122	CCl_4	(6x500ml)	(2x500ml)	-----
123	Dithiozonesolution	(3x500ml)	(5x500ml)	----
124	NH_4CNS	(10x500gm)	(4x500gm)	-----

125	$AgNO_3$ Anhydrous	(5x100gm)	(5x100gm)	(5x100gm)
126	K_2HPO_4	(5x500gm)	(5x500gm)	(1x500gm)
127	KH_2PO_4	(5x500gm)	(5x500gm)	(1x500gm)
128	Potassiumferricyanide	(5x500gm)	(5x500gm)	(1x500gm)
129	Azomethane	(5x500gm)	------	----
130	Silverdiethyl-dithiocarbamate	(3x500gm)	(3x500gm)	(3x500gm)
131	Ammoniumorpotassiumsulphate	(4x250gm)	(3x250gm)	----
132	2-3Diaminonaphtheline(DAN)Solution	(4x100 ml)	(2x100 ml)	-----
133	Hydroxylaminesulphate	(5x500gm)	(5x500gm)	(2x500gm)
134	SodiumNitroprusside	(5x500gm)	--	--
135	Trisodiumcitrate	(5x500gm)	--	--
136	PhosphateBuffer	(3x500ml)	---	--
137	Ferroinindicator	(3x250ml)	--	--

Annex-III

A suggestive list of laboratory infrastructure

S. No.	Infrastructure	State Laboratory	District Laboratory	Sub-district Laboratory
1.	Space for Analysis (in m2)	80 (including 20 for microbiological)	60 m2 (including 20 m2 for microbiological)	50 m2 (including 10m2 for microbiological testing)
	Space for Storage (in m2)	45	25	20
	Space for office & library	45	15	10
	Total space req. (in m2)	200*	100	80
2.	No. of Computers	02 (include 1system for library)	01	01
3.	Internet	Yes	Yes	Yes
4.	No. of UPS	02	01	01
5.	Inverters (back up time=3 hrs)	02	02	01
6.	Printer	02	01	01
7.	Telephone facility	Yes	Yes	Yes
8.	Fax	Yes	Yes	Yes
9.	AC	Yes	Yes	Yes
10.	Provision for Fume hood	Yes	Yes	Yes
11.	Provision for gas connection	Yes	Yes	Yes (Only LPG)

All laboratories shall invariably adopt roof-top rainwater harvesting structure and include waste-water/ spent water treatment before being disposed off and also adopt proper SLWM (Solid and Liquid Waste Management) procedures for safe disposal of laboratory waste as per MOEF&CC/ State Government norms, etc.

Annex- IV

Suggestive List of instruments requirement in laboratories

S. No.	Item	Specification	State	District	Sub-District
1.	pH meter (both lab based and portable type)	Digital display (0-14 range)	Yes	Yes	Yes
2.	TDS/ Conductivity meter (both lab based and potable type)	Direct reading digital display	Yes	Yes	Yes
3.	Nephelometer (Turbidimeter)	Digital reading: 0-100 NTU	Yes	Yes	Yes
4.	Digital balance	Single pan Cap.200 gr Tarring device Accuracy-0.0001gm	Yes	Yes	Yes
5.	UV- Visible spectrophotometer	Should cover wavelength of important	Yes	Yes	No
6.	Refrigerator	295 Liters cap	Yes (2 nos)	Yes	Yes
7.	Water still	Stainless steel (Cap. 5 liters/h)	Yes	Yes	Yes
8.	Voltage stabilizer/ Inverters	Standard make	3 Nos	2 Nos	2 Nos
9.	Hot Plate	Big size	2 Nos	1 No	1 No
10.	Heating mantle	Cap 1 liter	Yes	Yes	Yes
11.	Water bath	Big size (12 hles) Temo 500 degree to 1000 drgree Centigrade	Yes	Yes	Yes
12.	Hot air oven	Standard make- Big Size	4 Nos	2 Nos	2 Nos
13.	Bacteriological incubator	Temp control	2 Nos	2 Nos	2 Nos

		device (Range 1 to 50 degree centigrade) Medium Size			
14.	Autoclave	Medium size steel cabinet	2 Nos	1 Nos	1 No
15.	Magnetic stirrer	With speed control and Teflon paddle	2 Nos.	1 No	1 No
16.	Microscope	Binocular	Yes	Yes	No
17.	Vacuum pump	1 hp Cap	Yes	Yes	Yes
18.	Atomic Absorption Spectrophotometer (AAS) with electrode lamp	-	Yes	No/ Yes#	No
19.	Inductively coupled plasma-optical emission spectrometry (ICP-OES)/ mass spectrometry (MS)	-	Yes	No	No
20.	UV laminar Air flow chamber for bacteriological analysis	-	Yes	Yes	Yes
21.	Plate count and colony counter	Standard make	Yes	Yes	Yes
22.	Arsenic Testing Instrumentation (portable)	-	Yes	Yes	Yes+
23.	Hydride generator with all accessories	-	Yes	Yes**	Yes+
24.	DO meter	Digital	Yes	Yes	Yes
25.	Cool box with icepacks		Yes	Yes	Yes
26.	Specific Ion meter along with electrodes (for Fluoride)	Digital	Yes	Yes	Yes
27.	Fume coup board		Yes	Yes	Yes
28.	GC-MS / HPLC/ LC-MS	Digital	Yes	No	No
29.	Auto burette and auto pipette		Yes	Yes	Yes
30.	Uranium analyser	Digital	Yes	No/ Yes*	No
31.	Thermometers	Digital	Yes	Yes	Yes
32.	Single Stage distillation apparatus	-	Yes	Yes	Yes
33.	Double distillation Apparatus/ Ultrapure Water Purification	-	Yes	Yes	Yes

	System to provide type I/type II water for sophisticated instruments				
34.	Argon, Nitrogen, Hydrogen Helium & Oxygen Gas Cylinders (To be usedwith AAS/ Advanced Spectrophotometer)/ICP-MS/ OES	-	Yes	Yes	No
35.	Kjeldal distillation apparatus	-	Yes	Yes	No
36.	Pressure Pump	-	Yes	Yes	No
37.	Membrane filtration	-	Yes	Yes	Yes
38.	PCR machine	-	Yes	No	No
39.	Deep freezer (-20 deg C)	-	Yes	No	No
40.	Micropipette	-	Yes	No	No
41.	Centrifuge	-	Yes	Yes	No
42.	Redflux Apparatus/ COD digester	_	Yes	Yes+	No
43.	Ion Chromatograph	-	Yes	No	No

Note- The equipment listing is based on the incremental approach for choosing the parameters to be tested at each level of laboratories. However, the laboratory should have necessary equipments if it testparameters specific to the areas.

#Whereverheavymetalscontamination/uraniumisfoundto behigh

** Whereverarseniccontaminationisfoundtobehigh

***Wherepesticides/uraniumaredetected

+Whereverapplicable

****TrainedandexperiencedmanpowerwithM.Sc.qualificationrequiredforoperation of thesame

Annex V

A suggestive list of glassware required

S.No	Item	State lab	District Lab	Sub-district lab
1.	Conical flask	24	16	12
	Cap. 100 ml	50	30	20
	250 ml	24	16	12
	500 ml	10	06	03
	1000 ml			
2.	Beakers	24	16	12
	Cap. 100 ml	24	16	12
	250 ml	24	16	12
	500 ml	12	08	04
	1 lt.	06	04	02
	2 lt			
3.	Pipette	12	08	04
	Cap. 5 ml	20	12	08
	10 ml	12	08	04
	20 ml	12	08	04
	25 ml	06	04	02
	50 ml	04	02	02
	00 ml			
4.	Pipette (Graduated)	06	04	02
	Cap. 1 ml	10	06	04
	5 ml	12	08	04
	10 ml	06	04	02
	20 ml			
5.	Burette (ordinary)	12	08	04
	25 ml	12	08	04
	50 ml	02	01	01
	100 ml			
6.	Burette (Automatic)	3	Not Req.	Not Req.
	Cap. 50 ml			
7.	Desiccators	6	4	3
8.	Reagent Bottles	25	20	15
	100 ml	50	35	30
	250 ml	36	24	18
	Cap. 500 ml	24	10	06
	1 lit	10	06	03
	2 lit	10	06	03

Annex VI

Sanitary Inspection form for Piped Water Supply

I. Type of Facility PIPED WATER

1. General Information: Zone: Area:
2. Code Number linked to scheme ID
3. Date of Visit
4. Water samples taken? …….. Sample Nos. ……

II. Specific Diagnostic Information for Assessment

(Please indicate at which sample sites the risk was identified) Risk Sample No

1. Do any Standposts leak? Y/N ……
2. Does surface water collect around any Standpost? Y/N ……
3. Is the area uphill of any Standpost eroded? Y/N ……
4. Are pipes exposed close to any Standpost? Y/N ……
5. Is human excreta on the ground within 10m of any Standpost? Y/N ……
6. Is there a sewer within 30m of any Standpost? Y/N……
7. Has there been discontinuity in the last 10 days at any Standpost? Y/N ……
8. Are there signs of leaks in the main pipes? Y/N……
9. Do the community report any pipe breaks in the last week?Y/N ……
10. Is the main pipe exposed anywhere in the vicinity? Y/N ……

Total Score of Risks ..../10
Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

III. Results and Recommendations:

The following important points of risk were noted : (list nos. 1-10)
Signature of surveyor:
Comments:

Sanitary inspection form for piped water with service reservoir

I. Type of Facility PIPED WATER WITH SERVICERESERVOIR

1. General Information: Zone: Area:
2. Code Number linked to scheme ID

3. Date of Visit:
4. Water samples taken? …….. Sample Nos. ……

II. Specific Diagnostic Information for Assessment

(Please indicate at which sample sites the risk was identified) Risk Sample No

1. Do any standpipes leak at sample sites? Y/N ……..
2. Does water collect around any sample site? Y/N ……..
3. Is area uphill eroded at any sample site? Y/N ……..
4. Are pipes exposed close to any sample site? Y/N ……..
5. Is human excreta on ground within 10m of standpipe? Y/N ……..
6. Sewer or latrine within 30m of sample site? Y/N ……..
7. Has there been discontinuity within last 10 days at sample site? Y/N ……..
8. Are there signs of leaks in sampling area? Y/N ……..
9. Do users report pipe breaks in last week? Y/N ……..
10. Is the supply main exposed in sampling area? Y/N……..
11. Is the service reservoir cracked or leaking? Y/N ……..
12. Are the air vents or inspection cover insanitary? Y/N ……..

Total Score of Risks ..../12
Risk score: 10-12 = Very high; 8-10 = High; 5-7 = Medium; 2-4 = Low; 0-1 = Very Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-12)
Signature of surveyor:
Comments:

Sanitary Inspection Form for Hydrants and Tanker trucks

I. Type of Facility HYDRANTS AND TANKER TRUCKS

1. General Information: Zone: Area:

2. Code Number linked to scheme ID
3. Date of Visit:
4. Is water samples taken? …….. Sample Nos. …… Thermotolerant Coliform Grade……

II. Specific Diagnostic Information for Assessment Risk

1. Is the discharge pipe dirty? Y/N……..
2. Is the discharge water dirty/ smelly/ coloured? Y/N……
3. Is the delivery nozzle dirty or in poor condition? Y/N……
4. Are there any leaks close to the riser pipe of the hydrant? Y/N……
5. Is the base of the riser pipe for the hydrant sealed with a concrete apron?.Y/N……
6. Is the tanker ever used for transporting other liquids? Y/N…….
7. Is the inside of the tanker dirty? Y/N……..
8. Does the tanker fill through an inspection cover on the tanker? Y/N……..
9. Is there direct contact of hands of supplier with discharge water? Y/N……..
10. Does the tanker leak? Y/N……

Total Score of Risks …./10

Risk score: >8/10 = Very high; 6-8/10 = High; 4-7/10 = Intermediate; 0-3/10 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-10)
And the authority advised on remedial
action Signature of surveyor:
Comments: .....

Sanitary Inspection Form for Gravity-fed Piped Water

I. Type of Facility GRAVITY-FED PIPED WATER

1. General Information: System name:
2. Code Number linked to scheme ID
3. Date of Visit
4. Water samples taken? …….. Sample Nos. ……

II. Specific Diagnostic Information for Assessment

(please indicate at which sample sites the risk was identified) Risk Sample No

1. Does the pipe leak between the source and storage tank? Y/N…….
2. Is the storage tank cracked, damaged or leak? Y/N…….
3. Are the vents and covers on the tank damaged or open? Y/N…….
4. Do any Standposts leak? Y/N …….
5. Does surface water collect around any Standpost? Y/N …….
6. Is the area uphill of any Standpost eroded? Y/N …….
7. Are pipes exposed close to any Standpost? Y/N …….
8. Is human excreta on the ground within 10m of any Standpost?Y/N …….
9. Has there been discontinuity in the last 10 days at any Standpost?Y/N …….
10. Are there signs of leaks in the main supply pipe in the system?Y/N …….
11. Do the community report any pipe breaks in the last week?Y/N …….
12. Is the main supply pipe exposed anywhere in the system?Y/N …….

Total Score of Risks …./12
Risk score: 10-12 = Very high; 8-10 = High; 5-7 = Medium; 2-4 = Low;0-1 = Very Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-12)
Signature of surveyor:
Comments: .....

Sanitary Inspection Form for Deep borehole with Mechanized Pumping

I. Type of Facility DEEP BOREHOLE WITH MECHANISEDPUMPING

1. General Information: Supply zone: Location:
2. Code Number linked to scheme ID
3. Date of Visit:

4. Water sample taken? …….. Sample No. …… E.coli/100 ml.....

II. Specific Diagnostic Information for Assessment Risk

1. Is there a latrine or sewer within 30m of pumphouse? Y/N……..
2. Is the nearest latrine unsewered? Y/N…….
3. Is there any source of other pollution within 30m? Y/N……
4. Is there an uncapped well within 100m? Y/N……
5. Is the drainage around pumphouse faulty? Y/N……..
6. Is the fencing damaged allowing animal entry? Y/N…….
7. Is the floor of the pumphouse permeable to water? Y/N……..
8. Does water forms pools in the pumphouse? Y/N……
9. Is the well seal insanitary? Y/N……..

Total Score of Risks …./9

Risk score: 7-9 = High; 3-6 = Medium; 0-2 = Low

III. ResultsandRecommendations:

Thefollowingimportantpointsofriskwerenoted:

Signatureofsurveyor:

Comments:.....
..

Sanitary Inspection Form for Borehole with Hand pump

I. Type of Facility BOREHOLE WITH HANDPUMP

1. GenerallnformationZone: Location:
3. CodeNumberlinkedtoschemeID
4. DateofVisit:
5. Water sample taken? …….. Sample No. …… E.coli/100 ml.....

II. Specific Diagnostic Information for Assessment Risk

1. Is there a latrine within 10m of the borehole? Y/N…….
2. Is there a latrine uphill of the borehole? Y/N…….
3. Are there any other sources of pollution within 10m of borehole? Y/N…… (e.g. animal breeding, cultivation, roads, industry etc)
4. Is the drainage faulty allowing ponding within 2 m of the borehole? Y/N……
5. Is the drainage channel cracked, broken or need cleaning? Y/N……..
6. Is the soakage pit missing or ponding ? Y/N…….
7. Is the apron less than 1m in radius? Y/N……..
8. Does spilt water collect in the apron area? Y/N……..
9. Is the apron cracked or damaged? Y/N……..
10. Is the handpump loose at the point of attachment to apron? Y/N……. Total Score of Risks …./10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

III. Results and Recommendations:

The following important points of risk were noted:

Signature of surveyor:

Comments:
.....

Sanitary Inspection Form for Protected Spring

I. Type of Facility PROTECTED SPRING

- General Information: Zone: Location:
- Code Number linked to scheme ID
- Date of Visit:

Water sample taken? …….. Sample No. …… E.coli/100 ml.....

II. Specific Diagnostic Information for Assessment Risk

1. Is the spring unprotected? Y/N……..
2. Is the masonry protecting the spring faulty? Y/N……..
3. Is the backfill area behind the retaining wall eroded? Y/N……..
4. Does spilt water flood the collection area? Y/N……..
5. Is the fence absent or faulty? Y/N……..
6. Can animals have access within 10m of the spring? Y/N……
7. Is there a latrine uphill and/or within 30m of the spring? Y/N……
8. Does surface water collect uphill of the spring? Y/N……..
9. Is the diversion ditch above the spring absent or non-functional? Y/N…….
10. Are there any other sources of pollution uphill of the spring? Y/N…….. (e.g. solid waste)

Total Score of Risks …./10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

III. Results and Recommendations:

The following important points of risk were noted:

Signature of surveyor:

Comments: ……

Sanitary Inspection Form for Rainwater collection and storage

I. Type of Facility Rainwater Collection and Storage

- General Information: Zone: Location:
- Code Number linked to scheme ID
- Date of Visit:

Water sample taken? …….. Sample No. …… E.coli/100 ml…….

II. Specific Diagnostic Information for Assessment Risk

1. Is rainwater collected in an open container? Y/N……

2. Are there visible signs of contamination on the roof catchment? Y/N…….. (e.g. plants, excreta, dust)

3. Is guttering that collects water dirty or blocked? Y/N…….

4. Are the top or walls of the tank cracked or damaged? Y/N……

5. Is water collected directly from the tank (no tap on the tank)? Y/N……

6. Is there a bucket in use and left where it can become contaminated? Y/N……

7. Is the tap leaking or damaged? Y/N……..

8. Is the concrete floor under the tap defective or dirty? Y/N……

9. Is there any source of pollution around the tank or water collection area?Y/N……

10. Is the tank clean inside? Y/N…….. Total Score of Risks …./10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-10)

Signature of surveyor:

Comments: .....

Sanitary Inspection Form for Piped water supply with service reservoir and mechanised pumping

I. Type of Facility :**Piped water supply with service reservoir and mechanised pumping**

- General Information: Zone: Location:
- Code Number linked to scheme ID
- Date of Visit:

Water sample taken? …….. Sample No. …… E.coli/100 ml.....

1. Does the pipe leak between the source and storage tank? Y/N…….
2. Does surface water collect around any Standpost? Y/N …….
3. Can animals have access within 10m of the reservoir ? Y/N------
4. Does open defecation is prevalent or cattle-dung is observed within 50 m of the reservoir? Y/N……..
5. Is there a sewer within 30m of any tap stand or reservoir? Y/N--------
6. Are the pipes corroded? Y/N--------
7. Are there signs of leaks in the mains pipes? Y/N…….
8. Are the reservoirs used for human and cattle bathing? Y/N--------
9. Are the buried pipes ever checked for leakage? Y/N--------
10. Are storage tanks are cleaned at specified intervals? Y/N-------- Total Score of Risks …. /10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

Results and Recommendations:

The following important points of risk were noted: (list nos. 1-10) Signature of surveyor:

Comments: .....

Sanitary Inspection Form for the source of Dugwell (Ringwell)

I. Type of Facility :**Dugwell (Ringwell)**

- General Information: Zone: Location:
- Code Number linked to scheme ID
- Date of Visit:

Water sample taken? …….. Sample No. …….. E.coli/100 ml…….

II. SpecificDiagnosticInformationforAssessmentRisk

1. Is there a latrine or sewer within 30m of the dugwell? Y/N……
2. Is the wall of the well lined properly and the well covered adequately ? Y/N……..
3. Does open defecation is prevalent or cattle-dung is found within 50 m of the ringwell? Y/N……..
4. Does the well is used for bathing and washing of clothes? Y/N----
5. Is there any water drainage facility available around platform of the well and does the drainage facility leads to water stagnation within 30 m of the wall? Y/N……..
6. Does the well have fixed stainless steel/aluminium buckets with chain pulley for drawing water? Y/N…….
7. Is the well deep? Y/N……..
8. Does the water of the well appears visibly clean? Y/N……..
9. Is there any other source of pollution within 10 m of the well? (e.g. animal breeding, cultivation, roads, industry etc) Y/N……..
10. Was the well chlorinated during last 7 days Y/N…….. Total Score of Risks ……/10

Risk score: 9-10 = Very high; 6-8 = High; 3-5 = Medium; 0-3 = Low

III. Results and Recommendations:

The following important points of risk were noted: (list nos. 1-10) Signature of surveyor:

Comments: .....

Note : The above mentioned questionnaire of the sanitary surveys is suggestive in nature. States/UTs may develop their own questionnaire as per local needs.

All the sanitary survey formats should have signature of the Surveyor and Pradhan/Sarpanch/ Chairman VWSC of the concerned Gram Panchayat.

Annex VII

Suggestive Tariff for testing water quality parameters

(In Rupees)

S. No.	Parameters	Individual Rates Recommended	Package Rates Recommended

1.	Odour	1	50
2.	Color	1	
3.	pH	1	
4.	Total dissolved solids	1	
5.	Turbidity	5	
6.	Total alkalinity	20	
7.	Total hardness	20	
8.	Residual Chlorine	1	
9.	Chloride	50	50
10.	Sulphate	50	50
11.	Iron	50	50
12.	Total Arsenic	100	100
13.	Fluoride	50	50
14.	Nitrate	50	50
15.	Total coliform bacteria	100	100
16.	E.coli or thermotolerant coliform bacteria	100	100

Annex VIII

NABL accreditation

About NABL

The laboratory accreditation program in India was initially set-up by Department of Science & Technology, Government of India in 1982 with its name as "National Coordination of Testing & Calibration Facilities (NCTCF)" for providing accreditation services to testing & calibration laboratories. Subsequently in 1993, NCTCF was renamed as "National Accreditation Board for Testing and Calibration Laboratories (NABL)".

Presently, NABL is a constituent Board of Quality Council of India (QCI), an Autonomous Body under Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India.

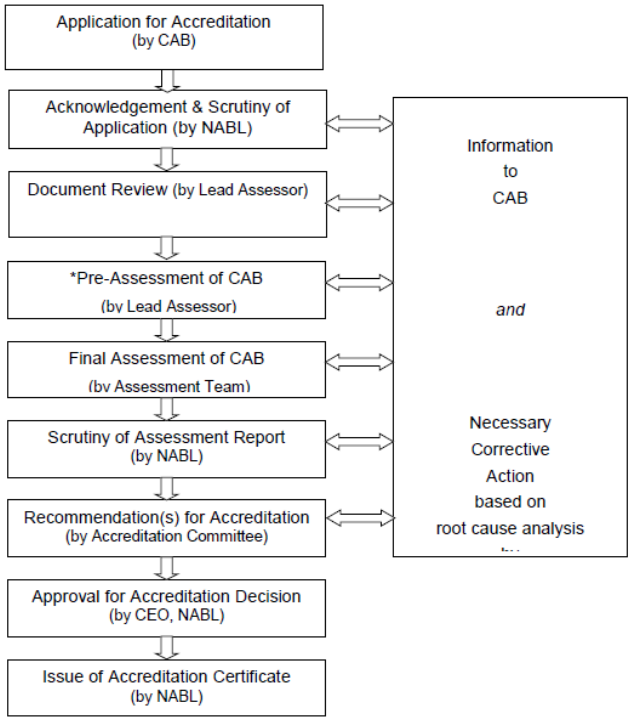
NABL is well recognised Nationally and Internationally. NABL accreditation is accepted by almost all Government department/Regulators. Internationally, NABL is a full signatory of International Laboratory Accreditation Co-operation (ILAC) MRA.

NABL is Mutual Recognition Arrangement (MRA) signatory to ILAC as well as Asia Pacific Accreditation Co-operation (APAC) for the accreditation of Testing and Calibration Laboratories (ISO/IEC 17025), Medical Testing Laboratories (ISO 15189), Proficiency Testing Providers (PTP) (ISO/IEC 17043) and Reference Material Producers (RMP). Such MRA reduces technical barriers to trade and facilitate acceptance of test/ calibration results between countries which MRA partners represent.

Accreditation Process

Laboratories are required to apply through NABL Web Portal in prescribed application form along with prescribed application fee. The applicant laboratory (testing and calibration) should describe the management system in accordance with ISO/IEC 17025: 2017.

The acknowledgement with unique ID of the laboratory will be sent to laboratory and scrutiny of application for its completeness in all aspects will be done. NABL may ask for additional



*Optional for laboratories (Testing/ Calibration/ Medical Testing)

information/ clarification(s) at this stage, if found necessary.

The preliminary document review of the application and management system document/ quality manual submitted by the laboratory is carried out by NABL whereas the detailed review is carried out by Lead Assessor.

The lead assessor informs the inadequacies in the document review, if any. The laboratory addresses the deficiencies in the application and makes changes in the management system document accordingly within seven days.

A pre-assessment (one day) of the laboratory is conducted by lead assessor appointed by NABL. Since Pre-assessment is optional, laboratory is required to express its willingness to undergo preassessment in writing within two days of completion of document review. The laboratory must ensure their preparedness by carrying out an internal audit and a management review before pre-assessment.

The lead assessor submits a pre-assessment report to NABL and shares a copy of the non-conformities with the laboratory. The laboratory takes corrective actions on the non-conformities raised and submits a report to NABL within fifteen days.

After the laboratory has taken satisfactory corrective actions based on root cause analysis, NABL proposes constitution of an assessment team. The date(s) for assessment are decided in agreement with the laboratory. The assessment team includes the lead assessor, the technical assessor(s)/ expert(s) in order to cover the scope for which the accreditation has been sought. The assessment is generally carried out for two days.
The assessment team verifies laboratory's documented management system and checks its compliance with the requirements of ISO/IEC 17025:2017 and other NABL policies. The documented Management system, SOPs, work instructions, test methods etc. are assessed for their suitability, implementation and effectiveness. The laboratory's technical competence to perform specific tasks is also evaluated.

The assessment report contains the test witness report, recommended scope of accreditation and remarks on the laboratory's compliance to ISO/IEC 17025: 2017 and relevant NABL policies. The non-conformities, if identified, are reported in the assessment report. It also provides a recommendation towards grant of accreditation or otherwise. The report prepared by the assessment team is sent to NABL. However, a copy of summary of assessment report and copies of non-conformities, if any, are provided to the laboratory at the end of the assessment visit.

The assessment report is examined by NABL and follow up action, as required, is initiated. Laboratory has to take necessary corrective action on non - conformities/ concerns based on root cause analysis and submit a report along with evidence to NABL within 30 days. NABL monitors the progress of closure of non -conformities.

After the submission of corrective action(s) by the laboratory, the assessment report along with corrective actions is reviewed by the Accreditation Committee. In case the Accreditation Committee finds deficiencies in the assessment report, NABL obtains clarification from the Lead Assessor/ Technical Assessor/ laboratory. In case everything is in order, the Accreditation Committee makes appropriate recommendations regarding accreditation of the laboratory to the CEO, NABL. Based on review of assessment report, accreditation committee may also make other recommendations (denial of accreditation, verification assessment etc.) to CEO, NABL.

CEO, NABL is the approving authority for all accreditation related decision making.When accreditation is granted to the laboratory, NABL issues an accreditation certificate which has a unique number, QR code, date of validity along with the scope of accreditation.

The list of parameters for which NABL Accreditation/ recognition is to be obtained is given below for various levels of labs:

List of water quality parameters for NABL Accreditation:

S.no.	Parameters	State	District	Block/Sub-division
1.	Color	All parameters from S.no 1 – 17 and gradually other parameters as per BIS: 10500to be applied for NABL Accreditation	All parameters to be applied for NABL Accreditation	On the basis of proficiency Testing, All parameters to be recognized by NABL
2.	Odour			
3.	Taste			
4.	PH value			
5.	Total dissolve solids			
6.	Turbidity			
7.	Chloride			
8.	Total Alkalinity			
9.	Total Hardness			
10.	Sulphate			Area Specific
11.	Iron			Area Specific
12.	Total Arsenic			Area Specific
13.	Fluoride			Area Specific
14.	Nitrate			Area Specific
15.	Residual Chlorine			Not Applicable
16.	Total Coliform bacteria			

17.	E. Coli or thermo tolerant coliform bacteria			
18.	Gradually for other parameters (Heavy Metals etc.) as per BIS;10500		Area Specific	

NABL Proposed Fee Structure

It is proposed that State lab and District lab can obtain NABL accreditation following ISO/ IEC 17025:2017, whereas sub-divisional/ block labs can obtain NABL recognition on the successful participation in PT program. If the sub-divisional/ block labs have facilities to test adequate parameters, they can also apply for NABL accreditation.

S. No.	**Parameters**	**Charges for State Lab**	**Charges for District Lab**	**Charges for Sub- divisional/ block level labs**
1.	Application fee (one discipline)	11,000/-	11,000/-	No Assessment. Recognition fee: Rs 15,000/- per Lab for 3 years PT Fees (one Discipline): Rs 1,000/- per lab Surveillance Charges- at actual GST extra as applicable.
2.	Quality Manual assessment adequacy fee	2000/-	2000/-	
3.	Pre- Assessment (optional)	0	0	
4.	Final Assessment charges			
	Lead Assessor	4500/-	4500/-	
	Assistant	4000/-	4000/-	
5.	Overhead charges	11,000/-	11,000/-	
6.	Annual Accreditation fee	24,000/-	24,000/-	
Total		**56,500/-**	**56,500/-**	**16,000/-**

(Travel and accommodation expenses for assessor as per actual, of applicable GST extra as applicable)

Annex IX

Criteria for Star Rating of Laboratories

S. No.	Check List	Yes	No
1.	Whether the laboratory is properly spaced?		
2.	Whether the laboratory has dedicated lab in-charge?		
3.	Whether the laboratory has sufficient technicians and assistants?		
4.	Whether the lab has Generator/ UPS for uninterrupted power backup?		
5.	Whether the lab has adopted sufficient safety measures?		
6.	Whether the equipment in the lab is properly calibrated?		
7.	Whether the lab staff have been trained on ISO 17025:2017?		
8.	Whether the records are properly maintained?		
9.	Whether Backup facility of the laboratory test report is available?		
10.	Whether necessary statutory clearance for setting the lab has been obtained?		
11.	Whether the data have been properly uploaded in IMIS?		
12.	Whether the data have been properly uploaded in WQMIS?		
13.	Whether the equipments/ intruments have AMC?		
14.	Whether proper Waste Management is in place?		
15.	Whether the stock register of chemicals/ reagents is maintained?		
16.	Whether the material safety data sheet is maintained?		
17.	Whether relevant IS standards / Manuals is kept?		
18.	Whether safety signages /SOPs display arrangements is done?		
19.	Availability of safety items like: lab coat, gloves, mask, lab safety goggles, lab safety shoes		
20.	Whether first aid box and list of first aid items duly approved and maintained?		
21.	Whether quality manual is prepared and kept?		
22.	Internet facility in laboratories		

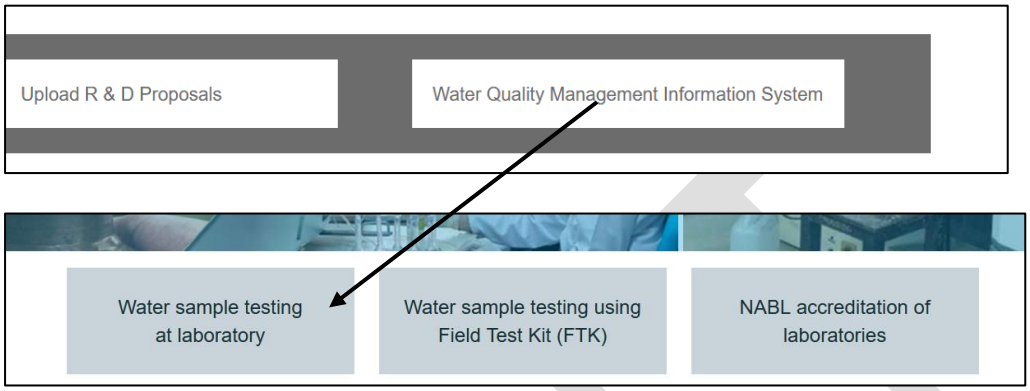
23.	Washroom to be identified separately for male and female		
24.	Whether the lab is NABL accredited?		
25.	Whether the lab performs sample testing in compliance with JJM guidelines		

22-25 : 5 star
18-21 : 4 Star
12-17 : 3 Star
6-11 : 2 star
1-5 : 1 star

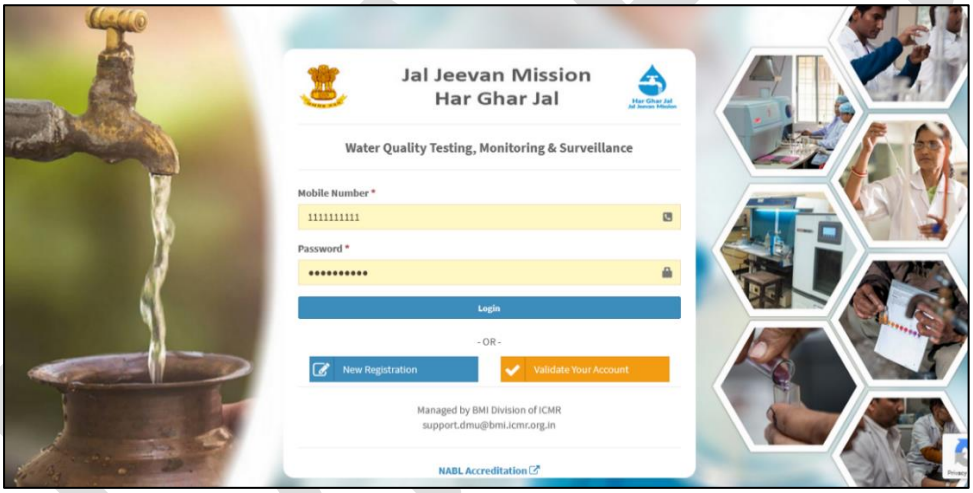
Accessing WQMIS portal

Register your account

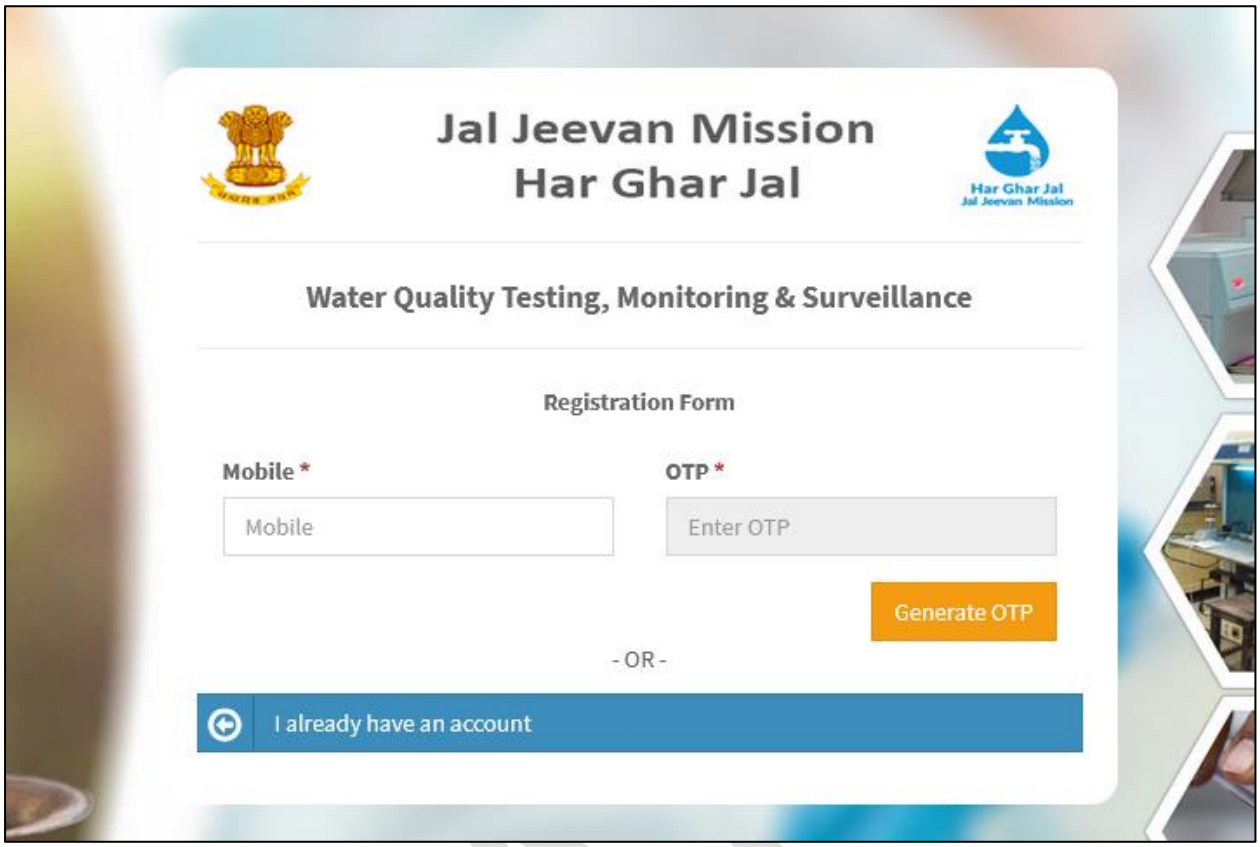
Open any web browser and go to https://jaljeevanmission.gov.in/. On the website select “Water Quality Management Information System” and further select “Water Sample testing at laboratory”.



This will redirect to the online data management portal.



Select New Registration option. The following screen will appear.

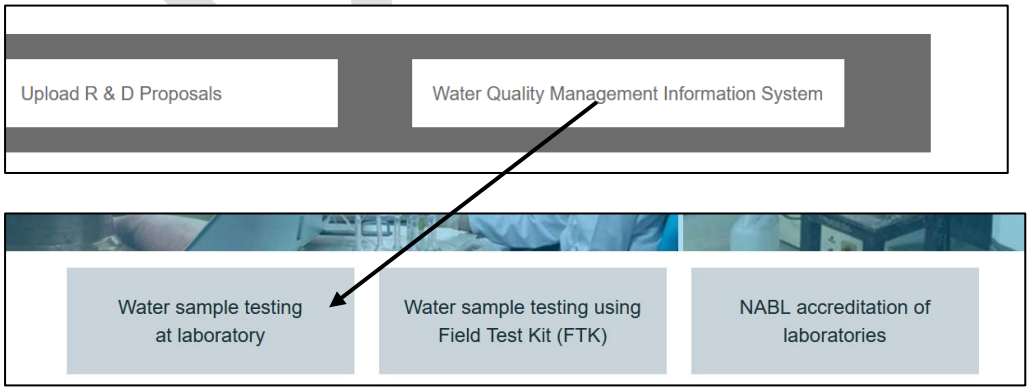


Enter your mobile number. Click generate OTP and enter the OTP received on your mobile and Submit. On successful validation, enter the required details including your password. Once validated your login ID will be your mobile number.

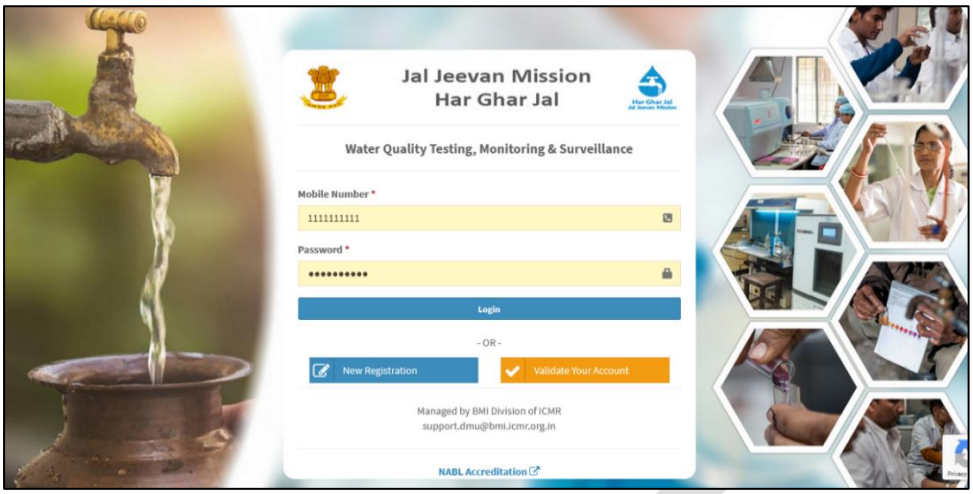
NOTE- Fields for registration will be slightly different for departmental and public users.

Test Request

Open any web browser and go to https://jaljeevanmission.gov.in/. On the website select “Water Quality Management Information System” and further select “Water Sample testing at laboratory”.

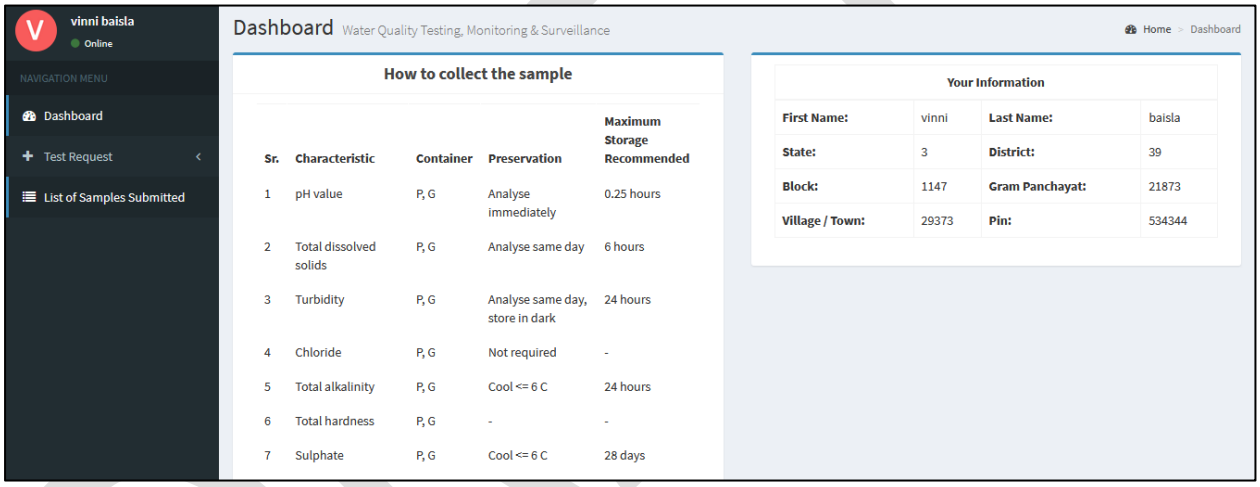


This will redirect to the online data management portal.

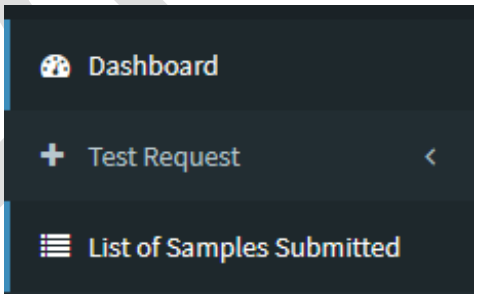


Enter your credentials and click Login.

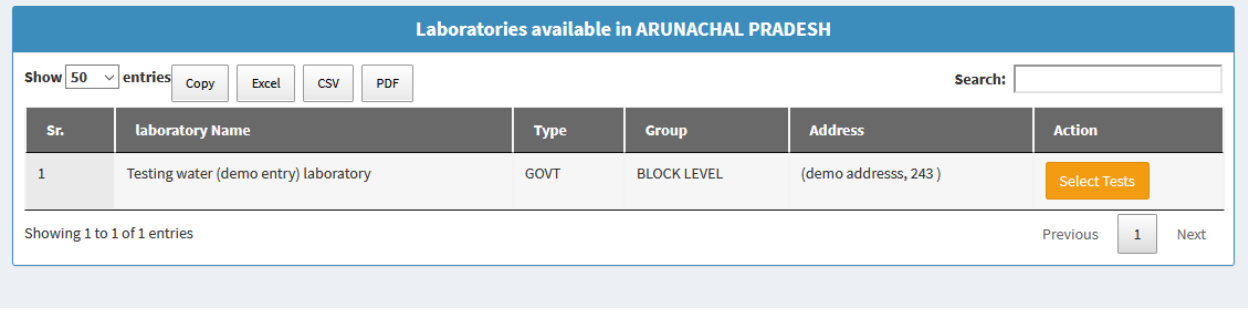
On successful login, the following screen will open



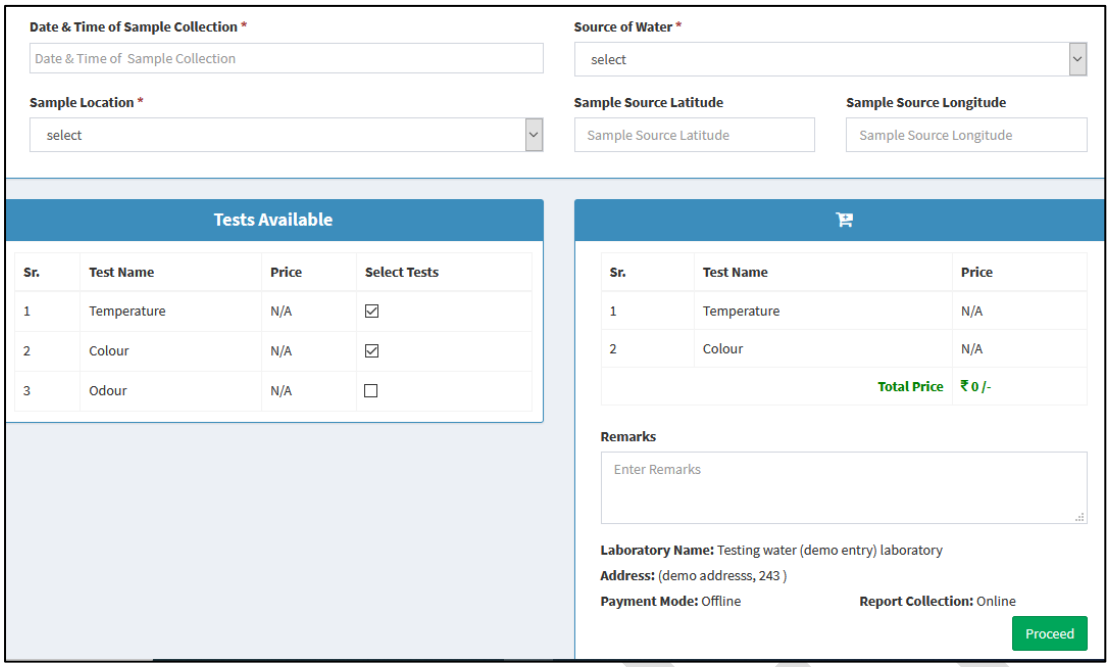
The navigation menu shows following options



Request for test can be made customized or by selecting a nearby lab.



Go to Select Tests

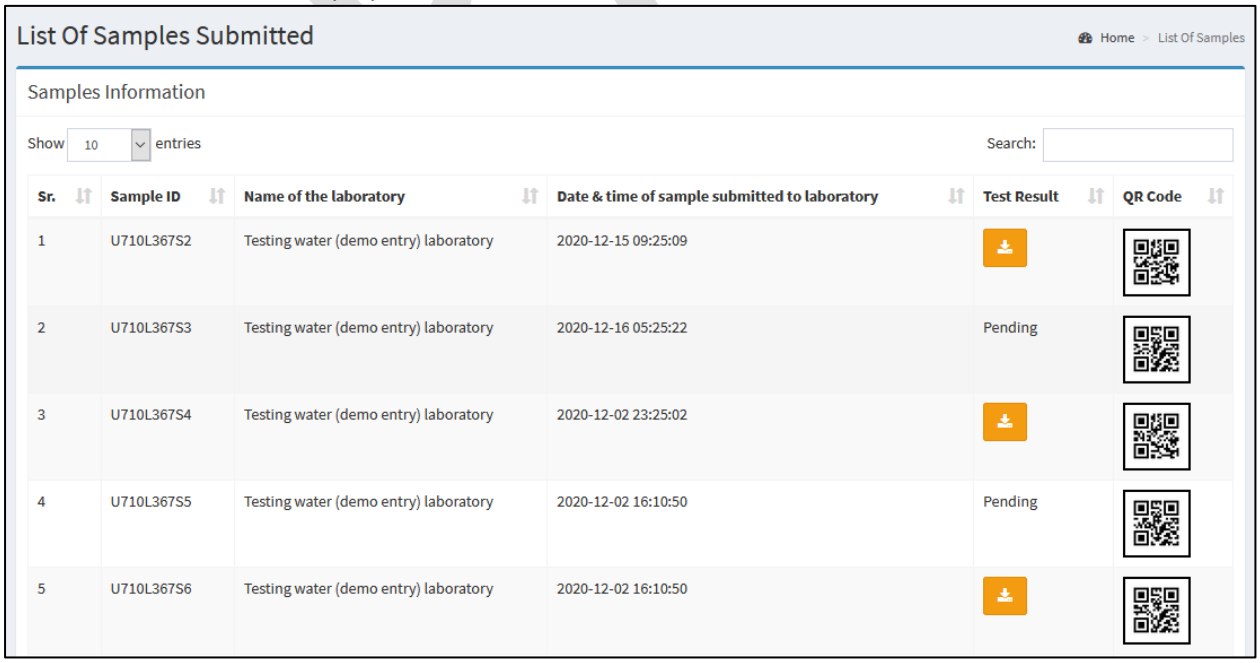


Enter the details and click Proceed

NOTE-

- **In Lab-wise option, the lab is selected firsts and only the test done by the lab can be selected. In customized option, a list of all the nearby labs performing the selected tests will be displayed.**
- **On successful submission, message with the sample ID and QR code is sent to the sample submitter. This has to be provided to lab tech along with the sample.**

List of submitted tests is displayed as follows



Support

For any queries please contact - labs.jjm@gmail.com