GROUND WATER QUALITY IN SHALLOW AQUIFER OF MADHYA PRADESH

**Central Ground Water Board
North Central Region, Bhopal
Department of Water Resources, River
Development and Ganga Rejuvenation
Ministry of Jal Shakti
October2023**

REPORT ON

GROUND WATER QUALITY IN SHALLOW AQUIFER OF MADHYA PRADESH

Prepared by

Dr. V.K. Kulshreshtha, Sc-C   **Sh. Tej Singh, Assistant Chemist**
Sh. Rahul Vashishtha, Asstt. Chemist   **Sh. Jitendra Kumar, STA (Chemical)**
Ms. Adiba Khan, STA (Chemical)

Supervision by

Sri A.K. Biswal, Regional Director, CGWB, NCR, Bhopal
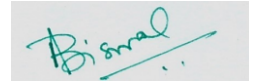
A.K.Biswal
Regional Director

Foreword

Water quality is one of the main challenges that societies will face during this century. Over the last few years much of the attention in ground water has shifted from problem of ground water supply to considerations of ground water quality. Groundwater contamination recently has come to the attention of the public as incidents of contamination are being reported from many districts.

Central Ground Water Board for the last nearly six decades has been carrying out hydrogeological and hydro chemical investigations and has generated voluminous data. Central Ground Water Board, NCR, Bhopal monitors groundwater quality throughout the State of MP, once in a year during the months of May, from a network of monitoring stations called "National Hydrograph Network Stations (NHNS)", which comprises open dug wells and piezometers. This report has been prepared based on the analytical results obtained from the water samples collected from these NHNS stations.

This report contains compilation and statistical analysis of Water Quality Monitoring data observed at NHNS monitoring stations during the period April to May, 2022. The data has been interpreted to know the affected locations. The report attempts to briefly describe an over view and general conclusion based on the basis of water quality data of water samples This report will provide knowledge about nationwide chemical quality and reflect extent of contaminants occurring in groundwater.

I am sure that this report will be of immense use for the administrators, planners, academicians and other stake holders in the field of Ground water quality management.

The sincere efforts made by Dr V.K. Kulshreshtha, Sh. Tej Singh, Sh. Rahul Vashisstha, Sh. Jitendra Kumar and Ms. Adiba Khan in compilation of data and preparation of this report in present form is highly appreciable.

(A.K. Biswal)
Regional Director

Bhopal
October, 2023

TABLE OF CONTENTS

ANNEXURES

1.0 INTRODUCTION

The quality of groundwater is a very sensitive issue. Groundwater is never pure and contains varying amounts of dissolved solids, the type and concentration depend on itssource, surface and sub-surface environment, rate of groundwater movement, the residence time, the solubility of minerals present and the amount of dissolved carbon dioxide. In addition to the natural changes, anthropogenic activities such as sewage disposal, agricultural practices, industrial pollution etc. also contribute significantly to changes in groundwater quality. Once the contaminants have entered to the sub-surface geological environment, they may remain concealed for many years and may get dispersed over wide areas. Weathering of rock and mineral solubility controls the major ion composition of groundwaters. With increasing anthropogenic activities, a substantial amount of dissolved matter is added to groundwater. The ground water resources are being utilized for drinking, irrigation and industrial purposes. However, due to rapid growth of population, urbanization, industrialization and agriculture activities, ground water resources are under stress. There is growing concern on the deterioration of ground water quality due to geogenic and anthropogenic activities.

MP is a vast state with varied hydrogeological situations resulting from diversified geological, climatological and topographic settings. Water-bearing rock formations (aquifers), range in age from Archaean to Recent. The natural chemical composition of ground water is influenced predominantly by type & depth of soils and subsurface geological formations through which ground water passes. Ground water quality is also influenced by contribution from the atmosphere and surface water bodies. Quality of ground water is also influenced by anthropogenic factors. For example, excessive use of fertilizers and pesticides in agriculture and improper disposal of urban/industrial waste can cause contamination of ground water resources.

A diverse range of dissolved inorganic compounds present in different concentrations characterizes groundwater. These compounds originate from the chemical and biochemical interactions between water and geological substances. Inorganic impurities such as salinity, chloride, fluoride, nitrate, iron, and arsenic play a crucial role in assessing the suitability of groundwater for drinking purposes.
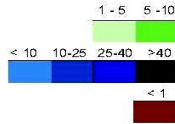
2.0 HYDROGEOLOGY

The State of Madhya Pradesh has varied hydrogeological characteristics due to which ground water potential differs from place to place. The area is underlain by various geological formations ranging in age from the Archaean to the Recent. Hard rock areas cover more than 80% of total land area of the State. These hard-rock areas show wide variations and complexities in nature and composition of rocks, geological structures, geomorphological set up and hydrometeorological conditions. The crystalline rocks of Archaean age like granite, gneiss,granulites, schist, quartzite and granitoids occupy about 14.7% of geographical area of the State. The basaltic rocks of Deccan lava flows are the predominant formations and occupy nearly 44.5% of total geographical area. The consolidated sedimentary rocks of Vindhyan Super Group and Mahakoshal (Cuddapah) Super Group of Proterozoic age occupy about 19.1% of total geographical area and the semi consolidated (Gondwana Formation) occupies about 6.7%. Recent unconsolidated alluvial sediments occupy about 14.4% of total geographical area. Hydrogeological map of Madhya Pradesh State has been given in **Fig. 1**

Fig. I

LEGEND

AGE   FORMATION   LITHOLOGY   AQUIFER CHARACTERISTICS

UNCONSOLIDATED

Age	Formation	Lithology	Aquifer Characteristics
Quaternary		Recent and Aeolian Alluvium, Clay, Silt, Sand, Pebble, Gravel, Calcareous	**POROUS MEDIA** Thick and regionally extensive unconfined, semi-confined to confined aquifers

SEMI-CONSOLIDATED

Cenozoic Mesozoic & Upper Plaeozoic		Sandstone, Shale, Limestone including Conglomerate, Siltstone, Claystone	Thick and regionally extensive unconfined, semi-confined to confined aquifers

CONSOLIDATED

Cenozoic to Mesozoic	i) Effusives	Basalt with or without intertrappean Sediments	**FISSURED MEDIA** Discontinuous unconfined, semi-confined aquifers restricted to weathered mantle
Cenozoic to Proterozoic	ii) Sedimentaries and Meta-sedimentaries	Shale, Quartzite, Slate, Sandstone, Phyllite, Schists	Discontinuous, unconfined to semi-confined aquifers down to a depth of 100 mbgl restricted to weathered mentle and fractures.
	iii) Meta-Sedimentaries	Limestone, Dolomite	Discontinuous, unconfined to semi-confined aquifers down to a depth of 100 mbgl restricted to weathered mentle, caverns and fractures.
Proterozoic Azoic	IV) Meta-Sedimentaries	Schist, Phyllite, Slate, Gneiss, Marble	Discontinuous, unconfined to semi-confined aquifers down to a depth of 200mbgl, restricted to weathered mentle and fractures
Azoic	v) Basal Crystallines	Graninte-Gneiss Complex and asociated basic and ultrabasic intrusives	Discontinuous-unconfined to semi-confined aquifers down to a depth of 150 mbgl

STRUCTURE

- Axis of Syncline
- F ——————— F   Basement Fault

MAN MADE FEATURES

- Tubewell/Borewell

SURFACE HYDROLOGY

- Stream, River
- Surface water divide
- Reservoir

GROUND WATER HYDROLOGY

- Water table contour in metres above mean sea level
- Electrical conductivity (in µs / Cm at 25°C)
- Spring
- Directoin of ground water flow

Groundwater Potential
(Yield in litres / sec.)

1 - 5	5 -10

Aquifers with secondary intergranular porosity and fractures

< 10	10-25	25-40	>40

Aquifers with primary intergranular porosity

< 1

Regions generally with limited ground water, compact formations with less intergranular porosity and fractures

---

3.0 HYDROCHEMISTRY

Hydrochemistry is an interdisciplinary science that deals with the chemistry of water in the natural environment. Professional fields such as chemical hydrology, aqueous chemistry, hydrochemistry, water chemistry and hydro-geochemistry are all more or less synonyms. The classical use of chemical characteristics in chemical hydrology is to provide information about the regional distribution of water qualities. At the same time, hydrochemistry has a potential use for tracing the origin and history of water. The hydrochemistry can also be of immense help in yielding information about the environment through which water has circulated. Hydrochemistry can be helpful in knowing about residence times, flow paths and aquifer characteristics as the chemical reactions are time and space dependent. It is essential to study the entire system like atmospheric water (rainwater), surface water and ground water simultaneously in evaluating their hydrochemistry and pollution effect.

3.1 CHEMISTRY OF RAINWATER

The atmosphere is composed of water vapors, dust particles and various gaseous components such as N_2, O_2, CO_2, CH_4, CO, SO_4, NO_3 etc. Pollutants in the atmosphere can be transported long distances by the wind. These pollutants are mostly washed down by precipitation and partly as dry fall out. Composition of rainwater is determined by the source of water vapors and by the ion, which are taken up during transport through the atmosphere. In general, chemical composition of rainwater shows that rainwater is only slightly mineralized with specific electrical conductance (EC) generally below 50 μS/cm, chloride below 5 mg/l and HCO_3 below 10 mg/l. Among the cations, concentration of Ca, Mg, Na & K vary considerably but the total cations content is generally below 15 mg/l except in samples contaminated with dust. The concentration of sulphates and nitrates in rainwater may be high in areas near industrial hubs.

3.2 CHEMISTRY OF SURFACE WATER

Surface water is found extremely variable in its chemical composition due to variations in relative contributions of ground water and surface water sources. The mineral content in river water usually bears an inverse relationship to discharge. The mineral content of river water tends to increase from source to mouth, although the increase may not be continuous or uniform. Other factors like discharge of city wastewater, industrial waste and mixing of waters can also affect the nature and concentration of minerals in surface water. Among anions, bicarbonates are the most important and constitute over 50% of the total anions in terms of milli equivalent per liter (meq/l). In case of cations, alkaline earths or normally calcium predominates but with increasing salinity the hydro-chemical facies tends to change to mixed cations or even to Na-HCO_3 type.

3.3 CHEMISTRY OF GROUND WATER

The downward percolating water is not inactive, and it is enriched in CO_2. It can also act as a strong weathering agent apart from general solution effect. Consequently, the chemical composition of ground water will vary depending upon several factors like frequency of rain, which will leach out the salts, time of stay of rain water in the root-zone and intermediate zone, presence of organic matter etc. It may also be pointed out that the water front does not move in a uniform manner as the soil strata are generally quite heterogeneous. The movement of percolating water through larger pores is much more rapid than through the finer pores. The

overall effect of all these factors is that the composition of ground water varies from time to time and from place to place.

Before reaching the saturated zone, percolating water is charged with oxygen and carbon dioxide and is most aggressive in the initial stages. This water gradually loses its aggressiveness, as free CO_2 associated with the percolating water gets gradually exhausted through interaction of water with minerals.

$$CO_2 + H_2O \longleftrightarrow H_2CO_3 \longleftrightarrow H^+ + HCO_3^-$$

$$H^+ + Feldspar + H_2O \longrightarrow Clay + H_4SiO_4 + Cation$$
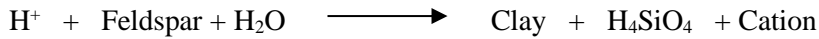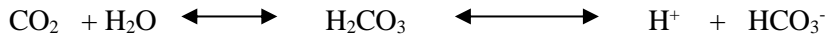
The oxygen present in this water is used for the oxidation of organic matter that subsequently generates CO_2 to form H_2CO_3. This process goes on until oxygen is fully consumed.

$$CH_2O + O_2 = CO_2 + H_2O$$
(Organic matter)
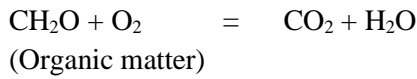
Apart from these reactions, there are several other reactions including microbiological mediated reactions, which tend to alter the chemical composition of the percolating water. For example, the bicarbonate present in most waters is derived mostly from CO_2 that has been extracted from the air and liberated in the soil through biochemical activity. Some rocks serve as sources of chloride and sulphate through direct solution. The circulation of sulphur, however, may be greatly influenced by biologically mediated oxidation and reduction reactions. Chloride circulation may be a significant factor influencing the anion content in natural water.

4.0 WATER QUALITY CRITERIA

The available quality of groundwater is the resultant of all the processes and reactions, which taken place since the condensation of water in the atmosphere to the time it is retrieved in the form of groundwater from its source. The water has excellent capability to accumulate substances in soluble form as it moves over and into the land resource, from the biological processes and from human activities. Urbanization, agricultural development and discharges of municipal and industrial residues significantly alter characteristics of groundwater resource. The prevailing climatic conditions, topography, geological formations and use and abuse of this vital resource have significant effect on the characteristics of the water, because of which its quality varies with locations.

The definition of criteria and standards for water quality vary with the type of use. The characteristic of water required for human consumption, livestock, irrigation, industriesetc., have different water quality requirements. The term water quality criteria may be defined as the "Scientific data evaluated to derive recommendations for characteristics of water for specific use'. The term standard applies to any definite rule, principle or measure established by any statutory Authority. The distinction between criteria andstandards is important, as the two are neither interchangeable nor they become synonyms for the objective or goal. Realistic standards are dependent on criteria, designated uses and implementation as well as identification and monitoringprocedure. The changes in all these factors may provide a basis for alteration instandards. In formulation of water quality criteria, the selection of water quality parameters depends on its use. Sayers, et. al. (1976 as quoted in CGWB & CPCB 2000) identified the key water quality parameters according to its various uses **(Table 4.0).**

Table 4.0: Water quality criteria parameters for various uses (Sayers et.al., 1976)

Public Water supply	Industrial Water supply	Agricultural water supply	Aquatic life & wild life water supply	Recreation and Aesthetics
Coliform bacteria Turbidity colour, Taste, Odour TDS, CI, F, SO_4 NO_3, CN, Trace Metals, Trace Organics Radioactive substances	**Processing** pH, Turbidity Colour, Alkalinity, Acidity, TDS, Suspended solids, Trace metals, Trace Organics **Cooling** PH, Temp, Silica, AI, Fe, Mg, Total hardness, Alkalinity / Acidity Suspended solids, Salinity	Farmstead Same as for public supply Live-stock Same as for public supply Irrigation TDS, EC, Na, Ca, Mg, K, B, CI and Trace metals	Temp, DO, pH, Alkalinity, Acidity, TDS Salinity, pH, DCOs, Turbidity Colour, Settleable materials, Toxic substances, Nutrients, Floating materials	Recreations Tem, Turbidity, Colour, Odour, Floating Materials, Settable Materials Nutrients, Coliforms Aesthetics Same as for Recreation and Substances adversely affecting wild life

4.1 Water Quality Criteria for Drinking Purpose

With the objective of safeguarding water from degradation and to establish a basis for improvement in water quality, standards / guide lines / regulations have been laid down by various national and international organizations such as; Bureau of Indian Standards(BIS), World Health Organization (WHO), European Economic Community (EEC), Environmental Protection Agency (EPA), United States, and Inland Waters Directorate, Canada. The Bureau of Indian Standards (BIS) earlier known as Indian Standards Institutions (ISI) has laid down the standard specification for drinking water during 1983, which have been revised and updated from time to time. In order to enable the users, to exercise their discretion towards water quality criteria, the maximum permissible limit has been prescribed especially where no alternative sources are available. The national water quality standards describe essential and desirable characteristics required to be evaluated to assess suitability of water for drinking purposes. The important water quality characteristics as laid down in BIS standard (IS 10500: 2012) are summarized in **Table - 4.1**

Table 4.1: Drinking Water Characteristics (IS 10500: 2012)

S. No.	Parameters	Desirable Limits (mg/L)	Permissible limits (mg/L)
Essential Characteristics			
1	Colour Hazen Unit	5	15
2	Odour	Unobjectionable	-
3	Taste	Agreeable	-
4	Turbidity (NTU)	1	5
5	pH	6.5-8.5	No relaxation
6	Total Hardness, $CaCO_3$	200	600
7	Iron (Fe)	1.0	No relaxation

8	Chloride (Cl)	250	1000
9	Residual Free Chlorine	0.2	1
10	Fluoride (F)	1.0	1.5
Desirable Characteristics			
11	Dissolved Solids	500	2000
12	Calcium (Ca)	75	200
13	Magnesium (Mg)	30	100
14	Copper (Cu)	0.05	1.5
15	Manganese (Mn)	0.1	0.3
16	Sulphate (SO_4)	200	400
17	Nitrate (NO_3)	45	No relaxation
18	Phenolic Compounds	0.001	0.002
19	Mercury (Hg)	0.001	No relaxation
20	Cadmium (Cd)	0.003	No relaxation
21	Selenium (Se)	0.01	No relaxation
22	Arsenic (As)	0.01	No relaxation
23	Cyanide (CN)	0.05	No relaxation
24	Lead (Pb)	0.01	No relaxation
25	Zinc (Zn)	5.0	15
26	Hexavalent Chromium	0.05	No relaxation
27	Alkalinity	200	600
28	Aluminum (Al)	0.03	0.2
29	Boron (B)	0.5	2.4
30	Pesticides	Absent	0.001
31	Uranium	0.03	No relaxation

NTU- Nephelometric Turbidity Unit.

N.B. The fluoride limits vary with average annual temperature of the areas. Similarly, the limits for magnesium are based on sulphate contents of water. When sulphate content is 250 mg/L or above, the magnesium should be between 30 and 50 mg/L but if sulphate is lower, higher content of magnesium is permissible.

4.2 Water Quality Criteria for Irrigation Purpose

Water quality plays a significant role in irrigated agriculture. Many problems originate due to inefficient management of water for agriculture use, especially when it carries high salt loads. The effect of total dissolved salts in irrigation water (measured in terms

of electrical conductance) on crop growth is extremely important. Soil water passes in to the plant through the root zone due to osmotic pressure and the plants root able to assimilate water and nutrients. Thus, the dissolved solid contents of the residual water in the root zone also have to be maintained within limits by proper leaching. These effects are visible in plants by their stunted growth, low yield, discoloration and even leaf burns at margin or top. The safe limits of electrical conductivity for crops of different degrees of salt tolerances under varying soil textures and drainage conditions are presented in **Table - 4.2.**

Table 4.2: Safe Limits for electrical conductivity for irrigation water (IS:11624-1986)

S. No.	Nature of soil	Crop Growth	Upper permissible safe limit of electrical conductivity in water μs/cm at 25°C
1	Deep black soil and alluvial soils having clay content more than 30%; soils that are fairly to moderately well Drained	Semi-tolerant	1500
		Tolerant	2000
2	Textured soils having clay contents of 20-30%; soils that are well drained internally and have good surface drainage system	Semi-tolerant	2000
		Tolerant	4000
3	Medium textured soils having clay 10-20%; internally very well drained and having good surface drainage system	Semi-tolerant	4000
		Tolerant	6000
4	Light textured soils having clay less than 10%; soils that have excellent internal and surface drainage system.	Semi-tolerant	6000
		Tolerant	8000

In addition to problems caused by total amount of salts, some of the specific ions like sodium, boron and trace elements, if present in water in excess, also render it unsuitable for agricultural use.

4.2.1 SODIUM ADSORPTION RATIO (SAR) & RESIDUAL SODIUM CARBONATE (RSC)

The clay minerals in the soil adsorb divalent cations like calcium and magnesium ions from irrigation water. Whenever the exchange sites in clay are filled by divalent cations, the soil texture is conducive for plant growth. Sodium reacts with soil to reduce its permeability. In case the irrigation water is sodium dominant, the clay lattice is filled with sodium ions due to ion exchange. Such soils become impermeable and sticky and as such the cultivation becomes difficult to support plant growth. However, the cation exchange process is reversible and can be controlled either by adjusting the composition of water or by soil amendment by application of gypsum, which releases cations (Calcium) to occupy the exchange position. The tendency of water to replace adsorbed calcium and magnesium with sodium can be expressed by the Sodium Adsorption Ratio (SAR), where all the ion concentrations are in milli-equivalents per litre (meq/L).

$$SAR = \frac{Na}{\sqrt{(Ca + Mg)/2}}$$

When, water having high bicarbonates and low calcium and magnesium is used for irrigation purpose, precipitation of calcium and magnesium as carbonate takes place, changing the residual water to high sodium water with sodium bicarbonate in solution. It is termed as Residual Sodium Carbonate (RSC) which is expressed as;

$$RSC = (HCO3 + CO3) - (Ca + Mg)$$

(Where all the ions' concentrations are in milli equivalents / litre).

Percentage sodium (%Na):

Percentage sodium (%Na) is an indication of the soluble sodium content of the groundwater and also used to evaluate Na hazard. In all natural waters, %Na is a common parameter to assess its suitability for irrigation purposes since sodium reacts with the soil to reduce permeability.

$$\%Na = \frac{(Na + K)}{(Ca + Mg + Na + K)} * 100$$

The quality of water is commonly expressed by classes of relative suitability for irrigation with reference to salinity levels. The recommended classification with respect to Electrical Conductivity, Sodium content, Sodium Adsorption Ratio, and Residual Sodium Carbonate, under customary irrigation conditions has been depicted in **Table - 4.2.1.**

Table 4.2.1: Guidelines for evaluation of quality of irrigation water

Water Class	Alkalinity hazards		
	SAR IS:11624-1986	RSC (meq/L) IS:11624-1986	%Na Wilcox
Low	< 10	< 1.5	< 20
Medium	>10 – 18	1.5 – 3	20 - 60
High	>18 – 26	3 - 6	> 60
Very High	> 26	> 6	

4.3 Effects of Water Quality Parameters on Human Health and Distribution for Various Users

It is essential to ensure that various constituents are within prescribed limits in drinkingwater supplies to avoid impact on human health **(Table – 4.2.3)**. Man, life forms and domestic animals are affected by alteration in water quality due to natural or anthropogenic reasons. The effect of these substances depends on the quantity of water consumed per day and their concentration in water.

Table 4.2.3: Effects of water quality parameters on human health when used for drinking Purpose

S. No.	Parameters	Prescribed limits IS:10500, 2012		Probable Effects
		Desirable Limit	Permissible Limit	
1	Colour (Hazen unit)	5	15	Makes water aesthetically undesirable
2	Odour	Essentially free from objectionable odour		Makes water aesthetically undesirable
3	Taste	Agreeable		Makes water aesthetically undesirable

S. No.	Parameters	Prescribed limits IS:10500, 2012		Probable Effects
		Desirable Limit	Permissible Limit	
4	Turbidity (NTU)	1	5	High turbidity indicates contamination / Pollution.
5	pH	6.5	8.5	Indicative of acidic or alkalinewaters, affects taste, corrosivity and the water supply system
6	Hardness as CaCO₃ (mg/L)	200	600	Affects water supply system(Scaling), Excessive soap consumption, and calcification of arteries. There is no conclusiveproof but it may cause urinary concretions, diseases of kidney or bladder and stomach disorder.
7	Iron (mg/L)	1.0	No relaxation	Gives bitter sweet astringenttaste, causes staining of laundry and porcelain. In traces it isessential for nutrition.
8	Chloride (mg/L)	250	1000	May be injurious to some people suffering from diseases of heartor kidneys. Taste, indigestion, corrosion and palatability are affected.
9	Residual Chlorine (mg/L) Only when water is Chlorinated	0.20	-	Excessive chlorination of drinking water may cause asthma,colitis and eczema.
10	Total Dissolved Solids-TDS (mg/L)	500	2000	Palatability decreases and may cause gastro intestinal irritation in human, may have laxative effect particularly upon transits and corrosion, may damage water system.
11	Calcium (Ca) (mg/L)	75	200	Causes encrustation in water supply system. While in sufficiency causes a severe typeof rickets, excess causes concretions in the body such as kidney or bladder stones and irritation in urinary passages.
12	Magnesium (mg) (mg/L)	30	100	Its salts are cathartics and diuretic. High concentration may have laxative effect particularly on new users. Magnesium deficiency is associated with structural and functional changes.It is essential as an activator of many enzyme systems.
13	Copper (Cu) (mg/L)	0.5	1.50	Astringent taste but essential and beneficial element in humanmetabolism. Deficiency results in nutritional anemia in infants. Large amount may result in liver damage, cause central nervous system irritation and depression. In water supply it enhancecorrosion of aluminum in particular
14	Sulphate (SO₄) (mg/L)	200	400	Causes gastro intestinal irritation along with Mg or Na, can have a cathartic effect on users, concentration more than 750 mg/L may have laxative effect along with Magnesium.
15	Nitrate (NO₃) (mg/L)	45	No relaxation	Cause infant methaemoglobinaemia (blue babies) at very high concentration, causes gastriccancer and affects adversely central nervous system and cardiovascular system.
16	Fluoride (F) (mg/L)	1.0	1.50	Reduce dental carries, very high concentration may cause crippling skeletal fluorosis.
17	Cadmium (Cd) (mg/L)	0.003	No relaxation	Acute toxicity may be associated with renal, arterial hypertension, itai-itai disease, (a bone disease).Cadmium salt causes cramps, nausea, vomiting and diarrhea.

S. No.	Parameters	Prescribed limits IS:10500, 2012		Probable Effects
		Desirable Limit	Permissible Limit	
18	Lead (Pb) (mg/L)	0.01	No relaxation	Toxic in both acute and chronic exposures. Burning in the mouth, severe inflammation of the gastro-intestinal tract withvomiting and diarrhoea, chronic toxicity produces nausea, severe abdominal pain, paralysis, mental confusion, visual disturbances, anaemia etc.
19	Zinc (Zn) (mg/L)	5	15	An essential and beneficial element in human metabolism. Taste threshold for Zn occurs at about 5 mg/L imparts astringent taste to water.
20	Chromium (Cr^6) (mg/L)	0.05	No relaxation	Hexavalent state of Chromium produces lung tumors can produce cutaneous and nasal mucous membrane ulcers and dermatitis.
21	Boron (B) (mg/L)	0.5	2.4	Affects central nervous system itssalt may cause nausea, cramps, convulsions, coma etc.
22	Alkalinity (mg/L) as $CaCO_3$	200	600	Impart distinctly unpleasant taste may be deleterious to human being in presence of high pH, hardness and total dissolved solids.
23	Pesticides: (m g/l)	Absent	0.001	Imparts toxicity and accumulated in different organs of human body affecting immune and nervous systems may be carcinogenic.
24	Phosphate (PO_4) (mg/L)	No guideline		High concentration may causevomiting and diarrhea, stimulate secondary hyperthyroidism andbone loss
25	Sodium (Na) (mg/L)	No guidelines		Harmful to persons suffering From cardiac, renal andcirculatory diseases.
26	Potassium (K) (mg/L)	No guidelines		An essential nutritional elementbut its excessive amounts is cathartic
27	Silica (SiO_2) (mg/L)	No guidelines		-
28	Nickel (Ni) (mg/L)	0.02		Non-toxic element but may becarcinogenic in animals, can react with DNA resulting in DNAdamage in animals.
29	Pathogens (a) Total coliform (per100ml) (b) Faecal Coliform (per 100ml)	nil		Cause water borne diseases like coliform Jaundice, Typhoid, Cholera etc. produce infections involving skin mucous membraneof eyes, ears and throat.
30	Arsenic	0.01	**No relaxation**	Various skin diseases, Carcinogenic
31	Uranium	0.03	**No relaxation**	Kidney disease, Carcinogenic

5.0 GROUND WATER QUALITY MONITORING

The International Standard Organization (ISO) has defined monitoring as," The programmed process of samplings, measurements and subsequent recording or signaling or both, of various water characteristics, often with the aim of assessing, conformity to specified objectives". A systematic plan for conducting water quality monitoring is called Monitoring Programme, which includes monitoring network design, preliminary survey, resource estimation, sampling, analysis, data management & reporting.

Monitoring of ground water quality is an effort to obtain information on chemical quality through representative sampling in different hydrogeological units. Ground Water is commonly tapped from phreatic aquifers through dug wells in a major part of the country and through springs and hand pumps in hilly areas. The main objective of ground water quality monitoring programme is to get information on the distribution of water quality on a regional scale as well as lattice is to create a background data bank of different chemical constituents in ground water.

One of the main objectives of the ground water quality monitoring is to assess the suitability of ground water for drinking purpose. The quality of drinking water is a powerful environmental determinant of the health of a community. The problem of the quality of water resources in general, and groundwater resources in particular, is becoming increasingly important in both industrialized and developing nation. In developing countries like India, the essential concerns as regards water resources are their quantity, availability, sustainability and suitability. Groundwater plays a leading role because it has of fundamental importance to all living beings.

Even though water is the most frequently occurring substance on earth, lack of safe drinking water is more prominent in the developing countries. Due to increasing world population, extraction of groundwater is also increasing for irrigations, industries, municipalities and urban and rural households' day by day. During dry season extensive withdrawal of groundwater for irrigation purpose is lowering the water table in the aquifer and also changing the chemical composition of water.

The physical and chemical quality of ground water is important in deciding its suitability for drinking purposes. Bureau of Indian Standards (BIS) formally known as Indian Standard Institute (ISI) vide its document IS: 10500:2012, Edition 3.2 (2012-15) has recommended the quality standards for drinking water. On this basis of classification, the natural ground water of India has been categorized as desirable, permissible and unfit for human consumption.

From the analytical results, it is seen that majority of water samples collected from observation / monitoring wells of CGWB in a major part of the state fall under desirable or permissible category and hence are suitable for drinking purposes. However, a small percentage of well waters are found to have concentrations of some constituents beyond the permissible limits. Such waters are not fit for human consumption and are likely to be harmful to health on continuous use.

5.1 Data Validation / Data Quality Control

Groundwater quality data validation is an essential step in ensuring the reliability and accuracy of the data. Here are some of the main steps for groundwater quality data validation.

a. Checking of Data Consistency: Checking of the data for consistency by comparing the measurements of a particular parameter over time. This will help identify any changes in the groundwater quality due to measurement methodology or equipment
b. Checking the correlation between EC and TDS:
    a. The relationship between the two parameters is often described by a constant (commonly between 0.55 and 0.95 for freshwaters).
    b. Thus: TDS (mg/l) ~ (0.55 to 0.95) x EC (mS/cm).
    c. The value of the constant varies according to the chemical composition of the water. For freshwaters, the normal range of TDS can be calculated from the following relationship:
    d. 0.55 conductivity (mS/cm) < TDS (mg/l) < 0.95 conductivity (mS/cm).
    e. Typically, the constant is high for chloride rich waters and low for sulphate rich waters.

c. **Checking the cation-anion balance**
    When a water quality sample has been analysed for the major ionic species, one of the most important validation tests can be conducted: the cation-anion balance.

$$\text{Sum of cations} = \text{sum of anions}$$

where:
cations = positively charged species in solution (meq/l)
anions = negatively charged species in solution (meq/l)

The Electronic charge balance is expressed as follows:

$$\text{Electronic Charge Balance (ECB \%)} = \frac{[\sum \text{cations} - \sum \text{anions}]}{[\sum \text{cations} + \sum \text{anions}]} \times 100$$

All concentrations should be in epm. Error charge balance has been computed for the chemical results of 2022-23 and analysis showing more than 5% ECB has not been accepted as it indicates that there has been an error made in at least one of the major cation/anion analyses.

6.0 GROUND WATER QUALITY SCENARIO IN MP

The quality of groundwater in Madhya Pradesh has been evaluated by sampling and analysis of water samples collected from Groundwater Monitoring wells. About **1143** Groundwater Monitoring wells were monitored for water quality during May 2022 representing pre-monsoon water quality. Locations of sample collection points have been shown in **Fig. 3**.
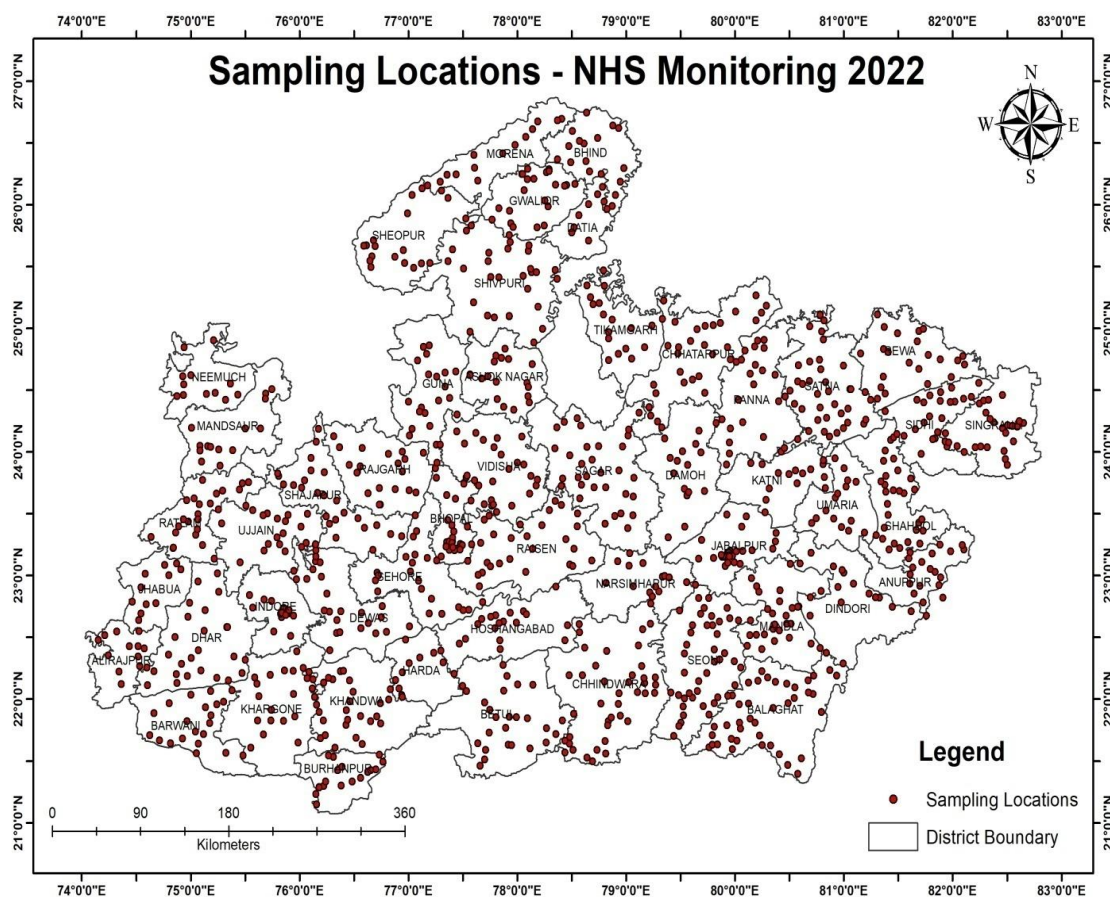
The district-wise chemical analysis data of the samples are given in the Annexure - V. The summarized results of groundwater quality ranges are given in **Table - 6.1.**

Table - 6.1. Summarized results of groundwater quality ranges, (May 2022)

S. No	Parameters		Range	No. of sample	Percentage
1	Electrical Conductivity µs/cm at 25°c	Fresh	< 750	396	34.6
		Moderate	750- 2250	718	62.8
		Slightly mineralized	2251- 3000	17	1.5
		Highly mineralized	> 3000	12	1
2	Chloride mg/L	Desirable limit	< 250	1039	91.08
		Permissible limit	251-1000	102	8.92
		Beyond permissible limit	> 1000	0	0

S. No	Parameters		Range	No. of sample	Percentage
3	Fluoride mg/L	Desirable limit	< 1.0	1019	89.2
		Permissible limit	1.0 - 1.5	109	9.5
		Beyond permissible limit	>1.5	15	1.3
4	Nitrate mg/L	Permissible limit	< 45	872	76.29
		Beyond permissible limit	> 45	271	23.71

The groundwater samples collected from dug wells tapping phreatic aquifers are analyzed for all the major inorganic parameters. Based on the results, it is found that ground water of the state is mostly of calcium bicarbonate (Na-HCO$_3$) type when the total dissolved solids of water is below 500 mg/L (corresponding to electrical conductance of 750 μS/cm at 25^{0}C). They are of mixed cations and mixed anion type when the electrical conductance is between 750 and 3000 μS/cm and waters with electrical conductance above 3000 μS/cm are of sodium chloride (Na-Cl) type. However, other types of water are also found among these general classifications, which may be due to the local variations in hydro-chemical environments due to anthropogenic activities. Nevertheless, occurrence of high concentrations of some water quality parameters such as salinity, chloride, fluoride, iron, arsenic and nitrate have been observed in some pockets in few states of the country.

7.0 GROUND WATER QUALITY HOT SPOTS IN UNCONFINED AQUIFERS OF MADHYA PRADESH

Unconfined aquifers are extensively tapped for water supply across the state therefore; its quality is of paramount importance. The chemical parameters like TDS, Chloride, Fluoride, Iron, Arsenic and Nitrate etc are main constituents defining the quality of ground water in unconfined aquifers. Therefore, presence of these parameters in ground water beyond the permissible limit in the absence of alternate source has been considered as groundwater quality hotspots.

Groundwater quality hot spot maps of the state have been prepared depicting five main parameters based on their distribution shown on the separate maps. These maps depict the spatial distribution of the following constituents in ground water tapping the unconfined aquifers.

I. Electrical Conductivity
II. Chloride (> 1000 mg/L)
III. Fluoride (>1.5 mg/L)
IV. Nitrate (>45mg/L)
V. Total Hardness (>600 mg/L)

7.1 Electrical Conductivity

Conductivity measurements are used routinely in many industrial and environmental applications as a fast, inexpensive and reliable way of measuring the ionic content in a solution. For example, the measurement of product conductivity is a typical way to monitor and continuously trend the performance of water purification systems. In many cases, conductivity is linked directly to the total dissolved solids (TDS).

Salinity is the saltiness or dissolved salt contents of a water body. Salt content is an important factor in water use. Salinity can be technically defined as the total mass in grams of all the dissolved substances per Kilogram of water. Different substances dissolve in water giving it taste and odour. In fact, humans and other animals have developed senses which are, to a degree, able to evaluate the potability of water, avoiding water that is too salty or putrid.

Salinity always exists in ground water but in variable amounts. It is mostly influenced by aquifer material, solubility of minerals, duration of contact and factors such as the permeability of soil, drainage facilities, and quantity of rainfall and above all, the climate of the area. The salinity of groundwater in coastal areas in addition to the above may be due to air borne salts originating from air water interface over the sea and also due to over pumping of fresh water which overlays saline water in coastal aquifer systems.

BIS has recommended a drinking water standard for total dissolved solids a limit of 500 mg/L (corresponding to EC of about 750 μS/cm at 25^0C) that can be extended to a TDS of 2000 mg/L (corresponding to EC of about 3000 μS/cm at 25^0C) in case of no alternate source. Water having TDS more than 2000 mg/L is not suitable for drinking purpose. In Fig 7.1.1, the EC values (in μS/cm at 25^0C) of ground water from observation/monitoring wells have been used to show

distribution patterns of electrical conductivity in different ranges of suitability for drinking purposes. It is apparent from the map that majority of the waters having EC values less than 750μS/cm at 25^0C occur mostly in 34.6 % of sampling locations in the state.

Groundwater with EC ranging between 750 and 3000 μS/cm at 25^0C falling under 'permissible' range are confined mainly in 64.6 % of sampling locations. However, in some cases, relatively high values of EC in excess of 3000 μS/cm are observed in hardly 1 % of sampling locations in Bhind, Dhar, Gwalior, Indore, Neemuch, Shivpuri and Ujjain. Table 7.1.1 shows the list of districts affected by high EC water (EC > 3000 μS/cm) and these areas are water quality hot spots from salinity point of view.
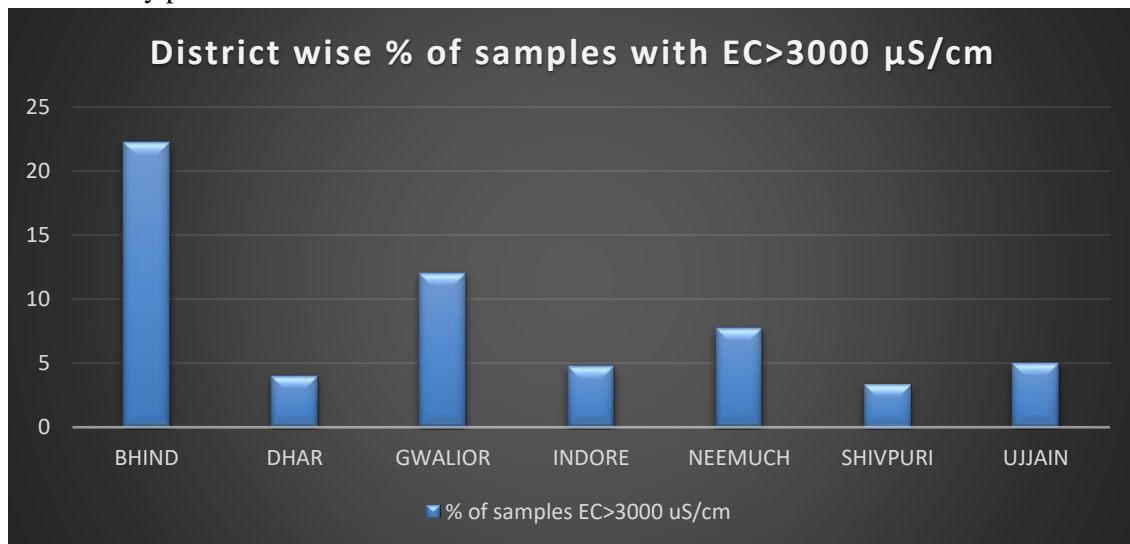
Fig 7.1.1 District-wise percentage of wells having EC >3000 μS/cm.

District-wise percentage of wells having EC >3000 μS/cm is shown as a bar diagram in Fig 7.1.1 and the occurrences of Electrical Conductivity in ground water beyond permissible limit (>3000 μS/cm) have been shown on the contour map as Fig 7.1.2, the percentage groundwater samples in various EC range is also illustrated in Fig 7.1.3. locations details are given in Annexure-I.

Table 7.1.1 District-wise percentage of samples having EC >3000 μS/cm

Sr. No	District name	No. of Samples collected (NHS 2022-23)	No. of Samples (EC >3000 μS/cm)	(%) Samples (EC >3000 μS/cm)
1	AGAR MALWA	12	0	0
2	ALIRAJPUR	13	0	0
3	ANUPPUR	20	0	0
4	ASHOK NAGAR	18	0	0
5	BALAGHAT	39	0	0
6	BARWANI	20	0	0
7	BETUL	28	0	0
8	BHIND	18	4	22
9	BHOPAL	26	0	0
10	BURHANPUR	18	0	0

11	CHHATARPUR	29	0	0
12	CHHINDWARA	39	0	0
13	DAMOH	16	0	0
14	DATIA	8	0	0
15	DEWAS	24	0	0
16	DHAR	25	1	4
17	DINDORI	14	0	0
18	GUNA	21	0	0
19	GWALIOR	25	3	12
20	HARDA	12	0	0
21	HOSHANGABAD	19	0	0
22	INDORE	21	1	5
23	JABALPUR	34	0	0
24	JHABUA	11	0	0
25	KATNI	16	0	0
26	KHANDWA	30	0	0
27	KHARGONE	20	0	0
28	MANDLA	30	0	0
29	MANDSAUR	14	0	0
30	MORENA	13	0	0
31	NARSINGHPUR	17	0	0
32	NEEMUCH	13	1	8
33	PANNA	21	0	0
34	RAISEN	28	0	0
35	RAJGARH	20	0	0
36	RATLAM	24	0	0
37	REWA	22	0	0
38	SAGAR	34	0	0
39	SATNA	41	0	0
40	SEHORE	19	0	0
41	SEONI	44	0	0
42	SHAHDOL	28	0	0
43	SHAJAPUR	14	0	0
44	SHEOPUR	21	0	0
45	SHIVPURI	30	1	3
46	SIDHI	26	0	0
47	SINGRAULI	26	0	0
48	TIKAMGARH	17	0	0
49	UJJAIN	20	1	5
50	UMARIA	15	0	0
51	VIDISHA	29	0	0
	Total	**1142**	**12**	**1**
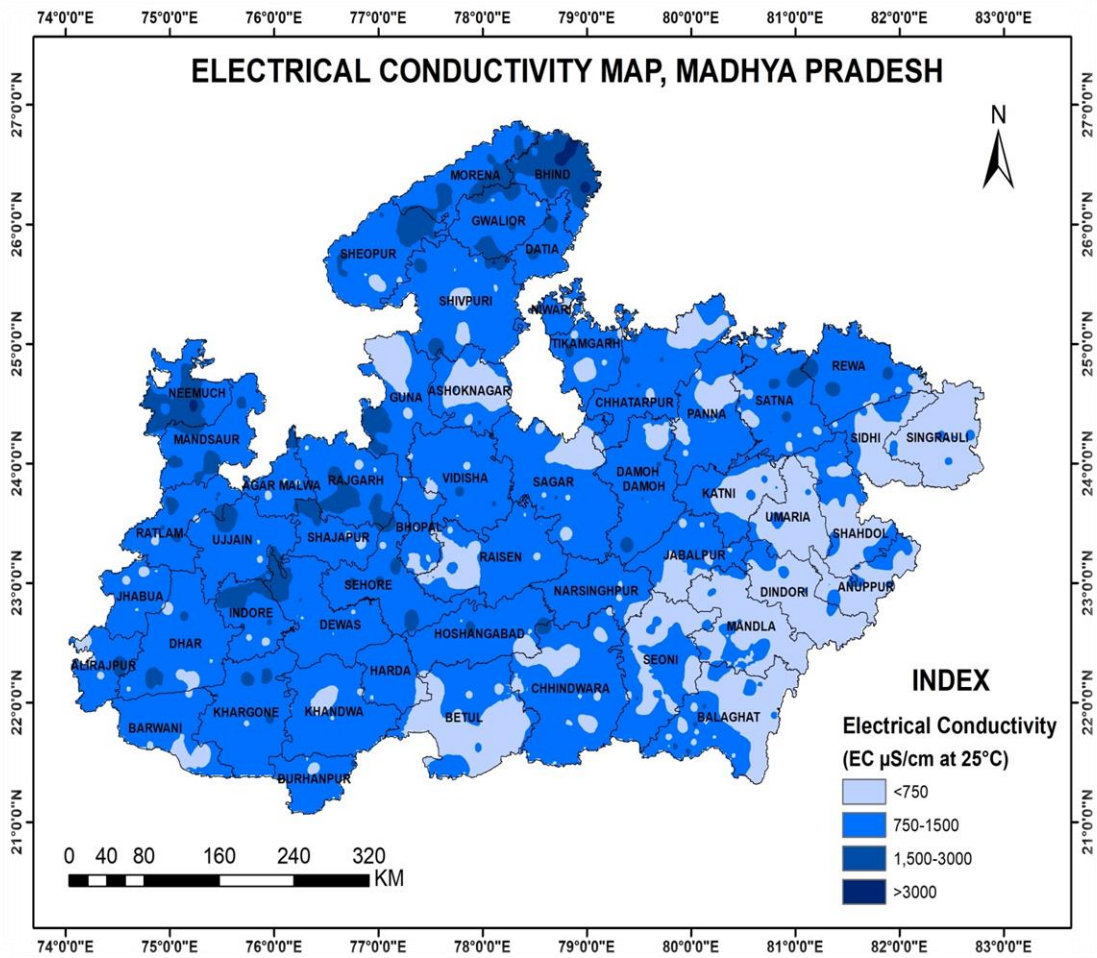
Fig 7.1.2 Spatial distribution of Electrical Conductivity in MP during NHS 2022.
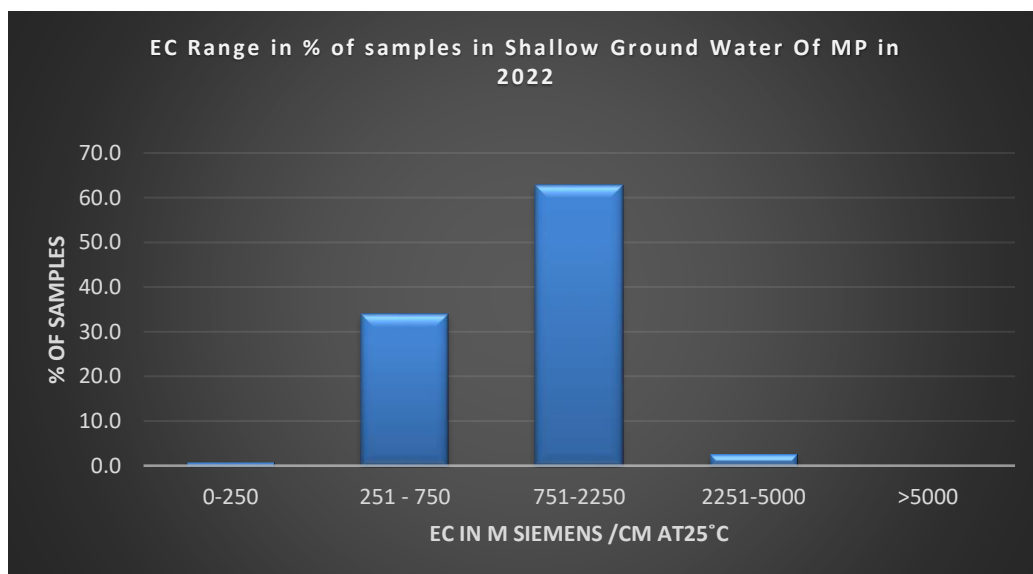
Fig 7.1.3 Percentage groundwater samples in various EC range (MP).

Table 7.1.2: Locations Affected by Salinity (High EC) in Groundwater in Different Districts of MP.

S. No.	State	Parts of districts having EC > 3000 µS/cm.
1	BHIND	Balaji, Lavan, Mehgaon, Phuph
2	DHAR	Dhulsar
3	GWALIOR	Dongarpur, Jahangirpur, Suro
4	INDORE	Sanwer
5	NEEMUCH	Girdola
6	SHIVPURI	Sehore
7	UJJAIN	Kaiytha

Table 7.1.3: Comparative change in number of districts having EC > 3000 µS/cm in various districts.

S. No.	District	Nos. of Locations having EC > 3000 µS/cm.		
		2017	2022	Increase/Decrease
1	AGAR MALWA	1	0	-1
2	ALIRAJPUR	1	0	-1
3	ANUPPUR	0	0	0
4	ASHOK NAGAR	0	0	0
5	BALAGHAT	0	0	0
6	BARWANI	0	0	0
7	BETUL	0	0	0
8	BHIND	4	4	0
9	BHOPAL	0	0	0
10	BURHANPUR	0	0	0
11	CHHATARPUR	0	0	0
12	CHHINDWARA	0	0	0
13	DAMOH	0	0	0
14	DATIA	0	0	0
15	DEWAS	0	0	0
16	DHAR	0	1	1
17	DINDORI	0	0	0
18	GUNA	0	0	0
19	GWALIOR	0	3	3
20	HARDA	0	0	0
21	HOSHANGABAD	0	0	0
22	INDORE	2	1	-1
23	JABALPUR	0	0	0
24	JHABUA	0	0	0
25	KATNI	0	0	0
26	KHANDWA	0	0	0
27	KHARGONE	0	0	0
28	MANDLA	0	0	0

29	MANDSAUR	0	0	0
30	MORENA	1	0	-1
31	NARSINGHPUR	0	0	0
32	NEEMUCH	2	1	-1
33	PANNA	0	0	0
34	RAISEN	0	0	0
35	RAJGARH	2	0	-2
36	RATLAM	1	0	-1
37	REWA	1	0	-1
38	SAGAR	1	0	-1
39	SATNA	2	0	-2
40	SEHORE	0	0	0
41	SEONI	0	0	0
42	SHAHDOL	0	0	0
43	SHAJAPUR	0	0	0
44	SHEOPUR	0	0	0
45	SHIVPURI	0	1	1
46	SIDHI	0	0	0
47	SINGRAULI	0	0	0
48	TIKAMGARH	0	0	0
49	UJJAIN	3	1	-2
50	UMARIA	0	0	0
51	VIDISHA	0	0	0
	Total	**21**	**12**	**-9**
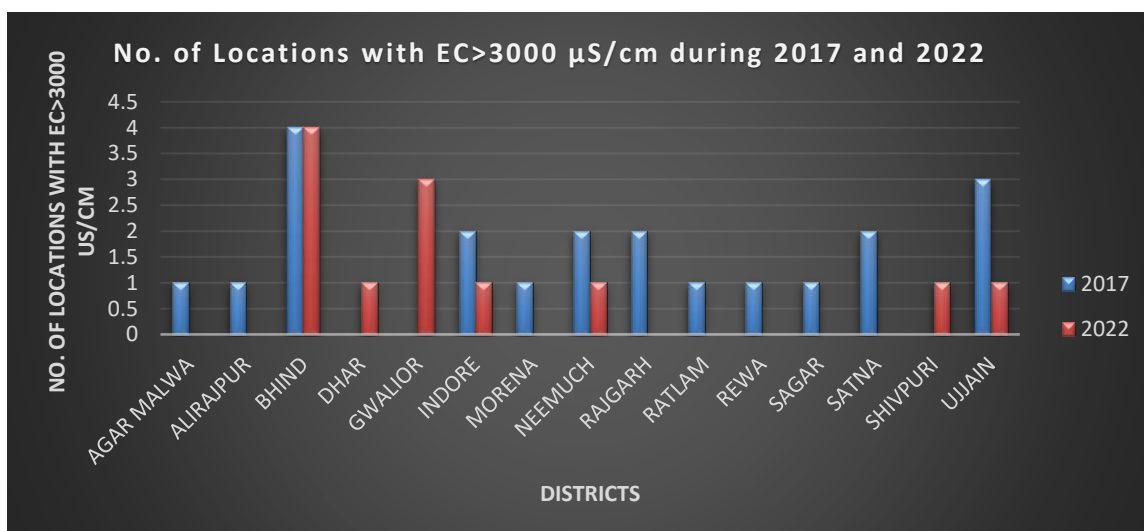
Fig. 7.1.4 Comparison on No of locations exceed EC >3000 µS/cm during 2017 and 2022 in MP.

In comparison to 2017 (Table 7.1.3), it has been observed that the no. of districts having EC more than 3000 µS/cm in various States has decreased in 2022. In Dhar, Gwalior, Shivpuri districts increase in the no. of locations is a matter of concern. However, in some districts, it has decreased also, which may be because of dilution in that particular area.

7.1.1 TREND ON ELECTRICAL CONDUCTIVITY

Trend analysis determines whether the measured values of the water quality variables increase or decrease during a time period. The Electrical Conductivity (EC) of groundwater is contributed by all the dissolved ionic constituents. Therefore, it is a measure of the total ionic content of the water. It could be used as a source of inorganic pollution indicator as most of the inorganic compounds are present as ions in water. Hence, EC was taken to assess the trend of ground water quality in MP. The percentage of well exceeds the electrical conductivity more than 3000 µS/cm for the period of 2017 to 2022 were compared and presented in the Table 7.1.4 and Fig 7.1.2 and observed that the percentage of samples exceed the permissible limit of 3000 µS/cm were ranging between 0-2 % and a decreasing trend was noticed. Trend on water quality for Electrical conductivity (EC) prepared for the state of Ujjain, Bhind and Neemuch is showing a slightly decreasing trend (Fig. 7.1.5 & 7.1.5a & 7.1.5b).

Table 7.1.4: Percentage of wells Exceed EC>3000 µS/cm during the period of 2017-2022

Year	Total Number of samples analysed	No. of districts affected by EC	Total No of locations affected by EC	% of locations affected by EC (EC>3000 uS/cm)
2017	1197	12	21	1.75
2018	1175	10	13	1.11
2019	1193	9	12	1.01
2020	1038	6	8	0.77
2021	1153	7	8	0.69
2022	1142	7	12	1.05
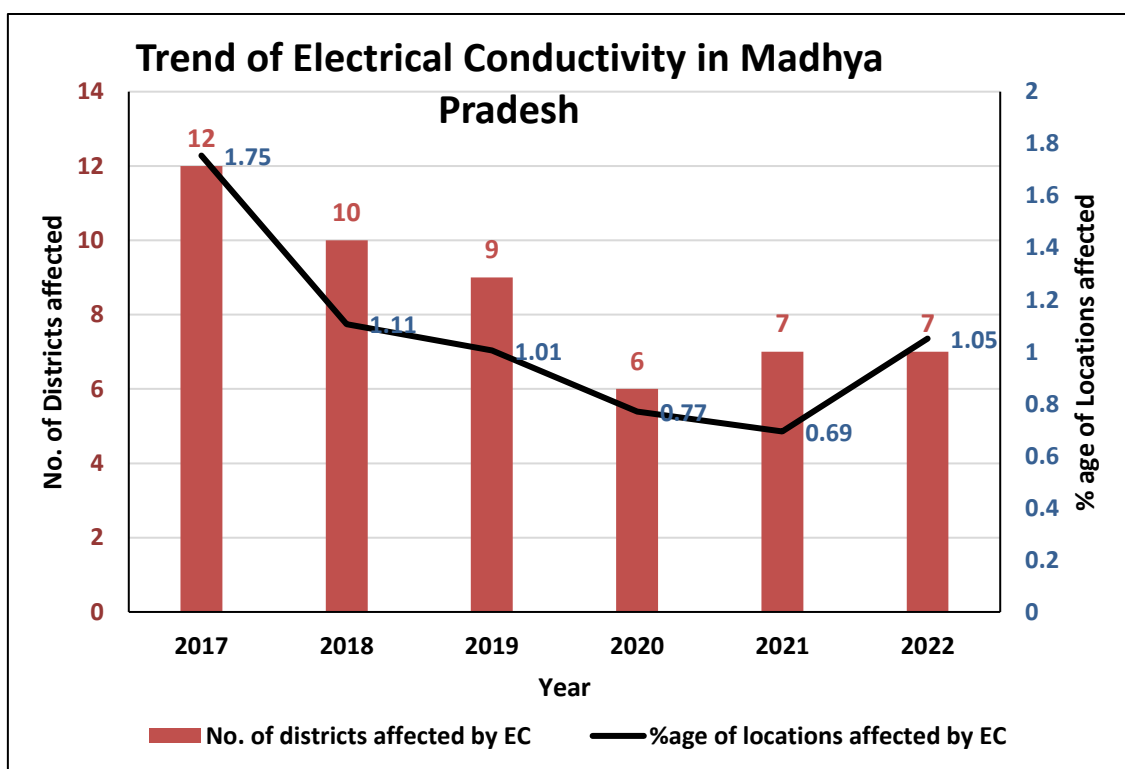
Fig. 7.1.5 Trend of Electrical Conductivity in Madhya Pradesh
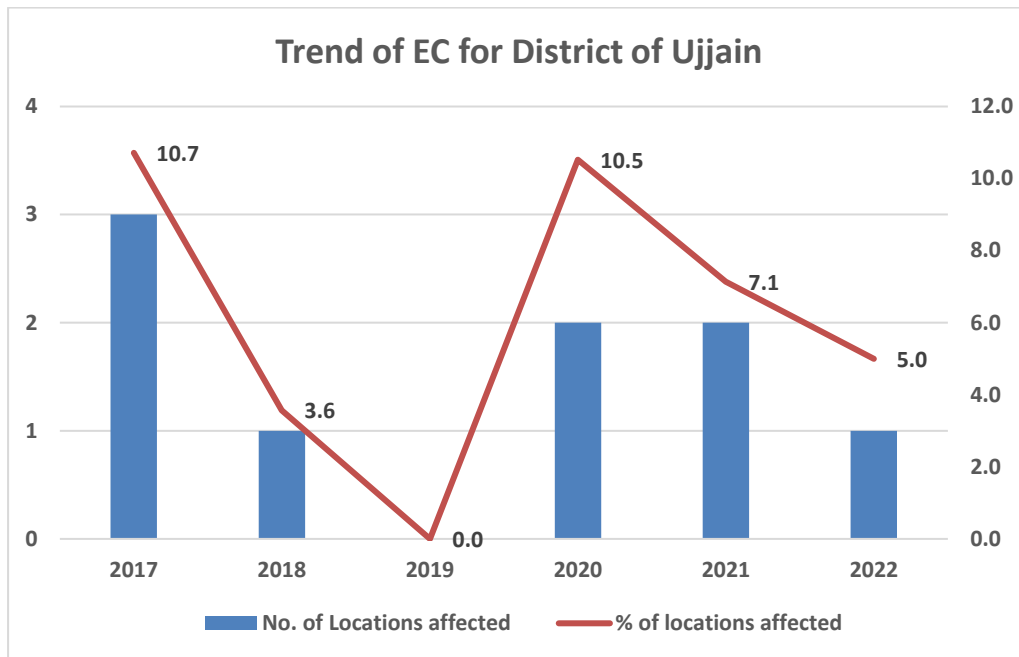
Fig. 7.1.5a Trend of Electrical Conductivity in District of Ujjain.
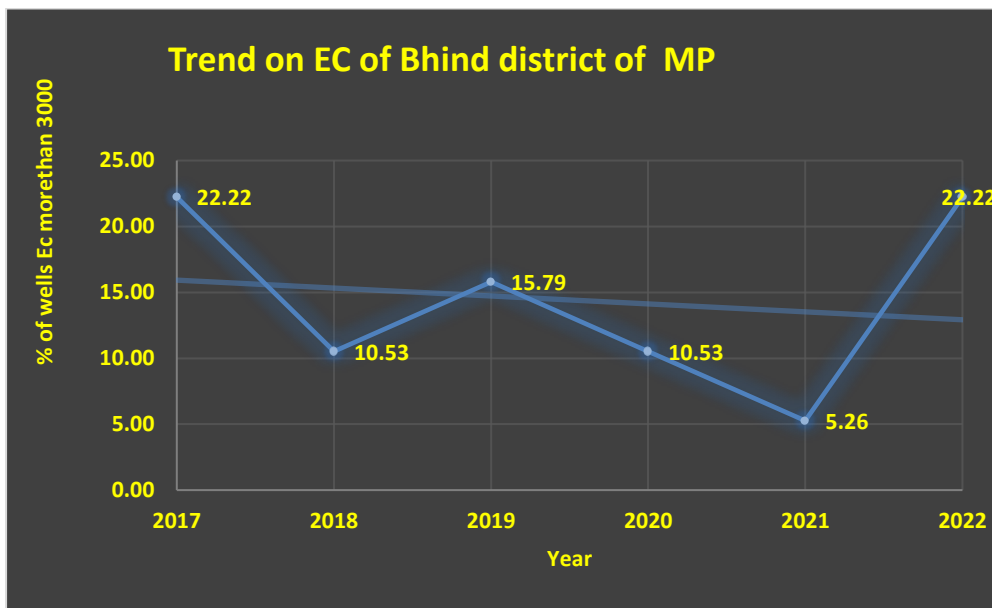
Fig. 7.1.6 Trend on Electrical Conductivity in Bhind district for the period of 2017-2022
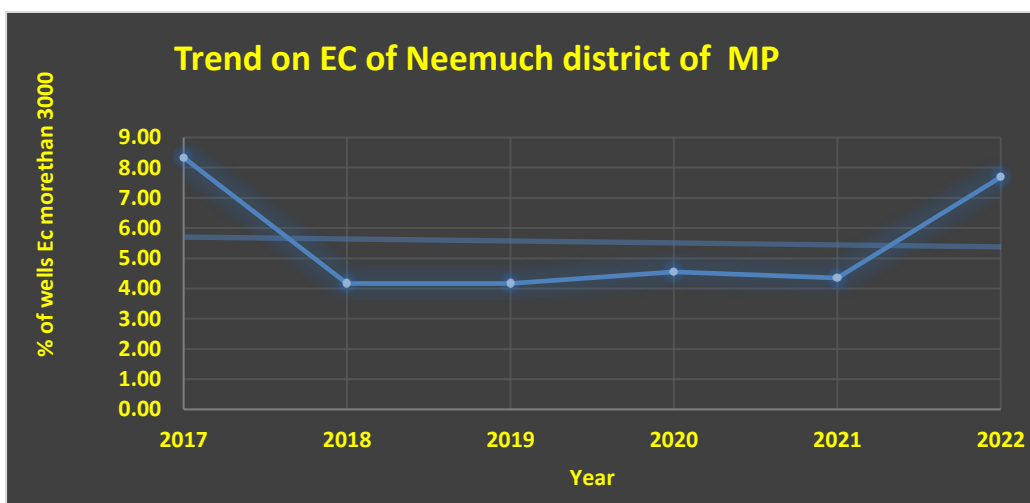
Fig. 7.1.7 Trend on Electrical Conductivity in Neemuch district the period of 2017-2022

Trend on Electrical Conductivity in Bhind district shows (Fig 7.1.6) a decreasing trend from 2017 to 2021. Trend on Electrical Conductivity in Neemuch district shows (Fig. 7.1.7) an unchanged trend from 2018-2021.

7.2 CHLORIDE

Chloride is present in all-natural waters, mostly at low concentrations. It is highly soluble in water and moves freely with water through soil and rock. In ground water the chloride content is mostly below 250 mg/L except in cases where inland salinity is prevalent and in coastal areas.

BIS (Bureau of Indian Standard) have recommended a desirable limit of 250 mg /L of chloride in drinking water; this concentration limit can be extended to 1000 mg/L of chloride in case no alternative source of water with desirable concentration is available. However, ground water having concentration of chloride more than 1000 mg /L are not suitable for drinking purposes.

In Fig 7.2.1, the concentration of chloride (in mg/L) in ground water from observation wells have been used to show distribution patterns of chloride in different ranges of suitability. It is apparent from the map that majority of the samples having chloride values less than 250 mg/L are found mostly in 91 % locations in the state of MP

Water with chloride ranging between 250 and 1000 mg/L falling under 'permissible' range are confined mostly to 8.9 % locations of MP.

Relatively high values of Chloride (>1000 mg/L) are not observed in the State of MP.

Table-7.2.3: Comparative Change in number of Districts having Cl > 1000 mg/L in Various districts

S. No.	District	Nos. of locations having Cl > 1000 mg/L.		
		2017	2022	Increase/Decrease
1	AGAR MALWA	0	0	0
2	ALIRAJPUR	0	0	0
3	ANUPPUR	0	0	0
4	ASHOK NAGAR	0	0	0
5	BALAGHAT	0	0	0
6	BARWANI	0	0	0
7	BETUL	0	0	0
8	BHIND	1	0	-1
9	BHOPAL	0	0	0
10	BURHANPUR	0	0	0
11	CHHATARPUR	0	0	0
12	CHHINDWARA	0	0	0
13	DAMOH	0	0	0
14	DATIA	0	0	0
15	DEWAS	0	0	0
16	DHAR	0	0	0
17	DINDORI	0	0	0
18	GUNA	0	0	0
19	GWALIOR	0	0	0
20	HARDA	0	0	0
21	HOSHANGABAD	0	0	0
22	INDORE	0	0	0
23	JABALPUR	0	0	0
24	JHABUA	0	0	0
25	KATNI	0	0	0
26	KHANDWA	0	0	0
27	KHARGONE	0	0	0
28	MANDLA	0	0	0
29	MANDSAUR	0	0	0
30	MORENA	0	0	0
31	NARSINGHPUR	0	0	0
32	NEEMUCH	1	0	-1
33	PANNA	0	0	0
34	RAISEN	0	0	0
35	RAJGARH	0	0	0
36	RATLAM	0	0	0
37	REWA	0	0	0
38	SAGAR	0	0	0
39	SATNA	0	0	0
40	SEHORE	0	0	0
41	SEONI	0	0	0
42	SHAHDOL	0	0	0
43	SHAJAPUR	0	0	0

44	SHEOPUR	0	0	0
45	SHIVPURI	0	0	0
46	SIDHI	0	0	0
47	SINGRAULI	0	0	0
48	TIKAMGARH	0	0	0
49	UJJAIN	0	0	0
50	UMARIA	0	0	0
51	VIDISHA	0	0	0
	Total	**2**	**0**	**-2**

In comparison to 2017, it has been observed that the no. of districts having chloride more than 1000 mg/Lin various States has decreased in 2022 (Table 7.2.3 & Fig.7.2.3) in Bhind, Neemuch district which may be because of dilution in that particular area.
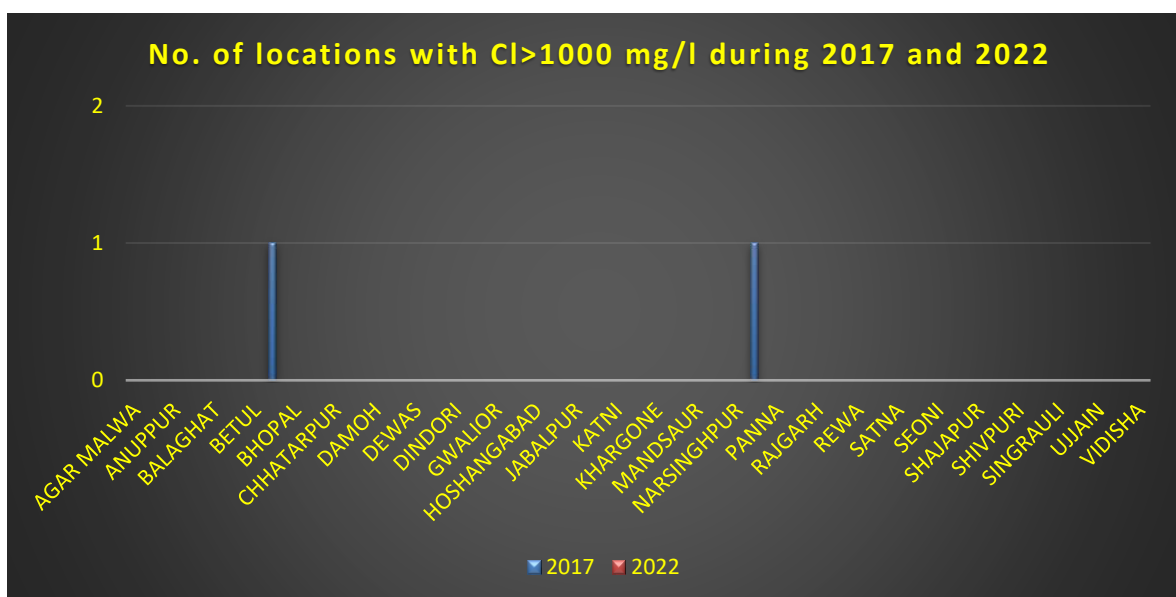
Fig. 7.2.3 Comparison on No of locations exceed Chloride >1000 mg/L during 2017 and 2022.

Techniques Available for Removal of Salinity

Traditionally, distillation has been the method used for desalting water for human consumption or other use. Membrane methods have emerged through the last 50 years and now predominate among the desalination practices. The following describes each of the various methods used for water desalination treatment.

1. Distillation Methods

There are several variations in distillation technology used in desalination. They are all based on the vapourization of liquid water when brought to its boiling point. The nearly pure water vapour produced is condensed and collected for use, while dissolved salts remain behind in the remaining liquid feed water. Some of the methods by which distillation is practiced are as follows:

• Multi-stage flash;

• Multiple effect;

• Vapour compression;

• Membrane distillation; and

• Solar humidification.

2. Membrane Technologies

Membrane processes involve passing of impaired feed water through a semi-permeable material which can filter out unwanted dissolved or undissolved constituents, depending on the size and treatment of the openings. Membrane technologies identified include:

• Reverse Osmosis;
• Microfiltration/Ultrafiltration/Nanofiltration;
• Electrodialysis Reversal; and
• Forward Osmosis.

3. **Hybrid Technology:** A method of reducing overall costs of desalination can be the use of hybrid systems using both RO and distillation processes. Such a system could provide a more suitable match between power and water development needs.

7.3 FLUORIDE

Fluorine is a fairly common element but it does not occur in the elemental state in nature because of its high reactivity. Fluorine is the most electronegative and reactive of all elements that occur naturally within many types of rock. It exists in the form of fluorides in a number of minerals of which fluorspar, cryolite, fluorite and fluorapatite are the most common. Fluorite (CaF_2) is a common fluoride mineral.

Most of the fluoride found in groundwater is naturally occurring from the breakdown of rocks and soils or weathering and deposition of atmospheric particles. Most of the fluorides are sparingly soluble and are present in ground water in small amounts. The occurrence of fluoride in natural water is affected by the type of rocks, climatic conditions, nature of hydrogeological strata and time of contact between rock and the circulating ground water. Presence of other ions, particularly bicarbonate and calcium ions also affect the concentration of fluoride in ground water.

It is well known that small amounts of fluoride (less than 1.0 mg/L) have proven to be beneficial in reducing tooth decay. Community water supplies commonly are treated with NaF or fluorosilicates to maintain fluoride levels ranging from 0.8 to 1.2 mg/L to reduce the incidence of *dental carries*. However, high concentrations such as 1.5 mg/L of F and above have resulted in staining of tooth enamel while at still higher levels of fluoride ranging between 5.0 and 10 mg/L, further pathological changes such as stiffness of the back and difficulty in performing natural movements may take place.

BIS has recommended an upper desirable limit of 1.0 mg/L of F$^-$ as desirable concentration of fluoride in drinking water, which can be extended to 1.5 mg/L of F in case no alternative source of water is available. Water having fluoride concentration of more than 1.5 mg/L are not suitable for drinking purposes.

The fluoride content in groundwater from observation wells in a major part of the state is found to be less than 1.0 mg/L. The distribution of ground water samples with fluoride concentration more than 1.5 mg/L have been depicted on the map as Fig. 7.3.1. It is observed that there are several locations in the districts of Anuppur, Chhatarpur, Datia, Dindori, Neemuch, Neemuch, Seoni, Shajapur, Singrauli where the fluoride in ground water exceeds 1.5 mg/L. The details of

locations where fluoride concentration more than 1.5 mg/l is given in Annexure III. The list of districts showing localized occurrence of fluoride in ground water in excess of 1.5mg/L is given in table 7.3.1

The occurrences of fluoride in groundwater beyond permissible limit (1.5 mg/L) have also been shown on the map as Fig. 7.3.1, district-wise percentage of wells having fluoride >1.5mg/L is shown as a bar diagram in Fig 7.3.2.
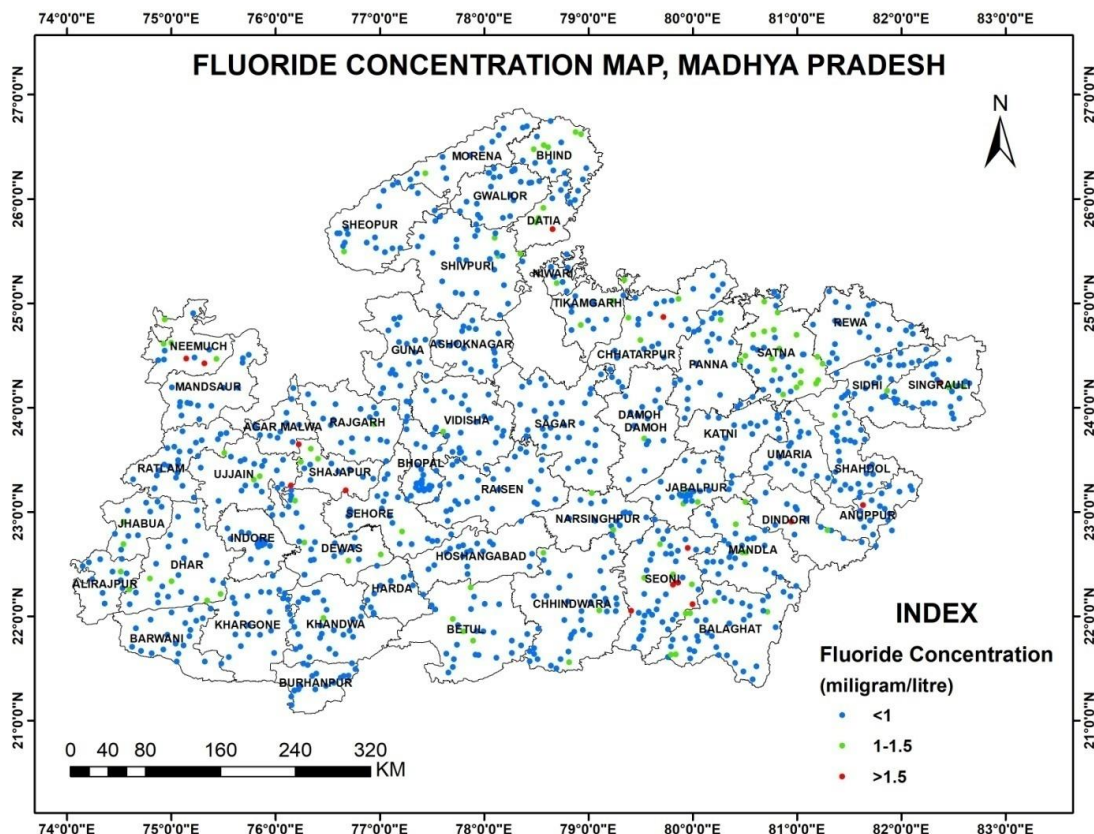
Fig 7.3.1 Locations having Fluoride concentration > 1.5 mg/L in MP during May 2022.

Table 7.3.1 District-wise percentage of wells having fluoride >1.5mg/L

S. No	District	No. of Samples collected (NHS 2022-23)	No. of Samples (F >1.5 mg/l)	% of Samples (F >1.5 mg/l)
1	AGAR MALWA	12		0
2	ALIRAJPUR	13		0
3	ANUPPUR	20	1	5
4	ASHOK NAGAR	18		0
5	BALAGHAT	39		0
6	BARWANI	20		0
7	BETUL	28		0
8	BHIND	18		0
9	BHOPAL	26		0
10	BURHANPUR	18		0
11	CHHATARPUR	29	1	3

12	CHHINDWARA	39		0
13	DAMOH	16		0
14	DATIA	8	1	13
15	DEWAS	24		0
16	DHAR	25		0
17	DINDORI	14	1	7
18	GUNA	21		0
19	GWALIOR	25		0
20	HARDA	12		0
21	HOSHANGABAD	19		0
22	INDORE	21		0
23	JABALPUR	34		0
24	JHABUA	11		0
25	KATNI	16		0
26	KHANDWA	30		0
27	KHARGONE	20		0
28	MANDLA	30		0
29	MANDSAUR	14		0
30	MORENA	13		0
31	NARSINGHPUR	17		0
32	NEEMUCH	13	2	15
33	PANNA	21		0
34	RAISEN	28		0
35	RAJGARH	20		0
36	RATLAM	24		0
37	REWA	22		0
38	SAGAR	34		0
39	SATNA	41		0
40	SEHORE	19		0
41	SEONI	44	5	11
42	SHAHDOL	28		0
43	SHAJAPUR	14	3	21
44	SHEOPUR	21		0
45	SHIVPURI	30		0
46	SIDHI	26		0
47	SINGRAULI	26	1	4
48	TIKAMGARH	17		0
49	UJJAIN	20		0
50	UMARIA	15		0
51	VIDISHA	29		0
	Total	**1142**	**15**	
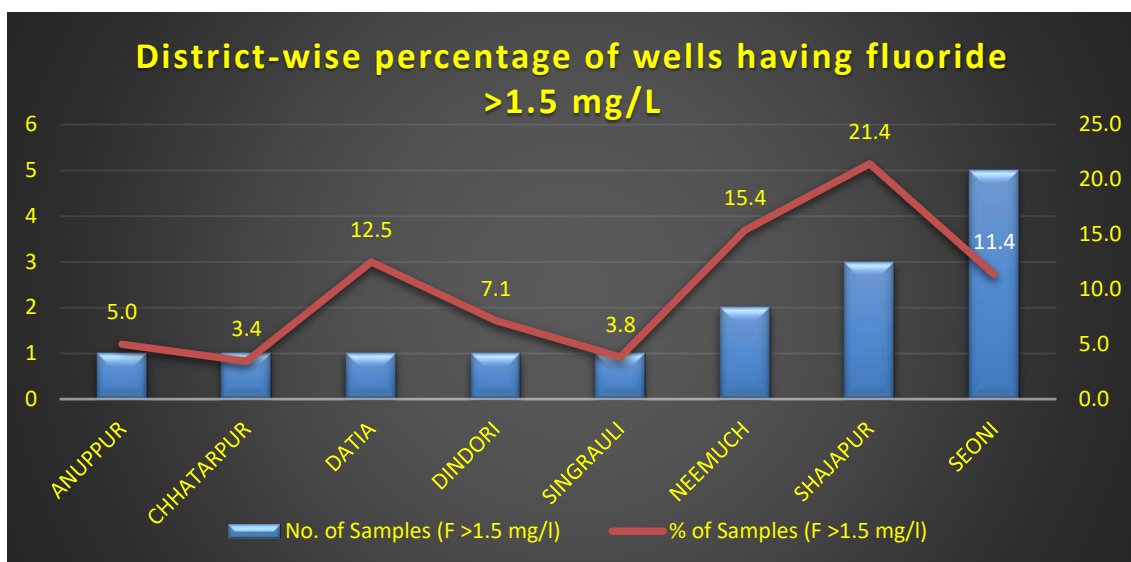
Fig 7.3.2 District-wise percentage of wells having fluoride >1.5 mg/L

Table 7.3.2   Districts showing localized occurrence of Fluoride (>1.5mg/L) in Groundwater in India

Sl. No	District	Locations of Districts having F > 1.5mg/L
1.	Anuppur	Jamudi
2.	Chhatarpur	Kurri
3.	Datia	Dursadha
4.	Dindori	Salaiya
5.	Neemuch	Barlai, Manasa
6.	Seoni	Dhangada, Ghansor1, Palari, Pandiachhappara, Pipardahi
7.	Shajapur	Arandia, Chouma, Makshi New
8.	Singrauli	Betaha Dand

Table-7.3.3: Comparative Change in number of Districts having F > 1.5 mg/L in various states.

S. No.	District	Nos. of locations having F> 1.5 mg/L.		
		2017	2022	Increase(+)/Decrease(-)
1	AGAR MALWA			
2	ALIRAJPUR	3		-3
3	ANUPPUR	2	1	-1
4	ASHOK NAGAR			
5	BALAGHAT			
6	BARWANI			
7	BETUL	4		-4
8	BHIND	4		-4
9	BHOPAL			
10	BURHANPUR			

11	CHHATARPUR		1	1
12	CHHINDWARA	5		-5
13	DAMOH			
14	DATIA		1	1
15	DEWAS			
16	DHAR	3		-3
17	DINDORI	2	1	-1
18	GUNA	2		-2
19	GWALIOR			
20	HARDA	2		-2
21	HOSHANGABAD			
22	INDORE	1		-1
23	JABALPUR	1		-1
24	JHABUA			
25	KATNI			
26	KHANDWA	1		-1
27	KHARGONE			
28	MANDLA	2		-2
29	MANDSAUR			
30	MORENA			
31	NARSINGHPUR			
32	NEEMUCH	3	2	-1
33	PANNA			
34	RAISEN			
35	RAJGARH			
36	RATLAM			
37	REWA			
38	SAGAR			
39	SATNA	1		-1
40	SEHORE	2		-2
41	SEONI	2	5	3
42	SHAHDOL			
43	SHAJAPUR	1	3	2
44	SHEOPUR			
45	SHIVPURI			
46	SIDHI			
47	SINGRAULI		1	1
48	TIKAMGARH			
49	UJJAIN	3		-3
50	UMARIA	1		-1
51	VIDISHA			
	TOTAL	**45**	**15**	**-30**
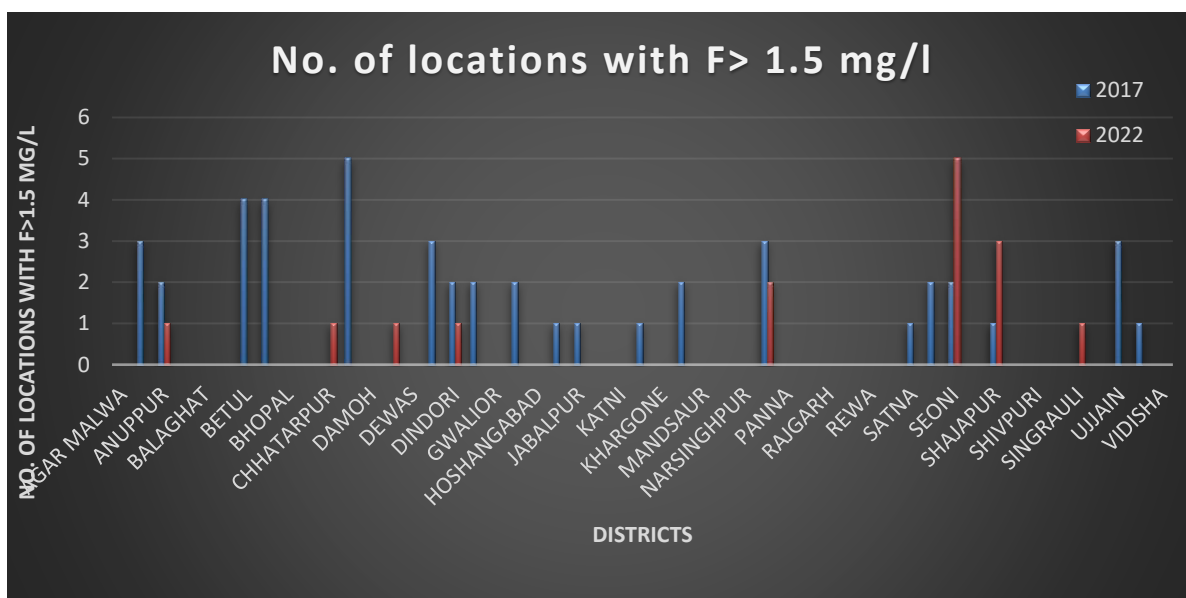
Fig 7.3.3 Comparison on No of districts exceed Fluoride >1.5 during 2015 and 2022

It has been observed (Table 7.3.3) that total number of locations affected by high fluoride in different districts has decreased by 66.66 % in 2022 as compared to the data available in 2017. In Chhatrapur, Datia, Seoni, Shajapur and Singrauli the increase in the no. of locations is a matter of concern.

7.3.1 TREND ON FLUORIDE

The occurrence of fluoride in groundwater is mainly due to weathering and leaching of fluoride bearing minerals from rocks and sediments. To assess the trend of ground water pollution due to geogenic activity, the percentage of well exceeds the permissible limit of 1.5mg/L for the period of 2017 to 2022 were compared and presented in the Table 7.3.4 and Fig 7.3.4 and observed that the percentage of samples exceed the permissible limit of fluoride 1.5 mg/L were ranging between 1-4 % and a decreasing trend was noticed. The number of fluoride affected district has decreased in the year 2022. Trend on water quality for fluoride was prepared for the state of Madhya Pradesh is showing a similar pattern (Fig 7.3.5).

Table 7.3.4: Percentage of wells Exceed fluoride >1.5 mg/L during the period of 2017-2022

Year	Total Number of samples analysed	No. of districts affected by F	No. of locations affected by F	%age of locations affected by F
2017	1197	20	45	3.76
2018	1175	18	39	3.32
2019	1193	19	38	3.19
2020	1038	12	19	1.83
2021	1153	16	24	2.08
2022	1142	8	15	1.31
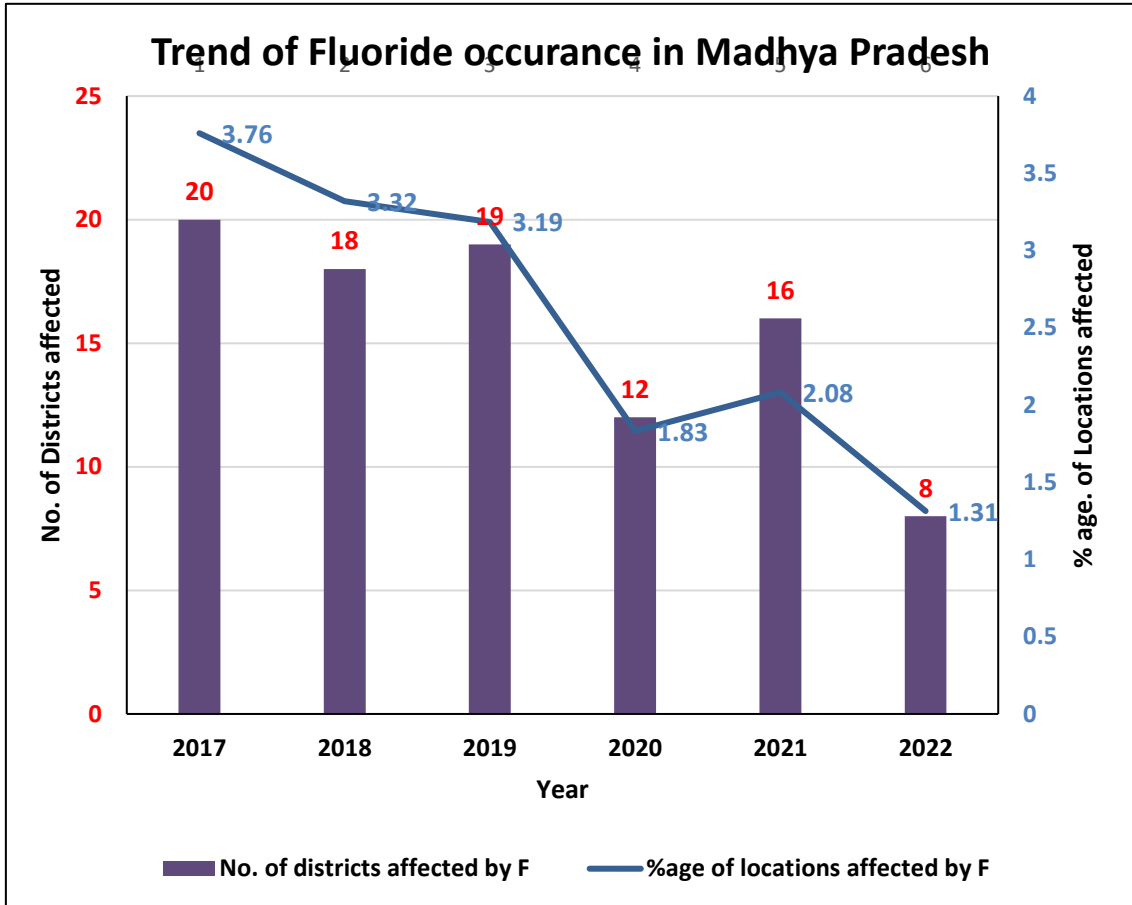
Fig. 7.3.4 Trend of Fluoride occurrence in MP

Trend on fluoride in Chhindwara, Bhind and Datia district, MP shows (Fig 7.3.6) an decreasing trend after 2019.

Trend on F of Bhind district of MP
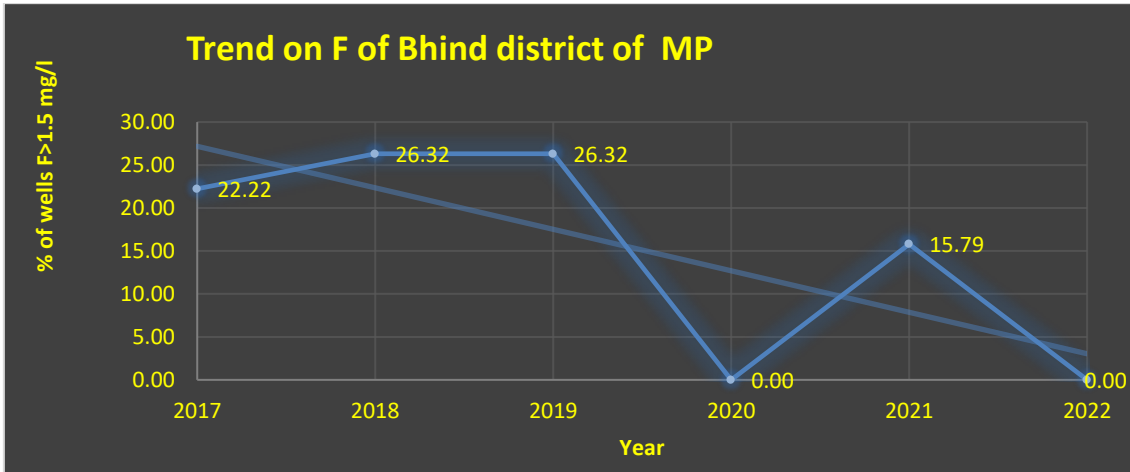
Fig 7.3.6 Trend on Fluoride in Bhind district for the period of 2017-2022

Trend on F of Datia district of MP
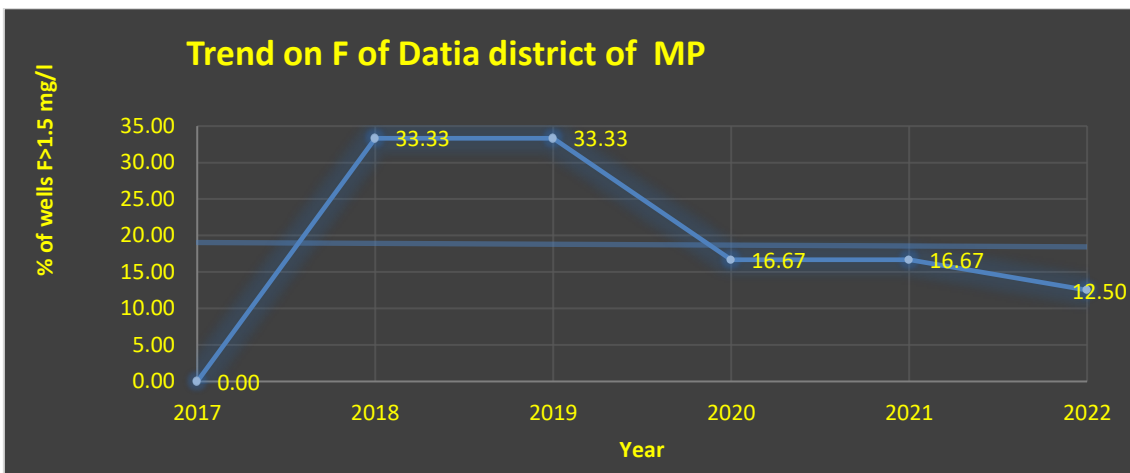
Fig 7.3.7 Trend on Fluoride in Datia district for the period of 2017-2022

Remedial Measures for Fluoride

The fluoride remedial measures broadly adopted are ex-situ techniques. They can be classified into three major categories.

(a) Adsorption and ion exchange

This technique functions on the adsorption of fluoride ions onto the surface of an active agent such as activated alumina, red mud, bone char, brick pieces column, mud pot and natural adsorbents where fluoride is removed by ion exchange or surface chemical reaction with the solid bed matrix.

Activated alumina: Activated alumina is a highly porous aluminum oxide exhibiting high surface area. Alumina has a high preference for fluoride compared to other anionic species, and hence is an attractive adsorbent. The crystal structure of alumina contains cation lattice discontinuities giving rise to localized areas of positive charge which makes it attract various anionic species. It also does not shrink, swell, soften nor disintegrate when immersed in water. The maximum absorption capacity of activated alumina for fluoride is found to be 3.6 mg F/g of alumina.

Ion-Exchange resins: Synthetic chemicals, namely, anion and cation exchange resins have been used for fluoride removal. Some of these are Polyanion (NCL), Tul-sion A - 27, Deacedite FF (IP), Amberllte IRA 400, LewatitMIH - 59, and AmberliteXE - 75. These resins have been used in chloride and hydroxy form. The fluoride exchange capacity of these resins depends upon the ratio of fluoride to total anions in water.

(b) Coagulation-precipitation

Precipitation methods are based on the addition of chemicals (coagulants and coagulant aids) and the subsequent precipitation of a sparingly soluble fluoride salt as insoluble. Fluoride removal is accomplished with separation of solids from liquid. Aluminium salts (eg. Alum), lime, Poly Aluminium Chloride, Poly Aluminium Hydroxy sulphate and Brushite are some of the frequently used materials in defluoridation by precipitation technique. The best example for this technique is the famous Nalgonda technique.

Nalgonda Technique

Nalgonda technique involves addition of Aluminium salts, lime and bleaching powder followed by rapid mixing, flocculation, sedimentation, filtration and disinfection. It is opined that this technique is preferable at all levels because of the low price and ease of handling, is highly versatile and can be used in various scales from household level to community scale water supply. The Nalgonda technique can be used for raw water having fluoride concentration between 1.5 and 20 mg/L and the total dissolved solids should be <1500 mg/L, and total hardness < 600 mg/L. The alkalinity of the water to be treated must be sufficient to ensure complete hydrolysis of alum added to it and to retain a minimum residual alkalinity of 1 - 2 meq/L in the treated water to achieve a pH of 6.5 - 8.5 in treated water. Several researchers have attempted to improve the technique by increasing the removal efficiency of fluoride using Poly Aluminium Chloride (PAC) and Poly Aluminium Hydroxy Sulphate (PAHS).

Fig.3.   Defluoridation at Domestic Level
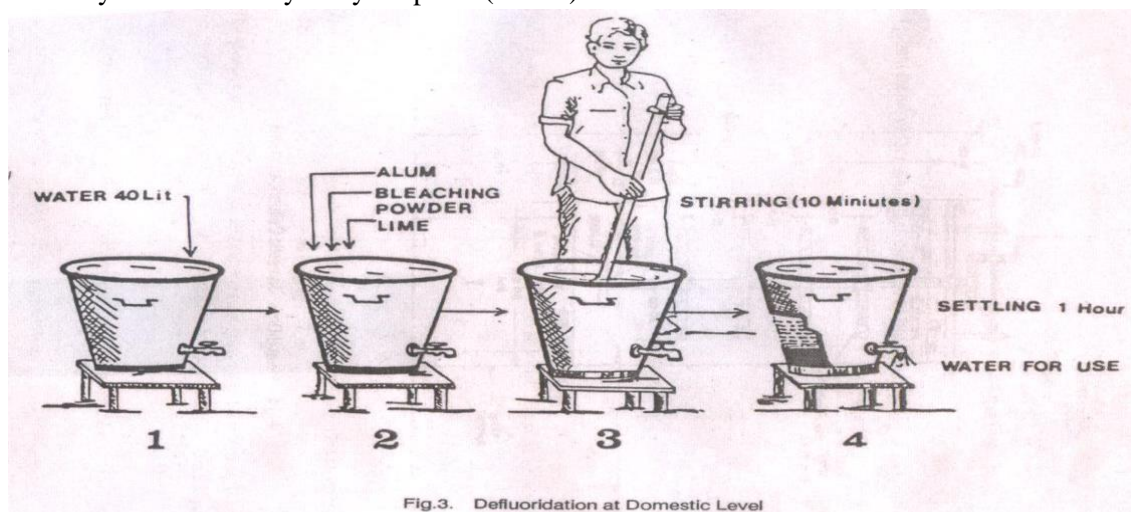
(c) Membrane techniques

Reverse osmosis, nanofiltration, dialysis and electro dialysis are physical methods that have been tested for defluoridation of water. Though they are effective in removing fluoride salts from water, however, there are certain procedural disadvantages that limit their usage on a large scale.

7.4 NITRATE

Nitrate is a naturally occurring compound that is formed in the soil when nitrogen and oxygen combine. The primary source of all nitrates is atmospheric nitrogen gas. This is converted into organic nitrogen by some plants by a process called nitrogen fixation. Dissolved Nitrogen in the form of Nitrate is the most common contaminant of ground water. Nitrate in groundwater generally originates from non-point sources such as leaching of chemical fertilizers & animal manure, groundwater pollution from septic and sewage discharges etc. It is difficult to identify the natural and man-made sources of nitrogen contamination of ground water. Some chemical and micro-biological processes such as nitrification and denitrification also influence the nitrate concentration in ground water.

As per the BIS Standard for drinking water the maximum desirable limit of Nitrate concentration in ground water is 45 mg/L with no relaxation. Though, Nitrate is considered relatively non-toxic, a high nitrate concentration in drinking water is an environmental health concern arising from increased risks of methemoglobinemia particularly to infants. Adults can tolerate little higher concentrations. The specified limits are not to be exceeded in public water supply. If the limit is exceeded, water is considered to be unfit for human consumption.

The occurrences of Nitrate in ground water beyond permissible limit (45 mg /L) have been shown on the map as a point source Fig 7.4.1 and also given in Annexure-IV. Table-7.4.1 shows the districts where nitrate has been found in excess of 45 mg/L in groundwater.
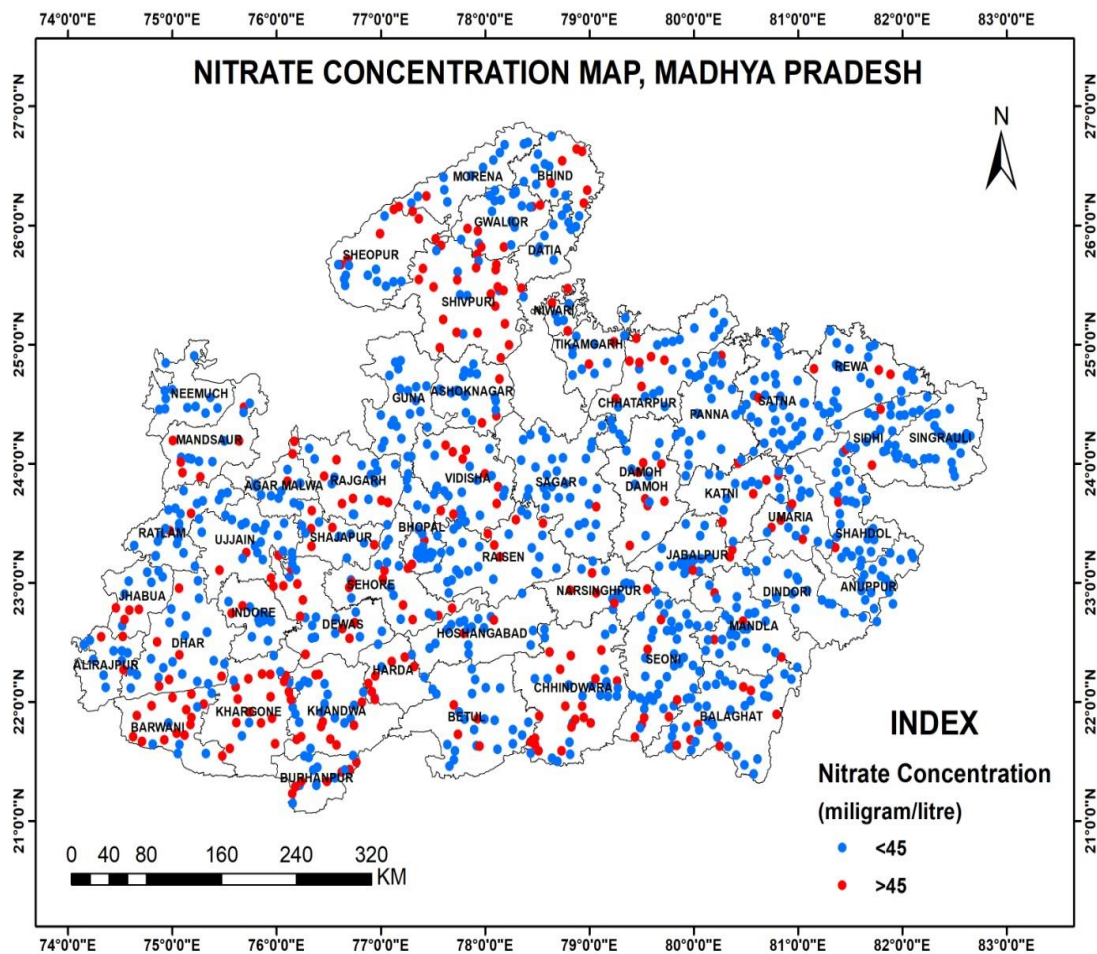
Fig 7.4.1 Locations having Nitrate concentration > 45 mg/L in MP during 2022-23

Table 7.4.1: District-wise percentage of wells having Nitrate > 45 mg/L

S. No	District	No. of Samples collected (NHS 2022-23)	No. of Samples (NO3 > 45 mg/L)	(%) Samples (NO3 > 45mg/L)
1	AGAR MALWA	12	3	25
2	ALIRAJPUR	13	3	23
3	ANUPPUR	20	0	0
4	ASHOK NAGAR	18	3	17
5	BALAGHAT	39	7	18
6	BARWANI	20	13	65
7	BETUL	28	5	18
8	BHIND	18	6	33
9	BHOPAL	26	2	8
10	BURHANPUR	18	7	39
11	CHHATARPUR	29	7	24
12	CHHINDWARA	39	17	44
13	DAMOH	16	7	44
14	DATIA	8	0	0
15	DEWAS	24	10	42
16	DHAR	25	6	24
17	DINDORI	14	0	0
18	GUNA	21	0	0
19	GWALIOR	25	9	36
20	HARDA	12	8	67
21	HOSHANGABAD	19	2	11
22	INDORE	21	3	14
23	JABALPUR	34	4	12
24	JHABUA	11	4	36
25	KATNI	16	4	25
26	KHANDWA	30	13	43
27	KHARGONE	20	15	75
28	MANDLA	30	4	13
29	MANDSAUR	14	6	43
30	MORENA	13	1	8
31	NARSINGHPUR	17	5	29
32	NEEMUCH	13	0	0
33	PANNA	21	2	10
34	RAISEN	28	4	14
35	RAJGARH	20	6	30
36	RATLAM	24	2	8
37	REWA	22	3	14
38	SAGAR	34	1	3
39	SATNA	41	2	5
40	SEHORE	19	8	42
41	SEONI	44	7	16
42	SHAHDOL	28	2	7
43	SHAJAPUR	14	5	36
44	SHEOPUR	21	9	43
45	SHIVPURI	30	21	70

46	SIDHI	26	3	12
47	SINGRAULI	26	0	0
48	TIKAMGARH	17	4	24
49	UJJAIN	20	4	20
50	UMARIA	15	4	27
51	VIDISHA	29	10	34
	Total	1142	271	24

Fig 7.4.2 District-wise samples exceed Nitrate 45 mg/L (NHS 2022-23)

Table 7.4.2: List of Districts Showing Localized Occurrence of Nitrate (>45 mg/L) in Ground Water in Different District of Madhya Pradesh

Sl. No.	District	Parts of Districts having Nitrate > 45 mg/L
1	AGAR MALWA	Amla, Guradi Bangla and Soyat
2	ALIRAJPUR	Bhabra New, Nanpur, Khusal Bahedi
3	ASHOK NAGAR	Bahadurpur, Chanderi, Mungaoli
4	BALAGHAT	Amai, Baihar1, Damoh2, Khurmundi, Miragpur, Newargaon, Rajegaon
5	BARWANI	Balsamund, Baruphatak, Borlai, Julwania, Niwali1, Rajpur, Sendwa, Talwada Deb, Osada, Chouki, Mortalai, Pansemal, Joganwada
6	BETUL	Betul1, Ghatpiparia, Gujarmaal, Jhallar, Jogli
7	BHIND	Balaji, Chirole, Lahar, Lavan, Nahrakapura, Phuph
8	BHOPAL	Islamnagar, Sarvar
9	BURHANPUR	Burhanpur-dw, Dedtalai, Karkheda, Manjrod Kalan, Nachankheda, Pipalpani, Bahadurpur1
10	CHHATARPUR	Bijawar, Chhatarpur, Issanagar, Kurri, Nowgaon, PiporaKhurd, Sendpa
11	CHHINDWARA	Chhindi, Chinchkheda, Delakhari, Goni, Lahgudna, Linga Rly.Stn., Mohi, Pandurna, Piplanarayanwar, Ramakona New, Ramgarh, Saonri1, Sarangbheri, Silwanighati, Singhori, Surla, Tansara Mal
12	DAMOH	Abhana, Bamhori, Bangaon New, Khamaria, Palar, Patera2, Samnapur

13	DEWAS	Bhesuni, Bhonrasa, Dewas, Kannod, Karnawad,Nevri,Pipri,Satwas New,Udainagardw,Tonk Kalan
14	DHAR	Dhamnod,Pipalya,Rajod,Singhana,Tanda,Zeerabad
15	GWALIOR	Aarauli,Aron,Behat,Charai Shyampur,Dongarpur,Harsibandh,Kariyawati,Padampur Kheria,Jahangirpur
16	HARDA	Chhipawaddw,Hardadw,Mandla,Mohanpur1,Morgarhidw,Sonpura Colony,Temagaon,Timarni
17	HOSHANGABAD	Pathrautadw,Semri Harchand
18	INDORE	Rangwasa,Sanwer,Ushapura
19	JABALPUR	Ghughara,Gokalpur,Kundam,Saliwada
20	JHABUA	Jhabua1,Pitol,Tikadimoti,Chapari
21	KATNI	Badwara,Barhi,Piparia2,Umariapan
22	KHANDWA	Balwara1,Balwara1,Bori Saray,Chanera,Daulatpur,Dhangaon,Gurhi,Jaswadi1,Khalwa1,Kusumbia, Pandhana,Rudhy Bhata,Thapana,Udaipur
23	KHARGONE	Amba,Baddiya,Bamnala New,Bhikangaon1,Bhulwani,Daudwa,Dhargaon,Dhulkot,Gogaon,Kasra wad1,Khargone,Piplyabuzrug,Sanawad New,Sawda,Ziranniya
24	MANDLA	Dithori,Kalpi,Mahania Patpara,Motinala
25	MANDSAUR	Babulda,Daloda1,Manpura,Nayakhera,Pipaliya,Shamgarh1
26	MORENA	Tonga Gaon
27	NARSINGHPUR	Betli,Jhoteshwar,Kareli Basti,Koudiya,Sundernagar
28	PANNA	Ajaigarh,Powai
29	RAISEN	Dehgaon,Garhi,Paloha,Sultanganj
30	RAJGARH	Chhapihera,Ganayari,Gandhigram,Khilchipur,Pachor,Udhankheri
31	RATLAM	Dhamnod,Ukediya
32	REWA	Naigarhi 1,Pahadi,Semaria2
33	SAGAR	Rehli
34	SATNA	Jhukehi,Patwara
35	SEHORE	Ashta,Bayan,Bhandeli,Budhni,Ichhawar,Kankad Kheda,Larkui New,Rala
36	SEONI	Dharamkuan,Ghunai,Kauria,Khawasa,Kurai New,Makarjhir,Rukhar
37	SHAHDOL	Jaisinghnagar1,Shahdol
38	SHAJAPUR	Majhania,Moman Badodia,Nandni,Salsalai,Tilawad Govind
39	SHEOPUR	Bhagwara,Dhobni,Garhi1,Ghaswani,Harkui,Panchoncolony,Pura,Rajpur a,Vijaypurcolony
40	SHIVPURI	Achhroni New,Ainpura,Awas,Badarwas,Bamorkalan New,Behgwan,Bhonti,Khareh,Languri,Manipura New,Masoori,Narwar,Pichhore,Pohari,Sarsod,Satanwara,Sehore,Semri, Sikandara,Sitapur,Toda Karea
41	SIDHI	Bastua,Chilheri Kalan,Majhauli
42	TIKAMGARH	Birorakhet,Majna,Orchha,Palera
43	UJJAIN	Chakrawada Grid,ChhotiGhadsod,Kaiytha,Palkhanda
44	UMARIA	Bichua,Birsinghpur1,Parasi,Umaria
45	VIDISHA	Atari Khejda,Bareth,Bilari,Dehri Jagir,Deopur,Ghatera,Gyaraspur1,Patharia,Salaiya,Sironj1

Table-7.4.3: Comparative Change in number of Districts having Nitrate > 45 mg/Lin various districts.

S. No.	District	Nos. of locations having NO$_3$> 45 mg/L.		
		2017	2022	Increase/ Decrease
1	AGAR MALWA	5	3	-2
2	ALIRAJPUR	9	3	-6
3	ANUPPUR	0	0	0
4	ASHOK NAGAR	4	3	-1
5	BALAGHAT	8	7	-1
6	BARWANI	5	13	8
7	BETUL	5	5	0
8	BHIND	5	6	1
9	BHOPAL	13	2	-11
10	BURHANPUR	3	7	4
11	CHHATARPUR	9	7	-2
12	CHHINDWARA	14	17	3
13	DAMOH	3	7	4
14	DATIA	3	0	-3
15	DEWAS	14	10	-4
16	DHAR	10	6	-4
17	DINDORI	1	0	-1
18	GUNA	4	0	-4
19	GWALIOR	4	9	5
20	HARDA	6	8	2
21	HOSHANGABAD	5	2	-3
22	INDORE	5	3	-2
23	JABALPUR	3	4	1
24	JHABUA	3	4	1
25	KATNI	3	4	1
26	KHANDWA	18	13	-5
27	KHARGONE	12	15	3
28	MANDLA	2	4	2
29	MANDSAUR	8	6	-2
30	MORENA	3	1	-2
31	NARSINGHPUR	3	5	2
32	NEEMUCH	12	0	-12
33	PANNA	2	2	0
34	RAISEN	9	4	-5
35	RAJGARH	7	6	-1
36	RATLAM	14	2	-12

37	REWA	3	3	0
38	SAGAR	7	1	-6
39	SATNA	4	2	-2
40	SEHORE	6	8	2
41	SEONI	5	7	2
42	SHAHDOL	5	2	-3
43	SHAJAPUR	5	5	0
44	SHEOPUR	9	9	0
45	SHIVPURI	17	21	4
46	SIDHI	1	3	2
47	SINGRAULI	2	0	-2
48	TIKAMGARH	9	4	-5
49	UJJAIN	13	4	-9
50	UMARIA	4	4	0
51	VIDISHA	10	10	0
	Total	**334**	**271**	**-63**

It has been observed (Table 7.4.3) that No. of locations in various districts of MP having high Nitrate (more than 45 mg/l) content in ground water has decreased by 18.86% in year 2022 as compared to the data available in year 2017.
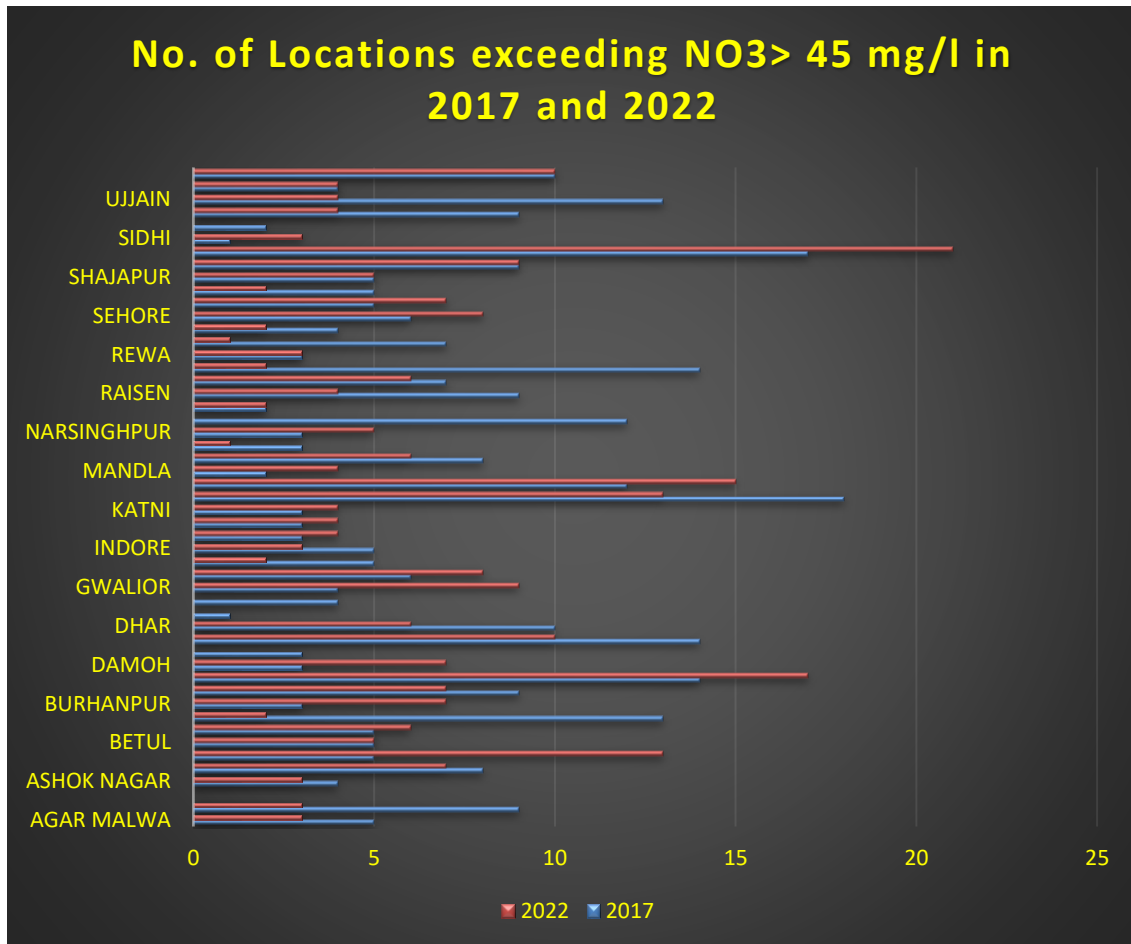
Fig. 7.4.3 Bar diagram comparing no. of Nitrate contaminated (45 mg/L) locations in various districts during year 2017 and 2022 in MP.

7.4.1 TREND ON NITRATE

Trend analysis determines whether the measured values of the water quality variables increase or decrease during a time period. Nitrate is one of the major indicators of anthropogenic sources of pollution. Nitrate is the ultimate oxidized product of all nitrogen containing matter and its occurrence in groundwater can be fairly attributed to infiltration of water through soil containing domestic waste, animal waste, fertilizer and industrial pollution. As the lithogenic sources of nitrogen are very rare, its presence in ground water is almost due to anthropogenic activity. Hence, nitrate was taken to assess the trend of ground water quality in India due to anthropogenic activity. The percentage of well exceeds the permissible limit of 45 mg/L for the period of 2017 to 2022 were compared and presented in the Table 7.4.4 and Fig 7.4.4 and observed that the percentage of samples exceed the permissible limit of nitrate (> 45 mg/L) were ranging between 23-35 % and a decreasing trend was noticed. The numbers of nitrate affected district have decreased in the year 2022 which may be due to dilution effect. Trend on water quality for Nitrate prepared for the state of Madhya Pradesh is showing a similar pattern (Fig 7.4.5).

Table 7.4.5: Percentage of wells Exceed Nitrate >1.5 mg/L during the period of 2017-2022

Year	Total Number of samples analysed	No. of districts affected by Nitrate	No. of locations affected by Nitrate	% age of samples affected by Nitrate (NO$_3$ >45 mg/L)
2017	1197	50	334	27.9
2018	1175	48	324	27.6
2019	1193	50	367	30.8
2020	1038	48	362	34.9
2021	1153	48	291	25.2
2022	1142	45	271	23.7

Trend on Nitrate in Balaghat, Ujjian and district of MP is shown (Fig 7.4.6 and 7.4.7) . It can be observed that there is an overall decreasing trend in number of locations affected by Nitrate from 2017 to 2022.
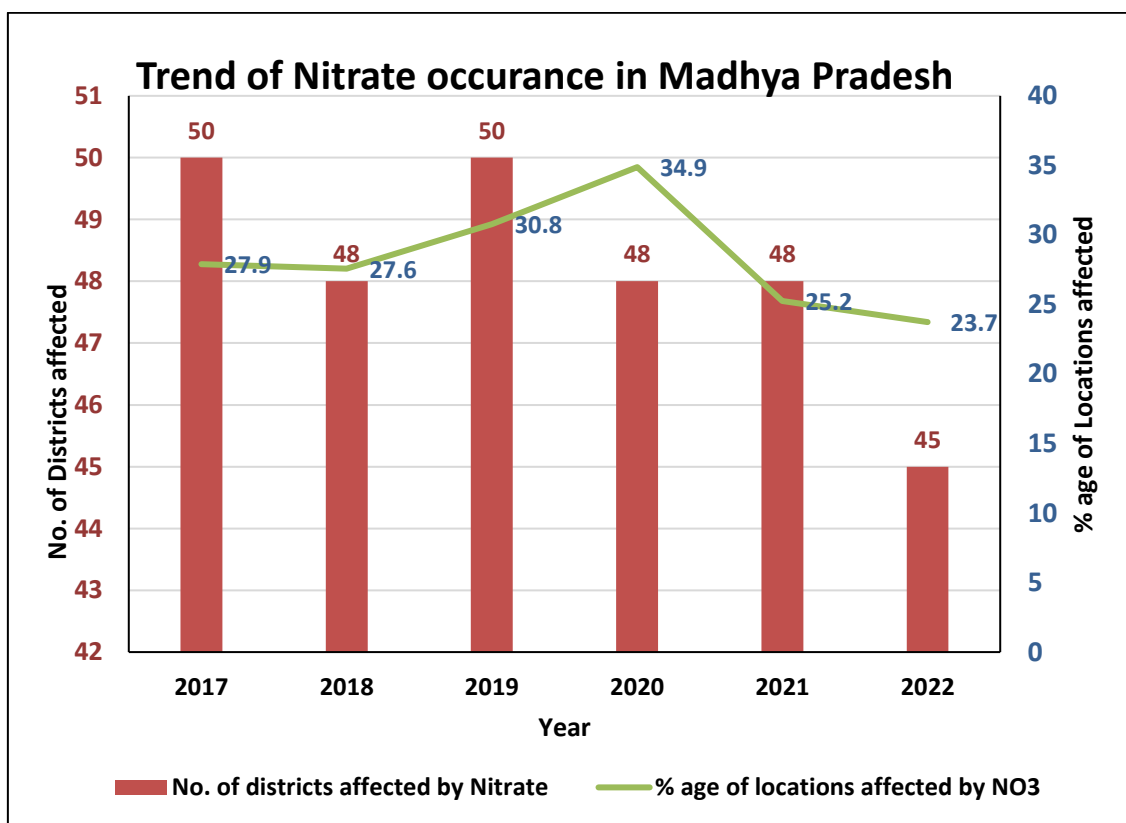
Fig. 7.4.4 Trend of Nitrate occurrence in MP
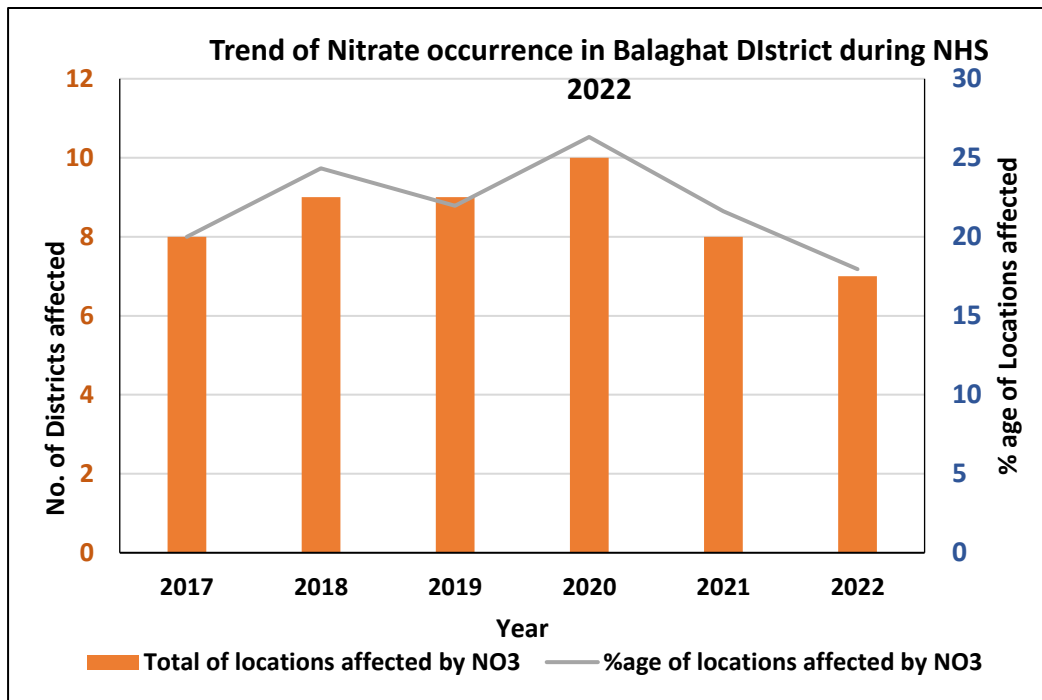
. **Fig. 7.4.5 Trend of Nitrate occurrence in Balaghat District, MP during NHS 2022**
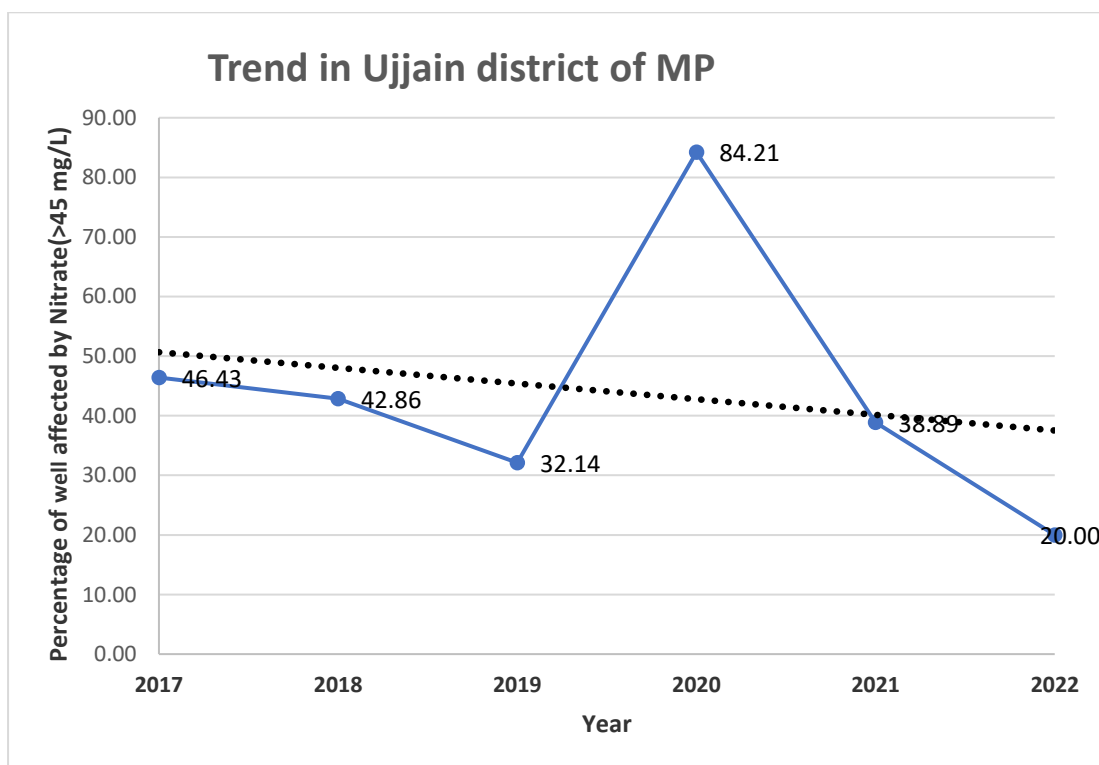
Fig 7.4.6 Trend on Nitrate in Ujjain district MP for the period of 2017-2022
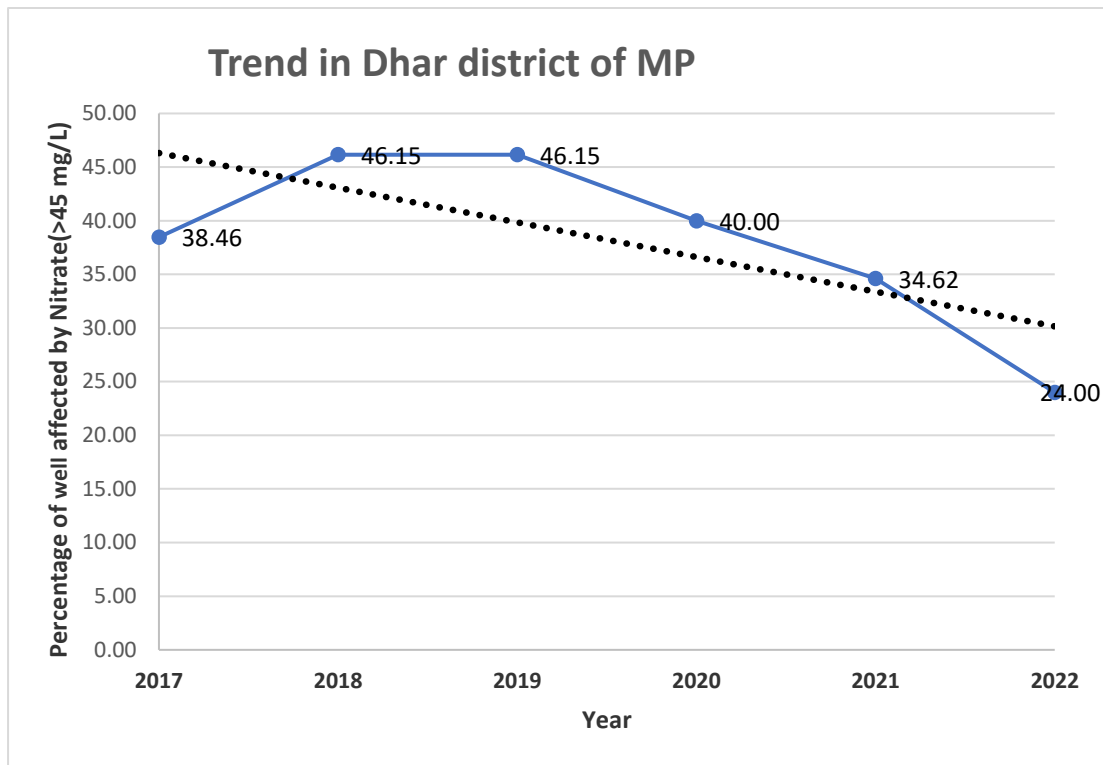
Fig 7.4.7 Trend on Nitrate in Dhar district of MP for the period of 2017-2022

Remedial Measures for Nitrate

For removal of nitrate both non-treatment techniques like blending and treatment processes such as ion-exchange, reverse osmosis, biological denitrification and chemical reduction are useful. The most important thing is that neither of these methods is completely effective in removing all the nitrogen from the water.

a) Methods involving no treatment: In order to use any of these options the nitrate problem must be local-scale. Common methods are –
  - Raw water source substitution
  - Blending with low nitrate waters

This greatly reduces expenses and helps to provide safer drinking water to larger numbers of people.

b) Methods involving Treatment:
They are as follows
  - Adsorption/Ion Exchange
  - Reverse Osmosis
  - Electrodialysis
  - Bio-chemical Denitrification (By using denitrifying bacteria and microbes)
  - Catalytic Reduction/Denitrification (using hydrogen gas)

The mechanism of nitrate pollution in subsurface porous unconfined/confined aquifer is governed by complex biogeochemical processes. Apart from recharge conditions, groundwater chemistry may be impacted by the mineral kinetics of water-rock interactions. Consequently, suitable nitrate removal technologies should be selected. Nitrate is a very soluble ion with limited potential for co-precipitation or adsorption. This makes it difficult such as chemical coagulation, lime softening and filtration which are commonly used for removing most of the chemical pollutants such as fluoride, arsenic and heavy metals. According to King et al., 2012 nitrate treatment technologies can be classified in two categories in two categories, i.e. nitrate reduction and nitrate removal options. Nitrate removal technologies involve physical processes that does not necessarily involve any alteration of the chemical state of nitrate ions. Bio-chemical reduction options aim to reduce nitrate ions to other states of nitrogen, e.g. ammonia, or a more innocuous form as nitrogen gas. In-situ bioremediation is also effectively used in used in nitrate treatment of contaminated groundwater. Reverse Osmosis, catalytic reduction and blending are effective methods for nitrate removal from groundwater. For nitrate removal, operating trans-membrane pressure of RO unit generally ranges from 20 to 100 bar.
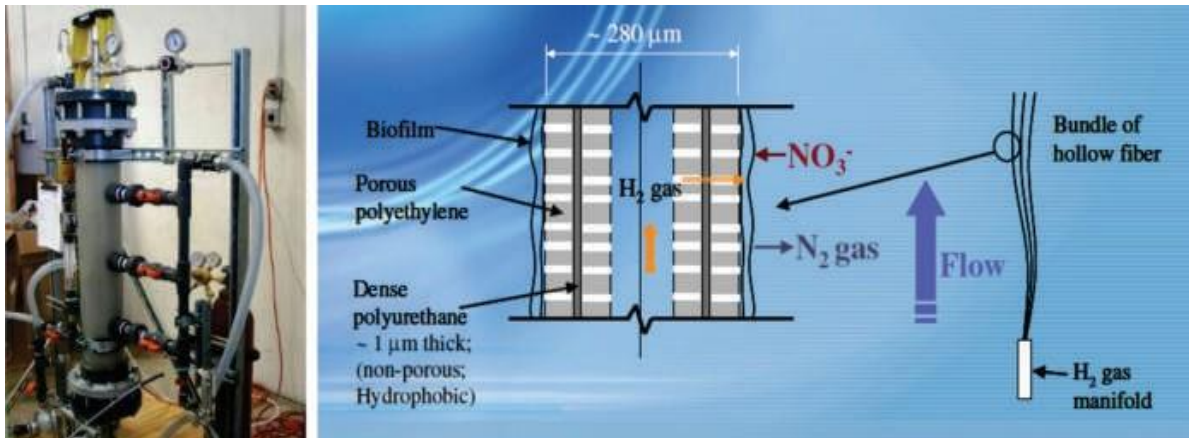
Fig. 7.4.8 Advanced Nitrate Reduction Hollow Fiber Membrane Reactor (Source: Hand Book for Drinking Water Treatment, JJM, Ministry of Jal Shakti, Gov. of India)

7.5 URANIUM

Uranium occurs naturally in groundwater and surface water. Being a radioactive mineral, high uranium concentration can cause impact on water, soil and health. Uranium has both natural and anthropogenic source that could lead to the aquifer. These sources include leaching from natural deposits, release in mill tailings, and emissions from the nuclear industry, combustion of coal and other fuels and the use of phosphate fertilizers that contains uranium and contribute to ground water pollution. Uranium enters in human tissues mainly through drinking water, food, air and other occupational and accidental exposures. Intake of uranium through air and water is normally low, but in circumstances in which uranium is present in a drinking water source, the majority of intake can be through drinking water.

Water with uranium concentration above the recommended maximum permissible concentration of 30 ppb (BIS,10500:2012) is not safe for drinking purposes as it can cause damage to internal organs, on continuous intake. Elevated uranium concentrations in drinking water have been associated with many epidemiological studies such as urinary track cancer as well as kidney

toxicity. A recent study, found a strong correlation between uranium concentration in drinking water and uranium in bone, suggesting that bones are good indicators of uranium exposed via ingestion of drinking water. Therefore, such studies trigger further assessment of uranium's adverse health effects on humans and/or the environment for countries where elevated uranium concentration in drinking water has been observed. Hence, it becomes important to study the level of uranium in drinking water for health risk assessment.

Uranium concentration in the shallow ground water varies primarily due to recharge and discharge, which would have dissolved or leached the uranium from the weathered soil to groundwater zone. High uranium concentrations observed in groundwater may be due to local geology, anthropogenic activities, urbanization and use of phosphate fertilizers in huge quantity for agriculture purpose. Studies have shown that phosphate fertilizer possess uranium concentration ranging from 1 mg/kg to 68.5 mg/kg (Brindha K et al., 2011). Hence, the phosphate fertilizers manufactured from phosphate rocks may also contribute uranium to ground water in agriculture region. In ores, uranium is found as uranite (UO_2^{2+}) and pitchblende ($U_3O_8^{2+}$) or in the form of secondary minerals (complex oxides, silicates, phosphates, vanadates).

Table 7.5.1 Summary of uranium concentrations in different types of rocks

Rocks	Range(mg/kg)
Granite	3.4
Limestone/dolomite	2.2
Argillaceous shale	3.7
Sediments	1.4-53
Phosphates	30-100

Table 7.5.2 Standards and guidelines for uranium in drinking water in various countries.

Sl. No	Country / agency	guideline value (µg/L)	Reference
1	Australia	GV 17	NHMRC, Australia (2011)
2	Bulgaria	ML 60	European Food Safety Authority (2009)
3	Canada	MAC 20	Health Canada (2019)
4	Finland	RV 100	European Food Safety Authority (2009)
5	India	RBL 60	AERB, India (2004)
6	India	PL 30	BIS,2012
7	Malaysia	MAV 2	Ministry of Health Malaysia (2004)
8	USA	MCL 30	USEPA (2011)
9	WHO	PGV 30	WHO 2011

GV, Guideline value; ML, Maximum limit; MAC, Most acceptable concentration; RV, Recommended value; RBL, Radiological based limit; PL, Permissible Limit; MAV, Maximum acceptable value; MCL, Maximum contaminant level; PGV, Provisional guideline value

To assess the Uranium concentration and distribution in the ground water, Central Ground Water Board, North Central Region, Bhopal had decided to carry out Uranium sampling of its National Hydrograph Network Stations (NHNS) in the entire state during Pre-monsoon monitoring

(May,2022). The sample collection and storage were done according to the standard protocols prescribed by APHA (2017). The groundwater samples were collected in plastic bottles without acidification. Uranium (U) was detected using Led Uranium analyser -Fluorimeter of Model-Quantalase. To ensure quality control, standard checks were performed on every ten samples.

The analytical results of uranium concentration varied from 0.0 to 125.23ppb in the Madhya Pradesh state during pre-monsoon monitoring (May, 2022). In the state, uranium concentration more than BIS permissible limit of 30 ppb recorded in the Bhind, Shahdol, Shivpuri, Alirajpur, Raisen, Gwalior, Datia, Gwalior, Mandla and Shivpuri districts of Madhya Pradesh. List of uranium concentration more than 30 ppb given in the Annexure IV.
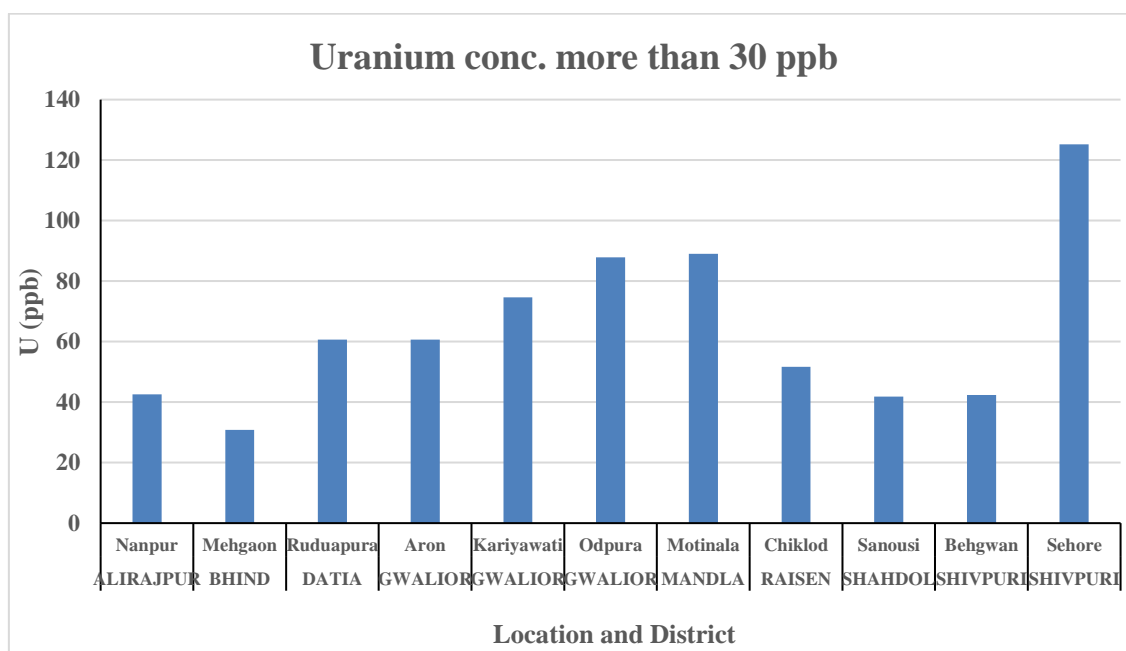
Fig 7.5.1 District-wise samples exceed Uranium conc. More than 30 ppb (NHS 2022-23)

REMEDIAL MEASURES

Finding a remedy for the uranium contaminated groundwater effectively and thoroughly, has become need of day. Remediation technologies can be classified into physical, chemical and biological methods. Bioremediation is divided into plant and microorganism methods. Each method consists of both advantages and disadvantages and the appropriate mitigation techniques should be need based.

Adsorption has a high removal efficiency, but costs are also higher. The coagulation process is simple and comparatively economical, but the standard effluent concentration is hard to reach, so there is a need for follow-up treatment. Combined with adsorption, coagulation can remove 99% of U. The extraction process can remove effluent U concentrations of less than 0.05mg / L, but it will produce a lot of sludge. Reverse osmosis is referred as a best technology, but due to its high cost it cannot be used on community scale. The evaporation method is simple and effective, the removal rate is high, but there are high costs and sludge needs that must be dealt with. A review of various treatment technologies for Uranium removal from water and their technical achievability as reported by various researchers are given below in Table 7.7.4

7.5.3 Comparison of treatment methods for removal of Uranium.

Treatment Method	Technical Achievability (%)
Coagulation/filtration at high pH (10+)	> 95
Lime softening	85-99
Anion exchange	99
Reverse osmosis	>95
Activated alumina	90
Coagulation/filtration	80-89

(Source: Hand Book for Drinking Water Treatment, JJM, Ministry of Jal Shakti, Gov. of India).

7.6 TOTAL HARDNESS

Total hardness is predominantly caused by cations such as calcium and magnesium and anion such as bicarbonate and sulphate. Total hardness is defined as the sum of calcium and magnesium both expressed as $CaCO_3$ in mg/L. Hardness represents the soap-consuming capacity of water. Species that form insoluble compounds with soap Ca, Mg, Organic compounds etc. Total hardness is sum of Ca and Mg and expresses as CaC03 mg/l. EDTA titration. The two kinds of hardness observed in water.

- Temporary hardness is due to Carbonate.
- Permanent hardness is due to Sulphate, Chloride or Nitrate.

The hardness in water is derived largely from contact with the soil and rock formations. Rain water as it falls upon the earth is in capable of dissolving the tremendous amount of solids found in many natural waters. People with kidney and bladder stones should avoid high content of calcium and magnesium in water (K. R. Karanth, 1997). The BIS permissible limit of hardness is 300 – 600 mg/L. The total hardness in groundwater was observed in many parts of the country. It is observed that there are several locations in the districts of Agar Malwa, Alirajpur, Bhind, Burhanpur, Chhatarpur, Chhindwara, Dhar, Gwalior, Hoshangabad, Indore, Khargone, Mandsaur, Neemuch, Raisen, Rajgarh, Ratlam, Rewa, Satna, Sehore, Sheopur, Shivpuri, Ujjain and Vidisha where the total hardness in ground water exceeds 600 mg/L. The details of locations where total hardness concentration more than 600 mg/l is given in table 7.8.1.

Table – 7.6.1 Number of locations having total hardness > 600 mg/L in State of MP.

S. No.	District	No. of locations having TH> 600 mg/L
1	Agar Malwa	1
2	Alirajpur	2
3	Bhind	4
4	Burhanpur	2
5	Chhatarpur	3
6	Chhindwara	2
7	Dhar	3
8	Gwalior	3
9	Hoshangabad	2
10	Indore	2
11	Khargone	2
12	Mandsaur	3
13	Neemuch	2

14	Raisen	1
15	Rajgarh	4
16	Ratlam	1
17	Rewa	2
18	Satna	1
19	Sehore	4
20	Sheopur	1
21	Shivpuri	4
22	Ujjain	3
23	Vidisha	1
	Total	53

Table 7.6.2 Locations having total hardness > 600 mg/L in Ground Water in Different Districts of MP

S.No.	District	Parts of District having Total Hardness > 600 mg/L as $CaCO_3$
1	Agar Malwa	Soyat
2	Alirajpur	Khattali, Nanpur
3	Bhind	Balaji, Lahar, Lavan,Phuph
4	Burhanpur	Dedtalai, Manjrod Kalan
5	Chhatarpur	Bijawar, Issanagar, Kurri
6	Chhindwara	Mahaljhir, Piplanarayanwar
7	Dhar	Dasai, Dhulsar, Pipalya
8	Gwalior	Dongarpur, Jahangirpur, Suro
9	Hoshangabad	Gurra New, Pathrautadw
10	Indore	Dudhiya, Sanwer
11	Khargone	Baddiya , Bhikangaon1
12	Mandsaur	Babulda, Nayakhera, Surjani
13	Neemuch	Girdola, Neemuch
14	Raisen	Dehgaon
15	Rajgarh	Bamangaon, Ganayari,Pilukhedi, Udhankheri
16	Ratlam	Barkheda
17	Rewa	Raipur, Sagra
18	Satna	Barakalan
19	Sehore	Ashta, Heerapur, Ichhawar, Rala
20	Sheopur	Garhi1
21	Shivpuri	Ainpura, Badarwas, Sehore, Sitapur
22	Ujjain	DelchiBuzurg, Kaiytha, Mahidpurroad
23	Vidisha	Gyaraspur1
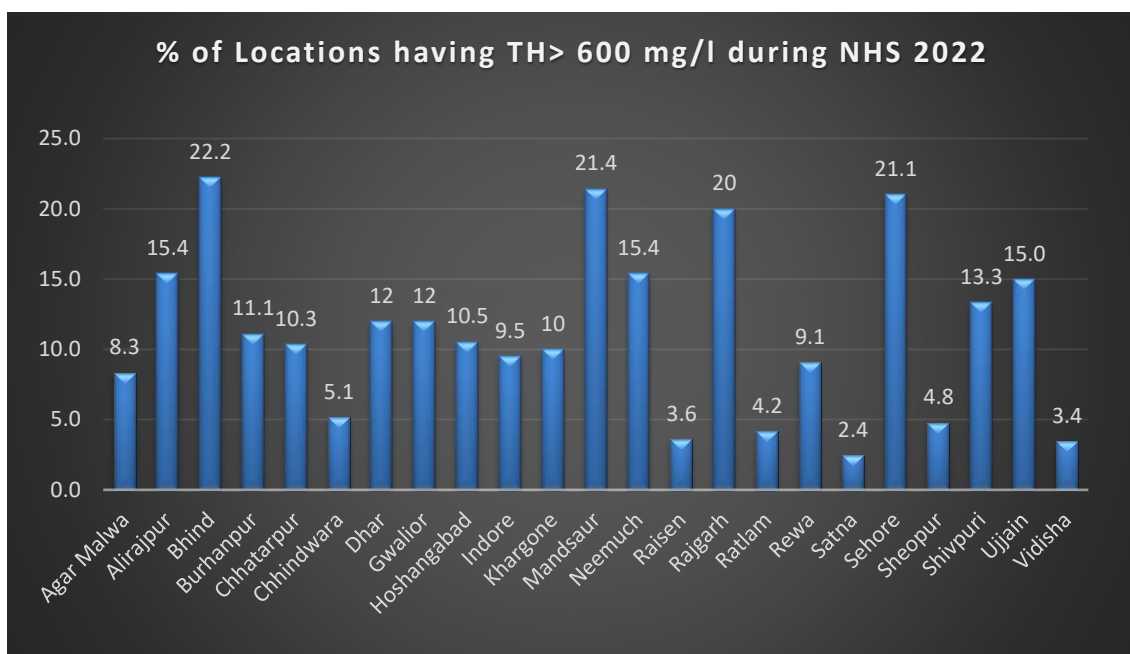
Fig 7.6.1 Bar diagram District-wise percentage of wells having Total hardness > 600 mg/L

Removal of total hardness

A few methods to remove hardness from water are,

- Chemical Process of Boiling Hard Water.
- Adding Slaked Lime (Clark's Process)
- Adding Washing Soda.
- Calgon Process.
- Ion Exchange Process.
- Using Ion Exchange Resins.

CARBONATE (TEMPORARY) HARDNESS also known as Ca Bicarbonate

$Ca(HCO_3)_2$ + Mg Bicarbonate $Mg(HCO_3)_2$. Removal by Boiling or adding Lime

NON-CARBONATE (PERMANENT) HARDNESS

Calcium Sulfate $CaSO_4$ + Magnesium Sulfate $MgSO_4$ & Calcium Chloride $CaCl_2$ + Magnesium Chloride $MgCl_2$. Removal by Lime-soda, Zeolite or Demineralization Processes

Table 7.6.2 State-wise percentage of samples having Total hardness >600 mg/L

S. No.	District	No. of samples collected	No. of locations having TH> 600 mg/L	% of samples TH>600
1	Agar Malwa	12	1	8.3
2	Alirajpur	13	2	15.4
3	Bhind	18	4	22.2
4	Burhanpur	18	2	11.1
5	Chhatarpur	29	3	10.3
6	Chhindwara	39	2	5.1
7	Dhar	25	3	12
8	Gwalior	25	3	12
9	Hoshangabad	19	2	10.5

10	Indore	21	2	9.5
11	Khargone	20	2	10
12	Mandsaur	14	3	21.4
13	Neemuch	13	2	15.4
14	Raisen	28	1	3.6
15	Rajgarh	20	4	20
16	Ratlam	24	1	4.2
17	Rewa	22	2	9.1
18	Satna	41	1	2.4
19	Sehore	19	4	21.1
20	Sheopur	21	1	4.8
21	Shivpuri	30	4	13.3
22	Ujjain	20	3	15.0
23	Vidisha	29	1	3.4

8.0 SUITABILITY OF GROUNDWATER FOR IRRIGATION PURPOSE

The chemical quality of water is an important factor to be considered in evaluating its usefulness for irrigation purposes. Plants grown by irrigation absorb and transpire water but leave nearly all the salts behind in the soil, where they accumulate and eventually prevent plant growth. Excessive concentrations of solute interfere with the osmotic process by which plant root membranes are able to assimilate water and nutrients. In areas where natural drainage is inadequate, the irrigation water infiltrating the root zone will cause water table to rise excessively. In addition to problems caused by excessive concentration of dissolved solids, certain constituents in irrigation water are especially undesirable and some may be damaging even when present in small concentrations. Irrigation indices viz. Sodium Adsorption Ratio (SAR) and Residual Sodium Carbonate (RSC) have been evaluated to assess the suitability of ground water for irrigation purposes.

Alkali Hazard

In the irrigation water, it is characterized by absolute and relative concentrations of cations. If the sodium concentrations are high, the alkali hazard is high and if the calcium & magnesium levels are high, this hazard is low. The alkali soils are formed by the accumulation of exchangeable sodium and are characterized by poor tilt and low permeability. The U.S. Salinity laboratory has recommended the use of sodium adsorption ratio (SAR) as it is closely related to adsorption of sodium by the soil.

SAR is derived by the following equation:

$$SAR = \frac{Na^+}{\sqrt{\dfrac{Ca^{2+}Mg^{2+}}{2}}}$$

The water with regard to SAR is classified into four categories

➢ **S_1 – Low Sodium Water** (SAR <10)

Such waters can be used on practically all kinds of soils without any risk or increase in exchangeable sodium.

➢ **S_2 – Medium Sodium Water** (SAR 10-18)

Such waters may produce an appreciable sodium hazard in fine textured soil having high cation exchange capacity under low leaching.

➢ **S_3 – High Sodium Water** (SAR >18-26)

Such waters indicate harmful concentrations of exchangeable sodium in most of the soil and would require special management, good drainage, high leaching and addition of organic matter to the soil. If such waters are used on gypsiferrous soils the exchangeable sodium could not produce harmful effects.

  ➢ **S₄ – Very High Sodium Waters** (SAR >26)

Generally, such waters are unsatisfactory for irrigation purposes except at low or perhaps at medium salinity where the solution of calcium from the soil or addition of gypsum or other amendments makes the use of such waters feasible.
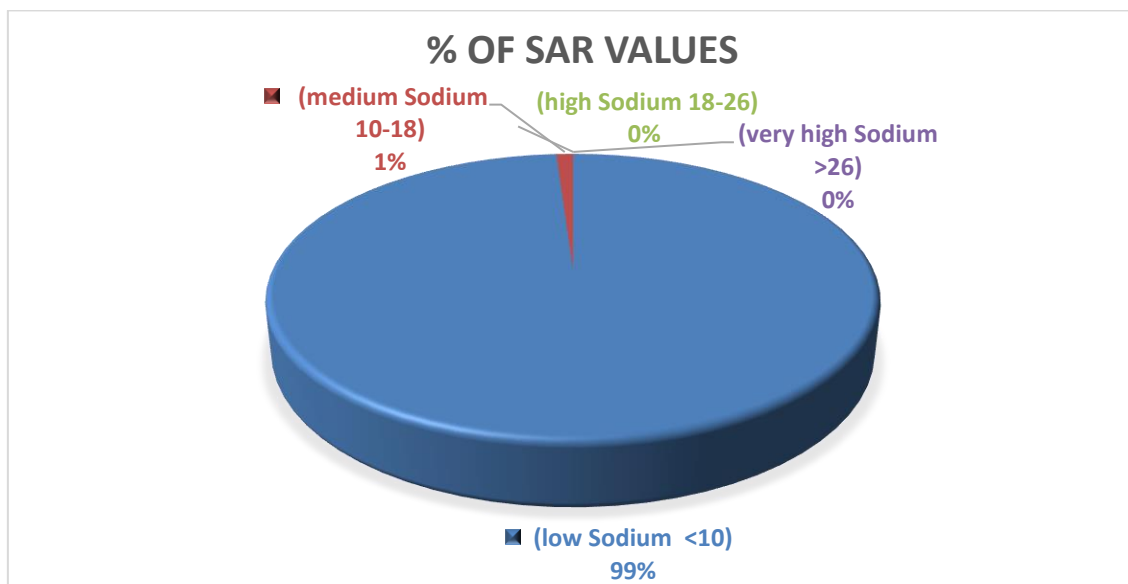
Figure 8.1: Percentage of groundwater samples according to SAR classifications (n=15507).

The computed SAR values ranges from 0.14 to 23.9. It is apparent from Fig. 8.1 that 99% samples belong to excellent category (S_1) and only 1% water samples are associated with medium sodium category (S_2) and are good for irrigation. None of the samples in MP belong to S3 or S4 category.

Table 8.1: Summary of irrigation quality of the groundwater samples in various districts of MP based on SAR classifications.

S.No.	District	%. of samples in various SAR range			
		(low Sodium <10)	(medium Sodium 10-18)	(high Sodium 18-26)	(very high Sodium >26)
1	AGAR MALWA	100	0	0	0
2	ALIRAJPUR	100	0	0	0
3	ANUPPUR	100	0	0	0
4	ASHOK NAGAR	100	0	0	0
5	BALAGHAT	100	0	0	0
6	BARWANI	95	5	0	0
7	BETUL	100	0	0	0
8	BHIND	83	17	0	0
9	BHOPAL	100	0	0	0
10	BURHANPUR	100	0	0	0

11	CHHATARPUR	100	0	0	0
12	CHHINDWARA	100	0	0	0
13	DAMOH	100	0	0	0
14	DATIA	100	0	0	0
15	DEWAS	96	4	0	0
16	DHAR	100	0	0	0
17	DINDORI	93	7	0	0
18	GUNA	100	0	0	0
19	GWALIOR	100	0	0	0
20	HARDA	92	8	0	0
21	HOSHANGABAD	100	0	0	0
22	INDORE	95	5	0	0
23	JABALPUR	100	0	0	0
24	JHABUA	100	0	0	0
25	KATNI	100	0	0	0
26	KHANDWA	100	0	0	0
27	KHARGONE	100	0	0	0
28	MANDLA	100	0	0	0
29	MANDSAUR	100	0	0	0
30	MORENA	100	0	0	0
31	NARSINGHPUR	100	0	0	0
32	NEEMUCH	92	8	0	0
33	PANNA	100	0	0	0
34	RAISEN	96	4	0	0
35	RAJGARH	100	0	0	0
36	RATLAM	96	4	0	0
37	REWA	100	0	0	0
38	SAGAR	100	0	0	0
39	SATNA	100	0	0	0
40	SEHORE	100	0	0	0
41	SEONI	100	0	0	0
42	SHAHDOL	100	0	0	0
43	SHAJAPUR	93	7	0	0
44	SHEOPUR	100	0	0	0
45	SHIVPURI	100	0	0	0
46	SIDHI	100	0	0	0
47	SINGRAULI	100	0	0	0
48	TIKAMGARH	100	0	0	0
49	UJJAIN	100	0	0	0
50	UMARIA	100	0	0	0
51	VIDISHA	100	0	0	0
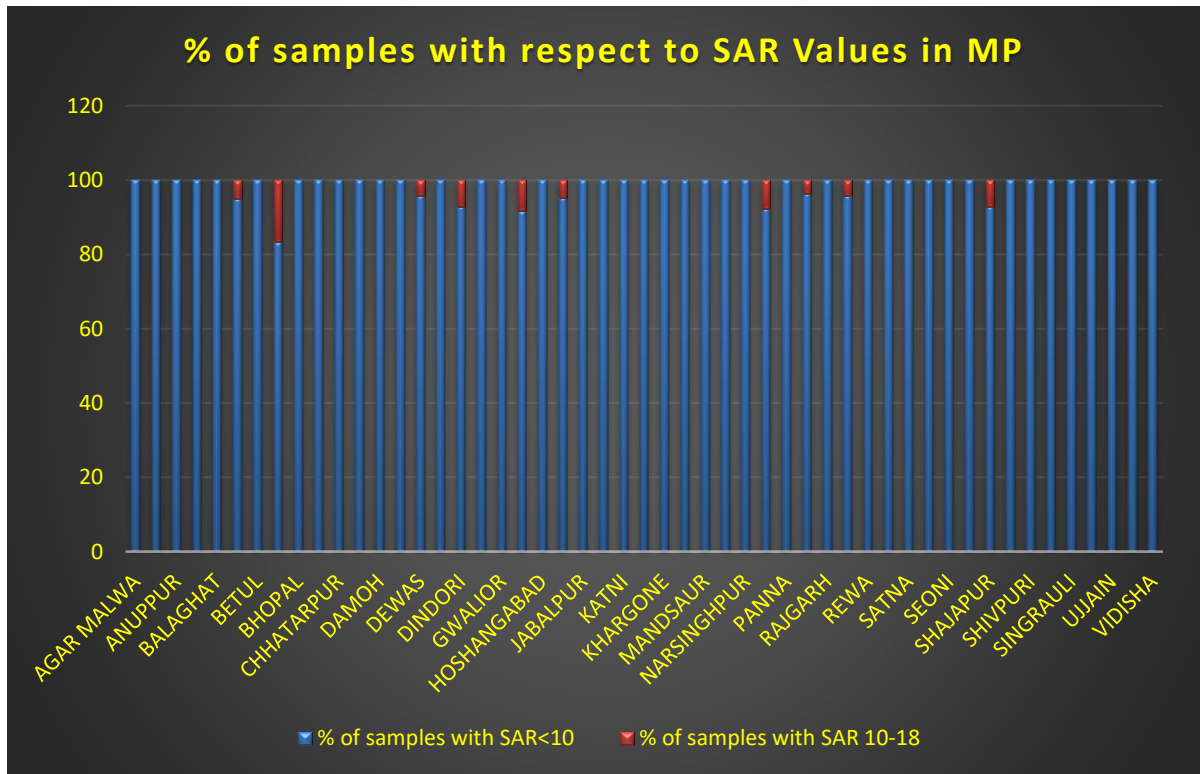
Figure 8.2: percentage of samples with respect to SAR values.

Residual Sodium Carbonate (RSC)

If the enriched carbonate (residual) concentration becomes relatively high, carbonates get together with calcium and magnesium to form precipitates. The relative abundance of sodium in comparison to alkaline earths and the quantity of bicarbonate and carbonate in excess of alkaline earths also influences the suitability of water for irrigation. This excess is represented in terms of "Residual Sodium Carbonate" (RSC). The highly soluble sodium carbonate known as residual sodium carbonate (RSC) is defined as;

$$RSC = (HCO_3^- + CO_3^-) - (Ca^{2+} + Mg^{2+})$$
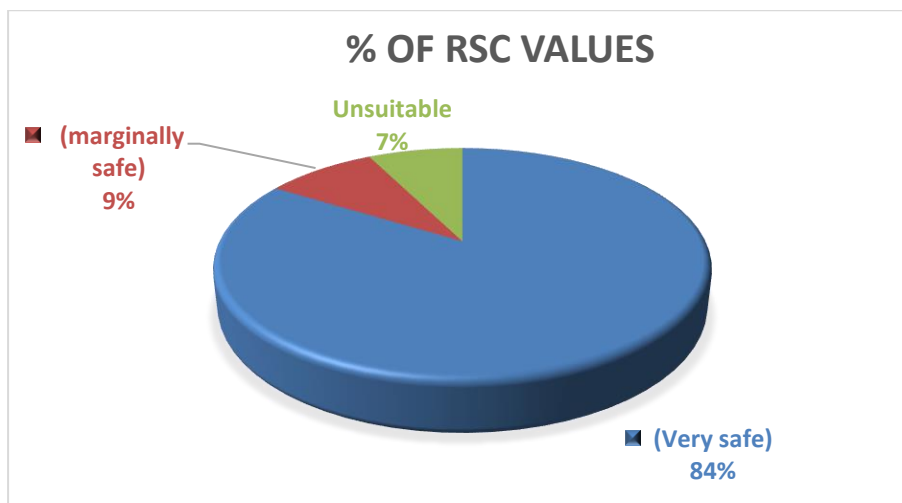
Figure 8.3: Percentage of groundwater samples in various categories according to RSC classifications (n=15507) (Wilcox et al.,1954).

Waters with high RSC produces harmful effects on plant development and is not suitable for irrigation. Waters associated with RSC < 1.25 are of excellent irrigation quality and can be safely applied for irrigation for almost all crops without the risks associated with residual sodium carbonate (Wilcox et al.,1954). If the RSC values lie between 1.25 and 2.5, the water is of an acceptable quality for irrigation. Waters associated with RSC values higher than 2.5 are not acceptable for irrigation. In fig. it can be seen that in India 85.77% collected water samples are associated with RSC values less than 1.25 and are safe for use in irrigation practices. Only 7.69% water samples are associated with RSC values more than 2.5 and are unsuitable for irrigation. The water with high RSC values if applied for irrigation causes soil to become infertile owing to deposition of sodium. Table 8.4 summarizes the irrigation quality of the groundwater samples in various states based on RSC values.
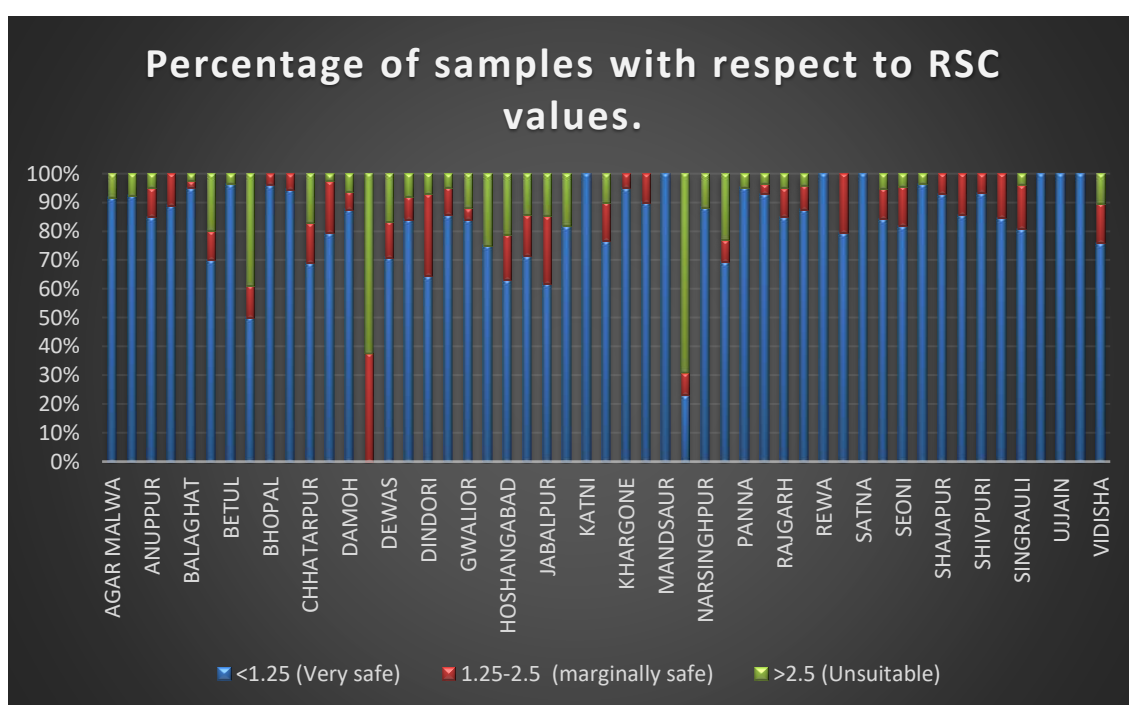
Figure 8.4: Percentage of samples with respect to RSC values.
 According to RSC classification 100% of water samples in Katni, Mandsaur, Rewa, Satna, Tikamgarh, Ujjain, and Umaria fall in very safe category with RSC values less than 1.25.

Table 8.2: Summary of irrigation quality of the groundwater samples in various states based on RSC values.

S.No.	District	%. of samples in various RSC range		
		<1.25	1.25-2.5	>2.5
		(Very safe)	(marginally safe)	(Unsuitable)
1	AGAR MALWA	11	0	1
2	ALIRAJPUR	12	0	1
3	ANUPPUR	17	2	1

4	ASHOK NAGAR	16	2	0
5	BALAGHAT	37	1	1
6	BARWANI	14	2	4
7	BETUL	27	0	1
8	BHIND	9	2	7
9	BHOPAL	25	1	0
10	BURHANPUR	17	1	0
11	CHHATARPUR	20	4	5
12	CHHINDWARA	31	7	1
13	DAMOH	14	1	1
14	DATIA	0	3	5
15	DEWAS	17	3	4
16	DHAR	21	2	2
17	DINDORI	9	4	1
18	GUNA	18	2	1
19	GWALIOR	21	1	3
20	HARDA	9	0	3
21	HOSHANGABAD	12	3	4
22	INDORE	15	3	3
23	JABALPUR	21	8	5
24	JHABUA	9	0	2
25	KATNI	16	0	0
26	KHANDWA	23	4	3
27	KHARGONE	19	1	0
28	MANDLA	27	3	0
29	MANDSAUR	14	0	0
30	MORENA	3	1	9
31	NARSINGHPUR	15	0	2
32	NEEMUCH	9	1	3
33	PANNA	20	0	1
34	RAISEN	26	1	1
35	RAJGARH	17	2	1
36	RATLAM	21	2	1
37	REWA	22	0	0
38	SAGAR	27	7	0
39	SATNA	41	0	0
40	SEHORE	16	2	1
41	SEONI	36	6	2
42	SHAHDOL	27	0	1
43	SHAJAPUR	13	1	0
44	SHEOPUR	18	3	0
45	SHIVPURI	28	2	0

46	SIDHI	22	4	0
47	SINGRAULI	21	4	1
48	TIKAMGARH	17	0	0
49	UJJAIN	20	0	0
50	UMARIA	15	0	0
51	VIDISHA	22	4	3

Table 8.3: Summary of various other Irrigation Water Quality parameters for the samples collected from MP during NHS 2022.

Irrigation Quality Parameter	Range	Class/Category	Remarks	% of samples (Shallow Aquifers)
Salinity Hazard	0-250	C1	Can be used safely	0.70
	251-750	C2	Can be used with moderate leaching	33.95
	751-2250	C3	Can be used for irrigation with some management practices.	62.82
	2251-5000	C4	Can't be used for irrigation purpose	2.54
	>5000		Unsuitable	0.00
Sodicity Index	<10	S1 (Excellent)	Any type of crops grown and water used	98.86
	10 to 18	S2 (Good)	Drainage water used for sandy soil	1.05
	19 - 26	S3 (Doubtful/fair/poor)	Sensitive crops are not take	0.09
	>26	S4 and S5 (Unsuitable)	This water is not used for crops.	0.00
Residual Sodium carbonate	<1.25	Good	Can be used safely	83.81
	1.25 - 2.50	Doubtful	Can be used with certain management	8.75
	>2.50	Unsuitable	Unsuitable for irrigation purposes	7.44
Soluble Sodium Percentage	< 60 per cent		good quality and suitable for irrigation	90.03
	> 60 per cent		poor quality water and unsuitable for irrigation	9.97
%Na	<20		Excellent	10.32
	20 - 40		Good	52.58
	41 - 60		Permissible	27.03
	61 - 80		Doubtful	7.79
	>80		Unsuitable	2.27
Permeability Index	>75%		Excellent	3.67
	25% - 75%		Good	75.33
	<25%		Unsuitable	21.00
Kelly Index	<1		Suitable	68
	>1		Unsuitable	31
Magnesium Hazard	<50		suitable and not harmful	95
	>50		harmful /unsuitable for irrigation	5

9.0 Wilcox diagram

EC and sodium concentration are very important in classifying irrigation water. The Wilcox diagram (Wilcox 1948) relating EC and %Na shows (fig. 9.0) that all the samples are plotted in excellent to good and good to permissible categories in most of the water samples indicating their suitability for irrigation. Most of the samples associated with doubtful to unsuitable zone for irrigation belong to Andhra Pradesh, Gujarat, Haryana, Rajasthan and Punjab. Wilcox diagram of some of the States of India is presented as Fig. 9.0 a to 9.0f.
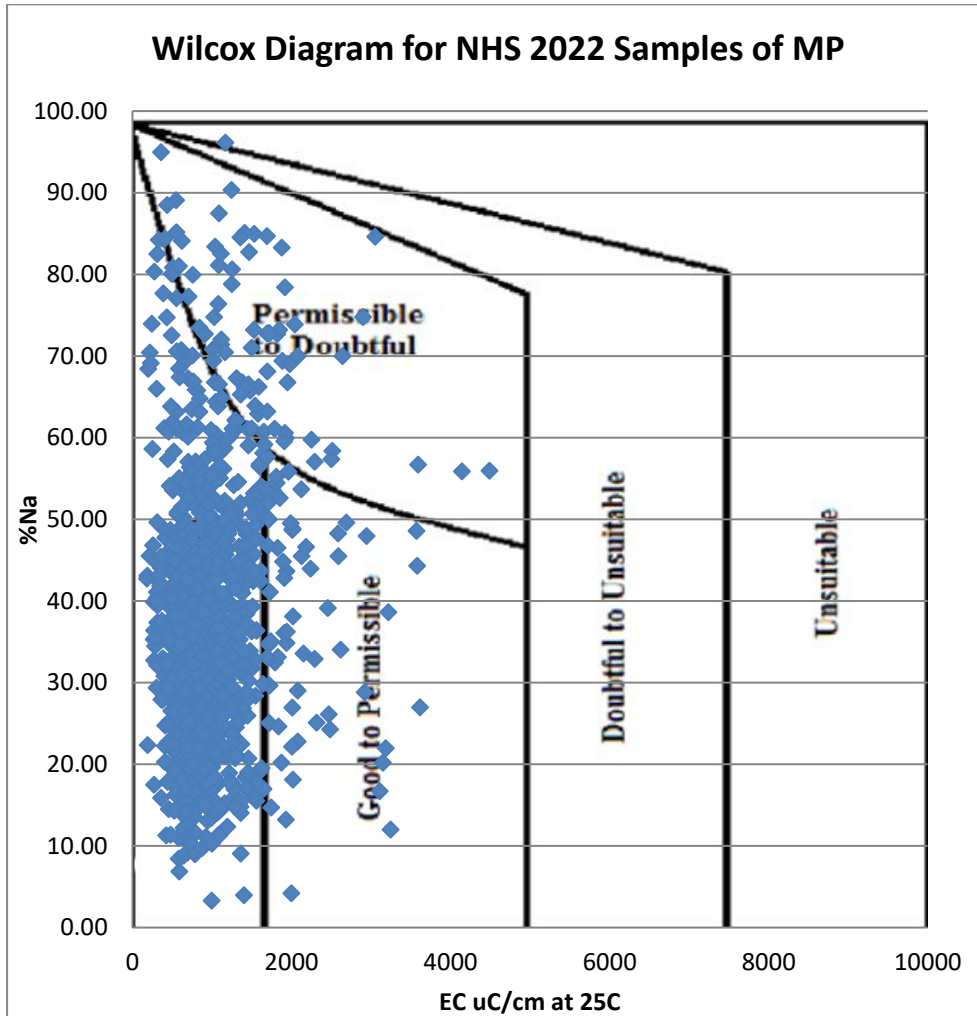
Fig.9.0 : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples of MP.
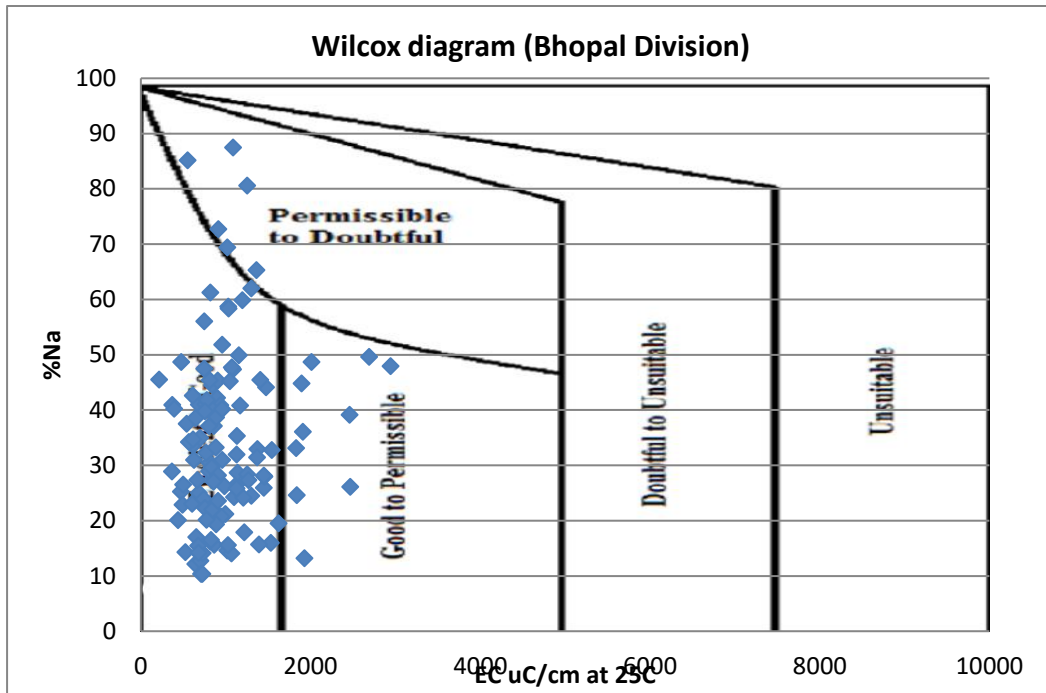
Fig.9.0a : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Bhopal Division.
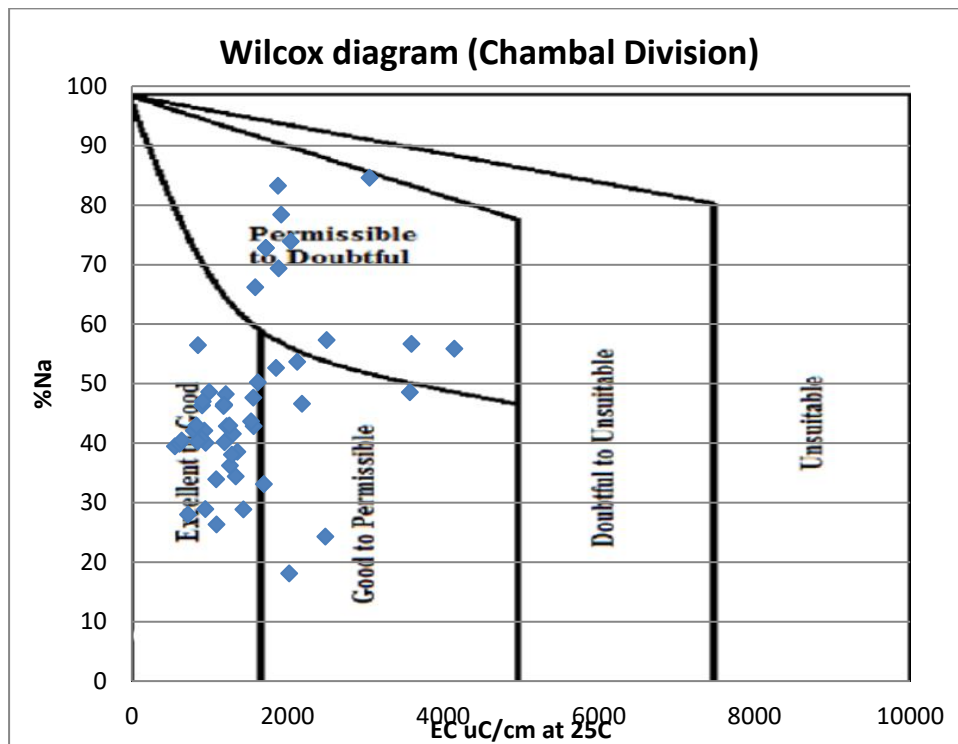
Fig.9.0b : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Chambal Division.
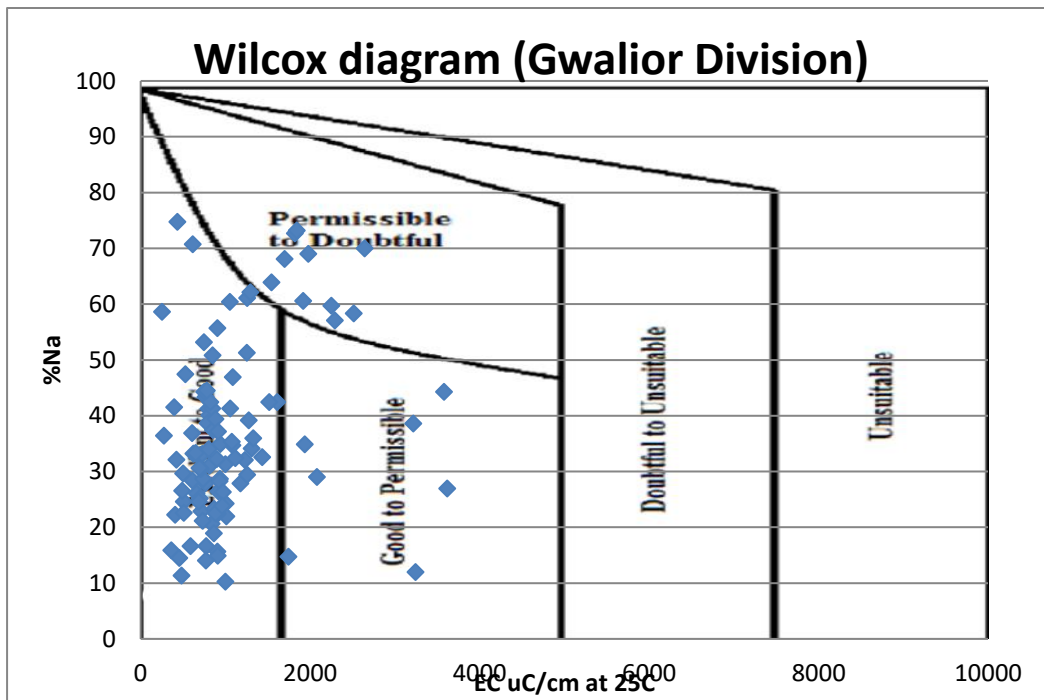
Fig.9.0c : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Gwalior Division.
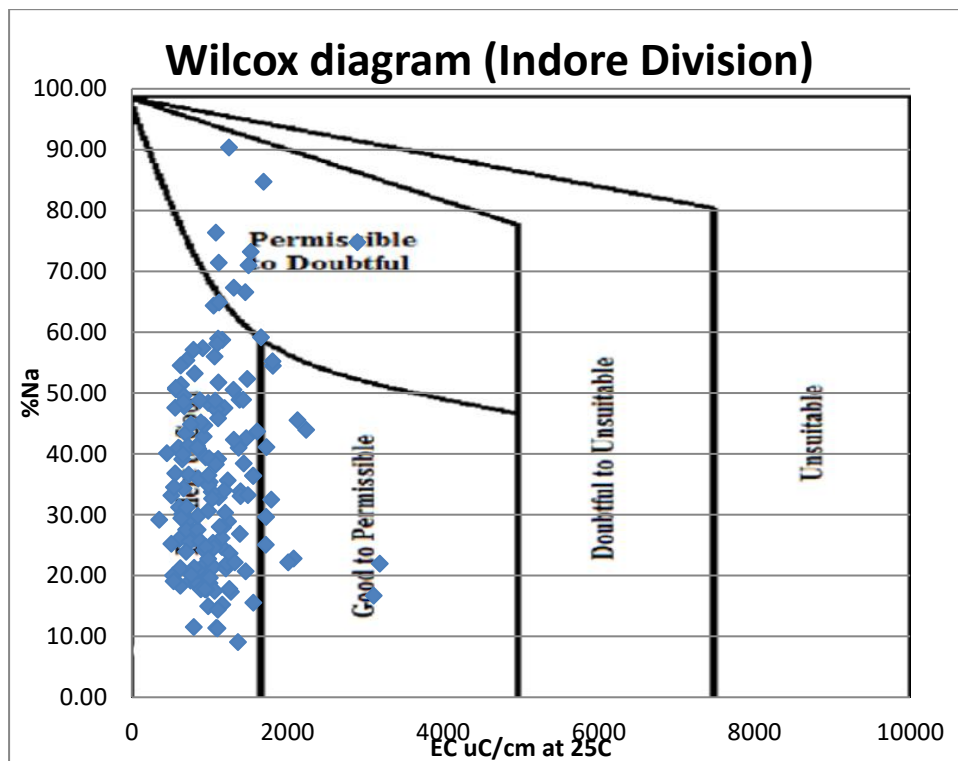
Fig.9.0d : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Indore Division.
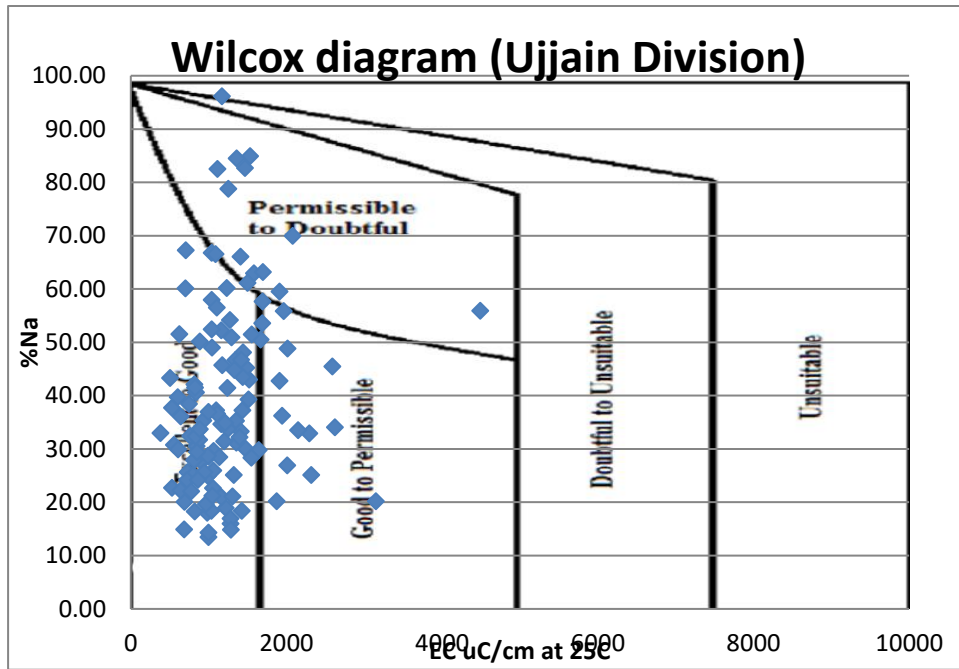
Fig.9.0e : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Ujjain Division.
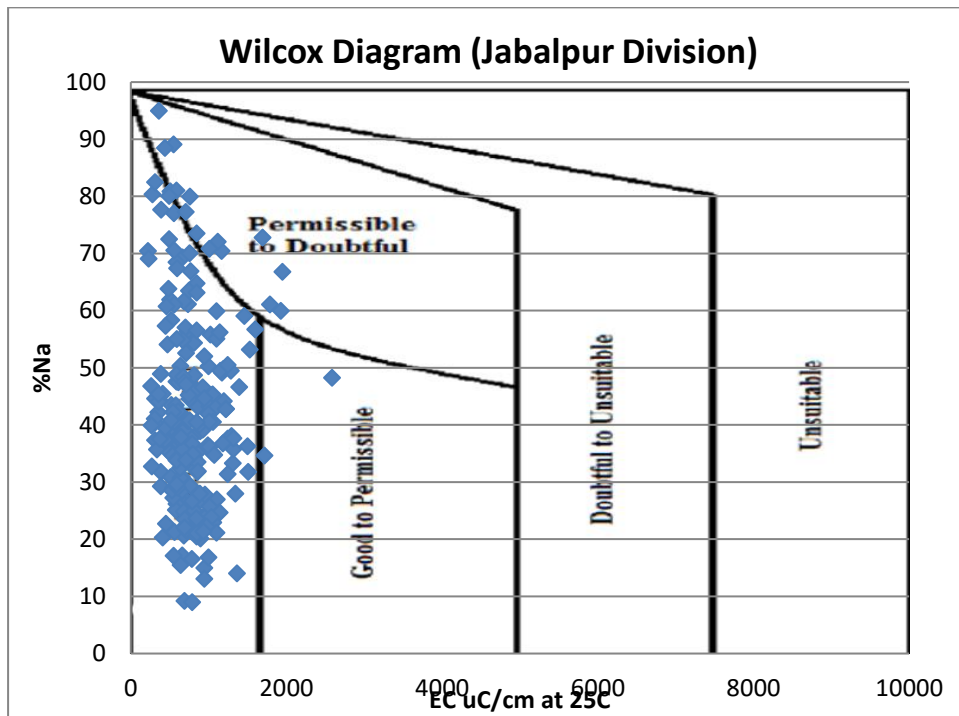
Fig.9.0f : Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Jabalpur division.
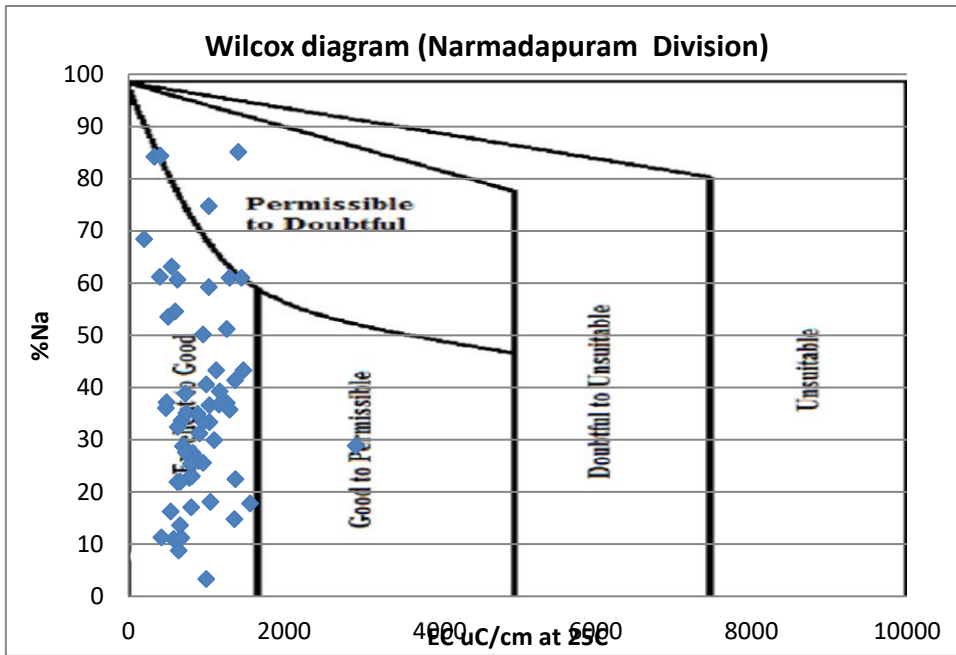
Fig.9.0g: Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Narmadapuram division.
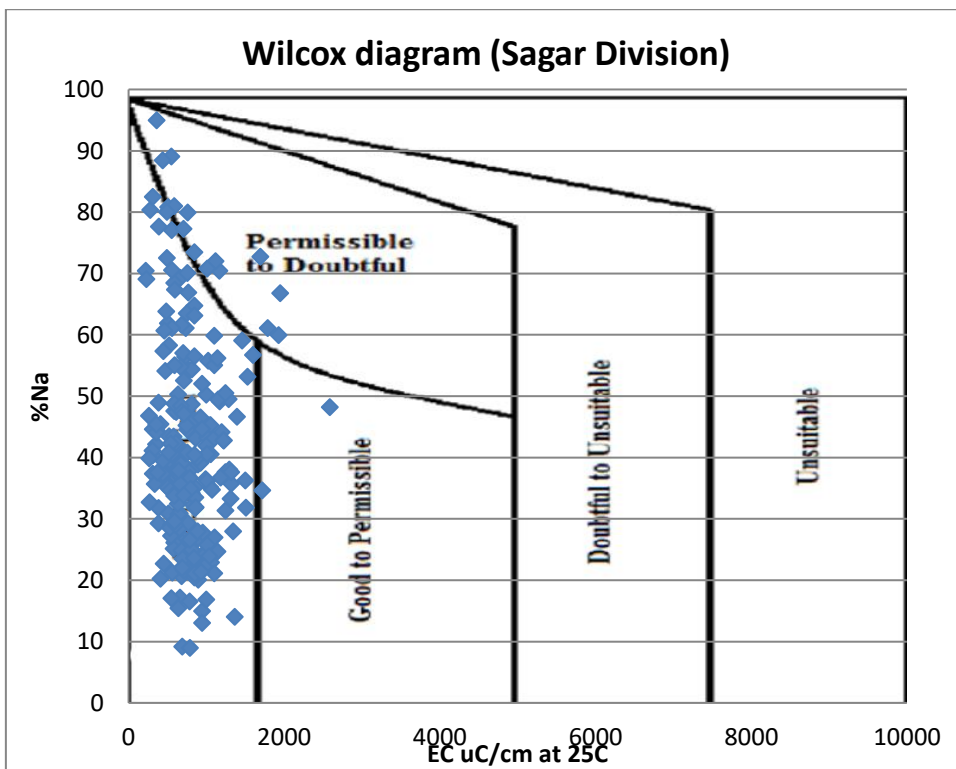
Fig.9.0g: Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Sagar division.
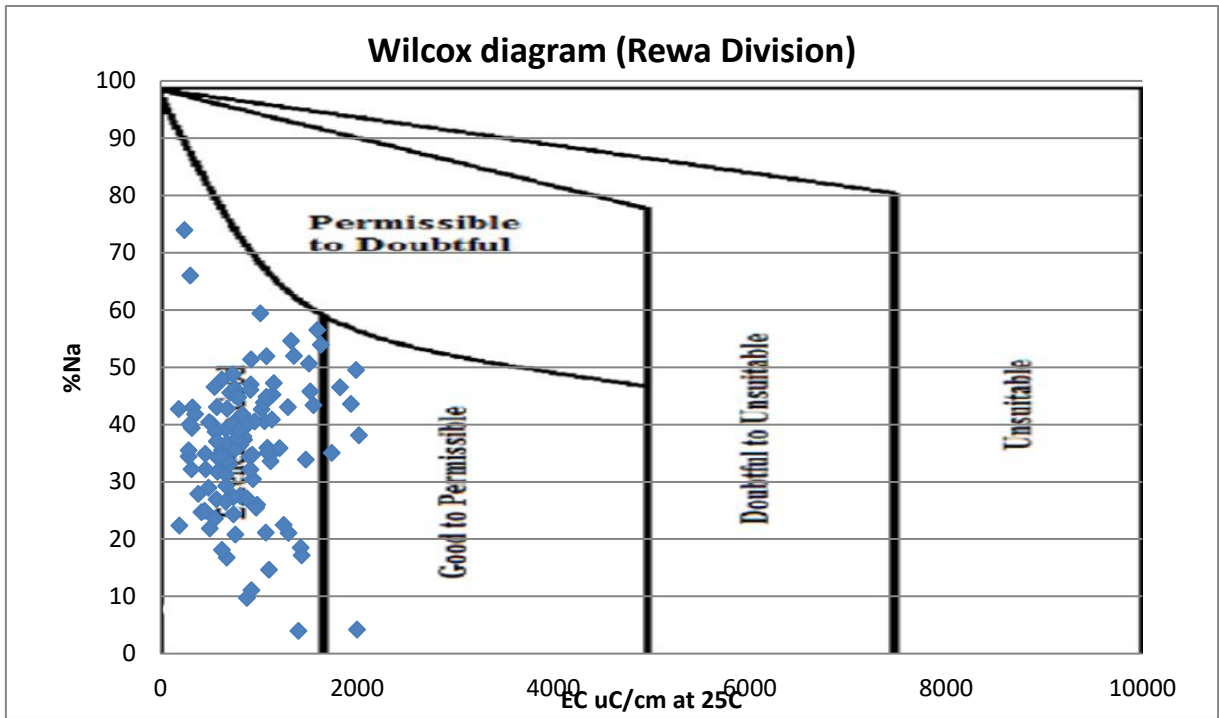
Fig.9.0h: Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Rewa division.
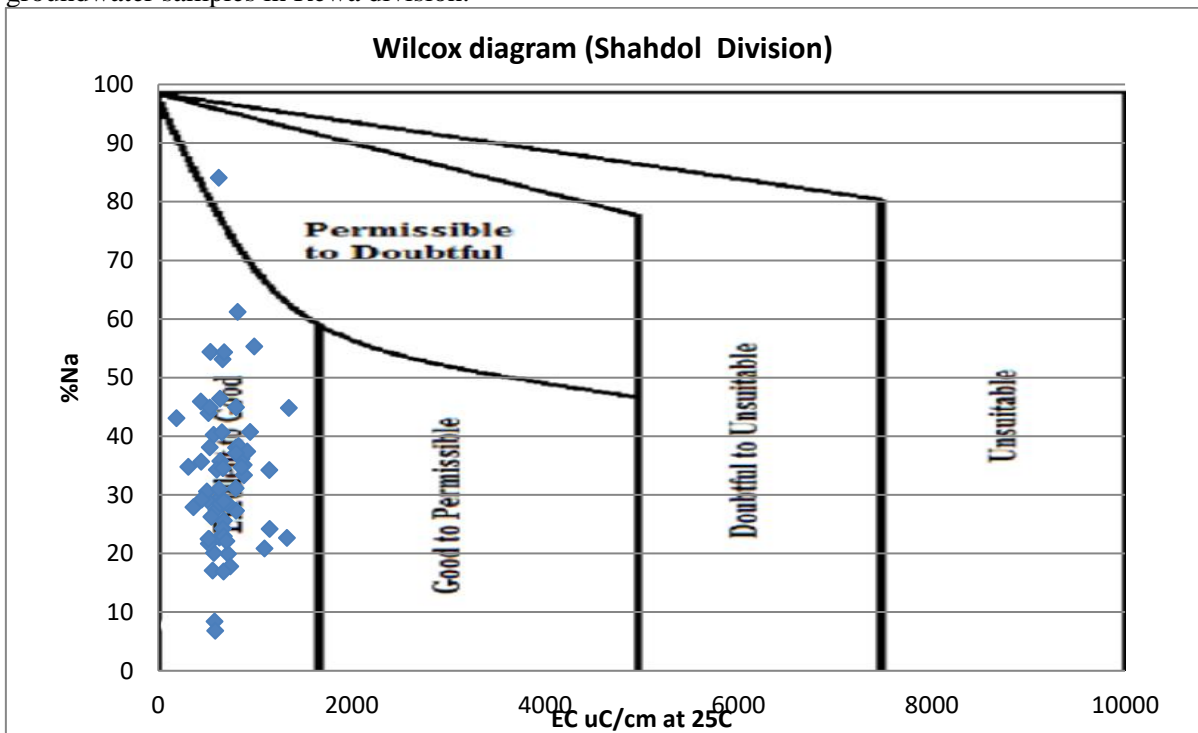
Fig.9.0i: Plots of sodium percent verses electrical conductivity (after Wilcox 1955) in groundwater samples in Shahdol division.

The above Wilcox Diagrams for various divisions of MP clearly indicate that the groundwater Quality is "**Excellent to Good**" for Irrigation point of view in almost all of the districts in Rewa and Shahdol division and in rest of the divisions, the majority of districts have Excellent to Good water while some parts have "**Permissible to Doubtful**" type of Water for Irrigation use.

9.1 Piper Diagram:

Piper diagram (Piper 1944) describes the process responsible for the evolution of hydrogeochemical parameter in groundwater. Based on the major cation and major anion content in the water samples and plotting them in the trilinear diagram, hydrochemical facies could be identified. Hydro-chemical facies are very useful in investigating diagnostic chemical character of water in hydrologic systems. Different types of facies within the same group formations are due to characteristic ground water flow through the aquifer system and effect of local recharge. The types of facies are inter-linked with the geology of the area and distribution of facies with the hydrogeological controls. Hydrochemical facies are delineated by plotting percentage reacting value of major ions on tri-linear diagrams know as Piper Diagram.

In MP, cation chemistry is dominated by calcium is followed by sodium and Potassium. In anion side bicarbonate is dominating anion followed by chloride and sulphate.
The facies mapping shows (Fig.9.1) that Ca-HCO$_3$ is the dominant hydrogeochemical facies followed by   mixed chemical character of hydrogeochemical facies.
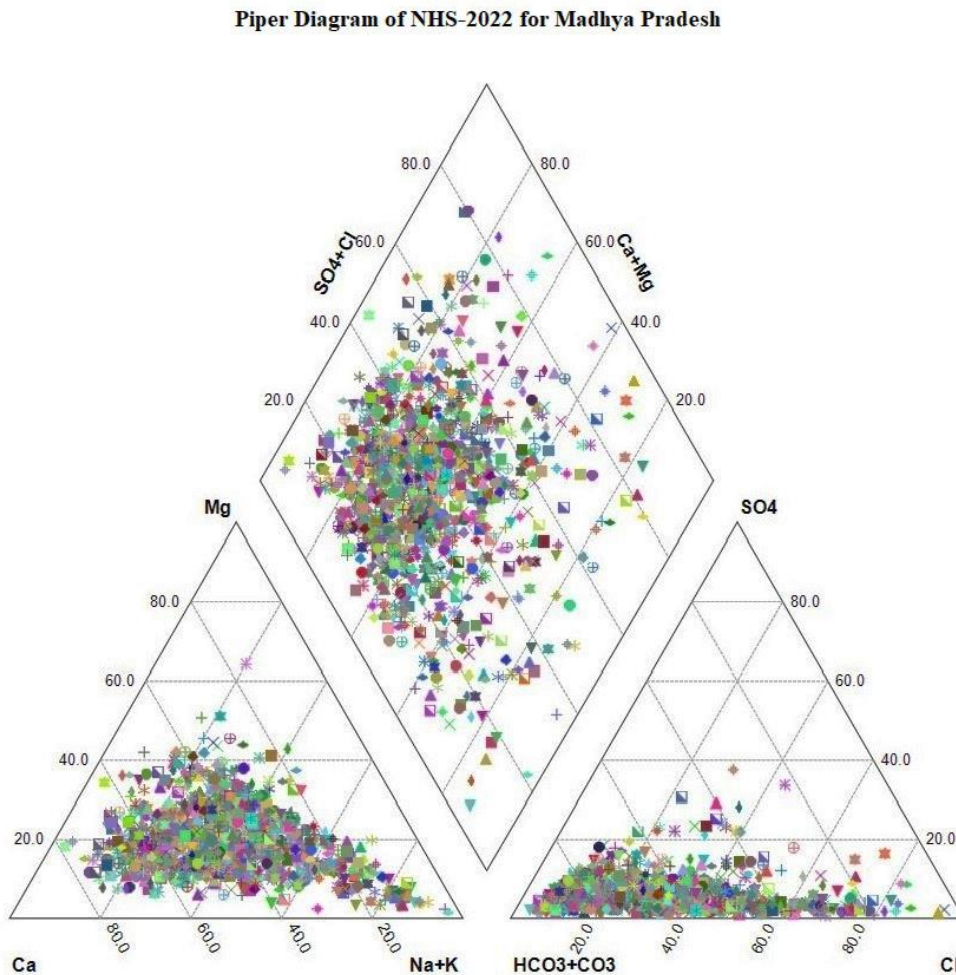
Fig- 9.1 Piper diagram of groundwater of MP.

The Piper Plot showing hydrochemical species in various divisions of MP are displayed in Fig.9.1 a to 9.1 j.
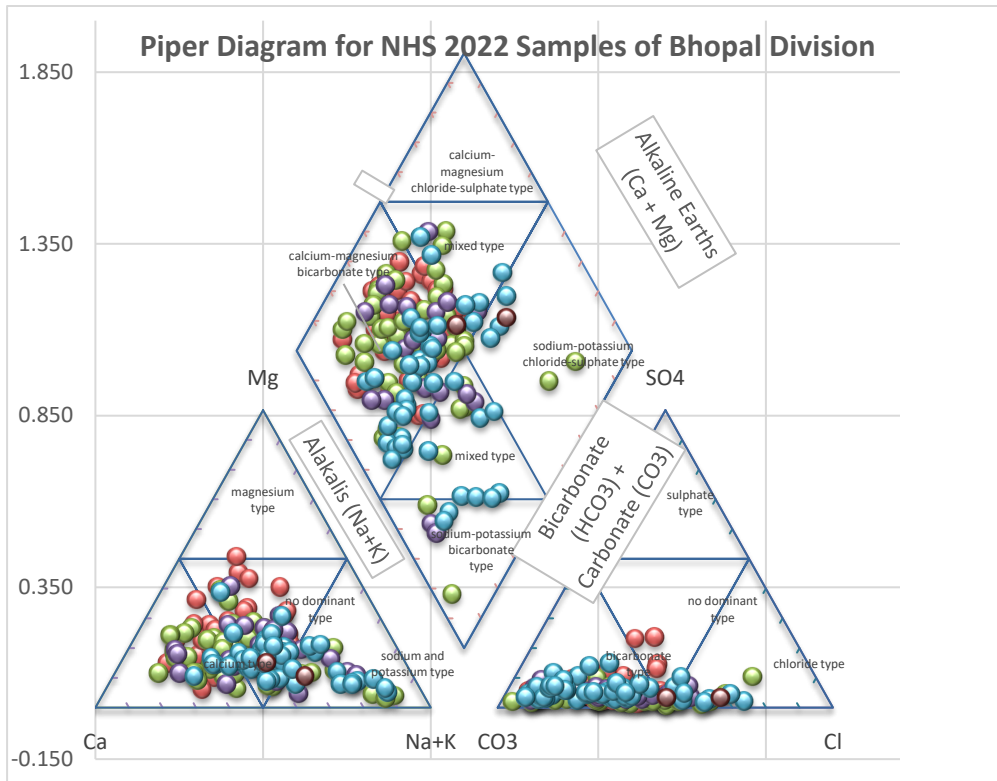
Fig- 9.1a Piper diagram of groundwater of Bhopal Division.

The Piper Diagram for NHS 2022 Samples belonging to Bhopal Division comprising of Districts of Bhopal, Raisen, Rajgarh, Sehore and Vidisha suggests that the majority of Samples belong to Sodium Bicarbonate type of water and very few samples belong to Mixed type of water.
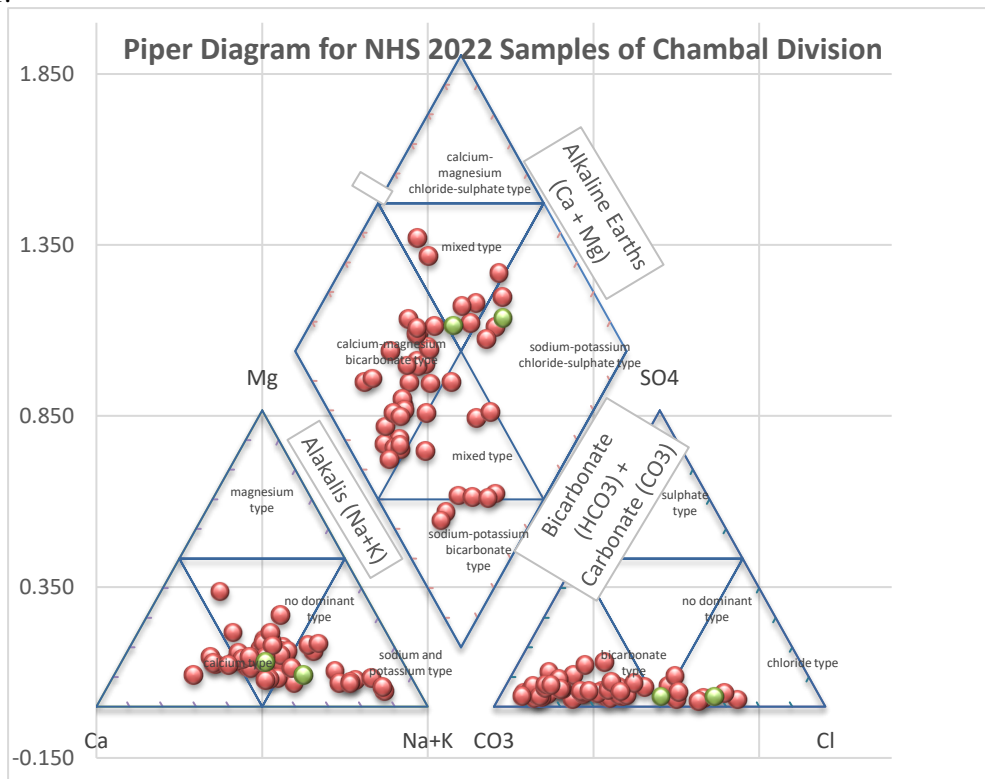
The Piper Diagram for NHS 2022 Samples belonging to Chambal Division comprising of Districts of Bhind, Morena and Sheopur suggests that the majority of Samples belong to Calcium Bicarbonate type of water and some of the samples belong to Mixed type of water.

Fig- 9.1 b Piper diagram of groundwater of Chambal division.
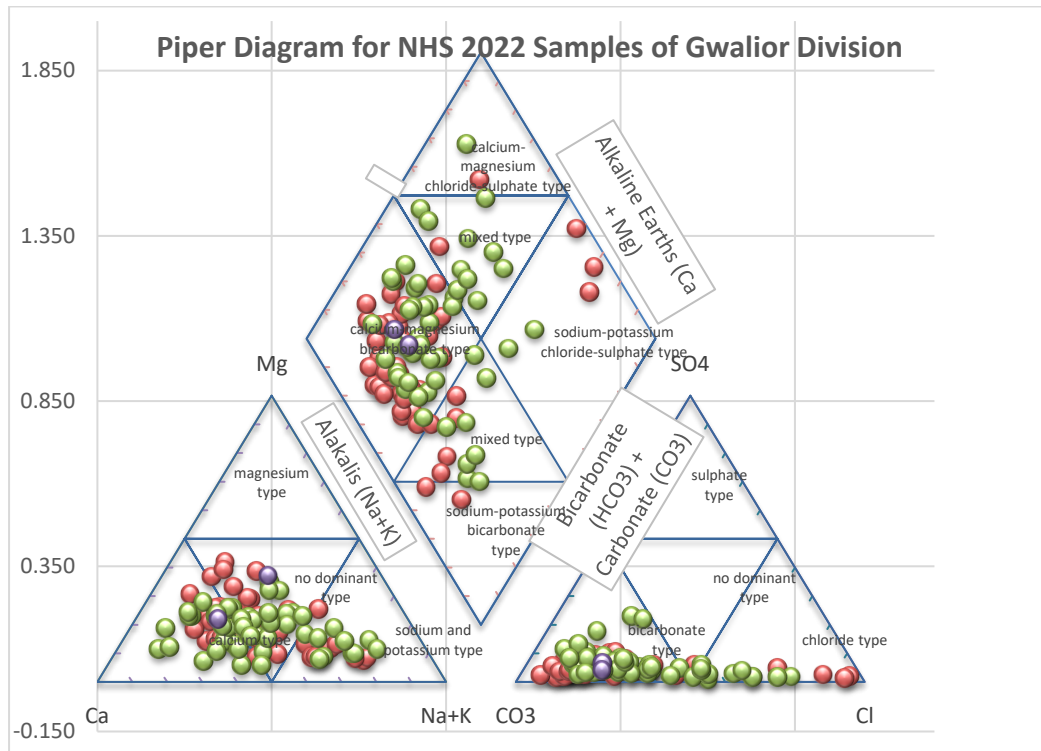
9.1 c Piper diagram of groundwater of Gwalior Division.

The Piper Diagram for NHS 2022 Samples belonging to Gwalior Division comprising of Districts of Ashok Nagar, Datia, Guna, Gwalior and Shivpuri suggests that the majority of Samples belong to Calcium Bicarbonate type of water while there are few samples belonging to Calcium chloride and Sodium Chloride also and many samples belong to Mixed type of water.
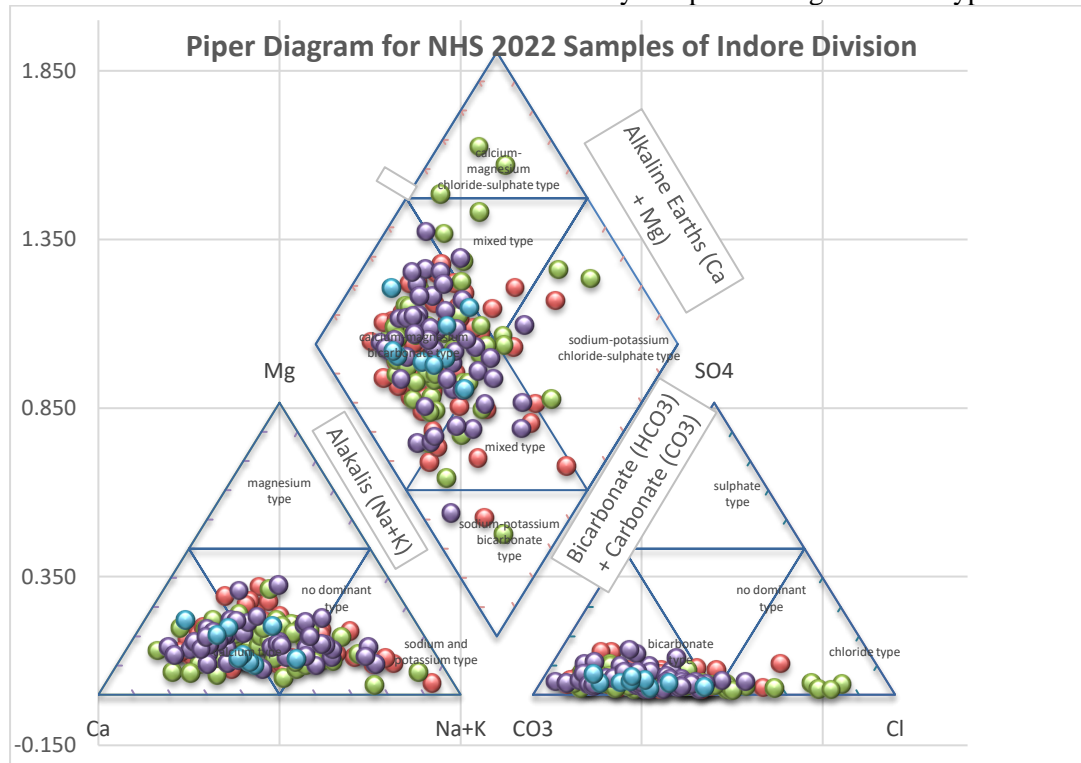
9.1 d Piper diagram of groundwater of Indore division.

The Piper Diagram for NHS 2022 Samples belonging to Indore Division comprising of Districts of Alirajpur, Barwani, Burhanpur, Dhar, Indore, Jhabua, Khandwa and Kharone suggests that the majority of Samples belong to Calcium Bicarbonate type of water while there are few samples belonging to Calcium chloride and Sodium Chloride also and many samples belong to Mixed type of water.
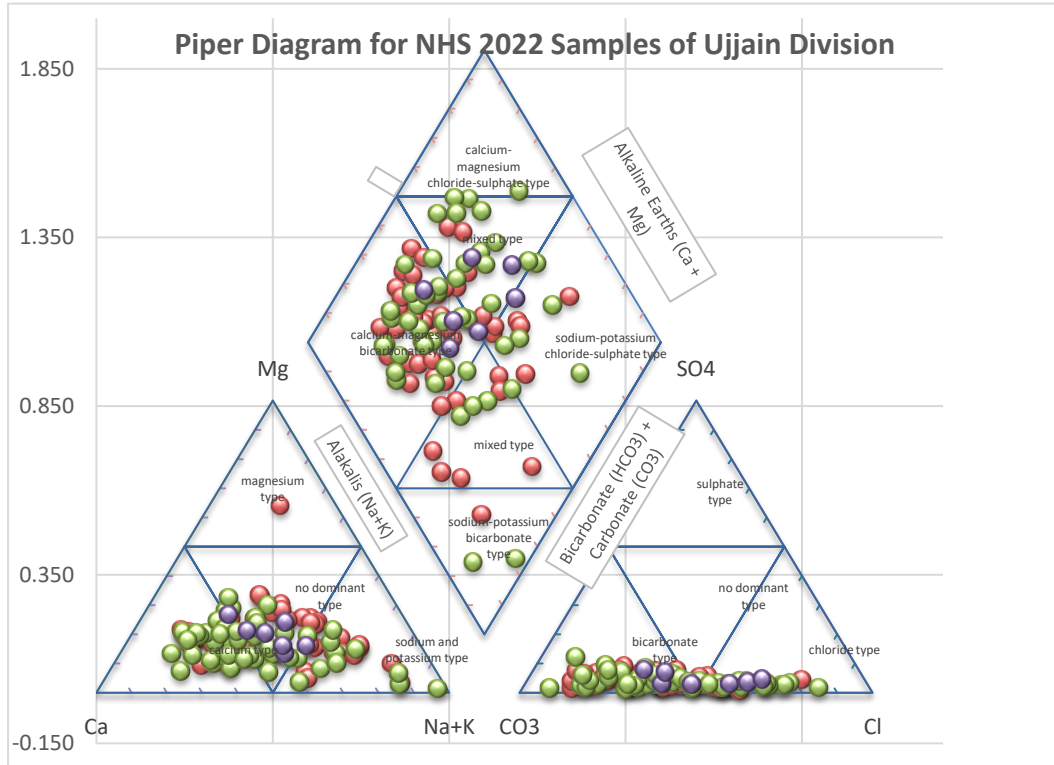
9.1 e Piper diagram of groundwater of Ujjain Division.

The Piper Diagram for NHS 2022 Samples belonging to Ujjain Division comprising of Districts of Agar Malwa, Dewas, Mandsaur, Neemuch, Ratlam and Ujjain suggests that the majority of Samples belong to Calcium Bicarbonate type of water while there are a lot of samples belonging to Mixed type of water.
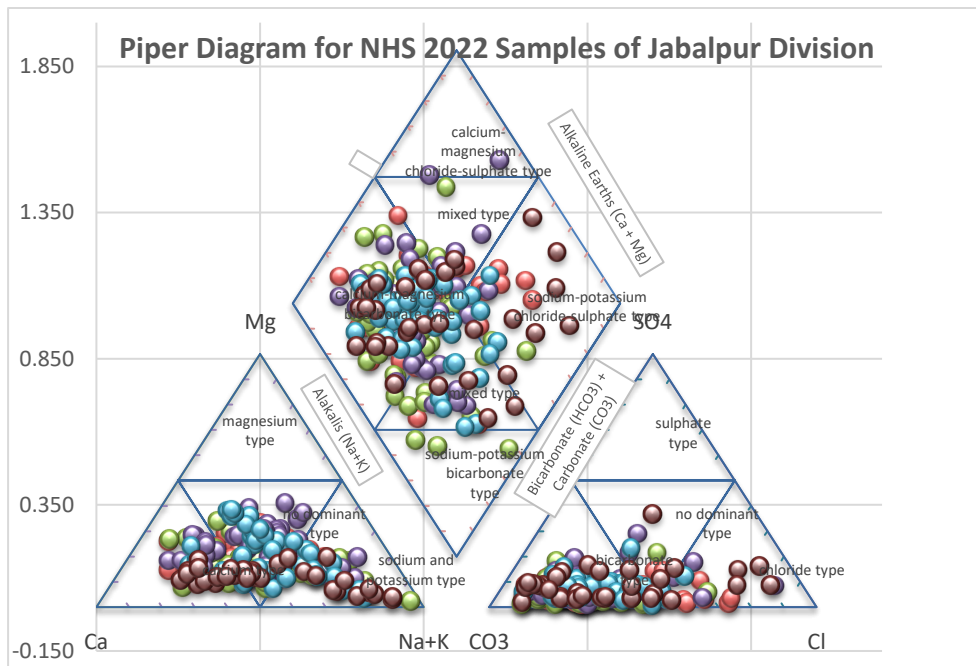
9.1 f Piper diagram of groundwater of Jabalpur Division.

The Piper Diagram for NHS 2022 Samples belonging to Jabalpur Division comprising of Districts of Balaghat, Chhindwara, Dindori, Jabalpur, Katni, Mandla, Narsinhapur and Seoni suggests that the many of Samples belong to Calcium Bicarbonate type of water while there are a lot of samples belonging to Mixed type of water. Also sufficient number of samples belonging to Na-Cl type of water can also be observed.
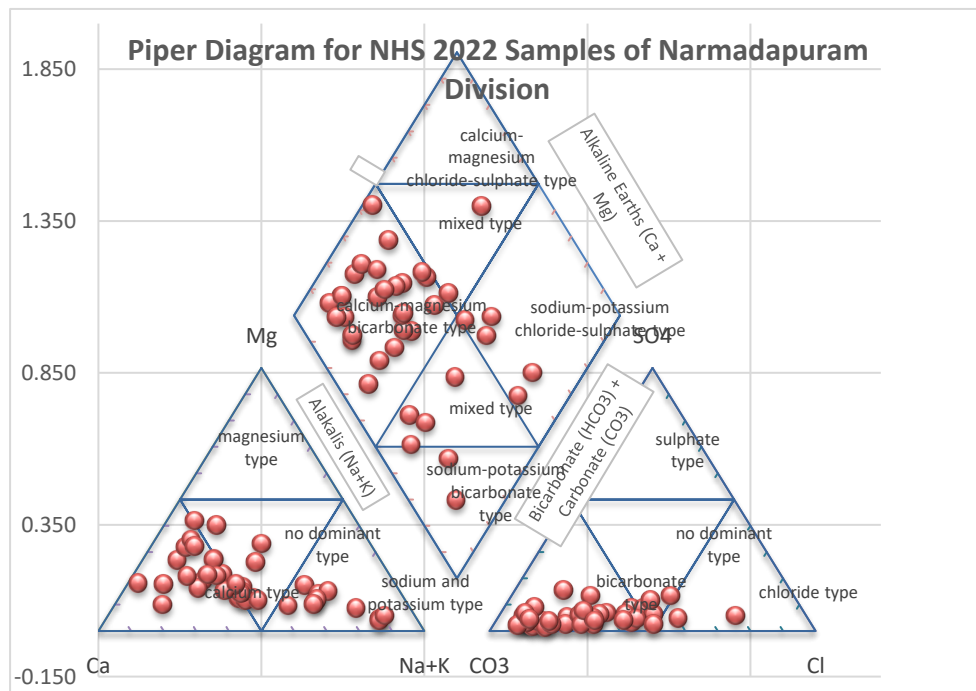
9.1 g Piper diagram of groundwater of Narmadapuram Division.

The Piper Diagram for NHS 2022 Samples belonging to Narmadapuram Division comprising of Districts of Betul and Harda suggests that the majority of Samples belong to Calcium Bicarbonate type of water while there are few samples belonging to Mixed type of water.
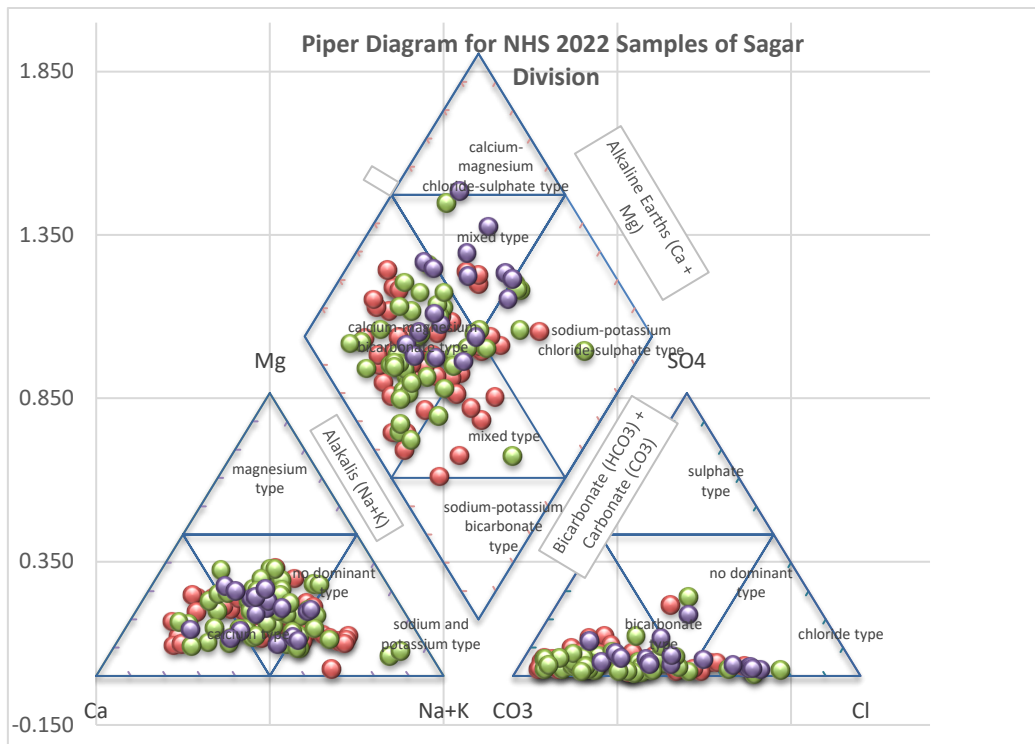
9.1 h Piper diagram of groundwater of Sagar Division.

The Piper Diagram for NHS 2022 Samples belonging to Sagar Division comprising of Districts of Chhatarpur, Damoh, Panna, Sagar and Tikamgarh suggests that the majority of Samples belong to Calcium Bicarbonate type of water while there are few samples belonging to Mixed type of water.
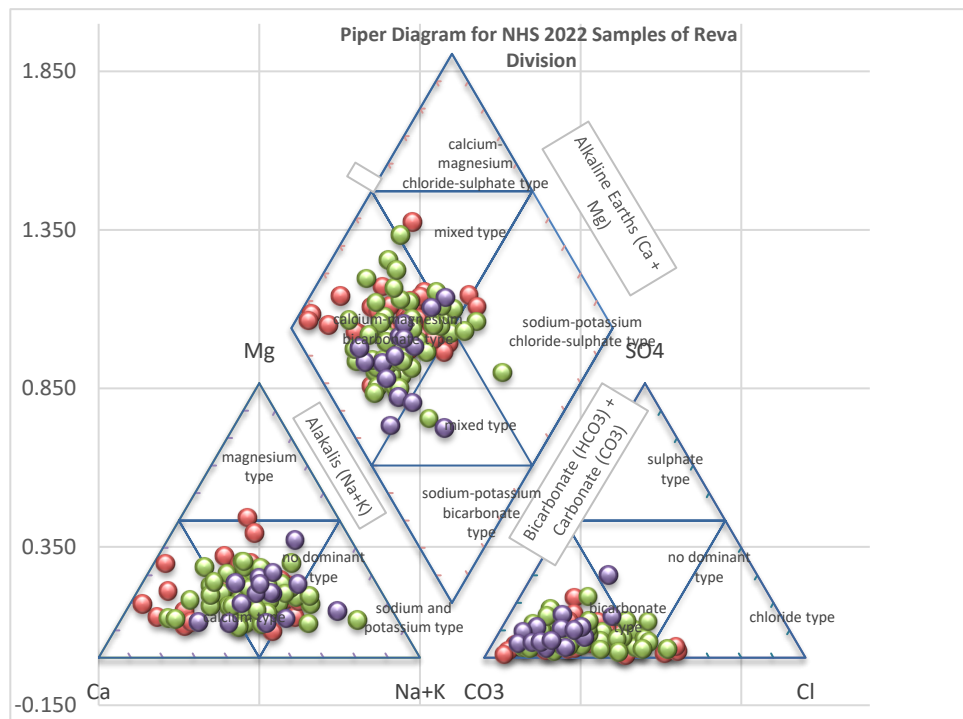
9.1 i Piper diagram of groundwater of Reva Division.

The Piper Diagram for NHS 2022 Samples belonging to Reva Division comprising of Districts of Rewa, Satna, Sidhi and Singrauli suggests that the majority of Samples belong to Calcium Bicarbonate type of water.
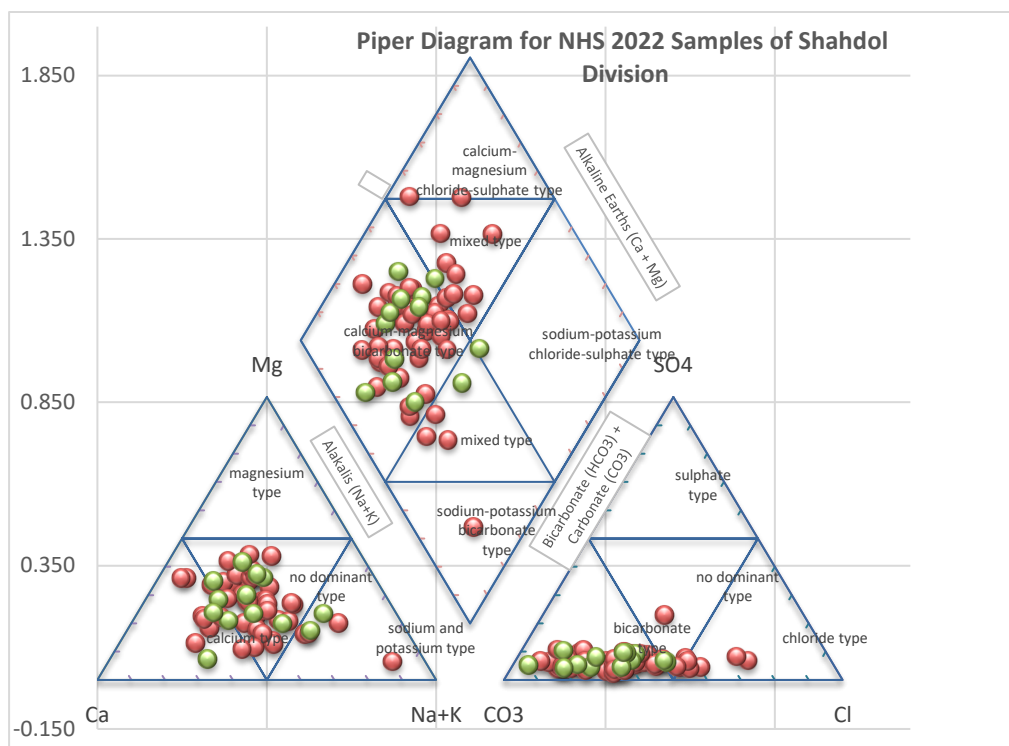
9.1 j Piper diagram of groundwater of Shahdol Division.

The Piper Diagram for NHS 2022 Samples belonging to Shahdol Division comprising of Districts of Annupur, Shahdol and Umaria suggests that the majority of Samples belong to Calcium Bicarbonate type of water and very few belong to mixed type of water.

9.2 X-Y Plot:

If halite dissolution is responsible for the sodium, the Na+/Cl- ratio is approximately one, whereas a ratio greater than one, it is typically interpreted as Na+ released from silicate weathering reaction. In the water samples of the shallow aquifers of India, 28% of the samples fall along the equilibrium in the Na+/Cl- plot, indicating common source of halite for both the ions (Fig.9.2). In the water samples of the shallow aquifers of India, 45.4% of the samples have molar ratio greater than one indicating ion exchange is the major process. It is where Na montmorillonite clay reacts with calcium and magnesium and releases sodium (sometimes called natural softening).

$$2Na^+ - clay + Ca^{2+} \; = \; Ca^{2+} - clay + Na^+$$
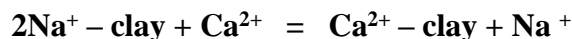
The observed $Na^+/Cl^- < 1$, may be attributed to groundwater interaction with connate seawater in coastal areas and Cl^- enrichment from anthropogenic sources such as irrigation return flows or domestic waste disposal in another areas. Bivariant plot of Bhopal and Gwalior divisions of MP is shown in Fig.9.2a & 9.2b.
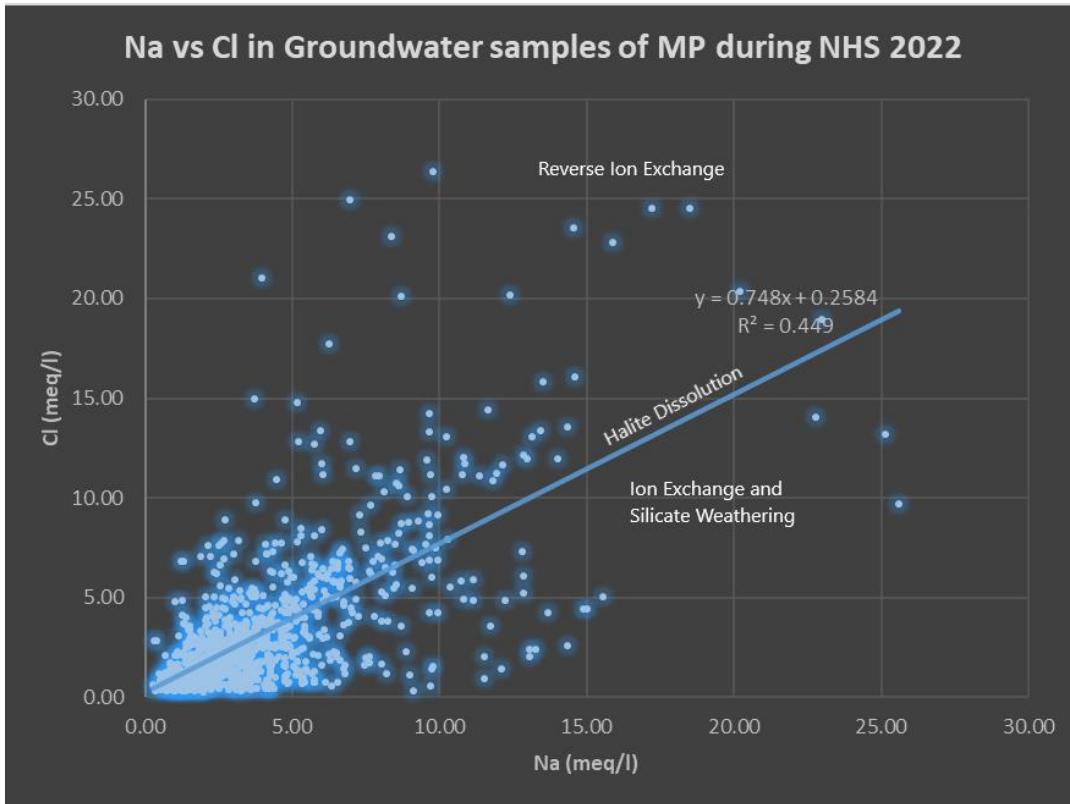
Fig. 9.2: The plot for Na versus Cl in groundwater samples of MP
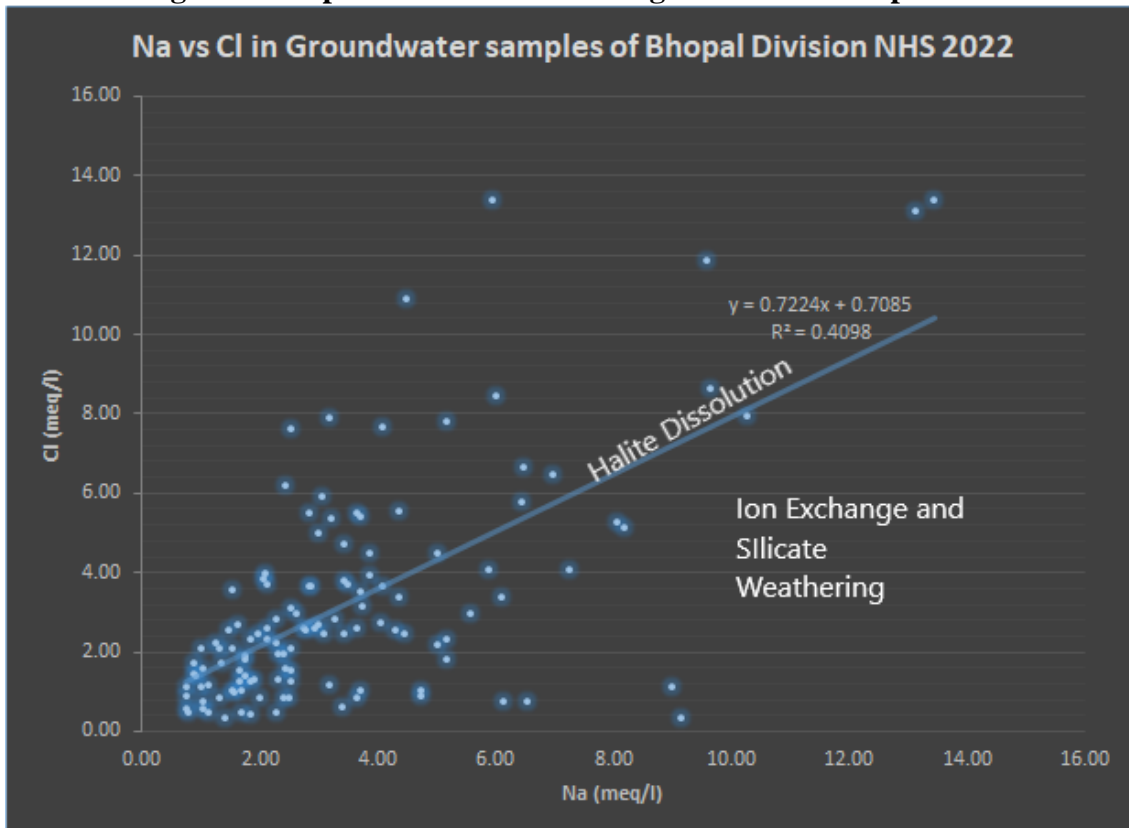
Fig.9.2a: The plot for Na versus Cl in groundwater samples of Bhopal Division

In Bhopal Division sodium and chloride enriched in groundwater by ion exchange and silicate weathering and Reverse Ion Exchange processes mainly.
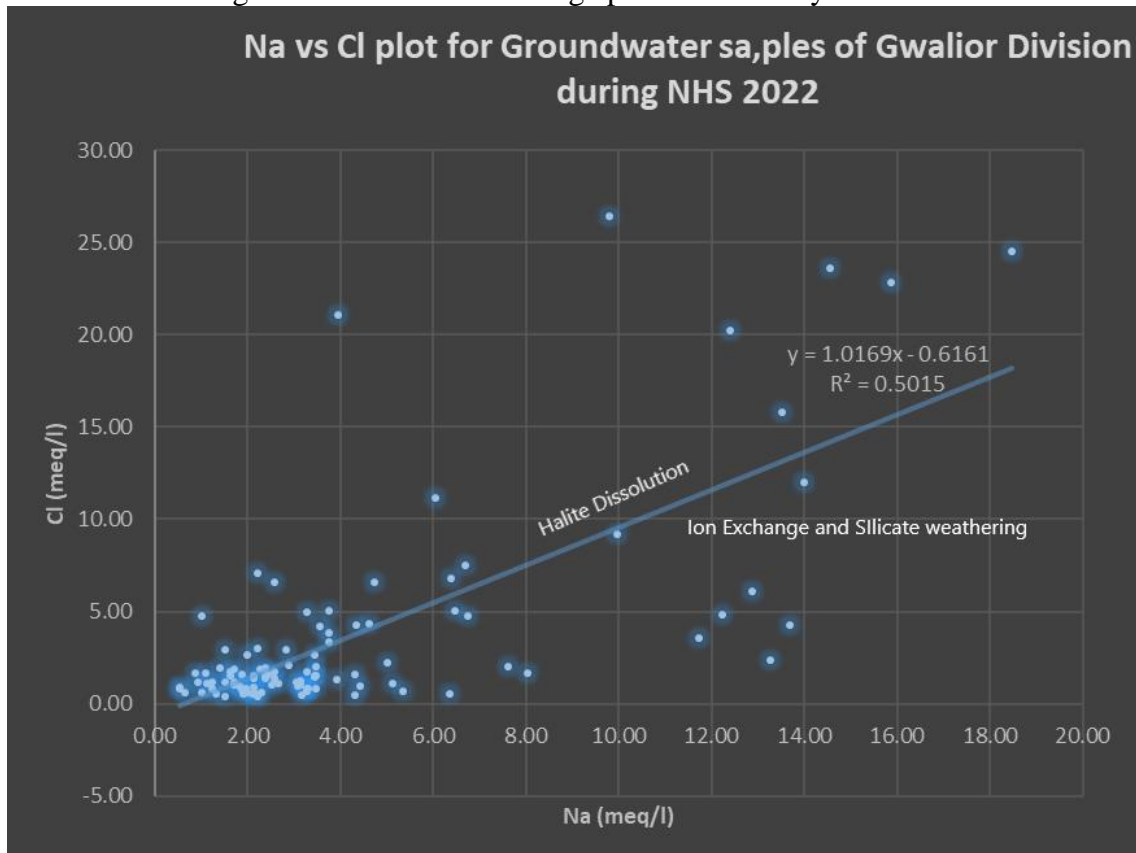
Fig. 9.2b: The plot for Na versus Cl in groundwater samples of Gwalior Division.

In Gwalior Division ion exchange is main mechanism for sodium and chloride enrichment in groundwater.

Conclusion

The evaluation of the ground water quality of the study area for drinking purposes with respect to standards prescribed by BIS (2012) for Basic and Uranium reveals that:

- **pH** of most of the waters belonging to MP fall within the desirable range of 6.5 to 8.5 during NHS 2022 and about 35 samples showed higher pH. The pH value of all the waters ranged between 6.54 to 8.30 with an average of 7.65.
- High **EC** Values > 3000 µS/cm have been found in 12 number of samples out of 1143 total number of samples (1%) analyzed indicating saline nature of water in those parts of the state.
- High **Chloride** > 1000mg/l has not been found in any location throughout the state.
- High Fluoride >1.5mg/l, which is mainly attributed due to geogenic conditions, have been observed in 15 water samples out of 1143 water samples analyzed (1.31%). Highest Fluoride concentration (1.95 mg/l) was observed in the sample collected from Kurri, Chhatarpur district.
- High **Nitrate** > 45mg/l have been found in 271 locations out of 1143 total number of samples (23.1%) analyzed indicating high nitrate pollution due to use of nitrogen containing fertilizer, domestic and agriculture waste and anthropogenic activities. The highest being reported at Bhagwara, Sheopur district with NO_3 concentation 276 mg/l.
- **Uranium** was found to be within the permissible limit of 30 ppb in all the samples collected from Groundwater monitoring network stations.
- It is found that most of the samples (62.82%) collected during NHS 2022-23 are categorized under medium salinity classes. (**Salinity Index**) with EC ranging from 751-2250 µS/cm.
- The SAR value of most of the samples (98.9%) were found to S1 and are classified as Excellent for irrigation as per **sodicity Index**.
- The classification of groundwater samples with respect to **%Na** shows that majority samples (52.58%) fall under good category and were found to be suitable for irrigation.
- As per Todd's classification of **SSP**, 90% samples suitable for irrigation with SSP<60.
- Based on the **RSC** values, 83.81% samples reflected to Good Category and were suitable for irrigation.
- The soil permeability is affected by long-term use of irrigation water and according to **permeability Index**, 75.3 % of the samples fall under class 2 corresponding to Good (PI ranged from 25% to 75%) in the NHS 2022-23
- The A **Kelly's index** of less than 1 in 68 % samples shows suitability for Irrigation.
- The **magnesium hazard (MH)** parameter indicates that 95% samples are suitable for irrigation and not harmful.

Thus from the analytical results it has been observed that majority of water samples collected from observation wells of Central Ground Water Board, NCR, Bhopal in a major part of the state fall under desirable or permissible category as far as basic parameters and Uranium concentration is concerned and hence are suitable for drinking purposes. However, some well waters are found to have concentrations of some constituents beyond the permissible limits with respect to basic parameters and heavy metals. Such waters are not fit for human consumption and are likely to be harmful to health on continuous use.

10.0 Bibliography

- APHA (2017), "Standard Methods for the Examination of Water and Wastewater (22th Ed.)". Washington, Dc: American Public Association.
- CGWB (2018), "Ground Water Quality in Shallow Aquifers of India". Faridabad: Central Ground Water Board, Ministry of water Resources, Government of India.
- Drinking water standards of BIS 10500: 2012.
- Karanth K.R. (1997), „Groundwater Assessment, Development and Management. New Delhi, India‟: Tata Mcgraw-Hill Publishing Company Limited.
- Todd D.K., Groundwater Hydrology. John Wiley and sons Inc. Newyork, 1976
- USSL (1954), Diagnosis and improvement of saline and alkali soils. USDA Agr. Handbook No. 60, Washington DC.
- Freeze, R.A., and Cherry, J.A., 1979, Groundwater: New Jersey, Prentice Hall.
- Hem, J.D., 1985, Study and interpretation of the chemical characteristics of natural water (3rd ed.): U.S. Geological Survey, Water Supply Paper.2254.
- L.V. Wilcox, (1955), "Classification and Use of Irrigation Waters", U.S. Department of Agriculture Circle, Amer. J. of Science, Vol,8, No.3, pp. 123128.
- N. Manivasagam (1984), Physico-Chemical Examination of Water, Sewage and Industrial Effluents, Pragati Prakashan, Meerut.
- Piper, A.M., 1944, A graphical procedure in the geochemical interpretation of water analysis: American Geophysical Union Trans., v. 25, p. 914-923.

Locations having Electrical Conductivity > 3000 µS/cm in Ground Water in Different Districts of Madhya Pradesh

S. No.	District	Block	Location	Source	Long.	Lat.	EC µS/cm at 25°C
1	Bhind	Lahar	Balaji	HP	78.9788	26.2967	3573
2	Bhind	Ater	Lavan	HP	78.7395	26.5427	3595
3	Bhind	Mehgaon	Mehgaon	BORE	78.6143	26.4984	3054
4	Bhind	Bhind	Phuph	HP	78.8788	26.6429	4144
5	Dhar	Kukshi	Dhulsar	HP	74.869	22.205	3110
6	Gwalior	Bhitarwar	Dongarpur	HP	77.9623	25.8216	3247
7	Gwalior	Gwalior	Jahangirpur	DW	78.2906	26.2756	3220
8	Gwalior	Gwalior	Suro	DW	78.0417	26.2499	3620
9	Indore	Sanwer	Sanwer	BW	75.971	22.971	3187
10	Neemuch	Neemuch	Girdola	DW	75.2233	24.48	4490
11	Shivpuri	Narwar	Sehore	DW	78.1074	25.6722	3581
12	Ujjain	Tarana	Kaiytha	Dw	76.0183	23.2331	3150

Locations having Fluoride concentration > 1.5 mg/litre in Ground Water in Different Districts of Madhya Pradesh

S. No.	District	Block	Location	Source	Long.	Lat.	F
1	Anuppur	Jaithari	Jamudi	DW	81.6325	23.0665	1.63
2	Chhatarpur	Chhatarpur	Kurri	DW	79.72	24.86806	1.95
3	Datia	Datia	Dursadha	HP	78.6561	25.7124	1.51
4	Dindori	Dindori	Salaiya	HP	80.9468	22.9109	1.67
5	Neemuch	Manasa	Barlai	DW	75.32	24.4242	1.84
6	Neemuch	Manasa	Manasa	DW	75.1439	24.4706	1.55
7	Seoni	Keolari	Dhangada	BW	79.8592	22.3225	1.51
8	Seoni	Ghansaur	Ghansor1	HP	79.9535	22.6556	1.69
9	Seoni	Seoni	Palari	HP	79.8129	22.3057	1.84
10	Seoni	Keolari	Pandiachhappara	HP	79.999	22.1163	1.76
11	Seoni	Seoni	Pipardahi	HP	79.4103	22.0544	1.71
12	Shajapur	Kalapipal	Arandia	DW	76.6735	23.2098	1.59
13	Shajapur	Moman Badodia	Chouma	DW	76.2238	23.6502	1.91
14	Shajapur	Shajapur	Makshi New	BW	76.1463	23.2536	1.89
15	Singrauli	Deosar	Betaha Dand	DW	82.376	24.242	1.6

Locations having Nitrate concentration > 45 mg/litre in Ground Water in Different Districts of Madhya Pradesh

S. No.	District	Block	Location	Source	Long.	Lat.	NO3 (mg/l)
1	Agar Malwa	Agar	Amla	DW	76.1051	23.853	60
2	Agar Malwa	Susner	Guradi Bangla	DW	76.1531	24.0832	77
3	Agar Malwa	Susner	Soyat	DW	76.1725	24.1889	200
4	Alirajpur	Bhabra	Bhabra New	DW	74.319	22.549	62
5	Alirajpur	Alirajpur	Nanpur	HP	74.532	22.271	102
6	Alirajpur	Udaigarh	KhusalBahedi	DW	74.5258	22.5519	102
7	Ashok Nagar	Mungoali	Bahadurpur	DW	77.969	24.342	54
8	Ashok Nagar	Chanderi	Chanderi	DW	78.136	24.712	72
9	Ashok Nagar	Mungoali	Mungaoli	DW	78.109	24.403	75
10	Balaghat	Waraseoni	Amai	HP	79.9678	21.6813	47
11	Balaghat	Baihar	Baihar1	HP	80.5498	22.0982	68
12	Balaghat	Birsa	Damoh2	HP	80.7939	21.8979	47
13	Balaghat	Paraswada	Khurmundi	HP	80.476	22.126	55
14	Balaghat	Khairlanji	Miragpur	HP	79.8378	21.6359	103
15	Balaghat	Waraseoni	Newargaon	HP	80.0413	21.8122	90
16	Balaghat	Kirnapur	Rajegaon	HP	80.2481	21.6304	64
17	Barwani	Rajpur	Balsamund	BW	75.175	21.81	122
18	Barwani	Thikri	Baruphatak	DW	75.303	21.981	224
19	Barwani	Thikri	Borlai	DW	75.002	22.039	130
20	Barwani	Rajpur	Julwania	BW	75.185	21.871	132
21	Barwani	Newali	Niwali1	DW	74.923	21.683	86
22	Barwani	Rajpur	Rajpur	DW	75.136	21.936	77
23	Barwani	Sendwa	Sendwa	BW	75.1179	21.7207	92
24	Barwani	Rajpur	Talwada Deb	DW	75.1835	22.0683	56
25	Barwani	Barwani	Osada	DW	74.8025	21.9695	102
26	Barwani	Pati	Chouki	DW	74.6614	21.888	66
27	Barwani	Pansemal	Mortalai	BW	74.6243	21.7107	111
28	Barwani	Pansemal	Pansemal	DW	74.7122	21.6683	125
29	Barwani	Sendhawa	Joganwada	DW	75.0438	21.7399	65
30	Betul	Betul	Betul1	DW	77.9269	21.8602	120
31	Betul	Multai	Ghatpiparia	DW	78.5186	21.8822	148
32	Betul	Athner	Gujarmaal	DW	77.9463	21.6302	49
33	Betul	Bhainsdehi	Jhallar	DW	77.7401	21.7301	202
34	Betul	Chicholi	Jogli	HP	77.7013	21.9752	58
35	Bhind	Lahar	Balaji	HP	78.9788	26.2967	62
36	Bhind	Mehgaon	Chirole	HP	78.6317	26.3546	151
37	Bhind	Lahar	Lahar	HP	78.9452	26.1885	110
38	Bhind	Ater	Lavan	HP	78.7395	26.5427	106
39	Bhind	Bhind	Nahrakapura	HP	78.9313	26.6229	47
40	Bhind	Bhind	Phuph	HP	78.8788	26.6429	102
41	Bhopal	Phanda	Islamnagar	HP	77.416	23.3572	50
42	Bhopal	Phanda	Sarvar	HP	77.3	23.156	48
43	Burhanpur	Burhanpur	Burhanpurdw	BW	76.2399	21.3341	66
44	Burhanpur	Khaknar	Dedtalai	BW	76.7647	21.4952	106
45	Burhanpur	Khaknar	Karkheda	BW	76.4829	21.3357	94
46	Burhanpur	Khaknar	Manjrod Kalan	BW	76.6246	21.4115	149

47	Burhanpur	Burhanpur	Nachankheda	HP	76.1511	21.2336	137
48	Burhanpur	Khaknar	Pipalpani	DW	76.6988	21.4342	107
49	Burhanpur	Burhanpur	Bahadurpur1	HP	76.1794	21.288	49
50	Chhatarpur	Bijawar	Bijawar	DW	79.49806	24.65028	54
51	Chhatarpur	Chhatarpur	Chhatarpur	DW	79.59111	24.9	53
52	Chhatarpur	Chhatarpur	Issanagar	DW	79.38472	24.86194	55
53	Chhatarpur	Chhatarpur	Kurri	DW	79.72	24.86806	55
54	Chhatarpur	Nowgaon	Nowgaon	DW	79.45	25.05417	55
55	Chhatarpur	Chhatarpur	PiporaKhurd	DW	79.48083	24.85	108
56	Chhatarpur	BadaMalhara	Sendpa	DW	79.25278	24.54694	83
57	Chhindwara	Tamia	Chhindi	BW	78.8218	22.391	62
58	Chhindwara	Pandhurana	Chinchkheda	BW	78.4792	21.6409	53
59	Chhindwara	Tamia	Delakhari	HP	78.6179	22.4184	67
60	Chhindwara	Mohkhed	Goni	DW	79.0138	21.8233	59
61	Chhindwara	Parasia	Lahgudna	DW	78.7193	22.2741	87
62	Chhindwara	Mohkhed	Linga Rly.Stn.	HP	78.9293	21.9646	116
63	Chhindwara	Pandhurana	Mohi	DW	78.4375	21.666	64
64	Chhindwara	Pandhurana	Pandurna	DW	78.5121	21.5915	190
65	Chhindwara	Pandhurana	Piplanarayanwar	HP	78.7335	21.5919	87
66	Chhindwara	Sausar	Ramakona New	DW	78.4812	21.6959	143
67	Chhindwara	Chaurai	Ramgarh	HP	79.2665	22.1768	53
68	Chhindwara	Chhindwara	Saonri1	BW	78.7686	21.9654	78
69	Chhindwara	Mohkhed	Sarangbheri	HP	78.9471	21.8691	49
70	Chhindwara	Sausar	Silwanighati	DW	78.8298	21.7917	135
71	Chhindwara	Amarwara	Singhori	DW	79.058	22.1968	52
72	Chhindwara	Amarwara	Surla	DW	79.114	22.4353	88
73	Chhindwara	Mohkhed	Tansara Mal	DW	78.8645	21.8544	192
74	Damoh	Damoh	Abhana	DW	79.53667	23.705	126
75	Damoh	Jabera	Bamhori	DW	79.71889	23.685	57
76	Damoh	Patera	Bangaon New	DW	79.51694	24.00667	259
77	Damoh	Jabera	Khamaria	DW	79.55917	23.65	60
78	Damoh	Damoh	Palar	DW	79.46944	23.92917	86
79	Damoh	Patera	Patera2	DW	79.68861	23.99722	178
80	Damoh	Tendukheda	Samnapur	DW	79.38611	23.3125	106
81	Dewas	Dewas	Bhesuni	DW	76.6309	22.6184	50
82	Dewas	Sonkatch	Bhonrasa	DW	76.2016	22.9919	55
83	Dewas	Dewas	Dewas	DW	76.0662	22.9738	81
84	Dewas	Kannod	Kannod	HP	76.7496	22.6657	49
85	Dewas	Bagli	Karnawad	DW	76.2272	22.7176	53
86	Dewas	Bagli	Nevri	DW	76.252	22.8555	78
87	Dewas	Bagli	Pipri	DW	76.278	22.3986	60
88	Dewas	Kannod	Satwas New	DW	76.7008	22.5333	57
89	Dewas	Bagli	Udainagardw	DW	76.2772	22.3984	66
90	Dewas	Tonk Khurd	Tonk Kalan	DW	76.1458	23.1168	55
91	Dhar	Dharampuri	Dhamnod	BW	75.473	22.214	47
92	Dhar	Nisarpur	Pipalya	DW	74.875	22.134	115
93	Dhar	Sardarpur	Rajod	DW	75.067	22.954	82
94	Dhar	Manawar	Singhana	DW	74.969	22.188	59
95	Dhar	Bagh	Tanda	BW	74.8547	22.5039	74
96	Dhar	Gandhwani	Zeerabad	DW	75.07	22.398	80
97	Gwalior	Morar	Aarauli	HP	78.4522	26.1601	111
98	Gwalior	Ghatigaon	Aron	HP	77.9301	25.9535	129
99	Gwalior	Morar	Behat	BORE	78.5295	26.1707	127

100	Gwalior	Ghatigaon	Charai Shyampur	DW	77.8307	25.9748	153
101	Gwalior	Bhitarwar	Dongarpur	HP	77.9623	25.8216	253
102	Gwalior	Bhitarwar	Harsibandh	DW	77.9252	25.7561	80
103	Gwalior	Dabra	Kariyawati	HP	78.1805	25.8187	56
104	Gwalior	Gwalior	Padampur Kheria	DW	78.2687	26.2665	62
105	Gwalior	Gwalior	Jahangirpur	DW	78.2906	26.2756	109
106	Harda	Khirkiya	Chhipawaddw	DW	76.8809	22.1577	64
107	Harda	Harda	Hardadw	DW	77.1035	22.3391	137
108	Harda	Khirkiya	Mandla	DW	76.9456	22.2204	48
109	Harda	Timarni	Mohanpur1	BW		22.2508	53
110	Harda	Khirkiya	Morgarhidw	HP	76.9438	22.0205	131
111	Harda	Khirkiya	Sonpura Colony	DW	76.9141	22.0886	47
112	Harda	Timarni	Temagaon	HP	77.3193	22.299	177
113	Harda	Timarni	Timarni	DW	77.2314	22.3759	65
114	Hoshangabad	Kesla	Pathrautadw	DW	77.7958	22.5763	117
115	Hoshangabad	Sohagpur	Semri Harchand	DW	78.0849	22.6905	59
116	Indore	Depalpur	Rangwasa	DW	75.57	22.744	82
117	Indore	Sanwer	Sanwer	BW	75.971	22.971	77
118	Indore	Depalpur	Ushapura	HP	75.674	22.809	114
119	Jabalpur	Kundam	Ghughara	HP	80.37035	23.27719	62
120	Jabalpur	Jabalpur	Gokalpur	DW	79.98533	23.19003	46
121	Jabalpur	Kundam	Kundam	DW	80.34684	23.21991	51
122	Jabalpur	Jabalpur	Saliwada	TW	79.99325	23.10742	168
123	Jhabua	Jhabua	Jhabua1	DW	74.59	22.771	66
124	Jhabua	Jhabua	Pitol	BW	74.4618	22.7896	74
125	Jhabua	Ranapur	Tikadimoti	DW	74.542	22.694	57
126	Jhabua	Rama	Chapari	DW	74.6797	22.7774	47
127	Katni	Badwara	Badwara	DW	80.5723	23.749	67
128	Katni	Vijay Raghavgarh	Barhi	TW	80.8102	23.9024	49
129	Katni	Vijay Raghavgarh	Piparia2	HP	80.697	23.8629	50
130	Katni	Dhimarkheda	Umariapan	HP	80.2752	23.5121	79
131	Khandwa	Pandhana	Balwara1	DW	76.5177	21.6906	50
132	Khandwa	Harsud	Bori Saray	BW	76.8193	21.9986	83
133	Khandwa	Harsud	Chanera	DW	76.698	22.9616	68
134	Khandwa	Punasa	Daulatpur	DW	76.375	22.2285	57
135	Khandwa	Chhegaon Makhan	Dhangaon	DW	76.1181	22.0879	147
136	Khandwa	Pandhana	Gurhi	DW	76.5746	21.6386	127
137	Khandwa	Khandwa	Jaswadi1	DW	76.4275	21.7944	49
138	Khandwa	Khalwa	Khalwa1	DW	76.7445	21.8059	83
139	Khandwa	Pandhana	Kusumbia	DW	76.1926	21.6876	62
140	Khandwa	Chhegaon Makhan	Pandhana	DW	76.2371	21.7093	104
141	Khandwa	Khandwa	Rudhy Bhata	DW	76.4429	21.8356	60
142	Khandwa	Punasa	Thapana	DW	76.0873	22.2223	52
143	Khandwa	Punasa	Udaipur	DW	76.403	22.2324	176
144	Khargone	Barwaha	Amba	HP	75.944	22.043	166
145	Khargone	Maheshwar	Baddiya	HP	75.942	22.232	219
146	Khargone	Bhikangaon	Bamnala New	DW	75.853	21.825	69

147	Khargone	Bhikangaon	Bhikangaon1	DW	75.956	21.862	135
148	Khargone	Bhagwanpura	Bhulwani	DW	75.481	21.548	54
149	Khargone	Bhikangaon	Daudwa	DW	76.137	22.021	71
150	Khargone	Maheshwar	Dhargaon	DW	75.73	22.197	136
151	Khargone	Bhagwanpura	Dhulkot	DW	75.553	21.61	54
152	Khargone	Gogawan	Gogaon	HP	75.7433	21.9163	87
153	Khargone	Kasrawad	Kasrawad1	DW	75.608	22.127	100
154	Khargone	Khargone	Khargone	DW	75.614	21.828	66
155	Khargone	Maheshwar	Piplyabuzrug	DW	75.861	22.234	48
156	Khargone	Barwaha	Sanawad New	DW	76.071	22.173	46
157	Khargone	Kasrawad	Sawda	HP	75.6276	22.026	142
158	Khargone	Ziranniya	Ziranniya	DW	75.9876	21.6506	62
159	Mandla	Nainpur	Dithori	HP	80.197	22.524	53
160	Mandla	Bijadandi	Kalpi	HP	80.198	22.916	46
161	Mandla	Mandla	Mahania Patpara	HP	80.471	22.678	88
162	Mandla	Mawai	Motinala	HP	80.84	22.376	48
163	Mandsaur	Bhanpura	Babulda	DW	75.6881	24.4742	87
164	Mandsaur	Mandsaur	Daloda1	DW	75.0989	23.925	60
165	Mandsaur	Sitamau	Manpura	DW	75.2705	23.8908	188
166	Mandsaur	Mandsaur	Nayakhera	DW	75.0833	24.0144	143
167	Mandsaur	Malhargarh	Pipaliya	DW	75.0083	24.1963	63
168	Mandsaur	Garoth	Shamgarh1	DW	75.64	24.1913	84
169	Morena	Kailaras	Tonga Gaon	HP	77.4385	26.2472	72
170	Narsimhapur	Kareli	Betli	HP	79.0264	23.0825	51
171	Narsimhapur	Gotegaon	Jhoteshwar	HP	79.5551	22.9482	48
172	Narsimhapur	Kareli	Kareli Basti	HP	79.0656	22.9155	83
173	Narsimhapur	Chawarpatha	Koudiya	DW	78.8162	22.9407	48
174	Narsimhapur	Narsimhapur	Sundernagar	HP	79.2398	22.8309	64
175	Panna	Ajaigarh	Ajaigarh	DW	80.2664	24.909	109
176	Panna	Pawai	Powai	DW	80.162	24.26.01	50
177	Raisen	Gairatganj	Dehgaon	HP	78.0883	23.3187	57
178	Raisen	Gairatganj	Garhi	HP	78.1413	23.219	48
179	Raisen	Begamganj	Paloha	HP	78.296	23.532	51
180	Raisen	Begamganj	Sultanganj	DW	78.555	23.503	50
181	Rajgarh	Jirapur	Chhapihera	DW	76.4575	23.8973	50
182	Rajgarh	Narsinghgarh	Ganayari	DW	77.0067	23.6916	190
183	Rajgarh	Narsinghgarh	Gandhigram	DW	77.068	23.6753	61
184	Rajgarh	Khilchipur	Khilchipur	DW	76.5766	24.0355	66
185	Rajgarh	Narsinghgarh	Pachor	DW	76.7338	23.7089	149
186	Rajgarh	Sarangpur	Udhankheri	DW	76.6295	23.6673	53
187	Ratlam	Ratlam	Dhamnod	DW	74.9775	23.44028	97
188	Ratlam	Jaora	Ukediya	DW	75.18028	23.58472	57
189	Rewa	Naigarhi 1	Naigarhi 1	DW	81.775	24.787	48
190	Rewa	Mauganj	Pahadi	DW	81.886	24.75	57
191	Rewa	Sirmour	Semaria2	BW	81.154	24.798	137
192	Sagar	Rehli	Rehli	DW	79.06528	23.64056	52
193	Satna	Maihar	Jhukehi	TW	80.426	24.004	47
194	Satna	Nagod	Patwara	HP	80.621	24.553	47
195	Sehore	Ashta	Ashta	DW	76.7237	23.0042	66
196	Sehore	Budni	Bayan	DW	77.5527	22.7247	47
197	Sehore	Sehore	Bhandeli	DW	77.2607	23.1244	55
198	Sehore	Budni	Budhni	DW	77.6824	22.7872	92

199	Sehore	Ichhawar	Ichhawar	DW	77.0179	23.0333	57
200	Sehore	Ichhawar	Kankad Kheda	DW	77.0366	23.1043	52
201	Sehore	Nasrullaganj	Larkui New	DW	77.2127	22.8151	69
202	Sehore	Nasrullaganj	Rala	DW	77.3061	22.6933	142
203	Seoni	Barghat	Dharamkuan	HP	79.7607	21.876	58
204	Seoni	Chhapara	Ghunai	DW	79.557	22.4412	74
205	Seoni	Barghat	Kauria	DW	79.8411	22.0182	60
206	Seoni	Kurai	Khawasa	HP	79.4362	21.7042	104
207	Seoni	Kurai	Kurai New	HP	79.5014	21.8118	64
208	Seoni	Lakhnadon	Makarjhir	HP	79.685	22.6924	212
209	Seoni	Kurai	Rukhar	HP	79.5253	21.8707	120
210	Shahdol	Jiysingh Nagar	Jaisinghnagar1	TW	81.38725	23.67918	65
211	Shahdol	Sohagpur	Shahdol	HP	81.35773	23.29915	50
212	Shajapur	Shajapur	Majhania	DW	76.3315	23.4544	53
213	Shajapur	Moman Badodia	Moman Badodia	DW	76.34	23.6074	134
214	Shajapur	Kalapipal	Nandni	DW	76.938	23.3212	120
215	Shajapur	Moman Badodia	Salsalai	DW	76.5358	23.4663	54
216	Shajapur	Shajapur	Tilawad Govind	DW	76.3344	23.3073	49
217	Sheopur	Sheopur	Bhagwara	HP	76.6138	25.6733	276
218	Sheopur	Vijaypur	Dhobni	HP	77.5785	25.8327	106
219	Sheopur	Vijaypur	Garhi1	HP	77.3045	26.1177	186
220	Sheopur	Vijaypur	Ghaswani	HP	77.5274	25.8899	106
221	Sheopur	Vijaypur	Harkui	HP	77.1749	26.1592	101
222	Sheopur	Vijaypur	Panchoncolony	HP	77.125	26.1347	90
223	Sheopur	Vijaypur	Pura	HP	76.9919	25.9331	178
224	Sheopur	Sheopur	Rajpura	HP	76.6806	25.714	158
225	Sheopur	Vijaypur	Vijaypurcolony	BORE	77.3648	26.056	55
226	Shivpuri	Khaniyadhana	Achhroni New	HP	78.2311	24.9967	127
227	Shivpuri	Pohri	Ainpura	HP	77.4056	25.6393	270
228	Shivpuri	Karera	Awas	HP	78.3481	25.4733	269
229	Shivpuri	Badarwas	Badarwas	HP	77.5656	24.974	150
230	Shivpuri	Khaniyadhana	Bamorkalan New	HP	78.1511	24.8884	73
231	Shivpuri	Narwar	Behgwan	HP	78.1024	25.6298	79
232	Shivpuri	Pichhore	Bhonti	HP	78.097	25.3236	82
233	Shivpuri	Badarwas	Khareh	HP	77.7261	25.1037	65
234	Shivpuri	Karera	Languri	HP	78.1224	25.4837	93
235	Shivpuri	Kolaras	Manipura New	HP	77.598	25.213	57
236	Shivpuri	Khaniyadhana	Masoori	HP	77.9267	25.1002	78
237	Shivpuri	Narwar	Narwar	HP	77.9138	25.6467	48
238	Shivpuri	Pichhore	Pichhore	BORE	78.1903	25.1756	114
239	Shivpuri	Pohri	Pohari	DW	77.3632	25.5454	78
240	Shivpuri	Karera	Sarsod	HP	77.5062	25.4852	75
241	Shivpuri	Shivpuri	Satanwara	DW	77.7318	25.5445	65
242	Shivpuri	Narwar	Sehore	DW	78.1074	25.6722	110
243	Shivpuri	Pichhore	Semri	HP	77.9269	25.1008	87
244	Shivpuri	Karera	Sikandara	DW	78.79167	25.47222	52
245	Shivpuri	Khaniyadhana	Sitapur	HP	78.055	25.4251	270
246	Shivpuri	Karera	Toda Karea	HP	78.1754	25.4551	60
247	Sidhi	Majhauli	Bastua	DW	81.709	23.987	55

248	Sidhi	Sidhi	Chilheri Kalan	BW	81.792	24.458	52
249	Sidhi	Majhauli	Majhauli	DW	81.458	24.121	68
250	Tikamgarh	Prithvipur	Birorakhet	DW	78.79167	25.115	76
251	Tikamgarh	Tikamgarh	Majna	DW	78.99722	24.83639	75
252	Tikamgarh	Niwari	Orchha	DW	78.64111	25.34944	82
253	Tikamgarh	Palera	Palera	DW	79.2375	25.02361	46
254	Ujjain	Ujjain	Chakrawada Grid	Dw	75.7111	23.2564	81
255	Ujjain	Badnagar	ChhotiGhadsod	Dw	75.4528	23.1083	86
256	Ujjain	Tarana	Kaiytha	Dw	76.0183	23.2331	65
257	Ujjain	Ujjain	Palkhanda	Dw	75.9481	23.0406	55
258	Umaria	Karkeli	Bichua	DW	80.74657	23.46577	68
259	Umaria	Pali	Birsinghpur1	HP	81.04529	23.36604	58
260	Umaria	Bandhavgarh	Parasi	HP	80.9418	23.664	50
261	Umaria	Bandhavgarh	Umaria	DW	80.83522	23.52698	92
262	Vidisha	Gyaraspur	Atari Khejda	HP	78.026	23.414	46
263	Vidisha	Basoda	Bareth	HP	78.001	23.915	50
264	Vidisha	Vidisha	Bilari	DW	77.698	23.578	108
265	Vidisha	Sironj	Dehri Jagir	DW	77.786	24.041	83
266	Vidisha	Sironj	Deopur	BW	77.621	24.155	68
267	Vidisha	Basoda	Ghatera	HP	78.125	23.807	69
268	Vidisha	Gyaraspur	Gyaraspur1	HP	78.112	23.666	130
269	Vidisha	Sironj	Patharia	HP	77.816	24.115	62
270	Vidisha	Vidisha	Salaiya	HP	77.575	23.608	68
271	Vidisha	Sironj	Sironj1	DW	77.689	24.099	65

Locations having Uranium concentration (>30 ppb) in Ground Water in Different District of Madhya Pradesh

S. No.	District	Block	Location	Long.	Lat.	U (ppb)
1	BHIND	MEHGAON	MEHGAON	78.601	26.498	30.83
2	SHAHDOL	JAISINGH NAGAR	SANOUSI	81.458	23.949	41.81
3	SHIVPURI	NARWAR	BEHGWAN	78.103	25.629	42.36
4	ALIRAJPUR	ALIRAJPUR	NANPUR	74.532	22.271	42.52
5	RAISEN	GOHAGANJ	CHIKLOD	77.723	23.106	51.69
6	GWALIOR	GHATIGAON	ARON	77.931	25.952	60.66
7	DATIA	DATIA	RUDUAPURA	78.501	25.778	60.67
8	GWALIOR	DABRA	KARIYAWATI	78.18	25.819	74.63
9	GWALIOR	GWALIOR	ODPURA	78.2687	26.2665	87.84
10	MANDLA	MAWAI	MOTINALA	80.903	22.345	89.00
11	SHIVPURI	NARWAR	SEHORE	78.106	25.665	125.23

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
1	Agar Malwa	Agar	Agar New	DW	23.71340	76.01860	28.3	7.71	839	0	317	127	8	7	0.17	0	23	270	62	28	76	15.1	545	0.38
2	Agar Malwa	Agar	Amla	DW	23.85300	76.10510	29	7.75	691	0	256	60	12	60	0.04	0	35	290	88	17	33	0.8	449	0.18
3	Agar Malwa	Badod	Barod	DW	23.80690	75.80690	28.5	7.75	1283	0	482	127	26	29	0.7	0	29	545	164	33	47	1.5	834	2.67
4	Agar Malwa	Susner	Guradi Bangla	DW	24.08320	76.15310	26.3	7.41	1221	0	439	115	24	77	0.55	0.1	24	495	152	28	53	0.4	794	4.93
5	Agar Malwa	Badod	Jahangirpura	DW	23.82890	75.80000	29.5	7.5	383	0	128	37	11	23	0.19	0	22	130	42	6	29	0.6	249	0.16
6	Agar Malwa	Badod	Jhounta	DW	23.73270	75.94590	25.9	7.81	553	0	244	35	15	30	0.32	0	31	205	66	10	42	0.3	359	0.19
7	Agar Malwa	Agar	Kanad	DW	23.67240	76.16480	26.1	7.59	1055	0	445	80	21	33	0.31	0	45	410	122	26	55	1	686	3.5
8	Agar Malwa	Agar	Kashi Bardiya	DW	23.77270	76.04460	27.3	7.97	1233	0	604	57	9	37	0.95	0	35	245	64	21	171	0.8	801	1.7
9	Agar Malwa	Badod	Matkotra	DW	23.73930	75.85150	27.5	7.88	983	0	421	65	10	43	0.59	0.2	28	410	124	24	41	0.6	639	2.32
10	Agar Malwa	Nalkheda	Nalkheda	DW	23.83800	76.22690	28.6	7.47	685	0	250	77	22	18	0.29	0	37	315	96	18	25	0.5	445	0.64
11	Agar Malwa	Susner	Soyat	DW	24.18890	76.17250	25.6	7.74	2295	0	580	342	27	200	0.48	0	41	785	272	26	176	2.7	1492	7.19
12	Agar Malwa	Susner	Susner New	DW	23.95230	76.10610	28.4	7.78	868	0	299	87	17	42	0.46	0	31	285	94	12	65	1.3	564	0.44
13	Alirajpur	Alirajpur	Ambua	BW	22.43000	74.43700	29.2	7.81	854	0	378	60	12	25	0.96	0	22	255	68	21	80	2.2	555	6.39
14	Alirajpur	Jobat	Badaguda	DW	22.43000	74.51700	28.9	7.72	1004	0	476	40	21	38	1.06	0	31	330	98	21	82	2.4	653	3.02
15	Alirajpur	Sondwa	Bahediya	DW	22.12490	74.36200	29.2	7.6	1117	0	336	110	29	22	0.39	0	34	345	98	24	77	0.6	726	0.97
16	Alirajpur	Bhabra	Bhabra New	DW	22.54900	74.31900	29.1	7.72	950	0	409	45	23	62	0.96	0.2	44	290	84	19	85	2.3	618	1.24
17	Alirajpur	Alirajpur	Borkua	HP	22.22400	74.34200	28.9	7.96	610	0	299	20	20	4	0.69	0	21	215	46	24	44	1	397	2.85
18	Alirajpur	Kattiwada	Chandpur	DW	22.35700	74.24300	29.3	8.09	620	0	256	57	19	8	0.47	0	39	190	48	17	60	0.6	403	1.52
19	Alirajpur	Alirajpur	Fatta	DW	22.25900	74.59800	28.5	7.99	1113	0	555	27	17	10	1.24	0	27	270	78	18	132	0.9	723	3.7
20	Alirajpur	Jobat	Jobat New	HP	22.41360	74.57160	29.6	7.83	1273	0	549	97	14	43	0.54	0	25	540	164	32	51	2.1	827	1.31
21	Alirajpur	Kattiwada	Kathiwara	DW	22.48100	74.15000	29.3	7.8	718	0	336	52	13	10	0.44	0	38	270	76	19	50	0.4	467	1.08
22	Alirajpur	Alirajpur	Khattali	HP	22.34780	74.51780	29.1	7.45	2240	0	702	357	18	19	0.97	0.1	41	630	204	29	224	5	1456	7.49
23	Alirajpur	Udaigarh	KhusalBahedi	DW	22.55190	74.52580	28.7	7.68	912	0	244	107	16	102	0.35	0	28	355	116	16	44	1.3	593	0.56
24	Alirajpur	Alirajpur	Nanpur	HP	22.27100	74.53200	28.7	7.32	2128	0	451	465	24	102	1	0	32	620	200	29	235	4.9	1383	42.52
25	Alirajpur	Kattiwada	Salempura	DW	22.51850	74.20990	29.1	7.76	650	0	305	20	17	21	0.4	0	27	230	56	22	45	1.1	423	1.69
26	Anuppur	Pushprajgarh	Amarkantak	HP	22.67710	81.75670	24.9	7.79	190	0	43	22	19	12	0.05	0	32	55	14	5	19	0.6	124	0.1
27	Anuppur	Anuppur	Anuppur	HP	23.11300	81.71570	29.3	7.4	723	0	329	42	22	6	0.99	0	21	305	88	21	35	0.3	470	4.8
28	Anuppur	Kotma	Banshi Tola	DW	23.19020	81.60840	28.2	7.76	666	0	287	40	29	9	0.22	0.1	29	155	40	13	79	2	433	0.5
29	Anuppur	Pushprajgarh	Basaniha	HP	22.82320	81.91100	27.9	7.83	625	0	305	30	12	8	0.25	0	34	50	12	5	123	0.1	406	1.53
30	Anuppur	Pushprajgarh	Bhejari	HP	22.91860	81.69800	26.4	7.87	540	0	256	25	17	7	0.33	0	46	125	32	11	67	3	351	0.46
31	Anuppur	Jaithari	Deohara	DW	23.14170	81.59600	26.4	7.5	805	0	110	180	24	45	0.1	0	28	255	72	18	69	4.9	523	0.85
32	Anuppur	Jaithari	Dhangaon	HP	23.03080	81.83940	28.4	7.75	511	0	226	37	11	6	0.87	0.2	41	190	44	19	33	4.3	332	3.82
33	Anuppur	Anuppur	Funga	HP	23.18030	81.81250	28.6	7.33	1350	0	366	230	28	26	0.95	0	33	375	112	23	139	1.8	878	13.02
34	Anuppur	Jaithari	Jamudi	DW	23.06650	81.63250	27.8	7.59	599	0	287	27	15	9	1.63	0	28	230	48	27	40	0.5	389	2.64
35	Anuppur	Anuppur	Jhiriyatola	DW	23.21270	82.10330	28.3	7.63	442	0	207	20	10	6	0.52	0	37	125	38	7	46	4.1	287	0.62
36	Anuppur	Jaithari	Kerar	DW	23.01190	81.60810	26.5	7.41	1151	0	543	72	22	9	0.63	0.1	29	445	136	26	65	1.3	748	3.65
37	Anuppur	Kotma	Kotma	TW	23.19700	81.98250	29.4	7.38	530	0	79	110	19	30	0.14	0	31	205	46	22	26	2.3	345	0.6
38	Anuppur	Jaithari	Lapta	DW	22.98570	81.88790	26.5	7.52	888	0	305	110	23	13	0.88	0	32	300	84	22	68	2.2	577	5.04
39	Anuppur	Anuppur	Muddhoba	HP	23.25140	81.88410	29	7.66	1331	0	311	255	27	29	0.41	0	22	515	172	21	69	1.2	865	4.2
40	Anuppur	Jaithari	Murra Tola	DW	23.05660	81.79430	27.9	7.44	312	0	98	40	13	4	0.55	0.2	28	105	24	11	24	3.1	203	0.22
41	Anuppur	Kotma	Nagara Bandh	TW	23.24860	82.08800	28.1	7.48	885	0	293	117	26	7	0.89	0	31	290	74	26	72	1.3	575	5.97
42	Anuppur	Pushprajgarh	Piparaha	DW	22.85630	81.64370	23.6	7.59	582	0	244	42	19	8	0.15	0	26	270	66	26	11	0.9	378	1.24
43	Anuppur	Pushprajgarh	Podki	HP	22.78440	81.72900	26.3	7.69	564	0	238	35	28	9	0.41	0.1	37	235	56	23	22	0.5	367	0.81

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
44	Anuppur	Pushprajgarh	Rajendra Gram	HP	22.93740	81.60640	29.4	7.48	590	0	146	100	21	13	0.12	0	41	275	68	26	9	0.7	384	0.74
45	Anuppur	Jaithari	Venkat Nagar	HP	22.92290	81.87330	27.6	7.65	575	0	287	20	17	7	0.39	0	20	230	52	24	26	0.9	374	1.56
46	Ashok Nagar	Mungoali	Athaikhera	DW	24.43000	77.81600	25.7	8	1005	0	494	50	15	3	0.02	0	21	375	122	17	55	0.5	653	3.53
47	Ashok Nagar	Mungoali	Bahadurpur	DW	24.34200	77.96900	26	8.1	1612	0	586	170	29	54	0.41	0	33	460	104	49	155	2.5	1048	2.46
48	Ashok Nagar	Ashok Nagar	Barkheda	DW	24.57100	77.80600	27.1	8.02	510	0	195	30	19	30	0.79	0	37	190	50	16	28	1.1	332	2.21
49	Ashok Nagar	Chanderi	Chanderi	DW	24.71200	78.13600	27.9	7.74	750	0	256	62	15	72	0.29	0	42	175	50	12	59	54.3	488	4.22
50	Ashok Nagar	Mungoali	Damdama	DW	24.36600	77.87500	25.5	7.71	492	0	366	27	12	0	0.3	0.1	22	265	84	13	43	1.4	320	1.8
51	Ashok Nagar	Isagarh	Dhakoni	HP	24.76280	77.85560	28	7.66	610	0	281	20	20	26	0.25	0	28	190	52	15	50	2.7	397	0.62
52	Ashok Nagar	Isagarh	Isagarh NEW	DW	24.83820	77.88770	28.3	8.12	920	0	384	70	17	22	0.22	0	31	335	64	43	55	1.2	598	0.88
53	Ashok Nagar	Mungoali	Khalilpur	BW	24.56000	78.08990	28.8	8.24	686	0	323	57	28	14	0.25	0.2	47	260	78	16	56	4.5	446	1.77
54	Ashok Nagar	Mungoali	Mungaoli	DW	24.40300	78.10900	28.3	7.69	1310	0	433	152	20	75	0.8	0	36	430	128	27	100	4.9	852	1.23
55	Ashok Nagar	Isagarh	Pachlana	DW	24.78100	77.80300	26.9	7.66	625	0	293	30	18	2	0.57	0	28	205	54	17	45	3.3	406	1.32
56	Ashok Nagar	Ashok Nagar	Ratikheda	BW	24.59650	77.67400	28.8	7.52	410	0	98	60	10	30	0.25	0	22	160	42	13	20	1.45	267	3.4
57	Ashok Nagar	Mungoali	Sahrai	DW	24.52900	78.10200	28	7.44	396	0	384	52	23	12	0.25	0	46	250	76	15	79	5.4	257	2.49
58	Ashok Nagar	Ashok Nagar	Sankat Mochan	DW	24.61500	77.73100	27.9	8	802	0	403	25	17	15	0.58	0	44	235	64	18	75	0.9	521	1.49
59	Ashok Nagar	Isagarh	Saraskheri	HP	24.73360	77.78790	27.2	7.92	765	0	384	20	11	30	0.45	0	37	275	78	19	48	1	497	2.2
60	Ashok Nagar	Mungoali	Sehpura Chak	DW	24.45300	78.10000	27.5	7.59	502	0	323	20	8	17	0.65	0.1	28	230	54	23	44	0.9	326	1.68
61	Ashok Nagar	Ashok Nagar	Semrisehbad	HP	24.62757	77.56520	26.2	8.08	720	0	275	62	15	32	0.19	0	23	275	76	21	37	1.2	468	1.37
62	Ashok Nagar	Ashok Nagar	Shadora	HP	24.62162	77.56510	26.1	7.61	1180	0	360	177	12	27	0.41	0	38	425	134	22	75	1.2	767	6.28
63	Ashok Nagar	Isagarh	Shankarpur	DW	24.75500	77.92100	28.8	7.21	362	0	122	30	12	20	0.31	0	33	150	30	18	12	1.6	235	0.27
64	Balaghat	Waraseoni	Amai	HP	21.68130	79.96780	27	7.89	1310	0	445	147	32	47	0.82	0.12	34	435	90	51	99	1.3	852	0.37
65	Balaghat	Lanji	Baghatola	BW	21.39770	80.57570	26	7.74	575	0	189	67	15	14	0.13	0.11	36	175	38	19	49	1	374	0.07
66	Balaghat	Paraswada	Bagholi	HP	22.14260	80.37020	27	8.02	735	0	360	17	29	3	0.22	0.14	28	140	30	16	101	1.4	478	0.52
67	Balaghat	Baihar	Baihar1	HP	22.09820	80.54980	27	7.94	1196	0	323	162	23	68	0.64	0	25	330	86	28	118	3.7	777	4.09
68	Balaghat	Balaghat	Balaghat	HP	21.81260	80.18290	26	7.83	798	0	226	117	27	4	0.21	0.12	29	215	44	26	80	1.9	519	0.48
69	Balaghat	Baihar	Bhaisanghat	DW	22.19390	80.72280	27	7.69	533	0	232	32	15	5	0.24	0	31	185	48	16	34	1.3	346	0.17
70	Balaghat	Kirnapur	Bhanegaon	HP	21.55500	80.40730	27	7.71	724	0	214	92	26	21	0.28	0.13	21	210	46	23	65	3.1	471	0.19
71	Balaghat	Birsa	Birsa	DW	22.04420	80.71750	27	7.85	386	0	159	15	18	12	1.38	0	29	125	32	11	26	1.4	251	0.12
72	Balaghat	Khairlanji	Bonkatta	DW	21.61150	79.76090	26	8.05	864	0	329	72	33	15	0.86	0	32	240	50	28	83	1.5	562	2.3
73	Balaghat	Birsa	Damoh2	HP	21.89790	80.79390	26.9	7.6	777	0	159	137	9	47	0.31	0.15	25	175	36	21	95	2	505	0.38
74	Balaghat	Khairlanji	Garraghoda	HP	21.63370	79.79020	27	8.25	631	0	238	57	20	10	1.03	0.21	23	195	44	21	54	1.8	410	1.35
75	Balaghat	Baihar	Jawaditula	DW	22.23630	80.87170	25.6	7.93	658	0	244	52	30	16	0.1	0.16	24	225	52	23	44	3.7	428	0.52
76	Balaghat	Lalbarra	Kanjai	HP	22.03150	79.97480	27	7.92	747	0	366	25	16	12	1.03	0.11	42	275	68	26	42	1.2	486	2.4
77	Balaghat	Waraseoni	Kanki	HP	21.84360	80.13980	27	8	638	0	275	35	24	8	0.19	0.13	33	155	32	18	71	1.3	415	0.27
78	Balaghat	Lalbarra	Katang Tola	HP	21.95940	80.03970	27	8.06	513	0	189	47	19	10	0.34	0	24	175	36	21	35	2.1	333	3.77
79	Balaghat	Katangi	Katangi	HP	21.77740	79.80800	27	7.58	1031	0	397	95	31	19	0.7	0.16	26	290	68	29	102	1.3	670	6.87
80	Balaghat	Katangi	Katedhara	HP	21.71140	79.79200	26.9	7.19	524	0	207	45	14	9	0.97	0.21	20	145	32	16	50	2.7	341	7.22
81	Balaghat	Khairlanji	Khairlanji	HP	21.59830	79.97500	27	7.76	1696	0	256	415	12	24	0.9	0.11	26	230	54	23	279	5.5	1102	5.27
82	Balaghat	Paraswada	Khurmundi	HP	22.12600	80.47600	26.9	7.73	579	0	122	77	23	55	0.77	0.18	19	160	48	10	55	3.2	376	0.21
83	Balaghat	Kirnapur	Kirnapur	HP	21.62660	80.32760	27	7.23	764	0	323	42	33	17	0.26	0	31	265	62	27	49	2.9	497	0.31
84	Balaghat	Waraseoni	Kochwahi	HP	21.79170	79.92500	27	7.8	273	0	110	15	10	12	0.12	0	23	90	24	7	19	1.5	177	0.41
85	Balaghat	Balaghat	Lamta1	HP	22.13650	80.12510	26.9	7.96	700	0	275	65	19	6	0.42	0	34	230	46	28	53	1.9	455	21.16
86	Balaghat	Baihar	Laugur	HP	21.93150	80.35020	26.7	7.81	453	0	195	17	23	8	0.39	0	22	140	32	15	36	2.9	294	0.45
87	Balaghat	Balaghat	Magardarta	HP	21.96560	80.12460	27	7.82	1720	0	537	217	62	36	0.48	0	39	560	144	49	136	1.6	1118	0.26

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC μS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
88	Balaghat	Khairlanji	Miragpur	HP	21.63590	79.83780	27	7.54	1951	0	250	432	29	103	1.09	0.11	28	320	84	27	296	1.5	1268	16.37
89	Balaghat	Baihar	Mohagaon	HP	22.05590	80.67580	27	7.56	726	0	116	132	32	42	0.65	0.14	25	155	34	17	91	2	472	0.34
90	Balaghat	Baihar	Mukki	HP	22.15440	80.67210	27	7.96	789	0	329	55	18	20	0.32	0.17	41	240	48	29	66	2.1	513	0.52
91	Balaghat	Lanji	Nandora	HP	21.52190	80.61020	27	8.11	633	0	262	35	24	18	0.84	0	25	195	40	23	52	2.8	411	0.52
92	Balaghat	Waraseoni	Newargaon	HP	21.81220	80.04130	27	7.83	1930	0	342	395	26	90	0.37	0	23	385	78	46	261	6.4	1255	8.55
93	Balaghat	Lanji	Paldongri	HP	21.47090	80.48440	26.9	7.98	1172	0	329	180	33	17	0.92	0	27	295	64	33	130	2.7	762	4.14
94	Balaghat	Paraswada	Paraswara	HP	22.17770	80.30070	27	7.92	526	0	128	65	18	42	0.39	0	24	155	32	18	44	4	342	2.02
95	Balaghat	Baihar	Parsatola	HP	22.01110	80.54480	27	7.38	354	0	79	47	21	18	0.24	0.18	18	100	24	10	33	1.6	230	0.31
96	Balaghat	Kirnapur	Rajegaon	HP	21.63040	80.24810	27	7.5	1600	0	348	312	11	64	0.54	0.12	27	345	82	34	206	3.4	1040	10.15
97	Balaghat	Khairlanji	Rampalli	DW	21.66530	80.01630	24.9	7.58	439	0	134	52	8	25	0.13	0.16	19	135	28	16	36	2.2	285	0.35
98	Balaghat	Paraswada	Rangpatbaba	HP	22.15000	80.21210	27	7.97	642	0	275	32	30	13	1.23	0.21	25	190	38	23	55	3.2	417	1.19
99	Balaghat	Balaghat	Saleteka New	DW	21.70640	80.22460	25.3	7.84	687	0	256	67	19	9	0.8	0	31	205	42	24	59	1.9	447	1.56
100	Balaghat	Baihar	Samnapur	HP	21.96980	80.48760	27	7.54	412	0	85	57	24	21	0.42	0	27	110	24	12	40	3.3	268	1.41
101	Balaghat	Baihar	Supkhar	HP	22.19320	80.93490	27	7.95	442	0	171	25	25	9	0.74	0	29	130	28	15	38	2.7	287	1.91
102	Balaghat	Waraseoni	Waraseoni1	HP	21.76440	80.05080	27	7.71	505	0	134	75	16	15	0.16	0.22	17	95	20	11	68	5.4	328	1.2
103	Barwani	Rajpur	Balsamund	BW	21.81000	75.17500	29.5	8	1079	0	429	38	20	122	0.56	0.1	30	297	91	17	122	2.3	701	0.04
104	Barwani	Thikri	Baruphatak	DW	21.98100	75.30300	29.1	7.89	1163	0	374	53	13	224	0.57	0	20	530	164	29	43	1.2	756	0.33
105	Barwani	Sendhawa	Bijasanmataji	DW	21.56610	75.05170	29.6	7.83	559	0	236	45	23	5	0.27	0	22	183	42	19	48	1.8	363	0.09
106	Barwani	Thikri	Borlai	DW	22.03900	75.00200	28.8	7.78	1502	0	368	207	16	130	0.57	0	22	223	57	19	247	2.4	976	1.73
107	Barwani	Sendhawa	Chachariya	DW	21.56900	75.32400	28.5	7.8	569	0	211	25	34	34	0.22	0	35	144	32	16	68	1.3	370	0.07
108	Barwani	Pati	Chouki	DW	21.88800	74.66140	27.2	7.6	999	0	374	76	19	66	0.63	0	21	416	139	17	43	2.3	649	0.49
109	Barwani	Sendhawa	Joganwada	DW	21.73990	75.04380	28.5	7.84	797	0	236	71	26	65	0.42	0	43	277	63	29	43	3.2	518	0.16
110	Barwani	Rajpur	Julwania	BW	21.87100	75.18500	27.9	7.92	1159	0	495	25	22	132	0.96	0	25	446	147	19	66	2.2	753	0.19
111	Barwani	Niwali	Khadikham	DW	21.64560	74.81290	28.2	7.76	612	0	230	40	22	34	0.27	0	26	238	48	29	38	1.2	398	0.65
112	Barwani	Sendhawa	Khadkiya	DW	21.64350	75.07020	28.5	7.83	602	0	284	20	21	14	0.35	0	27	178	44	17	56	2.6	391	1.07
113	Barwani	Pansemal	Mortalai	BW	21.71070	74.62430	29.1	7.57	1162	0	368	109	17	111	0.25	0	27	233	44	30	152	1.4	755	0.26
114	Barwani	Rajpura	Mundla	DW	21.95970	75.24010	29.1	7.5	1052	0	447	73	20	12	0.54	0.1	35	178	46	16	149	2.3	684	0.54
115	Barwani	Newali	Niwali1	DW	21.68300	74.92300	29.3	8	1529	0	453	210	19	86	0.52	0	34	203	44	23	256	2.3	994	0.62
116	Barwani	Barwani	Osada	DW	21.96950	74.80250	28.6	7.65	982	0	411	33	15	102	0.55	0	38	411	137	17	32	2.4	638	0.1
117	Barwani	Rajpur	Palsud	DW	21.82300	74.96500	29.1	8.1	1239	0	501	109	17	34	0.3	0.2	45	441	143	20	81	2.2	805	0.44
118	Barwani	Pansemal	Pansemal	DW	21.66830	74.71220	31.2	7.68	1064	0	302	129	27	125	0.38	0	42	381	123	18	86	1.3	692	0.02
119	Barwani	Rajpur	Rajpur	DW	21.93600	75.13600	28.7	7.83	1248	0	344	172	22	77	0.53	0	41	59	14	6	256	2.1	811	0.67
120	Barwani	Sendwa	Sendwa	BW	21.72070	75.11790	28.6	8.07	702	0	145	91	12	92	0.35	0	36	158	42	13	89	2.3	456	0.37
121	Barwani	Rajpur	Talwada Deb	DW	22.06830	75.18350	29.2	7.76	623	0	230	20	36	56	0.62	0	29	262	61	26	26	1.3	405	0.03
122	Barwani	Thikri	Thikri	DW	22.07250	75.37880	28.7	7.82	1082	0	501	43	21	21	0.66	0	31	129	28	14	189	1.2	703	1.12
123	Betul	Athner	Athner1	DW	21.63300	77.91690	28.7	7.06	682	0	189	82	25	45	0.67	0	23	230	46	28	53	1.2	443	0.26
124	Betul	Betul	Betul1	DW	21.86020	77.92690	29.1	7.58	1262	0	140	275	30	120	0.59	0.1	21	400	128	19	106	2.8	820	21.2
125	Betul	Bhainsdehi	Bhainsdehi1	DW	21.64440	77.63660	29	7.65	510	0	140	72	20	16	0.48	0	36	120	38	6	63	0.8	332	5.63
126	Betul	Shahpur	Bhonra	DW	22.27770	77.86970	30	7.83	1300	0	311	252	30	10	1.33	0	29	255	72	18	182	1.7	845	13.65
127	Betul	Chicholi	Chirapatala	DW	22.10810	77.49650	29.9	7.48	541	0	262	20	10	19	0.27	0	35	230	48	27	20	1.1	352	0.89
128	Betul	Chicholi	Gadha	DW	21.91470	77.74800	28.4	7.78	630	0	311	25	5	22	0.69	0	41	245	64	21	31	1.4	410	1.56
129	Betul	Multai	Ghatpiparia	DW	21.88220	78.51860	30.2	7.66	999	0	250	102	23	148	0.22	0	31	505	164	23	7	1.6	649	0.32
130	Betul	Ghoradongri	Ghoradongri	DW	22.12110	78.00470	28.4	7.34	1370	0	451	202	20	8	0.44	0	26	400	126	21	129	2.3	891	5.26
131	Betul	Bhainsdehi	Gudagaon	DW	21.59160	77.71030	28	7.72	656	0	268	45	15	35	0.12	0	42	300	84	22	16	1.4	426	2.68

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
132	Betul	Athner	Gujarmaal	DW	21.63020	77.94630	29.2	7.77	826	0	275	85	25	49	0.57	0.1	22	305	86	22	52	1.9	537	0.56
133	Betul	Bhainsdehi	Jhallar	DW	21.73010	77.74010	29.4	7.71	600	0	140	12	5	202	0.34	0	31	140	34	13	75	2.7	390	0.61
134	Betul	Chicholi	Jogli	HP	21.97520	77.70130	29	7.43	1170	0	439	102	30	58	1.34	0	27	360	116	17	106	1.8	761	1.13
135	Betul	Multai	Junapani	DW	21.72060	78.35330	31	7.76	580	0	262	27	9	31	0.32	0	22	265	68	23	14	1.8	377	0.23
136	Betul	Multai	Kapasia	DW	21.83050	78.41520	30.9	7.95	630	0	336	17	10	7	0.54	0	24	125	32	11	87	3	410	2.23
137	Betul	Betul	Khedi	DW	21.85660	77.80270	28	7.95	745	0	366	40	5	13	1.43	0	31	245	58	24	59	2.8	484	2.52
138	Betul	Chicholi	Khokharkheda	DW	22.20770	77.41880	31	7.59	425	0	165	20	29	23	0.57	0	29	190	46	18	9	3.5	276	2.96
139	Betul	Betul	Kolgaon	DW	21.76860	77.89380	31.2	7.77	332	0	92	52	10	9	1.4	0.2	46	30	8	2	68	2.1	216	1.23
140	Betul	Bhainsdehi	Kotal Kund	DW	21.46300	77.65830	30	7.71	780	0	378	25	11	39	0.26	0	39	300	90	18	39	2.3	507	0.36
141	Betul	Prabhat Pattam	Masod New	DW	21.60280	78.11770	28.4	7.65	645	0	305	15	16	37	0.46	0	27	295	64	33	12	1.9	419	1.53
142	Betul	Multai	Multaidw	DW	21.76690	78.26690	29.2	7.79	555	0	146	82	30	7	0.75	0	25	100	24	10	78	3	361	0.52
143	Betul	Chicholi	Nimpani	DW	22.07160	77.87500	29	7.4	661	0	342	22	10	8	0.24	0	20	285	72	26	19	3.1	430	4.32
144	Betul	Chicholi	Pathakhera	DW	22.06770	77.53360	28	7.66	480	0	256	12	5	9	0.31	0	31	155	46	10	39	2.5	312	1.42
145	Betul	Prabhat Pattam	Pattan	DW	21.65080	78.26610	30.1	7.75	490	0	220	37	6	10	0.49	0.2	44	155	48	9	41	2.9	319	1.56
146	Betul	Bhainsdehi	Sanwal Medha	DW	21.51360	77.69940	30.2	7.35	1040	0	433	90	30	8	0.21	0	28	330	102	18	86	2.6	676	0.82
147	Betul	Ghoradongri	Sarni	DW	22.11830	78.14250	29.3	7.36	680	0	329	22	29	9	0.13	0	35	305	98	15	16	3.1	442	1.98
148	Betul	Multai	Sasundra	DW	21.84660	78.09190	28	7.66	401	0	146	32	25	10	0.67	0	22	80	22	6	56	3	261	0.98
149	Betul	Shahpur	Shahpur	DW	22.18940	77.90410	30	7.42	1040	0	415	110	13	17	0.43	0	31	350	104	22	79	3.1	676	5.36
150	Betul	Betul	Thapa	DW	21.85640	77.99120	29.6	7.73	666	0	336	17	21	11	0.36	0	29	260	68	22	32	2.9	433	3.23
151	Bhind	Lahar	Alampur	HP	26.02840	78.79820	28.1	7.52	1589	0	512	197	42	22	0.92	0.11	31	265	68	23	238	0.9	1033	11.34
152	Bhind	Ater	Ater	HP	26.74790	78.63720	28.4	7.58	1185	0	439	127	18	29	0.32	0.15	26	315	90	22	125	2	770	1.45
153	Bhind	Lahar	Balaji	HP	26.29670	78.97880	27.6	7.9	3573	0	519	870	37	62	0.57	0.08	40	915	244	74	396	2	2322	6.28
154	Bhind	Gohad	Bhagathar	BORE	26.34480	78.49040	27.8	7.99	850	0	378	30	45	19	0.64	BDL	26	185	42	19	109	0.4	553	4.1
155	Bhind	Gohad	Bhirkhari	DW	26.47670	78.47490	27.9	8.03	2045	0	909	157	24	18	1.17	0.24	39	265	70	22	345	0.9	1329	18.98
156	Bhind	Mehgaon	Chirole	HP	26.35460	78.63170	27.8	7.43	2125	0	299	417	38	151	0.32	BDL	27	470	104	51	250	0.6	1381	6.39
157	Bhind	Lahar	Daboh	BORE	25.99190	78.87180	28.1	8.02	903	0	433	32	25	18	0.4	0.21	41	240	60	22	95	1	587	0.45
158	Bhind	Lahar	Dewri	HP	26.08100	78.90110	28.2	7.96	932	0	409	55	24	18	0.56	BDL	42	265	68	23	88	0.9	606	0.41
159	Bhind	Mehgaon	Gormi	HP	26.59920	78.50620	27.9	7.94	1355	0	500	135	32	25	0.41	BDL	39	410	128	22	118	0.9	881	6.13
160	Bhind	Gohad	Khader	DW	26.36950	78.36950	28.9	8.02	1210	0	299	207	39	13	0.83	0.14	27	310	88	22	132	2	787	4.89
161	Bhind	Lahar	Lahar	HP	26.18850	78.94520	27.3	7.38	2022	0	378	247	47	110	0.57	BDL	22	645	136	74	62	6	1314	8.04
162	Bhind	Ater	Lavan	HP	26.54270	78.73950	26.9	7.57	3595	0	708	722	45	106	0.06	0.16	40	775	158	92	465	1	2337	4.59
163	Bhind	Gohad	Mau	BORE	26.27240	78.66510	26.8	7.91	1889	0	543	260	55	24	0.71	BDL	34	285	84	18	295	2	1228	7.56
164	Bhind	Mehgaon	Mehgaon	BORE	26.49840	78.61430	28.1	7.19	3054	0	1122	345	39	42	1.39	BDL	29	235	62	19	589	2	1985	30.83
165	Bhind	Mehgaon	Meroli	HP	26.51850	78.57040	28.8	8.01	1920	0	781	157	37	33	1.36	0.11	43	205	46	22	342	2	1248	17.47
166	Bhind	Bhind	Nahrakapura	HP	26.62290	78.93130	28.4	7.96	1880	0	714	180	38	47	1.35	BDL	47	155	38	15	358	1	1222	8.39
167	Bhind	Bhind	Phuph	HP	26.64290	78.87880	28.3	8.08	4144	0	933	672	189	102	1.21	0.15	25	910	298	40	529	2	2694	12.74
168	Bhind	Ron Mihona	Ratanpura	HP	25.96700	78.82550	27.3	7.81	948	0	372	57	44	35	0.44	BDL	38	280	76	22	85	2	616	2.52
169	Bhopal	Berasia	Amlia	DW	23.87000	77.24800	28.8	7.16	642	0	305	17	20	32	0.79	0.1	25	290	68	29	18	0.8	417	1.44
170	Bhopal	Phanda	Ayodhya Nagar	BW	23.25630	77.47800	28.5	7.48	1131	0	323	177	30	23	0.64	0.1	16	415	124	26	69	0.3	735	9
171	Bhopal	Phanda	Bairagarh	DW	23.27300	77.35200	27.9	7.75	1305	0	378	210	15	12	0.55	0.5	11	490	136	36	70	4.9	848	7.02
172	Bhopal	Phanda	Balampurghati	DW	23.39700	77.54200	28.5	8.12	440	0	153	52	10	10	0.48	0.1	16	175	30	24	20	0.2	286	3.22
173	Bhopal	Phanda	BarkhedaPathani	DW	23.22840	77.46660	28	8.02	1100	0	384	105	35	28	1.01	0.1	21	410	70	57	60	0.6	715	0.95
174	Bhopal	Phanda	Barkhera	BW	23.23100	77.46800	28.4	7.66	368	0	122	40	18	8	0.23	0.1	20	130	28	15	23	2.7	239	0.34
175	Bhopal	Berasia	Berasia	DW	23.62300	77.43100	28.8	7.68	820	0	317	80	20	9	0.47	0.1	16	340	70	40	29	2.2	533	1.25

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
176	Bhopal	Phanda	Bilkhiria	HP	23.25570	77.58000	27.5	7.51	867	0	342	82	20	13	0.44	0.1	15	340	92	27	42	0.4	564	1.67
177	Bhopal	Phanda	Chichli	DW	23.20900	77.37600	28.9	7.11	216	0	55	27	25	8	0.25	0.1	11	65	14	7	24	0.9	140	0.11
178	Bhopal	Phanda	Dig Bangla	DW	23.27800	77.40400	27.8	7.98	1090	0	494	82	20	6	0.8	0.2	12	290	68	29	119	1.2	709	1
179	Bhopal	Phanda	E- 2 Nursery	DW	23.22000	77.43700	26.9	7.64	830	0	360	55	30	12	0.68	0.1	19	330	86	28	38	1.1	540	2.18
180	Bhopal	Phanda	Gandhi Nagar	BW	23.23600	77.34600	28	7.77	372	0	104	37	40	7	0.41	0.1	12	115	22	15	35	3.7	242	0.19
181	Bhopal	Berasia	Gunga	BW	23.44950	77.35980	28.1	8.12	685	0	177	92	45	20	0.5	0.4	19	200	36	27	63	2.1	445	1.53
182	Bhopal	Phanda	Islamnagar	HP	23.35720	77.41600	28.5	7.65	1450	0	470	195	10	50	0.5	0.4	16	530	164	29	84	2.3	943	2.16
183	Bhopal	Phanda	Lal Ghati	DW	23.27700	77.37600	27.9	7.54	618	0	177	92	40	15	0.24	0.4	26	225	54	22	49	6	402	0.66
184	Bhopal	Phanda	Nabibagh	DW	23.30800	77.40400	28.1	7.65	1140	0	323	190	18	17	0.63	0.4	16	405	108	33	74	1.9	741	3.41
185	Bhopal	Berasia	Nagirabad	DW	23.79400	77.25600	28.8	7.82	1208	0	323	195	14	32	0.83	0.3	15	450	142	23	65	1.4	785	2.87
186	Bhopal	Phanda	Nipaniya Jaat	HP	23.41010	77.39890	28.3	7.88	985	0	372	75	38	41	0.39	0.3	22	360	116	17	58	1.4	640	1.31
187	Bhopal	Phanda	Patel Nagar	BW	23.24920	77.49540	28.8	7.43	1000	0	323	137	17	20	0.35	0.3	19	390	126	18	47	2	650	10.68
188	Bhopal	Phanda	Piplani	DW	23.21400	77.47500	28	7.79	472	0	183	42	20	8	0.28	0.2	18	180	44	17	26	3.4	307	0.9
189	Bhopal	Berasia	Ramgarha	HP	23.65420	77.35180	29	7.9	940	0	415	37	40	38	0.84	0.2	30	280	76	22	85	1.3	611	1.22
190	Bhopal	Phanda	Sarvar	HP	23.15600	77.30000	29.4	7.54	654	0	232	57	10	48	0.39	0.2	18	270	42	40	24	2.5	425	1.81
191	Bhopal	Phanda	Shahjahana Bad	DW	23.26600	77.39800	30.1	7.59	843	0	293	112	15	9	0.24	0.5	19	235	58	22	86	1.8	548	0.49
192	Bhopal	Phanda	Shahpura	BW	23.20700	77.42300	29.2	7.89	1254	0	500	132	15	8	0.24	0.2	12	445	98	49	80	2.4	815	0.67
193	Bhopal	Phanda	South T T Nagar	DW	23.23100	77.40700	29.1	7.56	815	0	329	70	20	7	0.87	0.1	19	280	96	10	55	2.7	530	2.37
194	Bhopal	Berasia	Suhaya Kala	DW	23.74400	77.51000	31.2	8.1	543	0	250	30	10	17	0.33	0.1	23	170	52	10	46	2.1	353	0.55
195	Burhanpur	Burhanpur	Bahadurpur1	HP	21.29140	76.18030	27.5	7.93	1111	0	171	240	55	21	0.82	0.1	38	230	60	19	150	1	722	0.92
196	Burhanpur	Burhanpur	Bahadurpur1	HP	21.28800	76.17940	28	7.51	758	0	329	30	23	49	0.19	0.1	32	305	84	23	32	2.1	493	
197	Burhanpur	Burhanpur	Burhanpur New	HP	21.30020	76.22100	28.2	8.04	786	0	317	50	25	43	0.39	0.1	36	295	82	22	50	1	511	0.35
198	Burhanpur	Burhanpur	Burhanpurdw	BW	21.33410	76.23990	28	7.7	1048	0	415	70	25	66	0.31	0.1	37	410	128	22	51	1	681	1.95
199	Burhanpur	Burhanpur	Chandnidw	BW	21.42810	76.35060	29	8.19	676	0	262	62	20	14	0.56	0.1	31	180	60	7	75	0.8	439	0.36
200	Burhanpur	Khaknar	Dedtalai	BW	21.49520	76.76470	27.2	7.72	1794	0	494	235	70	106	0.26	0.2	33	605	210	19	132	2.3	1166	1.65
201	Burhanpur	Burhanpur	Dehnala	HP	21.53510	76.31030	26.5	8.04	632	0	317	27	10	10	0.61	0.1	45	155	36	16	75	1.2	411	0.26
202	Burhanpur	Burhanpur	Ichhapur	DW	21.15080	76.15570	28.1	7.93	927	0	238	142	35	35	0.81	0.1	26	265	62	27	91	1.4	603	0.86
203	Burhanpur	Burhanpur	Jhiri	DW	21.54750	76.26630	28.6	7.43	1372	0	439	202	25	9	0.65	0	21	405	120	26	129	2.1	892	0.26
204	Burhanpur	Khaknar	Karkheda	BW	21.33570	76.48290	28.2	7.79	1065	0	342	100	30	94	0.19	0.2	28	440	132	27	42	1.7	692	3.56
205	Burhanpur	Khaknar	Khaknardw	DW	21.36520	76.55940	27.5	7.54	958	0	336	102	30	32	0.36	0.1	32	395	114	27	38	1.9	623	0.23
206	Burhanpur	Khaknar	Manjrod Kalan	BW	21.41150	76.62460	28.2	7.68	1562	0	512	160	12	149	0.4	0.1	26	675	224	28	56	2	1015	0.69
207	Burhanpur	Burhanpur	Nachankheda	HP	21.23360	76.15110	27.8	8.03	1612	0	561	150	23	137	0.36	0.1	32	455	140	26	162	1.6	1048	3.26
208	Burhanpur	Khaknar	Nepa Nagar	HP	21.45370	76.39040	27	7.9	511	0	226	27	20	10	0.2	0.1	24	185	46	17	41	2	332	0.65
209	Burhanpur	Khaknar	Pipalpani	DW	21.43420	76.69880	26.7	7.36	1210	0	293	147	18	107	0.49	0.1	28	475	146	27	58	1.3	787	0.68
210	Burhanpur	Khaknar	Shekhpura	HP	21.55210	76.73430	28.2	7.32	1172	0	336	175	14	28	0.25	0.1	36	425	124	28	75	1.2	762	0.52
211	Burhanpur	Khaknar	Sirpur	HP	21.30160	76.38180	27.9	7.57	1234	0	409	175	19	17	0.31	0.1	29	425	126	27	107	2.7	802	0.85
212	Burhanpur	Khaknar	Tukai Thad	DW	21.42860	76.65320	27	7.87	742	0	342	35	17	30	0.23	0.2	33	290	68	29	45	1.3	482	0.62
213	Chhatarpur	Buxwaha	Amodha	DW	24.19944	79.32611	28.2	7.53	865	0	368	50	20	41	0.08	0	26	310	80	27	55	5.1	562	1.64
214	Chhatarpur	Bijawar	Bijawar	DW	24.65028	79.49806	28.4	7.67	1611	0	604	177	13	54	1.06	0	42	670	224	27	61	4.7	1047	18.06
215	Chhatarpur	Buxwaha	Buxwaha	DW	24.24861	79.28722	28.5	7.96	900	0	477	17	9	23	0.97	0	32	260	68	22	86	4	585	2.55
216	Chhatarpur	Laundi	Chandla	DW	25.06722	80.19444	29.3	7.58	672	0	296	52	12	7	0.69	0.1	29	215	56	18	65	1.9	437	0.38
217	Chhatarpur	Rajnagar	Chandra Nagar	DW	24.75000	79.95889	29.5	7.58	940	0	368	90	23	15	0.73	0	37	220	58	18	113	4.5	611	0.27
218	Chhatarpur	Chhatarpur	Chhatarpur	DW	24.90000	79.59111	29.2	7.6	1385	0	320	250	29	53	0.24	0	33	415	128	23	129	5.7	900	2.52
219	Chhatarpur	Buxwaha	Gadhoi	DW	24.29472	79.22722	28.6	7.89	913	0	471	17	21	23	0.53	0	29	265	72	21	95	4.3	593	1.71

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
220	Chhatarpur	Rajnagar	Ganj	DW	24.79194	79.79528	28.4	7.56	934	0	368	90	19	15	0.74	0	35	230	64	17	111	4.5	607	7.57
221	Chhatarpur	Gaurihar	Gaurihar	DW	25.26833	80.19444	29.3	7.55	1080	0	525	42	11	40	0.46	0	21	195	52	16	156	5.2	702	8.28
222	Chhatarpur	Chhatarpur	Issanagar	DW	24.86194	79.38472	29.5	7.61	1650	0	604	175	8	55	1.21	0	27	700	244	22	63	5.1	1073	14.82
223	Chhatarpur	Bijawar	KhairKalan	DW	24.56222	79.53278	29.2	7.84	785	0	290	87	24	2	0.41	0.1	28	195	50	17	92	6.5	510	0.71
224	Chhatarpur	Rajnagar	Khajuraho	DW	24.84972	79.93111	29.7	7.57	955	0	362	92	28	10	0.77	0	43	245	68	18	109	4.9	621	7.81
225	Chhatarpur	Nowgaon	Kukrel	DW	25.22611	79.34583	29.5	7.66	999	0	495	35	17	24	1.25	0	26	345	92	28	69	4.9	649	5.02
226	Chhatarpur	Chhatarpur	Kurri	DW	24.86806	79.72000	29.2	7.56	1610	0	598	170	24	55	1.95	0	34	650	224	22	68	5.2	1047	13.03
227	Chhatarpur	Laundi	Lavkush Nagar	DW	25.13889	80.00556	29.2	7.74	401	0	169	30	19	6	0.42	0	38	150	36	15	27	6.9	261	7.96
228	Chhatarpur	Nowgaon	Maharajpur	DW	25.02083	79.72556	29.3	7.7	865	0	266	107	26	36	0.42	0	44	260	70	21	77	5.1	562	1.89
229	Chhatarpur	Chhatarpur	Mankari	DW	25.02667	79.79889	29.1	7.51	635	0	248	47	23	16	0.75	0.1	26	180	46	16	68	1.5	413	7.72
230	Chhatarpur	Chhatarpur	Matgawan	DW	24.79778	79.47722	29.2	7.78	768	0	368	32	14	21	0.37	0	20	280	76	22	45	4.6	499	1.52
231	Chhatarpur	Bijawar	Motigarh	DW	24.61333	79.66917	29.2	7.58	930	0	368	90	24	12	0.69	0	31	215	56	18	113	4.7	605	1.79
232	Chhatarpur	Chhatarpur	Niwari1	DW	24.99639	79.65139	29.6	7.81	891	0	453	17	26	21	0.58	0	26	245	62	22	96	4.5	579	1.13
233	Chhatarpur	Nowgaon	Nowgaon	DW	25.05417	79.45000	29.5	7.56	1724	0	513	265	18	55	0.59	0	37	400	122	23	209	6.5	1121	6.31
234	Chhatarpur	Chhatarpur	PiporaKhurd	DW	24.85000	79.48083	29.1	7.51	1385	0	284	240	27	108	0.29	0	29	420	124	27	123	5.3	900	1.92
235	Chhatarpur	Bijawar	Raipura	DW	24.48139	79.72306	29.8	7.54	960	0	374	92	25	15	0.71	0	32	280	68	27	89	4.6	624	1.64
236	Chhatarpur	BadaMalhara	Sadwa	DW	24.47750	79.27500	29.8	7.82	865	0	459	17	10	21	0.84	0.2	44	225	60	18	96	4.5	562	1.63
237	Chhatarpur	Gaurihar	Sarwai	DW	25.18611	80.28722	29.7	7.5	668	0	290	55	19	5	0.55	0	39	210	56	17	64	1.9	434	0.46
238	Chhatarpur	BadaMalhara	Sendpa	DW	24.54694	79.25278	29.5	7.68	1480	0	519	150	29	83	0.19	0	41	255	60	26	222	8.3	962	1.56
239	Chhatarpur	Gaurihar	Singhpur	DW	25.12778	80.24389	29.6	7.23	687	0	236	92	15	32	0.35	0	31	240	58	23	59	5.1	447	0.4
240	Chhatarpur	Bijawar	Tapra Lahar	DW	24.58806	79.60972	28.9	7.64	410	0	163	27	27	4	0.35	0	37	140	24	19	27	6.7	267	10.32
241	Chhatarpur	Nowgaon	Tatampur	DW	25.04472	79.86528	27.4	7.61	420	0	163	30	21	3	1.47	0	26	130	22	18	36	6.4	273	4.35
242	Chhindwara	Amarwara	Amarwara	HP	22.13250	79.16980	27	7.59	855	0	305	75	22	34	0.55	0.3	20	305	88	21	65	1.2	556	0
243	Chhindwara	Pandhurana	Bangaon1	HP	21.56950	78.43840	27	7.59	708	0	329	22	25	8	0.14	0	34	260	76	17	42	3.2	460	1.1
244	Chhindwara	Amarwara	Banjari	DW	22.27110	79.14270	26.1	7.75	746	0	397	22	14	6	0.45	0	22	250	70	18	62	1.9	485	1.56
245	Chhindwara	Pandhurana	Borgaon1	HP	21.56030	78.81400	27	7.92	946	0	275	142	18	4	1.29	0	38	410	136	17	32	2.2	615	0.96
246	Chhindwara	Chaurai	Chaurai1	DW	22.05190	79.26100	26	7.72	1018	0	378	85	5	45	0.75	0	29	375	102	29	57	0.9	662	2.23
247	Chhindwara	Tamia	Chhindi	BW	22.39100	78.82180	26	7.84	509	0	159	22	32	62	0.23	0	24	50	14	4	99	1.7	331	1.52
248	Chhindwara	Chhindwara	Chhindwara	DW	22.04950	78.93350	26.3	7.48	689	0	220	92	16	6	0.4	0	37	270	78	18	42	3.1	448	6.23
249	Chhindwara	Pandhurana	Chinchkheda	BW	21.64090	78.47920	28	7.96	755	0	317	40	14	53	0.4	0.1	26	210	46	23	76	2.6	491	2.23
250	Chhindwara	Pandhurana	Chincholiwad	DW	21.50070	78.69170	27	7.81	692	0	329	40	8	9	0.59	0	36	330	94	23	14	2.3	450	3.26
251	Chhindwara	Jamai	Damua	BW	22.19480	78.47590	27	7.3	765	0	323	65	7	11	0.57	0	38	285	80	21	42	1.9	497	3.21
252	Chhindwara	Tamia	Delakhari	HP	22.41840	78.61790	26.9	7.16	556	0	165	42	24	67	0.1	0	29	185	38	22	46	1.7	361	1.12
253	Chhindwara	Mohkhed	Goni	DW	21.82330	79.01380	25.9	7.84	641	0	287	22	25	59	0.89	0	37	240	58	23	47	3.2	417	1.11
254	Chhindwara	Harai	Harraidw	HP	22.61210	79.22240	27	7.62	1104	0	390	142	18	8	0.14	0	34	400	116	27	66	3.6	718	2.63
255	Chhindwara	Jamai	Jamai	HP	22.19420	78.59780	27	7.39	843	0	317	62	27	41	0.26	0	26	230	54	23	89	2.4	548	1.02
256	Chhindwara	Chhindwara	Jamunia Ner	DW	22.13780	79.02340	27	7.38	898	0	415	32	34	26	0.51	0	35	330	96	22	54	2.9	584	1.32
257	Chhindwara	Harai	Kundali	BW	22.77630	79.22700	26.8	7.6	587	0	281	32	18	22	0.15	0	39	235	56	23	37	2.1	382	0
258	Chhindwara	Parasia	Lahgudna	DW	22.27410	78.71930	25	7.59	622	0	207	35	13	87	0.04	0	27	200	46	21	53	1.3	404	0
259	Chhindwara	Mohkhed	Linga Rly.Stn.	HP	21.96460	78.92930	27	7.57	1345	0	342	185	14	116	0.26	0.2	38	470	152	22	82	3.6	874	2.19
260	Chhindwara	Tamia	Mahaljhir	HP	22.60920	78.56960	27	7.64	2586	0	824	425	15	37	1.31	0	37	700	240	24	298	2.9	1681	6.32
261	Chhindwara	Chaurai	Marka Handi	DW	22.04860	79.17680	25.3	7.59	845	0	342	77	9	13	0.48	0	26	320	98	18	43	3.2	549	2.36
262	Chhindwara	Chaurai	Markadhana	BW	22.05850	79.10430	26	7.92	589	0	116	70	52	45	1.36	0	25	55	16	4	109	3.1	383	
263	Chhindwara	Pandhurana	Mohi	DW	21.66600	78.43750	25.9	7.77	812	0	378	22	7	64	0.55	0	33	270	76	19	63	1.9	528	1.23

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
264	Chhindwara	Pandhurana	Pandurna	DW	21.59150	78.51210	25.1	7.57	1245	0	397	92	8	190	0.4	0	20	390	118	23	107	1.8	809	0
265	Chhindwara	Pandhurana	Piplanarayanwar	HP	21.59190	78.73350	27	7.62	1363	0	458	180	11	87	0.23	0	40	635	174	49	47	1.3	886	3.23
266	Chhindwara	Pandhurana	Rajna	DW	21.52900	78.64010	27.1	7.72	955	0	360	100	16	12	0.05	0	30	360	112	19	62	2.4	621	1.26
267	Chhindwara	Sausar	Ramakona New	DW	21.69590	78.48120	26.9	7.89	1189	0	500	32	14	143	0.86	0	31	295	86	19	132	2.7	773	6.53
268	Chhindwara	Chaurai	Ramgarh	HP	22.17680	79.26650	27	7.52	1065	0	397	105	11	53	0.12	0	22	410	128	22	57	3.4	692	2.69
269	Chhindwara	Tamia	Renikhera	HP	22.54260	78.57160	26	7.42	923	0	445	45	13	14	0.19	0	27	250	82	11	98	3.9	600	1.69
270	Chhindwara	Chhindwara	Saonri1	BW	21.96540	78.76860	26	7.38	832	0	293	50	29	78	0.12	0	33	285	86	17	62	0.9	541	2.78
271	Chhindwara	Mohkhed	Sarangbheri	HP	21.86910	78.94710	27.1	7.66	581	0	201	20	27	49	0.06	0.1	41	210	60	15	32	1.2	378	0
272	Chhindwara	Harai	Sathiya	HP	22.56640	79.15170	27.8	8.13	522	0	226	20	26	13	0.13	0	29	105	28	9	67	3.2	339	0
273	Chhindwara	Sausar	Sausar	HP	21.66170	78.80710	27	7.88	989	0	482	45	14	17	0.02	0	36	315	104	13	82	1.3	643	1.23
274	Chhindwara	Mohkhed	Silwani1	HP	21.82390	78.83640	27.3	7.69	472	0	183	40	9	8	0.1	0	24	105	24	11	56	1.8	307	0.56
275	Chhindwara	Sausar	Silwanighati	DW	21.79170	78.82980	26	7.83	1022	0	397	27	17	135	0.8	0	31	230	64	17	132	2.6	664	3.23
276	Chhindwara	Amarwara	Singhori	DW	22.19680	79.05800	26	7.4	1320	0	506	157	13	52	0.24	0	37	445	152	16	112	3.6	858	1.28
277	Chhindwara	Parasia	Sonapipri	HP	22.14390	78.80040	27	7.59	1102	0	470	67	5	35	0.84	0.2	44	225	62	17	152	4.2	716	5.23
278	Chhindwara	Amarwara	Surla	DW	22.43530	79.11400	25.8	7.73	942	0	336	62	24	88	0.11	0.3	28	285	76	23	83	3.8	612	1.23
279	Chhindwara	Mohkhed	Tansara Mal	DW	21.85440	78.86450	26	7.26	972	0	122	150	19	192	0.13	0.1	22	370	126	13	53	1.2	632	2.23
280	Chhindwara	Chaurai	Thanvari Kunda	HP	22.11850	79.27080	27	7.69	1025	0	458	77	24	14	0.1	0	34	410	148	10	54	2.3	666	1.65
281	Damoh	Damoh	Abhana	DW	23.70500	79.53667	28.3	7.63	1645	0	397	272	10	126	1.12	0	29	345	90	29	219	1.3	1069	0.59
282	Damoh	Jabera	Bamhori	DW	23.68500	79.71889	28.6	7.69	840	0	390	22	21	57	0.5	0	32	275	64	28	69	1.4	546	0.62
283	Damoh	Patera	Bangaon New	DW	24.00667	79.51694	28.8	7.27	815	0	134	52	13	259	0.12	0	41	145	36	13	126	1.6	530	0.25
284	Damoh	Batiagarh	Batiagarh1	DW	24.11056	79.35306	28.9	7.52	775	0	305	52	26	33	0.54	0.1	26	320	84	27	36	1.9	504	1.62
285	Damoh	Damoh	Damoh2	DW	23.82833	79.43611	29.4	7.64	1000	0	445	70	27	9	0.6	0	35	320	86	26	82	1.2	650	0.44
286	Damoh	Hatta	Gaisabad	DW	24.23556	79.82694	29.6	7.57	765	0	323	52	18	28	0.6	0	28	325	88	26	27	1.8	497	1.54
287	Damoh	Hatta	Hardua	DW	24.17500	79.67083	28.9	7.17	416	0	195	17	19	3	0.27	0	24	110	22	13	45	1.1	270	0.14
288	Damoh	Damoh	Hindoria	DW	23.89722	79.56667	28.5	7.67	955	0	293	150	8	19	0.52	0.1	38	235	48	28	109	3.7	621	1.24
289	Damoh	Jabera	Khamaria	DW	23.65000	79.55917	29.8	7.47	1152	0	342	172	21	60	0.42	0	21	285	72	26	139	6.8	749	1.78
290	Damoh	Patera	Majhgawa	DW	24.06556	79.63972	29.8	7.77	795	0	348	40	29	29	0.75	0	44	135	36	11	119	1.7	517	2.32
291	Damoh	Jabera	Nohta	DW	23.67833	79.57361	30.1	7.64	620	0	226	65	24	13	0.25	0	46	195	46	19	53	1.7	403	1.62
292	Damoh	Damoh	Palar	DW	23.92917	79.46944	28.9	7.92	900	0	378	37	15	86	0.12	0	28	340	92	27	48	5	585	2.12
293	Damoh	Patera	Patera2	DW	23.99722	79.68861	29.4	7.71	1655	0	537	150	28	178	0.22	0.2	37	325	86	27	229	4.9	1076	0.72
294	Damoh	Damoh	PipariaChampat	DW	23.95500	79.40444	29.4	7.58	779	0	317	52	19	32	0.28	0	29	335	90	27	23	2	506	0.65
295	Damoh	Tendukheda	Samnapur	DW	23.31250	79.38611	29.5	7.43	1765	0	451	287	20	106	0.16	0	36	420	124	27	222	3.1	1147	0.52
296	Damoh	Tendukheda	Tendukheda2		23.39639	79.53889	28.3	7.62	1385	0	262	315	22	10	0.49	0	46	230	86	4	213	1.7	900	0.32
297	Datia	Seondha	Basturi	HP	26.08620	78.73690	27.5	7.79	1233	0	653	47	9	6	0.5	0	23	420	126	26	90	2.6	801	1.03
298	Datia	Seondha	Chhikau	HP	25.82010	78.52090	27.8	7.9	1056	0	573	20	12	9	1.12	0	24	210	64	12	146	1.6	686	13.91
299	Datia	Datia	Dursadha	HP	25.71240	78.65610	27.5	7.76	1258	0	604	72	16	7	1.51	0.1	32	245	68	18	175	2.3	818	29.71
300	Datia	Seondha	Indergarh New	BORE	25.91610	78.56700	28.1	7.86	1057	0	494	57	29	9	1.04	0	21	310	106	11	99	2.5	687	10.04
301	Datia	Seondha	Kasherua	HP	26.25100	78.77200	27.9	7.8	767	0	372	27	24	9	0.86	0	33	215	60	16	75	1.7	499	2.6
302	Datia	Datia	Ruduapura	BORE	25.77800	78.50070	28.3	7.92	1823	0	903	85	21	32	1.32	0.2	29	250	72	17	305	1.4	1185	60.67
303	Datia	Seondha	Seondha	HP	26.14500	78.78240	28.2	7.91	1090	0	512	40	27	30	0.71	0	27	295	96	13	118	2.2	709	7.76
304	Datia	Seondha	Tharet	HP	26.00750	78.65520	28.1	7.43	2295	0	970	217	22	21	0.42	0	35	495	158	24	296	10	1492	8.42
305	Dewas	Tonk Khurd	Alari	DW	23.20710	76.15080	28.2	7.56	1045	0	433	72	27	33	0.82	0.22	25	265	56	30	115	2.4	679	0.98
306	Dewas	Bagli	Bagli1	DW	22.64290	76.34310	29.3	7.85	846	0	287	85	24	41	0.36	0.11	24	290	62	33	58	1.4	550	1.89
307	Dewas	Bagli	Bamohri	DW	22.70950	76.27520	26.1	7.69	705	0	177	117	18	16	1.18	0.24	32	115	24	13	106	2	458	0.45

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
308	Dewas	Tonk Khurd	Barkheda	DW	23.15580	76.15090	27.6	7.13	1039	0	464	57	13	35	1	BDL	34	170	42	16	156	3.2	675	1.86
309	Dewas	Dewas	Bhesuni	DW	22.61840	76.63090	28.3	7.89	1442	0	384	232	26	50	0.54	0.16	33	375	76	45	159	2.1	937	1.56
310	Dewas	Bagli	Bhikupura	DW	22.53830	76.33980	26.6	8.16	1296	0	336	205	32	35	0.39	BDL	41	315	64	38	149	3.4	842	0.85
311	Dewas	Sonkatch	Bhonrasa	DW	22.99190	76.20160	27.7	7.92	1065	0	366	105	21	55	0.33	BDL	36	370	78	43	71	1.6	692	3.69
312	Dewas	Kannod	Bijawad	DW	22.70240	76.57030	29.6	8.02	1099	0	354	132	23	42	0.8	BDL	29	340	70	40	92	1.4	714	1.75
313	Dewas	Tonk Khurd	Chhotamalspur	DW	23.05130	76.12420	29.1	7.65	1965	0	421	397	29	16	0.43	0.14	32	430	144	17	248	3.7	1277	0.95
314	Dewas	Dewas	Dewas	DW	22.97380	76.06620	28.7	7.14	1668	0	397	280	16	81	0.39	BDL	33	410	86	47	190	2.8	1084	1.89
315	Dewas	Khategaon	Dhayali	DW	22.54630	76.79960	28.2	8.11	763	0	323	45	23	24	0.7	BDL	35	255	64	23	55	2.2	496	2.56
316	Dewas	Tonk Khurd	Harnoda	DW	23.11020	76.18820	28.7	7.91	1252	0	580	50	42	23	1.17	BDL	32	130	28	15	224	2.3	814	3.25
317	Dewas	Kannod	Kannod	HP	22.66570	76.74960	26.7	7.09	1176	0	439	107	18	49	0.41	BDL	36	315	66	36	117	7.1	764	0.98
318	Dewas	Kannod	Kantaphor	DW	22.57680	76.56320	29.3	8.06	701	0	214	97	25	10	0.87	0.11	31	140	30	16	96	2.8	456	2.41
319	Dewas	Bagli	Karnawad	DW	22.71760	76.22720	28.5	7.85	730	0	250	55	27	53	0.39	0.16	22	265	70	22	41	2	475	0.98
320	Dewas	Kannod	Kusumania	DW	22.75600	76.75840	26.8	7.08	642	0	287	32	19	7	0.59	0.2	33	200	46	21	51	2.4	417	0.29
321	Dewas	Bagli	Matmore New	DW	22.71310	76.37820	27	7.48	1353	0	580	105	33	19	0.25	0.14	39	440	116	36	108	3.3	879	0.86
322	Dewas	Bagli	Nevri	DW	22.85550	76.25200	27.5	8.01	1534	0	482	185	28	78	0.37	BDL	28	115	36	6	296	3.1	997	6.89
323	Dewas	Khategaon	Pipilianankar	DW	22.59220	77.00930	29.6	7.99	1275	0	598	52	23	42	1.16	BDL	46	290	76	24	155	3.7	829	3.95
324	Dewas	Bagli	Pipri	DW	22.39860	76.27800	28.6	7.58	1581	0	470	215	26	60	0.77	BDL	31	290	74	26	224	6.7	1028	5.23
325	Dewas	Bagli	Punjapura	DW	22.54440	76.36980	28.5	8.13	1164	0	445	112	14	33	0.34	BDL	31	275	72	23	136	4.1	757	1.75
326	Dewas	Kannod	Satwas New	DW	22.53330	76.70080	30.2	8.04	1523	0	433	232	25	57	1.2	0.14	29	435	130	27	149	4.2	990	8.56
327	Dewas	Tonk Khurd	Tonk Kalan	DW	23.11680	76.14580	28.3	7.87	1694	0	342	327	20	55	0.22	BDL	24	355	126	10	221	3.4	1101	1.26
328	Dewas	Bagli	Udainagardw	DW	22.39840	76.27720	28.1	7.95	1162	0	360	127	36	66	0.85	0.26	65	375	106	27	89	4.9	755	2.86
329	Dhar	Sardarpur	Amjhira	DW	22.55600	75.12300	30.2	7.76	1190	0	427	182	21	18	0.38	0	31	425	128	26	92	15.8	774	1.79
330	Dhar	Badnawar	Badnawar New	DW	23.01900	75.24600	28.4	7.93	983	0	506	40	11	2	0.84	0	22	260	92	7	110	2.6	639	3.46
331	Dhar	Bagh	Bagh New	pZ	22.36300	74.79600	29.9	7.49	1157	0	476	105	10	16	1.12	0	29	435	136	23	70	1.3	752	2.33
332	Dhar	Dahi	Dahi	DW	22.11640	74.60370	28.6	7.65	665	0	287	40	28	41	0.23	0	29	235	76	11	56	1	432	0.37
333	Dhar	Sardarpur	Dasai	BW	22.72200	75.13200	30.1	7.26	1726	0	506	287	26	15	0.42	0.1	47	655	238	15	122	8.9	1122	1.27
334	Dhar	Kukshi	Dehari	DW	22.28800	74.91600	29.8	7.79	1307	0	348	215	21	4	0.75	0	26	305	100	13	139	5.9	850	1.94
335	Dhar	Dharampuri	Dhamnod	BW	22.21400	75.47300	28.9	7.82	1129	0	421	112	17	47	1.11	0	34	415	122	27	74	0.9	734	1.34
336	Dhar	Dhar	Dhar	BW	22.58650	75.33160	29.6	7.34	1121	0	85	325	19	7	0.75	0	21	200	48	19	168	0.8	729	0
337	Dhar	Dharampuri	Dharampuri1	DW	22.15300	75.34700	29.4	8.17	1066	0	506	80	20	28	1.21	0	37	255	76	16	149	1.2	693	1.4
338	Dhar	Kukshi	Dhulsar	HP	22.20500	74.86900	30.1	7.06	3110	0	793	532	27	29	0.22	0	41	1335	484	30	85	64.5	2022	2.76
339	Dhar	Gandhwani	Gandhwani	BW	22.33600	75.00500	29.7	8	1191	0	458	120	23	6	1.12	0	25	305	78	27	125	4.2	774	1.67
340	Dhar	Dharampuri	Gujri1	DW	22.32100	75.50000	29.9	7.96	856	0	305	72	11	40	0.79	0.1	38	330	96	22	32	3.7	556	0.82
341	Dhar	Sardarpur	Julana	DW	22.78100	74.98900	30.1	7.7	532	0	214	27	24	30	0.33	0	26	225	68	13	25	1.2	346	0.03
342	Dhar	Badnawar	Kanwan New	DW	22.87000	75.25800	30.1	7.6	1391	0	360	242	22	43	0.37	0	31	510	170	21	86	0.6	904	1.46
343	Dhar	Tirla	Lunera	BW	22.58650	75.33630	28.8	7.95	837	0	348	47	18	19	0.48	0	28	230	54	23	72	4	544	0.42
344	Dhar	Manawar	Manawar	DW	22.23500	75.09400	28.7	7.71	454	0	189	32	14	8	0.53	0	22	135	38	10	41	1.6	295	0.27
345	Dhar	Nalchha	Mandu	DW	22.34700	75.39800	29.4	7.98	730	0	366	25	27	3	0.18	0	37	235	56	23	52	17.4	475	0.39
346	Dhar	Kukshi	Palasi	DW	22.22800	74.66100	29.5	7.85	697	0	378	35	13	3	0.56	0	23	275	78	19	42	9.7	453	0.7
347	Dhar	Nisarpur	Pipalya	DW	22.13400	74.87500	29.1	7.65	1366	0	287	242	16	115	0.44	0	47	670	224	27	30	1.2	888	0.9
348	Dhar	Sardarpur	Rajod	DW	22.95400	75.06700	29.7	7.64	920	0	323	70	26	82	0.41	0.2	22	375	122	17	41	1.5	598	0.54
349	Dhar	Umarban	Rawatpura	DW	22.17360	75.24070	29.1	7.79	508	0	244	20	19	2	0.58	0	26	190	48	17	29	0.8	330	0.88
350	Dhar	Sardarpur	Sardarpur	HP	22.66800	74.97400	30.2	7.76	812	0	348	60	21	29	0.38	0	34	335	102	19	39	0.7	528	0.39
351	Dhar	Manawar	Singhana	DW	22.18800	74.96900	29.4	7.76	1111	0	415	107	22	59	0.41	0	28	345	98	24	95	11.6	722	1.06

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
352	Dhar	Bagh	Tanda	BW	22.50390	74.85470	27.9	7.8	1086	0	116	242	17	74	0.25	0	35	485	144	30	28	0.9	706	0.49
353	Dhar	Gandhwani	Zeerabad	DW	22.39800	75.07000	30.2	7.65	1005	0	336	102	25	80	0.45	0	46	415	128	23	46	1.1	653	0.1
354	Dindori	Amarpur	Amarpur1	DW	22.78550	80.97670	29.2	7.58	411	0	163	37	12	3	0.34	0	23	165	38	17	18	2.2	267	0.23
355	Dindori	Bajag	Bijhauri	HP	22.85690	81.23020	25.5	7.85	665	0	205	95	20	9	0.84	0.2	42	105	24	11	109	0.6	432	0.99
356	Dindori	Dindori	Dindori	DW	22.93510	81.08900	26.3	7.44	790	0	308	75	29	6	0.15	0	31	360	102	26	16	0.8	514	0.77
357	Dindori	Bajag	Gadasarai	HP	22.82450	81.32610	25.8	7.3	1050	0	290	180	18	15	0.13	0	26	340	98	23	84	1.3	683	0.87
358	Dindori	Karanjiya	Gorakhpur	HP	22.74850	81.44660	27.6	7.84	701	0	290	55	24	9	0.14	0.1	33	265	76	18	39	0.6	456	2.36
359	Dindori	Mehadwani	Harra	HP	22.87640	80.79040	26.9	8.22	495	0	242	15	16	8	0.12	0	34	70	16	7	83	0.9	322	0
360	Dindori	Karanjiya	Karanjiya	DW	22.71250	81.61930	28.9	7.69	661	0	278	47	25	8	0.2	0.2	29	275	76	21	26	0.6	430	0.46
361	Dindori	Shahpura	Katangi1	DW	23.09990	80.59840	27.2	7.48	450	0	193	35	11	4	0.2	0	31	175	50	12	23	1	293	1.12
362	Dindori	Bajag	Sagar Tola	HP	22.82590	81.29150	27.8	8.28	554	0	223	40	27	9	1.41	0	41	65	14	7	98	1.1	360	0.21
363	Dindori	Dindori	Salaiya	HP	22.91090	80.94680	26.4	8	360	0	133	30	18	10	1.67	0.1	21	10	2	1	79	0.5	234	0.56
364	Dindori	Dindori	Shahpur	HP	23.02610	80.99970	24.6	7.7	311	0	127	12	26	7	0.14	0	49	95	26	7	29	0.4	202	1.65
365	Dindori	Shahpura	Shahpura Depot	DW	23.04770	80.98510	27	7.56	641	0	308	30	13	9	0.1	0	29	250	72	17	31	0.9	417	0.21
366	Dindori	Shahpura	Shahpura2	HP	23.18470	80.69920	28.3	7.61	1001	0	393	105	21	8	0.02	0.2	39	250	74	16	116	1.1	651	2.33
367	Dindori	Dindori	Vikrampur1	DW	23.07690	80.90470	27.6	7.64	892	0	368	72	29	11	0.13	0	31	280	84	17	81	1.7	580	1.13
368	Guna	Bamori	Akoda	DW	24.86500	77.19000	27.1	7.1	459	0	207	22	12	14	0.24	0	20	200	46	21	15	1.2	298	0.3
369	Guna	Raghogarh	Amlia	HP	24.21200	77.19700	27.1	7.6	1278	0	580	80	16	39	0.26	0	26	390	118	23	115	0.8	831	2.88
370	Guna	Aron	Aron	DW	24.43800	77.37800	29	7.33	839	0	390	42	18	21	0.21	0	34	330	94	23	39	0.7	545	1.79
371	Guna	Chachaura	Badaud New	DW	24.40900	77.00000	28	7.67	1846	0	116	562	22	10	0.48	0.1	38	250	68	19	311	1.5	1200	2.06
372	Guna	Bamori	Bamori New	DW	24.85300	77.13900	27.8	7.69	589	0	226	42	26	25	0.35	0	46	245	52	28	21	2.6	383	1.27
373	Guna	Bamori	Berkheri	DW	24.62800	77.18400	28.5	7.54	735	0	305	42	29	28	0.32	0	24	290	78	23	35	1.3	478	1.08
374	Guna	Chachaura	Binaganj	DW	24.18800	77.03200	28.3	7.73	1014	0	134	252	23	17	0.2	0	31	395	116	26	51	0.8	659	0.98
375	Guna	Raghogarh	Gunjari	DW	23.91500	77.26200	28.7	7.37	864	0	372	55	15	38	0.38	0	28	350	108	19	37	0.8	562	1.84
376	Guna	Guna	Jaitadongar	DW	24.53100	77.33600	29.8	7.73	1000	0	476	45	17	37	0.94	0	47	345	96	26	72	1.2	650	3.24
377	Guna	Raghogarh	Janjali	HP	24.36200	77.12100	27.5	7.91	1295	0	665	60	11	8	0.4	0	39	245	64	21	185	1.6	842	2.68
378	Guna	Raghogarh	Khairai	DW	24.41900	77.27800	27.3	7.64	483	0	214	32	8	13	0.14	0	42	215	56	18	12	1.1	314	0.26
379	Guna	Chachaura	Khatkiya	DW	24.33000	77.10300	27.9	7.44	2515	0	49	837	24	9	0.95	0.2	26	520	166	26	335	2.9	1635	1.94
380	Guna	Guna	Mahugarha	BW	24.61200	77.25900	27.5	7.69	613	0	256	37	26	16	0.36	0	38	220	52	22	39	2.1	398	0.52
381	Guna	Raghogarh	Maksudangarh	HP	24.06100	77.25680	27	7.7	936	0	439	40	19	34	0.32	0	24	335	102	19	61	1	608	1.87
382	Guna	Guna	Pagara	HP	24.65400	77.43600	26.7	7.76	811	0	378	37	28	14	0.59	0	46	285	76	23	58	1.5	527	2.05
383	Guna	Chachaura	Penchi	BW	24.13600	77.00900	27.1	7.5	2646	0	79	870	16	12	0.9	0	29	395	116	26	425	1.7	1720	3.38
384	Guna	Raghogarh	Pipaliya	BW	24.31600	77.15100	26.5	7.52	871	0	439	22	22	23	0.6	0	37	335	96	23	46	1.3	566	2.49
385	Guna	Aron	Rampur-I	BW	24.30600	77.44700	30	7.84	812	0	415	30	14	9	0.44	0	46	245	64	21	75	1.4	528	1.52
386	Guna	Bamori	Rampur-Ii	HP	24.79600	77.16710	28	7.61	511	0	195	40	24	14	0.27	0.1	28	200	46	21	26	1.8	332	0.68
387	Guna	Guna	Singwasa	HP	24.64500	77.33700	28.5	7.58	1085	0	421	120	18	8	0.47	0	49	360	106	23	86	3.2	705	1.86
388	Guna	Bamori	Suhaya New	BW	24.74200	77.08300	29	7.62	742	0	348	32	12	34	0.3	0	32	270	72	22	49	1.8	482	0.52
389	Gwalior	Morar	Aarauli	HP	26.16010	78.45220	27.1	7.97	850	0	317	35	18	111	0.23	0.1	22	215	42	27	102	1.2	553	0.37
390	Gwalior	Ghatigaon	Aron	HP	25.95350	77.93010	28.4	7.58	942	0	256	95	20	129	0.56	0	19	325	84	28	79	2.3	612	60.66
391	Gwalior	Bhitarwar	Bajna	DW	25.85060	77.94160	27.4	7.9	790	0	378	35	15	10	0.42	0	23	250	76	15	71	3.5	514	1.43
392	Gwalior	Morar	Bajrang Colony Dabka	HP	26.15550	78.43390	28.2	7.69	1078	0	293	150	22	30	0.19	0	35	330	96	22	82	1.9	701	0.39
393	Gwalior	Gwalior	Beelpura	DW	26.24990	78.04710	27.5	8.1	900	0	427	42	27	10	0.29	0.2	27	320	86	26	70	0.9	884	3.96
394	Gwalior	Morar	Behat	BORE	26.17070	78.52950	27.6	7.06	615	0	195	17	19	127	0.29	0	46	90	18	11	99	2.4	400	1.17

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
395	Gwalior	Gwalior	Behrata	DW	26.29200	78.09600	27.5	7.61	2252	0	598	425	29	35	0.17	0.3	34	475	152	23	322	3.4	1464	0.61
396	Gwalior	Ghatigaon	Charai Shyampur	DW	25.97480	77.83070	27.9	7.84	1520	0	336	242	5	153	0.35	0.1	29	440	144	19	147	2.8	988	0.31
397	Gwalior	Bhitarwar	Dongarpur	HP	25.82160	77.96230	29.8	7.29	3247	0	329	747	23	253	0.18	0	35	1485	516	47	91	3.4	2111	10.68
398	Gwalior	Gwalior	Ghosipura	DW	26.27570	78.29060	26.3	7.46	275	0	79	22	26	8	0.22	0.2	42	90	18	11	23	1.3	179	0.55
399	Gwalior	Bhitarwar	Harsibandh	DW	25.75610	77.92520	28.4	7.98	754	0	262	30	29	80	0.56	0	29	210	48	22	76	1.8	490	8.55
400	Gwalior	Gwalior	Jahangirpur	DW	26.27560	78.29060	27.8	7.81	3220	0	573	717	26	109	0.42	0	28	990	358	23	285	2.7	2093	18.96
401	Gwalior	Dabra	Kariyawati	HP	25.81870	78.18050	27.4	7.59	1435	0	500	155	32	56	0.27	0	28	485	156	23	106	2.9	933	74.63
402	Gwalior	Gwalior	Maithana	DW	26.29020	78.29050	26.5	7.86	1980	0	787	152	38	27	0.19	0	19	310	84	24	315	2.5	1287	2.09
403	Gwalior	Dabra	Makoda	HP	26.03540	78.25420	28.9	7.28	1254	0	390	180	12	34	0.34	0	56	310	82	26	149	3.4	815	0.24
404	Gwalior	Morar	Manpura	HP	26.16450	78.35290	28.4	7.63	856	0	390	37	24	10	0.52	0	32	270	80	17	72	4.1	556	2.32
405	Gwalior	Dabra	Masoorpur New	DW	25.83530	78.24870	27.6	7.95	848	0	317	72	32	29	0.78	0	29	250	74	16	80	2.2	551	18.51
406	Gwalior	Ghatigaon	Mohna	DW	25.88090	77.76940	27.5	7.66	731	0	311	55	18	5	0.89	0.2	24	250	72	17	55	3.4	475	15.91
407	Gwalior	Ghatigaon	Nayagaon2	BORE	26.11840	78.06430	28.1	7.95	826	0	360	30	39	6	0.12	0	34	240	56	24	80	1.7	537	3.86
408	Gwalior	Gwalior	Odpura	DW	26.26650	78.26870	25.5	7.59	255	0	67	15	22	34	0.21	0	38	55	12	6	35	1.1	166	87.84
409	Gwalior	Gwalior	Padampur Kheria	DW	26.26650	78.26870	27.9	7.7	1921	0	738	172	29	62	0.36	0	37	400	124	22	281	3.5	1249	3.21
410	Gwalior	Gwalior	Prithvi Ka Pura	DW	26.20760	78.09260	26.6	7.82	425	0	165	20	34	5	0.35	0	19	145	28	18	30	2.3	276	0.31
411	Gwalior	Gwalior	Suro	DW	26.24990	78.04170	27.5	7.98	3620	0	519	937	30	34	0.25	1.5	26	1325	478	32	225	1.1	2353	0.21
412	Gwalior	Dabra	Tekanpur	HP	25.98810	78.28160	27.9	8.08	1700	0	793	127	27	9	0.25	0	26	275	76	21	270	2.9	1105	27.58
413	Gwalior	Gwalior	Tighara	DW	26.21310	78.15130	27.3	7.59	784	0	323	55	33	6	0.29	0	29	220	56	19	80	0.9	510	20.98
414	Harda	Timarni	Chhidgaon	DW	22.39580	77.29690	29.4	7.6	1030	0	476	62	12	32	0	0	20	130	34	11	175	4.6	670	1.12
415	Harda	Khirkiya	Chhipawaddw	DW	22.15770	76.88090	29.8	7.22	912	0	256	122	18	64	0	0	26	315	98	17	65	1.2	593	0.15
416	Harda	Khirkiya	Chhuri Khal	DW	22.03420	76.93920	29.2	7.61	411	0	92	70	26	8	0	0	34	35	10	2	82	0.9	267	0.52
417	Harda	Harda	Handia	DW	22.48490	76.97410	28.4	7.88	1452	0	677	82	24	35	0	0.1	48	285	84	18	204	1.3	944	8.23
418	Harda	Harda	Hardadw	DW	22.33910	77.10350	28	7.66	1372	0	494	110	13	137	0	0	32	545	172	28	72	1.2	892	5.62
419	Harda	Khirkiya	Mandla	DW	22.22040	76.94560	29.5	7.34	900	0	317	90	25	48	0	0	27	335	96	23	52	3.3	585	1.98
420	Harda	Harda	Masangaon	DW	22.29290	77.00550	27.5	7.77	1412	0	714	50	29	25	0	0	31	105	26	10	278	1.5	918	6.86
421	Harda	Timarni	Mohanpur1	BW	22.25080		28	7.38	805	0	287	75	17	53	0	0	36	345	104	21	32	1.3	523	2.21
422	Harda	Khirkiya	Morgarhidw	HP	22.02050	76.94380	28.2	7.61	1362	0	397	160	23	131	0	0	42	600	212	17	47	1.6	885	0.26
423	Harda	Khirkiya	Sonpura Colony	DW	22.08860	76.91410	29	7.4	814	0	299	65	27	47	0	0.2	47	310	90	21	42	1.3	529	1.85
424	Harda	Timarni	Temagaon	HP	22.29900	77.31930	29	7.34	1476	0	348	207	14	177	0	0	28	420	134	21	147	1.6	959	1.56
425	Harda	Timarni	Timarni	DW	22.37590	77.23140	28.7	7.32	964	0	342	92	16	65	0	0	31	320	94	21	73	2.1	627	2.25
426	Hoshangabad	Babai	Babaidw	HP	22.69980	77.93370	25.4	7.57	1164	0	531	72	21	21	0.39	0	26	370	104	27	98	1.8	757	2.86
427	Hoshangabad	Babai	Bagratawadw	DW	22.62180	77.99100	28	7.5	890	0	489	15	10	10	0.1	0	44	290	86	18	71	0.9	579	2.23
428	Hoshangabad	Babai	Baharpur	DW	22.71390	78.05620	25	7.4	802	0	338	55	23	24	0.44	0.1	23	300	96	15	45	3.7	521	2.45
429	Hoshangabad	Seoni Malwa	Bhilatdeo	HP	22.49110	77.52300	28.5	7.84	1001	0	538	17	19	12	0.44	0	35	300	94	16	94	1.1	651	1.85
430	Hoshangabad	Hoshangabad	Dolariadw	HP	22.60860	77.63810	28	7.71	958	0	483	25	26	18	0.52	0	29	240	62	21	111	1.5	623	2.13
431	Hoshangabad	Kesla	Gurra New	DW	22.62830	77.87110	29.1	7.68	2921	0	344	820	11	9	0.32	0	22	1040	364	32	192	3.3	1899	0.89
432	Hoshangabad	Kesla	Kesla	DW	22.47750	77.83970	29.5	7.43	956	0	399	82	21	11	0.31	0.2	28	360	106	23	56	1.4	621	1.12
433	Hoshangabad	Pipariya	Matkuli	DW	22.59930	78.46060	27.4	7.33	700	0	368	17	14	8	0.79	0	37	250	84	10	46	1.2	455	3.12
434	Hoshangabad	Hoshangabad	Nimsadia	BW	22.68180	77.80010	27.5	7.5	632	0	308	20	22	10	0.5	0	46	215	58	17	45	4.2	411	2.85
435	Hoshangabad	Pipariya	Pachmarhi	DW	22.47780	78.43800	28.2	6.67	200	0	24	27	28	14	0.05	0.1	49	35	10	2	31	3.6	130	2.29
436	Hoshangabad	Kesla	Pathrautadw	DW	22.57630	77.79580	27	7.68	1561	0	538	157	18	117	0.54	0	42	645	212	28	63	2.3	1015	0.86
437	Hoshangabad	Hoshangabad	Raisalpur	BW	22.66890	77.75750	27.8	7.45	732	0	374	15	26	11	0.5	0	38	225	56	21	65	1.8	476	1.13
438	Hoshangabad	Pipariya	Sandia	BW	22.91250	78.35520	26.5	7.5	1052	0	507	55	17	13	0.41	0	26	435	138	22	43	2.1	684	5.26

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
439	Hoshangabad	Hoshangabad	Sanwalkhera	HP	22.65020	77.67430	26.8	7.43	1030	0	483	57	23	10	0.56	0.1	21	210	62	13	138	2.2	670	4.56
440	Hoshangabad	Sohagpur	Semri Harchand	DW	22.69050	78.08490	27.6	7.26	1100	0	368	127	19	59	0.32	0	25	390	112	27	76	1.3	715	2.26
441	Hoshangabad	Seoni Malwa	Seonimalwa	DW	22.45170	77.46790	27.1	7.8	1261	0	556	82	26	36	0.45	0	41	310	96	17	148	2.7	820	1.23
442	Hoshangabad	Sohagpur	Sohagpur	DW	22.69610	77.19010	27	7.49	735	0	344	35	21	12	0.6	0	36	285	82	19	47	4.6	478	2.69
443	Hoshangabad	Kesla	Sonkhera	DW	22.61660	77.83410	28.4	7.7	1127	0	471	142	17	8	0.44	0.2	28	350	114	16	121	3.8	733	1.56
444	Hoshangabad	Kesla	Suktawa	DW	22.40750	77.84270	28	7.63	1300	0	374	220	21	9	0.26	0	37	420	136	19	106	1.8	845	5.65
445	Indore	Indore	Bhil Paltan	DW	22.69600	75.83400	29.7	7.61	1486	0	409	242	21	17	0.24	0	31	355	112	18	178	1	966	0.36
446	Indore	Indore	Bijalpur Masjid	DW	22.66600	75.83400	28.8	7.77	649	0	281	37	30	4	0.07	0	39	205	50	19	59	1.7	422	0.48
447	Indore	Indore	Cable Factory	DW	22.71300	75.83600	29.5	7.3	1696	0	799	92	29	37	0.01	0	35	130	26	16	330	5	1102	2.34
448	Indore	Depalpur	Depalpur	BW	22.84300	75.53900	29.3	7.89	1813	0	207	472	15	32	0.05	0.1	26	405	122	24	222	0.2	1178	2.36
449	Indore	Indore	Dudhiya	DW	22.67600	75.94600	29.7	7.21	2080	0	439	525	24	16	0.14	0	27	880	304	29	119	0.8	1352	0.82
450	Indore	Indore	Footi Kothi	DW	22.69200	75.82600	29.9	7.58	1473	0	458	235	28	0.3	0.12	0	22	440	138	23	150	0.2	957	1.12
451	Indore	Indore	Gandhi Hall	DW	22.72000	75.86600	30.2	7.97	1027	0	415	125	27	14	0.19	0	39	370	116	19	86	0.4	668	0.86
452	Indore	Indore	Hatod	HP	22.79600	75.74300	28.3	7.66	1085	0	366	155	14	2	0.21	0.1	34	290	72	27	120	0.5	705	1.87
453	Indore	Indore	Mari Mata	BW	22.73800	75.84930	28.7	7.81	934	0	421	57	16	6	0.11	0	28	260	62	26	97	0.7	607	0.38
454	Indore	Mhow	Mhow	DW	22.54900	75.76200	30.3	7.5	636	0	281	30	20	3	0.07	0	29	225	44	28	43	0.4	413	0.48
455	Indore	Indore	MushakhediPHED	DW	22.69600	75.89400	30.1	7.85	856	0	372	60	21	6	0.01	0	24	285	84	18	73	0.5	556	0.42
456	Indore	Mhow	Nandpura	DW	22.51400	75.91800	28.7	7.53	539	0	250	35	17	16	0.16	0	37	235	64	18	25	0.6	350	0.17
457	Indore	Indore	Polo Ground	BW	22.73900	75.85400	29.2	8.12	996	0	390	115	26	9	0.16	0	32	320	92	22	95	0.4	647	1.01
458	Indore	Indore	Prakash Nagar	DW	22.69800	75.87900	28.9	7.74	1660	0	854	55	29	29	0.02	0	21	340	98	23	225	2.4	1079	1.83
459	Indore	Depalpur	Rangwasa	DW	22.74400	75.57000	29.3	7.75	987	0	275	107	28	82	0.84	0	41	310	86	23	76	0.2	642	0.74
460	Indore	Indore	Ranjeet Hanuman Temple	DW	22.70000	75.83600	30.2	7.86	1080	0	470	95	15	5	0.24	0.2	28	335	94	24	95	0.1	702	0.45
461	Indore	Indore	Ravindra Nagar	DW	22.72200	75.89300	30.1	7.78	541	0	275	30	18	2	0.01	0	35	190	50	16	46	0.5	352	0.24
462	Indore	Indore	Sajan Nagar	DW	22.69500	75.88200	29.5	7.88	1224	0	549	92	12	9	0.01	0	25	480	148	27	62	0.3	796	1.73
463	Indore	Sanwer	Sanwer	BW	22.97100	75.97100	29.1	7.27	3187	0	311	885	24	77	0.2	0	42	1250	452	29	160	3.1	2072	8.09
464	Indore	Indore	Soyabeen Research Centre	DW	22.68300	75.87300	28.9	7.87	914	0	323	80	27	14	0.47	0	31	185	40	21	115	0.5	594	1.6
465	Indore	Indore	Telephone Nagar	DW	22.72300	75.90400	29.3	7.83	694	0	336	32	23	3	0.01	0	39	200	50	18	70	0.1	451	0.75
466	Indore	Depalpur	Ushapura	HP	22.80900	75.67400	30.1	7.61	2901	0	695	500	17	114	0.67	0	22	385	134	12	524	0.6	1886	9.2
467	Jabalpur	Jabalpur	Adhartal Naka	TW	23.20305	79.95423	28.8	7.37	1285	0	397	202	12	18	0.49	0.1	21	340	86	30	152	1.1	835	16.2
468	Jabalpur	Jabalpur	Barela	TW	23.09558	80.04751	27.4	7.54	589	0	159	92	18	5	1.09	0.1	34	95	16	13	92	2.2	383	0.89
469	Jabalpur	Jabalpur	Bargi1	DW	23.28958	79.69307	28.1	7.7	848	0	445	27	5	2	0.16	0.1	26	155	28	21	132	0.3	551	1.23
470	Jabalpur	Jabalpur	Bedi Nagar	TW	23.15478	79.90390	28.9	7.48	1102	0	451	107	9	15	1.05	0.1	29	255	64	23	142	2.6	716	3.26
471	Jabalpur	Shahpura	Bheraghat New	DW	23.14422	79.80290	27.7	7.85	745	0	360	32	14	4	0.26	0	31	205	50	19	76	2.1	484	2.56
472	Jabalpur	Kundam	Bishanpura	DW	22.22930	80.24727	28.2	7.31	1142	0	476	105	7	23	0.12	0.1	33	440	122	33	66	0.8	742	2.45
473	Jabalpur	Jabalpur	Bus Stand	HP	23.18745	79.92997	26.9	7.52	1152	0	451	107	22	38	1.01	0.1	44	295	72	28	128	8.3	749	5.26
474	Jabalpur	Jabalpur	Cherital	TW	23.18076	79.93110	28.4	7.32	1035	0	403	110	14	16	0.65	0.1	27	295	76	26	112	1.4	673	2.26
475	Jabalpur	Jabalpur	Datta Mandir	HP	23.17121	79.92992	27.8	7.41	748	0	342	50	29	4	1.09	0.1	39	150	38	13	118	1.4	486	2.96
476	Jabalpur	Jabalpur	Deotal	TW	23.15815	79.89650	27.8	7.9	312	0	134	15	17	5	0.3	0.1	26	100	14	16	27	1.1	203	3.56
477	Jabalpur	Kundam	Ghughara	HP	23.27719	80.37035	28.1	8.1	645	0	256	40	13	62	0.1	0.1	20	245	60	23	44	0.8	419	2.23
478	Jabalpur	Jabalpur	Gokalpur	DW	23.19003	79.98533	29.8	7.34	1052	0	415	97	10	46	0.45	0	45	290	84	19	109	1.5	684	8.56
479	Jabalpur	Jabalpur	Gorakhpur	TW	23.15003	79.92711	30.9	6.96	310	0	128	22	9	3	0.09	0.1	31	95	18	12	29	2.2	202	0.56
480	Jabalpur	Jabalpur	Jabalpur	BW	23.20218	79.95759	27.8	7.43	1145	0	336	197	14	10	0.54	0.1	45	260	62	26	152	4.5	744	5.69
481	Jabalpur	Jabalpur	Jain Dharamshala	DW	23.15296	79.88507	28.6	7.13	589	0	250	45	8	5	1.1	0.1	28	160	36	17	65	3	383	0

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
482	Jabalpur	Sihora	Kachupura	DW	23.39724	80.06162	27.4	7.58	1012	0	336	122	16	40	0.29	0.1	22	285	72	26	98	4.3	658	2.26
483	Jabalpur	Jabalpur	Kanch Ghar	DW	23.17611	79.95710	28.1	7.69	945	0	378	62	24	40	0.2	0.1	30	225	68	13	109	4.2	614	2.13
484	Jabalpur	Kundam	Kundam	DW	23.21991	80.34684	29.2	7.62	1059	0	311	142	22	51	0.15	0.1	40	405	126	22	55	0.9	688	1.59
485	Jabalpur	Jabalpur	Madan Mahal	DW	23.15717	79.91580	32.5	7.12	365	0	134	20	32	4	0.05	0	41	105	16	16	38	1.4	237	0.65
486	Jabalpur	Majhauli	Majholi	HP	23.49467	79.92409	29.3	7.44	702	0	281	65	19	5	0.3	0.1	37	150	34	16	92	0.3	456	2.86
487	Jabalpur	Jabalpur	Manegaon1	DW	23.07976	79.90980	27.6	7.28	545	0	159	57	22	31	1.11	0	22	205	38	27	35	0.9	354	0.56
488	Jabalpur	Jabalpur	Nagar Nigam Complex	TW	23.10588	79.93314	28.5	8.11	812	0	348	67	14	4	0.41	0.1	34	190	46	18	102	2.8	528	5.26
489	Jabalpur	Patan	Nunsar	HP	23.28940	79.69295	28.4	7.69	845	0	372	47	24	10	0.41	0.1	49	160	40	15	127	1	549	1.26
490	Jabalpur	Jabalpur	Padaria	TW	23.20796	80.15656	28.3	7.72	612	0	305	20	19	3	0.16	0	26	165	38	17	68	0.9	398	0.96
491	Jabalpur	Jabalpur	Panchpedi	DW	23.15850	79.97491	32.8	7.95	845	0	336	77	26	12	0.07	0.1	23	115	26	12	144	3.2	549	2.12
492	Jabalpur	Jabalpur	Panda Ki Madhia	DW	23.15859	79.89235	26.9	7.16	385	0	153	27	22	2	0.21	0.1	42	135	32	13	22	5.8	250	0
493	Jabalpur	Jabalpur	Raddi Chowki	HP	23.18660	79.94180	27.3	7.36	756	0	305	65	18	19	1.11	0.1	32	120	16	19	126	2.1	491	2.43
494	Jabalpur	Jabalpur	Railway Station	DW	23.16611	79.94722	27.6	7.55	312	0	140	15	22	4	0.1	0.1	43	90	12	15	33	1.7	203	0.42
495	Jabalpur	Jabalpur	Ranjhi	TW	23.19896	80.01044	28.9	7.71	589	0	262	45	14	5	0.18	0	35	155	42	12	66	2.9	383	2.59
496	Jabalpur	Jabalpur	Sadar Bazar	DW	23.15649	79.94845	27.7	7.48	812	0	366	50	25	5	0.25	0.1	39	205	40	26	88	4.1	528	0.26
497	Jabalpur	Jabalpur	Saliwada	TW	23.10742	79.99325	28.3	7.71	945	0	336	22	19	168	0.25	0.1	28	430	136	22	29	1.3	614	2.15
498	Jabalpur	Shahpura	Shahpura	HP	23.13820	79.66530	28.3	7.89	1012	0	427	85	24	4	0.09	0.1	24	370	104	27	58	2.1	658	2.46
499	Jabalpur	Sihora	Sihora1	TW	23.48193	80.10319	32.6	7.83	712	0	256	70	14	31	0.31	0	20	225	44	28	58	1.1	463	0.86
500	Jabalpur	Jabalpur	Umariya	HP	23.20230	80.07230	27.8	7.73	1089	0	451	112	5	6	0.24	0.1	30	310	82	26	107	2	708	0.36
501	Jhabua	Petlawad	Bamania	HP	23.08900	74.76100	31.2	7.55	557	0	159	67	20	39	0.21	0	21	145	34	15	61	0.4	362	0.68
502	Jhabua	Rama	Chapari	DW	22.77740	74.67970	28.4	7.55	708	0	232	45	40	47	0.28	0.1	28	240	44	32	50	0.8	460	0.63
503	Jhabua	Jhabua	Jhabua1	DW	22.77100	74.59010	30.9	7.63	1387	0	482	130	35	66	0.17	0	43	360	112	19	155	4.6	902	0.21
504	Jhabua	Petlawad	Karwar	DW	23.10100	74.87000	29.9	7.61	723	0	268	67	21	34	0.25	0	23	230	64	17	74	0.5	470	0.75
505	Jhabua	Meghnagar	Meghnagar New	DW	22.90500	74.54200	30.7	8.09	1117	0	397	135	45	4	1.19	0.1	38	165	42	15	190	2.7	726	0.52
506	Jhabua	Petlawad	Petlabad	BW	23.00540	74.79850	30.2	7.42	1109	0	451	85	39	14	0.07	0	29	315	96	18	122	0.3	721	2.67
507	Jhabua	Jhabua	Pitol	BW	22.78960	74.46180	28.9	7.57	1202	0	378	140	23	74	0.32	0	45	425	144	16	85	0.5	781	0.84
508	Jhabua	Ranapur	Ranapur	BW	22.64040	74.52130	29.3	7.55	1098	0	433	67	47	7	0.9	0	22	230	64	17	145	2.9	714	1.13
509	Jhabua	Petlawad	Sarangi	HP	23.05180	74.90910	27.4	7.58	845	0	342	45	20	43	0.31	0	37	315	98	17	55	0.2	549	0.92
510	Jhabua	Thandla	Thandla1	HP	23.01530	74.58080	29.4	7.65	659	0	238	60	29	16	0.53	0	27	200	58	13	60	1.1	428	0.37
511	Jhabua	Ranapur	Tikadimoti	DW	22.69400	74.54200	30.2	7.63	842	0	360	22	37	57	1.09	0.2	34	255	72	18	81	0.8	547	1.42
512	Katni	Badwara	Badwara	DW	23.74900	80.57230	30.3	7.09	999	0	323	112	15	67	0.36	0.1	22	410	128	22	36	3.8	649	8.56
513	Katni	Vijay Raghavgarh	Barchheka	TW	23.85140	80.55610	30.7	7.84	335	0	153	15	13	4	0.21	0	26	105	32	6	26	1.3	218	3.56
514	Katni	Vijay Raghavgarh	Barhi	TW	23.90240	80.81020	28.6	8.1	695	0	31	180	25	49	0.4	0	25	225	58	19	54	2.7	452	7.89
515	Katni	Badwara	Basadi	HP	23.82750	80.62150	28.9	7.43	263	0	67	27	24	17	0.03	0	28	70	22	4	28	1.6	171	0
516	Katni	Rithi	Deogawan	DW	23.90410	80.25000	28.3	7.87	784	0	153	172	14	11	0.46	0	29	330	88	27	29	2	510	0
517	Katni	Katni	Katni1	DW	23.83210	80.39760	26.8	8.19	502	0	177	57	19	8	0.3	0	32	165	42	15	39	4.3	326	1.23
518	Katni	Badwara	Kewlari	HP	23.79850	80.82140	27.5	7.23	777	0	317	65	17	18	0.27	0.2	35	295	86	19	39	4	505	0.56
519	Katni	Badwara	Khitoli	DW	23.70960	80.82980	26.1	8.12	356	0	55	60	27	22	0.31	0	46	100	28	7	34	3.1	231	0
520	Katni	Katni	Lakhapateri	HP	23.70760	80.31570	27.9	7.94	446	0	92	72	23	26	0.04	0	24	95	24	9	59	1.7	290	1.26
521	Katni	Katni	Majhgawan1	TW	23.82170	80.49560	25.2	7.69	268	0	49	22	28	39	0.02	0	38	80	16	10	22	4.7	174	0
522	Katni	Vijay Raghavgarh	Piparia2	HP	23.86290	80.69700	28.6	7.84	856	0	314	77	14	50	0.49	0	45	275	82	17	67	2.7	556	6.23
523	Katni	Rithi	Rithi	HP	23.91140	80.14630	27.6	7.84	1295	0	368	225	16	5	0.8	0	42	405	130	19	112	3.2	842	15.26
524	Katni	Dhimarkheda	Siloni	HP	23.34660	80.37620	27.9	7.57	1100	0	441	87	27	41	0.55	0.1	37	435	136	23	52	2.8	715	5.63

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
525	Katni	Dhimarkheda	Sleemanabad	HP	23.61370	80.28510	27.9	7.63	640	0	272	32	28	23	0.24	0	28	270	72	22	20	4.7	416	2.23
526	Katni	Vijay Raghavgarh	Ubra	HP	23.93570	80.81320	29.8	7.45	683	0	326	32	15	13	0.34	0	26	280	76	22	32	2.7	444	3.69
527	Katni	Dhimarkheda	Umariapan	HP	23.51210	80.27520	28.4	7.35	1394	0	435	177	19	79	0.59	0	41	375	118	19	146	6.9	906	2.23
528	Khandwa	Pandhana	Balwara1	DW	21.69060	76.51770	28	7.32	1460	0	769	20	29	50	0.32	0	32	245	50	29	223	0.9	949	0.9
529	Khandwa	Punasa	Bangarda	DW	22.15400	76.45910	26	7.55	889	0	464	22	16	16	0.32	0	26	245	56	26	93	0.9	578	0.07
530	Khandwa	Harsud	Bedia	HP	21.97070	76.74270	28	7.66	835	0	342	57	25	35	0.13	0.1	22	340	98	23	36	0.6	543	1.21
531	Khandwa	Pandhana	Borgaon Buzurg	DW	21.60910	76.32520	28.7	7.7	1310	0	537	122	19	30	0.11	0	30	380	108	27	109	33.2	852	0.51
532	Khandwa	Harsud	Bori Saray	BW	21.99860	76.81930	28	7.25	1045	0	250	160	21	83	0.53	0	42	390	114	26	61	0.6	679	1.43
533	Khandwa	Harsud	Chanera	DW	22.96160	76.69800	28.2	7.4	1255	0	427	145	13	68	0.36	0	29	535	170	27	53	0.6	816	1.28
534	Khandwa	Chhegaon Makhan	Chhegaonmakhan	BW	21.83040	76.21730	29.1	7.33	1056	0	433	100	18	12	0.6	0	32	395	116	26	51	14.6	686	0.99
535	Khandwa	Harsud	Dagad Khedi	DW	22.08280	76.83320	29.7	7.25	623	0	262	22	30	39	0.36	0.2	26	245	54	27	30	0.8	405	1.01
536	Khandwa	Punasa	Daulatpur	DW	22.22850	76.37500	27	7.26	845	0	323	60	25	57	0.68	0	33	350	108	19	42	0.4	549	0.5
537	Khandwa	Chhegaon Makhan	Deshgaon New	DW	21.89860	76.18020	29.2	7.63	760	0	244	97	18	28	0.26	0	28	210	46	23	78	0.6	494	0.56
538	Khandwa	Chhegaon Makhan	Dhangaon	DW	22.08790	76.11810	29	7.61	1400	0	482	125	9	147	0.22	0	31	465	152	21	72	64.2	910	0.61
539	Khandwa	Punasa	Ghosali	DW	22.16260	76.12280	29.6	8.1	875	0	427	30	19	31	0.48	0	35	225	44	28	96	4.6	569	0.18
540	Khandwa	Punasa	Gujar Khedi	DW	22.16240	76.30410	29	7.83	800	0	366	30	26	35	0.63	0.1	44	315	92	21	39	0.5	520	0.22
541	Khandwa	Pandhana	Gurhi	DW	21.63860	76.57460	28	7.28	1100	0	275	147	16	127	0.14	0	31	495	162	22	29	0.3	715	0.98
542	Khandwa	Khandwa	Jaswadi1	DW	21.79440	76.42750	27.5	7.77	795	0	275	72	27	49	0.34	0	22	170	44	15	105	0.1	517	1.17
543	Khandwa	Khandwa	Jawar	BW	21.91250	76.43100	28.4	7.69	666	0	214	70	18	45	0.38	0.1	34	170	46	13	76	0.3	433	1.27
544	Khandwa	Khandwa	Kahlari	DW	21.98420	76.46170	30	7.53	630	0	146	122	13	11	1.05	0	31	145	36	13	79	0.1	410	1
545	Khandwa	Khalwa	Kalamkalan	DW	21.86270	76.70860	28	7.29	934	0	311	107	22	42	0.28	0	46	355	108	21	52	0.3	607	0.61
546	Khandwa	Punasa	Karoli	DW	22.13640	76.22030	29	7.7	851	0	415	30	29	15	0.42	0	41	305	86	22	58	2.7	553	0.71
547	Khandwa	Punasa	Kelwa Kalan	TB	22.17460	76.26570	29.1	7.8	810	0	354	52	21	22	0.88	0	39	190	48	17	98	2.2	527	1.15
548	Khandwa	Khalwa	Khalwa1	DW	21.80590	76.74450	29	7.57	1260	0	458	127	10	83	0.14	0.2	29	485	158	22	63	10.3	819	1.33
549	Khandwa	Khandwa	Khandwadw	DW	21.82400	76.65220	27.4	7.67	1312	0	415	195	28	16	0.2	0	47	215	52	21	194	18.2	853	0.55
550	Khandwa	Khalwa	Khedi New	DW	21.86630	76.56040	27	7.5	699	0	262	57	20	37	0.41	0	35	270	72	22	39	0.1	454	0.52
551	Khandwa	Pandhana	Kusumbia	DW	21.68760	76.19260	30.1	7.61	888	0	268	107	16	62	0.46	0.1	22	395	128	18	39	0.1	577	0.49
552	Khandwa	Punasa	Mundi	BW	22.06290	76.49100	30.5	7.59	354	0	134	22	25	10	0.35	0	43	130	34	11	24	1.1	230	0.15
553	Khandwa	Chhegaon Makhan	Pandhana	DW	21.70930	76.23710	31	7.37	1560	0	494	192	17	104	0.3	0	29	500	166	21	132	0.2	1014	1.44
554	Khandwa	Chhegaon Makhan	Roshiya	BW	21.95680	76.15530	29	8.1	666	0	256	55	23	21	0.39	0	27	170	42	16	74	0.1	433	0.25
555	Khandwa	Khandwa	Rudhy Bhata	DW	21.83560	76.44290	27.2	7.76	1075	0	494	47	16	60	0.35	0.2	46	275	68	26	121	0.2	699	0.26
556	Khandwa	Punasa	Thapana	DW	22.22230	76.08730	28.5	7.33	1810	0	598	245	27	52	0.89	0	22	405	126	22	229	1.4	1177	5.53
557	Khandwa	Punasa	Udaipur	DW	22.23240	76.40300	30	7.24	1400	0	354	177	18	176	0.56	0	38	495	164	21	112	1.3	910	2.39
558	Khargone	Barwaha	Amba	HP	22.04300	75.94400	29.9	7.83	1325	0	433	101	22	166	0.29	0.1	22	520	162	28	67	1.9	861	0.66
559	Khargone	Maheshwar	Baddiya	HP	22.23200	75.94200	30.1	7.71	2010	0	525	260	13	219	0.64	0.1	21	780	244	41	100	3.3	1307	3.56
560	Khargone	Barwaha	Balwara	DW	22.39000	75.97500	31.2	8.12	982	0	378	88	19	37	0.91	0.1	36	340	84	32	67	4	638	1.42
561	Khargone	Bhikangaon	Bamnala New	DW	21.82500	75.85300	28.4	7.93	1107	0	366	121	20	69	0.47	0.1	35	470	158	18	35	2.2	720	0.61
562	Khargone	Barwaha	Barwah	DW	22.25400	76.03500	29.3	7.72	879	0	354	61	31	28	0.56	0.1	26	325	86	27	50	3	571	2.55
563	Khargone	Bhikangaon	Bhikangaon1	DW	21.86200	75.95600	30.2	7.36	1723	0	494	222	26	135	0.39	0	34	650	224	22	100	0.2	1120	1.18
564	Khargone	Bhagwanpura	Bhulwani	DW	21.54800	75.48100	29.9	7.79	942	0	421	45	12	54	0.6	0	45	395	124	21	37	4	612	0.17
565	Khargone	Bhikangaon	Daudwa	DW	22.02100	76.13700	31.3	7.71	1462	0	519	167	13	71	0.54	0	35	585	188	28	70	0.6	950	0.67

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
566	Khargone	Maheshwar	Dhargaon	DW	22.19700	75.73000	30.2	7.87	1732	0	525	212	20	136	0.2	0	29	505	172	18	160	3.2	1126	0.22
567	Khargone	Bhagwanpura	Dhulkot	DW	21.61000	75.55300	31.2	7.93	764	0	329	35	11	54	0.47	0	48	320	96	19	36	1.4	497	0.13
568	Khargone	Gogawan	Divalgaon	DW	21.82900	75.73600	29.7	7.75	567	0	171	61	31	12	0.54	0.2	35	135	40	9	65	0.4	369	0.19
569	Khargone	Bhagwanpura	Ghatti	HP	21.71500	75.66700	30.2	7.62	1438	0	573	157	16	3	0.39	0.2	47	455	152	18	130	0.5	935	1.14
570	Khargone	Gogawan	Gogaon	HP	21.91630	75.74330	28.9	7.59	1562	0	433	227	18	87	0.36	0	26	495	164	21	130	0.8	1015	1.41
571	Khargone	Kasrawad	Kasrawad1	DW	22.12700	75.60800	29.3	7.91	1493	0	476	164	24	100	0.19	0	35	520	166	26	116	6	970	1.26
572	Khargone	Khargone	Khargone	DW	21.82800	75.61400	30.2	8.04	1033	0	433	76	19	66	0.26	0	27	380	124	17	84	1	671	0.56
573	Khargone	Maheshwar	Maheshwar	DW	22.17800	75.58800	30.9	7.81	953	0	439	53	17	40	0.52	0	31	365	102	27	54	2	619	0.89
574	Khargone	Maheshwar	Piplyabuzrug	DW	22.23400	75.86100	29.6	7.93	1432	0	537	134	32	48	0.29	0.1	33	365	112	21	159	3.6	931	1.41
575	Khargone	Barwaha	Sanawad New	DW	22.17300	76.07100	30.2	7.88	986	0	409	83	20	46	0.37	0	41	325	82	29	85	1.2	641	0.5
576	Khargone	Kasrawad	Sawda	HP	22.02600	75.62760	29.5	7.97	982	0	348	33	24	142	0.55	0	31	375	110	24	50	1	638	0.21
577	Khargone	Ziranniya	Ziranniya	DW	21.65060	75.98760	27.9	7.93	798	0	287	58	20	62	0.5	0	29	370	106	26	22	0.6	519	0.02
578	Mandla	Nainpur	Anjania	TW	22.50000	80.50000	27.3	7.79	734	0	293	62	18	16	0.49	BDL	26	215	44	26	68	0.8	477	0.56
579	Mandla	Narayanganj	Babaliya	HP	22.88400	80.41300	28.6	8.02	595	0	226	47	22	12	1.07	BDL	36	95	20	11	90	1	387	0.65
580	Mandla	Nainpur	Bamhni New	TW	22.47300	80.36400	27.8	7.89	785	0	336	52	12	25	0.87	BDL	34	305	84	23	38	0.2	510	4.26
581	Mandla	Bichhiya	Bichhia1	DW	22.45200	80.70000	27	7.61	1001	0	281	130	36	41	0.16	BDL	25	290	60	34	96	0.5	651	1.23
582	Mandla	Mohgaon	Chabi	DW	22.82500	80.69300	27.4	7.66	672	0	293	27	23	29	0.38	BDL	29	210	44	24	55	1.9	437	0.95
583	Mandla	Mandla	Devgaon	DW	22.74100	80.52600	27.4	7.91	698	0	214	80	34	15	0.11	BDL	34	220	46	26	57	0.5	454	1.23
584	Mandla	Nainpur	Dithori	HP	22.52400	80.19700	28.7	7.62	684	0	244	47	22	53	0.41	BDL	21	255	80	13	38	1	445	0
585	Mandla	Ghughri	Ghughri	HP	22.67800	80.68900	26.9	7.92	540	0	195	37	28	23	0.33	BDL	29	175	38	19	39	5.7	351	0.56
586	Mandla	Mandla	Gwari	TW	22.69400	80.34400	27.6	7.76	595	0	232	47	21	14	0.37	BDL	21	195	42	22	46	1.1	387	0.65
587	Mandla	Mohgaon	Indira	DW	22.75300	80.58600	27.4	7.64	564	0	244	32	14	18	0.6	BDL	31	220	46	26	27	0.9	367	0.26
588	Mandla	Bijadandi	Kalpi	HP	22.91600	80.19800	26.8	7.65	924	0	317	92	22	46	0.15	BDL	41	280	64	29	82	1.2	601	0.65
589	Mandla	Bijadandi	Khamher Kheda	DW	22.98200	80.15000	28.3	7.88	486	0	201	20	27	12	0.55	BDL	24	85	18	10	69	1.5	316	0.65
590	Mandla	Mandla	Khari	DW	22.79300	80.41100	26.3	7.59	668	0	214	70	29	28	0.45	BDL	42	150	38	13	80	4.7	434	0.21
591	Mandla	Narayanganj	Kudomali New	DW	22.87000	80.22000	26.9	7.68	551	0	238	30	20	11	0.16	BDL	33	225	64	16	20	2.4	358	0.52
592	Mandla	Mandla	Mahania Patpara	HP	22.67800	80.47100	29.8	7.94	788	0	207	77	27	88	0.41	BDL	28	245	76	13	63	3.3	512	2.24
593	Mandla	Mandla	Mahrajpur	HP	22.56900	80.35100	27.3	7.36	696	0	293	47	15	20	0.51	BDL	37	265	56	30	36	2.1	452	3.26
594	Mandla	Mandla	Mandla1	TW	22.60600	80.36600	29.2	7.97	1531	0	390	275	21	13	0.38	BDL	41	355	74	41	184	1.2	995	0.89
595	Mandla	Narayanganj	Mangalganj	DW	22.73000	80.30100	29.8	7.47	545	0	226	25	26	15	0.18	BDL	26	190	38	23	35	1.1	354	0.42
596	Mandla	Mawai	Mangli	DW	22.29100	80.99200	26.3	7.57	564	0	177	52	20	37	0.31	BDL	35	165	56	6	51	1.3	367	1.56
597	Mandla	Niwas	Manikpur	HP	23.09800	80.50700	30.1	8.01	861	0	342	70	32	13	1.38	BDL	29	285	66	29	65	1.5	560	0.21
598	Mandla	Mawai	Motinala	HP	22.37600	80.84000	27.6	7.02	592	0	104	95	29	48	0.22	BDL	23	130	28	15	73	2	385	89
599	Mandla	Nainpur	Nainpur	HP	22.43300	80.11300	27.5	7.38	1010	0	360	105	18	35	0.47	BDL	34	320	78	30	82	1.7	657	0.85
600	Mandla	Mandla	Padmi Choraha	DW	22.55700	80.40600	26.8	7.86	635	0	232	45	31	23	0.55	BDL	22	210	46	23	45	2.3	413	2.65
601	Mandla	Mandla	Pathiri Patpara	HP	22.61200	80.47700	28.2	7.99	495	0	189	32	24	14	1.49	BDL	31	50	16	2	88	1.9	322	0.52
602	Mandla	Mandla	Ramnagar1	HP	22.61200	80.51300	29.3	8.17	674	0	232	60	32	19	1.22	BDL	39	170	42	16	73	1.4	438	0.75
603	Mandla	Nainpur	Rampuri New	DW	22.40600	80.24700	26.8	7.79	730	0	299	45	27	22	0.46	BDL	32	235	50	27	56	2.1	475	4.16
604	Mandla	Mandla	Rehgaon	DW	22.74900	80.57700	28.8	7.83	529	0	207	42	11	13	0.28	BDL	41	185	38	22	33	1.8	344	2.45
605	Mandla	Bichhiya	Sijhora	DW	22.41500	80.78100	26.2	7.48	604	0	195	57	24	30	0.53	BDL	27	210	42	26	39	1.5	393	3.25
606	Mandla	Nainpur	Subhariya	DW	22.52600	80.27100	27.6	7.68	590	0	250	30	19	21	0.42	BDL	47	205	44	23	39	0.9	384	0.42
607	Mandla	Nainpur	Surajpura	DW	22.52100	80.13700	28.9	7.65	375	0	140	17	25	19	0.49	BDL	30	115	36	6	31	1.3	244	
608	Mandsaur	Bhanpura	Babulda	DW	24.47420	75.68810	27.9	7.6	1875	0	421	346	19	87	0.19	0	41	748	59	146	86	1.7	1219	1.38
609	Mandsaur	Bhanpura	Bhanpura	DW	24.50880	75.74440	28.6	7.91	1485	0	397	257	21	29	0.53	0	22	406	121	25	152	3.6	965	2.57

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
610	Mandsaur	Mandsaur	Chirmoliya	DW	24.02220	75.25690	28.9	7.83	999	0	305	132	20	42	0.57	0	31	431	129	26	30	1.2	649	0.49
611	Mandsaur	Mandsaur	Daloda1	DW	23.92500	75.09890	28.2	7.81	1001	0	299	132	11	60	0.58	0	26	356	105	23	65	1	651	0.42
612	Mandsaur	Garoth	Dharmarajeshwer	DW	24.19250	75.50000	27.8	7.56	820	0	342	66	25	14	0.21	0.1	36	243	55	25	79	2.4	533	0.29
613	Mandsaur	Mandsaur	Digaomali NPz	PZ	24.04830	75.15500	28.1	7.81	750	0	293	61	26	26	0.5	0	42	233	50	26	66	1.1	488	0.92
614	Mandsaur	Bhanpura	Dudhkheri	DW	24.43140	75.68470	29.9	7.88	801	0	366	42	16	15	0.46	0	27	302	95	16	46	1.4	521	0.61
615	Mandsaur		Gujarbardia NPz	PZ	24.04160	75.18330	28.5	7.68	1091	0	116	294	23	4	0.83	0	28	183	38	22	169	1.4	709	2.4
616	Mandsaur	Mandsaur	Mandsaur	DW	24.05270	75.08410	27.9	7.66	1415	0	470	184	21	41	0.8	0	29	475	145	28	109	1.3	920	0.28
617	Mandsaur	Sitamau	Manpura	DW	23.89080	75.27050	28.1	7.48	1645	0	421	206	27	188	0.43	0	31	574	186	26	111	1.5	1069	0.11
618	Mandsaur	Mandsaur	Nayakhera	DW	24.01440	75.08330	28.1	7.52	2318	0	464	451	9	143	0.46	0	25	861	301	26	132	1	1507	1.59
619	Mandsaur	Malhargarh	Pipaliya	DW	24.19630	75.00830	29.1	7.88	1034	0	329	118	22	63	0.65	0	34	421	127	25	43	1.1	672	1.11
620	Mandsaur	Garoth	Shamgarh1	DW	24.19130	75.64000	30.1	7.53	1427	0	409	199	19	84	0.53	0.2	26	574	184	28	59	1.2	928	1.9
621	Mandsaur	Sitamau	Surjani	DW	24.01670	75.38500	28.9	7.68	2152	0	537	407	17	40	0.6	0	37	718	244	26	165	2.7	1399	0.63
622	Morena	Porsa	Aurethi	HP	26.69650	78.40910	27.5	7.93	1182	0	580	42	15	16	0.23	0	22	330	86	28	130	1.1	768	6.53
623	Morena	Porsa	Bareha	HP	26.67690	78.18760	27.5	8.02	1222	0	616	27	26	30	0.45	0	46	365	112	21	125	2.3	794	8.26
624	Morena	Porsa	Dimni New	HP	26.61380	78.14160	28.1	8.11	1192	0	598	42	23	15	0.68	0	18	365	114	19	111	1.9	775	5.69
625	Morena	Joura	Huseinpur	DW	26.40410	77.60260	28.3	8.1	1189	0	616	35	29	5	0.42	0.1	35	315	82	27	124	3.2	773	10.63
626	Morena	Joura	Jafrabad	DW	26.41790	77.86510	27.9	8.04	1089	0	549	40	25	12	0.98	0	24	400	124	22	65	1.4	708	8.96
627	Morena	Kailaras	Kailaras	HP	26.29990	77.60750	27.8	8.14	1723	0	836	85	34	8	0.12	0	19	245	68	18	300	1.2	1120	12.56
628	Morena	Morena	Khera Mewda New	HP	26.55090	78.07820	27.8	7.88	1621	0	677	135	37	14	0.49	0	27	405	130	19	185	3.5	1054	5.69
629	Morena	Sabalgarh	Mangrol	HP	26.24420	77.35370	29.3	8.02	945	0	372	72	21	29	0.23	0	33	340	88	29	62	2.4	614	15.69
630	Morena	Morena	Morena	HP	26.48600	77.97930	29.4	8.06	993	0	476	27	31	12	0.38	0	25	260	66	23	112	1.8	645	8.98
631	Morena	Pahadgarh	Pahargarh	DW	26.19820	77.63850	28.1	8.09	1562	0	787	70	22	9	0.46	0.1	19	415	136	18	172	1.9	1015	9.58
632	Morena	Porsa	Porsa	HP	26.68630	78.37030	28.5	8.01	1723	0	872	72	27	31	0.87	0	24	245	70	17	300	2.3	1120	8.97
633	Morena	Sabalgarh	Tentra	DW	26.18690	77.29280	28.1	8.02	796	0	378	50	24	11	0.46	0	19	250	62	23	82	2.4	517	3.86
634	Morena	Kailaras	Tonga Gaon	HP	26.24720	77.43850	28.3	7.75	912	0	427	17	13	72	1.12	0	29	240	64	19	96	1.8	593	2.65
635	Narsimhapur	Narsimhapur	Bachai	DW	22.87260	79.30170	27	7.84	666	0	293	40	10	18	0.47	0.14	28	210	50	21	50	6.7	433	0.58
636	Narsimhapur	Narsimhapur	Bauchhar	DW	22.99210	79.33450	25.9	7.58	610	0	226	55	22	11	0.23	BDL	31	175	38	19	58	0.9	397	0.61
637	Narsimhapur	Kareli	Betli	HP	23.08250	79.02640	26.9	7.63	1461	0	360	235	40	51	0.32	BDL	26	295	76	26	195	3.6	950	1.17
638	Narsimhapur	Narsimhapur	Bhainsa	OCB	22.86520	79.21840	29.9	8.04	815	0	397	20	21	25	0.41	0.15	30	300	98	13	45	1.4	530	2.65
639	Narsimhapur	Narsimhapur	Dangidhana	HP	22.91280	79.27110	28.6	8	769	0	336	55	15	8	0.16	0.17	32	125	32	11	116	0.8	500	0.68
640	Narsimhapur	Chawarpatha	Dobhi	HP	23.11630	78.92320	27.9	7.84	1320	0	397	172	48	17	0.26	0.22	45	410	90	45	113	1.5	858	2.79
641	Narsimhapur	Gotegaon	Gotegaon	HP	22.03620	79.48330	27	7.89	1790	0	653	175	59	39	0.29	0.15	33	345	94	27	249	1.7	1164	0.21
642	Narsimhapur	Chawarpatha	Gundrai(Ii)	BW	23.18170	79.03130	27.5	8.15	1057	0	445	77	20	21	1.28	0	47	310	104	12	96	1.7	687	3.25
643	Narsimhapur	Gotegaon	Jhoteshwar	HP	22.94820	79.55510	26.9	7.64	1072	0	354	115	30	48	0.34	0.1	32	345	96	26	83	3.5	697	1.95
644	Narsimhapur	Narsimhapur	Karakbel New	HP	22.99750	79.35430	26.3	8.18	898	0	390	57	25	15	0.17	0	41	355	112	18	40	1.7	584	0.88
645	Narsimhapur	Kareli	Kareli Basti	HP	22.91550	79.06560	28.8	7.69	1224	0	323	155	44	83	0.1	0	31	345	84	33	118	1.9	796	0.31
646	Narsimhapur	Chawarpatha	Koudiya	DW	22.94070	78.81620	26.5	7.16	1510	0	598	130	25	48	0.1	0	42	510	162	26	109	1.5	982	0.69
647	Narsimhapur	Gotegaon	Manegaon2	HP	22.98780	79.39550	26.3	7.9	1034	0	397	77	39	35	0.06	0.2	40	390	80	46	55	2	672	0.58
648	Narsimhapur	Narsimhapur	Nandwara	DW	22.17050	79.16300	27	7.94	976	0	433	55	18	29	0.62	0	51	375	76	45	48	2.1	634	1.83
649	Narsimhapur	Narsimhapur	Ramkhiria	DW	23.10230	79.15480	24	8.12	797	0	293	72	29	18	0.33	0	28	255	54	29	61	3.1	518	1.15
650	Narsimhapur	Narsimhapur	Sundernagar	HP	22.83090	79.23980	27	7.51	1186	0	342	132	47	64	1.11	0	31	370	116	19	97	2.5	771	1.32
651	Narsimhapur	Chawarpatha	Tendukhera	HP	23.16850	79.87380	27.3	7.98	686	0	226	70	28	19	0.97	0	20	175	36	21	72	2.3	446	1.8
652	Neemuch	Manasa	Barlai	DW	24.42420	75.32000	28.9	8.03	1360	0	750	34	10	9	1.84	0	32	104	34	5	265	0.8	884	3.79
653	Neemuch	Manasa	Bhadanadw	DW	24.55610	75.36520	26.5	7.51	722	0	256	78	29	8.5	0.34	0	29	272	67	25	39	1	469	3.65

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
654	Neemuch	Jawad	Darai	DW	24.46220	74.93220	27.5	7.42	1000	0	354	130	16	5.9	0.36	0.1	34	426	129	25	32	1.2	650	1.02
655	Neemuch	Neemuch	Girdola	DW	24.48000	75.22330	28.9	7.7	4490	0	1885	468	22	8	0.96	0	27	995	364	20	578	3.3	2919	3.69
656	Neemuch	Manasa	Gota Pipliya	DW	24.84810	74.93810	29.9	7.78	1440	0	567	164	13	8.1	1.28	0	21	441	135	25	155	1.3	936	3.57
657	Neemuch	Jawad	Jat					7.39	1551	0	506	225	27	7	0.47	0.2	44	554	190	19	98	4.9	1008	1.84
658	Neemuch	Jawad	Lalpura	DW	24.61330	74.92640	27.1	7.77	1140	0	525	81	16	7.1	1.49	0	26	426	127	26	77	1.2	741	4.43
659	Neemuch	Manasa	Manasa	DW	24.47060	75.14390	29.1	7.91	1499	0	531	194	25	4.6	1.55	0	42	292	75	25	209	2	974	1.23
660	Neemuch	Jawad	Morban1	PZ	24.62220	75.00000	29.3	7.73	878	0	433	47	11	3	1.48	0.1	35	297	83	22	62	3	571	4.41
661	Neemuch	Neemuch	Neemuch	DW	24.45360	74.87390	27.9	7.53	2591	0	641	512	23	9	0.77	0	39	703	246	22	268	4.9	1684	2.03
662	Neemuch	Jawad	Patan1	DW	24.90720	75.21110	28.1	7.63	1462	0	714	93	12	0.3	0.46	0	41	515	170	22	100	4.8	950	1.34
663	Neemuch	Manasa	Rampura	DW	24.46670	75.43330	28.5	7.66	932	0	360	100	18	7	1.09	0.1	32	302	85	22	75	2	606	3.27
664	Neemuch	Neemuch	Semali Chandrawat	DW	24.54810	74.93610	27.9	7.58	1911	0	451	385	27	1.7	0.88	0	29	406	129	20	272	3.8	1242	0.71
665	Panna	Ajaigarh	Ajaigarh	DW	24.90900	80.26640	26.8	7.71	1195	0	397	120	10	109	0.88	0	21	525	164	28	34	0.2	777	1.56
666	Panna	Panna	Akola	DW	24.63400	80.14000	26.9	7.37	305	0	122	15	18	6	0.21	0	33	105	26	10	17	5.6	198	0.16
667	Panna	Gunnor	Amanganj	BW	24.42242	80.03294	26.5	7.42	915	0	378	67	18	31	0.54	0	25	330	82	30	55	2.9	595	12.56
668	Panna	Panna	Backchur	DW	24.74800	80.05800	29.7	7.72	443	0	189	17	7	7	0.39	0	37	165	48	11	15	2.6	288	0.89
669	Panna	Panna	Badagaon	DW	24.62500	80.36800	26	7.04	268	0	55	25	26	16	0.15	0	26	80	18	9	19	2.7	174	0.19
670	Panna	Panna	Bahera	DW	24.66300	80.25300	25.9	6.75	272	0	37	22	23	44	0.15	0	34	110	24	12	6	7.9	177	0.19
671	Panna	Ajaigarh	Banahari Kalan	DW	24.85500	80.18200	29.2	7.64	765	0	366	32	8	25	0.67	0	29	315	98	17	29	3.2	497	1.51
672	Panna	Panna	Barrachh	DW	24.54800	80.17100	27.1	7.64	587	0	299	15	11	11	0.63	0.1	31	220	62	16	31	0.8	382	0.56
673	Panna	Pawai	Hathkuri	DW	24.24300	80.07020	26.5	7.8	795	0	403	15	21	8	0.81	0	22	335	104	18	26	0.4	517	1.83
674	Panna	Pawai	Kharmora	DW	24.12200	80.26130	26.2	7.62	940	0	305	132	20	8	0.41	0	34	305	90	19	70	9.4	611	6.29
675	Panna	Shahnagar	Kuankheda	HP	23.90100	79.92300	28.1	8.12	1085	0	397	127	25	7	0.46	0	25	100	26	9	200	2.9	705	0.36
676	Panna	Panna	Madla	DW	24.72944	80.01056	26.4	7.55	1205	0	378	155	32	23	0.45	0	35	305	84	23	132	6.6	783	1.36
677	Panna	Pawai	Mohendra	BW	24.19081	79.95744	27	7.66	725	0	262	87	10	7	0.45	0	28	290	78	23	32	0.2	471	0.58
678	Panna	Ajaigarh	Pandepurwa	DW	24.84300	80.26700	28	7.47	1295	0	580	87	17	27	1.17	0	37	510	130	45	60	2.5	842	3.57
679	Panna	Panna	Panna1	DW	24.70510	80.18570	26.5	7.68	1550	0	445	267	11	12	0.49	0	24	390	122	21	172	5.3	1008	6.81
680	Panna	Pawai	Powai	DW	24.26.01	80.16200	27.8	7.77	453	0	134	37	26	50	0.84	0.2	36	155	40	13	38	1.2	294	0.14
681	Panna	Shahnagar	Saharan	DW	24.07900	79.94800	29	7.55	715	0	311	55	20	22	0.34	0	33	260	64	24	54	0.8	465	0.72
682	Panna	Gunnor	Salleha	DW	24.41300	80.40010	27.8	7.89	1136	0	500	87	10	18	0.42	0	44	390	96	36	69	17.5	738	1.79
683	Panna	Pawai	Semaria1	BW	24.26700	79.88010	30.8	7.43	678	0	195	95	15	25	0.62	0	42	260	64	24	35	2.2	441	0.46
684	Panna	Ajaigarh	Sinhai	HP	24.90410	80.20910	28.8	7.81	990	0	397	67	30	42	0.72	0	26	280	78	21	96	0.3	644	10.2
685	Panna	Shahnagar	Takhori	DW	23.98910	79.94820	27.6	7.72	886	0	281	112	22	16	0.5	0	31	290	76	24	55	17.1	576	
686	Raisen	Bareli	Bari	HP	23.03127	78.07770	31.1	8	805	0	311	50	22	35	0.23	0	26	310	96	17	40	1.1	523	2.93
687	Raisen	Obaidullaganj	Barkheda	HP	22.91670	77.65120	30.3	8.1	854	0	317	100	19	8	0.56	0	23	310	98	16	52	4.9	555	2.46
688	Raisen	Begamganj	Begumganj	DW	23.60700	78.34900	27.8	8.02	909	0	366	90	25	25	0.42	0	21	260	78	16	99	0.8	591	2.26
689	Raisen	Obaidullaganj	Chiklod	BW	23.10600	77.72300	29	7.74	1072	0	329	160	29	10	0.19	0	34	280	84	17	115	4.2	697	51.69
690	Raisen	Obaidullaganj	Dam Dongri	DW	23.09900	77.83800	30	7.71	492	0	256	17	11	7	0.29	0	29	195	52	16	26	1.2	320	7.01
691	Raisen	Gairatganj	Dehgaon	HP	23.31870	78.08830	27.9	7.66	1533	0	476	220	18	57	0.35	0.1	37	645	208	30	56	0.5	996	3.38
692	Raisen	Udaipura	Deori	HP	23.12396	78.68460	29.8	8.12	815	0	415	30	12	7	0.18	0	35	220	64	15	84	1.3	530	2.3
693	Raisen	Silwani	Dhangwan	HP	23.21908	78.51974	30	8.24	686	0	360	17	14	7	0.56	0	28	255	76	16	39	0.4	446	1.52
694	Raisen	Gairatganj	Gairatganj	TW	23.40800	78.22600	28.1	7.69	899	0	275	140	20	14	0.18	0	22	265	80	16	89	0.7	584	4
695	Raisen	Gairatganj	Garhi	HP	23.21900	78.14130	28.2	7.66	805	0	305	70	10	48	0.27	0	37	285	104	6	53	0.6	523	3.12
696	Raisen	Obaidullaganj	Goharganj	HP	23.02610	77.67900	29	7.44	396	0	140	35	22	6	0.34	0	26	120	32	10	36	2.6	257	1.02
697	Raisen	Bareli	Harsili	HP			29.6	8.1	1090	0	592	12	10	8	0.68	0	32	65	18	5	210	0.9	709	3.3

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
698	Raisen	Obaidullaganj	Hathi Palan	DW	23.07600	77.75300	30	8	478	0	220	30	23	6	0.52	0	21	130	36	10	57	0.5	311	0.99
699	Raisen	Sanchi	Khadera	HP	23.30500	77.94500	28.1	7.92	605	0	317	12	16	8	0.89	0	45	235	68	16	32	0.9	393	2.14
700	Raisen	Sanchi	Kharwai	HP	23.26720	77.66360	29.1	7.59	502	0	214	30	19	17	0.12	0	42	190	54	13	30	2.2	326	3.07
701	Raisen	Udaipura	Khiria	BW	23.09222	78.48333	29.6	8.08	700	0	311	30	25	20	0.25	0.1	28	225	34	34	55	1.1	455	2.23
702	Raisen	Obaidullaganj	Maindwa	BW	23.12180	77.54490	28	7.61	613	0	226	47	19	8	0.36	0	36	160	38	16	53	3.3	398	4.71
703	Raisen	Begamganj	Padahjhir	HP	23.57300	78.40400	27.6	7.21	705	0	275	62	20	12	0.42	0	46	305	90	19	20	0.7	458	4.88
704	Raisen	Begamganj	Paloha	HP	23.53200	78.29600	27.5	7.52	950	0	342	87	15	51	0.19	0	27	375	108	26	45	0.6	618	2.61
705	Raisen	Sanchi	Raisen	DW	23.33600	77.78300	29.2	7.35	765	0	262	87	15	30	0.17	0	28	225	64	16	71	2.2	497	3.05
706	Raisen	Sanchi	Salamatpur Chouraha	DW	23.45300	77.69800	29.1	7.9	646	0	281	55	13	7	0.25	0	34	205	52	18	58	1.7	420	9.71
707	Raisen	Sanchi	Sanchi	TW	23.48700	77.74100	28.2	7.4	1130	0	329	192	24	18	0.29	0	26	395	114	27	85	1.1	735	6.28
708	Raisen	Silwani	Siarmau	DW	23.40100	78.55000	27	7.76	837	0	293	110	17	15	0.36	0	37	305	92	18	58	1.7	544	5.96
709	Raisen	Silwani	Silwani	BW	23.29490	78.44710	28.9	7.77	865	0	348	75	18	10	0.29	0.2	47	360	96	29	30	1	562	1.09
710	Raisen	Begamganj	Sultanganj	DW	23.50300	78.55500	27.3	7.75	730	0	250	75	8	50	0.21	0	24	310	102	13	23	0.7	475	2.13
711	Raisen	Obaidullaganj	Sultanpur	BW	23.13600	77.93200	30.5	7.96	750	0	244	97	20	8	0.22	0	41	160	48	10	93	2.6	488	2.13
712	Raisen	Obaidullaganj	Tamot	DW	23.00700	77.63900	29	7.7	936	0	366	92	9	10	0.23	0	22	265	72	21	84	1.3	608	1.07
713	Raisen	Udaipura	Udaipura	HP	23.07807	78.50980	30.5	7.85	1375	0	610	87	18	35	0.45	0	33	455	104	47	102	1	894	2.62
714	Rajgarh	Biaora	Baiheda	DW	23.84260	76.94380	30	7.44	1170	0	628	37	10	7	1.1	0	32	345	104	21	109	1.4	761	3.69
715	Rajgarh	Sarangpur	Bamangaon	DW	23.88500	76.55720	26.8	7.24	2460	0	732	422	26	8	0.26	0.1	29	750	268	19	220	2.5	1599	6.42
716	Rajgarh	Biaora	Bapchi	DW	24.00420	76.94310	27.5	7.75	740	0	323	45	28	15	0.3	0	44	295	82	22	42	1.3	481	0.36
717	Rajgarh	Biaora	Barkheda	DW	23.94330	76.96660	31.3	7.88	677	0	323	20	12	34	0.85	0	26	285	78	22	24	0.1	440	1.17
718	Rajgarh	Rajgarh	Bawari	DW	23.98760	76.81560	28.4	7.68	526	0	183	40	22	37	0.19	0	34	225	64	16	17	0.6	342	1.23
719	Rajgarh	Biaora	Biora	DW	23.90940	76.90550	30.4	7.75	960	0	360	95	19	39	0.56	0.1	28	335	96	23	69	0.1	624	1.52
720	Rajgarh	Jirapur	Chhapihera	DW	23.89730	76.45750	27.6	7.91	758	0	336	37	8	50	0.83	0	20	295	84	21	39	0.2	493	0.37
721	Rajgarh	Narsinghgarh	Ganayari	DW	23.69160	77.00670	26.4	7.21	1930	0	494	270	23	190	0.44	0	46	835	290	27	58	1.1	1255	8.64
722	Rajgarh	Narsinghgarh	Gandhigram	DW	23.67530	77.06800	26.3	7.75	1020	0	372	90	27	61	0.27	0	37	440	138	23	34	1.1	663	0.93
723	Rajgarh	Khilchipur	Khilchipur	DW	24.03550	76.57660	27.9	7.39	1477	0	403	237	17	66	0.47	0.2	41	415	128	23	149	2.6	960	3.1
724	Rajgarh	Jirapur	Machalpur	DW	24.12880	76.31290	28.7	7.83	666	0	244	67	16	24	0.4	0	26	245	68	18	40	3.7	433	0.14
725	Rajgarh	Narsinghgarh	Mandawar	DW	23.70200	76.87960	27.5	7.7	1411	0	433	205	28	42	0.3	0	33	385	112	26	148	0.4	917	2.02
726	Rajgarh	Narsinghgarh	Pachor	DW	23.70890	76.73380	28	7.42	2011	0	519	307	24	149	0.27	0	28	515	168	23	222	4.9	1307	2.52
727	Rajgarh	Narsinghgarh	Pilukhedi	DW	23.48850	77.06200	28.6	7.51	2691	0	799	475	11	11	0.56	0.1	37	685	236	23	309	1.7	1749	0.46
728	Rajgarh	Sarangpur	Sandavta	DW	23.83340	76.52800	29.3	7.7	820	0	397	22	19	43	0.58	0	46	250	66	21	78	0.7	533	0.91
729	Rajgarh	Sarangpur	Sarangpur	DW	23.57440	76.74330	28.2	7.82	1255	0	220	282	26	24	1.03	0	22	125	38	7	236	1	816	0.14
730	Rajgarh	Biaora	Suthaliya	DW	23.99430	77.13690	29.2	7.39	1268	0	439	167	8	30	0.44	0	31	460	148	22	79	1.1	824	4.33
731	Rajgarh	Narsinghgarh	Talen	DW	23.57670	76.73230	29.6	7.45	1544	0	409	277	17	35	0.72	0.1	27	530	168	27	119	0.1	1004	2.87
732	Rajgarh	Sarangpur	Udhankheri	DW	23.66730	76.62950	27.4	7.65	1830	0	519	300	21	53	0.4	0	30	610	206	23	138	1.6	1190	4.88
733	Rajgarh	Jirapur	Zirapur	DW	24.04070	76.36560	28.4	7.8	1199	0	415	145	27	30	0.97	0	24	245	50	29	167	1.1	779	1.99
734	Ratlam	Alot	Alot	DW	23.75778	75.52972	29.5	7.47	990	0	360	110	21	30	0.25	0	32	375	116	21	57	1.1	644	0.42
735	Ratlam	Bajna	Bajna	DW	23.31389	74.63556	29.3	7.38	1165	0	415	135	15	30	0.43	0	26	455	152	18	55	0.8	757	0.99
736	Ratlam	Piploda	Barkheda	DW	23.62500	75.03056	28.5	7.41	2622	0	207	715	20	27	0.46	0	22	845	296	26	200	1.9	1704	3.03
737	Ratlam	Ratlam	Dhamnod	DW	23.44028	74.97750	28.5	7.49	1241	0	336	175	19	97	0.67	0.1	31	365	108	23	118	1.3	807	1.48
738	Ratlam	Ratlam	Dharad	DW	23.25000	75.10750	27.5	7.6	904	0	275	120	26	20	0.65	0	28	320	90	23	55	2.3	588	1.23
739	Ratlam	Jaora	Dhodhar	DW	23.77472	75.10889	28.1	7.8	1170	0	549	72	23	10	0.54	0	20	25	6	2	265	1.5	761	1
740	Ratlam	Alot	Gul Balod	DW	23.74861	75.47472	31	7.74	1554	0	195	395	25	24	0.39	0	34	375	114	22	180	5.6	1010	1.25
741	Ratlam	Alot	Malakhera	DW	23.69722	75.44861	29.5	7.66	1515	0	458	220	35	35	0.33	0	41	455	148	21	135	1.7	985	1.09

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
742	Ratlam	Ratlam	Mewasa	DW	23.49722	75.06722	28.1	7.54	890	0	305	107	16	31	0.46	0.2	22	230	56	22	106	1.1	579	0.95
743	Ratlam	Jaora	Mindli	DW	23.69028	75.29167	29.8	7.78	1248	0	256	255	20	30	0.42	0	45	410	90	45	95	2	811	0.96
744	Ratlam	Ratlam	Namli	DW	23.45713	75.06667	27.9	7.77	1212	0	415	162	15	19	0.3	0	35	390	104	32	95	2.9	788	1.48
745	Ratlam	Bajna	Rajapur	DW	23.53667	75.25500	28.3	7.65	532	0	238	17	29	16	0.23	0	29	205	52	18	27	1	346	0.19
746	Ratlam	Jaora	Ramnagar	DW	23.61278	74.96417	27.8	7.42	1309	0	214	280	20	40	0.42	0	32	510	152	32	62	1.8	851	0.67
747	Ratlam	Piploda	Rankoda	DW	23.22583	74.83889	28.9	8.16	1411	0	427	240	10	10	0.39	0.1	41	240	54	26	216	1.3	917	0.67
748	Ratlam	Bajna	Raoti	DW	23.22694	74.84222	29.2	7.7	835	0	317	80	13	28	0.19	0	28	280	70	26	60	3.5	543	0.42
749	Ratlam	Ratlam	Ratlam	DW	23.33111	75.04528	28.2	7.68	1357	0	336	255	21	9	0.46	0	37	465	152	21	95	3.9	882	1.32
750	Ratlam	Ratlam	Rattagarhkhera	DW	23.13944	75.21611	26.8	7.39	888	0	354	77	29	13	0.64	0.1	44	295	76	26	67	4.2	577	0.72
751	Ratlam	Sailana	Sailana	DW	23.45694	74.93278	28.9	7.6	1700	0	244	427	21	33	0.54	0	20	315	92	21	249	1.8	1105	0.87
752	Ratlam	Sailana	Saser	DW	23.39972	74.88694	28.1	7.66	641	0	299	32	18	12	0.36	0	31	250	68	19	32	1.2	417	0.2
753	Ratlam	Ratlam	Sejawata	DW	23.37694	75.06028	28.2	7.41	2015	0	275	505	25	32	0.68	0	38	510	156	29	222	2.9	1310	2.62
754	Ratlam	Sailana	Shivgarh	DW	23.34861	74.86167	28.5	7.8	506	0	201	32	21	22	0.34	0.2	29	150	38	13	50	3.7	329	0.54
755	Ratlam	Jaora	Sindurkiya	DW	23.66611	75.23528	28.9	7.46	965	0	409	75	23	17	0.34	0	34	390	118	23	43	1.5	627	0.23
756	Ratlam	Piploda	Sohangarh	DW	23.58028	75.08000	28.4	7.64	823	0	329	57	28	38	0.31	0	29	345	104	21	35	1.1	535	0.52
757	Ratlam	Jaora	Ukediya	DW	23.58472	75.18028	26.5	7.64	1040	0	372	105	21	57	0.65	0	22	220	52	22	139	1.6	676	0.93
758	Rewa	Rewa	Amilki	DW	24.43200	81.30900	31.1	7.6	1428	0	366	275	10	10	0.41	0	23	580	184	29	60	1	928	1.46
759	Rewa	Gangeo	Baikunthpur1	HP	24.81160	81.40780	30.3	7.5	878	0	427	45	29	5	0.46	0	32	415	122	27	20	1	571	2.91
760	Rewa	Sirmour	Bara	DW	24.82110	80.09320	27.8	7.67	812	0	329	52	40	10	0.52	0	21	290	74	26	50	2	528	2.24
761	Rewa	Jawa	Dabhoura	BW	25.11510	81.30730	29	7.59	810	0	275	45	78	35	0.29	0.1	42	255	66	22	65	4	527	0.05
762	Rewa	Gangeo	Gangeo	HP	24.72410	81.60010	30	7.75	1089	0	458	62	30	32	0.64	0	29	340	88	29	87	1	708	0.83
763	Rewa	Hanumana	Hanumana	BW	24.77800	82.09300	27.9	7.15	788	0	250	120	27	17	0.24	0	34	245	64	21	76	5	512	0.1
764	Rewa	Jawa	Jawa1	HP	24.96330	81.49190	29.8	7.2	1073	0	439	90	18	35	0.24	0	22	425	146	15	52	1	697	1.24
765	Rewa	Rewa	Kanauji	HP	24.47300	81.38000	30	7.34	925	0	519	25	22	4	0.68	0	31	450	150	18	24	3	601	3.26
766	Rewa	Teonthar	Katra	HP	24.89700	81.67320	28.1	7.62	1305	0	482	87	95	20	0.8	0	37	510	72	80	62	1	848	4.66
767	Rewa	Hanumana	Madha	HP	24.74100	82.04600	28.2	7.44	1298	0	427	187	11	22	0.19	0.2	25	370	114	21	128	2	844	0.05
768	Rewa	Mauganj	Mauganj1	DW	24.60900	81.98700	29	7.71	625	0	317	22	12	5	0.19	0	28	200	52	17	50	1	406	1.03
769	Rewa	Naigarhi 1	Naigarhi 1	DW	24.78700	81.77500	30	7.28	1133	0	329	157	27	48	0.44	0	37	375	104	28	92	2	736	1.47
770	Rewa	Mauganj	Pahadi	DW	24.75000	81.88600	28.1	7.09	1993	0	445	397	21	57	0.21	0	31	505	164	23	223	8	1295	6.16
771	Rewa	Hanumana	Pratapganj	DW	24.71000	82.11000	29.1	7.14	521	0	165	62	23	10	0.17	0	33	160	38	16	49	1	339	0.05
772	Rewa	Rewa	Raipur	DW	24.52400	81.34200	29.6	7.3	1405	0	744	30	17	12	0.26	0	41	660	170	57	12	1	913	4.16
773	Rewa	Rewa	Sagra	HP	24.61120	81.36230	28	7.25	2002	0	1104	40	10	35	0.29	0	27	955	304	47	18	2	1301	8.44
774	Rewa	Sirmour	Semaria2	BW	24.79800	81.15400	27.6	7.4	1743	0	519	237	6	137	0.29	0.2	34	570	174	33	130	20	1133	1.8
775	Rewa	Jawa	Senhuda	DW	25.01300	81.37050	27.5	7.87	1255	0	580	75	14	10	0.74	0	22	475	158	19	62	2	816	4.19
776	Rewa	Sirmour	Sirmaur1	DW	24.83300	81.36470	29.2	7.51	985	0	378	80	24	32	0.42	0	49	360	56	54	58	1	640	2.27
777	Rewa	Mauganj	Sitapur	DW	24.55300	81.77000	29.1	7.64	663	0	262	52	9	4	0.21	0	25	195	42	22	45	22	431	0.9
778	Rewa	Teonthar	Sohagi	HP	24.98110	81.68990	28.2	7.5	762	0	366	30	28	3	0.34	0	34	300	64	34	35	2	495	0.44
779	Rewa	Gangeo	Tikura	HP	24.67500	81.68950	27	7.77	742	0	305	67	12	11	0.33	0	26	280	78	21	41	1	482	1.02
780	Sagar	Malthon	BamhoriLal	DW	24.24556	78.43278	28.8	7.49	1002	0	360	130	12	5	0.49	0	20	265	42	39	104	3.5	651	0.72
781	Sagar	Banda	Banda	DW	24.04556	78.96722	29.3	7.63	429	0	195	22	14	6	0.12	0	23	140	26	18	36	1.4	279	1.15
782	Sagar	Malthon	Bandri	DW	24.04167	78.63972	29.4	7.29	642	0	275	32	17	7	0.32	0.1	39	210	38	28	44	0.3	417	0.39
783	Sagar	Jaisinagar	Baroda	DW	23.71500	78.70583	29.5	7.58	1612	0	275	367	18	18	0.7	0	42	380	108	27	187	1.3	1048	0.7
784	Sagar	Malthon	Barodia	DW	24.21583	78.58333	29.5	7.67	1042	0	372	127	5	6	0.29	0	33	265	40	40	112	2.7	677	0.66
785	Sagar	Banda	Behrol	DW	24.04972	78.74583	28.7	7.13	632	0	238	50	24	15	0.12	0.1	37	205	36	28	46	0.4	411	0.5

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
786	Sagar	Jaisinagar	Bhapel	DW	23.80611	78.63806	29.4	7.62	846	0	372	57	18	7	0.3	0	20	210	46	23	108	0.7	550	3.22
787	Sagar	Banda	Dalpatpur	DW	24.13417	79.01667	29.2	7.14	542	0	226	27	10	6	0.85	0	31	160	32	19	45	0.4	352	0.72
788	Sagar	Deori	Deorikhas	DW	23.38556	79.01556	29.6	7.65	816	0	360	47	23	15	0.2	0	45	285	68	28	56	0.9	530	2.54
789	Sagar	Shahgarh	Hirapur	DW	24.36556	79.21056	30.1	7.35	1052	0	287	152	14	22	0.13	0	49	260	62	26	112	1.7	684	2.62
790	Sagar	Rahatgarh	Hurra	DW	23.72778	78.40528	29.5	7.52	1615	0	281	377	17	22	0.81	0.2	25	370	116	19	198	1.5	1050	2.05
791	Sagar	Jaisinagar	Jaisingh Nagar	DW	23.62611	78.57500	28.8	7.5	1592	0	287	382	4	21	0.77	0	38	380	120	19	196	1.5	1035	1.42
792	Sagar	Rahatgarh	Jaruakhera	DW	23.97333	78.48194	29.1	7.48	1265	0	488	152	5	10	0.26	0	24	465	156	18	76	1.4	822	2
793	Sagar	Kesli	Kesli	DW	23.42056	78.80556	30.3	7.52	645	0	336	17	7	8	0.42	0	37	180	44	17	65	1.1	419	1.84
794	Sagar	Sagar	Khajuria	DW	23.93972	78.68639	29.6	7.46	823	0	366	57	9	9	0.44	0	33	275	82	17	67	1.3	535	0.22
795	Sagar	Malthon	Khimlasa	DW	24.20111	78.36306	29.4	7.6	787	0	378	42	12	5	0.34	0	26	245	76	13	68	2.6	512	6.23
796	Sagar	Banda	Manjla	DW	23.49028	79.06111	30.5	7.48	912	0	415	50	14	14	0.42	0.1	44	280	78	21	85	3	593	2.42
797	Sagar	Malthon	Naktapur	DW	24.27639	78.54944	28.9	7.31	602	0	287	30	15	5	0.12	0	41	215	48	23	42	0.7	391	0.59
798	Sagar	Rahatgarh	Naryawali	DW	23.90611	78.59250	29.3	7.31	945	0	275	115	44	38	0.24	0	31	315	104	13	66	6.6	614	0.34
799	Sagar	Kesli	Nayanagar	DW	23.48389	78.89583	28.2	7.65	784	0	348	50	12	15	0.26	0.2	29	270	86	13	58	1.3	510	0.65
800	Sagar	Rehli	Parsiya	DW	23.79194	79.07056	29.4	7.36	1045	0	299	152	32	20	0.14	0	39	245	62	22	135	1.9	679	1.92
801	Sagar	Sagar	Parsoria	DW	23.85389	78.93556	29.2	7.79	989	0	220	212	11	6	0.31	0	30	200	54	16	142	3.7	643	0.92
802	Sagar	Rehli	PipariaNarsing	DW	23.66222	78.99583	28.8	7.66	1142	0	445	117	12	28	0.25	0	40	450	156	15	59	0.9	742	0.77
803	Sagar	Rahatgarh	Rahatgarh	DW	23.78750	78.41806	27.9	7.56	1256	0	494	140	10	7	0.16	0.2	44	430	130	26	98	1	816	0.89
804	Sagar	Khurai	Reguwan	DW	24.03250	78.34583	26.2	7.66	989	0	384	95	8	34	0.54	0	25	250	54	28	112	2.8	643	0.6
805	Sagar	Rehli	Rehli	DW	23.64056	79.06528	25.2	7.5	1075	0	354	137	9	52	0.19	0	27	400	124	22	63	1.6	699	2.12
806	Sagar	Sagar	Rehpura	DW	23.71583	78.81361	25.1	7.47	656	0	305	30	24	6	0.25	0	36	225	46	27	45	1.3	426	0.58
807	Sagar	Shahgarh	Rurawan	DW	24.18167	79.02500	26.8	7.23	512	0	238	17	14	9	0.14	0	20	150	32	17	43	1.5	333	0.13
808	Sagar	Sagar	Sagar	DW	23.83333	78.76750	25.3	7.4	1023	0	451	65	15	8	0.27	0.1	46	305	94	17	89	2.3	665	0.05
809	Sagar	Jaisinagar	Sarkhedi	DW	23.73611	78.58861	25.4	7.21	575	0	220	50	19	5	0.29	0	37	170	42	16	54	1.6	374	0.23
810	Sagar	Shahgarh	Shahgarh1	DW	24.31972	79.11944	24.9	7.64	842	0	421	17	22	19	0.5	0	29	235	52	26	82	1.6	547	0.26
811	Sagar	Jaisinagar	Sihora	DW	23.79750	78.56083	25	7.48	1042	0	134	272	10	6	0.46	0	30	85	16	11	195	3.5	677	1.94
812	Sagar	Deori	Silarpur	DW	23.50417	78.95222	24.8	7.68	789	0	360	50	5	19	0.52	0.2	43	285	64	30	59	1.6	513	0.06
813	Sagar	Deori	Silarpur	DW	23.50417	78.95222	24.8	7.57	643	0	317	17	11	7	0.56	0	49	165	46	12	72	1.3	418	
814	Satna	Amarpatan	Amarpatan1	HP	24.31400	80.97600	31.6	7.42	1480	0	494	172	45	31	0.78	0.15	34	490	150	28	115	1	962	4.97
815	Satna	Maihar	Amdara	HP	24.10400	80.57600	29.9	7.43	908	0	287	105	49	10	0.54	BDL	28	295	64	33	71	0.9	590	1.11
816	Satna	Sohawal	Barakalan	HP	24.67100	80.78700	28.1	7.53	2022	0	689	220	82	36	0.6	0.11	42	625	156	57	176	1.5	1314	15.99
817	Satna	Nagod	Barethia	DW	24.57600	80.68400	27.3	7.62	1122	0	403	110	42	21	0.64	0.14	36	370	84	39	85	2.1	729	4.17
818	Satna	Maihar	Bhadanpur New	HP	24.16600	80.82100	27.9	7.35	935	0	354	97	23	12	0.4	BDL	36	305	62	36	73	1.9	608	0.81
819	Satna	Unchehara	Bhatanwara New	HP	24.49200	80.85800	28.5	7.42	1060	0	336	130	39	26	0.65	0.17	28	295	66	32	106	1.5	689	3.58
820	Satna	Majhgawan	Chitrakoot	HP	25.06700	80.81700	28.2	7.19	1525	0	451	242	24	17	0.36	BDL	39	410	84	49	159	1.3	991	3.77
821	Satna	Rampur Baghelan	Chorhata	HP	24.38800	80.91700	27.1	7.22	1940	0	616	232	92	31	0.57	0.14	28	545	152	40	188	9.9	1261	8.55
822	Satna	Majhgawan	Chowraha	TW	24.97800	80.79800	28	7.32	608	0	207	70	19	12	0.43	0.18	23	205	44	23	44	1.3	395	0.05
823	Satna	Ramnagar	Devra	HP	24.19400	80.99700	29.2	7.66	835	0	299	92	21	10	1.14	0.21	29	240	50	28	78	1.4	543	0.16
824	Satna	Nagod	Dureha	DW	24.45100	80.46100	27.9	7.31	709	0	214	105	16	8	1.04	0.11	31	190	40	22	72	2.4	461	1.1
825	Satna	Maihar	Ghunwara	BW			30.1	7.34	699	0	281	47	29	17	0.75	BDL	26	230	50	26	52	1.3	454	0.63
826	Satna	Ramnagar	Gorsari	HP	24.23800	81.03500	28.7	7.32	661	0	238	65	23	18	1.09	0.12	23	210	44	24	50	1.8	430	0.3
827	Satna	Ramnagar	Govindpur	TW	24.23000	81.18300	29	7.33	1077	0	323	142	26	34	1.4	BDL	31	255	56	28	125	3.1	700	0.02
828	Satna	Nagod	Jaso	HP	24.49900	80.50400	27.9	7.39	942	0	378	75	23	28	1.02	0.15	36	325	66	39	65	1.1	612	4.01

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
829	Satna	Sohawal	Jhali	HP	24.73200	80.68600	28.5	7.53	1058	0	409	90	32	19	1.03	BDL	39	310	72	32	97	1.4	688	5.46
830	Satna	Maihar	Jhukehi	TW	24.00400	80.42600	29.8	7.01	1632	0	354	310	29	47	0.96	0.1	22	375	102	29	200	2.8	1061	6.17
831	Satna	Ramnagar	Jowa	HP	24.15700	80.93800	28	7.24	626	0	195	65	34	18	0.6	0.14	32	160	38	16	67	1.6	407	0.56
832	Satna	Amarpatan	Kakra	HP	24.35300	81.03900	28.9	7.21	851	0	299	82	37	21	1.04	BDL	24	265	64	26	72	2.1	553	0.82
833	Satna	Amarpatan	Kemar	DW	24.48700	81.19500	28.1	7.08	1360	0	451	160	52	17	1.15	BDL	29	325	74	34	161	1.4	884	1.25
834	Satna	Rampur Baghelan	Kotar	HP	24.69900	80.99500	27.3	7.76	1828	0	610	222	49	44	1.03	0.16	36	485	101	57	193	2.8	1188	2.56
835	Satna	Sohawal	Kothi	DW	24.74700	80.77700	27.5	7.16	1090	0	380	111	39	31	1.17	0.21	33	351	71	42	86	2.1	709	6.69
836	Satna	Maihar	Kusendi	HP	24.17100	80.67700	28.5	7.92	1030	0	314	131	41	22	0.93	0.22	25	292	59	35	99	1.1	670	5
837	Satna	Maihar	Maihar New	TW	24.26000	80.76100	29	7.95	1558	0	501	207	33	33	0.9	0.17	33	436	127	29	153	1.8	1013	3.15
838	Satna	Majhgawan	Majhagawa	DW	24.91100	80.81300	28.6	7.21	957	0	272	129	29	34	1.25	BDL	24	282	77	22	88	1.2	622	3.2
839	Satna	Amarpatan	Mukundpur	DW	24.42300	81.24700	26.8	7.2	916	0	308	88	55	14	1.11	BDL	33	307	73	30	66	1.1	595	6.62
840	Satna	Nagod	Nagod	TW	24.57200	80.57800	29	7.12	319	0	121	20	19	9	0.5	0.14	19	94	20	11	28	0.9	207	0.27
841	Satna	Majhgawan	Nakaila	HP	25.01800	80.68600	27.6	7.11	569	0	211	48	21	14	1.28	BDL	28	203	44	23	34	1.2	370	0.17
842	Satna	Maihar	Naraura	HP	24.27700	80.84100	26.8	7.12	1140	0	344	157	28	26	0.94	BDL	32	307	67	34	116	1.4	741	0.46
843	Satna	Unchehara	Pahari	HP	24.39200	80.54700	26.5	7.45	460	0	151	48	19	16	0.5	0.16	26	153	34	17	33	1.5	299	0.17
844	Satna	Majhgawan	Paldeo	HP	25.11000	80.78300	28.6	7.11	920	0	260	131	32	23	0.49	0.17	29	243	55	25	97	1.7	598	1.42
845	Satna	Unchehara	Paras maniya	DW	24.35000	80.61600	26.1	7.58	560	0	157	78	26	12	0.84	BDL	28	168	42	16	49	1.2	364	0.06
846	Satna	Nagod	Patwara	HP	24.55300	80.62100	27	7.98	1597	0	374	293	23	47	0.7	0.13	23	342	75	37	198	8.3	1038	4.19
847	Satna	Unchehara	Pondipithourabd	HP	24.47200	80.75900	29.8	7.73	1513	0	441	225	25	43	1.26	0.11	27	371	83	40	175	1.1	983	5.77
848	Satna	Rampur Baghelan	Rampur1	HP	24.51100	81.05600	28.6	7.05	1211	0	429	136	34	19	0.65	BDL	32	386	101	33	99	1.7	787	5.27
849	Satna	Maihar	Rivara	HP	24.12600	80.86800	27.8	7.11	743	0	290	56	25	21	1.27	BDL	31	267	55	31	45	1.4	483	0.68
850	Satna	Maihar	Sabhaganj	HP	24.03500	80.45600	28.9	7.05	1330	0	356	205	42	26	0.99	BDL	28	302	61	36	165	2.1	865	1.63
851	Satna	Ramnagar	Sagauni New	HP	24.26400	81.20300	28.6	6.99	487	0	169	40	29	7	1.36	0.14	34	168	36	19	31	0.9	317	0.23
852	Satna	Sohawal	Satna	DW	24.56800	80.83200	27.5	7.23	1153	0	308	189	30	16	1.06	0.15	25	302	63	35	123	1.9	749	1.24
853	Satna	Nagod	Singhpur	DW	24.70200	80.58200	27.3	7.87	760	0	230	98	25	23	1.05	0.11	27	203	51	18	79	1.3	494	0.78
854	Satna	Unchehara	Uchehara	DW	24.36200	80.78100	28.4	7.09	1052	0	338	134	33	18	1.23	0.24	29	292	61	34	104	1.6	684	4.66
855	Sehore	Ichhawar	Amlaha	DW	23.02470	76.71280	27.2	7.77	1370	0	435	197	12	40	0.89	0	20	475	146	27	100	1	891	6.23
856	Sehore	Ashta	Ashta	DW	23.00420	76.72370	26.9	7.76	1912	0	676	230	15	66	0.5	0.1	21	630	208	27	160	6.6	1243	8.23
857	Sehore	Budni	Bayan	DW	22.72470	77.55270	28.8	7.66	1071	0	362	127	18	47	0.2	0	22	475	148	26	35	1.7	696	0.89
858	Sehore	Sehore	Bhandeli	DW	23.12440	77.26070	26.7	7.83	711	0	314	20	23	55	0.65	0	28	330	96	22	17	1	462	1.12
859	Sehore	Ichhawar	Bordi	DW	22.96140	77.09440	27.8	7.8	1032	0	380	120	29	2	0.16	0	28	215	62	15	140	3	671	0.86
860	Sehore	Budni	Budhni	DW	22.78720	77.68240	29.5	7.42	1458	0	531	130	27	92	0.51	0.1	20	530	174	23	94	1.3	948	6.23
861	Sehore	Sehore	Chandbar	DW	23.31790	77.04610	28.4	7.74	554	0	54	120	24	20	0.5	0	22	40	12	2	100	1.6	360	0.68
862	Sehore	Sehore	Heerapur	HP	23.14300	77.17300	29.7	7.4	2945	0	924	465	28	27	0.46	0	26	790	272	27	302	56.8	1914	2.42
863	Sehore	Ichhawar	Ichhawar	DW	23.03330	77.01790	29.1	7.19	1840	0	374	387	19	57	0.39	0	22	695	236	26	103	3	1196	11.23
864	Sehore	Sehore	Jattakheda	DW	23.15400	76.97820	28.5	7.67	830	0	338	62	18	33	0.41	0.2	24	355	112	18	31	2	540	1.89
865	Sehore	Ichhawar	Kankad Kheda	DW	23.10430	77.03660	28.5	7.48	725	0	308	32	17	52	0.43	0	27	335	98	22	17	1.5	471	2.24
866	Sehore	Ashta	Khachrod	DW	22.87240	76.71780	29.2	7.5	1451	0	393	272	13	5	0.42	0	22	545	176	26	94	7.6	943	7.58
867	Sehore	Sehore	Khajuria Kalan	DW	23.36210	77.07440	26.6	7.49	888	0	387	45	23	40	0.28	0.1	19	355	112	18	38	1.9	577	2.24
868	Sehore	Nasrullaganj	Larkui New	DW	22.81510	77.21270	27	7.58	1052	0	477	32	26	69	1.24	0	32	290	78	23	109	1.8	684	2.86
869	Sehore	Budni	Malibayan	DW	22.74600	77.46110	28.4	8.1	1365	0	707	40	30	9	0.47	0	30	240	62	21	207	3.2	887	5.26
870	Sehore	Ichhawar	Nadan	DW	22.89520	77.11970	27.7	8	1029	0	399	95	11	40	0.26	0.2	26	460	148	22	37	3.5	669	1.56
871	Sehore	Budni	Neelkachar	DW	22.72260	77.50220	28.4	7.72	780	0	266	100	16	14	0.34	0	26	230	64	17	75	1.8	507	1.12

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
872	Sehore	Nasrullaganj	Rala	DW	22.69330	77.30610	29.2	7.39	2471	0	525	475	13	142	0.44	0	23	930	326	28	137	24.3	1606	12.65
873	Sehore	Sehore	Sehore1	DW	23.17130	77.05960	28.3	7.83	911	0	435	45	18	18	0.23	0	29	330	96	22	58	2.8	592	1.85
874	Seoni	Seoni	Amagarh	HP	22.01540	79.61140	27	6.79	222	0	54	22	22	15	0.19	0.1	20	35	10	2	36	0.7	144	0.23
875	Seoni	Barghat	Ari	HP	21.94580	79.70950	27	7.27	1244	0	348	182	44	23	0.98	0	23	305	104	11	142	2.2	809	12.63
876	Seoni	Seoni	Bamandehi	DW	22.04840	79.57870	26.3	7.28	356	0	140	17	19	10	0.32	0	37	95	28	6	36	0.4	231	0.53
877	Seoni	Seoni	Bamhodi	HP	22.06770	79.65440	27	7.51	878	0	293	105	23	24	0.83	0	36	265	84	13	79	2.9	571	1.16
878	Seoni	Keolari	Banjal	HP	22.30800	79.99280	27	7.25	542	0	232	30	14	8	1.11	0.1	29	155	46	10	52	1	352	1.23
879	Seoni	Lakhnadon	Banjari	DW	22.82150	79.75800	25.9	7.51	712	0	275	55	24	14	0.27	0	34	285	88	16	36	0.4	463	0.53
880	Seoni	Barghat	Borghat	BW	22.02800	79.93440	26.1	7.1	1166	0	348	200	5	29	1.14	0	44	180	54	11	196	2.9	758	0.23
881	Seoni	Chhapara	Chhapara	BW	22.36970	79.53680	26	7.85	707	0	299	47	27	12	1.06	0.1	31	85	24	6	132	0.9	460	1.19
882	Seoni	Seoni	Chunatola	HP	22.14800	79.66700	27	7.48	684	0	232	72	13	32	0.99	0	25	130	36	10	96	1.7	445	4.56
883	Seoni	Lakhnadon	Dargada	HP	22.92810	79.63710	27	7.85	712	0	207	87	17	27	0.41	0	38	170	52	10	87	0.5	463	1.23
884	Seoni	Dhanaura	Dhanaura	HP	22.52940	79.83740	27	7.87	1118	0	366	145	14	28	0.83	0	34	150	46	9	179	2	727	0.56
885	Seoni	Keolari	Dhangada	BW	22.32250	79.85920	26	7.29	1220	0	293	215	15	41	1.51	0.2	26	340	108	17	116	1.5	793	
886	Seoni	Barghat	Dharamkuan	HP	21.87600	79.76070	27	7.24	1008	0	281	165	24	58	0.52	0	28	325	104	16	102	0.8	655	2.63
887	Seoni	Lakhnadon	Dhuma	HP	22.74080	79.71770	26	8.1	278	0	49	27	45	9	0.88	0	35	30	8	2	53	0.2	181	2.16
888	Seoni	Lakhnadon	Gaurabibi	BW	22.71990	79.49190	26	7.93	389	0	31	75	22	45	0.3	0	45	45	14	2	69	0.3	253	0.23
889	Seoni	Ghansaur	Ghansor1	HP	22.65560	79.95350	27	7.9	560	0	104	80	35	12	1.69	0	29	75	24	4	84	0.5	364	0.15
890	Seoni	Lakhnadon	Gharghatia	HP	22.67470	79.78650	27	7.79	516	0	116	75	24	7	0.53	0	37	150	46	9	48	0.4	335	0.26
891	Seoni	Chhapara	Ghunai	DW	22.44120	79.55700	26	7.56	789	0	299	45	12	74	0.64	0	48	305	108	9	50	2.1	513	0.43
892	Seoni	Ghansaur	Gorakhpur	HP	22.73960	79.92920	27	8.12	312	0	122	37	5	5	0.69	0.1	46	30	8	2	61	0.4	203	0.53
893	Seoni	Barghat	Kalyanpur	HP	21.96860	79.80970	27	7.1	232	0	85	17	18	3	0.49	0	26	40	12	2	39	0.6	151	0.49
894	Seoni	Seoni	Kaniwara	HP	22.21270	79.74120	27	7.75	945	0	348	102	16	16	0.57	0	31	260	82	13	89	12	614	15.23
895	Seoni	Barghat	Kauria	DW	22.01820	79.84110	27	7.46	862	0	244	107	13	60	0.6	0	49	300	104	10	59	10	560	12.23
896	Seoni	Keolari	Keolari	DW	22.37330	79.90340	27	7.62	848	0	329	50	11	10	0.55	0.2	41	305	106	10	35	2.1	551	2.23
897	Seoni	Dhanaura	Khamaria	HP	22.59920	79.79380	27	7.53	888	0	458	27	8	9	0.31	0	37	315	108	11	56	0.7	577	0.26
898	Seoni	Kurai	Khawasa	HP	21.70420	79.43620	27	7.65	1502	0	433	192	22	104	0.61	0	48	490	158	23	127	2	976	3.96
899	Seoni	Dhanaura	Kudari	HP	22.40280	79.81030	27.1	7.71	756	0	287	35	44	25	1.03	0	25	220	68	12	69	0.9	491	2.96
900	Seoni	Ghansaur	Kudopar	HP	22.63970	80.03180	27	7.3	712	0	354	17	26	14	0.5	0.1	34	190	52	15	78	0.9	463	0.52
901	Seoni	Kurai	Kurai New	HP	21.81180	79.50140	27	7.65	1245	0	433	135	23	64	0.89	0	32	435	144	18	89	4	809	0.12
902	Seoni	Lakhnadon	Lakhnadon1	BW	22.59970	79.61060	27	8.1	845	0	43	215	31	37	0.25	0	22	190	52	15	114	1.2	549	3.23
903	Seoni	Lakhnadon	Madai	BW	22.54140	79.59420	27	7.86	645	0	281	25	24	31	0.3	0	25	210	64	12	58	1.2	419	0.26
904	Seoni	Lakhnadon	Makarjhir	HP	22.69240	79.68500	27	8	1012	0	37	175	52	212	1.43	0	31	150	38	13	165	1.3	658	0.16
905	Seoni	Ghansaur	Masurbhanwari	HP	22.63890	80.14220	27	7.62	849	0	348	40	44	33	0.46	0	33	340	112	15	41	1.4	552	1.86
906	Seoni	Dhanaura	Mehta	DW	22.63030	79.85800	26	7.62	935	0	451	35	37	9	0.46	0	42	370	124	15	45	2.4	608	2.16
907	Seoni	Lakhnadon	Nagan Deori	DW	22.81960	79.66660	25	7.62	589	0	275	17	24	11	0.48	0	25	200	62	11	46	1.7	383	0.56
908	Seoni	Seoni	Nandora	HP	22.00910	79.53700	27	7.92	689	0	262	52	16	33	0.47	0.2	29	275	84	16	35	1.5	448	0.12
909	Seoni	Seoni	Palari	HP	22.30570	79.81290	27.1	8.03	760	0	201	112	12	7	1.84	0	41	70	18	6	126	3	494	1.12
910	Seoni	Keolari	Pandiachhappara	HP	22.11630	79.99900	27	7.82	558	0	244	47	8	5	1.76	0	34	115	32	9	83	2.6	363	0.23
911	Seoni	Seoni	Pipardahi	HP	22.05440	79.41030	27	8.01	550	0	61	125	21	3	1.71	0	28	30	8	2	105	1.6	358	12.69
912	Seoni	Kurai	Piparia1	DW	21.78420	79.48560	26	7.62	842	0	390	42	27	22	0.83	0	46	325	104	16	45	2.4	547	8.69
913	Seoni	Seoni	Rahiwara	DW	22.21690	79.53500	25	7.69	712	0	354	17	32	9	0.54	0.2	23	250	82	11	58	1.7	463	0.29
914	Seoni	Kurai	Rukhar	HP	21.87070	79.52530	26.7	7.72	845	0	275	60	14	120	0.67	0	27	260	84	12	78	5.3	549	8.23
915	Seoni	Lakhnadon	Sahasna	BW	22.60140	79.74370	25	7.62	439	0	122	52	15	12	0.96	0	31	25	6	2	81	1.8	285	1.96

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
916	Seoni	Seoni	Seoni1	DW	21.94160	79.52380	26	7.1	385	0	116	30	22	17	0.24	0	29	95	24	9	41	3	250	5.23
917	Seoni	Kurai	Suktara	HP	22.25900	80.05370	27	7.04	459	0	134	55	31	4	0.7	0.1	32	90	18	11	63	2	298	0.56
918	Shahdol	Jiysingh Nagar	Amjhor	HP	23.66871	81.55407	26.7	8.13	680	0	214	65	28	35	0.17	0	23	250	70	18	38	2.5	442	0.5
919	Shahdol	Burhar	Bahgad	DW	23.36945	81.66619	26.6	7.98	632	0	232	62	13	20	0.41	0	35	240	50	28	32	0.9	411	0.84
920	Shahdol	Burhar	Bandhua Tola	DW	23.43148	81.68937	29.4	7.89	445	0	153	47	12	10	0.55	0	32	140	36	12	35	0.9	289	0.66
921	Shahdol	Jiysingh Nagar	Bansukli	HP	23.78647	81.61503	28.4	7.7	861	0	372	42	29	30	0.4	0	22	270	62	28	70	0.7	560	0.25
922	Shahdol	Beohari	Beohari	HP	24.01258	81.38006	30.3	8.3	821	0	372	65	14	6	0.51	0	24	165	32	21	119	3.3	534	6.6
923	Shahdol	Burhar	Bhikhampur	DW	23.44421	81.06767	27.5	7.99	572	0	171	80	12	16	0.57	0	29	170	50	11	52	1.4	372	1.13
924	Shahdol	Jiysingh Nagar	Bhurka	DW	23.73555	81.37570	27.8	7.83	805	0	275	87	12	38	0.26	0	34	290	58	35	49	1.6	523	1.44
925	Shahdol	Burhar	Burhar	TW	23.22525	81.51473	28.4	7.91	365	0	128	30	10	20	0.33	0	31	130	30	13	22	1.5	237	2.38
926	Shahdol	Jiysingh Nagar	Daraudi	TW	23.68584	81.51119	28.6	7.94	550	0	250	27	12	15	0.15	0	45	200	38	26	32	2	358	0.32
927	Shahdol	Burhar	Girwah	HP	23.26195	81.69765	29.7	7.78	862	0	293	87	38	25	0.48	0	28	280	56	34	68	0.9	560	0.73
928	Shahdol	Gohparu	Gohparu	HP	23.49207	81.40736	28.3	7.75	642	0	171	87	20	40	0.39	0	41	205	46	22	52	1.2	417	2.27
929	Shahdol	Jiysingh Nagar	Jaisinghnagar1	TW	23.67918	81.38725	34.9	7.24	642	0	140	100	10	65	0.25	0	21	225	34	34	43	1	417	0.43
930	Shahdol	Jiysingh Nagar	Kanadi (Khurd)	HP	23.76301	81.34049	29.5	7.9	830	0	329	80	12	13	0.5	0	36	255	72	18	72	1.1	540	0.28
931	Shahdol	Sohagpur	Kanchanpur	TW	23.26056	81.46388	29.5	8.09	640	0	275	45	20	6	0.51	0	26	170	42	16	67	2	416	1.07
932	Shahdol	Jiysingh Nagar	Karki	DW	23.80915	81.38604	27.6	7.74	1150	0	439	120	12	32	0.48	0	29	375	92	35	87	4.7	748	0.7
933	Shahdol	Burhar	Khamhidol	DW	23.36327	81.72889	26.5	7.38	660	0	207	95	17	2	0.41	0	35	195	56	13	60	1.8	429	2.73
934	Shahdol	Burhar	Kotri	DW	23.45691	81.71779	27.6	7.7	505	0	232	17	25	10	0.77	0	43	175	42	17	35	0.9	328	0.63
935	Shahdol	Jiysingh Nagar	Kubara	HP	23.69264	81.45565	29	7.56	952	0	317	105	40	25	0.46	0	35	280	90	13	87	2	619	0.27
936	Shahdol	Burhar	Marjad	HP	23.27125	81.58842	29.9	8	745	0	281	75	15	20	0.42	0	28	305	60	38	30	0.9	484	0.64
937	Shahdol	Sohagpur	Nipaniya	HP	23.38771	81.37193	27.8	7.88	805	0	262	85	32	28	0.36	0	37	220	46	26	82	2.5	523	4.03
938	Shahdol	Beohari	Pasgari	DW	24.09816	81.43117	29.5	7.76	668	0	214	77	18	28	0.44	0	33	250	62	23	36	1.3	434	2.56
939	Shahdol	Jiysingh Nagar	Sanousi	DW	23.94806	81.45799	26.6	7.96	520	0	238	27	11	10	0.44	0	26	145	30	17	50	4	338	41.81
940	Shahdol	Gohparu	Sarsi	DW	23.58140	81.40052	28.3	7.82	605	0	146	102	18	10	0.52	0	22	195	48	18	45	2.8	393	0.62
941	Shahdol	Sohagpur	Shahdol	HP	23.29915	81.35773	26.4	7.72	1100	0	378	100	35	50	0.22	0	29	425	124	28	50	2.8	715	2.31
942	Shahdol	Jiysingh Nagar	Sidi	HP	23.69637	81.65127	33.9	7.79	921	0	348	95	15	25	0.22	0	34	285	94	12	76	3.9	599	0.39
943	Shahdol	Sohagpur	Singhpur1	HP	23.21147	81.41598	30.3	7.72	630	0	293	15	18	35	0.18	0	26	215	52	21	42	4.5	410	1.71
944	Shahdol	Jiysingh Nagar	Tihki	HP	23.93057	81.36383	29.6	7.97	640	0	226	70	10	17	1.01	0	25	225	44	28	40	2.3	416	3.96
945	Shahdol	Jiysingh Nagar	Umarkhohi	HP	23.85395	81.49631	27.5	7.69	805	0	214	130	17	22	0.23	0	31	250	58	26	65	5.9	523	2.94
946	Shajapur	Shujalpur	Akodia	DW	23.38940	76.59700	27.5	7.68	1345	0	366	220	33	13	0.88	0.1	36	355	72	43	143	1.1	874	3.26
947	Shajapur	Kalapipal	Arandia	DW	23.20980	76.67350	29.1	8.11	1042	0	287	167	15	27	1.59	0.2	19	245	54	27	124	1.3	677	1.96
948	Shajapur	Moman Badodia	Chouma	DW	23.65020	76.22380	27.2	7.24	2080	0	342	482	22	19	1.91	0.1	27	310	66	35	330	2.1	1352	2.23
949	Shajapur	Kalapipal	Kalapipal	DW	23.33820	76.83830	29.3	7.92	607	0	214	57	26	15	1	0	24	210	58	16	41	0.8	395	2.96
950	Shajapur	Shajapur	Majhania	DW	23.45440	76.33150	27.9	7.43	989	0	366	80	22	53	0.62	0	35	345	70	41	63	1.2	643	2.63
951	Shajapur	Shajapur	Makshi New	BW	23.25360	76.14630	29.8	7.73	1468	0	116	400	29	21	1.89	0.2	19	125	32	11	275	1.4	954	6.53
952	Shajapur	Moman Badodia	Moman Badodia	DW	23.60740	76.34000	26.2	7.31	1913	0	519	247	38	134	1.29	0	26	540	126	55	185	2.3	1243	8.56
953	Shajapur	Kalapipal	Nandni	DW	23.32120	76.93800	28.2	7.88	812	0	336	20	5	120	0.78	0	34	300	88	19	52	1.7	528	1.69
954	Shajapur	Shajapur	Narayangaon	DW	23.48110	76.24400	27.8	7.86	777	0	336	55	23	39	1.06	0.3	22	325	106	15	42	0.9	505	1.78
955	Shajapur	Shajapur	Panwadi	DW	23.51040	76.40810	28.4	7.97	1690	0	610	267	14	34	1.02	0	16	430	134	23	227	2.3	1099	2.78
956	Shajapur	Moman Badodia	Salsalai	DW	23.46630	76.53580	26.3	7.55	1112	0	390	107	28	54	0.69	0	24	350	72	41	92	1.1	723	4.36
957	Shajapur	Shajapur	Shajapur	DW	23.42050	76.27520	27.4	7.73	1062	0	397	92	38	32	0.75	0.1	39	390	80	46	62	1.5	690	0.96
958	Shajapur	Shujalpur	Shujalpur	DW	23.40890	76.70900	30.1	7.73	605	0	189	72	17	27	0.68	0	31	180	38	21	54	1.6	393	0.23
959	Shajapur	Shajapur	Tilawad Govind	DW	23.30730	76.33440	28	7.78	999	0	336	105	21	49	0.7	0.1	29	310	66	35	82	2.1	649	0.45

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
960	Sheopur	Sheopur	Baroda New	DW	25.49840	76.65700	27.8	7.87	1338	0	464	167	20	4	1.14	0	36	455	140	26	109	2	870	4.61
961	Sheopur	Sheopur	Bhagwara	HP	25.67330	76.61380	29.1	7.42	2186	0	390	370	15	276	0.7	0	20	590	196	24	235	2.9	1421	16.97
962	Sheopur	Vijaypur	Dhobni	HP	25.83270	77.57850	28.4	7.71	1435	0	476	165	23	106	0.36	0	32	525	168	26	96	4	933	0.51
963	Sheopur	Sheopur	Doti	HP	25.67180	76.59120	28.5	8.02	896	0	372	42	36	21	0.74	0.2	21	250	64	22	78	2	582	0.77
964	Sheopur	Sheopur	Filojpura	HP	25.58420	76.66370	28.4	8.07	1856	0	641	245	34	7	0.86	0	39	440	128	29	222	4.3	1206	8.75
965	Sheopur	Vijaypur	Garhi1	HP	26.11770	77.30450	28.3	7.63	2489	0	580	417	25	186	0.88	0	25	940	324	32	138	1.3	1618	8.16
966	Sheopur	Vijaypur	Ghaswani	HP	25.88990	77.52740	28.5	7.4	1565	0	311	230	28	106	0.38	0	28	425	126	27	146	1.4	1017	3.61
967	Sheopur	Karahal	Goras	HP	25.53010	76.96380	27.8	7.57	555	0	195	50	39	5	0.06	0	34	175	44	16	52	1.2	361	0.21
968	Sheopur	Vijaypur	Harkui	HP	26.15920	77.17490	27.7	7.59	1298	0	397	117	27	101	0.31	0.2	26	385	106	29	124	3	844	2.56
969	Sheopur	Karahal	Kalmi	HP	25.58180	76.87500	28.1	7.8	723	0	360	32	22	3	0.12	0	38	265	84	13	45	3.6	470	1.37
970	Sheopur	Karahal	Karahal	HP	25.49180	77.04800	28.6	7.64	612	0	220	40	37	32	0.29	0	27	185	48	16	55	3	398	1.45
971	Sheopur	Karahal	Kunorh	BORE	25.53030	77.19670	28.4	7.8	642	0	238	80	21	6	0.43	0	31	205	40	26	63	2.7	417	1.57
972	Sheopur	Karahal	Nonpura	HP	25.52720	77.11990	28.5	7.65	1256	0	592	77	35	1	0.54	0	49	380	108	27	131	1.9	816	3.37
973	Sheopur	Vijaypur	Panchoncolony	HP	26.13470	77.12500	28.3	7.6	1085	0	348	105	37	90	0.54	0	31	360	104	24	83	3	705	1.27
974	Sheopur	Sheopur	Pandola	HP	25.54880	76.64660	28.4	7.89	1261	0	555	122	33	22	0.8	0.2	41	440	132	27	110	9	820	2.19
975	Sheopur	Karahal	Piprani New	BORE	25.63410	76.95310	28.1	7.9	845	0	403	35	29	4	0.15	0	44	255	60	26	75	8	549	1.89
976	Sheopur	Vijaypur	Pura	HP	25.93310	76.99190	28.5	7.46	1286	0	317	132	37	178	0.23	0	26	395	116	26	108	7	836	1.5
977	Sheopur	Sheopur	Rajpura	HP	25.71400	76.68060	27.6	7.41	1698	0	519	182	35	158	0.22	0	35	575	182	29	129	3	1104	1.4
978	Sheopur	Sheopur	Sheopur	HP	25.66630	76.69430	27.9	7.76	832	0	366	37	26	34	0	0	27	250	64	22	86	1.4	541	7.76
979	Sheopur	Vijaypur	Shyampur	HP	26.08140	77.03480	27.8	7.52	1532	0	433	257	24	26	0.37	0	31	430	126	28	152	2.3	996	0.77
980	Sheopur	Vijaypur	Vijaypurcolony	BORE	26.05600	77.36480	28.1	7.71	2505	0	476	570	39	55	0.35	0.1	29	545	164	33	336	2.7	1628	0.87
981	Shivpuri	Khaniyadhana	Achhroni New	HP	24.99670	78.23110	28.1	7.83	1260	0	378	137	21	127	0.63	0	21	450	144	22	86	0.6	819	6.56
982	Shivpuri	Pohri	Ainpura	HP	25.63930	77.40560	27.2	7.83	1940	0	439	265	12	270	0.6	0	23	630	208	27	154	2.4	1261	3.26
983	Shivpuri	Karera	Awas	HP	25.47330	78.34810	16.5	8.19	908	0	214	25	19	269	1.07	0	29	215	56	18	123	1.4	590	2.96
984	Shivpuri	Badarwas	Badarwas	HP	24.97400	77.56560	26.8	7.34	2082	0	403	397	25	150	0.18	0	34	740	252	27	139	0.7	1353	18.35
985	Shivpuri	Khaniyadhana	Bamorkalan New	HP	24.88840	78.15110	27.3	7.82	935	0	305	105	11	73	0.82	0	28	360	106	23	65	0.5	608	3.69
986	Shivpuri	Narwar	Behgwan	HP	25.62980	78.10240	28.5	7.86	909	0	305	105	24	79	1.23	0.1	22	410	120	27	35	0.2	591	42.36
987	Shivpuri	Shivpuri	Bhagora	HP	25.41840	77.75790	27.4	7.89	530	0	250	15	28	3	0.1	0	35	140	32	15	51	13.3	345	3.89
988	Shivpuri	Pichhore	Bhonti	HP	25.32360	78.09700	27.6	7.86	912	0	311	107	18	82	0.4	0	29	385	108	28	51	0.3	593	1.69
989	Shivpuri	Badarwas	Ganeshkhera	HP	25.08930	77.78840	27.5	7.19	435	0	195	17	27	5	0.2	0	34	55	12	6	73	2.4	283	10.23
990	Shivpuri	Pohri	Gobardhan	HP	25.79140	77.53200	27.5	7.67	775	0	342	42	16	19	0.53	0	44	320	86	26	28	2.7	504	5.63
991	Shivpuri	Karera	Karera	DW	25.45480	78.13260	28.1	7.79	661	0	293	35	25	44	1.16	0	28	260	68	22	42	0.5	430	8.18
992	Shivpuri	Badarwas	Khareh	HP	25.10370	77.72610	27.5	7.64	885	0	293	62	24	65	0.25	0	21	265	70	22	75	7.7	575	0.56
993	Shivpuri	Karera	Languri	HP	25.48370	78.12240	27.9	7.85	701	0	220	57	19	93	0.9	0.1	33	280	74	23	43	0.6	456	16.53
994	Shivpuri	Narwar	Mangroni	BORE	25.70090	77.93610	27.4	7.74	650	0	275	22	22	44	0.51	0	36	230	48	27	53	0.2	423	19.86
995	Shivpuri	Kolaras	Manipura New	HP	25.21300	77.59800	28.1	7.68	970	0	421	50	10	57	0.38	0	31	360	106	23	59	0.1	631	5.36
996	Shivpuri	Khaniyadhana	Masoori	HP	25.10020	77.92670	28.3	7.64	687	0	238	67	8	78	0.1	0	39	275	72	23	39	3.8	447	2.56
997	Shivpuri	Narwar	Narwar	HP	25.64670	77.91380	28.4	7.91	806	0	329	75	17	48	0.56	0	37	290	78	23	66	4.6	524	6.45
998	Shivpuri	Shivpuri	Patera	HP	25.61380	77.73710	28.5	7.78	710	0	299	55	13	23	0.38	0	28	250	68	19	49	1.8	462	4.23
999	Shivpuri	Pichhore	Pichhore	BORE	25.17560	78.19030	27.2	7.47	912	0	281	70	23	114	0.2	0	34	395	116	26	32	0.1	593	8.56
1000	Shivpuri	Pohri	Pohari	DW	25.54540	77.36320	27.9	7.85	1119	0	268	180	29	78	0.56	0	41	390	112	27	86	0.6	727	5.23
1001	Shivpuri	Karera	Sarsod	HP	25.48520	77.50620	28.1	7.42	770	0	250	60	24	75	0.34	0	28	335	96	23	25	0.2	501	4.19
1002	Shivpuri	Shivpuri	Satanwara	DW	25.54450	77.73180	27.6	7.72	1330	0	323	235	16	65	0.17	0	37	425	128	26	109	2.5	865	13.86
1003	Shivpuri	Narwar	Sehore	DW	25.67220	78.10740	27.6	7.38	3581	0	647	810	27	110	0.46	0.2	20	1010	362	26	365	8.8	2328	125.23

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
1004	Shivpuri	Pichhore	Semri	HP	25.10080	77.92690	27.6	7.5	885	0	262	95	18	87	0.39	0	22	345	96	26	46	0.8	575	12.56
1005	Shivpuri	Karera	Sikandara	DW	25.47222	78.79167	27.8	7.85	1546	0	293	325	28	52	0.56	0	28	280	68	27	229	0.2	1005	8.69
1006	Shivpuri	Shivpuri	Sirsod	HP	25.40170	78.36730	28.5	7.61	915	0	409	55	13	36	0.63	0	38	290	72	27	79	0.3	595	5.26
1007	Shivpuri	Karera	Sirsod Chouraha	DW	25.42510	78.05500	27.9	7.48	1002	0	256	170	19	17	0.86	0	27	455	144	23	23	1.7	651	12.65
1008	Shivpuri	Khaniyadhana	Sitapur	HP	25.42510	78.05500	27.8	7.65	1745	0	354	235	29	270	0.76	0	31	745	256	26	59	0.6	1134	6.56
1009	Shivpuri	Shivpuri	Survaya	DW	25.41320	77.82980	28.1	7.75	695	0	287	50	21	22	0.32	0	32	245	46	32	49	1.8	452	1.26
1010	Shivpuri	Karera	Toda Karea	HP	25.45510	78.17540	27.9	7.76	965	0	378	67	17	60	0.84	0	41	370	106	26	52	2.7	627	6.89
1011	Sidhi	Sidhi	Badhaora	DW	24.40300	81.73400	28.8	6.54	325	0	85	38	18	11	0.1	BDL	22	90	14	13	30	1.2	211	0.18
1012	Sidhi	Rampur Naikin	Baghwar	DW	24.33100	81.37900	29	7.64	675	0	323	30	20	2	0.56	BDL	45	280	68	27	26	0.2	439	0.98
1013	Sidhi	Sihawal	Bahari	DW	24.44700	82.17100	26.5	7.54	580	0	268	23	15	5	0.27	BDL	23	190	38	23	45	0.8	377	0.08
1014	Sidhi	Sidhi	Barambaba	DW	24.27500	81.90200	27	7.23	383	0	159	20	22	0	0.54	0.1	48	135	28	16	24	0.3	249	0.16
1015	Sidhi	Majhauli	Bastua	DW	23.98700	81.70900	26.9	7.1	581	0	201	33	19	55	0.01	BDL	32	195	48	18	40	2.6	378	0.08
1016	Sidhi	Majhauli	Chhuhi	HP	24.18600	81.65600	27.6	7.29	626	0	195	81	5	25	0.23	BDL	30	255	76	16	25	1.8	407	0.08
1017	Sidhi	Sidhi	Chilheri Kalan	BW	24.45800	81.79200	27.8	7.66	884	0	342	63	23	52	0.35	BDL	31	335	92	26	57	1	575	0.63
1018	Sidhi	Rampur Naikin	Chouphal	DW	24.28900	81.78800	26.9	7.3	573	0	232	25	29	0.3	0.1	BDL	48	160	46	11	54	2.9	372	0.21
1019	Sidhi	Rampur Naikin	Chourhat	DW	24.42500	81.67300	28.8	7.6	835	0	299	78	32	7	0.39	BDL	39	240	62	21	75	7.8	543	1.06
1020	Sidhi	Majhauli	Dhuandol	DW	24.11000	81.83900	26.9	7.62	665	0	342	23	12	5	0.78	BDL	22	245	66	19	40	0.8	432	1.18
1021	Sidhi	Sidhi	Hatwa	HP	24.52261	81.99033	27.8	7.63	1105	0	427	103	22	35	0.62	0.1	42	470	156	19	37	0.1	718	4.3
1022	Sidhi	Sidhi	Jogikothar	DW	24.41000	82.02000	27	7.39	746	0	342	35	32	1	0.21	0.2	39	220	70	11	67	0.3	485	1.01
1023	Sidhi	Rampur Naikin	Khamh	DW	24.23800	81.73800	27.4	7.1	502	0	183	35	18	14	0.05	BDL	21	195	52	16	25	0.4	326	0.09
1024	Sidhi	Sidhi	Kuchwahi	DW	24.40600	81.97700	27.3	7.54	772	0	354	28	39	6	0.09	BDL	31	210	62	13	78	0.5	502	0.75
1025	Sidhi	Majhauli	Mahua Gaon	DW	24.04700	81.94700	27.2	7.57	678	0	299	33	27	1	0.18	BDL	20	210	66	11	55	2.1	441	0.05
1026	Sidhi	Majhauli	Majhauli	DW	24.12100	81.45800	27.6	7.39	1436	0	390	222	19	68	0.35	BDL	23	590	196	24	54	3.6	933	5.08
1027	Sidhi	Majhauli	Majhgawan	HP	24.99800	81.73200	27.2	7.49	792	0	378	23	26	9	0.15	BDL	34	245	72	16	67	2	515	0.65
1028	Sidhi	Sihawal	Padariya	DW	24.43200	82.09900	28.8	7.69	678	0	305	20	38	2	0.4	BDL	29	190	48	17	65	0.6	441	0.34
1029	Sidhi	Majhauli	Parsilli	DW	24.14700	81.48800	26.6	7.5	680	0	317	23	29	3	0.06	BDL	33	220	60	17	51	0.6	442	0.16
1030	Sidhi	Sidhi	Patpara	DW	24.48500	81.89000	27.3	7.57	845	0	415	25	19	6	0.36	0.2	34	260	84	12	72	1.3	549	1.1
1031	Sidhi	Rampur Naikin	Rampur2	HP	24.51100	81.06600	27.6	7.58	665	0	317	23	27	7	1	BDL	27	225	66	15	47	0.9	432	0.51
1032	Sidhi	Majhauli	Semariha	DW	24.13300	81.55200	28.1	7.62	974	0	445	56	28	8	0.73	BDL	43	360	108	22	52	8.1	633	0.89
1033	Sidhi	Sidhi	Sidhi	HP	24.41400	81.88600	29.3	7.1	1078	0	439	88	30	20	0.63	BDL	30	295	92	16	110	1	701	1.18
1034	Sidhi	Sihawal	Sihawal	DW	24.56200	82.23900	29.3	7.46	759	0	305	53	22	14	0.09	BDL	28	240	64	19	60	1.6	493	1.98
1035	Sidhi	Majhauli	Tamsar	HP	24.10400	81.81600	26.1	7.52	549	0	195	48	26	6	0.78	BDL	22	140	32	15	56	1.3	357	0.08
1036	Sidhi	Majhauli	Tikri	DW	24.16200	81.86300	28	7.09	495	0	207	18	41	5	1.38	0.1	39	145	34	15	45	1.3	322	0.16
1037	Singrauli	Deosar	Banjari	DW	24.08800	81.93000	28.2	7.67	874	0	366	67	19	24	0.22	0	23	265	60	28	80	1.2	568	0.58
1038	Singrauli	Deosar	Bargawan	DW	24.19600	82.45600	30.1	7.73	793	0	397	60	9	14	1.26	0	32	240	68	17	89	0.9	515	2.67
1039	Singrauli	Deosar	Barseda	DW	24.07800	81.96300	29.8	7.65	799	0	293	95	11	28	0.67	0	35	255	84	11	72	1.2	519	5.32
1040	Singrauli	Deosar	Betaha Dand	DW	24.24200	82.37600	27.2	7.81	1133	0	464	90	21	35	1.6	0	21	340	96	24	106	2.7	736	0.87
1041	Singrauli	Chitrangi	Bichhiya	DW	24.41850	82.28420	28.5	7.52	666	0	323	17	29	11	0.08	0	31	235	58	22	44	1.6	433	3.65
1042	Singrauli	Deosar	Chamari Dol	DW	24.00100	82.10670	29.9	7.41	416	0	128	32	22	20	0.1	0	26	150	36	15	22	1.6	270	0.26
1043	Singrauli	Waidhan	Chaura	DW	24.01100	82.47200	27.8	7.9	1015	0	433	75	20	5	0.53	0.1	34	200	56	15	135	1.4	660	0.05
1044	Singrauli	Deosar	Deosar1	HP	24.32060	82.30680	28.8	7.6	552	0	262	22	8	16	0.57	0	29	205	58	15	29	0.7	359	3.2
1045	Singrauli	Chitrangi	Dhawai	DW	24.42270	82.32860	27.8	7.71	737	0	372	20	17	16	0.33	0	41	190	36	24	82	1.1	479	3.46
1046	Singrauli	Waidhan	Gaderiya	DW	24.15600	82.48600	27	7.17	286	0	128	12	13	6	0.27	0	22	95	24	9	23	0.8	186	0.58
1047	Singrauli	Chitrangi	Godwald	DW	24.21810	82.50570	28.3	7.61	779	0	354	65	14	12	1.12	0.2	27	255	64	23	69	2.1	506	0.08

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
1048	Singrauli	Chitrangi	Gorbi	DW	24.20610	82.59540	29.9	7.58	603	0	207	45	28	34	1.04	0	29	190	62	9	45	2.3	392	1.28
1049	Singrauli	Waidhan	Jamgadi	DW	24.04000	82.31800	28.5	6.87	192	0	55	12	17	8	0.07	0	31	70	18	6	8	2.1	125	2.56
1050	Singrauli	Waidhan	Jattha Tola	DW	24.04700	82.25700	28.7	7.09	315	0	128	12	21	8	0.22	0	45	105	30	7	22	1.2	205	0.09
1051	Singrauli	Chitrangi	Kareila	DW	24.24990	82.61190	27.4	7.31	574	0	201	40	24	32	0.26	0	44	175	40	18	46	1.9	373	0.02
1052	Singrauli	Deosar	Karthua	DW	24.39500	82.24500	28.1	6.75	245	0	49	30	12	25	0.04	0	21	30	6	4	40	1.8	159	2.68
1053	Singrauli	Chitrangi	Khirwa	DW	24.23520	82.65140	27.9	7.34	921	0	403	55	26	17	0.64	0	36	225	64	16	109	1.3	599	0.18
1054	Singrauli	Deosar	Kohara Khoh	DW	24.26800	82.34400	26.8	7.01	185	0	43	12	22	10	0.48	0	22	50	12	5	17	0.6	120	3.28
1055	Singrauli	Waidhan	Koyal Khunth	DW	23.94600	82.48500	26.7	7.33	295	0	85	30	19	10	0.33	0.1	37	85	10	15	26	1	192	0.12
1056	Singrauli	Chitrangi	Mahediya	DW	24.21200	82.54870	26.5	7.18	800	0	372	40	21	18	0.3	0	28	245	48	30	71	1	520	0.06
1057	Singrauli	Waidhan	Mara	DW	23.89700	82.50300	27.6	7.05	350	0	110	27	10	34	0.18	0	46	100	24	10	32	2.5	228	0.08
1058	Singrauli	Deosar	Papal Khera	HP	24.15390	81.93430	27	7.68	915	0	464	60	16	8	0.27	0	38	265	82	15	99	9.9	595	0.26
1059	Singrauli	Deosar	Parasi	DW	24.04800	82.04100	30.2	7.36	285	0	110	15	20	7	0.44	0	33	90	20	10	22	1.8	185	0.12
1060	Singrauli	Waidhan	Parsauna New	DW	24.08900	82.55800	27.6	7.32	456	0	207	17	23	8	0.14	0	29	150	42	11	35	3.4	296	6.96
1061	Singrauli	Deosar	Sarai	DW	24.04100	82.20810	28.2	7.58	304	0	110	17	13	20	0.17	0	35	50	10	6	42	4	198	0.08
1062	Singrauli	Chitrangi	Sherwa	DW	24.46120	82.45660	28.3	7.6	449	0	214	17	11	14	0.91	0	46	170	56	7	25	1.3	292	0.05
1063	Tikamgarh	Baldeogarh	Baldeogarh	DW	24.75611	79.05000	27.8	7.37	700	0	201	97	12	41	0.25	0	23	275	66	27	32	4.5	455	0.27
1064	Tikamgarh	Jatara	Bawri	DW	24.92000	78.83861	28.9	7.56	1705	0	317	395	23	9	0.92	0	32	455	144	23	183	1.5	1108	7.47
1065	Tikamgarh	Prithvipur	Beer Sagar	DW	25.19639	78.69611	28.3	7.81	935	0	323	112	26	16	1.14	0	26	290	72	27	79	1.4	608	27.6
1066	Tikamgarh	Jatara	Bela	DW	25.07750	79.33333	28.5	8	315	0	92	37	19	10	0.56	0.1	35	80	18	9	36	2	205	2.07
1067	Tikamgarh	Prithvipur	Birorakhet	DW	25.11500	78.79167	29.2	7.63	1401	0	214	317	14	76	0.71	0	41	465	142	27	109	1	911	2.94
1068	Tikamgarh	Jatara	Digaura	DW	24.97111	78.83944	28.8	7.29	1720	0	311	405	25	11	0.99	0	29	435	126	29	199	1.3	1118	2.24
1069	Tikamgarh	Jatara	Jatara	DW	25.00306	79.04750	29.2	7.74	834	0	336	62	18	41	0.59	0	21	290	70	28	59	1.8	542	1.55
1070	Tikamgarh	Jatara	Ladhaura	DW	25.07167	78.87306	29.2	8.06	474	0	201	25	27	9	0.61	0	35	160	42	13	38	2.8	308	0.04
1071	Tikamgarh	Tikamgarh	Majna	DW	24.83639	78.99722	28.6	7.47	599	0	122	87	13	75	0.31	0.1	27	190	44	19	49	1.2	389	2.13
1072	Tikamgarh	Baldeogarh	Manikpur	DW	24.84806	79.17056	29.3	7.35	711	0	201	97	22	35	0.14	0	34	265	64	26	39	4.4	462	0.34
1073	Tikamgarh	Tikamgarh	Mawai	DW	24.79444	78.92833	28.7	7.35	313	0	61	35	27	33	1.01	0	48	110	26	11	23	1.7	203	0.81
1074	Tikamgarh	Prithvipur	Nengawan	DW	25.25472	78.67333	29.1	7.98	720	0	250	92	15	10	0.26	0	25	240	52	27	55	1.4	468	0.44
1075	Tikamgarh	Niwari	Niwari New	DW	25.34472	78.80111	29.5	7.58	433	0	165	37	16	14	0.12	0	46	150	48	7	32	1.1	281	0.36
1076	Tikamgarh	Niwari	Orchha	DW	25.34944	78.64111	29.8	7.61	1456	0	238	317	16	82	0.24	0.2	28	590	188	29	63	1.1	946	3.13
1077	Tikamgarh	Palera	Palera	DW	25.02361	79.23750	28.7	7.39	1711	0	348	357	29	46	1.22	0	31	410	122	26	205	1.1	1112	15.23
1078	Tikamgarh	Prithvipur	Prithipur	DW	25.20611	78.75389	28.4	7.75	974	0	342	127	18	10	0.17	0	26	245	52	28	113	2.1	633	3.23
1079	Tikamgarh	Tikamgarh	Tikamgarh	DW	24.74389	78.83806	29.5	7.87	924	0	366	90	27	6	0.63	0	36	270	64	27	89	1	601	11.97
1080	Ujjain	Ghatia	Bachhukhera	Dw	23.31060	75.79220	27.8	7.42	1115	0	183	262	12	14	1.08	0	26	95	24	9	210	2	725	0.12
1081	Ujjain	Mahidpur	Baijnath	Dw	23.50560	75.70360	28.9	7.83	1282	0	250	270	23	35	0.68	0	32	530	166	28	49	1.3	833	1.08
1082	Ujjain	Ujjain	Chakrawada Grid	Dw	23.25640	75.71110	28.9	8	1200	0	305	185	21	81	0.66	0	31	410	122	26	86	1.6	780	2.19
1083	Ujjain	Badnagar	ChhotiGhadsod	Dw	23.10830	75.45280	29.6	7.77	945	0	287	100	24	86	0.7	0	45	355	100	26	56	1.3	614	1.12
1084	Ujjain	Ujjain	Dabla Rehwari	Dw	23.25440	75.81560	26.3	7.83	850	0	317	87	9	12	0.56	0	34	290	82	21	55	1.6	553	0.93
1085	Ujjain	Tarana	Dablahardu	Dw	23.49280	75.89500	30.1	7.7	1286	0	311	250	11	28	0.46	0.1	25	550	186	21	43	2	836	6.32
1086	Ujjain	Mahidpur	DelchiBuzurg	Dw	23.53250	75.57080	30.2	7.83	2011	0	323	455	29	32	0.19	0	29	710	242	26	120	1.3	1307	1.72
1087	Ujjain	Mahidpur	Ghosla	Dw	23.44070	75.87000	28.1	7.82	1435	0	305	302	11	33	0.79	0	36	450	144	22	122	1.7	933	3.17
1088	Ujjain	Tarana	Kaiytha	Dw	23.23310	76.01830	29	7.76	3150	0	641	630	55	65	0.68	0	28	1245	452	28	144	1.9	2048	3.27
1089	Ujjain	Khachrod	Khachrod1	Dw	23.42560	75.28330	28.3	7.77	1105	0	281	190	15	10	0.83	0.1	37	235	48	28	140	1.1	718	0.52
1090	Ujjain	Tarana	Khakri Sultan	Dw	23.39860	76.01330	27.5	7.9	1325	0	519	130	18	28	0.44	0	24	490	144	32	75	1.7	861	2.32
1091	Ujjain	Mahidpur	Khera Khajuria	Dw	23.46170	75.79610	28.4	7.48	1050	0	305	162	18	20	0.57	0	43	410	96	41	50	1.2	683	3.05

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
1092	Ujjain	Mahidpur	Mahidpurroad	Dw	23.56670	75.50830	28.1	7.51	1945	0	342	455	19	20	1.01	0	26	615	202	27	160	1.6	1264	1.65
1093	Ujjain	Mahidpur	Mahidpurtown	Dw	23.48940	75.66530	28.8	7.73	1420	0	415	230	19	18	0.25	0	32	375	112	23	150	1.8	923	1.34
1094	Ujjain	Tarana	Makdon	Dw	23.50220	76.07220	27.8	7.68	1400	0	317	275	20	25	0.35	0.2	26	475	130	36	102	2.5	910	0.67
1095	Ujjain	Ujjain	Naikhedi	Dw	23.20420	75.67530	29.8	7.8	862	0	305	117	13	4	0.8	0	28	340	88	29	49	1.4	560	1.05
1096	Ujjain	Ghatia	Nazarpur	Dw	23.34470	75.84920	27.9	7.68	625	0	116	125	10	24	1.07	0	44	150	40	12	72	1.8	406	0.53
1097	Ujjain	Ujjain	Palkhanda	Dw	23.04060	75.94810	28.1	7.82	1332	0	214	287	27	55	0.65	0	32	365	104	26	132	8.5	866	0.64
1098	Ujjain	Ujjain	Patpala	Dw	23.19720	75.86670	25.6	7.76	530	0	177	70	18	2	0.46	0	46	165	44	13	44	2.7	345	0.56
1099	Ujjain	Tarana	Sumra Kheda	Dw	23.26670	76.06170	29.5	7.7	825	0	293	87	30	12	0.79	0	37	240	56	24	77	1.5	536	1.82
1100	Umaria	Pali	Amiliya	HP	23.32783	81.29779	28.2	7.16	534	0	159	60	21	7	0.14	0	31	155	38	15	42	4.2	347	0.24
1101	Umaria	Karkeli	Bichua	DW	23.46577	80.74657	29.8	7.4	680	0	195	65	20	68	0.5	0	27	260	44	36	34	2.3	442	0.3
1102	Umaria	Pali	Birsinghpur1	HP	23.36604	81.04529	26.3	7.29	727	0	189	67	24	58	0.27	0	34	255	72	18	38	14.1	473	0.91
1103	Umaria	Manpur	Dhamokhar	TW	23.63182	80.92277	28.5	7.43	675	0	220	75	20	24	0.14	0	26	275	64	28	25	1.5	439	1.52
1104	Umaria	Pali	Ghunghuti New	HP	23.34832	81.18994	27.9	7.18	705	0	275	52	14	38	0.08	0.1	38	270	50	35	34	2	458	0.24
1105	Umaria	Karkeli	Karkeli New	TW	23.46371	80.90636	28.5	7.46	683	0	189	102	19	25	0.23	0	21	160	40	15	84	7.9	444	0.57
1106	Umaria	Manpur	Mahroi	TW	23.95064	80.91951	32.1	7.44	534	0	244	22	26	8	0.59	0	44	150	38	13	55	1.1	347	0.52
1107	Umaria	Manpur	Manpur New	BW	23.75940	81.11137	32.2	7.7	800	0	354	52	20	12	0.35	0	26	275	52	35	55	3.4	520	1.17
1108	Umaria	Karkeli	Nigahari	HP	23.42728	80.70398	29.3	7.61	705	0	342	10	16	42	0.37	0	33	250	48	32	45	2.5	458	1.15
1109	Umaria	Karkeli	Nowrozabad	TW	23.39553	80.97974	27.8	7.31	680	0	183	95	20	38	0.19	0	22	240	86	6	43	3.2	442	2.65
1110	Umaria	Manpur	Panpatha	DW	23.86968	81.00340	27.8	7.59	668	0	323	37	13	3	0.22	0.2	24	220	56	19	52	1.9	434	0.17
1111	Umaria	Bandhavgarh	Parasi	HP	23.66400	80.94180	27.1	6.64	450	0	128	40	16	50	0.06	0	37	155	36	16	29	1	293	16.09
1112	Umaria	Manpur	Pataur	BW	23.77218	81.03538	25.2	7.34	525	0	214	42	20	3	0.19	0	26	205	52	18	24	3.5	341	0.55
1113	Umaria	Bandhavgarh	Tala	DW	23.72226	81.02064	28.2	7.08	520	0	183	55	10	15	0.17	0	29	200	56	15	25	3.4	338	1.17
1114	Umaria	Bandhavgarh	Umaria	DW	23.52698	80.83522	27.3	7.11	995	0	293	87	37	92	0.28	0	35	220	42	28	124	2.4	647	1.23
1115	Vidisha	Lateri	Anandpur	DW	24.16700	77.44300	28.4	8.13	842	0	336	65	21	30	0.17	0	23	325	70	36	40	3.2	547	0.34
1116	Vidisha	Gyaraspur	Atari Khejda	HP	23.41400	78.02600	28	7.98	910	0	348	82	13	46	0.41	0	35	350	118	13	49	0.9	592	3
1117	Vidisha	Vidisha	Bagri	HP	23.56700	77.76500	27.6	7.89	568	0	232	47	12	10	0.55	0	32	185	48	16	44	0.9	369	0.66
1118	Vidisha	Basoda	Bagrodcrossing	HP	23.73200	78.17400	28.5	7.7	861	0	372	42	29	41	0.4	0	22	270	62	28	73	0.7	560	2
1119	Vidisha	Vidisha	Bamuriya	DW	23.61300	77.76300	27.8	8.13	821	0	372	65	14	6	0.51	0	24	165	32	21	119	3.3	534	0.99
1120	Vidisha	Basoda	Bareth	HP	23.91500	78.00100	27.9	7.99	860	0	293	80	25	50	0.57	0.1	29	310	76	29	52	1.4	559	3.35
1121	Vidisha	Vidisha	Bilari	DW	23.57800	77.69800	27.1	7.83	1220	0	366	132	25	108	0.26	0	34	500	104	58	49	1.6	793	2.76
1122	Vidisha	Sironj	Dehri Jagir	DW	24.04100	77.78600	28	7.91	773	0	256	57	21	83	0.33	0	31	260	80	15	56	2.3	502	2.16
1123	Vidisha	Sironj	Deopur	BW	24.15500	77.62100	28.5	7.94	1020	0	494	27	12	68	0.15	0	45	155	38	15	141	38.6	663	0.39
1124	Vidisha	Basoda	Ganjbasoda1	DW	23.86300	77.92400	27.9	7.78	1302	0	427	187	17	15	0.48	0	28	245	56	26	185	0.9	846	1.8
1125	Vidisha	Basoda	Ghatera	HP	23.80700	78.12500	28.5	7.75	1134	0	323	160	20	69	0.39	0.1	41	370	130	11	89	6.7	737	2.52
1126	Vidisha	Gyaraspur	Gyaraspur1	HP	23.66600	78.11200	30.2	7.24	1624	0	348	280	24	130	0.25	0	21	660	226	23	73	1	1056	9.69
1127	Vidisha	Vidisha	Hirnai	DW	23.56800	77.95000	28.1	7.9	890	0	360	87	15	16	0.5	0	36	275	72	23	79	1.1	579	1.68
1128	Vidisha	Vidisha	Imaliya	BW	23.57700	77.77900	27.6	8.09	962	0	415	77	26	6	0.51	0	26	235	56	23	115	2	625	0.26
1129	Vidisha	Lateri	Islam Nagar	BW	24.06900	77.51600	28.1	7.74	885	0	323	90	24	12	0.48	0	29	290	92	15	64	4.7	575	3.15
1130	Vidisha	Kurwai	Kurwai1	HP	24.12500	78.04300	27	7.38	1036	0	354	145	19	2	0.41	0	35	220	78	6	135	11.2	673	4.1
1131	Vidisha	Basoda	Malkapur	DW	23.97900	77.85100	28	7.7	616	0	299	17	27	10	0.77	0	43	215	68	11	52	0.9	400	1.26
1132	Vidisha	Neteran	Mohanpura	DW	23.79600	77.53100	27.1	7.56	682	0	293	50	17	12	0.46	0	35	290	90	16	21	2	443	1.29
1133	Vidisha	Basoda	Mudra	DW	23.77700	78.18600	28.6	8	775	0	281	75	20	30	0.42	0	28	305	60	38	35	0.9	504	3.09
1134	Vidisha	Neteran	Nateran	DW	23.76200	77.77500	30.8	7.88	1895	0	763	182	38	20	0.36	0	37	520	112	58	188	10	1232	0.23
1135	Vidisha	Sironj	Patharia	HP	24.11500	77.81600	28.6	7.76	1130	0	366	130	18	62	0.44	0	33	415	104	38	66	1.3	735	3.16

S. No.	District	Block	Location	Source	Lat.	Long.	Field temp (C)	pH at 25°C	EC µS/cm at 25°C	CO3 (mg/l)	HCO3 (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3 (mg/l)	F (mg/l)	PO4 (mg/l)	SiO2 (mg/l)	TH (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	TDS (mg/l)	U (ppb)
1136	Vidisha	Vidisha	Pattan	DW	23.73100	77.64600	27.8	7.96	915	0	482	27	11	10	0.44	0.2	26	125	30	12	150	4	595	0.74
1137	Vidisha	Neteran	Rasulli	BW	23.81100	77.54000	27	7.82	748	0	171	135	25	10	0.52	0	22	195	48	18	79	2.8	486	0.49
1138	Vidisha	Vidisha	Salaiya	HP	23.60800	77.57500	27.8	7.72	1395	0	476	142	35	68	0.22	0	29	580	182	30	48	2.8	907	3.06
1139	Vidisha	Sironj	Sironj1	DW	24.09900	77.68900	28	7.79	1157	0	390	105	30	65	0.22	0	34	285	94	12	128	3.9	752	4.19
1140	Vidisha	Lateri	Tajpura	DW	24.06200	77.29300	26.5	7.72	630	0	293	15	18	35	0.18	0	26	215	52	21	42	4.5	410	0.23
1141	Vidisha	Neteran	Tinsiyai	DW	23.77200	77.60900	27.3	7.97	758	0	262	92	10	17	1.01	0	25	225	44	28	67	2.3	493	1.24
1142	Vidisha	Basoda	Udaipur	HP	23.89900	78.06100	27.6	7.69	805	0	214	130	17	22	0.23	0	31	250	58	26	65	5.9	523	6.42
1143	Vidisha	Vidisha	Vidisha	HP	23.51600	77.81100	28.2	7.41	959	0	317	125	27	4	0.52	0	33	285	64	30	85	4.4	623	4.95