



समझौता ज्ञापन/ Memorandum of Understanding
बीच में/ Between

भारतीय भूवैज्ञानिक सर्वेक्षण
/Geological Survey of India
एवं/ and
केंद्रीय भूमि जल बोर्ड
/Central Ground Water Board

पर/ on

राजस्थान के भूभागों में भूमि-जल के यूरेनियम, लेड,
आर्सेनिक, फ्लुओराइड और मरकरी संदूषण का अध्ययन/
**Study on Uranium, Lead, Arsenic, Fluoride
and Mercury Contamination of Ground Water
in parts of Rajasthan**

September, 2024

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

Memorandum of Understanding hereinafter referred to as MoU signed on ~~24th~~ ^{September} day of ~~2024~~ year ²⁰²⁴ between Geological Survey of India, 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, 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 and mitigation etc. GSI with over 173 years of geological expertise has evolved into an organization endowed with cultivated human resource of exceptional caliber, 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 Rajasthan has been reported by various central, state & research institutions in the last two decades with availability of advanced 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, Nitrate and Mercury in ground waters of different parts of Rajasthan 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 study Uranium, Lead, Arsenic, Fluoride & Mercury Contamination of Ground Water in

covering parts of Punjab, Haryana, Andhra Pradesh, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand and Assam states. Afterwards, a MoU between GSI and CGWB was signed on 5th January 2022 where Rajasthan State was not reflected. Further, as per minute point No. 3.i of meeting held on 28.02.2024 between Secretary (WR) and Secretary (Mines), Government of India, it was agreed to extend this study in Rajasthan State too.

In this context meeting between the officers of GSI and CGWB took place from 19th March, 1st April and 4th April, 2024 and identified the potential areas in parts of Rajasthan for such collaborative study.

GSI and CGWB may at times be referred to individually as "Party" and collectively as the "parties" whereas GSI and CGWB 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 Rajasthan State.

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/compounds/ pollutants.
- 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.
- Any site specific studies required subsequently and mutually agreed by both the parties.

5. Role of GSI

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

6. Role of CGWB

- i. CGWB will provide all archival/hierarchical base line data in respect of existing hydrogeological database. Desirable drilling core samples will be supplied for sediment analysis.
- ii. Collection of water samples for analysis of Uranium, Pb, As, Fe, Hg etc. in different aquifer (in consultation with the GSI party).
- iii. Determination of Uranium, Pb, As, Fe, Hg etc. levels in water from various groundwater sources like dug wells, hand pumps, deep bore wells/tube wells, surface water sources etc.
- iv. 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) along with other minor and heavy elements.
- v. Hydrogeological data generated during forthcoming studies of CGWB i.e. Piezometer / EW/OW Constructions under PIB / In-house drilling activities shall be utilized for the studies under MoU.
- vi. Geophysical investigation (VES/TEM etc.) shall be carried out in the study area as per need.
- vii. 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 GSI and CGWB

- i. Formulation of two year (2025-26 & 2026-27) pilot projects under this MoU including quantum, objectives and expected outputs, timeline, methodology of sample collection, analysis and interpretation. In total, three projects (2 projects of 2 year duration + one project of one year in consecutive years) will be formulated for consecutive five years during the period of this five year MoU. Any addition/ omission may be done with mutual consent of the both organizations.
- ii. Joint field traverses and collection of samples for analysis of Uranium, Pb, As, F, Hg etc. in solid and aqueous phase. The logistics and transport for field work may be shared on mutual consent.
- iii. Both the organizations may take up isotopic studies (viz., Oxygen, Lead etc) to trace migration pattern of contaminant after mutual consent.
- iv. Both organizations will provide access to libraries, archives, research laboratories and other facilities pertaining to mutually agreed project (s), without any charges.
- v. Preparation of final joint report after completion of the project. The report of the study would be placed in public domain within 6 months after completion 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, fluoride and other pollutants. Anthropogenic sources of Pb and other heavy metals 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 within 6 months after completion of the study.

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 of the parties. The MoU may be terminated at any time by mutual agreement on one month's notice, by either party.

10. Team Members

Geological Survey of India	Central Ground Water Board
Team of Geologists and Chemists from GSI	Team of Hydrogeologists & Chemists from CGWB
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)	A A nodal officer from CGWB to coordinate the requirements/inputs via-à-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)

11. Transfer of Data

- i. The data generated by GSI and CGWB during the said study in this MoU, shall be owned jointly by GSI and CGWB.
- 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 party without the knowledge of either party. 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 the collaborative study shall be jointly owned by GSI & CGWB.

15. Authorized 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:

<p>IF to GSI, WR Additional Director General & HoD, Geological Survey of India Western Region, 15-16 Jhalana Dungari, Jaipur</p> <p>PIN 302004</p> <p>Phone No. Fax - Email: hod.wr@gsi.gov.in</p>	<p>IF to CGWB, WR Regional Director Central Ground Water Board 6A Jhalana Dungari, Jaipur</p> <p>PIN 302004</p> <p>Phone No. Fax - Email- rdwr-cgwb@nic.in</p>
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16. Arbitration

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. Further, any dispute arising out of this MoU shall be settled by Administrative Mechanism for Resolution of Disputes (AMRD) vide OM No. 334774/ DoLA/ AMRD/2019 Dated 31/03/2020 issued by Department of Legal Affairs, Ministry of Law & Justice, Government of India.

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 24th day of September Year 2024


For, **GEOLOGICAL SURVEY OF INDIA, WR** by

For **CENTRAL GROUND WATER BOARD, WR** by


24-09-24

Name: Dr. Ram Jivan Singh


Designation: Deputy Director General, GSI, WR, Jaipur



24/9/24

Name: Er. M. S. Rathore


Designation: Regional Director, CGWB, WR, Jaipur


In Presence of Witness


Name: Vishal V. Sakhare
Designation: Director


Name: Dr. Surendra Atal
Designation: Sr. Geologist

In Presence of Witness


Name:
Designation: (Dr. R. K. Keshwani)
S.D. (Hg)


Name:
Designation: (R. K. Verma)
Scientist -D (Hg)
CGWB. WR.