



Presentation

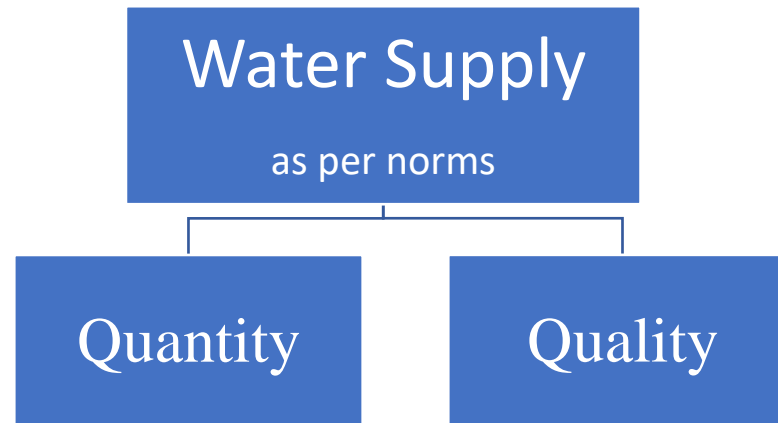


**WATER QUALITY MONITORING &
SURVEILLANCE
IN
PHE KASHMIR**

JAL SHAKTI DEPARTMENT

Objectives of PHE Kashmir.

- Providing water supply for drinking, bathing and washing.



Quantity: 135 Lpcd for cities, 100 Lpcd for Towns & 55 Lpcd for Rural

Quality: BIS 10500



STATISTICS

- **Population:- 82,90,370**
- **Blocks: 137**
- **No of Villages: 3201**
- **No of Panchayats: 2067**
- **Habitations: 7229**
- **Total House holds: 8,37,839(Excluding Institutions) 2019 Data**
- **Consumers :- Domestic, Commercial & Institutions.**



STATISTICS

- **Topography:- Northern Himalayas** (33.7782 N, 76.5762 E)
- **Area:** 5600 Sqkm
- **Climatic Conditions:** Winter (-8 to 12 C), Summer (35 C)
- **Average precipitation:** 660 mm



STATISTICS

- **Raw Water Supply Sources :** Surface(River Nallah & Lakes)
Ground water(Wells & Springs)
- **Treatment Components:-** Pre-Sedimentation, Flocculation,
Filtration (SSFP & RSFP), Disinfection
- **Reservoirs:-** GLSR and Elevated
- **Trunk Mains:-** 1200mm to 200mm(Pipe Network)
- **Service Lines:-** 150mm to 20mm(Pipe Network)



Organizational Set-up

- **Commissioner/Secretary to Govt.**
- **Chief Engineer**
- **Superintending Engineers**
- **Executive Engineers**



Assets of PHE in Kashmir

- Total Schemes : 2429 Nos.
- Lift Schemes : 714 Nos.
- Hand Pumps : 20107 Nos.
- Filtration Plants : 562 Nos.
- DG Sets : 328 Nos.
- Essential Dedicated Feeders : 25 Nos.
- Water Tankers : 103 Nos.



Quality :

Monitored Through Water Testing Labs

- Central water testing Lab (State Laboratory) 01 No.
- District Labs 10 No
- Sub- Divisional Labs 48 No's
- Total No. of labs 49 No's
- Block Level and Village Level Monitoring/ Surveillance to be Taken up as per JJM & is in the pipe line.

Laboratory Staff (Man power)


Category Position	Required	Available	Short/Addl-Requirement
Chemist	59	46	13
Microbiologist	59	33	26
Lab Technician	177	85	92
DEO	59	35	24
Sample Collector	177	80	97
Lab Cleaner	177	48	129
Total	708	327	381

Note: The Deficient Staff is Presently Being Met Through Field Staff.



Over All Scope

- Analysis Of Water Supply Raw Water Source.
- Monitoring Of Water Quality At Treatment Components
- Water Quality Surveillance Through Laboratories at All Stages(Source & FHTC).
- Creation Of Laboratories Facility At State/District/ Sub Division/Block/G.P. Level and Make these Operative to the Extent Possible.
- Training At G.P/or its Sub Committee For Quality Surveillance.
- Training of Five Women in Every Village For Quality Surveillance.
- Use Of FTKs At G.P Level to Know The Extent Of Contamination.

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- Sanitary Inspection To Investigate , Identify And Evaluate Factors That May Pose a Risk To Health.
 - Remedial Action Before public Problem Occurs.
 - Identification Of Sources Of Out Break of Water Borne Diseases.
 - Uniform Drinking Water Quality monitoring Protocol.
 - Fixing Of Water Testing Parameters needed To Be Tested At Laboratories As Per B.I.S 10500.
 - Strengthening Institutional Frame Work.
 - Ranking Of Laboratories.
 - Third Party Verification.
 - NABL Accreditation.



Scope of Central Water Testing Laboratory

- Overall monitoring and supervision of District and Sub-divisional labs.
- Third party check of parameters tested at District and Sub-divisional labs.
- Sample Material testing of chemicals used for sedimentation, flocculation and disinfection
- Training the field staff for conducting routine tests at consumer points and disinfection of newly laid pipes.
- Training the lab staff for new parameters introduced.
- Parameters to be tested at various Labs (details at “A”)
- Conducting seminars for public awareness regarding quality water supply.



District & Sub-Divisional Labs(Scope)

- Parameters testing at sources, water treatment plants, consumer points as per the prescribed frequency and parameters.
- Feedback to engineering staff and field staff for improvement of quality.
- Coordination with health department for ascertaining the root cause for any water born disease.
- Selection of source for proposed water supply scheme



Some of the equipment (Available in labs)

- Spectrophotometer
- pH Meter
- Turbidity Meter
- TDS/Conductivity Meter
- Bacteria Incubator
- Hot Air Oven
- Freezer/Fridge
- Digital Weighing Balance
- Distillation Unit
- Computer Set
- All Req'd. Glassware Items
- Furniture
- Laminar Chamber
- Flame Photometer



Parameters tested ("A")

S.No	Parameters	State lab.	District lab.	Sub-divisional Lab
Physical parameters				
1	Temperature	Yes	Yes	Yes
2	Colour	Yes	Yes	Yes
3	Odour	Yes	Yes	Yes
4	Taste	Yes	Yes	Yes
5	Turbidity	Yes	Yes	Yes
6	pH	Yes	Yes	Yes



Chemical parameters

7	TDS/Elect. Conductivity	Yes	Yes	Yes
8	Total Alkalinity	Yes	Yes	Yes
9	Chloride	Yes	Yes	Yes
10	Fluoride	Yes	Yes	Yes
11	Ammonia	Yes	Yes	No
12	Nitrate	Yes	Yes	Yes
13	Nitrite *	Yes	No	No
14	Sulphate	Yes	Yes	Yes
15	Silica	Yes	No	No
16	Sodium	Yes	Yes*	No
17	Potassium	Yes	Yes*	No



	Chemical parameters			
18	Boron *	Yes	No	No
19	Calcium (as Ca)	Yes	No	No
20	Magnesium (as Mg)	Yes	No	No
21	Total Hardness	Yes	Yes	Yes
22	Sulphide	Yes	No	No
23	Chloramines (as Cl ₂)	Yes	No	No



	Heavy metals			
24	Iron	Yes	Yes	Yes
25	Manganese	Yes	Yes	Yes
26	Copper	Yes	Yes*	No
27	Total Chromium (as Cr)	Yes	Yes*	No
28	Cadmium	Yes	No	No
29	Lead	Yes	Yes*	No
30	Nickel	Yes	Yes*	No
31	Total Arsenic (as As)	Yes	Yes	Yes*
32	Mercury	Yes	No	No



33	Barium	Yes	No	No
34	Zinc	Yes	Yes*	No
35	Aluminium *	Yes	Yes*	No
36	Antimony *	Yes	No	No
37	Selenium	Yes	Yes*	No
38	Silver	Yes	Yes*	No
39	Molybdenum (as Mo)	Yes	No	No
	<u>Microbiological</u>			
40	Total coliforms	Yes	Yes	Yes
41	E-coli / Thermotolerant coliforms	Yes	Yes	Yes
42	Virus	Yes*	No	No



43 V.Cholera, S.Typhi, S.Dysentrae, Staphiloccocus, F.Streptococci, G.Lamblia testing – may be included in the State level laboratory and viral parameters in certain cases. States to decide depending upon the disease burden

Specific parameters

44	Total Pesticide Residue	Yes	No	No
45	Radioactive elements	**	No	No
46	Cyanide	Yes	No	No
47	Poly Aromatic Hydrocarbons (PAH) *	Yes	No	No
48	Free Residual Chlorine	Yes	Yes	Yes
49	Polychlorinated Biphenyls	Yes	No	No
50	NDMA*	Yes*	No	No
51	Anionic Detergents (as MBAS *)	Yes	No	No



52	Oils& Grease*	Yes	Yes	No
53	Dissolved Oxygen (DO)	Yes*	Yes*	No
54	Biological Oxygen Demand (BOD)	Yes*	Yes*	No
55	Chemical Oxygen Demand (COD)	Yes*	Yes*	No
56	Mineral oil	Yes	No	No
57	Phenolic Compound (as C6 H5OH)	Yes	No	No
58	Tri-halo-methanes:	Yes	No	No
	a. Bromo-form			
	b. Di-bromo-methane			
	c. Chloroform			



Individual Pesticides* (to be tested once in a year)				
59	Alachlor	Yes	No	No
60	Atrazine	Yes	No	No
62	Aldrin/Deildrin	Yes	No	No
63	Alpha HCH	Yes	No	No
64	Beta HCH	Yes	No	No
65	Butachlor	Yes	No	No
66	Chloropyriphos	Yes	No	No
67	Delta HCH	Yes	No	No



68	2,4- Dichlorophenoxyacetic acid	Yes	No	No
69	DDT (o, p and p,p isomers of DDT, DDE and DDE)	Yes	No	No
70	Endosulfan (alpha, beta and sulphate)	Yes	No	No
71	Ethion	Yes	No	No
72	Gamma –HCH (Lindane)	Yes	No	No
73	Iso-proturon	Yes	No	No
74	Malathion	Yes	No	No
75	Methyl parathion	Yes	No	No
76	Mono-crotophos	Yes	No	No
77	Phorate	<u>Yes</u>	<u>No</u>	<u>No</u>
Total Number of Parameters to be monitored		74	34	19

List of Basic Water Quality Parameters

S. No.	Characteristic	Unit	Requirement (Acceptable Limit)	Permissible Limit in the absence of alternate source
1.	pH value	–	6.5-8.5	No relaxation
2.	Total dissolved solids	Milligram/litre	500	2000
3.	Turbidity	NTU	1	5
4.	Chloride	Milligram/litre	250	1000
5.	Total alkalinity	Milligram/litre	200	600
6.	Total hardness	Milligram/litre	200	600
7.	Sulphate	Milligram/litre	200	400
8.	Iron	Milligram/litre	1.0	No relaxation
9.	Total arsenic	Milligram/litre	0.01	No relaxation
10.	Fluoride	Milligram/litre	1.0	1.5
11.	Nitrate	Milligram/litre	45	No relaxation
12.	Total coliform bacteria	Shall not be detectable in any 100 ml sample		
13.	E.coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample		



Recommendations for Improvement of Water Supply Quality Monitoring.

- To bring quality monitoring under single umbrella control.
- Periodic Rationalisation of laboratory staff with respect to water supply schemes under coverage.
- Infra structure improvement of all labs as per the requirement.
- Up gradation of labs by latest hi-tech equipment and other facilities to increase the scope of labs.
- Monitoring the progress of labs on fortnightly basis.
- Internet/ Intranet connectivity to all Labs.
- Involvement of public with their recommendations for further improvement.



Identification Of Quality Effected Areas

- Extensive survey and testing of the sources is required to identify the quality affected areas.
- Survey for contamination of sources, its reasons and remedial measures to be take on priority.
- The intervention of technology is required for ground water sources in terms of Iron and Fluoride Plants if required.
- The treatment components may be proposed with respect to the characteristics of Raw water availability.



RESPONSIBILITIES

- Quality to be Monitored By PHED i.e Supplier.
- Surveillance of Water Quality At Grass Root Level By Gram Panchayats/Rural Community.
- Water Testing Through Existing Laboratories And Through Existing Staff.



ACTIVITIES & TRAININGS

- Awareness And Education Programmes On Water Quality In Schools, Aganwadi Centres/Health Centres/G.Ps/PRI etc.
- Capacity Building Of All Stake Holders.
- Engagement Of Communities In Surveillance Activities.
- Using Of FTKs.
- Sharing Of Results Through Various Communications & Modes.
- Alerts to The Officers For Preventive Measures Regarding Positive Tests.



- Involvement of Women In Quality Surveillance.
- Strengthening of Laboratories.
- Setting Up A System For Procurement Of FTKs And Other Consumables And Their Utilization.
- Providing Guidance And Training At Different Managerial Levels.
- Monitoring Of Corrective Actions Taken By The Department.
- NABL Accreditation Trainings Etc.
- Cross Verification Of Water Quality Data.



FREQUENCY OF TESTING

- Sub Divisional /Block Labs
- 100% Water sources to be tested Falling Under the Jurisdiction of the Laboratory once for Chemical Parameters and Twice For Bacteriological Parameters(Pre and Post Monsoon) in a year, Covering all the 13 basic Water Quality Parameters.
- For Monitoring and surveillance in Quality affected areas the testing parameters shall be customised and the frequency of tests shall be adopted accordingly.
- Positively Tested Samples To be Referred to the District Laboratory immediately.
- Other Parameters to be Tested as per Local Contamination



FREQUENCY OF TESTING

- District Labs
- 250 Water Sources /Samples testing per month(i.e 3000 in year as per target of roster available on Department/National Mission IMIS) Covering all Sources Randomly
- Positively Tested Samples Referred by the Sub Divisional/Block Labs/Mobile Labs on at least 13 Basic Parameters
- Positively tested Samples to be Referred to State Laboratory.
- Other Parameters to be Tested as per Local Contamination



FREQUENCY OF TESTING

- State Laboratory
- Testing of at least 5% of Total drinking Water Samples across all District Level Labs.
- Positively Tested Samples Referred by the District/Sub Divisional/Block Labs/Mobile Labs



FREQUENCY OF TESTING

- Field Kits(FTKs)
- Gram Panchayat and /or its Sub committee VWSC/Paani Samiti ect will ensure 100 % drinking water sources including Private Sources and consumer points under its jurisdiction using FTK
- Test Results to be submitted to the Concerned PHED/RWS



FUNDING

- 2% Of Total Allocation For WQM&S Activities.
- 5% for supports Activities.
- 90:10 Funding Pattern.
- Funding Utilization For Building And Up Gradation Of Laboratories.
- Procurement Of FTKs And Consumables.



I E C ACTIVITIES

- Display Of Details Of Nearest Water Testing Labs.
- Training Of Staff , G.P/Sub Committee.
- Awareness Programme.
- Water Safety Planning.
- Inter- Personal Communication.
- Audio/ Video Publicity.
- Wall Writings.
- Slogans, Group meeting, Plays Exhibitions Etc.



Uploading On IMIS Portal

- Water Testing At All Levels As Per Frequency.
- Water Tests Through FTKs.
- Progress Of FTKs.
- Special Report On Quality Affected Areas.
- Laboratory Assessment And Improvement Plans.
- NABL Accreditation And Testing.
- Water Quality Issues.

CONTAMINANTS - RISKS

Chemical and Bacterial Pollution

Chemical Contaminants

– Long Term Risk

Microbial Contamination

– Short Term Risk

Health Hazards/Risks

S.No.	Characteristic	Source	Health Hazards	Treatment
1.	pH	Natural	<p>Low pH - corrosion, metallic taste</p> <p>High pH – bitter/soda taste, deposits</p>	<p>Increase pH by soda ash</p> <p>Decrease pH with white vinegar / citric acid</p>
2.	TDS	<p>Livestock waste, septic system Landfills, nature of soil Hazardous waste landfills Dissolved minerals, iron and manganese</p>	<p>Hardness, scaly deposits, sediment, cloudy colored water, staining, salty or bitter taste, corrosion of pipes and fittings</p>	<p>Reverse Osmosis, Distillation, deionization by ion exchange</p>
3.	Chloride	<p>Fertilizers Industrial wastes Minerals, seawater</p>	<p>High blood pressure, salty taste, corroded pipes, fixtures and appliances, blackening and pitting of stainless steel</p>	<p>Reverse Osmosis , Distillation, Activated Carbon</p>
4.	Total Alkalinity	<p>Pipes, landfills Hazardous waste landfills</p>	<p>Low Alkalinity (i.e. high acidity) causes deterioration of plumbing and increases the chance for many heavy metals in water are present in pipes, solder or plumbing fixtures.</p>	<p>Neutralizing agent</p>

Contd....

5.	Total Hardness	Dissolved calcium and magnesium from soil and aquifer minerals containing limestone or dolomite	Scale in utensils and hot water system, soap scums	Water Softener Ion Exchanger , Reverse Osmosis
6.	Sulphate	Animal sewage, septic system, sewage By-product of coal mining, industrial waste Natural deposits or salt	Bitter, medicinal taste, scaly deposits, corrosion, laxative effects, "rotten-egg" odor from hydrogen sulfide gas formation	Ion Exchange , Distillation , Reverse Osmosis
7.	Iron	Leaching of cast iron pipes in water distribution systems Natural	Brackish color, rusty sediment, bitter or metallic taste, brown-green stains, iron bacteria, discolored beverages	Oxidizing Filter , Green-sand Mechanical Filter
8.	Total Arsenic	Previously used in pesticides (orchards) Improper waste disposal or product storage of glass or electronics, Mining Rocks	Weight loss; Depression; Lack of energy; Skin and nervous system toxicity	Activated Alumina Filtration, Reverse Osmosis, Distillation, Chemical Precipitation, Ion exchange, lime softening

Contd....

9.	Fluoride	Industrial waste Geological	Brownish discoloration of teeth, bone damage	Activated Alumina, Distillation, Reverse Osmosis, Ion Exchange
10.	Nitrate	Livestock facilities, septic systems, manure lagoons, fertilizers Household waste water, fertilizers Fertilizers Natural Deposits	Methemoglobinemia or blue baby disease in infants	Ion Exchange, Distillation, Reverse Osmosis
11.	Total Coliforms	Livestock facilities, septic systems, manure lagoons Household waste water Naturally occurring	Gastrointestinal illness	Chlorination, Ultraviolet, Distillation, Iodination
12.	E-Coli	-do-	-do-	-do-

LAB STAFF AT WORK



BACTERIOLOGICAL TESTING



PHYSIO-CHEMICAL TESTING



MATERIAL TESTING



MATERIAL TESTING





THANK YOU