



Memorandum of Understanding between

Geological Survey of India
Ministry of Mines
Govt of India

and

Central Ground Water Board, Faridabad, Haryana
Dept of Water Resources, River Development
and Ganga Rejuvenation,
Ministry of Jal Shakti, Govt of India

and

Drinking Water and Sanitation Department, Ranchi
Govt of Jharkhand

on

**Assessment of fluoride contamination in surface and
groundwater and its management in Jharkhand**

March, 2020

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[Signature]

MEMORANDUM OF UNDERSTANDING (MOU) ON ASSESSMENT OF FLUORIDE CONTAMINATION IN SURFACE AND GROUNDWATER AND ITS MANAGEMENT IN JHARKHAND

CL.1. The MoU

This Memorandum of Understanding hereinafter referred to as MoU signed on 15th day of July year 2020 between **Geological Survey of India**, 27, Jawaharlal Nehru Road, Kolkata 700016, an attached office of Ministry of Mines, Government of India (hereinafter referred to as 'GSI'), which expression shall include, unless repugnant to the context or contrary to the meaning thereof, its successors or permitted assignees on the first part.

AND

Central Ground Water Board, Bhujal Bhawan, NH IV, Faridabad, Haryana, a Sub-ordinate Office of the Ministry of Jal Shakti, Govt of India, (hereinafter referred to as 'CGWB') which expression unless otherwise provided shall include its successors, representatives and assignees on the other part.

AND

Drinking Water and Sanitation Department, 2nd Floor, Nepal House, Doranda, Ranchi 834002, Jharkhand, a department, Govt of Jharkhand, (hereinafter referred to as 'DWSD') which expression unless otherwise provided shall include its successors, representatives and assignees on the other part.

GSI, CGWB and DWSD may at times be referred to individually as "Party" and collectively as the "Parties".

CL. 2. Preamble

Geological Survey of India (GSI) is a premier organization under the Ministry of Mines engaged in carrying out multidisciplinary programme in Earth Sciences including studies in the field of medical geology. GSI is having expertise in geological mapping, geochemical and petrological studies, and geophysical studies for understanding a variety of geological problems including health hazard due to ground contamination. GSI's involvement in fluoride contamination studies dates back to 1970s with evaluation of ground water contamination in Bhilwara District, Rajasthan. Since 2004, GSI is constantly undertaking geological studies on delineation of geogenic cause of ground water contamination, particularly for fluoride in parts of Bihar, Uttar Pradesh and Rajasthan states.

Central Ground Water Board (CGWB), being the National apex organisation, vested with responsibilities to carry out scientific studies, exploration aided by drilling, monitoring of ground water regime and ground water quality assessment, augmentation, management and regulation

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of country's ground water resources. It is also implementing the National Project on Aquifer Management (NAQUIM) in the country.

Drinking Water and Sanitation Department (DWSD), is an apex department under Govt of Jharkhand which work towards providing safe, sustainable and adequate drinking water to the rural population of Jharkhand. It provides knowledge of cost effective technological option for enhanced access to water for informed choice making by community, contribute towards a healthy and dignified life through good sanitation and hygiene practices with community involvement, and ensure better quality of life through improved use of safe drinking water; thereby reducing incidences of water borne diseases and enhancement of productivity of people.

The three Parties agree to undertake the following activities to achieve the overall objective of promoting good public health through safe drinking water. Considering the important societal issue, the financial aspects regarding the field and laboratory work will be made by the parties of their own.

CL. 3. Proposed Activities

Fluorine is a common element that is widely distributed in Earth's crust and exists in the form of fluorides in a number of minerals in rocks and even phosphate fertilisers. Water passing through and soils developing over these rocks often lead to higher concentrations of fluorine in ground water and in vegetation. The intake of high fluoride, above 1.5 mg/l, increases the risk of dental and skeletal fluorosis. In Jharkhand, most of its district such as Garhwa, Palamu, Giridih, Bokaro, Hazaribagh, Godda, Ranchi etc are having high fluoride polluted water and local population is suffering from related health issues. At present, several steps are being taken by the Drinking Water and Sanitation Department (DWSD), Govt of Jharkhand and Central government for its management such as identification of affected habitans and installation of Electro Defluorisation (EDF) machines, capacity building etc. In most cases the implementation of the management plan is not backed by strong scientific basis and thus lead to uncertainty in the implementation of the management projects. During, SGPB meeting (GSI-05, held on 21-08-2019), the board suggested to have a tripartite collaboration between GSI, CGWB and DWSD to assess the fluoride contamination and its management practices.

Thus, this MoU is formalised on project concerning **Assessment of fluoride contamination in surface and groundwater and its management in Jharkhand** with an overall aim to present a systematic approach to evaluate the distribution of fluoride in the surface and groundwater sources with reference to its concentration, depth, geographical distribution, geogenic causes, health affect and optimal management practices in the affected region.

The objectives of this MoU are as follows:

- To carry out scientific studies for delineation of fluoride contamination in ground water at different levels (both spatial and vertical), its monitoring and correlation with geomorphological / geological elements present in the area.
- To develop a fluoride zonation and its management map for the area.
- To cooperate and facilitate sharing of geo-scientific data available with the three organisations for sustainable development of ground water resources.

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Thus, to initiate this MoU between GSI, CGWB and DWSD on the assessment of fluoride contamination, the three parties have jointly agreed to work together for a pilot project in one of the most affected districts in Jharkhand (e.g., Garhwa District).

The proposed pilot project will address the following objectives

- i) To update information on slope forming material by updating the macro-scale (1:50,000) Geological database of the area.
- ii) To update and map all the relevant geofactors (slope morphometry, geomorphology, lineament, lithology, slope forming material, structure, land use/ cover, drainage, water shed etc.) to examine the genetic relationships between the geofactors and fluoride incidences.
- iii) To delineate fluoride distribution pattern (spatial / vertical), fluoride values in ground water (pre and post monsoon), and chemical analysis of water samples.
- iv) To carry out lab studies (Petrological study of soil/sediment/hard rock/industrial waste) for determination of geotechnical and mineral/element parameters.
- v) To prepare aquifer map using method followed under NAQUIM project of CGWB.
- vi) To prepare fluoride zonation and its management map for the area, and to identify the areas for future developmental activities.

Responsibility of the parties for generating/ collection of data are appended below:

CL. 3.1. Responsibility of GSI

- 1. GSI will prepare and share GIS-based thematic maps on slope morphometry, geomorphology, lineament, slope forming material, land use/ cover, flow accumulation, drainage, watershed etc for the understanding of ground water recharge and distribution.
- 2. GSI will carry out sample collection and lab study and analysis of soil and rock samples for relevant parameters.
- 3. GSI will identify a suitable officer who will be the incharge / focal point of this activity.

CL. 3.2. Responsibility of CGWB

- 1. CGWB will prepare and share aquifer mapping data, including drill samples generated out of NAQUIM project.
- 2. CGWB will prepare and share depth to water table map (pre and post monsoon) for the area and any other data available with the organisation relevant for the study area.
- 3. CGWB will identify a suitable officer who will be the incharge / focal point of this activity.

CL. 3.3. Responsibility of DWSD

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1. DWSD will prepare and share fluoride risk management map based on inputs from GSI and CGWB.
2. DWSD will provide local lab facilities for carrying of part sample analysis.
3. DWSD will provide subsurface data of pump, borehole and tube well.
4. DWSD will identify a suitable officer who will be the incharge / focal point of this activity.

CL. 3.4. Joint responsibilities.

1. GSI and CGWB will jointly carry out sampling of ground water samples for fluoride pollutant.
2. GSI and DWSD will jointly carry out chemical analysis of surface and ground water samples for pollutant studies.
3. GSI and CGWB will jointly carry out extent of fluoride pollutant in ground water
4. GSI, DWSD and CGWB scientists may be provided with possible logistics from the organisations during the interactions.
5. GSI, DWSD and CGWB will jointly prepare lay-outs/ maps, reports and technical document describing the detailed methodology etc as discrete deliverables of the pilot project.

In this work plan, laboratory inputs and field inputs collected by all parties will be synthesised for preparation of fluoride zonation and risk management maps. GIS modelling and data synthesis will be carried out jointly by all parties. Geo-scientific data sharing between CGWB, DWSD and GSI will be based on existing data sharing norms of the parties.

CL. 4. Institutional arrangements

1. The duration of this MoU will be for five years after signing of MOU but can be extended as agreed upon by the Parties mutually. The study of Garhwa District may be taken up immediately as a pilot project of this assignment. The tentative schedule to complete the work of Garhwa District as a pilot project is kept as two years from the date of signing of the MoU for helping the affected community. After the completion of this work, similar investigation may be taken up for other districts of Jharkhand, on mutual agreement by the parties or as per specific request from the Government of India or the State Governments. The proposed investigation programme of Garhwa District will duly be reflected in the approved annual programme of the respective organisation.
2. The facilities in the form of equipment and expertise from the organizations will be utilized and extended to each other based on mutual agreement. The cost, if any, will be borne by the respective organisation.
3. Publications, if any, in respect of the said study with the prior mutual consent of Parties with prior approval from the competent authority, shall be in the names of the workers from the parties with suitable order of authorship. It will be suitably acknowledged that

Any notice, request or other communication required or permitted to be given under this MoU shall be in writing, preferably in English and shall be delivered in person or by recognized courier service or facsimile, at following addresses or to the authorized persons of the Parties to be notified separately:

For CGWB

Chairman
Central Ground Water Board
Bhujal Bhawan, NH IV, Faridabad, Haryana
Phone No 0129 2477101
Fax No 0129 2477200
Email: chmn-cgwb@nic.in

For DWSD

The Chief Engineer cum Executive Director,
PMU (SWSD), DWSD
Water Tower Campus
Doranda, Ranchi, Jharkhand
Phone No
Fax No
Email: swsm.jharkhand@gmail.com

For GSI

Director General,
Geological Survey of India,
27 JL Nehru Road, Kolkata, West Bengal
Phone No 033 22521779
Fax No 033 22521714
Email: dg.gsi@gov.in

Either of the Parties recognizes that the successful implementation of this MoU to the mutual satisfaction and benefit of all Parties will require a significant degree of co-operation and good faith on behalf of the Parties. The Parties resolve to act in good faith and in accordance with the spirit of this MoU to implement the provisions in accordance with the mutual desire and in the interest of the Parties.

CL. 8. Force Majeure

In the event of either party being rendered unable by Force Majeure to perform any obligation required to be performed by it in the MoU, the relative obligation of the party affected by such Force Majeure, shall upon notification by the other party, be suspended for the period during which the clause lasts. The term/expression Force Majeure shall include an act of nature, such

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as, earthquake, flood, inclement weather etc. and also war, riot, sabotage and breakdown of law and order caused by terrorist's activities.

CL. 9. Arbitration

Except as otherwise provided elsewhere in the MoU, in the event of any dispute or difference relating to, arising from or connected with the MoU, such dispute or difference shall be mutually discussed between the parties and will be finalized to the satisfaction of both the parties. Any officer in the rank of Secretary, Govt. of India as agreed upon between GSI, CGWB and DWSD will be the Arbitrator for this MoU.

CL. 10. Entire MoU and amendments

This MoU hereto is the Parties' understanding relating to the subject matter herein. It supersedes all prior or contemporaneous oral or written communications, proposals and representations with respect to its subject matter.

I. Either Party can terminate this MoU at any time by serving one month notice to the other Party.

IN WITNESS WHEREOF the Parties hereto have duly executed this MoU.

On the 15th day of July Two Thousand and Twenty

Sanjay Marwaha

For The Central Ground Water Board

Name *Sanjay Marwaha*

Designation MEMBER, HQ

In the presence of

Witness 1. *Rajen Ray*
(R.K. RAY, CGWB, F&D)

Witness 2. *Judhvedi*
(S. N. D. VEDI, CGWB, F&D)

For The Drinking Water and Sanitation Department

Name

Designation THE CHIEF ENGINEER CUM EXECUTIVE DIRECTOR

In the presence of

Witness 1. *Sudhakant Jha*
(SUDHAKANT JHA)

Witness 2. *Ramesh Prasad*
(Ramesh Prasad)

Jayaram Prasad

For The Geological Survey of India by

Name *JAYARAM PRASAD*

Designation DY. DIRECTOR GENERAL SU: Jharkhand, Ranchi

In the presence of

Witness 1. *Arunkumar Sharm*
(ARUNKUMAR SHARM)

Witness 2. *Pankaj Kumar*
(Pankaj Kumar)