



Memorandum of Understanding

Between

Central Ground Water Board

Department of Water Resources, RD & GR

Ministry of Jal Shakti

Government of India

and

Geological Survey of India

Ministry of Mines

Government of India

on

**Study on Uranium, Lead, Arsenic,
Fluoride and Mercury Contamination of
Ground Water**

in

**Parts of Punjab, Haryana, Andhra Pradesh, Uttar Pradesh,
Bihar, Chhattisgarh, Jharkhand and
Assam States**

Memorandum of Understanding
Between
Central Ground Water Board
and
Geological Survey of India

Memorandum of Understanding hereinafter referred to as MOU signed on 5th day of January, year 2022 between Geological Survey of India, 27, Jawaharlal Nehru Road, Kolkata, an attached Office of Ministry of Mines, Govt. 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 Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Government of India, (hereinafter referred to as CGWB) which expression shall include its successors, representatives and assignees on the other part.

1. Preamble

GSI is a premier organization carrying out geological mapping, mineral exploration and multidisciplinary programme in Earth Sciences including sponsored and societal related studies in the field of engineering geology, environmental geological studies, natural hazard mitigation etc. GSI with over 160 years of geological expertise has evolved into an organization endowed with cultivated human resource of exceptional calibre, laboratories equipped with world class equipment and activities spreading over air, land and ocean in the specialized fields of geology, geophysics and geochemistry.

CGWB, being the National apex organization, 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 of country's ground water resources. It is also implementing the National project on Aquifer Management (NAQUIM) in the country.

2. Background of Study

Presence of high Uranium in ground water in different parts of the country has been reported by various central, state & research institutions in the last two decades with availability of better analytical facilities. Exposure to uranium through drinking water has been associated with nephrotoxic effects. The concentration of naturally-occurring uranium in groundwater depends on the uranium content of the rocks and the rate of leaching and dissolution processes. The main factors that may drive high uranium concentrations in groundwater are source rocks, oxidation state, water-rock interaction and formation of soluble complexes. Anthropogenic factors such as groundwater table decline and nitrate pollution has also been found to further enhance uranium mobilization in ground



water. Industrial processes like extraction of phosphorus from phosphate ores to produce phosphate fertilizers, uranium enrichment, uranium mine tailings disposal, and uranium mining and milling to produce uranium oxides also add Uranium in the environment.

Besides Uranium, the presence of other major deleterious heavy metal toxins like Lead, Arsenic, Fluoride and Mercury in ground waters of different parts of the country have also been reported.

As per the decisions taken in the 59th Central Geological Programming Board Meeting a collaborative study on Uranium contamination in ground water in India was proposed by CGWB which has been agreed upon by GSI. In subsequent meeting between CGWB and GSI, it has been jointly agreed to include As, Pb, F and Hg under the study. In this backdrop a collaborative study with GSI is proposed to be taken up in separate clusters covering parts of Punjab, Haryana, Andhra Pradesh, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam states.

Cluster 1: Parts of Punjab and Haryana States (covering Hoshiarpur, Ludhiana and Bhatinda districts in Punjab State and Bhiwani, Sirsa, Mahendragarh and Rohtak districts in Haryana State.)

Cluster 2: Parts of Andhra Pradesh State (covering areas in and around Tummalapalle uranium deposit, Vemula Mandal of YSR Kadapa district)

Cluster 3: Parts of Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam states (study area to be decided mutually by CGWB and GSI)

CGWB and GSI may at times be referred to individually as "Party" and collectively as the "parties" whereas CGWB and GSI have agreed upon to co-operate for the above mentioned study. The activities to be undertaken in this cooperation, Role of GSI & CGWB, time frame and other conditions of the collaboration are given below: -

3. Title of the Programme

Study on Uranium, Lead, Arsenic, Fluoride and Mercury contamination of ground water in parts of Punjab, Haryana, Andhra Pradesh, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam states

4. Objectives

- Determination of Uranium, Lead, Arsenic, Fluoride and Mercury level in water from various groundwater sources likes dug wells, hand pumps, deep bore wells/tube wells, surface water sources used for drinking water, irrigation etc.
- Determination of Uranium Lead, Arsenic, Fluoride and Mercury concentration in soils, sediments, rocks and anthropogenic wastes.
- Spatial and depth wise distribution of Uranium, Lead, Arsenic, Fluoride and Mercury in ground water in the study area at admissible scale (decided mutually) and its correlation with geological and geomorphological aspects in the study area and mitigation measures in affected zones.



- Detailed study of the hydrogeological regime in the area and zonation maps of different elements.
- Possible mechanism of mobilization of Uranium, Arsenic and Fluoride in ground water
- Geological controls on mobilization of uranium, arsenic and fluoride and probable anthropogenic sources of Pb and Hg contamination in the study areas.
- Tracing the extent of mobilization, particularly for cluster 2 in the areas in and around uranium mine tailings disposal, and uranium mining and milling and its management plans for sustainable development.
- Any site specific studies required subsequently and mutually agreed by both the parties.

5. Role of GSI

- Providing Geological Map of the area on 1:50,000 scale.
- To map all the site specific geological factors like slope morphometry, geomorphology, lineament, lithology, structure, land use land cover (LULC), drainage, etc., influencing the incidence of the pollutant in study area.
- Systematic collection of samples from soils, sediments, rocks and industrial wastes for analysis of mineral/elemental parameters (in consultation with CGWB party).
- Laboratory studies for determination of elemental concentration of U, Pb, As, F and Hg in soils, sediments, rocks and industrial wastes.
- Explore and predict geogenic causes for elemental distribution pattern (spatial/vertical), source tracing of contaminants in ground water through isotopic studies, etc.
- Pb isotopic source apportionment of U to be done by GSI.
- Any other specific laboratory analysis or site specific field study required may be formulated during detailed preparation of pilot projects under ambit of MoU (in consultation with CGWB party).

6. Role of CGWB

- CGWB will provide all archival/hierarchical base line data of subsurface geology.
- Collection of water samples for analysis of Uranium, Pb, As, F and Hg in ground water (in consultation with the GSI party).
- Determination of Uranium, Pb, As, F and Hg level in water from various groundwater sources likes dug wells, hand pumps, deep bore wells/tube wells, surface water sources etc.
- Analysis of water samples including major parameters (pH, Electrical conductivity/total dissolved solids, carbonate, bicarbonate, chloride, sulphate, nitrate, fluoride, total hardness, calcium, magnesium, sodium, potassium and silica).
- Any other specific laboratory analysis or site specific field study required may be formulated during detailed preparation of pilot projects under ambit of MoU (in consultation with GSI party).

7. Joint Responsibilities of CGWB and GSI

- Formulation of pilot projects including quantum, objectives and expected outputs, timeline, methodology of sample collection, analysis and interpretation.




- ii. Joint field traverses and collection of samples for analysis of Uranium, Pb, As, F and Hg in solid and aqueous phase.
- iii. Both organizations will provide access to libraries, archives, research laboratories and other facilities pertaining to mutually agreed project.
- iv. Preparation of final joint report of the study.

Each of the Parties recognizes that the successful implementation of this MOU to the mutual satisfaction and benefit of the both parties will require a significant degree of cooperation and good faith on behalf of both Parties. Each of the Parties resolves 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.

8. Final Outcome

It is expected that results of this study would help in improved understanding of the distribution of uranium in solid and aqueous phases, causal factors for its mobilization in ground water, assessment of vulnerability of an aquifer to uranium contamination and identification of aquifers safe from uranium contamination. The study would also provide insights into the mobilization of arsenic and fluoride. Anthropogenic sources of Pb and Hg would also be determined.

Possible remedial measures would be worked out. Awareness campaigns to sensitize the people living in the contaminated areas/risk zones would be carried out.

The report of the study would be placed in public domain.

9. Validity

The MOU shall be effective from the date on which it is executed by the parties and may continue for a period of five years and may be extended by mutual consent. The MOU may be terminated at any time by mutual agreement on one month's notice at any time by either party.

10. Team Members

Central Ground Water Board	Geological Survey of India
Team of Hydrogeologists and Chemists from CGWB	Team of Geologists and Chemists from GSI
A nodal officer from CGWB to coordinate the requirements/inputs vis-a-vis progress of all the projects under the ambit of MoU and Liaison with GSI for successful implementation (as recommended in CGPB Committee XII meeting)	A nodal officer from GSI to coordinate the requirements/inputs vis-a-vis progress of all the projects under the ambit of MoU and liaison with CGWB for successful implementation (as recommended in CGPB Committee XII meeting)

11. Transfer of Data

- i. The data generated by CGWB and GSI during the said study in this MOU, shall be owned jointly by CGWB and GSI.
- ii. Data provided by GSI will not be shared by CGWB with third party without the prior approval of GSI and vice versa. Parties also agree not to utilize the shared data for any kind of commercial purpose without prior explicit permission of other party.
- iii. Data provided by GSI will be used by CGWB only for the purpose for which it has been acquired. The data provided by CGWB will also be used by GSI for their internal use.

12. Confidentiality

Both parties acknowledge the confidentiality of the information which may be transferred between the parties or obtained or developed during the course of this exchange from time to time as being essential to this MOU and agree not to disclose the same to any third party or any outside parties. However, each party shall be free to disclose this information as is required to be disclosed by official authorities in accordance with applicable law or regulation.

13. Financial Commitments

While the parties agree to co-operate and otherwise act in good faith with the view to the successful implementation, **there is no financial binding on either party.** This MOU is intended to mutual understanding of the Parties hereto as at the date thereof.

14. Intellectual property right

The intellectual property right that is generated out of collaborative study shall be jointly owned by GSI&CGWB.

15. Authorised Signatories

Any notice, request or other communication required or permitted to be given under this MOU shall be in writing in the English language and shall be delivered in person or by recognized courier service or facsimile at addresses as follows or the authorized persons of two organizations to be notified separately:

IF to CGWB Chairman Central Ground Water Board Bhujal Bhawan NH-IV, Faridabad Phone No. 0129-2477101 Fax - 0129-2477200	IF to GSI Director General Geological Survey of India 27, Jawahar Lal Nehru Road Kolkata Phone No. 033-2252-1779 Fax - 033-2252-1656
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16. Arbitration

Except as otherwise provided elsewhere in the contract in the event of any dispute or difference relating to arising from or connected with the contract, such dispute or difference shall be mutually discussed between the parties and will be finalized to the satisfaction of both the parties. Further, if need arises, dispute may be referred to Secretary, MOM and his decision will be final and binding to both the parties. This MOU is subject to the Law of the land. Any clause not specifically mentioned herein is subject to the rules and regulations in accordance with Law.

17. Force Majeure

Neither party shall be held responsible for non-fulfillment of their respective obligation under the agreement due to exigency of one or more of the unforeseen events such as but not limited to Acts of God, war, flood, earthquake, strikes, lockouts, epidemics, riots, civil commotion etc. provided on the occurrence and cessation of such events, the effected thereby shall give notice in writing to other parties within one month of such occurrence or cessation. If the force majeure conditions continue beyond six months, the parties shall then mutually decide about the future course of action.

18. Liability

Both GSI and CGWB shall ensure that the data will be used only for the purpose it is being shared and the data will not be transmitted to other than bonafide users.

19. Entire Contract and Amendments

This MOU will be signed along with attached signed addends and / or subsequent agreements, which will constitute the entire agreement between the GSI and CGWB. No prior written or oral representations shall be binding and all amendments and / or subsequent agreements shall be in writing and signed by a party of equal position as those of the executing parties hereto. This MOU shall supersede all previous oral and written communications, representations and undertaking between the parties on this issue.



IN WITNESS WHEREOF the Parties hereto have duly executed this MOU on the 5th day of January, Year 2022.

For **CENTRAL GROUND WATER BOARD** by

For **GEOLOGICAL SURVEY OF INDIA** by

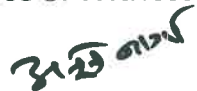

05.01.2022

Name : **Dr. Nandakumaran P.**
Designation : **Chairman, CGWB**


5/1/22

Name : **Shri Rajendra Singh Garkhal**
Designation : **Director General, GSI**

In presence of Witness


31/12/21

Name **CHANDAN NAGARI**
Designation **Member, CGWB**

In presence of Witness


5/1/22

Name **DR. L. P. SINGH**
Designation **Dy. D. G., GSI**


5/1/2022.

Name **R. K. RAY**
Designation **Scientist 'D'**

Name
Designation