

Guidelines to provide safe drinking water in remaining Arsenic and Fluoride affected habitations in rural India on mission mode

A. Preamble:

About 76 percent of rural habitations in India have achieved a fully covered (FC) status, under the National Rural Drinking Water Program, with 40 liters per capita daily (lpcd), but this coverage is primarily through hand-pumps and does not necessarily translate into sustainable and good quality service delivery. More than 71,000 habitations are suffering from problems of water quality and only 52 percent of the 170 million plus rural households have access to tap water. The major physio-chemical pollutants include Arsenic, Fluoride, Iron, Salinity and Nitrate, with critical being Arsenic and Fluoride since they pose immediate health hazard compared to the others. A state-wise list of habitations affected by Arsenic and Fluoride is given below:

Table 1: States affected by Fluoride and Arsenic contamination as per IMIS of Ministry as on 11th August 2016

State	Total Water Quality affected Habitations	Arsenic (>0.05mg/l)	Fluoride (>1.5mg/l)
Rajasthan	20895	0	6855
West Bengal	10004	962	1053
Assam	8840	284	155
Jharkhand	6834	119	998
Bihar	5574	102	1087
Punjab	3770	206	285
Odisha	2799	0	70
Karnataka	2117	4	1054
Telangana	1484	0	1041
Chhattisgarh	1148	0	75
Kerala	656	0	73
Andhra Pradesh	571	0	491
Maharashtra	394	0	100

Uttar Pradesh	361	57	200
Haryana	209	0	200
Madhya Pradesh	193	0	148
Gujarat	17	0	11

*Note: Recently BIS has reduced the permissible limit of arsenic in drinking water from 0.05 mg/litre to 0.01 mg/litre through an Amendment issued in June 2015. Hence around 10,000 rural habitations are expected with arsenic level more than 0.01 mg/l.

Arsenic is a carcinogenic element and is associated with skin, lung, bladder, kidney, and liver cancer. Dermatological, developmental, neurological, respiratory, cardiovascular, immunological, and endocrine effects are also evident.

Fluorosis, a public health problem, is caused by excess intake of fluorides through drinking water/food products/industrial pollutants, over a prolonged period. It causes severe health related disorders such as dental fluorosis, skeletal fluorosis and non-skeletal fluorosis besides inducing ageing.

These harmful effects, being permanent and irreversible in nature, are detrimental to the health of an individual and the community, which in turn have an impact on growth, development, economy and human resource development of the country.

To address the issue of last mile coverage and eliminate problems of Arsenic and Fluoride in all the habitations, Ministry of Drinking Water and Sanitation proposes a program focused on Arsenic and Fluoride. This programme aims to take India one step closer toward international standards of Water Quality by the year 2020.

B. Defining standard drinking water quality:

Bureau of Indian Standards has set specifications in its IS-10500-2012 standards for drinking water. However, this standard is only voluntary in nature and not legally supported for enforcement. This standard has two limits:

- Desirable limits
- Maximum permissible or cause for rejection limits

If any parameter exceeds the cause for rejection limit, that water is considered as contaminated. Broadly speaking, water is defined as contaminated if it is biologically contaminated (presence of microscopic organisms such as algae, zoo-plankton, flagellates, E-coli etc) or chemical contamination exceeds permissible limits (e.g. excess fluoride [$>1.5\text{mg/l}$], salinity i.e., Total Dissolved Solids (TDS) [$>2,000\text{mg/l}$], dissolved iron [$>0.3\text{mg/l}$], arsenic [$>0.01\text{mg/l}$], nitrates [$>45\text{mg/l}$] etc.).

In rural areas, more than 85% of drinking water sources are ground water based and in the short-term, chemical constituents in groundwater do not change much, therefore testing once in a year for chemical contaminants is adequate. Testing for bacteriological contamination is recommended 4 times a year, once in every season. However, every year it should be carried out at least twice i.e. during pre-monsoon and post-monsoon seasons.

C. Existing funding under NRDWP to tackle drinking water quality problems:

Up to 67% fund allocated to the States can be utilized for coverage of water quality affected habitations and for tackling water quality problems in rural areas of the country. Further, 5% of NRDWP funds are also earmarked and allocated to Japanese Encephalitis/Acute Encephalitis Syndrome (JE/AEs) affected high priority districts. In addition to this, Government of India provides 3% NRDWP funds on 100% Central assistance basis to States for water quality monitoring and surveillance, which inter alia include taking up works relating to setting up of new up-gradation of districts/sub district water quality testing laboratories, providing chemicals and consumables to laboratories, providing field test kits/refills to Gram Panchayats etc. Further, up to 10% of NRDWP funds allocated to States could be utilized for sustainability of drinking water sources through artificial recharge of ground water and other methods, which inter alia may also dilute the level of contamination in aquifers.

D. Steps taken so far / short term measures for tackling drinking water contamination:

1. The Ministry has prepared a Strategy Plan to provide safe drinking water to 90% of the rural population of the country preferably through surface water based piped water supply schemes by the year 2022 as a long-term sustainable solution, subject to availability of funds.
2. The Ministry has encouraged all the States to commission surface water based piped water supply schemes in all water quality affected habitations as a long term sustainable solution.
3. All States have been advised to install community water purification plants, in reported arsenic and fluoride affected habitations by March 2017, as this is quicker compared to installation of piped water supply schemes.
4. This is being done as a short term immediate measure for providing 8-10 lpcd (litre per capita per day) of safe water for drinking and cooking purpose only.
5. Since the allocation of the Ministry was reduced during 2015-16, NITI Aayog has released Rs 1000 crore as a one-time Central assistance for this purpose which also includes funds for last mile connectivity of piped water supply schemes in Rajasthan and West Bengal which are most affected by fluoride and arsenic contaminations in drinking water respectively.

E. Why a National Sub-Mission?

The proposed program warrants a National Sub-Mission to be completed on mission mode before March 2020 due to:

1. Criticality and urgency of the matter
2. Requirement of significant increase in operational efficiency
3. Requirement of additional funds, robust monitoring and surveillance of those
4. Requirement of special technology, manpower and strategy to achieve the goal

F. Goal:

To cover of all the arsenic & fluoride affected habitations with safe & perennial surface water based piped water supply schemes as the permanent & sustainable solution.

(a)The sub-mission will have three phases namely:

1. Diagnostic phase: To correctly determine the action plan based on most recent and authentic data
2. Implementation phase: Roll-out of area specific schemes as per guidelines
3. Sustain phase: To ensure that schemes are running successfully with adequate monitoring and surveillance

G. Steps to roll out the project:

1. A clear action plan, not more than two pages, will be submitted by all states to Ministry of Drinking Water and Sanitation by **10th October 2016**. The action plan will contain unambiguous timelines, proposed schemes and corresponding village coverage, scheme wise funding requirements, potential sources of funding and tasks to be executed over the course of next four years to ensure the state is Arsenic/Fluoride free.
2. **Identification of habitations:** State has to correctly identify the habitations, affected by water contaminated by Arsenic and Fluoride. The habitations will be geo-tagged for all future uses. The geo-tagged location will be accessible on the 'Mobile Application', Integrated Management Information System (IMIS) for real time monitoring.

Priorities may be as below:-

- (a) Habitations not covered by any other existing long term programme of central or state government.

(b) Habitations having higher degree of contamination according to IMIS data.

3. Identification of Source: State has to identify, geo-tag and select the source on the basis of following parameters

- Source/Aquifer must be contaminant free
- Source must be perennial in nature
- Source must be the most economically feasible (least lifecycle cost) option which has the ability to provide clean drinking water in perpetuity

4. Quality testing of source: States have to follow the Uniform Drinking Water Quality Monitoring Protocol published and widely distributed by the Ministry of Drinking Water and Sanitation.

5. Preparation of Schemes: On the basis of identification of habitation and source, State has to prepare a proposal.

➤ **Mandatory Requirements :**

1. Per capita cost of supply of safe and adequate drinking water to the end user.
2. Operation and Maintenance cost.
3. Provision of en-route villages, towns and cities if any, in co-ordination with the respective local government bodies / institutions, but priority to be given on Arsenic / Fluoride affected habitations.
4. Detailed phase wise and time bound plan.
5. The State should firmly commit in providing, State matching share corresponding to release of Central Share for Arsenic and Fluoride affected habitations and entire share corresponding to en-route habitations.
6. Ground Level Service Reservoir (GLSR) / Over Head Tanks (OHT / ESR) should not be far away from the source to minimize raising mains.
7. Ground Level Service Reservoir (GLSR) / Over Head Tanks (OHT / ESR) should be located so as to give adequate distribution by gravity to cover maximum number of habitations.
8. The schemes should have recycling / reuse of filter bed washed water in Water Treatment Plants (WTP).

9. All mega schemes with Capital Expenditure more than 20 Crore shall necessarily have Supervisory Control and Data Acquisition (SCADA) system to minimize water losses and non-revenue water losses.
10. The schemes should have sufficient capacity of chlorination plants including online booster chlorination plants, so that end user should get purified / safe water.
11. All the mega water supply schemes shall have dedicated Three Phase electrical power supply.
12. All Water Treatment Plants (WTP's) shall necessarily have a water quality testing laboratory with adequate manpower.
13. It is up to the State Government to decide the service level of water supply delivery, however in no case this shall be less than 40 liter per capita per day (LPCD) based on current population.
14. All mega schemes, shall be commissioned within a span of 24 months from the date of award of work.
15. The schemes should have the provision for bulk water meter before the entry point of Gram Panchayat / Habitation.

➤ **Advisory :**

16. It is advised to use renewable energy like Solar power / solar panels /solar light wherever necessary and required to minimize the O&M cost and to the save electricity.
17. It is advised to have sufficient number of flow meters in the scheme.
18. It is advisable that, the schemes should be designed so that, it makes minimum energy consumption.
19. It is advised to have necessary provision for extension, in future.
20. It is advised to have a suitable water tariff plan, if not existing already.

H. Apex Committee:

States have to submit the Detailed Project Report (DPRs) approved by State Level Scheme Sanction Committee (SLSSC) to the Ministry to accord the approval from Apex Committee.

Details of Apex Committee member are as below:

Sl.No.	Committee	
1.	Secretary, Ministry of Drinking Water and Sanitation.	Chairperson
2.	Financial Adviser, Ministry of Drinking Water and Sanitation.	Member
3.	Joint Secretary (Water), Ministry of Drinking Water and Sanitation.	Member
4.	Representative from NITI Aayog.	Member
5.	Representative from Department of Expenditure.	Member
6.	Representative from Ministry of Statistical and Programme Implementation.	Member
7.	Representative from Ministry of Health and Family Welfare.	Member
8.	Director (Water), Ministry of Drinking Water and Sanitation.	Member
9.	Deputy Adviser (WQ), Ministry of Drinking Water and Sanitation.	Convenor

I. Monitoring and Surveillance:

Institutional Arrangement in States

For implementation of the program in mission mode, every state will appoint a 'State submission coordinator' at the level of Chief Engineer, who will be accountable for the following:

- Planning, preparation and fund management of state level program
- Timely implementation of the program at state level
- Ensuring continuous monitoring, surveillance, timely data collection, updation on online system and analysis
- Ensuring technical, financial and overall sustainability of the program at the state level

Institutional Arrangement at Centre

For implementation of the program in mission mode at Centre, Ministry of Drinking Water and Sanitation will appoint the 'Deputy Advisor – Water Quality' as the 'National submission coordinator', who will be accountable for the following:

- Timely coordination with States
- Timely implementation of the program

- Continuous Monitoring, Surveillance, Data Collection and analysis of the program at Central level
 - Ensuring technical, financial and overall sustainability of the program at the national level
1. States have to report regularly on Integrated Management Information System (IMIS) of the Ministry about physical and financial progress.
 2. States have to report the Global Positioning System (GPS) co-ordinates of source point and delivery point in IMIS of the Ministry.
 3. States have to upload the photographs regularly on mRWS mobile app.
 4. This Programme will be monitored by District Development Coordination and Monitoring Committee (DISHA) at district level recently constituted by Ministry of Rural Development under Chairmanship of Member of Parliament (M.P.).
 5. All the schemes will have milestone linked funding.
 6. All the schemes will have Geo-Tagging facility.
 7. All the schemes are monitored either by Bhuvan based satellite or by Drone based satellite.

J. Modus operandi of implementation:

➤ Process flow:

1. A dedicated technology application viz. workflow based application, will be developed for the sub-mission which will serve as a repository of all sub-mission related data.
2. All scheme related processes will be routed through this portal to ensure accountability, real-time monitoring, and increased efficiency.
3. A standard and user friendly Project Information Format (PIF) will be designed by Ministry of Drinking Water and Sanitation which will be common to all the states. The PIF will be used to initiate all new schemes and serve as a feeder for

the DPR. The PIF will contain information about the Mandatory Requirements (listed above).

4. The portal will have the functionality of integrating existing schemes into the sub-mission.
5. As per the guidelines and approval framework of the sub-mission, all scheme related information will be uploaded on the portal for review and approval. All approvals, rejections, sanctions will be online with a pre-decided turnaround time for stakeholders. At any point of time, stakeholders can access real-time status of the PIF and scheme approvals.
6. The DPRs, which are a critical part of any scheme, will be required Post-Facto and only for those scheme PIFs which have received all necessary approvals.
7. The scheme implementation and ground-work can start in parallel to ensure speed and efficiency.

➤ **Project planning:**

8. It is the Engineer in Chief / Chief Engineer of the State Government who will be responsible for preparing the most techno-economically feasible and cost effective Detailed Project Report (DPR).
9. While preparing the DPR's the Engineer in Chief / Chief Engineer shall ensure the ground level engineers with the help of district administration and Zilla Panchayat to take in principal approval of all Gram Panchayat (G.P.) for acceptance of the scheme and taking over the assets within their jurisdiction.
10. The approved proposal in Annual Action plan shall then be made into detailed project reports (DPR's) for final approval in State Level Scheme Sanction Committee (SLSSC).
11. After preparation of DPR's they should be vetted technical by the State technical agency before the same is placed at State Level Scheme Sanction Committee (SLSSC).

12. The area officer of the Ministry of Drinking Water and Sanitation shall be responsible for technical examination of DPR's and appraise the State Level Scheme Sanction Committee (SLSSC) for taking a decision.
13. States have to submit the Detailed Project Report (DPRs) approved by State Level Scheme Sanction Committee (SLSSC) to the Ministry to accord the approval from Apex Committee.
14. Since overall implementation is on mission mode a dedicated Project Director (not below the rank of Superintendent Engineer) shall be engaged by all the State Governments for design and implementation of the project.

K. Technical and Administrative Sanctions:

After approval of the proposal in Apex Committee. Technical sanction to be accorded by the competent authority. Depending up on technical sanction, administrative sanction to be accorded by the competent authority.

L. Funding Pattern:

Funds sharing between Center and State for North-Eastern /Himalayan States shall be 90:10 and for all other States 50:50.

M. Proposed Release of Grants:

On the basis of administrative sanctions, grants should be released to the executing agency by the Ministry of Drinking Water & Sanitation, in phased manner based on the performance and submission of requisite physical and financial document to the Ministry.

N. Recurring Expenditure:

1. It is advisable that the State shall dovetail 14th finance commission funds for under taking O&M within their jurisdiction.
2. It is the overall responsibility of the concerned State Government to bear the Recurring expenditure, if necessary over and above the 15% NRDWP-O&M funds allocated to them.
3. It is the responsibility of Gram Panchayat to own-up and take-up operation and maintenance (O&M) within their jurisdiction, while O&M responsibility of all head works including Water Treatment Plants (WTP's) shall be with the State Department / Board dealing with rural water supply.

O. Information, Education and Communication (IEC) activities:

1. Extensive awareness campaign on Arsenic and Fluoride should be organized at Gram Panchayat level.
2. To explain the technology / training / methodology and procedure to the Scheme implementing Engineers, periodic Workshop should be organized at various reputed institutions.

The program strives to ensure sustainability of water availability in terms of potability, adequacy, convenience, affordability and equity, on a sustainable basis, while also adopting decentralised approach involving States and community organizations.