

**Chapter-V**  
**Poor Quality of water supplied**



## CHAPTER-V

### Poor Quality of water supplied

**Water quality was found affected at some selected locations due to presence of coliforms and physical and chemical parameters beyond permissible limits. There was shortage of manpower in the State, District and Sub-divisional laboratories. Resultantly, shortfalls in water sample testing at the District/Sub-divisional laboratories were noticed in the selected districts. Audit could not ascertain follow-up on the samples found unfit during testing as no record for the purpose was maintained by the PHED. Shortcomings were noticed in functioning of laboratories (State, District/Sub-divisional). There was no facility for testing Uranium contamination and only one facility existed for testing of heavy metals in the State. Field testing kits were not used judiciously as neither the record related to procurement and distributions of kits was maintained nor were the unfit samples found by using FTKs sent to nearby laboratories for further examination.**

Uniform Drinking Water Quality Monitoring Protocol (UDWQMP) issued by the Ministry (February 2013 and revised in March 2019) lays down specific requirements for monitoring drinking water quality by establishing water quality testing laboratories in the States. The parameters for these laboratories are also specified in terms of infrastructure, manpower and water quality testing facilities.

Audit observed that the laboratories i.e. State laboratory, District laboratories and sub-divisional laboratories were under the jurisdiction of PHED. No laboratory testing facilities/infrastructure was available in other entities responsible for water supply i.e. ULBs and HSVP, which led to non-fixation as well as non-achievement of targets for testing water samples as required under CPHEEO manual as illustrated in subsequent paragraphs.

#### 5.1 Assessment of quality of water supplied

Water Treatment Plants (WTPs) were installed on canal based schemes in Urban Areas. In case of urban areas, where tube-well based supply is in existence, disinfection is done by way of chlorination before supply of water to the consumers. There are 108<sup>1</sup> WTPs under the jurisdiction of PHED, HSVP and ULBs in Urban areas. In six<sup>2</sup> out of the eight selected districts, though 38 WTPs were installed audit observed deficiencies in the quality of water being supplied as discussed below:

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<sup>1</sup> PHED: 87, HSVP: 18 and ULB: 3.

<sup>2</sup> Karnal: 1, Fatehabad: 5, Hisar: 12, Panchkula: 4, Rewari: 2 and Rohtak: 14.

To assess quality of water being supplied by PHED, ULB and HSVP, joint sampling (water sample collected for testing) was carried out on 25 locations<sup>3</sup> from consumer end in collaboration with the departmental representatives.

Further, to cross check the results of various parameters<sup>4</sup> of water samples, one set of water sample was sent to State Level Water Testing Laboratory of PHED at Karnal and another set of same sample was sent to Shri Ram Institute of Industrial Research (SRI)<sup>5</sup>, New Delhi for analysis. Bacteriological analysis (including presence of residual chlorine) and Physical & Chemical analysis of various parameters were carried out in both the laboratories.

**Audit observed the following while collecting the water samples and physical verification of various sites:**

- 1. Chlorination:** It was observed that at 12 locations (out of selected 25 locations), chlorination was not detected in the water samples. The chlorination testing was done on site by chemists of PHED by using Orthotolidine (OT) kits. At 11 locations chlorination was found to be more than the prescribed limit (maximum value of three parts per million (PPM) as against the requirement of 0.2 PPM) and at two locations<sup>6</sup> Chlorination was found within permissible limit. However, when these 25 samples were analyzed at SRI, chlorination was found slightly above permissible limit in two samples and in rest of the 23 samples, chlorination was not detected at all.
- 2.** At all 25 locations, it was observed that no record related to dosing of chlorination was maintained. In its absence, it is assessed that water pump operators/J.E.s were negligent about proper dosing for chlorination.
- 3. Cleanliness:** Out of 25 locations, at seven locations Clear Water Tank (CWT)/ Over Head Service Reservoir (OHSR) were in use and at three locations, cleaning status of CWT/OHSR was not satisfactory (formation of *algae* inside CWT in Katesra, frogs in CWT in Sahu, CWT without cover in Kabrel), growth of *sarkanda* in SS tank at Khijuri as evident from the picture given below:

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<sup>3</sup> PHED-13, ULB-8 and HSVP-4.

<sup>4</sup> Uranium parameter has been analysed at five locations only.

<sup>5</sup> Third party laboratory hired by this office.

<sup>6</sup> 1. Kalwa (PHED-Kurukshetra); 2. Khaleta (PHED-Bawal, Rewari).



### 5.1.1 Results of water samples analyzed at both laboratories:

1. **Bacteriological analysis:** In bacteriological analysis of water sample, presence of Coliforms confirms that water was not potable. It was observed that presence of Coliforms (*Appendix 16*) was detected in 19 samples (76 per cent water samples) out of 25 samples, as per analysis done at PHED laboratory. However, as per analysis at SRI laboratory, the same was detected only in five samples (20 per cent water samples). Thus, water supplied was found as not potable as presence of Coliforms was detected (*Appendix 16*).
2. **Physical & Chemical analysis:** In respect of physical & chemical parameters, test reports/results indicate that situation was not encouraging in Municipal Corporation, Faridabad. Total eight locations were selected in MC, Faridabad. At seven locations, various parameters (as detailed in *Appendix 17*) were found beyond permissible limit as per analysis done at PHED laboratory. Even analysis at SRI laboratory had

detected the range of various parameters beyond permissible limit in respect of five locations.

Further, for the sake of consistency, Audit made a comparison between results of common parameters<sup>7</sup> tested in both the laboratories. Results of some of the common parameters are given in *Appendix 18*. Test result of water samples clearly indicates that the department failed to supply potable water supply to the inhabitants.

During 2016-21, 2901 cases of water borne diseases and 14 deaths related to these cases were reported as per information furnished by Health Department. In four<sup>8</sup> out of eight selected districts, 1,382 cases of water borne diseases and 12 death cases against these cases were noticed during 2016-21. It is pertinent to mention that 10 WTPs (Karnal -1, Fatehabad-5 and Panchkula 4 WTPs) were installed in these districts on the canal based water supply under the jurisdiction of PHED/HSVP and for tube/ranney well based water supply, chlorination was being done in these districts for areas under ULBs.

*Beneficiary survey:* 50 out of 564 beneficiaries<sup>9</sup> (*nine per cent*) complained about bad quality of water. Out of these 50 beneficiaries, 44 beneficiaries were from Faridabad district.

## **5.2 Analysis of water samples tested at various laboratories of PHED**

As per 4.1 of UDWQMP, 2019 Water Quality laboratories are the backbone of water quality monitoring. Provision of safe drinking water necessitates a strong well located and well equipped laboratory network within the state for water quality assessment. Audit analysis in respect of water sample reports (*Appendix 19*) for the year 2016-21 are as follows:

- During the period 2016-17 to 2020-21, samples found unfit for Physical and Chemical testing ranged between 0.12 *per cent* to 25.57 *per cent*.
- During the period 2016-17 to 2020-21, samples found unfit for Bacteriological samples testing ranged between 0.17 *per cent* to 14.50 *per cent*. 1,382 cases of various water borne diseases and 12 death cases were noticed in four<sup>10</sup> selected districts as per information furnished by the Health Department, Haryana.

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<sup>7</sup> Colour, Odour, pH, Turbidity, Total Dissolved Solids, Total Hardness, Calcium, Chloride, Fluoride, Iron, Magnesium Manganese, Nitrate, Sulphate, Total Alkalinity, Zinc, Lead, Total Arsenic, Residual Chlorine and Total Coliform.

<sup>8</sup> Fatehabad, Karnal, Kurukshetra and Panchkula.

<sup>9</sup> Beneficiaries have been selected from 20 locations selected randomly from the 58 locations which was already selected for installation of flow meter selected through Computer Assisted Audit Technique.

<sup>10</sup> Fatehabad, Karnal, Kurukshetra and Panchkula.

- There was no facility of Physical and Chemical testing in respect of Kalka, Assandh, Indri and Hansi Sub Divisional Water Testing laboratories.

In selected districts, a total of eight district laboratories and seven sub divisional laboratories were there. As per guidelines, there was target of 3000 water samples fixed for each laboratory. The shortfall in achievement of targets by different district/sub-divisional labs is given in **Table 5.1**.

**Table 5.1: Shortfall in achievement of targets in District/Sub-divisional Laboratory**

Year	2016-17		2017-18		2018-19		2019-20		2020-21	
	A	S	A	S	A	S	A	S	A	S
Sub-divisional laboratory, Hansi	2,832	168	2,626	374	1,791	1,209	2,267	733	3,595	0
Sub-divisional laboratory, Assandh	1,898	1,102	3,018	0	2,581	419	2,378	622	1,920	1,080
Sub-divisional laboratory, Indri	0	3,000	509	2,491	1,378	1,622	1,460	1,540	1,621	1,379
Sub-divisional laboratory, Kosli	3,203	0	3,007	0	2,978	22	1,253	1,747	3,098	0
District laboratory, Rewari	4,200	0	3,340	0	3,000	0	1,968	1,032	2,796	204
District laboratory, Faridabad	3,012	0	3,933	0	3,126	0	2,958	42	3,196	0
District laboratory, Fatehabad	3,285	0	3,868	0	3,454	0	2,832	168	3,345	0
Sub-divisional laboratory, Pehowa	4,353	0	3,774	0	3,628	0	3,598	0	2,761	239

**A: Achievement, S: Shortfall**

During 2020-21, there was improvement in achievement of targets for testing by the district/sub-divisional laboratories over 2019-20. Testing below the prescribed norms was carried out by four (50 *per cent*) out eight district/sub-divisional laboratories as against seven out of eight district/sub-divisional laboratories in 2019-20.

### 5.3 Lack of mechanism for re-testing of failed sample

Scrutiny of records in selected PHED Divisions revealed that there was no practice of record maintenance for follow up of failed samples/samples found unfit. As per data provided by divisional offices regarding testing of water samples, it was noticed that a total of 2,64,025 water samples were tested during the period April 2016 to March 2021 out of which 18,104 samples (6.86 *per cent*) were found unfit. The details are given in **Table 5.2**.

**Table 5.2: Total number of samples tested for the period 2016-17 to 2020-21**

Year	Total samples tested	Fit samples	Unfit samples	Percentage unfit samples
2016-17	51,637	48,291	3,346	6.48
2017-18	60,601	57,394	3,207	5.29
2018-19	54,430	51,093	3,337	6.13
2019-20	47,422	43,694	3,728	7.86
2020-21	49,935	45,449	4,486	8.98
<b>Total</b>	<b>2,64,025</b>	<b>2,45,921</b>	<b>18,104</b>	<b>6.86</b>

Audit enquired (August 2021 to May 2022) follow up action of the department on the unfit samples, the divisions failed to provide the relevant record. In absence of record related to action taken on failed sample, audit could not ascertain whether timely action was carried out by the Department to ensure safe and potable drinking water for the inhabitants of areas where water sample were found unfit.

During exit conference (November 2022), the department/ entities assured that suitable steps would be taken to improve the quality of water.

#### 5.4 Testing of source prior to commissioning of schemes

As per Clause 6.0 of the Inspection and Testing Plan for Certification of Drinking Water as per IS 10500:2012 under scheme IV of BIS (Conformity Assessment), Regulations 2018, the source water used in production of Drinking Water shall be initially tested for Organoleptic and physical parameters, Chemical requirement, and all microbiological requirements possible to be tested in house. Further as per clause 6.3, as and when there is change in source water or addition of new source of raw water, it shall be intimated to BIS. The raw water collected from the new source shall be tested in accordance with Clause 6 and the treated water produced from such source water shall be tested for conformity to IS 10500 before commissioning for regular production. Marking and records of the same should be maintained.

During scrutiny of records<sup>11</sup>, it was noticed that various tube-well based schemes were in operation under the divisional offices of PHED, HSVP and ULB/MCs to provide water supply to the inhabitants. But no such practice was prevalent in the state of Haryana as all the concerned departments/ entities failed to provide any documents regarding request to BIS for change of source or new source of raw water as per the Regulations 2018 mentioned *ibid*. In case of PHED, only regular testing was being done for those parameters for which testing facilities were available in the local PHED laboratories whereas the other department viz. HSVP and ULB/MCs are not even doing the routine testing. During exit conference (November 2022), PHED stated that all the sources are tested before commissioning. The reply is not acceptable as record/supporting documents were not furnished by divisional offices during field visit.

#### 5.5. Laboratory infrastructure

Para 9.8.3 of CPHEEO manual states that water quality laboratory is the main backbone of water quality surveillance. A well-located and well-equipped analytical laboratory with competent staff is very essential to evaluate the efficiency of water utility services in terms of water quality.

The State of Haryana is equipped with 43<sup>12</sup> water testing laboratories besides a mobile water testing van. During physical verification of laboratories (August 2021 to May 2022), various shortcomings were noticed which are as under:

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<sup>11</sup> EE, PHED, (Fatehabad, Faridabad, No. 1 & No. 2, Karnal, Kurukshetra); HSVP Divisions-Faridabad, Rohtak, Rewari, Karnal; MC Faridabad & Karnal

<sup>12</sup> State Level Water Testing laboratory at Karnal-1, Zonal level water testing laboratory at Sirsa-1, District level water testing laboratory-20 and block/sub-divisional water testing laboratory-21.



### 5.5.1 Shortcomings in functioning of Laboratories as per Uniform Drinking Water Quality Monitoring Protocol (UDWQMP) 2019

#### (i) State Level Water Testing Laboratory

Chapter 5 of UDWQMP 2019 elaborates the functioning of state water testing laboratories who is headed by Chief Chemist. The roles and responsibilities of Chief Chemist are given in Chapter 8 of UDWQMP 2019. He is overall in-charge of the drinking water quality testing laboratories set up in the State. During physical verification of state laboratory (May 2022), it was noticed that very little attention was paid towards implementation of these functions. Deficiencies noticed are detailed in **Table 5.3**:

**Table 5.3: Functions envisaged vis-à-vis Functions in practice in the State Laboratory**

Sr. No.	What was envisaged	What is prevalent
1.	Act as a referral institute to analyze specific or new/emerging water quality problems.	No referred samples were ever received from any of the departmental/inter-departmental labs.
2.	Preparation of State and district annual action plans, identification of newly emerging contaminants, instruments/equipments required and approval in State Level Scheme Sanctioning Committee (SLSSC).	The state laboratory was working like a routine district laboratory with no involvement in preparation of action plan for effective WQM&S.
3.	To monitor the performance of district, Sub-divisional/block/ mobile laboratories and ensure Quality Assurance & Quality Control (QA & QC) in these laboratories.	There was no practice prevalent to monitor the performance of other laboratories which was one of the main functions to guide and ensure the Quality Assurance & Quality Control.
4.	Ensure proper AMC/CAMC/calibration of all instruments/equipments using Certified Reference Material (CRM) as per "IS/ISO/IEC 17025:2017".	The AMC/CAMC was done in respect of only two equipments viz. Atomic Absorption Spectrophotometer i.e. AAS (for testing of heavy metals) and GC-MS/MS (for testing Pesticide residue) whereas protocol emphasises on doing AMC/CAMC for all instruments. In rest of the Haryana, no AMC/CAMC was done in respect of available instruments/equipments available in concerned laboratories.
5.	Analysis of targeted samples of State laboratories including the positively tested samples of district, sub-divisional/block/mobile laboratories.	District/sub-divisional laboratories had never referred positive samples to State Laboratory. Even, State laboratory had not asked either from concerned laboratories to refer positively detected samples.
6.	Preparation of documents/manuals related to water quality testing and monitoring.	No such practice was prevalent in State laboratory.
7.	Data analysis and follow-up corrective action for ensuring safe drinking water.	No such practice was prevalent in State laboratory.
8.	Coordination with similar laboratories of other departments in the State and to establish a mechanism for cross verification of test results carried out by different labs.	No such co-ordination was ever made.
9.	Ensuring supervision and monitoring of results carried out by Gram Panchayats (GPs)/VWSCs using Field Test Kit, sanitary surveillance and strengthening community in water quality monitoring and surveillance.	There was no monitoring done by state laboratory in respect of samples tested by GPs and VWSCs by using FTK, sanitary surveillance. Even the District consultant at Karnal and Chief Chemist, State laboratory had no coordination with each other for strengthening the community in water quality monitoring and surveillance.

Sr. No.	What was envisaged	What is prevalent
10.	Networking and coordination with Department of Atomic Energy (DAE) approved laboratories /NABL accredited laboratories for monitoring radioactive and virological parameters.	State laboratory had not made any correspondence with DAE approved laboratories for monitoring of radioactive and virological parameters despite the fact that presence of Uranium contamination was pointed out by CGWB in its report (2020) at some places in Haryana.
11.	Para 9.1 of the UDWQMP, 2019 states that the State level laboratory should concentrate on analysis of specific parameters of local importance like pesticides, toxic substances, microbiological and virological parameters, Poly Aromatic Hydrocarbons (PAH), Poly Chlorinated Biphenyls (PCB) and Disinfection byproducts like Tri Chloro Methane (TCM) etc.	In respect of specific parameters, state laboratory had started testing only Pesticide residue and that too from year 2022 onwards and none of the other specific parameters as mentioned in the protocol were tested at all.
12.	Para 7.2 of UDWQMP, 2019 states that the performance of laboratory at all levels should be one of the factors for evaluation in the annual performance appraisal reports of concerned engineers and laboratory personnel.	The performance of laboratories was not part of evaluation in APAR of the concerned chemists and engineers.

Had the department considered the performance of laboratories as the criteria for evaluation of annual performance appraisal reports of concerned engineers and laboratory personnel (as defined in protocol) the concerned engineers and chief chemist would have paid special attention towards lab functioning. But in the absence of such criteria, the State laboratory was not performing functions which are required to be performed as per UDWQM Protocol, 2019.

**(ii) District and Sub-Divisional Water Testing Laboratory**

Chapter 5 of UDWQMP 2019 elaborates functioning of district and sub-divisional water testing laboratories. District laboratory headed by Chemist and sub-divisional laboratory by Junior Chemist. Executive Engineer of the district and the Chemist of the district laboratory are responsible for the performance of the laboratories in their jurisdiction. The functions of these laboratories besides water quality testing, monitoring and surveillance of the water sources is strengthening of community participation in the activities of monitoring and surveillance.

During scrutiny of selected seven<sup>13</sup> district level and seven<sup>14</sup> sub-divisional laboratories, it was observed that:

- Only regular testing of selected parameters of which testing facility was available was being done in these laboratories and results of water testing were sent to concerned Sub-Divisional Engineers.
- There was no practice prevalent in the department for intimation of results to Zila Parishad and Gram Panchayat for corrective action.

<sup>13</sup> District laboratory- Hisar, Kurukshetra, Rewari, Fatehabad, Rohtak, Faridabad and Panchkula.

<sup>14</sup> Sub-divisional laboratory- Assandh, Indri, Hansi, Kosli, Kalka, Pehowa and Tohana.

In order to assess the factual position of the infrastructure available as well as working of these laboratories, joint physical verification was done with departmental officials. Shortcomings noticed during physical verification are shown in **Table 5.4 (a) and 5.4 (b)**.

**Table 5.4 (a): Infrastructure status of District Laboratories**

District laboratory/ category	Fatehabad	Faridabad	Panchkula	Rewari
1. Space 2. Storage facility 3. Equipment/kits	1. No sample collection room because Bill branch was running in store room of laboratory. 2. One Laminar Flow <sup>15</sup> amounting to ₹ 0.50 lakh was lying unutilized since October 2020 (date of purchase) and Arsenic FTK-500 was found unutilized. 3. One bacteriological instrument amounting to ₹ 6.25 lakh was lying abandoned since February 2021 (date of purchase). 4. E. Coli/Coliform Test Kit (25 test) amounting to ₹ 0.28 lakh got expired without being used.	Nephelometer (turbidimeter) & Bacteriological incubator were not in working condition	No space for Bacteriological testing. Storage facility for Glassware/Equipment/ Chemical was not available.	No space for Bacteriological testing.
*NABL accreditation of District Water testing Laboratory, Fatehabad (PHED) has been suspended w.e.f. 08 May 2022.				

**Table 5.4 (b): Infrastructure status of Sub Divisional Laboratories**

Sub-divisional lab/ category	Indri	Hansi	Kosli	Tohana
1. NABL Accreditation 2. Space 3. Storage facility 4. Equipment/kits	1. NABL not accredited 2. Space not as per UDWQMP, 2019 3. Computer, Internet facility was not available.	1. NABL not accredited	1. Space available was not as per UDWQMP, 2019	1. NABL not accredited. 2. One room is occupied by WSSO. 3. One Voltas refrigerator (570 litre) supplied of different specification was lying unutilised since February 2022.

**(iii) Non completion of laboratory buildings**

During scrutiny of records<sup>16</sup>, it was noticed that the civil work of upgradation of laboratory buildings at Panchkula, Kalka and Hansi was completed (April 2019- March 2020) but these could not be made operational (March 2022). The details are given in **Table 5.5**.

<sup>15</sup> Laminar Flow is an enclosed bench designed to maintain a working area devoid of contaminants.

<sup>16</sup> EE, Hansi and Panchkula.

**Table 5.5: Status of various laboratory buildings**

Name of Laboratory	Status
<b>District Laboratory, Panchkula</b>	<ul style="list-style-type: none"> <li>The civil work of upgradation of laboratory building was completed in April 2019, but balance work (construction of stairs, plastering, flooring, painting) which was allotted in February 2021 was not completed till date (March 2022).</li> <li>The laboratory was running in old building.</li> </ul>
<b>Sub divisional laboratory, Kalka</b>	<ul style="list-style-type: none"> <li>The civil work of up gradation of laboratory building was completed in April 2019.</li> <li>Due to non-installation of infrastructure, the sub divisional laboratory was not operational for doing Physical and Chemical testing and laboratory was running in old building.</li> </ul>
<b>Sub-divisional laboratory, Hansi</b>	<ul style="list-style-type: none"> <li>The works for “Renovation &amp; Up-gradation of Laboratory” and “Supplying &amp; Fixing AC, Fan, Solar lighting, etc.” were allotted in March 2020 and these works were required to be completed up to June 2020.</li> <li>The building work was physically completed but the infrastructure such as AC, Fan, Solar Lighting, Fire Extinguishers, Modular Laboratory Furniture, etc. were not installed till July 2022. The work was delayed by more than 14 months from the schedule completion date of laboratory.</li> <li>The laboratory work operates from a single room and no proper infrastructure was available in the room as required under UDWQMP.</li> </ul>

### 5.6 Non-testing of water sample as per Uniform Drinking Water Quality Monitoring Protocol’s parameters

As per UDWQMP, the State Level Water Testing Laboratory should have the capability and facilities for testing 73 parameters, the District Level Water Testing Laboratory should have the capability and facilities for testing 32 parameters and the Sub-divisional/block Level Water Testing Laboratory should have the capability and facilities for testing 19 parameters. Further, Department of Drinking Water and Sanitation, Government of India also directed (December 2021) for ensuring NABL accreditation of various level laboratories.

During scrutiny of records of selected district and sub-divisional laboratories it was noticed that the laboratories were not testing parameters as per UDWQMP as detailed in **Table 5.6** below:

**Table 5.6: Details of parameter tested at various laboratories of PHED**

Laboratory	Location	Norms of parameters as per UDWQMP	No. of parameters (Physical & Chemical) tested by April- May 2022	Shortfall	No. of parameter NABL accredited
State Level	Karnal	73	43	30	15
District	Hisar	32	15	17	06
	Kurukshetra		12	20	09
	Panchkula		15	17	07
	Fatehabad		11	21	06
	Rewari		15	17	15
	Faridabad		11	21	11
	Rohtak		11	21	07
Sub-Divisional	Asandh	19	00	19	--
	Indri		00	19	--
	Hansi		00	19	--
	Pehowa		15	04	11
	Kalka		00	19	--
	Tohana		15	04	--
	Kosli		15	04	11

From above table, it can be concluded that there were shortfalls in terms of number of parameters tested and NABL accreditation was not sought for all the parameters. This is indicative of absence of monitoring mechanism for compliance to the UDWQMP and government instruction for ensuring supply of safe drinking water to the inhabitants.

### 5.7 Non-fixation of targets in respect of water sampling

Para 15.3.4 of Central Public Health & Environmental Engineering Organisation (CPHEEO) manual provide details about frequency of water sample testing. It is necessary to collect samples of both raw and treated water for the examination of toxic substances at least every three months. For bacteriological sampling, the samples should be taken from the different points on each occasion to enable overall assessment. The minimum number of samples to be collected from a distribution system is given in *Table 5.7*.

**Table 5.7: Norms of testing of water quality in urban areas**

Population Served	Maximum Intervals between successive sampling	Minimum no. of samples to be taken from entire distribution system
Upto 20,000	One month	One sample per 5,000 of population per month
20,000-50,000	Two weeks	
50,001 – 1,00,000	Four days	
More than 1,00,000	One day	One sample per 10,000 of population per month

During scrutiny of records, it was seen that the departments i.e. PHED (regular water testing is being conducted) and ULB did not have readily available data on population pertaining to the areas under their jurisdiction which hampered fixing of targets. Thus, fixation of targets was left to the discretion of divisional officer to conduct and test without any scientific analysis. The situation was not encouraging in Urban Local Bodies department as scrutiny in selected offices<sup>17</sup> revealed that the department had not followed any mechanism regarding fixation of targets for test sampling. Neither had any instructions been issued at higher level nor were the tests conducted by the department despite provisions in the CPHEEO manual. The department failed to provide the relevant record as to how many tests had been conducted during the audit period. In absence of records, audit could not comment on the quality aspect of the water supplied by the selected divisions/ offices.

Scrutiny of records in selected divisions of HSVP revealed that divisional offices were conducting tests without fixing any targets. The details of tests conducted by HSVP divisional offices during 2016-21 in different laboratories of other department/private laboratories are detailed in *Table 5.8*.

<sup>17</sup> MC, Karnal and Faridabad.

**Table 5.8: Details of water samples tested by selected HSVP divisions during 2016-21**

Unit Name	Norms as per CPHEEO Manual (One sample per 10000 of Population per month)	Total no. of sample Tested under water works	Unfit Sample
<b>Town and Country Planning Department</b>			
HSVP I, Panchkula	2,711	2,638	0
HSVP-II Panchkula	1,314	427	14
HSVP, Karnal	975	2,371	0
HSVP, Kalaka, Rewari	477	270	0
HSVP I, Faridabad	470	11	0
HSVP III, Faridabad	87	5	0
HSVP I, Hisar	1,200	3	0
HSVP II, Hisar	600	29	0
<b>Total</b>	<b>7,834</b>	<b>5,754</b>	<b>14</b>

From the above, it can be seen that selected divisional offices had conducted 5,754 water tests against requirement of 7,834 water tests. There was a shortfall of 26 *per cent* as against the norm/requirement.

## 5.8 Shortage of manpower in laboratory

UDWQMP 2019 provides a suggestive staffing pattern for Sub-Divisional/Block Level Water Quality Testing Laboratory. Information on the sanctioned strength of laboratories personnel was not provided by the PHE Department. The shortage of manpower in the State laboratory, district laboratories and sub-divisional laboratories was assessed during audit using the UDWQMP norms (State Level laboratory at Karnal; District laboratories and sub-divisional laboratories). The shortage of manpower in respect of State Water Testing Laboratory, Karnal, ranged between 67 *per cent* and 100 *per cent* under different category of posts, are shown in **Table 5.9**.

**Table 5.9: Staff position at State Water Testing Laboratory, Karnal**

Sr. No.	Name of post	As per UDWQMP	Karnal State lab		Percentage of shortage
			Actual position	Shortage	
1	Chief Chemist/Chief Water analyst	1	1	0	-
2	Senior Chemist/Senior Water Analyst	1	0	1	100
3	Chemist/ Water Analyst	2	0	2	100
4	Microbiologist/Bacteriologist	1	0	1	100
5	Laboratory Assistant	3	1	2	67
6	Lab Attendant	2	0	2	100
7	Data Entry Operator	2	1 (RME staff posted)	2	100
8	Field Assistant (task/need based field staff)	2	0	2	100

During audit, it was noticed that the shortage of manpower in respect of District laboratories ranged between 50 *per cent* and 100 *per cent* and in respect of sub-divisional laboratories, it was upto 100 *per cent* (**Appendix 20**).

Audit analysis of the data related to staff required and positioned (including contractual staff) in the laboratories during 2016-2021 revealed the following:

- In State Laboratory, against the requirement of 14, average 10 posts remained vacant during 2016-2021.
- In selected seven district laboratories, against the requirement of eight

posts in each district laboratory, posts ranging between two and six remained vacant during 2016-21.

- In selected seven sub-divisional laboratories, against the requirement of six posts in each sub-divisional laboratory, posts ranging between one and five remained vacant during 2016-21.

As is evident from the above, during 2016-21, adequate staff was not deployed in all the laboratories.

Thus, shortage of staff is hampering the activities of the laboratory resulting in non-achievement of target of water sampling (Paragraph 5.2) and less number of parameters being tested (Paragraph 5.6).

## 5.9 Shortcomings in utilisation to Field Testing Kits (FTKs)

### 5.9.1 In-judicious expenditure on procurement of FTKs valuing ₹ 0.78 lakh

Para 4.2 of UDWQMP states that the FTK for examination of physico-chemical contamination not only serves the purpose of initial screening of contamination but also is an effective tool for generating awareness amongst the community to consume safe drinking water. This multi parameter field test kit can carry out 100 tests. For bacteriological examination, a simple Presence/Absence (P/A) water test kit is also available which indicates the presence/ absence of Coliforms in water samples.

During test check of records<sup>18</sup>, it was seen that 31 chemical kits (Rewari-8, Rohtak-23) which were capable of testing 11 parameters were procured at a cost of ₹ 0.78 lakh during the year 2016-17 to 2020-21. It was observed that the divisional offices tested only one to five parameters (Rewari-two parameters and Rohtak-one to five parameters) leading to injudicious use of these kits. The details are shown in **Table 5.10**.

**Table 5.10: Information relating to Chemical kits (FTK)**

Name of District	Year	No. of chemical kits procured/purchased/received	Rate (per kit) in ₹	No. of parameters tested	Expenditure incurred
Rewari	2016-17	No Kit Procured			
	2017-18	No Kit Procured			
	2018-19	No Kit Procured			
	2019-20	8	2,500	2 parameters	20,000
	2020-21	No Kit Procured			
Rohtak	2016-17	13	2,500	1 to 5 parameters	57,500
	2017-18	0	-		
	2018-19	5	2,500		
	2019-20	5	2,500		
	2020-21	0	-		

Further, it was observed that the other divisions did not maintain record related to purchase, distribution, sample testing from FTKs. In response to audit

<sup>18</sup> EE, PHED, Rewari and EE, PHED-2, Rohtak.

enquiry, District Consultants<sup>19</sup> failed to produce stock register of FTKs which were procured and distributed by WSSO staff. In the absence of record, the authenticity of information furnished by the divisional office could not be ascertained.

Neither the controlling authorities at headquarters office nor the divisional officer ever examined the stock register related to FTK in disregard to Punjab Financial Rules (PFR). This was indicative of lack of monitoring mechanism which led to non-maintenance of records of procurement and distribution of FTKs.

### **5.9.2 Non-referring of unfit samples found through FTKs to nearby laboratories**

As per Chapter 10 of JJM guidelines, the water quality surveillance activities include use of FTKs at GP level to know the extent of contamination and refer the positively tested samples to the nearby water quality testing laboratory for confirmation.

During scrutiny of records/analysis of data furnished by the WSSO staff in the selected divisions<sup>20</sup>, it was noticed that contrary to the guidelines, none of the failed FTK samples were ever referred to nearby laboratory.

### **5.9.3 Non-uploading of detailed test results of FTKs on Integrated Management Information System (IMIS) website**

As per JJM guidelines, the JJM IMIS portal will capture the following:

- Water quality monitoring through laboratory tests at all levels as per the frequency;
- Water quality surveillance undertaken by community through FTKs in all villages as per the frequency of testing.

During scrutiny of records<sup>21</sup>, it was noticed that details of FTKs test reports were not uploaded on website during the period 2016-17 to 2020-21. As a routine practice, test results were kept separately in files without uploading the results on portal. The uploading of results of unfit samples detected by using FTKs on portal could have helped the department in identifying the source of contamination for corrective action. Thus, the envisaged objective of ensuring Water quality surveillance through the portal was defeated as neither the results

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<sup>19</sup> District Consultants are hired by PHED as WSSO staff for providing support for awareness creation (IEC) and training activities (HRD) and work under the supervision of State Consultant and overall supervision is done by Director (WSSO).

<sup>20</sup> Rewari, Fatehabad, Rohtak-2, Karnal-1, Hisar, Kurukshetra, Panchkula and Faridabad.

<sup>21</sup> EE, PHED, Fatehabad, Rewari & No. 2: Rohtak, Karnal, Hisar, Kurukshetra, Panchkula and Faridabad.



were uploaded nor were the samples found unfit by using FTKs referred to nearby laboratories for detailed analysis.

### **5.10 Lack of testing facilities to detect presence of Uranium and non-testing of water samples for heavy metals in areas where water supply is ground based**

#### **Uranium**

As per report (June 2020) of Central Ground Water Board, Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation on “Uranium Occurrence in Shallow Aquifers in India”, there were 19.5 *per cent* samples (88 out of total 450 samples) analysed where Uranium concentration was found more than 30 ppb<sup>22</sup> (permissible limit for drinking water prescribed by World Health Organization) in state of Haryana with maximum value observed as 131.4 parts per billion (detected in Sahu village of Hisar district). The districts which were partly affected by high Uranium in ground water were - Ambala, Bhiwani, Faridabad, Fatehabad, Gurugram, Hisar, Jhajjar, Jind, Kaithal, Karnal, Kurukshetra, Mahendergarh, Palwal, Panipat, Rohtak, Sirsa, Sonipat and Yamuna Nagar.

It was observed that there was no testing facility for testing uranium contamination in the State laboratory situated at Karnal. No efforts had ever been made to tie up with other laboratories for checking the presence of uranium in ground water in the areas where tube well based water supply was in practice whereas UDWQMP, 2019 emphasizes that state laboratories should coordinate with Department of Atomic Energy (DAE) approved laboratories /NABL accredited laboratories for monitoring radioactive and virological parameters.

The Department stated (April 2022) that contamination of Uranium in drinking water drawn from shallow tube wells would have given rise to kidney diseases in that segment/ region which would have been easily captured through an epidemiological survey but no such evidence has ever been reported across the State. Audit is of the view that timely and appropriate remedial measure was required to be taken in respect of Uranium contamination so as to timely restrict the chances of people getting exposed to the contaminated underground water as traces of Uranium presence (though within permissible limit) have been detected at three out<sup>23</sup> of five randomly selected locations during sampling exercise.

#### **Heavy Metal**

EIC, PHED issued instructions ( December 2017) to the sub-ordinate officers for testing chemical contamination for every ground water source i.e. tube well and spring based sources and were directed to submit samples of ground water

<sup>22</sup> Parts per billion.

<sup>23</sup> Locations: Thana (Kurukshetra), Moond (Karnal) and Ballabgarh.

sources to the State Water Testing Laboratory, Karnal. Each test report was required to be scrutinized by concerned Executive Engineer for failed samples and remedial measures were required to be taken on priority. For the purpose, Atomic Absorption Spectrophotometer (AAS) had been installed (October 2016) in the State Water Testing Laboratory, Karnal which had the capacity to test presence of heavy metals in drinking water. As per data provided by the department, it was noticed that 2,835 deep tube wells (2,480-Rural, 355-Urban) and 268 (244-Rural, 24-Urban) shallow tube wells were operated by PHED Haryana in selected divisions. Year wise number of samples received in State laboratory from selected divisional offices and percentage of source tested is shown in **Table 5.11** below:

**Table 5.11: Year-wise number of sources tested for heavy metals at State Lab, Karnal**

Sr. no.	Name of division	Total number of sources to be tested (as on May 2022)	2017-18		2018-19		2019-20		2020-21	
			No. of sample received	Percentage of sources actually tested	No. of sample received	Percentage of sources actually tested	No. of sample received	percentage of sources actually tested	No. of sample received	Percentage of sources actually tested
1.	PHED Hansi	44	30	68	01	2	0	0	11	25
2.	PHED Kurukshetra	789	154	20	282	36	12	2	0	0
3.	PHED, Panchkula	248	67	27	159	64	0	0	0	0
4.	PHED Rewari	104	0	0	20	19	0	0	0	0
5.	PHED Bawal	287	25	9	118	41	0	0	0	0
6.	PHED Kosli	183	0	0	0	0	0	0	0	0
7.	PHED Fatehabad	85	11	13	42	49	15	18	0	0
8.	PHED Tohana	145	22	15	58	40	58	40	0	0
9.	PHED 1 Karnal	393	601	153	288	73	406	103	530	135
10.	PHED 2 Karnal	370	152	41	314	85	169	46	607	164
11.	PHED 1 Rohtak	64	0	0	0	0	0	0	0	0
12.	PHED 2 Rohtak	42	0	0	0	0	0	0	0	0
13.	PHED Faridabad	349	89	26	40	11	0	0	35	10
	<b>Total</b>	<b>3,103</b>	<b>1,151</b>	<b>37</b>	<b>1,336</b>	<b>43</b>	<b>660</b>	<b>21</b>	<b>1,183</b>	<b>38</b>

From the above, it can be seen that during 2017-21, PHED division 1, Karnal had got water samples tested for heavy metals more than the number of sources but no data in this regard was available to confirm whether all the sources had actually been tested or not. Therefore, audit cannot comment on 100 per cent coverage of sources. Whereas in case of other divisions percentage of source tested was ranging from zero to 68 per cent during 2017-21. Thus, instructions of higher authorities to test all sources for chemical contamination was not adhered to as the divisional offices had not sent samples for all the sources under their jurisdiction.

### **5.11 Non-installation of Community Water Purification Plants (CWPP) resulted in depriving the habitants of potable water**

As per IMIS of Ministry of Drinking Water and Sanitations, there were 128 quality affected habitations (April 2017) in state of Haryana. In this regard EIC, PHED had informed (April 2017) all the SEs that out of these above 128 habitations, 90 habitations had been taken up for coverage under various projects and there were

still 38 habitations which were not taken up under any projects for providing alternate safe source. EIC, PHED directed to all SEs to submit project for coverage of balance these 38 quality affected habitations by January 2018.

During scrutiny of records/website (IMIS of Ministry of Drinking Water and Sanitations) data (February 2022) it was seen that the department had not installed any CWPP as an interim measure in the selected districts despite detecting water quality affected habitations continuously from 2016-17 to 2020-21 as shown in **Table 5.12** below:

**Table 5.12: Details of quality affected habitations detected year-wise**

District	2016-17	2017-18	2018-19	2019-20	2020-21
Hisar	--	--	11	15	16
Rewari	36	25	0	2	19
Panchkula	--	--	--	--	2

Further it was observed that habitations from the above districts remained quality affected for two or more consecutive years (**Appendix 21**).

It was observed that in Hisar, eight habitations of the district remained quality affected habitation (Fluoride and Total Dissolved Solid) continuously from 2018-19 to 2020-21. In Rewari, eight habitations of the district were found as quality affected habitation (Fluoride) for two consecutive years during the period of 2016-17 to 2017-18. Besides this, in Panchkula, two habitations namely Baladwal and Dunga were found fluoride affected during chemical testing in the year 2020-21 and 2021-22.

The department did not install any CWPPs in these habitations and the inhabitants were forced to consume non-potable water. Superintending Engineer, PHE circle, Hisar (December 2021) admitted that to cater to the needs of inhabitants during shortage of canal-based water, shallow tube wells were installed. The reply confirms the audit observation.

### **5.12 Delay in commissioning of conversion of tube well based scheme to canal based scheme**

During scrutiny of the records<sup>24</sup>, it was noticed that tube well based water supply was provided in nine habitations/colonies (**Appendix-22**) where ground water had been detected with fluoride contamination<sup>25</sup>.

Out of these nine<sup>26</sup> locations of tubewell supply, the department had planned (2018-21) to shift water supply from tubewell based to canal based at four<sup>27</sup>

<sup>24</sup> EE, PHED, Fatehabad.

<sup>25</sup> Source: PHED laboratory reports.

<sup>26</sup> 1. Ajeet Nagar, Aherwan; 2. Majra; 3. Noorki Ahli; 4. Daulatpur (two installation as per electricity account number); 5. Dhani Binja Lamba; 6. Hanspur; 7. Chandermal; 8. Hans Colony; 9. Kairan.

<sup>27</sup> 1. Aherwan, 2. Majra, 3. Noorki Ahli and 4. Daulatpur.

habitations. Out of these four habitations, work for only one habitation had been physically completed in 2021 and other three works were still in progress (May 2022). No interim measures had been taken by the department for providing safe drinking water. These habitations continued to consume non-potable water as is evident from electric meter bill showing the tube wells to be operative.

Audit observed delays in other projects/schemes related to conversion of tube well based supply to canal based supply, the details are shown in *Appendix 23*.

### **5.13 Regular Cleaning of Over Head Tanks (OHTs)/Clear Water Tanks (CWTs) not done**

As per CPHEEO O&M Manual, OHTs/reservoirs are to be cleaned at regular interval (at least once in six months) and sample of water and silt/mud accumulated in the tank is to be collected for biological analysis to see the presence of snails and worms.

It was observed in selected divisions<sup>28</sup> that records were not maintained to substantiate that periodic cleaning of OHTs/reservoirs was being done at divisional level. This indicated non-compliance to the extant instructions/guidelines. In absence of the records, cleanliness of water supplied to inhabitants could not be ascertained in audit.

### **Conclusion**

Water quality was found affected at some selected locations due to presence of coliforms, physical and chemical parameters found beyond permissible limits. There was shortage of manpower in the State, District and sub-divisional Laboratories. Resultantly, shortfalls in water sample testing at the District/Sub-divisional laboratories were noticed in the selected districts. Audit could not ascertain follow-up on the samples found unfit during testing as no record for the purpose was maintained by the PHED. Shortcomings were noticed in functioning of Laboratories (State, District and Sub-divisional) against the Uniform Drinking Water Quality Monitoring Protocol. There was no facility for testing Uranium contamination and only one facility existed for testing of heavy metals in the State. Field testing kits were not used judiciously as neither the record related to procurement and distributions of kits was maintained nor were the unfit samples found by using FTKs sent to nearby laboratories for further examination. In some quality affected areas, Community Water Purification Plants were not installed and delays were noticed in conversion of ground water based scheme to canal based scheme in the quality affected habitations.

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<sup>28</sup> EE (PHED, No.1&2, Rohtak, Faridabad, Kosli), EE (HSVP, No.1&2, Panchkula, Rewari, No.1 &3, Faridabad), MC (Karnal).

### Recommendations

In view of the above audit observation it is recommended that

7. *The department should focus on improving testing facilities by upgrading laboratories infrastructure and deploying manpower as per requirement.*
8. *FTKs being an important detecting tool for initial screening of contamination, the department should ensure its usage judiciously and as per extant instructions.*
9. *Timely and appropriate remedial measure are required to be taken by the department for detection of Uranium and heavy metals so as prevent the chances of people getting exposed to the contaminated underground water.*
10. *The Department should prioritise timely completion of water supply projects in the quality affected habitations to ensure that potable water supply is available to the inhabitants.*