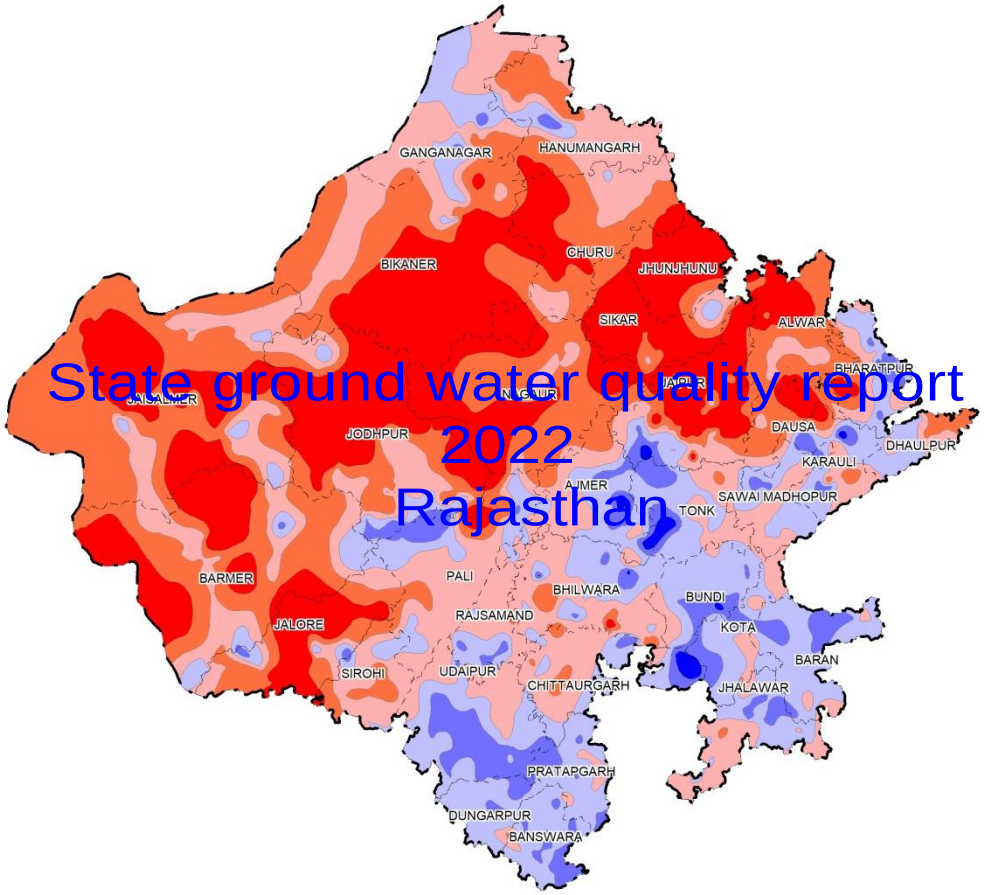
Government of India

Central Ground Water Board

Department of Water Resources, River Development & Ganga Rejuvenation

Ministry of Jal Shakti



State ground water quality report 2022 Rajasthan

Western Region, Jaipur

October 2023

Preface

Groundwater is an important natural resource and is considered as a precious national asset. It is a major constituent of all living beings. Unplanned and accelerated development of this prime natural resource is creating concern among scientists, users, policy makers and other stake holders.

Government of India initiative to provide safe and adequate drinking water supply to every households in rural India by 2024 and implement source sustainability measures such as recharge and reuse through grey water management, water conservation, rain water harvesting, etc. As per directions from the Ministry of Jal Shakti, State Ground Water quality report for the year 2022 has been prepared. The two main concerns in the state are depleting resources volumetrically due to depletion of water levels below ground and another major concern is quality of ground water.Water quality is one of the main challenges that societies will face during this century. This report contains compilation and statistical analysis of Water Quality Monitoring data observed at NHS monitoring stations during the period April to May, 2022. The water samples were collected from NHS wells of the state by the CGWB officers. The ground water quality samples are analysed at the NABL accredited Regional Chemical Laboratory, Jaipur. 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 information on ground water quality of the state and the extent of contaminants occurring in groundwater.

State Ground Water quality report /Year book 2022-23 has been compiled & edited by Dr Jaipal Garg, Scientist "B" (Chemist), Ms. Aruna Saini, Assistant Chemists based on the data analysis. The report was completed under the supervision of Dr. Rakesh Kushwaha Scientist "E" and this report also received valuable suggestions from Mr. Suresh Kumar Pareek, Scientist "D", Mr. R.K. Verma Scientist "D", Mr. Vipin Kumar Scientist "C". has been included. **The analysis water samples were carried out by Dr. J P Garg, Scientist "B" (Chemist) ,** Ms. Aruna Saini, Dr. Prerna Mathuriya, Assistant Chemists and Ms Shivani Shukla, STA (Chemical). Mapes for report were prepared by Shri Lokendra Kumar, Draftsman.

We cannot afford to wait. We must put water at the heart of action plans. I am sure, this report would be of useful in policy planning and implementation by Scientists, Academicians, *generation of various maps in carrying out NAQUIM 2.0 and preparation of Ground Water Management Plan for various user agencies as well as stakeholders,* NGOs and Individuals, t*hese data will also helpful for the formulation of various ground water-based schemes in the Rajasthan State.* Findings of this report will pave ways to ensure quality of this vital natural resource for sustainable and human development.

(Er.M S Rathore)
Regional Director

Contents:

EXECUTIVE SUMMARY

1. Water is the basis for all life forms and is a vital component for our life support system. Ground water plays an important role in domestic water supplies, agriculture and for industrial use. Rajasthan State is under severe stress regarding ground water quantity and quality and its management. The State is situated in the northwestern side of India.It is the largest State in the country comprising of 33 districts with geographical area of 3,42,239 square kilometre (sq km). It is situated between north latitudes $23^0$03' and $30^0$12' and east longitudes $69^0$30' and $78^0$17'.

2. Rainfall is the principal source of ground water recharge in the state. In canal irrigated areas, a part of canal water through seepage from conveyance system and part of water i.e. utilised for irrigation also returns to ground water and contributes to storage. The state receives 90 % rainfall from southwest monsoon from June to September. The average annual rainfall of the state is 829 mm.

3. The ground water occurrence movement and availability in Rajasthan is controlled by hydro geological situation. Diverse rock types ranging from the oldest Archaean rocks to sub- Recent alluvium and wind-blown sand are exposed in Rajasthan. In a major portion of the area, particularly in western Rajasthan, the oldest rocks are concealed below a thick cover of alluvium and wind- blown sands.

4. It is imperative to have knowledge of ground water quality for the entire State as well as each district, for its better use and effective management. 298 water samples were collected from uranium affected districts in Rajasthan with the objective to assess the contamination in and around the hot spots & this report has describe the water quality the 33 districts of Rajasthan State for finding its suitability for drinking purposes .

5. The ground water quality data generated during the study have been compared with the standards/guideline/regulation laid down by Bureau of Indian standards (BIS with objective to identify the extent of degradation and to establish the basis for improvement.

6. The ground water quality in Rajasthan has indicated higher concentration of Electrical conductivity, Chloride, Nitrate and Fluoride vis-a-vis drinking water standards and the violation of Water quality standards have been observed at many places in surveyed districts of the State.

7. Out of 809 sample analysed, 13.13% have chloride value beyond permissible limit of 1000 mg/l, 33.85 % between acceptable and permissible limit and 53.03 % samples are within acceptable limit. In Churu (55.55 %), Jodhpur (52.94 %) , & Nagaur (43.47 %) districts chloride value is beyond permissible limit. In Bundi, Baran, Chittaurgarh Dholpur, Dungarpur, Ganganagar, Jhalawar, Kota, Rajsamand Pratapgarh & Tonk districts, none of the sample shows chloride value beyond permissible limit. Maximum value of chloride (9359 mg/l) at Kukunda in Jodhpur district and minimum value 7 mg/l) is observed at Rakho in Banswara District.

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9. High nitrate concentrations have been observed in ground water at several places and ranges between below detection limit and 1050 mg/l. Around 59.64 % of samples have nitrate values within acceptable limit & remaining 40.36 % samples have nitrate value beyond permissible limit. i.e. 45 mg/l. Churu is worst effected (74.07 %) district have beyond permissible limit. More than 50% of samples of Nagaur (69.56 %), Barmer (60.97%), Jodhpur (58.82) , Sawaimadhopur & Bikaner (58.33 %) & ,Hanumangarh (52.38 %) , have nitrate above Permissible limit (45 mg/l). Dhaulpur , Jaipur , Karauli, Ajmer & Sikar districts having between 40 % to 50 % . Maximum value of nitrate as 1450 (mg/l) have been observed at Sahar1 in Karauli district and 1350 mg/l at Karsai in Karauli district
10. Occurrence of high fluoride in the ground water is a great concern as 25.89 % of 809 ground water samples contain fluoride value beyond Permissible limits i.e. 1.5 mg/l, whereas, 55.71 % samples fall within acceptable limit.18.39 % samples fall between acceptable and permissible limit of Fluoride. The worst affected districts are Sawaimadhopur (58.33), Ganganagar (52.94%), Pali (52.63) Jalore (52.38%), Jodhpur (49.01%) , Bundi (46.15%) .Jaisalmer, Churu, Barmer , Bikaner , Tonk, Nagaur, Sirohi, Rajsamand, & Jhunjhunu districts are moderately affected with 26 % to 45.00% water samples having fluoride above 1.5 mg/l. In Baran, Chittaurgarh, Dhaulpur and Kota no sample beyond the permissible limit. Ajitgarh in Sikar district. Highest values of fluoride (15.50 mg/l) have been observed at Dhawa Jodhpur , 15.3 mg/l at Sujangarh & 15.25 at Sardarshar in Churu districtMost of the groundwater occurring in the districts Alwar, Baran, Bhilwara, Chittaurgarh, Dhaulpur, Ganganagar, Hanumangarh, Jhunjhunu, Sikar and Udaipur have almost all the parameters within acceptable limit for drinking purposes, thus can be considered as potable. Ground waters from the districts of Barmer, Bikaner, Bundi, Dausa, Jaisalmer, Jalore, Jodhpur, Karauli, Pali, Pratapgarh, Sirohi and Tonk indicate low potable rating.
11. Out of 809 samples where Uranium concentration above 30 µg/l is observed in 24 districts out of 33 districts of Rajasthan state (13.72%). Most of locations in 11 districts where more than four locations where >30 ppb uranium were found namely Jodhpur , Jaipur, Nagaur, Tonk, Bikaner, Bharatpur, Ganganagar, Churu Jhunjhunu, Bhilwara, Dausa & remaining 13 districts having one to three locations where more than 30 ppb uranium were found namely Barmer, Hanumangarh, Karauli, Rajsamand, Swai Madhopur, Sikar, , Pali, Alwar,

Banswara, Baran, Jalore Sirohi, Udaipur. But most of locations with concentration above 30 µg/l are found in Jodhpur , Jaipur, Nagaur, Tonk, Bikaner districts. Maximum value of uranium 450 ppb were found in one place in Sauwaipadampur (Barmer), Bhandu kalan (Jodhpur),Bagot (Nagaur) districts.

12. Districts having greater than 30 ppb uranium in ground water are primarily associated with alluvial aquifer.Elevated levels of uranium in ground water of unconfined alluvium aquifers may be due to redox rections which controls the solubility.

13. The ground waters in various districts falling in C_1, C_2, C_3 salinity and S_1-S_2 sodicity classes can be used for irrigation on soils with good permeability for growing salt tolerant or semi salt tolerant crops. Addition of small quantity of gypsum may improve the permeability of the soil and avoid the sodium hazards. Ground water within C_4S_1, C_4S_2, C_3S_3, C_3S_3, C_4S_2, C_4S_3 and C_4S_4 classes are not suitable for irrigation. Use of such waters for irrigation under normal conditions may lead to both high to very high salinity as well as sodium hazards.

14. The overall probable causes of ground water quality deterioration in Rajasthan State are due to natural hydro-geological conditions, population pressure, over exploitation of ground water, lack of harvesting of rainfall for recharge of ground water, improper disposal of municipal and industrial solid waste and lack of public awareness, inadequate measure for rain water harvesting. Recommendations based on the ground water survey study have been presented at the end of the report. Areas identified with unsuitable or marginally suitable water quality should be monitored on micro level to effectively delineate such areas and use suitable management measures.

1.0 INTRODUCTION

The Rajasthan State comprising of 33 districts has a geographical area of 3, 42, 239 square kilometre (sq km) and is the largest state in the country. It is situated between north latitudes 23^0 03' and 30^0 12' and east longitudes 69^0 30' and 78^0 17 '.

Rapid population increase coupled with agricultural practices, urbanization and industrialization has brought in many interventions in the State of Rajasthan. This has resulted in both ground water and surface water pollution over space and time Water quality problem has posed serious health hazards and people are affected by various water borne diseases. To mitigate this problem, various Central and State departments, R&D institutions are actively engaged in water quality assessment and monitoring.

The administrative map of Rajasthan is shown in Plate-I

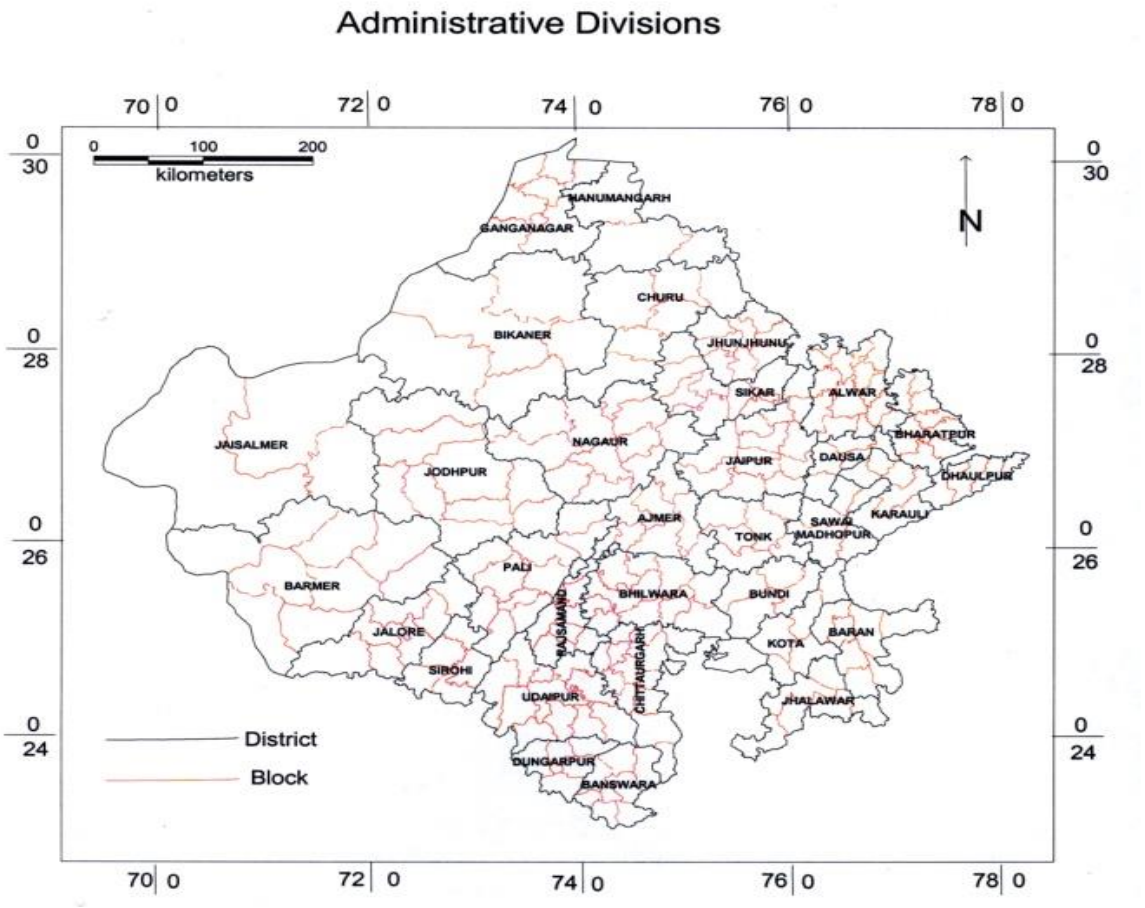

Plate-I

The economy of Rajasthan is the ninth-largest state economy in India and is primarily agricultural and pastoral. Wheat and barley are cultivated over large areas, as are pulses, sugarcane, and oilseeds. Cotton and tobacco are the state's cash crops. Rajasthan is among the largest producers of edible oils in India and the second largest producer of oilseeds. Rajasthan is also the biggest wool-producing state in India and the main opium producer and consumer. There are mainly two crop seasons. The water for irrigation comes from wells and tanks. The Indira Gandhi Canal irrigates northwestern Rajasthan.

The main industries are mineral based, agriculture-based, and textile based. Rajasthan is the second largest producer of polyester fibre in India. Several prominent chemical and engineering companies are located in the city of Kota, in southern Rajasthan. Rajasthan is pre-eminent in quarrying and mining in India. The state is the second largest source of cement in India. It has rich salt deposits at Sambhar, copper mines at Khetri, Jhunjhunu, and zinc mines at Dariba, Zawar mines and Rampura Agucha (opencast) near Bhilwara. Dimensional stone mining is also undertaken in Rajasthan. Jodhpur sandstone is mostly used in monuments, important buildings, and residential buildings. Jodhpur leads in Handicraft and Guar Gum industry. Rajasthan also has reserves of low-silica limestone. It is sevent largest state of India by population and Jaipur remains the most populous city of Rajasthan.

The quality of groundwater in Rajasthan is a matter of concern given the high salinity and over exploitation of groundwater. The present report is an effort to understand status groundwater quality in the Rajasthan State with special reference to trace elementswith an aim to understand the cause of contamination of groundwater, if any

A network of ground water monitoring stations is distributed all over the State and spatially presented in Plate–II. These stations are periodically monitored for ground water regime behaviour viz. recording of water level, temperature and collection of water samples for chemical quality assessment (once in a year i.e. in the month of May).

In the background of this, to evaluate the intensity of industrial pollution and its impact on ground water quality in industrial clusters of Bhiwadi, Jaipur and Jodhpur have been taken up during the past few years by CGWB,WR.

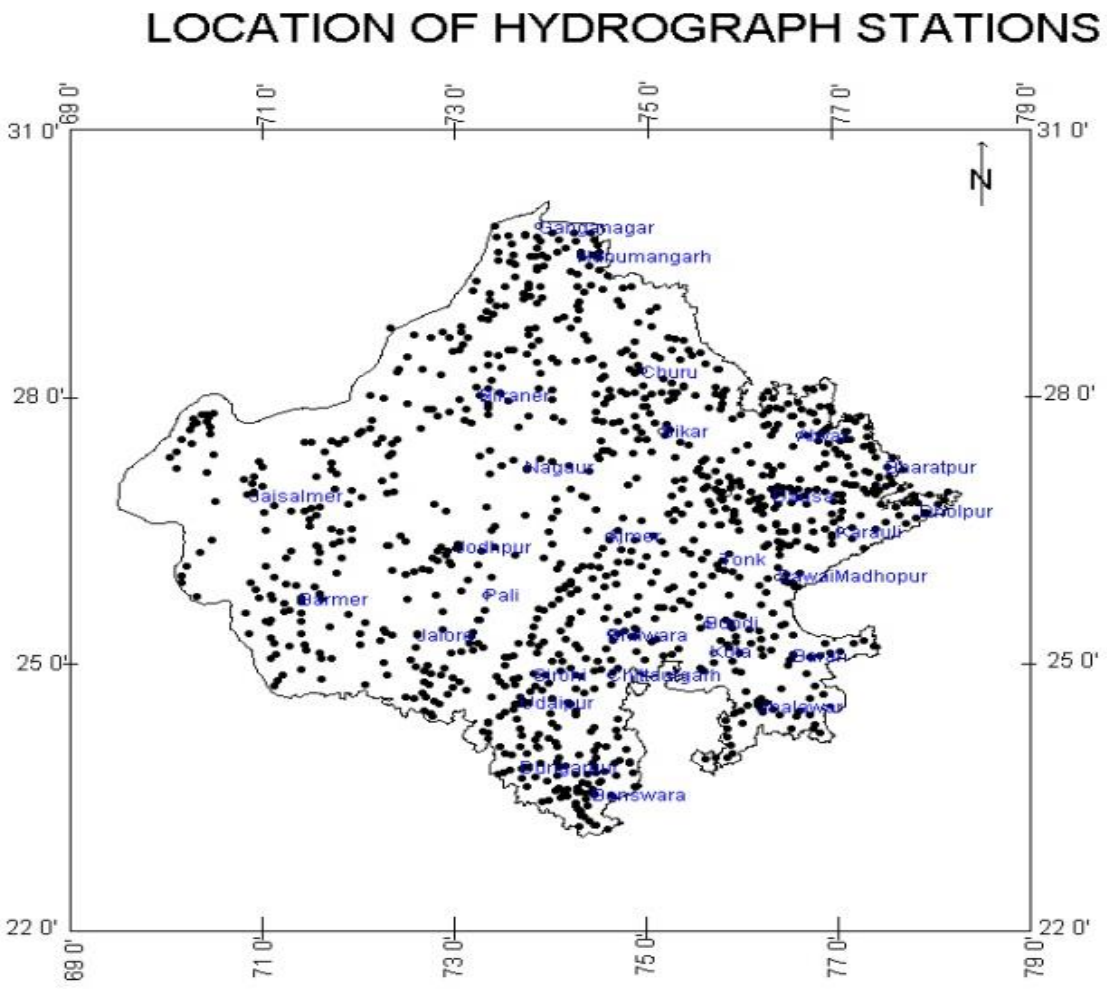

Plate-II

2.0 Aims and Objectives

Ground water is extensively used for drinking, irrigation and industrial activities in Rajasthan. Suitability of ground water for these uses depends on its ambient quality that is reflected in the concentrations of chemical constituents present in it at that time. As the composition of ground water is dependent on various geo-hydrological and environmental factors, the resultant chemical quality of ground water varies in time and space. For its optimal utilization for intended uses, it is imperative to assess the ambient quality of regional ground water.

The common belief that groundwater is of better quality as compared to surface water quality does not hold good at all times at all places. Recently, researchers have reported different types of pollutants in shallow ground waters at variouslaces and the onus has been placed on the pollution of the overall environment (air, soil, and water) as a whole.The pollution of the environment is undoubtedly associated

with rapid increase in population, industrialization and agricultural growth, as progress in civic amenities normally lags behind than necessary.Over exploitation of ground water to meet the rising demand for fresh water for human use has also contributed towards pollution levels of ground water.

One of the pollutants of major concern is the 'hazardous metal ion' also referred in scientific literature as 'Heavy Metal' due to their specific density being above 5.They are also termed as 'Trace Elements' because of their occurrences in low quantities in natural sources. Almost all the trace elements are toxic at higher concentration; some of them are toxic at low levels and few others are toxic even in trace amounts. CGWB, WR, Jaipur monitors the ground water quality annually through network of hydrograph stations consisting of dug wells and/or hand pumps of shallow depth.

The quality of groundwater in Rajasthan is a matter of concern given the high salinity and over exploitation of groundwater. The present report is an effort to understand present status of ground water quality in the Rajasthan State and an aim to understand the cause of contamination of groundwater, if any Status of ground water quality of Rajasthan state report has been prepared on the basis of chemical data generated from the analysis of ground water samples, collected during May 2022-23 from shallow wells GWMS.

3.0 PHYSIOGRAPHIC FEATURES

3.1 Topography

The state has a fairly mature topography developed during the long period of denudation and erosion. The present physiography and landforms are greatly determined by geological formations and structures and is the product of the past fluvial cycle of erosion and the recent & continuing desert cycle of erosion. The Physiographical map of Rajasthan is shown in Plate-III.

Physiographically the state can be divided into four units:

(a) Aravalli hill ranges (b) Eastern plains

© Western Sandy Plain and Sand Dunes

(d) Vindhyan Scarpland and Deccan Lava Plateau

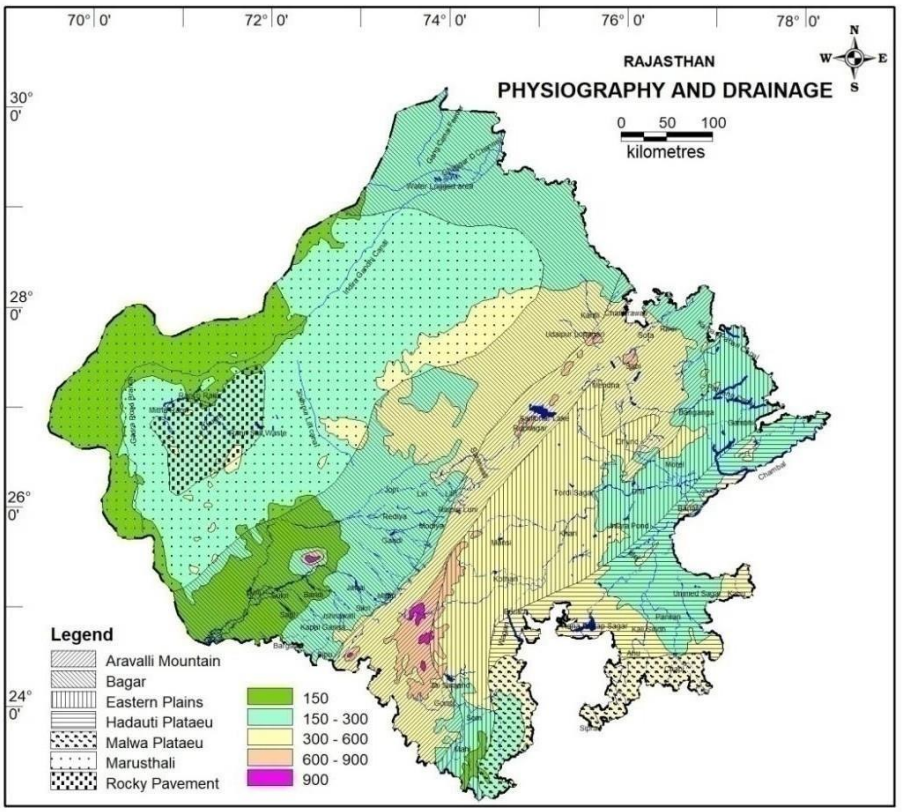

Plate-III : Physiographical map of Rajasthan

3.2 Drainage

The Aravalli Hill Ranges from the main water divide in Rajasthan. Luni is the only river westof Aravallis. In the remaining area of western Rajasthan comprising about 60% of the geographical area of the state, the drainage is internal, and the streams are lost in the desert sands after flowing for a short distance from the point of origin. Luni itself essentially is an ephemeral stream with flood cycle of 16 years. Drainage in western Rajasthan istowardswest and south - west. In the east of Aravalli ranges the main drainage is towards north - east.The other important catchments include Yamuna-Ganga in the north east, and Mahi and Sabarmati in the south west with flow towards south. The former three catchmentssupport perennial rivers. In the northern and north-eastern parts of eastern Rajasthan, the Banganga, Barah, Sota, Sahib and Kantli rivers are of inland nature. The drainage in the BISle of Rajasthan is generally dendritic.

In the desert area a few salt lakes and depressions exist, prominent among them being the Sambhar Lake, Didwana Lake, Bap, Pachpadra and Rann of Jaisalmer and Pokhran.

4.0 CLIMATE AND RAINFALL

Rainfall is the major source of ground water recharge in the state. The state receives 90 % rainfall from south west monsoon from June to September. The winter rainfall is meagre. Map showing distribution of average annual rainfall during 2022 in the State (Figure 4).

There are 349 Rain gauge stations in the state. The annual rainfall data of ten years 2012 to 2022 have been analysed to calculate average rainfall of each district in the respective years. The average annual rainfall of the state during the period 2022 works out to be 643.9 mm.

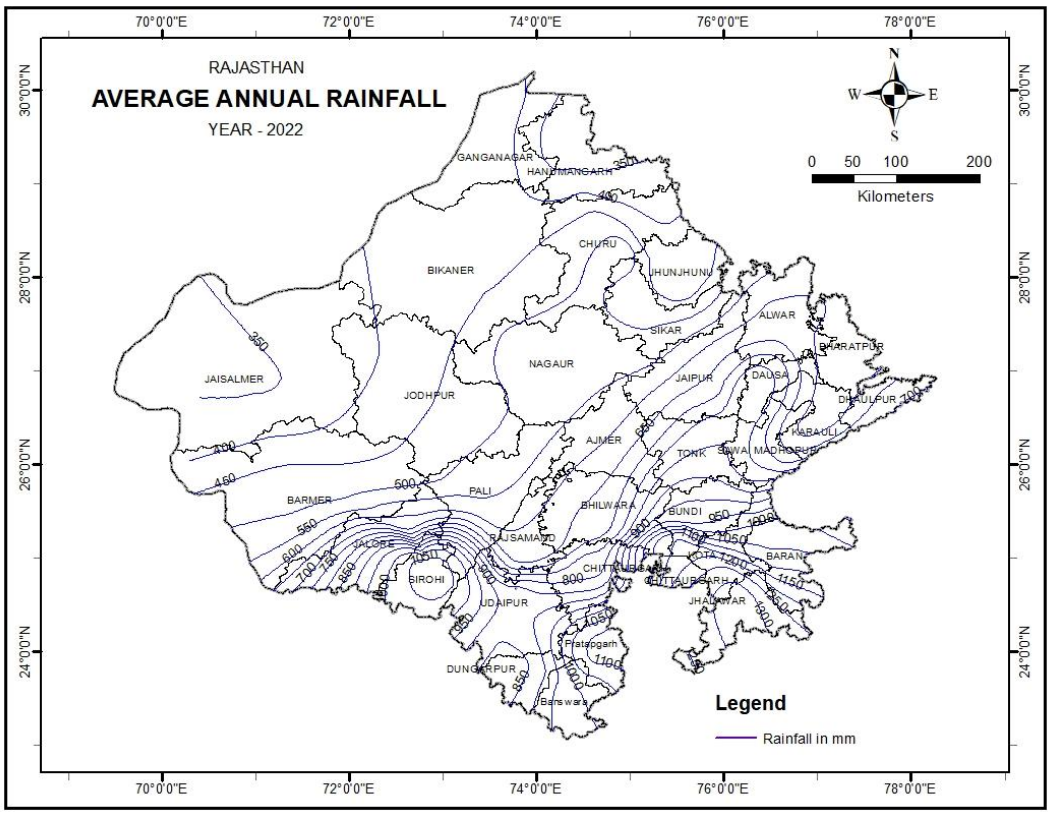

Plate-IV : Distribution of average annual rainfall

The average annual rainfall and departures (%) from normal annual rainfall in the state is shown in plate-IV. The percentage departures of average annual rainfall from Normal (1901-70) have been computed for the last ten years and tabulated in Table 1. It is observed that the average annual rainfall in the State, during the year 2022 is 29.5% more than the normal annual rainfall. The average annual rainfall in the state was more than 21.2% of average (2013-22) rainfall. Annual Rainfall and Departure from Normal is shown in plate-V.

Table 1: Average Annual Rainfall and Departure (%) From Normal Rainfall

S. No.	District	Normal (1901-70)	Average rainfall (2013-22) (mm)	Rainfall -2022 (mm)	Departure (%) in 2022 from normal rainfall	Departure (%) in 2022 from Average rainfall
1	Ajmer	437	536.617	573.1	25	6.37
2	Alwar	626	563.0577	615.8	13	8.56
3	Banswara	870	940.9554	998.3	13	5.74
4	Baran	895.3	1076.585	1049.2	26	-2.61
5	Barmer	260	345.2562	476	75	27.47
6	Bharatpur	675.1	599.8897	572.7	5	-4.75
7	Bhilwara	603.3	667.9568	675.2	12	1.07
8	Bikaner	249.8	322.5508	437.4	77	26.26
9	Bundi	715.8	817.8333	920.5	43	11.15
10	Chittorgarh	772.3	898.7908	785.8	8	-14.38
11	Churu	337.9	456.7919	508.7	52	10.2
12	Dausa	625.7	658.6147	784.2	32	16.01
13	Dhaulpur	717.5	670.2537	696.3	19	3.74
14	Dungarpur	610.4	830.7643	829.5	17	-0.15
15	Ganganagar	171.6	250.248	400.5	96	37.52
16	Hanumangarh	237.5	321.0413	317.9	25	-0.99
17	Jaipur	526.8	577.6903	652.8	24	11.51
18	Jaisalmer	158.6	244.2497	346.7	96	29.55
19	Jalore	400.6	533.1836	626.4	50	14.88
20	Jhalawar	884.8	1158.188	1317.1	49	12.07
21	Jhunjhunu	459.5	493.911	406.5	-1	-21.5
22	Jodhpur	296.7	394.983	457.5	56	13.66
23	Karauli	616.2	627.0379	582	-2	-7.74
24	Kota	808.7	923.4967	1150.8	57	19.75
25	Nagaur	363.1	494.9179	510.8	38	3.11
26	Pali	484.5	602.056	540.6	10	-11.37
27	Pratapgarh	806	1145.449	1129.6	24	-1.4
28	Rajsamand	556.1	697.8857	617	15	-13.11
29	Sawai	655.8	802.153	749	13	-7.1
30	Sikar	459.8	549.0175	490.4	20	-11.95
31	Sirohi	606.3	748.4663	1074.7	23	30.36
32	Tonk	598.2	809.9219	802.4	42	-0.94
33	Udaipur	632.7	742.3694	889.5	44	16.54
RAJASTHAN		**549.1**	**651.58**	**696.51**	**33.21**	**6.45**

A perusal of PLATE- IV reveals that the rainfall in the east of Aravalli is significantly higher as compared to the western part.

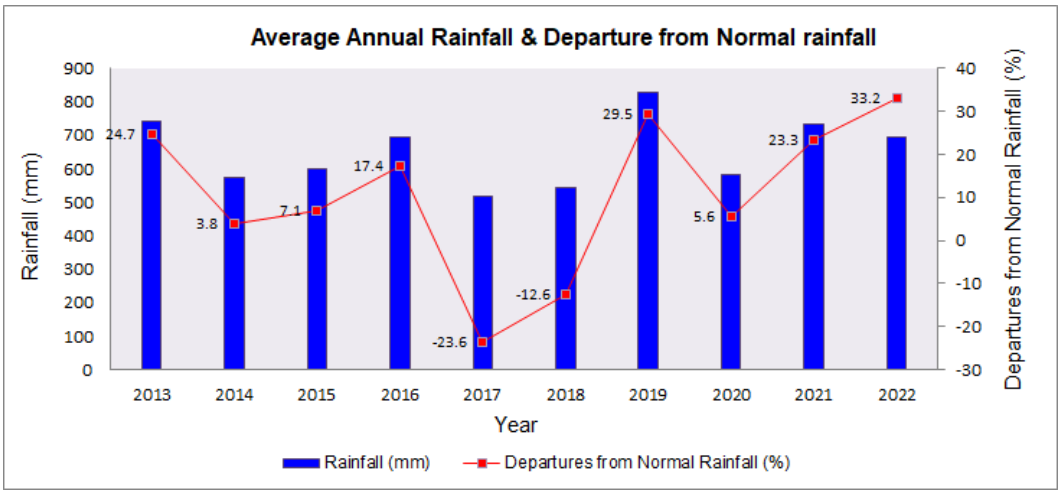

Plate-V : Annual Rainfall and Departure from Normal

4.1 Temperature

The hot weather season commences in the month of March and continues through April to June. In the month of May the diurnal range of temperature increases more and the day become hotter. During June the mean maximum temperature reaches as high as 48° C.

January is the coldest month. The normal minimum temperature (January) range from 2°C in the north to 7.8°C in south. At Mount Abu (1195 m AMSL), temperature dips to freezing point during the month of December/January. In eastern Rajasthan the range of normal minimum temperature (January) in and around the Aravalli hill ranges is 7°C to 8°C which increases towards the east and attains a high of more than 10°C in the districts of Kota and Bundi.

Climatically, the year in Rajasthan can be divided into three major conventional seasons as follows:

The Hot- Weather Season (March to end of June)

Monsoon Season (End of June to September)

The Cold- Weather Season (October to February)

5.0 GEOLOGY

Diverse rock types ranging from the oldest Archaean rocks to sub- Recent alluvium andwind-blown sand are exposed in Rajasthan. In a major portion of the area, particularly inwestern Rajasthan, the oldest rocks are concealed below a thick cover of alluvium and wind-blown sands. A generalised stratigraphic succession of various formations and rock types is given in

Table 2: Geological Succession

GEOLOGICALTIMEUNIT		LITHOSTRATIGRAPHICTIMEUNIT		LITHOLOGY
ERA	PERIOD	SUPERGROUP/GROUP		
RECENT				Alluviumandblown sand
CAINOZOIC(TERTIARY)	Eocene	Mandai/Akli/Kapurdih/Jogira/Banda/Khuiala /Palana		Sandstone,bentoniticclay&fuller' searth
DECCANTRAPS				Basalt
MESOZOIC	Cretaceous	Abur/Fatehgarh		Sandstone,limestone,clayandlign ite
	Jurassic	Paruhar/Bhadesar/Baisakhi/Jaisalmer/Lath i		Limestone,sandstone& shale
PALAEOZOIC	Permo- Carboniferous		Bhadura	Sandstone& boulders
		Marwar	Nagaur/ Bilara/Jodhpur	Sandstone, gypsum, siltstone,limestone,dolomite &shale
UPPERPROTEROZOIC		Vindhyan	Bhander/Rewa/Kaimur/ Semri	Sandstone, shale, limestone,conglomerate&basicflows
		Acid,BasicandUltrabasicIntrusivesandExtrusivesMalaniVolcanics/Plutonics Kishangarh Syenite		
LOWERPROTEROZOIC		Delhi	Ajabgarh/Alwar/Sirohi/ Punagarh/Raialo	Quartzite, schist, gneiss, marble,shale,slate,phyllite&basic flows
		Granite,Basic& UltrabasicIntrusives		
		Aravalli	Jharol/ Bari/ Udaipur/Debari	Quartzite, schist, phyllite, conglomerate, greywacke,metavolcanics&marble
		Granite& BasicIntrusives		
ARACHAEAN		Bhilwara	Ranthamobre/ Rajpura-Dariba /Hindoli	Phyllite,slates,schist,gneiss,granitegneiss& migmatites

The various lithological units have been classified into two groups on the basis of their degree ofconsolidation and related parametres these are:

I Porous formations - a) Unconsolidated formations b) Semi- consolidated formations ,
II Fissured formations- Consolidated sedimentary rocks, b) Igneous and metamorphic rocks, c) Volcanic rocks d) Carbonate rocks

6.0 HYDROGEOLOGY

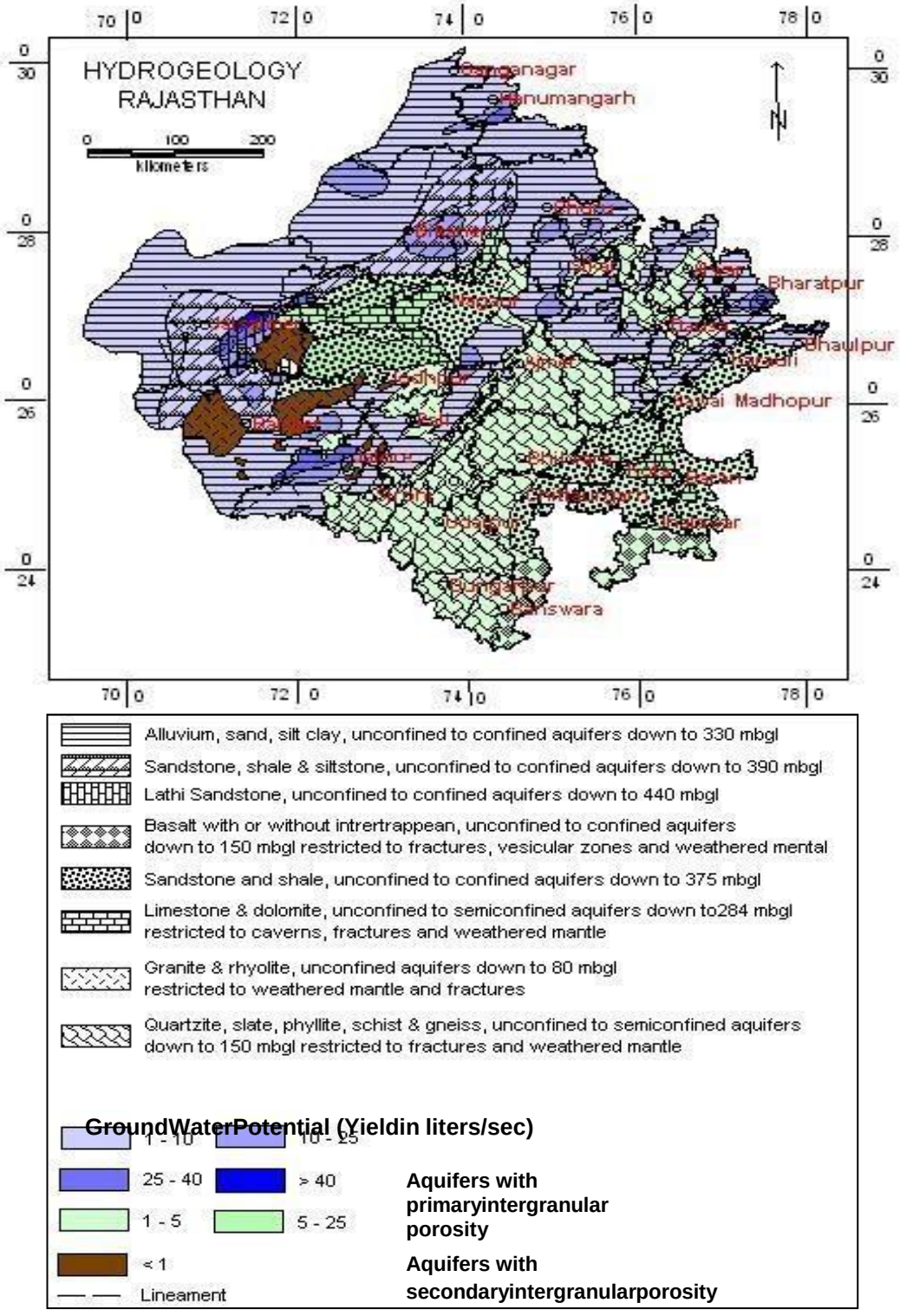

Plate VI : Hydrogeological map of Rajasthan

The hydrogeological map of Rajasthan is shown in Plate-VI. The rincipal sourceof recharge to ground water in Rajasthan is rainfall.In canal irrigated areas, apart of canal water through seepage from conveyance system and part of water i.e. utilised for irrigation also returns to ground water and contributes to storage.

7.0 DEPTH TO WATER LEVEL (UnconfinedAquifer)-
May 2021 to May 2022

Total number of wells analysed are 884. A perusal of map (Fig-19) of annual water level fluctuation from May, 2021 to May, 2022 reveals that 47.28% stations shown rise, 50.22% decline & 2.49% stations shows no change in water level. Area of rise in water spreads from south east to south-central, north western, western and west central parts of the State. Minimum & maximum rise was recorded 0.02 m in (Dhirera Pz of Bikaner District, Tidiyasar Pz of Churu District and Padampura, Ganganagar District) and 26.40 m (Phulia, Jaisalmer district).

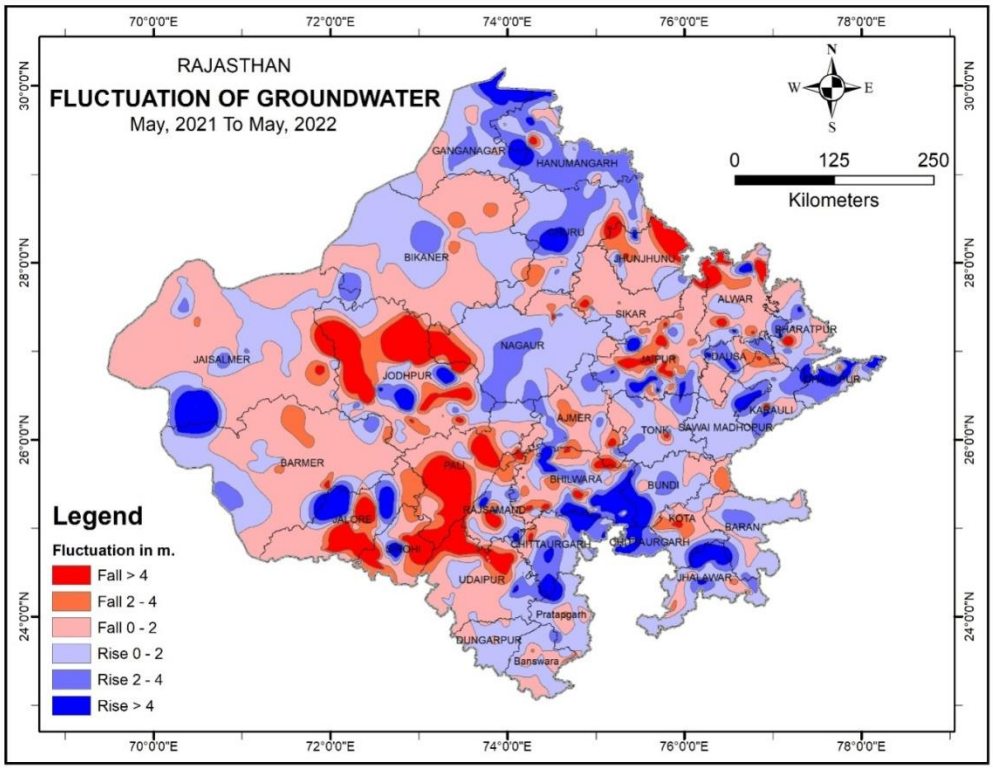

Plate-VII : Water Level Fluctuation – May 2021 to May 2022

Rise in water level < 2m in 28.6% stations was observed falling mostly in Sawai Madhopur, Banswara, Dungarpur, Pratapgarh, Bundi, Nagaur, Baran, Kota, Churu, Ganganagar, Karauli, Tonk, Jaisalmer, Udaipur, Hanumangarh, Rajsamand and Pali districts and at isolated locations in all the remaining districts except Jalore, Jhunjhunu and Sirohi Districts.

Water level rise between 2 & 4m was shown by 10.7% stations mostly falling in Tonk, Ganganagar, Hanumangarh, Dholpur, Nagaur, Karauli, Chittrogarh Churu Bundi, Baran, Bharatpur, Dausa and Ajmer districts and at isolated patches in Bhilwara, Jhunjhunu, Jaipur, Jhalawar, Barmer, Jalore, Bikaner, , Jaisalmer and Sikar districts.

Rise of more than 4m has been recorded at 7.9% stations falling mostly in Dholpur, Dausa, Chittorgarh, Jhunjhunu, Bhilwara, Bharatpur, Rajsamand Sawai Madhopur, Jaipur, Jhalawar, Jalore, Hanumangarh & Sirohi districts and at isolated locations in Karauli, Alwar, Jodhpur, Ganganagar, Pratapgarh Churu, Ajmer, Jaisalmer, Sikar and Udaipur districts.

About 50.22% stations scattered in all the districts, mostly in north-eastern, south, south weastern, north& north central parts, shows decline in water level during this period. Minimum & maximum decline was recorded at 0.02 m in (Ajagara, Ajmer District) and 35.30 m (Hanuman Sagar, Jodhpur district).Decline in water level <2m was recorded in 32.0% stations falling mostly in Sikar, Bikaner, Barmer, Sirohi, Jaisalmer, Ajmer, Udaipur, Pali, Baran, Jalore, Jaisalmer, Hanumangarh, Barmer, Jhunjhunu, Ganganagar, Bundi, Bharatpur, Alwar, Jodhpur, Bundi, Jalore, Bhilwara and Dausa districts and at isolated locations in all other districts.

Decline in water level between 2 & 4m was recorded at 8.7% stations at Jhunjhunu, Rajsamand, Jalore, Kota, Udaipur, Dausa and Alwar, Barmer, Jhalawar, Jodhpur, Ajmer, Bhilwara and Sirohi Districts and at isolated locations in Bikaner, Udaipur, Chittorgarh, Nagaur, Sikar, Pratapgarh, Churu and Banswara districts. Water level decline>4m was exhibited by 9.5% stations at Pali, Sirohi, Jalore, Jodhpur, Alwar Jaipur, Karauli, Rajsamand, Bhilwara, Jhunjhunu and Udaipur Districts and at isolated locations in Dausa, Churu, Chittorgarh, Dholpur, Kota, Nagaur, Tonk, Bharatpur, Ajmer, Jaisalmer, Hanumangarh, Sikar, Barmer, and Banswara districts.

8.0 GROUND WATER QUALITY SCENARIO OF THE STATE

Natural quality of ground water is dependent on geological characteristics and climatic conditions. It is further influenced and generally degraded by human activities. Indiscriminate extraction of groundwater for day to day uses, application of fertilizers in agriculture and unscientific disposal of industrial waste have great impact on ground water quality. The quality of ground water is normally ascertained through concentration values of number of physical, chemical and biological parameters present in it. Concentration of these parameters affects its acceptability and usefulness for domestic, agriculture, industrial and other purposes. It is, therefore, essential to know the chemical composition of ground water to determine its

suitability for the intended use. Knowledge of quality of ground water not only helps in finding its suitability for various purposes, but it also helps in taking effective remedial measures for its improvement on scientific lines. In rural as well as in urban area of Rajasthan State, ground water is a major resource for drinking and other uses. Wherever surface water is inadequate or unavailable, ground water is exploited for drinking and irrigation purposes. In the backdrop of various uses of ground water, its quality is monitored annually by CGWB, WR Jaipur, through dedicated ground water monitoring stations (GWMS) of dug wells and/or hand pumps of shallow depth.

8.1 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.

8.2 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.

8.3 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 hydrochemical facies tends to change to mixed cations or even to Na-HCO_3 type.

8.4 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.

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

$$H^+ + \text{Feldspar} + H_2O \longrightarrow \text{Clay} + H_4SiO_4 + \text{Cation}$$

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.

8.5 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, industries etc., 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 and standards 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 monitoring procedure. The changes in all these factors may provide a basis for alteration in standards. 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 3.0).**

Table 3.0: 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

8.5.1 Water Quality Criteria for Drinking Purpose

With the objective of safeguarding water from degradation and to establish a basis forimprovement in water quality, standards / guide lines / regulations have been laid downby 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 4.0: 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.,

8.5.2 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 5: 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 lessthan 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.

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).

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

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;

$$\mathbf{RSC} = (\mathbf{HCO3} + \mathbf{CO3}) - (\mathbf{Ca} + \mathbf{Mg})$$

(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.

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

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 6 : 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	

8.60 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 drinking water supplies to avoid impact on human health **(Table – 8)**. 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.

The water quality for various uses should be as per specification of water required for particular use. The chemical parameters above the permissible limit have adverse effect on human health. Hardness, measured as CaCO3, when present more than 600 mg/l may affect water supply system (Scaling), lead to excessive soap consumption, calcification of arteries. There is no conclusive proof but it may cause urinary concretions, diseases of kidney or bladder and stomach disorder. Iron in traces is essential for nutrition and high Iron concentration (> 1.0mg/l) in water, though not having major effect on human health, gives bitter sweet astringent taste, causes staining of laundry and porcelain.Nitrate at very high concentration may cause infant methaemoglobinaemia (blue babies), causes gastric cancer and affects adversely central nervous system and cardiovascular system.Fluoride less than 1.0 mg/l is desirable in drinking water as it prevents dental carries but with very high concentration may cause crippling skeletal fluorosis. Copper is essential and beneficial element in human metabolism. Deficiency results in nutritional anaemia in infants. Large amount gives astringent taste, causes liver damage, central nervous system irritation and depression. In water supply it enhances corrosion of aluminium in particular. The desirable limit of Lead in drinking water is 0.05 mg/l. It is toxic in both acute and chronic exposures. Burning in the mouth, severe

inflammation of the gastro-intestinal tract with vomiting and diarrhoea, chronic toxicity nausea, severe abdominal pain, paralysis, mental confusion, visual disturbances, anaemia etc are some of its manifestations when present in higher concentrations.The probable effects of the water quality, for drinking uses beyond the prescribed limits are summarised in the Table

Common symptoms of mercury poisoning include peripheral neuropathy (presenting as paresthesia or itching, burning or pain), skin discoloration. Other symptoms may include kidney dysfunction (e.g. Fanconi syndrome) or neuropsychiatric symptoms such as emotional lability, memory impairment, or insomnia. Long term exposure to Cyanide affects the thyroid and central nervous system adversely. In drinking water the maximum permissible limit for cyanide is 0.05 mg/l and there is no relaxation in this value as beyond this limit water becomes toxic. Arsenic is a recognized carcinogenic element. The gastrointestinal tract, nervous system, respiratory tract and skin can be severely affected. Chronic poisoning is manifested by general muscular weakness, loss of appetite and nausea, leading to inflammation of mucous membrane in the eye, nose and larynx, skin lesions may also occur. Neurological manifestations and even malignant tumours in vital organs may also be observed. Animals consuming Se rich fodder exhibit typical symptoms of Selenium poisoning. The most consistent clinical manifestations are loosing body condition and loss of hair, necrosis of tail, reluctance to move, stiff gate, and overgrowth of hooves followed by cracks gradually leading to detachment from main hoof.
Water containing low amounts of uranium is usually safe to drink. Because of it's nature, uranium is not likely to accumulate in fish or vegetables and uranium that is absorbed will be eliminated quickly through urine and faeces. Uranium concentrations are often higher in phosphate-rich soil, but this does not have to be a problem, because concentrations often do not exceed normal ranges for uncontaminated soil. It is possible that intake of a large amount of uranium might damage the kidneys. There is also a chance of getting cancer from any radioactive material like uranium. Natural and depleted uranium are only weakly radioactive and are not likely to cause cancer from their radiation. The provisional guideline by WHO of Uranium for drinking water is 30 µg/l. The guideline value is designated as provisional because of outstanding uncertainties regarding the toxicology and epidemiology of Uranium.

system in general and other sensitive systems leading to immuno suppression, immuno potentiation and hypersensitivity of the host against infectious and non infectious diseases as well as causing glomerulonephritis, rheumatoid arthritis, carcinogenicity, reduced fertility, increased cholesterol, high infant mortality, varied metabolic and genetic disorders and reduced lifespan in humans and livestock populations in India. The main cause of water borne diseases and enteric diseases like cholera, typhoid, para-typhoid, bacillary, dysentery, gastro-enterititis etc. are due to the contamination of source with intestinal pathogenic micro-organisms. The contamination of drinking water by human/animal excreta faecal matter constitutes the most common mechanism for transmission of these organisms to healthy human being not only directly but also indirectly.

8.6.1 Impact on Plant Growth

The electrical conductivity is the measure of salt contents in the water. The effects of salinity are stunted plants growth, low yield, discoloration and even leaf burns at margin or top. High sodium in water affects the permeability of soil and causes infiltration problems. This is because sodium when present in the soil in exchangeable form replaces calcium and magnesium adsorbed on the soil clays and causes dispersion of soil particles

Other problems to the crop caused by an excess of Na is the formation of crusting seed beds, temporary saturation of the surface soil, high pH and the increased potential for diseases, weeds, soil erosion, lack of oxygen and inadequate nutrient availability.

Bicarbonate hazard, expressed as RSC, when above 2.5 meq/l results in increase of sodium causing adverse effect. 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.

Boron is an essential plant nutrient but concentration above 4.0 mg/l is toxic to plant.Copper, Lead and Zinc are essential plant nutrients but very high concentration may be toxic and reduce root growth. Chromium above 1.0 mg/l is toxic to plants. Very high concentration may reduce growth, produce iron deficiency in plants and reduce the yields. High concentration of Cadmium (>0.5 mg/ l) reduces plant growth, bio-accumulates in plants and reduces yields. Iron is an important and essential element. Deficiency caused by excess of lime in soils, results in chlorosis. Excess iron contributes to soil acidification. Excess of Nickel in irrigation water causes stunted growth of plants when concentration is above 0.5 mg/l. It is toxic to barley, beans, Oats, when more than 2.0 mg/l.

8.6.2 Impact on Industries

The quality requirements for industrial water supplies range widely and almost every industrial application has it's own standards.

Low pH increases corrosion of concrete; pH 7 is required for most industries, pH 6.7-7.2 is advised for carbonated beverage industry. Total dissolved solids above 3000 mg/l cause foaming in boilers and solids interfere with cleanliness, colour or taste of finished products. Low TDS values are required in most industries, high TDS leads to corrosion. Recommended value of Iron for food processing units is 0.2mg/l, for paper and photographic industry iron of 0.1 mg/l is recommended, iron less than 0.1 mg/l is recommended in cooling waters. Fluoride above 1.0 mg/l is harmful in industries involved in production of food, beverages, pharmaceuticals and medical items while nitrate above 30 mg/l is injurious to dyeing of wool and silk fabrics and harmful in fermentation process for brewing. Nitrate in some water protects metals in boilers from inter-crystalline cracking. Copper is undesirable in food industry as it has colour reactions and imparts fishy taste to finished products. Affects smoothness and brightness of metal deposits in metal plating, baths. No guidelines have been given for Chromium, Zinc and Lead for water to be used for industrial purposes.The water quality standards are laid down to evaluate suitability of water for intended uses and to safeguard water from degradation. These recommended limits form the basis of treatment needed for improvement in quality of water before use. In the formulation of water quality standards, the selection of parameters is considered depending upon its end use.

8.6.3 WATER POLLUTION & ITS ENVIRONS

The quality of groundwater may be impacted by naturally occurring processes as well as by the activities directly attributable to human interventions in different environs. The complex biodiversity, physiographic setup coupled with prevailing hydrogeological set up attribute to water pollution in various parts of the State. The magnitude of environmental impact associated with each of these processes is highly complicated and variable. Four general ways in which the chemical composition of water may be changed include natural processes, agricultural and urban runoff industrial effluents, waste disposal practices, and spills, leaks and other unintentional / intentional releases. In the natural way of contamination, the leaching of natural chemical deposits can also result in increased concentration of chlorides, sulfates, fluorides, Arsenic, nitrates, iron, and other inorganic chemicals.

The nature of contamination impacts may be assessed in terms of the characteristics of the chemicals that are released and in terms of their distribution and difficulty of restoration or containment. In addition, impacts are directly related to potential human and ecological exposures and risk. Groundwater moves slowly, so it takes a long time for contamination to appear at potential receptor locations. It follows that it will take a correspondingly long time to remediate the initial release of contaminants. The primary chemicals of concern are classified as organic chemicals, metals and radionuclide, other inorganic chemicals such as chloride, sulfates, nitrates and sodium from irrigation return flows and other sources are also significant. Sources of contamination of water are presented in Table 3.

Table: 7- Sources of Ground water Contamination

Category - I	**Category - II**	**Category - III**
Sources designed to discharge substances	Sources designed to store, treat, and /or dispose of substances: discharge through unplanned releases	Sources designed to retain substances during transport or transmission
Subsurface percolation (eg. Septic tanks, etc), injection wells, land applications	Landfills, open dumps, surface impoundments, waste tailings/piles, above ground/underground storage tanks, radioactive disposal sites	Pipelines, material transport and transfer
Category - IV	**Category - V**	**Category - VI**
Sources discharging as consequence of other planned activities	Sources providing conduit or inducing discharge through flow patterns	Natural occurring sources whose discharge is created and /or exacerbated by human activity
Irrigation practices, Pesticide applications, Fertilizers use, animal feedings, urban runoff, percolation of atmospheric pollutants, mining and mine drainage	Production wells, Other wells, Construction excavation	Groundwater-surface water interactions, natural leaching, salt water intrusion, upconing

Environmental pollution is an undesirable change in the physical, chemical and biological characteristics of the environment. Such changes are caused by substances that are introduced into the environment, by human interferences and natural causes also. Broadly, two types of pollution exist and these are as follows:

- ***Geogenic***

Deterioration of quality of ground water due to natural contamination from aquifers and overlaying soils is called geogenic contamination. This type of contamination occurs due to entrapped water reaction with the strata. Presence of high Fluoride, Selenium and Arsenic are usually a result of geogenic contamination as there are only a very few other source of these ions.

- ***Anthropogenic***

Agriculture Activities: Fertilizers are an important input in the agriculture production. Initially organic fertilizers were mainly used in fields, however, later on use of chemical fertilizers have played a very important role in enhancing the agricultural production in the state.

Use of fertilizers: Nitrogenous based fertilizer releases large amounts of NO_3^-which accumulate in the soil profile and is susceptible to leaching.

Animal wastes Disposal: unscientific disposal of Animal wastes, dung and urine around dairy sheds appear to be the major contributors to high NO_3^--N in groundwater under village inhabitations and feedlots.

Use of Pesticides: Due to rampant use of pesticides for agricultural activity there have been numerous reports of pesticides residues in food and water.

Industrial Waste water Pollution: Organic and toxic wastes from industries cause water pollution

Municipal Waste: Application of sewage sludge to agricultural fields and untreated industrial effluents alone, or in combination with ground/canal water, especially in the vicinity of large cities, as these are considered reusable sources of essential plant nutrients and organic Carbon are causing pollution to the ground water. Discharge of partially/untreated water contributes to biological contamination of surface and groundwater.

Table 8. : Effects of water quality parameters on human health when used fordrinking 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
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 $CaCO_3$ (mg/L)	200	600	Affects water supply system (Scaling), Excessive soap consumption, and calcification of arteries. There is no conclusive proof 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 heart or 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 type of rickets, excess causes concretions in the body such as kidney or bladder stones and irritation in urinary passages.

S. No.	Parameters	Prescribed limits IS:10500, 2012		Probable Effects
		Desirable Limit	Permissible Limit	
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 human metabolism. 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 enhance corrosion of aluminum in particular
14	Sulphate (SO_4) (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 (NO_3) (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.
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 with vomiting and diarrhoea, chronic toxicity produces nausea, severe abdominal pain, paralysis, mentalconfusion, 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.

S. No.	Parameters	Prescribed limits IS:10500, 2012		Probable Effects
		Desirable Limit	Permissible Limit	
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 membrane of eyes, ears and throat.
30	Arsenic	0.01	**No relaxation**	Various skin diseases, Carcinogenic
31	Uranium	0.03	**No relaxation**	Kidney disease, Carcinogenic

8.6.4 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 dugwells 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 country 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.

8.6.5 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 10% 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.

8.6.6 Sampling & Analysis :

For the evaluation of Hydro-Chemical status and distribution of various chemical constituents in Ground water of Rajasthan state, 809 water samples were collected from NHS during pre-monsoon, 2022 from open dug wells and hand pumps, which are fully or partially in use. and analyzed in Regional chemical laboratory(a NABL accreditated lab). Sampling points are mostly open dug wells and hand pumps, which are fully or at least are partially in use. Chemical analysis was carried out for major cations (Ca, Mg, Na, K) and anions (CO_3, HCO_3, Cl, SO_4, NO_3, F) in addition to pH, EC, PO_4, TH as $CaCO_3$, in the Chemical Laboratory at Jaipur. Standard analytical procedures as given in APHA 2012 were followed.

For the beneficial use of water its purity is essential otherwise it may affect human health adversely. The quality of water depends on its physical and chemical properties. Physical properties include colour, odour & turbidity which can be determined by our senses. The chemical properties depend on the nature & quantity of various chemical constituents individually or jointly. The possible sources, effect on human health & distribution of some major Chemical constituents are described in following chapter. Results of chemical analysis of water samples are placed in Annexure I.

The standard analytical methods followed for determination of various parameters are given in Table 9.

Table 9, Standard Analytical Methods

Parameters	Analytical Methods
pH	Electro-metric method, pH meter
Conductivity (EC)	Electrical conductivity method, EC meter
Carbonate & bicarbonate (CO_3, HCO_3)	Titrimetric method
Chloride (Cl)	Argentometric method
Sulphate (SO_4)	Turbidimetric Method
Nitrate (NO_3)	Ultraviolet spectrophotometric method
Fluoride (F)	ECR method
Phosphate (PO_4)	Stannous Chloride Method
Total hardness (T.H)	EDTA-Titrimetric method
Calcium (Ca)	EDTA-Titrimetric method
Magnesium (Mg)	By difference
Sodium (Na)	Flame photometric method
Potassium (K)	Flame photometric method
Iron	Phenanthroline method
Total dissolved solids (TDS)	By Calculation
Heavy Metals	AAS Method
Uranium	Fluorimeter

8.6.7 Hydrochemistry :

Electrical Conductance (EC)

Electrical Conductance is the ability of a substance to conduct an electric current. Chemically pure water in liquid form has a very low conductance. The presence of dissociated ions in solution renders the solution conductive. Distribution of Electrical Conductance is presented in Fig1.

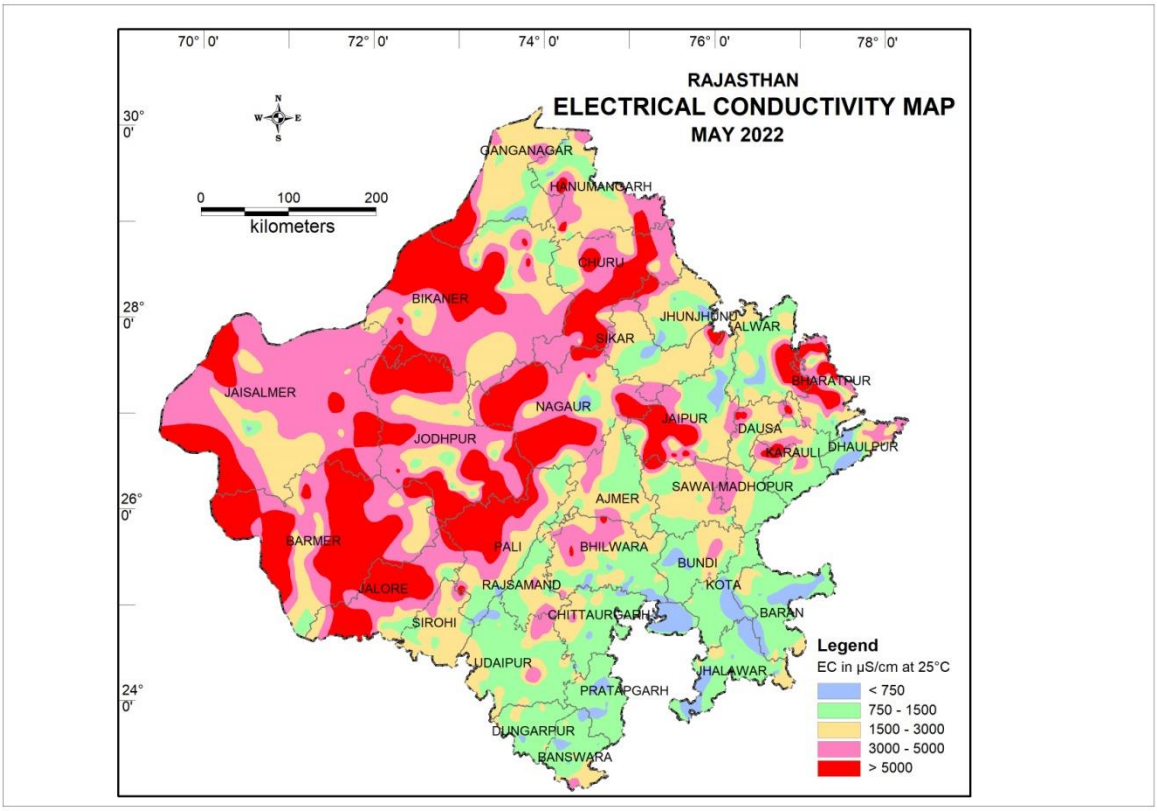

Plate-8 :- Distribution of Electrical Conductance –May 2022

EC of a solution, therefore, gives an idea about the quantity of ions or dissolved solids present in it. In western, central and some eastern parts of the state higher EC values of water (>3000 µS/cm) have been observed thus making the ground water saline and non-potable. In southern and some eastern part of the state water is fresh as the EC values are within 1500 µS/cm.

Out of 809 water samples analysed, 11.07 % samples have EC values less than 750 µS/cm, 32.56 % between 750 & 1500 µS/cm, 28.88 % between 1500 & 3000 µS/cm and 27.50 % samples have more than 3000 µS/cm at 25^0 C in the districts of Churu (74.07%), Jodhpur (68.62 %), Barmer (65.85 %), Jaisalmer (65.51) Nagaur (60.86%), Jalore (57.14 %) & Dausa (46.15%) samples have EC values in water. None of the sample shows chloride value beyond permissible

limit in Baran, Dungarpur, Jhalawar, Kota, Rajsamand Pratapgarh & Tonk districts. Fig 1 is shows that most of samples in West Rajasthan districts like Jaisalmer Barmer, Nagaur , Churu and Jalore where EC is greater than 5000 µS/cm Distribution of Electrical Conductance –May 2022 . Minimum value of EC (180 µS/cm) was found at Bhuwana in Jhunjhunu and maximum value (24290.00 µS/cm at 25^0 C) at Kukunda in Jodhpur district. Distribution of electrical conductance in Ground Water of Rajasthan is shown in plate-8.

Chloride (Cl)-

It is one of the most common constituent present in natural water and remains soluble in water unaffected by biological processes therefore reducible by dilution. Natural mineral origin can also be a cause of high chloride content. Industrial effluents (galvanizing plants, water softening plants, oil wells, refineries and paper works) may also leach into ground water.

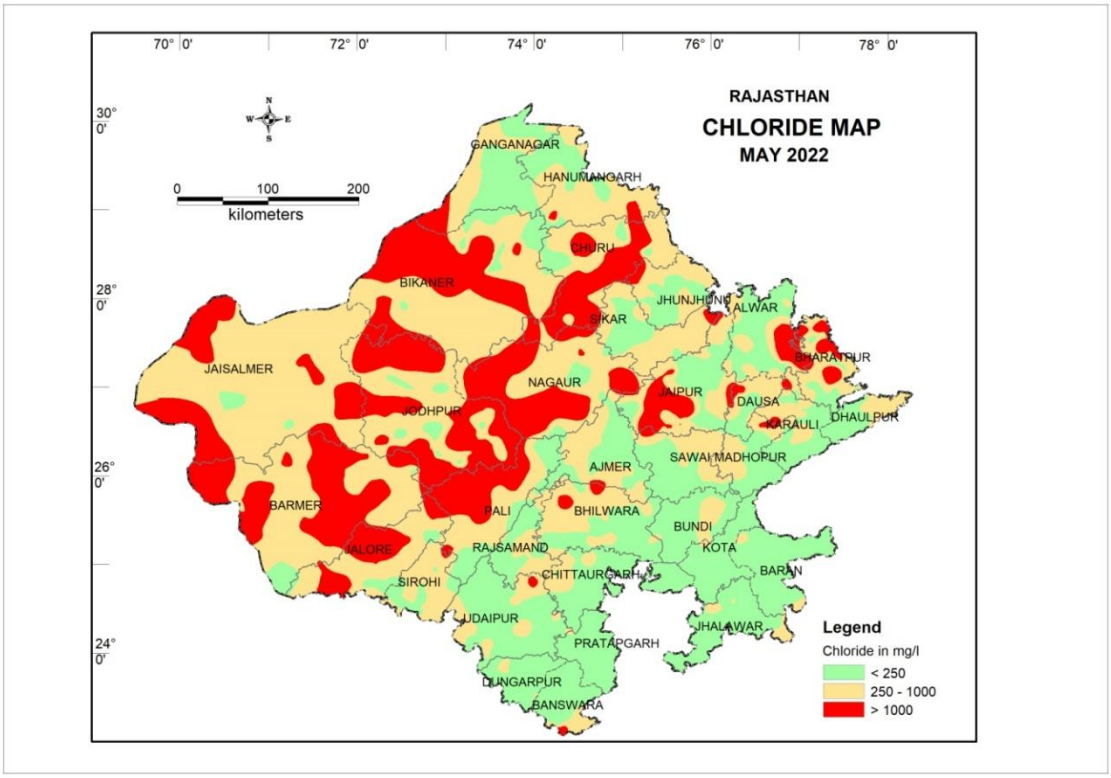

Plate-9:- Distribution of Chloride May 2022

Sewage effluents contain a larger concentration of Chlorides. Chloride ions have some functions in the body. The tolerance limits of chloride vary with climate and excretion. Cation associated with chloride is usually has harmful effects on human body. Individual affected by heart and kidney disease should restrict water consumption with a high chloride concentration. In western, central and some eastern parts of the state high Chloride (Cl) values (>1000 mg/l) have been observed thus making the ground water bitter in taste and non-potable.

Out of 809 sample analysed, 13.13% have chloride value beyond permissible limit of 1000 mg/l, 33.85 % between acceptable and permissible limit and 53.03 % samples are within acceptable limit. In Churu (55.55 %), Jodhpur (52.94 %) , & Nagaur (43.47 %) districts chloride value is beyond permissible limit. In Bundi, Baran, Chittaurgarh Dholpur, Dungarpur, Ganganagar, Jhalawar, Kota, Rajsamand Pratapgarh & Tonk districts, none of the sample shows chloride value beyond permissible limit. Maximum value of chloride (9359 mg/l) at Kukunda in Jodhpur district and minimum value 7 mg/l) is observed at Rakho in Banswara District

Sulphate (SO_4)-

Sulphates are found in natural water in the final oxidized state of sulphides, sulphites and thiosulphates or in the oxidized stage of organic matter in the sulphur cycle; in all cases as a product of pollution sources related to mining or industrial waste. Detergents add Sulphate to sewage. Tanneries, steel mills, textile plants may contaminate water. Sulphate ions associated with high concentration of Magnesium and sodium ions, acts as laxative and may cause gastric disorders. In all, 60.02 % samples fall within acceptable limit, 18.61 % within acceptable and permissible limit and 19.37 % samples are beyond permissible limit of BIS guidelines for drinking water. In Barmer (60.97 %), Jaisalmer (58.62 %), Churu (48.14 %) & Ganganagar

(41.17%) districts water samples have Sulphate value beyond permissible limit (400 mg/l). Minimum value of sulphate (1 mg/l) at Kalighati Sariska in Alwar district and maximum value of sulphate (5888 mg/l) has been observed at Meghwalo ki basti in Barmer district.

Nitrate (NO_3)

Sources of Nitrate are mineral deposits (sodium and potassium nitrates), soils, sea water and atmosphere. Nitrate is used as a fertilizer, as a food preservative and as an oxidizing agent in the chemical industries. Higher concentrations are expected where fertilizers are used, in decayed animals and vegetable matter, in leachates from sludge and refuge disposal and in industrial discharges. Higher concentration of nitrate causes Methemoglobinemia disease in bottle fed infants (3 months old). In western, north western, southern and some eastern parts of the state high nitrate values (>45mg/l) have been observed thus making the ground water non potable. Gastrointestinal disorders are also founds. It may also have adverse effect on central nervous and cardio vascular system.

High nitrate concentrations have been observed in ground water at several places and ranges between below detection limit and 1050 mg/l. Around 59.64 % of samples have nitrate values within acceptable limit & remaining 40.36 % samples have nitrate value beyond permissible limit. i.e. 45 mg/l. Churu is worst effected (74.07 %) district have beyond permissible limit. More than 50% of samples of Nagaur (69.56 %), Barmer (60.97%), Jodhpur (58.82) , Sawaimadhopur & Bikaner (58.33 %) & ,Hanumangarh (52.38 %) , have nitrate above Permissible limit (45 mg/l). Dhaulpur , Jaipur , Karauli, Ajmer & Sikar districts having between 40 % to 50 % . Maximum value of nitrate as 1450 (mg/l) have been observed at Sahar1 in Karauli district and 1350 mg/l at Karsai in Karauli district . Distribution of Nitrate is shown in plate-10.

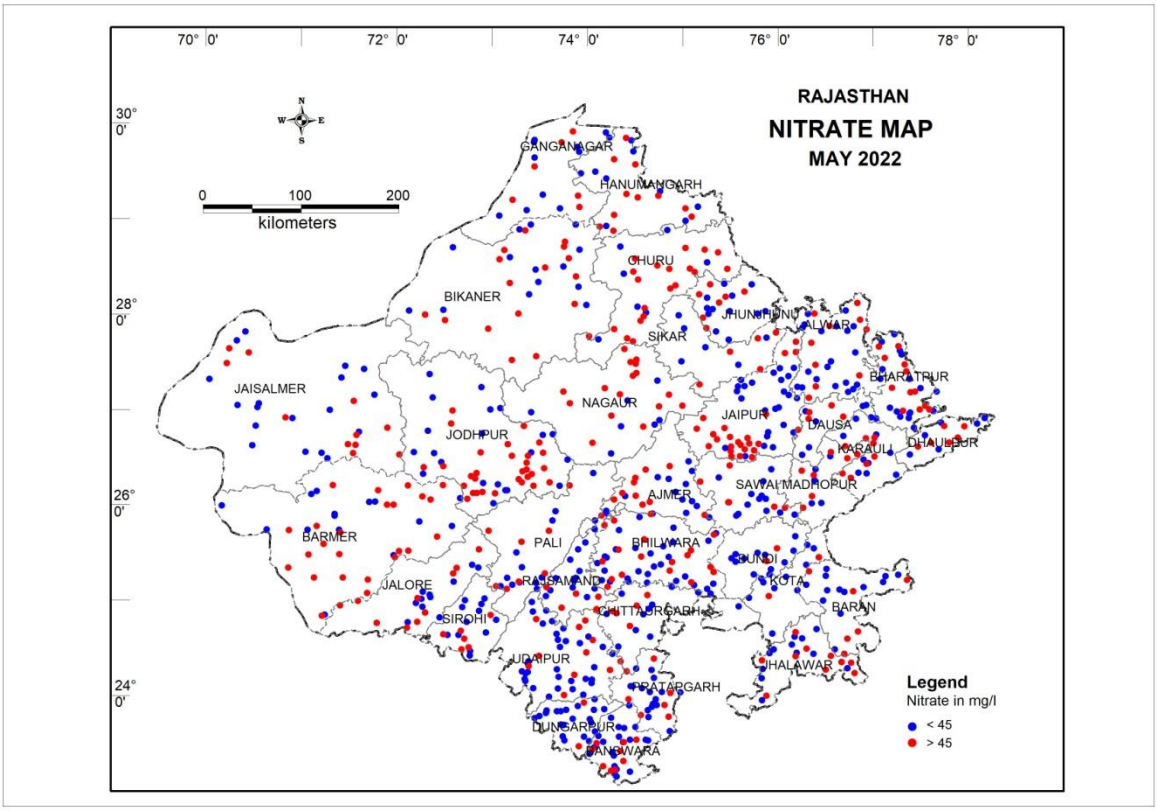

Plate-10 Distribution of Nitrate May 2022

Fluoride (F)

Fluoride is as inherent component of igneous rocks. The main sources of fluoride in natural water are Fluorite (CaF_2), Cryolite(Na_2AlF_2), Fluorapatite. In minerals like mica, amphiboles and topaz etc, the fluoride ions are bound on the mineral surfaces. Food in the diet is the major source of fluoride. Tea contains high fluoride concentration. Fluoride reduces dental carries, very high concentration may cause crippling skeletal fluorosis in human body. Less than 1.0 mg/l is essential. .

Fluoride(F) values higher than the BIS permissible limit (>1.5 mg/l) for drinking water, have been observed in western, north western, central areas and a few places lying in eastern and southern areas of the State, thus, making the ground water non-potable. The southern, south western and north-eastern areas in the State have a better ground water quality with respect to Fluoride as the concentrations at point locations are within permissible limit assigned by BIS(<1.5 mg/l).

Occurrence of high fluoride in the ground water is a great concern as 25.89 % of 809 ground water samples contain fluoride value beyond Permissible limits i.e. 1.5 mg/l, whereas, 55.71 % samples fall within acceptable limit.18.39 % samples fall between acceptable and permissible limit of Fluoride. The worst affected districts are Sawaimadhopur (58.33), Ganganagar (52.94%), Pali (52.63) Jalore (52.38%), Jodhpur (49.01%) , Bundi (46.15%) .Jaisalmer, Churu, Barmer , Bikaner , Tonk, Nagaur, Sirohi, Rajsamand, & Jhunjhunu districts are moderately affected with 26 % to 45.00% water samples having fluoride above 1.5 mg/l. In Baran, Chittaurgarh, Dhaulpur and Kota no sample beyond the permissible limit. Minimum value of fluoride has been observed 0.01 mg/l at Bhojasar in churu district & Ajitgarh in Sikar district. Highest values of fluoride (15.50 mg/l) have been observed at Dhawa Jodhpur , 15.3 mg/l at Sujangarh & 15.25 at Sardarshar in Churu district. Distribution of Fluoride in Ground Water of Rajasthan is shown in plate-11.

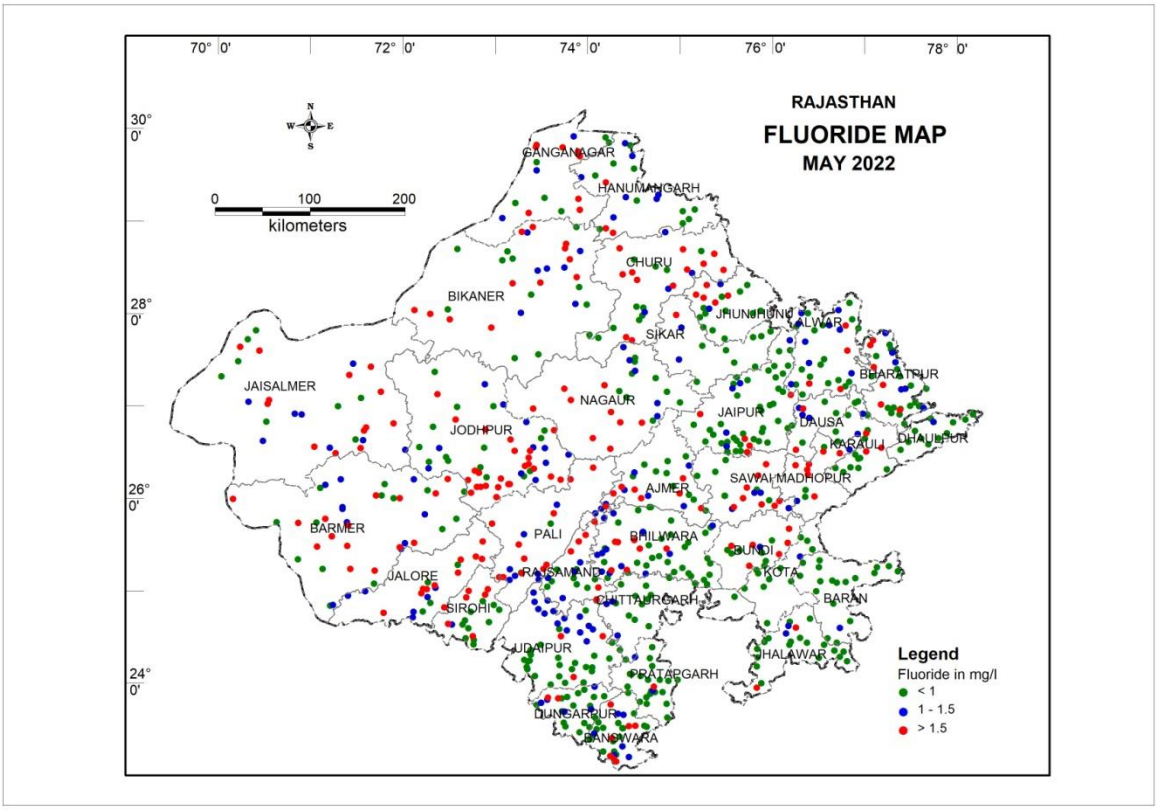

Plate-XI: Distribution of Fluoride May 2022

Total Hardness (TH)

It is primarily determined by sum of calcium and magnesium ions expressed as calcium carbonate. Other substances such as iron, manganese, aluminum, strontium, zinc may also contribute to a very small extent due to low solubility. An inverse correlation between hardness of water & cardiovascular diseases (Heart, hypertension and stroke) has been shown. High values may cause calcification of arteries, urinary concretions and stomach disorder.

Out of 809 samples analysed, 17.50 % samples are within Acceptable limit of 200 mg/ l for total hardness. 23.16 % samples have concentration beyond permissible limit while 59.34 % samples

fall within acceptable and permissible limits. Total hardness above 600 mg/l is found in Barmer (65.38%), Jodhpur (56.67%), Bharatpur & Dausa (50.00%), Nagaur (33.33%) districts have Total Hardness concentration beyond permissible limit. In Dungarpur, Jhunjhunu, & Pratapgarh districts none of samples have Total Hardness concentration beyond permissible limit. The minimum value of hardness as 50 mg/l has been found at Bhuhana in Jhunjhunu district. The maximum value 3600 mg/l has been observed at Khariakua_DW in Jaisalmer district**.**

Calcium (Ca)

It is always found in combination in limestone, marble and chalk. Its most common compounds are limestone, gypsum, fluorite; also calcium carbide, chloride, hypochlorite. Calcium is essential for human body. Its low content in soft water has been linked with rickets & defective teeth. Its excess may cause stones in kidney or bladder. Gout, Rheumatism etc. are also linked with its high concentration.

There is no cause of concern about the calcium hazard as only 6.18 % samples are beyond the permissible limit of 200 mg/l, 37.41 % samples are lies between acceptable & permissible limits of BIS. and 56.41 % samples are within acceptable limit of BIS. The minimum value of calcium has been observed as 4.0 mg/l at Kharbaro in Bikaner distric. Maximum value of 712 mg/l Karsai in Karauli district.

Magnesium (Mg)

It is never found as a free element. It constitutes a large deposit as magnesite & common rock forming dolomite. Presence of magnesium is beneficial for heart & nervous system. However higher concentrations have laxative and diuretic effect. Only 18.10 % of samples have magnesium concentration beyond permissible limit of 100 mg/l. 27.99% samples fall within Acceptable limit and 53.91 % samples are lies between acceptable & permissible limits of BIS. None of the sample in Pratapgarh & Dungarpur districts have magnesium value beyond permissible limit. Mg value beyond permissible limit is found in well water of Churu (55.55 %), Bharatpur (39.28 %), Nagaur (39.13%), Hanumangarh (33.33%) & Barmer (31.07 %) districts. The minimum value of Mg as 2.4 mg/l has been found at Loha in Churu and maximum value 632 mg/l at Khariakua_DW in in Jaisalmer district.

8.6.8 Trace Elements in Groundwater :

Trace elements are generally present in small concentration in natural water system. Their occurrence in groundwater and surface water can be due to natural sources such as dissolution of naturally occurring minerals containing trace elements in the soil zone or the aquifer material or to human activities such as mining, fuels, smelting of ores and improper disposal of industrial wastes.

Trace metals like Fe, Mn, Cu, Zn, Co, Ni etc are essential nutrients and are very important for the proper functioning of the biological system and their deficiency or excess in the human system can lead number of disorders. However, certain trace elements such as As, Cd, and Hg are not only biologically non essential but definitely toxic. In case of many heavy metals, bio-magnification occurs through food chain so are known to be identified to cause persistent environment contamination and toxic to most form of life.

Point locations withtrace elements above respective BIS drinking water permissibleLimit (IS 10500 : 2012) in groundwater Samples of Rajasthan State is depicted in Fig 12.

Arsenic:

Arsenic is generally distributed in more than 320 minerals, and it's commonly found in arsenopyrite (FeAsS), orpiment (As_2S_3), realgar (As_2S_2), and pyrite solid solutions (FeS_2). The major sources of arsenic in natural waters include arsenic minerals, together with a once widespread use of arsenic in wood preservatives, glass manufacture, electronics, catalysts, alloys, feed additives, veterinary chemicals, pigments, insecticides and herbicides. About 70% of all arsenic uses are in pesticides.

Arsenic can form both inorganic and organic compounds. It occurs with valence states of -3,0, +3 and +5, nevertheless, the valence states of -3 and 0 occur only rarely in nature. In sea water and surface water, arsenite and arsenate constitute the dominant species.

Geomaterials such as clays, carbonaceous materials, and oxides of iron, aluminum, and manganese are sediment components that may participate in adsorptive reactions with arsenic.As(III) is considered to be more toxic and more difficult to remove from water than As(V). Arsenic is found in low concentration, generally below the detection limit at many places. Its concentration is higher than 10 µg/l (BIS limit for drinking water) in 2.1% of the samples analysed and exteremly high value of 95.173 ppb is recorded at village Nimbornath in Pali district.

Cadmium

It is one of the rare elements in nature and it occurs at an average concentration of 0.2mg/Kg. It is found associated with zinc, copper, lead etc in mineral deposits and is released in the environment during mining and processing operations carried out for the extraction of these metals. The major sources of cadmium are effluents of industries involved with electroplating, copper and nickel alloys, paints, nickel-cadmium batteries etc. Fertilizers produced from phosphate ores constitute a major source of diffuse cadmium pollution. The solubility of cadmium in water is influenced to a large degree by its acidity; suspended or sediment-bound cadmium may dissolve when there is an increase in acidity (Ros & Slooff, 1987). In natural waters, cadmium is found mainly in bottom sediments and suspended particles (Friberg et al., 1986). BIS has recommended a concentration limit of 0.003mg/l (3.0µg/l) as maximum permissible level for drinking waterand excess intake may cause renal problem and hypertension. Cadmium is found in low concentration, generally below the detection limit at many places. At few places where it is recorded, its concentration is above the permissible limit of3.0µg/lin four

samples falling in Barmer, Jaisalmer and Udaipur districts, with very high value recorded at village Santara (71.035µg/l) inBarmer district.

Chromium

It occurs in ground water in trivalent (Cr^{3+}) and hexavalent state (Cr^{6+}). Cr^{3+} forms insoluble hydroxide at neutral pH and Cr^{6+} is soluble and toxic in nature. Chromium has tendency to get adsorbed by clays and sand as a result of which only a small amount of it goes to ground water. BIS has recommended 0.05mg/l as maximum permissible level for drinking purposes. Intake of water above this level may cause lung cancer, Coentaneous and nasal membrane ulcers and dermatitis. Chromium is found to be present in low concentration and within the permissible limit except at three locations, namely,Delunda(1.511 mg/l), Nathukabera(0.055 mg/l) and Binda (2.703 mg/l). These locations fall in Bundi, Jaisalmer and Jhalawar district.

Copper

The concentration of copper in water depends on pH, alkalinity and other anions in solution. It imparts colour and undesirable taste to drinking water. It is an essential element in human metabolism, but intake of excessively large doses may lead to severe mucosal irritation, renal damage and depression. It also enhances corrosion of aluminium and zinc utensils and fittings. BIS has recommended aacceptable limit of 0.05mg/l and in the absence of an alternate source of drinking water supplies, a maximum permissible limit of 1.5mg/l in drinking water.

Copper concentration in all samples is found well within the permissible limit of BIS. It ranges from less than detectable concentration to 0.080mg/l at Prithipura in district Pali.

Lead

It is a toxic constituent that accumulates in skeletal structure of man and animal. Naturally, lead occurs in the earth's crust at an average concentration of 16mg/Kg. In unpolluted waters, it has been found to be less than 10µg/l (Hem, 1970). In industrialized areas, the higher values have been recorded due to contamination with industrial effluents. The major source activities that can possibly contribute lead into the environment are weathering of rocks, use of lead compounds as insecticide, occurrence of lead as an impurity in fertilizers and/or soil amendments, smelting operations of lead ores, sulfide ores, Plumbing operations, waste effluents from industries such as paint, batteries, and tanneries and use of lead compounds as anti-knock agents in fuels used in automobiles. The maximum concentration of lead in drinking water has been set at 0.01mg/l (BIS 2012). The high concentration may result in loss of appetite, fatigue, irritation, headache,

vomiting, convulsion and death. Lead is found in significant number of well waters. It is found to range from below detection limit to exteremly high concentration at village Prithipura(409.24 mg/l) in Pali distirct. About 3.4% of the wells have recorded more than 0.01mg/l of lead. Such waters are found in parts of Baran, Barmer, Bhilwara, Bundi, Hanumangarh, Jaisalmer, Jhalawar and Kota. These waters are not suitable for consumption.

Iron

Iron is an essential nutrient for man, animal and plants. It occurs in ground water in both the ferrous (Fe^{2+}) and ferric (Fe^{3+}) state. Under reducing conditions in water, the mobile ferrous ion is present but upon exposure to air, it is oxidized to the less mobile form and gets precipitated as the ferric ion. In water, such iron precipitates produce reddish brown stains on porcelain, enamel, plumbing, and clothing. The solubility of iron increases with decreasing pH. Geogenically, it is derived from crystal weathering especially from minerals of igneous rocks and sulfide ores (pyrite, Fe_2S) but also from sedimentary and metamorphic rocks. Anthropogenically, industrial wastes, the burning of coke and coal, acid mine drainage, mineral processing and corrosion of iron and steel may contribute iron to environment. Atmospheric transport may provide as much as 0.05mg/L of iron in rainfall.

High concentration of iron in drinking water causes bitter-sweet astringent taste and inky flavour which is objectionable. The Bureau of Indian Standards, based on aesthetic and economic considerations, has given aacceptable limit of 1.0mg/l.

The concentration of iron in ground water of the State ranges from below detection level to 11.168 mg/l (Binda, district Jhalawar). Most of the shallow water samples have iron content within the acceptable limit of 1.0mg/l, only about 3.7% water wells recorded its concentration more than more than acceptable limit 1.0mg/l. Waters high in iron content are found in some parts of districts Churu, Dungarpur, Jaisalmer, ,Pratapgarh, Rajsamand and Udaipur. These waters are not suitable for domestic purpose.

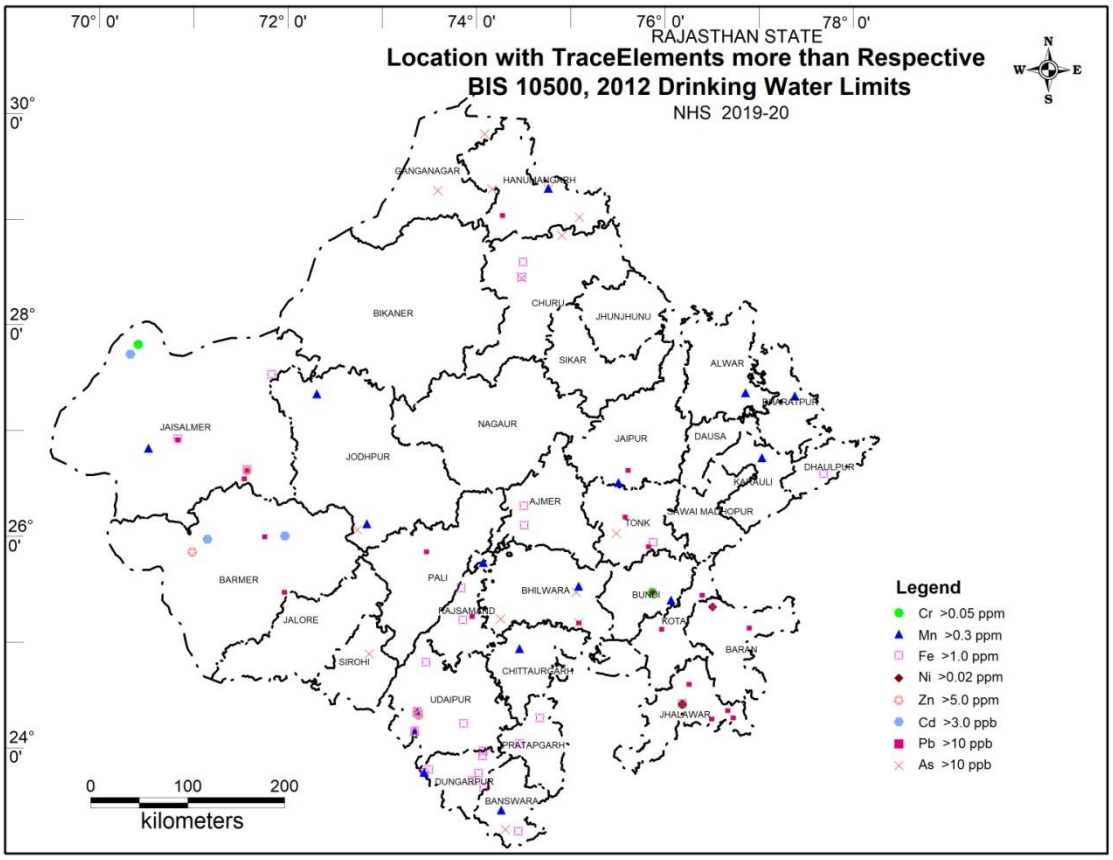

Plate-XII : Locations with Trace Elements more than respective BIS:10500, 2012 Drinking water Limits

Manganese

Manganese is similar to iron in its chemical behavior and is frequently found in association with iron. It may exist in the manganous (Mn^{2+}) form and is readily oxidized to the manganic (Mn^{4+}) form. Geogenically, soils and sediments are important sources of manganese along with metamorphic and sedimentary rocks. Minerals such as biotite mica and amphiboles contain large amounts of manganese. After plants die, the manganese that has accumulated within them is available for re-solution in runoff and in soil moisture. Anthropogenically, industrial wastes and acid-mine drainage are major sources of manganese to ground waters. Iron and steel plants also release manganese to the atmosphere. It is then deposited through atmospheric deposition. In areas where soils exhibit manganese deficiency, manganese is added to soils for proper plant growth. The solubility of manganese under aerobic environment and in the presence CO_2 cannot

be more than few micrograms per liter. However, when anaerobic conditions prevail, manganese content is likely to rise, as Mn^{2+} is quite stable under such circumstances. The probable reasons for manganese concentration beyond extended levels in observation well waters are

- Atmospheric deposition
- Anaerobic conditions caused by flooded irrigation and
- Organic matter from plant debris

Manganese, in small amounts, is an essential nutrient element for man, animals and for plant metabolism. The presence of substantial amounts of manganese is objectionable in laundry and textile processing because of staining qualities. The Bureau of Indian Standards has given aacceptable limit of 0.1mg/l that can be extended up to 0.3mg/l in absence of an alternative source for drinking water. Standards for manganese have been recommended on aesthetic and economic considerations.

The manganese is found to be present at many places though mostly in low concentrations. It ranges from below detection limit to 1.591mg/l. A few wells locatedin Ajmer, Alwar, Banswara, Baran, Bharatpur, Bhilwara, Churu, Hanumangarh, Jahalawar, Pratapgarh, Sawai Madhopur and Udaipur have manganese values within acceptable(0.1mg/l) and permissible(0.3mg/l)limitsof BIS for drinking water. Very highconcentration of Manganese are found at Sam(1.180 mg/l)in Jaisalmer district and Ratanpur(1.591 mg/l) in district Dungarpur. Isolated wells (2.4%) located in districts of Alwar, Banswara, Bharatpur, Bhilwara,Bundi, Chittaurgarg, Dungarpur, Hanumangarh, Jaipur, Jaisalmer, Jodhpur, Karauli, Rajasamand and Udaipur have been found to contain manganese above 0.30mg/l.

Nickle

Nickel is one of many trace metals widely distribute in the environment. It is present in the soil, water and air in deferent form. Nickel is essential element for plant in low concentration but high concentration is toxic. It is also toxic for human health. Nickel occurs predominantly as the ion $Ni(H_2O)_6^{2+}$ in natural waters at pH 5-9 . Nickel usually has two valence electrons, but oxidation states of +1, +3, or +4 may also exist.

Contamination of water due to nickel is generally associated with industrial activities. Its main anthropogenic sources in the environment are electroplating, steel production, Ni-Cd batteries and chemical industries etc. The discharge of industrial effluents containing nickel, storm water

run-off, sewage and sludge generation, fly ash from coal burning power plant, automobiles etc release significant amount of nickel to the environment. It can also enter the environment through natural processes like weathering of minerals and rocks, and geo-thermal emissions.

Though there is limited intestinal absorption of Nickel, it is considered a serious health hazard for persons exposed to various nickel compounds as they are at a significantly higher risk for cancer of the lungs,nasal cavity, kidney or prostate. Toxic effects like embryo toxic effect, allergic reactions, nephrotoxic effects and contact dermatitis may also manifest.BIS has formulated 0.02mg/l as acceptable limit for its concentration in the drinking water and no relaxation above this value.

In the study area, Nickle is found either below the detection level or in a very low amount at several places. However, it is found to be higher than 0.02 mg/l at Mangrol (0.029 mg/l) in Baradn district and Binda (0.866 mg/l) in Jhalawar district.

Selenium

Selenium is of special interest in different environmental fields due to its narrow range between beneficial and toxic effects. Se is an essential trace element with multiple positive functions like reducing the risk of cancer and cardiovascular diseases or enhancing the detoxification of heavy metal intake, but both low and excessive dietary intake could cause various health risks or disorders in humans and livestock. Plants, which are the main Se source for humans and animals, play a decisive role in this context due to their ability to transform inorganic species that are taken up from the soil into organic Se species that are mainly less toxic and more accessible.

Selenium (Se) is a micronutrient which is often called a “double-edged sword”1 due to its ambivalent nature with regard to human and animal health. Selenium is not an essential element for plant growth, but its concentration in fodder crops is important to animal health. It is also essential trace element, necessary for metabolism in humans and is required for growth of fibroblasts and other body cells, Its excess as well as deficiency causes specific signs and symptoms in humans and animals. On a global scale, Se deficiency is more widespread. Excessive consumption resulting in toxicity in humans has common symptoms in human beings as giddiness, lassitude, nervousness, mental depression, hair and nail loss and deformity, garlic odor in breath. Animals are affected more than humans as green fodder contains more Selenium as compared to grains/ 2 beans consumed by humans. In animals it can cause alkali diseases like alopecia, hoof deformity or stagger disease (visual difficulty, anaemia, liver damage, paralysis

and heart failure) Forms of selenium found in soils influence its mobility, uptake, and metabolism by plants. The major forms in alkaline, oxidizing environments which are available for plant uptake are selenium-VI as selenite and selenium-IV as selenite. High Se concentrations in water can be of concern if transferred to the soil-plant system via irrigation leading to toxic Se concentrations in food as reported in several cases worldwide. Selenium concentrations in soils are generally low with 0.01–2 mg kg −1 (average: 0.4 mg kg−1) but soils with highly elevated Se concentrations (>2–5000 mg kg−1), called seleniferous soils, are widely distributed throughout the world. Primarily, the Se concentration in soils is determined by its content in the parent rock as well as the topography and climate. Over time, however, deposition of seleniferous erosion material, poor drainage of soils, irrigation with Se containing water and input through mining operations, volcanic eruptions, precipitation, combustion of coal or petroleum can considerably overprint the background Se content in soils. Consequently, the Se distribution is usually heterogeneous and site specific.

BIS has formulated 0.01mg/l (10µg/l) as acceptable limit for its concentration in the drinking water and no relaxation above this value. Selenium concentration in well water of Rajasthan State is very low and ranged between below detection limit and 1.254 µg/l.

Silver- Silver mainly occurs in argenite and stephanite, from which it is released through weathering. In soils it is mainly present in sulphide minerals. Naturally occurring pure silver is extremely rare. Commonly known are applications in electronics, jewellery, coins and cutlery. Silver compounds play an important role in photo and film production, and are applied in developing chemicals. It serves as a catalyser in many chemical processes. Silver oxides are applied in batteryproduction.Colouring agents for food stuffs, preservatives and **disinfectants** may contain silver. It is generally a by-product of metal refinery, and may be recycled.The ^{110m}Ag isotope is applied in nuclear physics. Silver is a bactericide, and may therefore be applied in **water disinfection**. Seawater contains approximately 2-100 ppt of **silver**, and the surface concentration may be even lower. River water generally contains approximately 0.3-1 ppb of silver. Dissolved in water silver mainly occurs as Ag^+ (aq), and in seawater as $AgCl_2^-$ (aq). Silver is not a dietary requirement for humans. In larger amounts, some silver compounds may be toxic, because silver ions have a high affinity for sulphur hydryl and amino groups, and therefore complexation with amino acids, nucleic acids and other compounds occurs in the body. Silver that ends up in the body is generally deposited in connective tissue, skin and

eyes and causes a gray to black colouring. Intake of silver compounds may irritate the eyes, respiratory tract & skin and may also cause vomiting, dizziness and diarrhoea.

Silver was found to be below 0.10 mg/l (100µg/l), BIS guideline for drinking water, in all samples analysed

Zinc **-** Zinc occurs in traces in water because it normally forms sparingly soluble compounds and easily gets adsorbed on the sediments. It may be contributed to aquatic environment by calcareous sediments. The industrial effluents of metal plating, plumbing can also contribute it to ground water. It is also contributed by discharge from muncipal and industrial waste-water treatment plant. It is considered non- toxic but excessive intake may cause vomiting, dehydration, nausea and lethargy. Based on taste and appearance of water rather than toxicity, BIS has recommended the maximum acceptable limit of 5mg/l and maximum permissible limit of 15mg/l.

In Rajasthan state, it is found well within the maximum permissible limit with few exceptions. Zincbetween 5 mg/l and 15 mg/l is found at three locations, namely, Redana (7.101 mg/l) in Barmer district, Luna Kalan (5.861 mg/l) in Jaisalmer district and Garanwas (7.703 mg/l) in Udaipur district. Extremely high concentration of Zinc has been observed at Koliyari (33.63 mg/l) and Ghori Mari (29.884 mg/l) in Udaipur district. The concentration above 5mg/l may cause bitter taste to water.

Arsenic concentration above 0.10 mg/l(10µg/l). Pali, Bhilwara, Hanumangarh and Ganagnagar districts have few samples with high Arsenic but isolated cases have also been observed in Banswara, Churu, Jodhpur, Pali, Sirohi and Tonk districts. Well water with Cadmium concentration beyond 1.0 µg/l fall in Barmer, Churu and Jaiasalmer district. Isolated high values are also reported in Ajmer, Pali and Udaipur district. Chromium above 0.10 mg/l is reported at only two locations in the falling in Bundi district and Jhalawar district.Similarly, Iron above 5.0 mg/l is reported at only two locations falling in Jhalawar and Udaipur district.The isolated cases of high Manganese in groundwater in many districts are scattered all over the State.Locations with with Zinc concentration above 2.0 mg/l in groundwater fall in Barmer, Dungaarpur,Jaisalmer and Udaipur districts. Isolated cases ofgroundwater with high zinc have also been observed in Banswara, Chittaurgarh, Ganganagar and Rajasamand districts.Selenium and lead are found to be within respective recommended maximum limit for irrigation water.

Uranium (U) :

Uranium is a primordial and heaviest naturally occurring radioactive element that occurs in dispersed state in the earth's crust with an average concentration of 2–4 mg kg-1. The formation of uranium accumulations is a normal geological process in granites as well as in sedimentary rocks and the commonly occurs as uraninite (uranium oxide), autunite (a hydrated calcium uranium phosphate), brannerite (uranium calcium cerium titanium oxide) and carnotite (hydrated potassium uranium vanadate).

In groundwater, Uranium is present as a result of leaching from natural deposits, release from mill tailings, emission from the nuclear industry, contribution from fly ash and commonly present in lignite, monazite and phosphate rocks The migration and/or mixing of contaminant chemicals in the groundwater are put into motion by certain drivers. These drivers can be anthropogenic factors, such as drainage, irrigation, groundwater pumping, waste or wastewater disposal from industry. Natural uranium can also be released into the environment from various Anthropogenic or man-made activities such as the use of phosphate fertilizers, pesticides, combustion of coal in thermal power plants, mining, depleted uranium from the wars.

In general, most drinking water sources have radioactive contaminants at levels that are low enough to be considered a public health. However, elevated levels of Uranium in drinking water have been reported in many parts of the world including India. BIS has set drinking water standards for Uranium in drinking water at 30 µg/L while Atomic Energy Regulatory Board, India has prescribed the maximum limit of U in drinking water at 60 µg/L (ppb).

Out of 809 samples where Uranium concentration above 30 µg/l is observed in 24 districts out of 33 districts of Rajasthan state (13.72%). Most of locations in 11 districts where more than four locations where >30 ppb uranium were found namely Jodhpur , Jaipur, Nagaur, Tonk, Bikaner, Bharatpur, Ganganagar, Churu Jhunjhunu, Bhilwara, Dausa & remaining 13 districts having one to three locations where more than 30 ppb uranium were found namely Barmer, Hanumangarh, Karauli, Rajsamand, Swai Madhopur, Sikar, , Pali, Alwar, Banswara, Baran, Jalore Sirohi, Udaipur. But most of locations with concentration above 30 µg/l are found in Jodhpur , Jaipur, Nagaur, Tonk, Bikaner districts. Maximum value of uranium 450 ppb were found in one place in Sauwaipadampur (Barmer), Bhandu kalan (Jodhpur),Bagot (Nagaur) districts.

8.1.2.10 Types of water

Considering the predominance of the cation and anion in the chemical composition of ground water, its type is determined and its relation with its occurrence in an area as well as with its salinity is studied. It is found that no discernible relationship between type of water and its occurrence in any particular area could be established. Nearly all types of waters are available in each district of the State. However, study of relation of water type with salinity of the water clearly indicates that only 18% ground waters of the State are fresh with salinity and 59% of the ground waters having intermediate salinity. Amongst the anions Bicarbonate is predominant in 36% followed by chloride in 24% of the samples. At some isolated locations sulphate is found to be dominant anion.Sodium is predominant cation in 54% of the samples while Ca+Mg are predominant in only 9% samples. Generally mixed type of groundwater is found in the State as there is no clear dominance of particular ion.

8.1.2.11 Potability of Ground Water:

To assess the suitability of ground water for drinking purpose, district-wise percent distribution of groundwater samples according to BIS guidelines for acceptable and permissible criteria for each constituent is tabulated in Table 6 & 7.

On perusal of analysed data , it is observed that TDS, represented as E.C is higher than the BIS permissible limit in several districts, namely, Churu (74.07%), Jodhpur (68.62 %), Barmer (65.85 %), Jaisalmer (65.51) Nagaur (60.86%), Jalore (57.14 %) & Dausa (46.15%) samples indicative of highly saline groundwater. Similarly, districts with high percent of samples with chloride beyond permissible limit (1000mg/l) are In Churu (55.55 %), Jodhpur (52.94 %) , & Nagaur (43.47 %) districts . Minimum value of EC (180 µS/cm) was found at Bhuwana in Jhunjhunu and maximum value (24290.00 µS/cm at 25^0 C) at Kukunda in Jodhpur district. Distribution of electrical conductance in Ground Water of Rajasthan

Groundwater with with nitrate above 45 mg/l are found in Churu is worst effected (74.07 %) district have beyond permissible limit. More than 50% of samples of Nagaur (69.56 %), Barmer (60.97%), Jodhpur (58.82) , Sawaimadhopur & Bikaner (58.33 %) & ,Hanumangarh (52.38 %) , have nitrate above Permissible limit (45 mg/l). In general, Around 59.64 % of samples have nitrate values within acceptable limit .

Occurrence of high fluoride in the ground water is a great concern as 25.89 % of 809 ground water samples contain fluoride value beyond Permissible limits i.e. 1.5 mg/l or we can say the water is not fit for drinking purposes whereas, 55.71 % samples fall within acceptable limit.18.39 % samples fall between acceptable and permissible limit of Fluoride. The worst affected districts are Sawaimadhopur (58.33), Ganganagar (52.94%), Pali (52.63) Jalore (52.38%), Jodhpur (49.01%) , Bundi (46.15%) .Jaisalmer, Churu, Barmer , Bikaner , Tonk, Nagaur, Sirohi, Rajsamand, & Jhunjhunu districts are moderately affected with 26 % to 45.00% water samples having fluoride above 1.5 mg/l. In Baran, Chittaurgarh, Dhaulpur and Kota no sample beyond the permissible limit or we can say water is fit for drinking purposes.

17.50 % samples are within Acceptable limit of 200 mg/ l for total hardness. 23.16 % samples have concentration beyond permissible limit while 59.34 % samples fall within acceptable and permissible limits. Total hardness above 600 mg/l is found in Barmer (65.38%), Jodhpur (56.67%), Bharatpur & Dausa (50.00%), Nagaur (33.33%) districts have Total Hardness concentration beyond permissible limit. In Dungarpur, Jhunjhunu, & Pratapgarh districts none of samples have Total Hardness concentration beyond permissible limit.

Calcium is generally within permissible limit of 200mg/l. There is no cause of concern about the calcium hazard as only 6.18 % samples are beyond the permissible limit of 200 mg/l, 37.41 % samples are lies between acceptable & permissible limits of BIS. and 56.41 % samples are within acceptable limit of BIS

Out of 809 samples where Uranium concentration above 30 µg/l (Acceptable limit of BIS) is observed in 24 districts out of 33 districts of Rajasthan state (13.72%).

8.1.2.12. Scope for Irrigation

The suitability of ground water for irrigation is assessed based on EC, SAR and RSC values of waters. The diagram, suggested by USSL staff by taking EC and SAR into consideration is widely used for determining the irrigational classes of water. Salinity in terms of EC varies widely from 180 µS/cm at Buhana (Jhunjhunu) and maximum value of 242900 µS/cm observed at Kukunda district Jodhpur while SAR values range from 0.17 (Pajal tori,Baran district to 61.84 (Ramsar, district Barmer). Based on EC and SAR values, plot of USSL diagram indicates that most of the samples fall under C_2S_1, C_2S_2, C_3S_1, C_3S_2, C_4S_1, and C_4S_2 classes of irrigation water. Continuous use of such waters may lead to low to vary high salinity hazards, while they may not cause sodium hazards because of low SAR. The remaining of water samples having C_3S_3, C_3S_4, C_4S_3, C_4S_4, and classes may lead to salinity as well as sodium hazards when used for irrigation under normal practices

The ground waters in various districts falling in C_1, C_2, C_3 salinity and S_1-S_2 sodicity classes can be used for irrigation on soils with good permeability for growing salt tolerant or semi salt tolerant crops. Addition of small quantity of gypsum may improve the permeability of the soil and avoid the sodium hazards. Ground water within C_4S_1, C_4S_2, C_3S_3, C_3S_3, C_4S_2, C_4S_3 and C_4S_4 classes are not suitable for irrigation. Use of such waters for irrigation under normal conditions may lead to both high to very high salinity as well as sodium hazards.

Alkali hazards of irrigation ground waters are estimated through the computation of Residual sodium carbonate (RSC) also known as Eaton's Index. The values of RSC of ground waters are found to vary from below 0 to 22.0 meq/l (Pahari, district Bharatpur). A negative value indicates little risk of sodium accumulation due to offsetting levels of calcium an magnesium. A positive value indicate that the bicarbonate and carbonate will rescue free calcium and magnesium in the soil, thereby creating room for sodium to accumulate. Based on Eaton's index, it is found that 76.27% of the waters are rated fit, 5.31% marginal and the remaining 18.42% unfit for irrigational uses. The distribution of ground waters in various Eaton's index and irrigation rating based on USSL classification is given in Table 8.

Table 10 , District wise Irrigation Rating of Well Waters of Rajasthan-2022-23

S.No.	DISTRICT	No. of samples	IRRIGATION SUITABILITY			
			EATON's INDEX (RSC in meq/l)			USSL Classification
			Safe	Marginal	Unsafe	
			<1.25	1.25-2.5	>2.5	
1	AJMER	24	18	2	4	C2S1,C3S1,C3S2,CSS3,C4S2,C4S3,C4S4
2	ALWAR	31	22	2	7	C2S1,C3S1,C3S2,C4S1,C4S3,C4S4
3	BANSWARA	31	26	4	1	C2S1,C3S1
4	BARAN	19	19	0	0	C2S1,C3S1,C3S2,C4S1,C4S2,C4S4
5	BARMER	41	37	0	4	C2S1,C3S1,C3S2,C3S3,C4S2,C4S3,C4S4
6	BHARATPUR	28	21	1	6	C2S1,C3S1,C3S2,C4S2,C4S3,C4S4
7	BHILWARA	48	44	2	2	C3S1,C3S1,C3S2,C3S3,C4S1,C4S2,C4S3,C4S4
8	BIKANER	30	13	2	15	C2S1,C3S2,C4S2.C4S4
9	BUNDI	13	6	0	7	C1S1,C2S1,C3S1,C3S2,C4S2,C4S4
10	CHITTAURGARH	18	16	1	1	C2S1,C3S1,C3S2,C4S1,C4S2
11	CHURU	27	17	1	9	C2S1,C3S2,C3S3,C3S4,C4S2,C4S3,C4S4
12	DAUSA	13	8	1	4	C4S3,C4S4
13	DHAULPUR	12	6	1	5	C2S1,C3S1,C3S2
14	DUNGARPUR	24	24	0	0	C2S1,C3S1,C4S1
15	GANGANAGAR	17	13	1	3	C2S1,C3S1,C3S2,C4S2,C4S4
16	HANUMANGARH	21	17	2	2	C2S1,C3S1,C3S2,C3S3,C4S2,C4S3,C4S4
17	JAIPUR	48	32	6	10	C2S1,C3S1,C3S2,C4S2,C4S3,C4S4
18	JAISALMER	29	25	1	3	C2S1,C3S1,C3S2,C4S2,C4S3,C4S4
19	JALORE	21	17		4	C2S2,C4S3,C4S4
20	JHALAWAR	23	19	3	1	C2S1,C3S1,C3S2,C4S3
21	JHUNJHUNU	19	6	1	12	C2S1,C3S1,C3S2
22	JODHPUR	51	40	3	8	C2S1,C3S1,C3S2,C4S3,C4S4
23	KARAULI	17	12	2	3	C2S1,C3S1,C4S2,C4S3,C4S4
24	KOTA	14	10		4	C2S1,C3S1,C3S2,C4S2,C4S3
25	NAGAUR	23	15	3	5	C2S1,C3S2,C3S3,C4S3,C4S4
26	PALI	19	12	0	7	C3S1,C3S2,C4S2,C4S4
27	PRATAPGARH	22	21	0	1	C2S1,C3S1,C3S2
28	RAJSAMAND	20	19	0	1	C3S1,C3S2,C4S2,C4S3,C4S4
29	SAWAI MADHOPUR	12	4	1	7	C2S1,C3S1,C3S2,C3S3,C3S4,C4S1,C4S2,C4S4
30	SIKAR	11	7	0	4	C2S1,C3S1,C3S2,C4S1,C4S2,C4S3
31	SIROHI	19	19	0	0	C3S1,C3S2,C3S4,C4S3,C4S4
32	TONK	20	9	2	9	C2S1,C3S1,C3S2,C4S1,C4S3,C4S4
33	UDAIPUR	44	43	1	0	C3S1,C3S2,C3S3,C4S2,C4S3,C4S4
		809	617	43	149	

8.2 GROUNDWATER CHEMICAL QUALITY STUDIES IN URBAN CLUSTERS

Central Pollution Control Board (CPCB) in association with Indian Institute of Technology (IIT), New Delhi had recently carried out an environmental assessment of industrial clusters across the country based on Comprehensive Environmental Pollution Index (CEPI) with the aim of identifying polluted industrial clusters and prioritizing planning needs for interventions to improve the quality of environment in these industrial clusters and the nation as a whole. In the background of this, to evaluate the intensity of industrial pollution and its impact on ground water quality, sudies in four Urban Industrial Clusters have been taken up in the areas notified by the CPCB as critical areas. These industrial areas are Bhiwari Industrial Cluster, Alwar District, Jodhpur Urban Industrial Cluster, Pali Urban Industrial Cluster and Jaipur Urban Industrial Cluster of Sanganer area.

8.2.1 Pali Urban Industrial Cluster study 2021:

Groundwater of the south west part of cluster is alkaline in nature and medium to highsalinity category. In the study area higher values of EC (>3000 µS/cm) have been observed inSouth west part of cluster and ranges of electrical conductivity varies from 395 µS/cm to 14200µS/cm. Higher values of Chloride have been observed in all through Western-central partindustrial cluster area, more than 22% samples have nitrate values beyond permissible limit inthe cluster area.High Nitrate has also been observed in cluster area due to unsystematicdisposal of faecal, domestic waste, Industrial waste and lack of proper sewerage system. Mostof the industrial cluster part is fluoride affected. High value of Fluoride (11 mg/l) has beenobserved fromSh Mohan, Bambhali Road, From RIICO Phase II to Pali City in industrialcluster, The value of total hardness **54.55%** samples have been observed beyond permissiblelimit (600 mg/l). In general, violation of drinking water standards in respect of conductivity,Fluoride, Sulphate,total hardnesshave been observed.The heavy metalresultsofanalysedwater samples indicate theirpresence in small amounts with few exceptions. Eight samples(28.57 %) in out of 28 analysed samples have lead concentration are beyond the permissiblelimit (.01ppm) and in two samples were Nickel concentration beyond the acceptable limit.

The concentrations of Uranium in water samples of study area having uranium content below the BIS limit of i.e 30 µg/l in drinking water. The concentrations of Arsenic in water

samplesof study area, all the water samples having the concentration of Arsenic within the *permissible limit of BIS(50ppb) indrinking water.*

Piper diagram, **it reveals that most of the water samples are having Sodium-Chloride (Na-Cl) or mixed type of chemical character**. The assessment of the groundwater quality forirrigational use is carried out based on different criteria and reveals that **quality assessment of water for irrigation uses show that the ground water is good to permissible quality**.However, **high values of salinity and residual sodium carbonate (RSC) at certain sitesrestrictitssuitabilityforagricultureuses**.
pollution in the groundwater which may be due to industrial activities in the area.

8.2.2 Jaipur Urban Industrial Cluster of Sanganer Area :

The study (2016)area comprises of Jaipur industrial Cluster covering parts of Sanganer (45.5%), Jhotwara (42.5%) and Amer (12%) blocks. Ground water quality of Jaipur industrial Cluster has been studied based on 76 water samples for general analysis & 44 water samples for heavy metal analysis. Ground water quality has been studied with reference to pH, EC, Alkalinity, Chloride, Sulphate, Nitrate, Total Hardness, Fluoride Calcium, Magnesium , Sodium, Potassium, TDS & Heavy Metals.

Fluoride concentration in Jaipur urban cluster has been found to be in the range of 0.02-6.64. The minimum value of fluoride has been observed in a sample from a T/W at RIICO, Mansarovar. It is evident from chemical analysis data that fluoride concentration in 23 samples is beyond the permissible limit of 1.5 mg/l and 16 samples have fluoride values between desirable and permissible limit (1 – 1.5 mg/l). Remaining 34 samples have fluoride concentration within the desirable limit (<1.0 mg/l).Sanganer town is famous for specific cloth print design for which vegetable dyes were being used during earlier days. However, because of considerably lower cost of the organic (chemical) dyes, the same are preferred and are now being used extensively by the dyeing and printing industry.Voluminous liquid wastes are generated by dying and printing industry and disposed off in carrier channels (canals). In addition, some industrial units are also pouring their effluents into the Amnishah Nala. These liquid wastes are also being used for irrigation purposes. The unused part of effluent water gets accumulate near a bandh, which was built for impounding rain water.

High fluoride value obtained in the canal water flowing from Sanganer towards Goner, Bilwa, Mohanpura, Ramchandrapura, Bala ka nangal, Nevta etc. might be on account of fluoride in the raw water being used by the industry. The dyes being used by the industry contain very high fluoride and where huge quantity of such dyes is discharged as effluent, water in the canal gets enriched with fluoride. Intake of high fluoride at 1.5 to 2 ppm is known to cause dental fluorosis. Still higher concentration (>5 ppm) of fluoride may eventally lead to crippling or skeletal fluorosis, which can affect young and old alike. Plate (VI) shows values of fluoride in Jaipur industrial Cluster.

The **Nitrate** concentration in ground water of Jaipur industrial Cluster has been found to be in the range of 0-417 mg/l. Groundwater in most of the area along banks of main drain Amanishah nala is affected with high nitrate values than Permissible limit of (45 mg/l) and the dense concentration of nitrate can be observed from plate – towards the tail end of the drainage.

Leakage and seepage from sewerage system and soak pits is the chief source of contamination of the ground water by nitrate. The most of the study area is now connected with the severage system except newly developing colonies.The source of nitrate is exposed unlined effluent/sewerage carrying drains passing the periphery of the walled city, starting from Suraj Pole to Ghat Gate, Sanjay Bazaar, Bapu Bazaar, Nehru Bazaar, Indira Bazaar, Jayanti Market, 'C' Scheme, Jyoti Nagar etc. and falling into the main Amanishah Nala at Gopal Nagar- Gopal pura road to culvert near Mansarovar and the drains of other areas like vidhyadharnagar, vaishalinagar, mansarovar, Sanganer & their adjoining colonies also contribute to severage system. Higher concentration of Nitrate causes ‘Methemoglobinemia’ disease in bottle fed infants (3 months old). Gastrointestinal disorders are also founds. It may also have adverse effect on central nervous and cardio vascular system.

Plate-XIII : **Photograph showing pumping of industrial waste & sewerage water for agriculture use at Sanganer.**

Once the **Chloride** is dissolved in water, it is very difficult to be removed through natural processes owing to its high solubility. Hence concentration of Chloride in natural water continues to rise, particularly in the arid regions because the carbonates and the sulphates precipitate out, depending upon their saturation points and intensity of evaporation. Chloride concentration in natural waters is therefore highly variable over wide ranges. All the ground water samples have been found to have chloride concentration within the maximum permissible limit (1000 ppm) except at four places.

In drinking water, primarily inorganic salts with small concentration of organic matter constitute **Total dissolved solids(TDS)**. Major contribution of TDS in ground water is from natural contact with rocks and soils with minor contribution from anthropogenic sources. It has been observed from chemical analysis data that 15 samples have TDS value beyond permissible limit (2000 mg/l), 49 samples have TDS values between desirable and permissible limits (500–2000 mg/l) and 9 samples have TDS content within desirable limit of 500 mg/l. The minimum value of TDS (65 mg/l) has been found at Machwan T/W and maximum value (7677 mg/l) has been reported from Bala ki Nangal HP. The dense concentration of nitrate can be observed towards the tail end of the drainage.The chemical analysis data show that Calcium & Magnesium content value are between desirable and permissible limits and only few samples have calcium &

Magnesium value beyond permissible limit. The other parameter like pH, Alkalinity, were observed with in permissible limit.

In order to ascertain the industrial pollution in the area, 43 samples were collected from ground water/ effluent/dam /nalla and were analysed for **heavy metals Zn, Cu, Ni, Cd, Mn, Fe & Pb**.. The results reveal that most of the constituents in ground water are within the permissible limit **except Iron, Lead Nickel & Cadmium.**

Plate-XIV : Photograph showing washing point of cloth industry at Sanganer & resultant effluent.

The study clearly indicates that improper solid waste management, sewerage system and disposal of industrial effluents has affected the ground water quality in the area.

Hydrogeological data of the area has indicated many major geo-environmental problems related to ground water regime i.e. general depletion of water levels, ground water quality, industrial pollution, which deserve timely attention to avoid any adversity. The comparative

study of long term resource estimates shows increase in percentage of ground water development.

The withdrawal of Ground water by unauthorized people and illegal water supply through water tankers from the “Stressed Aquifer” should be regulated and minimized to reduce ground water depletion.

8.2.3 Bhiwari Industrial Cluster, Alwar District:

A total of '42' groundwater samples from Bhiwari Urban Industrial Cluster representing mixed type of industries have been collected and analysed. In the area studied concentration of Zinc (Zn) ranges from 0.0001 to 2.60 ppm, , Copper (Cu) 0.0118 to 0.1994 ppm, Nickel (Ni) 0.0001 to 0.027 ppm, Chromium (Cr) 0.0005 to 0.1528 ppm, Cadmium (Cd) 0.0009 to 0.0064 ppm , Manganese (Mn) 0.0014 to 0.2197 ppm, Iron (Fe) 0.0618 to 3.50 ppm & Lead (Pb) 0.0043 to 0.0727 ppm.

The study reveals that concentration of only Zinc (Zn) in the groundwater of these areas is within the desirable limit. Concentration of Copper (Cu) is within desirable limit only in 16.67 % samples (7, samples), whereas it is beyond desirable limit, but less than the maximum permissible limit in 83.33 % samples (35, samples). Concentration of Iron (Fe) is within desirable limit in 66.67 % samples (28, samples) and it is beyond desirable limit but less than the maximum permissible limit in 4.76 % samples (2, samples) and beyond maximum permissible limit in 28.57 % samples (12, samples). Concentration of Lead (Pb) is within desirable limit only in 14.29 % samples (6, samples) and it is beyond desirable limit (no relaxation) in 85.71 % samples (36, samples). Concentration of Cadmium (Cd) is within desirable limit in 78.57 % samples (33, samples) and it is beyond desirable limit (no relaxation) in 21.43 % samples (9, samples). Concentration of Manganese (Mn) is within desirable limit in 85.71 % samples (36, samples) and it is beyond desirable limit but less than the maximum permissible limit in 14.29 % samples (6, samples). Concentration of Chromium (Cr) is within desirable limit in 95.24 % samples (40, samples) and it is beyond desirable limit (no relaxation) in 4.76 % samples (2, samples). Concentration of Nickel (Ni) is within desirable limit in 97.62 % samples (41, samples) and it is beyond desirable limit (no relaxation) in 2.38 % samples (one sample). There is need of future surveillance on account of level of Pb, Cd, Fe, Cu & Mn pollution in the groundwater which may be due to industrial activities in the area.

8.2.4 Jodhpur Urban Industrial Cluster study 2021 **:**

Many industrial units in the Jodhpur industrial cluster have installed tube wells in their premises for exploration of ground water. There is a common effluent treatment plant installed in Basni industrial area. The industrial effluent after treatment is discharged in Jojari River. Jodhpur city's domestic waste water is drained out through main sewerage system towards Nandri area, Jodhpur airport side and near polytechnic institute, which has disposal outlet to the Jojari River. Of these only Nandri site has an organized sewage treatment plant. Sewage from Nandri after treatment and untreated sewage from other two sites is directly discharged in to Jojari River.

The Chemical analysis of samples collected during the course of study shows that urban and industrial areas have naturally high EC values. The formations have low transmissivity, hence less flushing causing rise in the TDS and EC values of ground water. High values of chloride, sulphate, nitrate and calcium have been observed in the urban and industrial areas. The nitrate concentrate has been found higher than 45 mg/l (maximum permissible limit) in most part of study area indicating pollution due to disposal of untreated sewage water or non availability of sewerage system and leakages from sewerage system. Industrial effluent and use of fertilizers may also cause nitrate pollution locally.

Heavy metal chemical analysis of ground water samples shows that few instructions of lead contamination have been observed. Copper contnent has been found to be within the desirable and maximum permissible limits. No other heavy metal contamination has been observed in the area. Sporadic instances of high manganese, chromium and cadmium have also been observed.

9.0 : CONCLUSION AND RECOMMENDATIONS:

The chemical quality of ground water in the state exhibits considerable variation from place to place depending upon the hydrogeology, environment, rain-fall and agricultural activity. Impact of disposable industrial waste in an unsystematic manner without pre-treatment is causing deterioration of ground water quality. Also due to over exploitation of ground water of fresh water zone the water quality has deteriorated.

Out of 809 water samples analysed, 11.07 % samples have EC values less than 750 µS/cm, 32.56 % between 750 & 1500 µS/cm, 28.88 % between 1500 & 3000 µS/cm and 27.50 % samples have more than 3000 µS/cm at 25^0 C in the districts of Churu (74.07%), Jodhpur (68.62 %), Barmer (65.85 %), Jaisalmer (65.51) Nagaur (60.86%), Jalore (57.14 %) & Dausa (46.15%) samples have EC values in water. None of the sample shows chloride value beyond permissible limit in Baran, Dungarpur, Jhalawar, Kota, Rajsamand Pratapgarh & Tonk districts.Most of samples due to aridity western part of Rajasthan districts like Jaisalmer Barmer, Nagaur , Churu and Jalore where EC is greater than 5000 µS/cm.

High nitrate has also been observed in most of the districts due to unsystematic disposal of faecal and domestic waste and lack of proper sewerage system. High fluoride concentration hazards prevail in majority of the districts. High nitrate concentrations have been observed in ground water at several places and ranges between below detection limit and 1050 mg/l. Around 59.64 % of samples have nitrate values within acceptable limit & remaining 40.36 % samples have nitrate value beyond permissible limit. i.e. 45 mg/l. Churu is worst effected (74.07 %) district have beyond permissible limit. Occurrence of high fluoride in the ground water is a great concern as 25.89 % of 809 ground water samples contain fluoride value beyond Permissible limits i.e. 1.5 mg/l, whereas, 55.71 % samples fall within acceptable limit.18.39 % samples fall between acceptable and permissible limit of Fluoride. The worst affected districts are Sawaimadhopur (58.33), Ganganagar (52.94%), Pali (52.63) Jalore (52.38%), Jodhpur (49.01%) , Bundi (46.15%) .Jaisalmer, Churu, Barmer , Bikaner , Tonk, Nagaur, Sirohi, Rajsamand, & Jhunjhunu districts are moderately affected with 26 % to 45.00% water samples having fluoride above 1.5 mg/l. In Baran, Chittaurgarh, Dhaulpur and Kota no sample beyond the permissible limit.

Out of 809 samples analysed, 17.50 % samples are within Acceptable limit of 200 mg/ l for total hardness. 23.16 % samples have concentration beyond permissible limit while 59.34 % samples fall within acceptable and permissible limits.

In the State, no specific trend for concentration of particular trace element in groundwater is observed. However, arsenic, chromium, cadmium, magnese, Iron, lead and Zinc are within drinking water limits in Bikaner, Dausa, Jalore, Jhunjhunu, Sikar and Swai Madhpur districts. Rest of the districts have isolated locations with one or more trace element above respective BIS drinking water permissible limit with southern and south eastern districts being more affected. Copper, Silver and selenium are in very low concentration in entire State.

Uranium concentration above 30 µg/l is observed in 24 districts out of 33 districts of Rajasthan state (13.72%). Most of locations in 11 districts where more than four locations where >30 ppb uranium were found & remaining 13 districts having one to three locations where more than 30 ppb uranium were found. Maximum value of uranium 450 ppb were found in one place in Barmer, Jodhpur Nagaur districts.

Arsenic concentration above 0.10 mg/l(10µg/l). Pali, Bhilwara, Hanumangarh and Ganagnagar districts have few samples with high Arsenic but isolated cases have also been observed in Banswara, Churu, Jodhpur, Pali, Sirohi and Tonk districts.Well water with Cadmium concentration beyond 1.0 µg/l fall in Barmer, Churu and Jaiasalmer district. Isolated high values are also reported in Ajmer, Pali and Udaipur district. Chromium above 0.10 mg/l is reported at only two locations in the falling in Bundi district and Jhalawar district.Similarly, Iron above 5.0 mg/l is reported at only two locations falling in Jhalawar and Udaipur district.The isolated cases of high Manganese in groundwater in many districts are scattered all over the State.Locations with with Zinc concentration above 2.0 mg/l in groundwater fall in Barmer, Dungaarpur,Jaisalmer and Udaipur districts. Isolated cases ofgroundwater with high zinc have also been observed in Banswara, Chittaurgarh, Ganganagar and Rajasamand districts.Selenium and lead are found to be within respective recommended maximum limit for irrigation water.

Based on EC and SAR values, plot of USSL diagram indicates that most of the samples fall under C_2S_1, C_2S_2, C_3S_1, C_3S_2, C_4S_1, and C_4S_2 classes of irrigation water. Continuous use of such waters may lead to low to vary high salinity hazards, while they may not cause sodium hazards because of low SAR. The remaining of water samples having C_3S_3, C_3S_4, C_4S_3, C_4S_4, and

classes may lead to salinity as well as sodium hazards when used for irrigation under normal practices

The values of RSC of ground waters are found to vary from below 0 to 22.0 meq/l . Based on Eaton's index, it is found that 76.27% of the waters are rated fit, 5.31% marginal and the remaining 18.42% unfit for irrigational uses.

There is progressive increase in ground water draft due to increasing population, urbanization and industrialisation. Any further increase in the draft will aggravate the already worsened situation of declining water levels and/or degrading water quality in some areas.Contamination in ground water may be due to industrial and sewage disposal activities. The ground water development in such areas therefore needs to be regulated through suitable measures to provide sustainability and protection to ground water reservoir.

An unsystematic release of industrial waste without pre-disposal treatment is causing deterioration of ground water quality. For Urgent measures including awareness and if need be, punitive action may have to be taken up to stop further degradation in the quality.

Instances of growing levels of nitrates in ground water are noticed due to haphazard disposal of wastes, particularly faecal disposals in urban areas. Educating public regarding the maintenance of hygiene and installation of organized sewerage system are the need of the hour to reduce these hazards. Large scale artificial recharge of aquifers is need of the hour for improvement of water quality. Ground Water once polluted become difficult and cost extensive for remediation. For this Ground Water resource should be protected from pollution through various measures such as water quality monitoring and survilance development of water quality testing Infrastructure, Research & Development, awareness and capacity building of stake holders etc. Ground water recharge measures are also important for improvement of ground water quality through dilution effect.

Ground water development is a 'People's programme'. Therefore, education and involvement of people in its management projects including development, conservation, protection and augmentation will be the prime requisite to protect resource against quality degradation and guarantee quality assurance.

Artificial recharge of ground water by arresting storm water run-off during monsoon seasons should be the policy directive in all areas with ground water draft more than 90% of the assessed replenishable resource or areas where decline, either in the pre monsoon or post

monsoon water levels is observed or the areas where adequate storage capacity is available. The following specific measures will improve the situation and help lessen the stress on the system.

- Paving of surface for providing civic amenities in the towns & cities has led to reduced infiltration and increased run-off during the rainy season. Rainwater harvesting structures should therefore be constructed to intercept and recharge the roof-top run-off from individual house-holds in feasible areas. Local municipal bodies should encourage such a provision.

- Concurrent with the above measures the work of impounding and recharging the storm water run-off from other sources may be adopted. Suitable locations in nalas & gullies should be utilised for the construction of check-dams, sub-surface dams, ponds etc. for ensuring stagnation of water & thus its infiltration underground for augmenting ground water storage. Such structures must be located and designed keeping in full view Geology, Geomorphology and Hydrogeological set-up prevailing in the area.

- Re-use and recycling of urban wastewater should receive added attention of municipal bodies. The liquid urban wastes can be recycled through aquifers to improve their quality and pumped out for reuse particularly for irrigation. It shall however, be essential to ensure that urban & industrial wastes are not inter-mixed. Where such a situation exists, the industrial wastes must be treated before disposal to remove the toxic elements. After primary treatment the liquid urban wastes can also be used for direct irrigation in suitable areas. It will reduce the dependence on ground water to some extent and shall also ensure conservation and use of the wastewater, which is otherwise lost to evaporation.

- To reduce dependence of ground water, measures aimed at affecting economy in water use be implemented. These could include installation of new small capacity cisterns in toilets and other household means of saving water, use of improved irrigation systems like sprinkler and drip, etc. Wherever feasible, metering of water and charging of economic costs, relocating high water-use industries to surplus water available areas, etc. should be undertaken.

- Instances of growing levels of nitrates in ground water are noticed due to haphazard disposal of wastes, particularly faecal disposals in urban areas. Educating public regarding the maintenance of hygiene and installation of organized sewerage system are the need of the hour to reduce these hazards.
- Disposal of solid wastes in natural or man-made depressions without adequate scientific considerations is bound to pollute ground water in due course. As a measure of precaution, it is therefore essential that solid wastes from major cities and towns should be disposedoff in scientifically located and designed sites/ structures for recycling and reuse. Detailed investigations to locate such sites must be initiated urgently.
- An unsystematic release of industrial waste without pre-disposal treatment is causing deterioration of ground water quality. For example, in Jaipur, the liquid waste from the cloth printing & dyeing industry is leading to an increase in fluoride content in ground water. Urgent measures including awareness and if need be, punitive action may have to be taken up to stop further degradation in the quality. Also, Ground water pollution has become a serious problem due to dyeing & printing industry in Balotra, texture industry in Pali and dyeing & processing industry in Bhilwara areas. Central Ground Water Authority and Pollution Control Boards may consider suitable actions, both preventive and remedial, and drawing up of long-term plans in this regard.
- Since ground water abstraction structures are individually owned, operated and managed, it is difficult to have an account of ground water abstraction by volume. Voluntary registration of structures needs to be encouraged so as to obviate the requirement for enactment and enforcement of any legal measures.
- Whereas restrictions must be laid on the construction and energization of individually owned structures for drinking and domestic use with a view to avoid wastage of water, but also, adequate supply from municipal water supply system shall have to be ensured in such areas. Also, Ground water markets will have to be regulated.
- Keeping in view rapidly declining ground wate trend, Public Interaction Programme is being organized on priority in NAQUIM areas since Ground water development is a ‘People’s

programme’. Therefore, education and involvement of people in its management projects including development, conservation, protection and augmentation will be the prime requisite to protect resource against quality degradation and guarantee quality assurance. Mass awareness programmes aimed at educating the users regarding the adverse effects of over-exploitation of ground water on its quality & quantity, economic and efficient use of water, voluntary regulation of abstraction, etc. will ensure utilisation of the resource at optimal levels.

DISTRICT WISE MINIMUM AND MAXIMUM VALUES OF VARIOUS CHEMICAL CONSTITUENTS, PRE-MONSOON, 2022 Annexure-i

S. No.	DISTRICT	Samples analysed	pH		EC		Cl		SO4		NO3		TH		Ca		Mg		F		TDS	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1	AJMER	24	7.62	8.14	720	3520	64	610	30	483	2.30	239	130	720	20	108	14.59	109.44	0.02	2.10	468	2288
2	ALWAR	31	7.14	8.28	450	7900	35	2056	1	1505	1.00	850	130	2080	24	244	7.30	389.12	0.10	6.60	293	5135
3	BANSWARA	31	7.32	8.45	395	4250	7	1312	10	320	1.00	302	100	1000	16	160	14.59	145.92	0.02	2.97	257	2763
4	BARAN	19	7.34	8.02	400	2480	14	418	5	724	1.70	330	180	990	32	304	9.73	131.33	0.22	1.00	260	1612
5	BARMER	41	7.19	8.41	550	22750	50	3793	28	5888	1.00	392	150	2450	24	520	12.16	376.96	0.13	3.63	358	14788
6	BHARATPUR	28	7.46	8.33	570	11840	14	3829	5	958	1.00	320	120	2920	16	456	17.02	437.76	0.10	5.80	371	7696
7	BHILWARA	48	7.02	8.24	390	7000	34	2056	20	1632	1.06	287	110	1680	20	320	14.59	252.93	0.01	2.63	254	4550
8	BIKANER	30	7.50	8.50	550	17320	50	5885	20	1302	1.00	480	50	2100	4	380	4.86	304.00	0.10	13.50	358	11258
9	BUNDI	13	7.42	8.26	415	3500	28	560	5	572	1.00	227	70	910	16	120	7.30	179.97	0.37	3.00	270	2275
10	CHITTAURGARH	18	7.07	8.28	450	3590	28	538	1	485	1.02	266	160	830	36	152	9.73	133.76	0.13	1.49	293	2334
11	CHURU	27	7.42	8.88	795	14000	14	3829	20	1450	12.70	950	90	2020	12	408	2.43	403.71	0.01	15.30	517	9100
12	DAUSA	13	7.57	8.43	770	6250	50	1524	12	766	2.00	200	160	1380	24	152	4.86	252.93	0.12	3.40	501	4063
13	DHAULPUR	12	7.52	8.25	320	3240	21	730	7	414	1.00	240	150	1210	32	236	9.73	150.78	0.01	1.45	208	2106
14	DUNGARPUR	24	7.46	8.14	630	2360	35	475	18	288	1.00	132	210	480	36	96	21.89	68.10	0.03	2.44	410	1534
15	GANGANAGAR	17	7.51	8.28	350	8075	35	922	6	2556	2.00	288	150	1630	16	384	4.86	162.94	0.20	4.38	228	5249
16	HANUMANGARH	21	7.35	8.86	620	14000	28	3864	2	2104	3.94	700	200	1800	16	560	17.02	364.80	0.14	8.75	403	9100
17	JAIPUR	48	7.40	8.54	501	12410	21	2092	10	2912	8.70	334	90	2950	12	648	14.59	437.76	0.01	2.00	326	8067
18	JAISALMER	29	6.88	8.22	630	13550	28	3615	22	1354	1.00	319	170	3600	24	400	19.46	632.32	0.11	3.58	410	8808
19	JALORE	21	7.34	8.62	860	11500	78	2233	5	2040	1.20	545	70	2550	12	600	9.73	376.96	0.10	7.00	559	7475
20	JHALAWAR	23	7.23	8.39	370	2800	21	596	4	147	1.00	145	50	900	8	140	7.30	133.76	0.17	5.00	241	1820
21	JHUNJHUNU	19	6.84	8.32	181	5780	28	1050	10	960	2.00	260	50	570	12	100	4.86	104.58	0.12	6.50	117	3757
22	JODHPUR	51	7.24	8.39	503	24290	35	9359	1	1591	5.10	700	110	2900	16	520	4.86	474.24	0.21	15.50	327	15789
23	KARAULI	17	7.14	8.13	460	9900	21	1666	4	2040	1.12	1450	150	2620	20	712	19.46	306.43	0.12	10.40	299	6435
24	KOTA	14	7.27	8.19	450	2530	35	610	5	400	2.30	89	100	630	20	96	9.73	114.30	0.18	1.08	293	1645
25	NAGAUR	23	7.36	8.64	333	9240	35	2659	12	1580	2.00	1350	60	1300	12	348	7.30	170.24	0.40	4.80	217	6006
26	PALI	19	7.56	8.86	520	8930	35	2021	1	1152	3.40	1340	70	2260	8	416	9.73	296.70	0.75	6.14	338	5805
27	PRATAPGARH	22	7.15	8.34	260	1760	14	376	2	186	1.00	99	80	430	20	96	7.30	55.94	0.03	1.60	169	1144
28	RAJSAMAND	20	7.08	8.15	690	3820	35	709	55	619	1.00	164	250	990	24	168	21.89	138.62	0.12	2.61	449	2483
29	SAWAI MADHOPUR	12	7.31	8.29	1250	5240	85	1049	10	896	13.00	300	100	1360	12	248	9.73	179.97	0.42	4.65	813	3406
30	SIKAR	11	7.28	8.89	570	7320	28	1524	30	910	11.40	320	80	2050	16	420	9.73	243.20	0.01	2.70	371	4758
31	SIROHI	19	7.11	7.99	750	6300	71	1645	16	514	1.50	270	250	1160	46	208	26.75	162.94	0.26	3.15	488	4095
32	TONK	20	7.38	8.38	870	4290	64	993	12	565	6.40	155	130	740	20	124	17.02	104.58	0.21	4.84	566	2789
33	UDAIPUR	44	7.11	8.39	260	5010	64	1156	56	827	1.00	523	160	1250	30	180	14.59	194.56	0.14	1.97	169	3257
Total		809	6.84	8.89	181	24290	7	9359	1	5888	1.00	1450	50	3600	4	712	2.43	632	0.01	15.50	117	15789

DISTRICT WISE DISTRIBUTION (%) OF MAJOR CONSTITUENTS WITHIN ACCEPTABLE LIMIT, PERMISSIBLE LIMIT AND BEYOND PERMISSIBLE LIMIT - PRE-MONSOON, 2022 Annexure-ii

S. No.	DISTRICT	Samples analysed	TDS			CHLORIDE			SULPHATE			FLUORIDE			NITRATE	
			0-500	501-2000	>2000	0-250	251-1000	>1000	0-200	201-400	>400	0-1.0	1.01-1.5	>1.5	0-45	> 45
1	AJMER	24	4.17	83.33	12.50	58.33	41.67	0.00	54.17	33.33	12.50	41.67	25.00	33.33	54.17	45.83
2	ALWAR	31	16.13	74.19	9.68	64.52	25.81	9.68	83.87	3.23	12.90	61.29	25.81	12.90	67.74	32.26
3	BANSWARA	31	29.03	67.74	3.23	93.55	3.23	3.23	87.10	12.90	0.00	61.29	16.13	22.58	70.97	29.03
4	BARAN	19	36.84	63.16	0.00	94.74	5.26	0.00	84.21	0.00	15.79	100.00	0.00	0.00	68.42	31.58
5	BARMER	41	2.44	31.71	65.85	12.20	51.22	36.59	17.07	21.95	60.98	34.15	24.39	41.46	39.02	60.98
6	BHARATPUR	28	10.71	50.00	39.29	42.86	39.29	17.86	50.00	25.00	25.00	57.14	21.43	21.43	57.14	42.86
7	BHILWARA	48	20.83	60.42	18.75	58.33	37.50	4.17	54.17	35.42	10.42	62.50	22.92	14.58	64.58	35.42
8	BIKANER	30	6.67	50.00	43.33	23.33	50.00	26.67	50.00	23.33	26.67	40.00	20.00	40.00	46.67	53.33
9	BUNDI	13	23.08	61.54	15.38	69.23	30.77	0.00	76.92	7.69	15.38	46.15	7.69	46.15	84.62	15.38
10	CHITTAURGARH	18	22.22	72.22	5.56	77.78	22.22	0.00	83.33	11.11	5.56	77.78	22.22	0.00	66.67	33.33
11	CHURU	27	0.00	25.93	74.07	14.81	29.63	55.56	33.33	18.52	48.15	40.74	14.81	44.44	25.93	74.07
12	DAUSA	13	0.00	53.85	46.15	30.77	38.46	30.77	69.23	7.69	23.08	53.85	30.77	15.38	61.54	38.46
13	DHAULPUR	12	16.67	50.00	33.33	58.33	41.67	0.00	75.00	16.67	8.33	91.67	8.33	0.00	50.00	50.00
14	DUNGARPUR	24	8.33	91.67	0.00	87.50	12.50	0.00	91.67	8.33	0.00	70.83	20.83	8.33	91.67	8.33
15	GANGANAGAR	17	5.88	70.59	23.53	52.94	47.06	0.00	23.53	35.29	41.18	29.41	17.65	52.94	64.71	35.29
16	HANUMANGARH	21	9.52	57.14	33.33	52.38	38.10	9.52	66.67	0.00	33.33	57.14	28.57	14.29	47.62	52.38
17	JAIPUR	48	10.42	58.33	31.25	47.92	33.33	18.75	64.58	20.83	14.58	79.17	10.42	10.42	52.08	47.92
18	JAISALMER	29	3.45	34.48	62.07	6.90	65.52	27.59	6.90	34.48	58.62	27.59	27.59	44.83	62.07	37.93
19	JALORE	21	0.00	47.62	52.38	23.81	42.86	33.33	33.33	14.29	52.38	19.05	28.57	52.38	52.38	47.62
20	JHALAWAR	23	26.09	73.91	0.00	86.96	13.04	0.00	100.00	0.00	0.00	82.61	8.70	8.70	56.52	43.48
21	JHUNJHUNU	19	15.79	73.68	10.53	47.37	47.37	5.26	78.95	15.79	5.26	63.16	10.53	26.32	63.16	36.84
22	JODHPUR	51	3.92	29.41	66.67	17.65	29.41	52.94	41.18	27.45	31.37	29.41	21.57	49.02	41.18	58.82
23	KARAULI	17	5.88	64.71	29.41	64.71	23.53	11.76	64.71	29.41	5.88	76.47	5.88	17.65	52.94	47.06
24	KOTA	14	21.43	78.57	0.00	92.86	7.14	0.00	85.71	14.29	0.00	92.86	7.14	0.00	85.71	14.29
25	NAGAUR	23	4.35	34.78	60.87	13.04	43.48	43.48	43.48	21.74	34.78	39.13	21.74	39.13	30.43	69.57
26	PALI	19	10.53	57.89	31.58	31.58	47.37	21.05	63.16	15.79	21.05	10.53	36.84	52.63	63.16	36.84
27	PRATAPGARH	22	36.36	63.64	0.00	95.45	4.55	0.00	100.00	0.00	0.00	90.91	4.55	4.55	72.73	27.27
28	RAJSAMAND	20	5.00	75.00	20.00	55.00	45.00	0.00	50.00	25.00	25.00	40.00	30.00	30.00	70.00	30.00
29	SAWAI MADHOPUR	12	0.00	75.00	25.00	50.00	41.67	8.33	75.00	8.33	16.67	25.00	16.67	58.33	41.67	58.33
30	SIKAR	11	9.09	72.73	18.18	36.36	54.55	9.09	63.64	27.27	9.09	72.73	18.18	9.09	54.55	45.45
31	SIROHI	19	5.26	78.95	15.79	36.84	57.89	5.26	42.11	42.11	15.79	57.89	5.26	36.84	63.16	36.84
32	TONK	20	0.00	85.00	15.00	70.00	30.00	0.00	70.00	25.00	5.00	45.00	15.00	40.00	70.00	30.00
33	UDAIPUR	44	6.82	86.36	6.82	81.82	15.91	2.27	63.64	31.82	4.55	61.36	31.82	6.82	75.00	25.00
Total		809	11.42	62.23	26.35	53.03	33.85	13.13	62.02	18.61	19.37	55.71	18.39	25.89	59.64	40.36

DISTRICT WISE DISTRIBUTION (%) OF MAJOR CONSTITUENTS WITHIN ACCEPTABLE LIMIT, PERMISSIBLE LIMIT AND BEYOND PERMISSIBLE LIMIT - PRE-MONSOON, 2022 annexure-III

S. No.	DISTRICT	Samples analysed	TH			Ca			Mg			Electrical Conductance			
			0-200	201-600	>600	0-75	76-200	>200	0-30	31-100	>100	0-750	751-1500	1500 - 3000	>3000
1	AJMER	24	16.67	75.00	8.33	62.50	37.50	0.00	33.33	62.50	4.17	4.17	41.67	41.67	12.50
2	ALWAR	31	16.13	64.52	19.35	51.61	45.16	3.23	41.94	45.16	12.90	16.13	45.16	29.03	9.68
3	BANSWARA	31	9.68	83.87	6.45	61.29	38.71	0.00	38.71	58.06	3.23	25.81	58.06	12.90	3.23
4	BARAN	19	10.53	68.42	21.05	42.11	52.63	5.26	42.11	52.63	5.26	36.84	42.11	21.05	0.00
5	BARMER	41	2.44	53.66	43.90	34.15	58.54	7.32	12.20	56.10	31.71	2.44	4.88	26.83	65.85
6	BHARATPUR	28	7.14	53.57	39.29	42.86	46.43	10.71	17.86	42.86	39.29	10.71	25.00	25.00	39.29
7	BHILWARA	48	10.42	64.58	25.00	64.58	31.25	4.17	25.00	60.42	14.58	18.75	35.42	25.00	20.83
8	BIKANER	30	50.00	30.00	20.00	76.67	10.00	13.33	46.67	36.67	16.67	6.67	16.67	33.33	43.33
9	BUNDI	13	30.77	61.54	7.69	84.62	15.38	0.00	46.15	46.15	7.69	23.08	38.46	23.08	15.38
10	CHITTAURGARH	18	16.67	66.67	16.67	61.11	38.89	0.00	16.67	77.78	5.56	22.22	50.00	22.22	5.56
11	CHURU	27	18.52	14.81	66.67	37.04	48.15	14.81	18.52	25.93	55.56	0.00	7.41	18.52	74.07
12	DAUSA	13	7.69	53.85	38.46	53.85	46.15	0.00	7.69	61.54	30.77	0.00	23.08	30.77	46.15
13	DHAULPUR	12	8.33	75.00	16.67	50.00	41.67	8.33	41.67	41.67	16.67	16.67	41.67	8.33	33.33
14	DUNGARPUR	24	0.00	100.00	0.00	66.67	33.33	0.00	29.17	70.83	0.00	4.17	79.17	16.67	0.00
15	GANGANAGAR	17	11.76	41.18	47.06	41.18	47.06	11.76	11.76	58.82	29.41	5.88	11.76	58.82	23.53
16	HANUMANGARH	21	9.52	47.62	42.86	61.90	23.81	14.29	9.52	57.14	33.33	9.52	23.81	28.57	38.10
17	JAIPUR	48	20.83	50.00	29.17	60.42	31.25	8.33	37.50	35.42	27.08	10.42	31.25	27.08	31.25
18	JAISALMER	29	10.34	48.28	41.38	34.48	55.17	10.34	20.69	48.28	31.03	3.45	0.00	31.03	65.52
19	JALORE	21	9.52	47.62	42.86	33.33	38.10	28.57	9.52	61.90	28.57	0.00	19.05	23.81	57.14
20	JHALAWAR	23	34.78	60.87	4.35	52.17	47.83	0.00	47.83	47.83	4.35	26.09	56.52	17.39	0.00
21	JHUNJHUNU	19	63.16	36.84	0.00	94.74	5.26	0.00	63.16	31.58	5.26	15.79	15.79	47.37	21.05
22	JODHPUR	51	7.84	56.86	35.29	39.22	50.98	9.80	15.69	52.94	31.37	3.92	9.80	17.65	68.63
23	KARAULI	17	11.76	70.59	17.65	41.18	47.06	11.76	17.65	64.71	17.65	5.88	52.94	11.76	29.41
24	KOTA	14	28.57	64.29	7.14	78.57	21.43	0.00	28.57	64.29	7.14	21.43	57.14	21.43	0.00
25	NAGAUR	23	13.04	56.52	30.43	73.91	17.39	8.70	17.39	43.48	39.13	4.35	13.04	21.74	60.87
26	PALI	19	21.05	57.89	21.05	63.16	26.32	10.53	31.58	52.63	15.79	10.53	21.05	31.58	36.84
27	PRATAPGARH	22	18.18	81.82	0.00	45.45	54.55	0.00	45.45	54.55	0.00	36.36	59.09	4.55	0.00
28	RAJSAMAND	20	0.00	75.00	25.00	50.00	50.00	0.00	5.00	75.00	20.00	5.00	45.00	25.00	25.00
29	SAWAI MADHOPUR	12	25.00	50.00	25.00	75.00	16.67	8.33	25.00	58.33	16.67	0.00	16.67	58.33	25.00
30	SIKAR	11	45.45	27.27	27.27	72.73	18.18	9.09	45.45	36.36	18.18	9.09	9.09	63.64	18.18
31	SIROHI	19	0.00	73.68	26.32	47.37	47.37	5.26	10.53	68.42	21.05	5.26	21.05	57.89	15.79
32	TONK	20	35.00	60.00	5.00	60.00	40.00	0.00	50.00	45.00	5.00	0.00	30.00	55.00	15.00
33	UDAIPUR	44	6.82	86.36	6.82	47.73	52.27	0.00	13.64	84.09	2.27	4.55	72.73	15.91	6.82
Total		809	17.50	59.34	23.16	56.41	37.41	6.18	27.99	53.91	18.10	11.07	32.56	28.88	27.50

DISTRIBUTION (%) OF MAJOR CONSTITUENTS in state WITHIN ACCEPTABLE LIMIT, PERMISSIBLE LIMIT AND BEYOND PERMISSIBLE LIMIT - PRE-MONSOON, 2022

Annexure-IV

S.No.	Limit	CONSTITUENTS IN PERCENT								
		TDS	Cl	SO4	F	NO3	TH	Ca	Mg	
1	Acceptible limit	11.42	53.03	62.02	55.71	59.64	17.50	56.41	27.99	
2	Permissible Limit	62.23	33.85	18.61	18.39		59.34	37.41	53.91	
3	Beyond Permissible limit	26.35	13.13	19.37	25.89	40.36	23.16	6.18	18.10	

Chemical analysis results of water samples collected during NHS monitoring 2022-23(May-2022) Annexure-V

District2022	Block	Location	Long_	Lat_	pH_	EC	CO3	HCO3	Cl	SO4	NO3	PO4	TH	Ca	Mg	Na	K	F	U2022	RSC	%Na	SAR
						µS/cm at25C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	ppb			
AJMER	Jawaja	BAGLIAS	74.2	25.9083	7.62	1780	Nil	201	333	211	38	0.01	320	60	41	254	16	1.87	29.0	-3.1	64	6.2
AJMER	Jawaja	TARAGARH	74.15	25.8833	8.14	1230	Nil	220	135	156	97	0.08	220	36	32	175	13	1.00	25.0	-0.8	64	5.1
AJMER	Peesangan	Mangaliyawas	74.5081	26.2769	7.97	3520	Nil	732	610	302	60	0.96	470	80	66	620	7	1.10	23.0	2.6	74	12.4
AJMER	Peesangan	TABIJI	74.6167	26.3631	7.92	3220	Nil	720	525	230	70	1.45	430	80	56	550	8	0.05	21.0	3.2	74	11.5
AJMER	Peesangan	LAMANA	74.4917	26.2333	7.68	3350	Nil	622	610	260	92	0.80	360	60	51	620	9.2	0.12	19.3	3.0	79	14.2
AJMER	Masuda	LUDIYANA	74.5833	25.9972	7.74	2990	Nil	305	482	422	148	0.01	610	92	92	296	189	1.52	16.0	-7.2	59	5.2
AJMER	Masuda	JHOPADIYAN	74.6583	26.025	7.7	2450	Nil	342	202	483	188	0.01	370	84	39	285	185	1.10	14.0	-1.8	70	6.4
AJMER	Jawaja	PAKHRIAWAS	74.3992	26.0881	7.84	1140	Nil	195	163	154	20	0.01	210	60	15	164	5.7	1.03	12.0	-1.0	63	4.9
AJMER	Kekri	BOGLA	75.2333	25.89	8	2000	Nil	403	340	136	53	0.01	460	60	75	228	36	1.56	11.0	-2.6	54	4.6
AJMER	Jawaja	NARBADKHERA	74.2833	26.05	8.09	1700	Nil	234	219	257	95	0.01	420	100	41	171	49	2.10	11.0	-4.6	51	3.6
AJMER	Arain	DASUK	75.1	26.3519	8.05	1445	Nil	439	156	119	17	0.01	130	20	19	231	72	1.10	10.0	4.6	82	8.8
AJMER	Jawaja	MAIDAYABADAYA	74.37	26.12	8.01	1920	Nil	268	248	197	221	0.01	300	60	36	194	186	1.89	10.0	-1.6	69	4.9
AJMER	Jawaja	JAWAJA1	74.2	25.9333	8.01	1090	Nil	354	71	142	2.4	0.01	260	56	29	105	47	1.44	9.3	0.6	53	2.8
AJMER	Arain	AJAGARA	75.1	26.0333	7.64	2320	Nil	537	291	258	44	0.01	370	76	44	354	17	0.98	9.0	1.4	68	8.0
AJMER	Bhinai	Goelo	74.9278	26.1292	7.87	1650	Nil	256	277	181	43	0.01	290	44	44	236	19	0.18	9.0	-1.6	65	6.0
AJMER	Masuda	MASUDA1	74.5125	26.0917	7.94	2750	Nil	299	362	403	239	0.12	720	108	109	208	159	1.88	8.6	-9.5	48	3.4
AJMER	Arain	SARWAD	75	26.05	7.91	1870	Nil	250	290	273	39	0.14	410	80	51	230	21	1.57	8.6	-4.1	56	4.9
AJMER	Kekri	KEKRI1	75.15	25.9833	8.02	1250	Nil	195	156	220	18	0.01	300	40	49	145	11	0.61	5.5	-2.8	52	3.6
AJMER	Srinagar	KANPURA1	74.8667	26.4	7.81	1450	Nil	378	149	150	90	1.20	300	84	22	165	77	0.22	5.3	0.2	60	4.1
AJMER	Arain	SANPLA	75.0417	25.9111	8.11	1280	Nil	195	184	184	30	0.02	300	56	39	147	18	1.25	4.1	-2.8	53	3.7

AJMER	Arain	Barora	75.0361	26.2125	7.83	895	Nil	220	64	159	4.5	0.01	150	36	15	96	71	2.05	4.0	0.6	67	3.4
AJMER	Srinagar	RAMSAR2	74.8583	26.2667	7.71	1050	Nil	317	99	95	38	1.70	250	52	29	112	36	0.09	2.4	0.2	54	3.1
AJMER	Peesangan	NASIRABAD	74.7403	26.2867	7.83	774	Nil	293	71	30	11.2	1.15	170	40	17	95	9	0.02	1.6	1.4	56	3.2
AJMER	Arain	ARIAN	75.0667	26.45	7.74	720	Nil	146	71	129	2.3	0.01	180	40	19	45	65	0.41	0.4	-1.2	50	1.5
ALWAR	Mandawar	Mandawar	76.5455	27.8696	7.61	1180	Nil	427	128	40	95	0.11	310	88	22	154	4.2	0.70	41.8	0.8	52	3.8
ALWAR	Reni	Reni	76.7389	27.1775	8.28	2670	Nil	793	355	223	1.27	0.20	280	100	7	510	3.2	3.04	29.4	7.4	80	13.3
ALWAR	THANAGAZI	Bairawas	76.3989	27.4611	7.23	2800	Nil	464	567	167	60	0.16	860	244	61	245	11	1.25	29.0	-9.6	39	3.6
ALWAR	Rajgarh	Tehla	76.4	27.2375	7.63	2320	Nil	390	369	157	220	0.05	660	96	102	240	3.72	1.54	22.0	-6.8	44	4.1
ALWAR	Thanagazi	Kabrala	76.205	27.2306	7.42	1950	Nil	281	482	75	18	0.16	490	124	44	235	4.55	1.20	20.0	-5.2	51	4.6
ALWAR	Lachhmangarh	Lachmangarh	76.8597	27.35	7.56	7000	Nil	586	2056	538	90	0.45	2080	192	389	890	1.97	1.20	20.0	-32.0	48	8.5
ALWAR	NEEMRANA	Neemrana	76.3875	27.9989	7.8	1580	Nil	451	184	132	65	0.12	190	40	22	290	1.51	0.53	18.9	3.6	77	9.1
ALWAR	BANSUR	BANSUR	76.3556	27.6917	7.57	1450	Nil	732	121	8	55	0.28	290	36	49	245	2.92	1.05	17.8	6.2	65	6.3
ALWAR	KISHANGARH BAS	BOLNI	76.7956	27.8664	7.86	1420	Nil	647	121	8	17	0.44	130	24	17	280	1.06	6.60	17.1	8.0	82	10.7
ALWAR	BEHROR	Sota Nala	76.2589	27.8528	7.14	2850	Nil	329	773	75	4	0.10	580	80	92	396	5.8	0.25	15.7	-6.2	60	7.1
ALWAR	Rajgarh	Rajgarh	76.6044	27.2411	8.1	860	Nil	244	113	102	5.1	0.15	160	32	19	140	7	0.40	12.5	0.8	66	4.8
ALWAR	BANSUR	Alanpur	76.4572	27.8144	7.49	780	Nil	415	35	15	18	0.48	170	32	22	116	1.39	0.98	11.7	3.4	60	3.9
ALWAR	KOTKASIM	HARSAULI	76.6167	27.8667	7.7	1180	Nil	561	64	47	25	0.18	240	48	29	176	1.44	1.33	11.0	4.4	62	4.9
ALWAR	Kathumar	Kathumar	77.0778	27.3161	7.94	6330	Nil	464	1617	598	41	0.23	1140	168	175	1000	4.13	0.66	10.2	-15.2	66	12.9
ALWAR	Rajgarh	Todi Ka Bas	76.3275	27.1181	7.83	1370	Nil	573	128	11	90	2.06	540	136	49	87	5.48	0.57	9.2	-1.4	27	1.6
ALWAR	Lachhmangarh	Jhaladala	76.8322	27.2542	7.9	1530	Nil	586	191	71	4.4	0.05	280	48	39	250	5	0.39	8.7	4.0	66	6.5
ALWAR	TIJARA	TAPUKARA	76.835	28.11	7.63	1320	Nil	360	128	40	208	0.20	330	76	34	164	1.51	0.10	7.7	-0.7	52	3.9
ALWAR	TIJARA	TIJARA1	76.8644	27.9331	7.6	2330	Nil	195	305	10	850	0.12	670	168	61	280	8	0.11	6.1	-10.2	48	4.7
ALWAR	BEHROR	BEHROR	76.2833	27.8833	7.55	1440	Nil	378	262	45	24	0.20	300	60	36	205	3.07	1.00	5.8	0.2	60	5.1
ALWAR	KOTKASIM	Kotkasim	76.7153	28.0319	7.5	1480	Nil	525	199	33	14	0.66	390	60	58	170	1.48	1.40	5.7	0.8	49	3.7
ALWAR	TIJARA	NIMLI	76.9333	27.8333	7.3	960	Nil	305	106	18	80	0.32	400	132	17	38	2.03	0.24	3.8	-3.0	18	0.8
ALWAR	NEEMRANA	Majri Khurd	76.3167	27.9972	7.7	2650	Nil	476	397	408	1	0.34	290	44	44	500	3.39	1.20	3.2	2.0	79	12.8

ALWAR	Umren	Umren	76.5611	27.4997	7.86	607.2	Nil	329	43	8	12	0.11	270	64	27	31	9	0.10	2.7	0.0	23	0.8
ALWAR	Thanagazi	Ghata Mordi	76.2583	27.225	7.77	650	Nil	293	57	2	11.6	0.02	230	60	19	45	4.73	0.52	2.3	0.2	31	1.3
ALWAR	Reni	Doroli	76.7167	27.275	8.04	1050	Nil	439	71	84	1	0.15	240	40	34	140	3.92	0.20	2.2	2.4	56	3.9
ALWAR	UMREN	Baran1	76.525	27.4417	7.3	670	Nil	329	43	1	5	0.06	260	80	15	32	4.9	0.25	1.7	0.2	23	0.9
ALWAR	KISHANGARH BAS	KISHANGARH BAS1	76.7333	27.82	7.42	1240	Nil	476	149	34	40	0.64	360	88	34	142	2.9	1.23	1.3	0.6	46	3.3
ALWAR	Thanagazi	Kalighati Sariska	76.4078	27.3119	7.55	450	Nil	220	35	1	7.6	0.05	180	52	12	25	3.33	0.18	1.3	0.0	25	0.8
ALWAR	Thanagazi	Thanagazi	76.3211	27.3904	8.02	856.1	Nil	415	78	5	6	0.21	310	64	36	66	5.1	0.25	0.8	0.6	33	1.6
ALWAR	Reni	Gadi Swairam	76.7917	27.2083	7.5	565	Nil	207	64	21	11.6	0.02	210	40	27	35	4.07	0.12	0.0	-0.8	28	1.1
ALWAR	RAMGARH	RAMGARH1	76.8136	27.5936	7.7	7900	Nil	476	1574	1505	1	0.18	1400	120	268	1280	2.55	2.25	0.0	-20.2	67	14.9
BANSWARA	Kushalgarh	KUSALGARH	74.45	23.2	7.58	2450	Nil	195	546	272	10	0.00	1000	160	146	102	4.2	1.16	129.0	-16.8	19	1.4
BANSWARA	Garhi	Raiyana	74.17	23.5147	8.15	640	Nil	159	57	72	36	0.00	140	20	22	74	16	0.93	10.0	-0.2	56	2.7
BANSWARA	Banswara	Padla Barora	74.5194	23.5361	7.67	1200	Nil	281	113	129	88	0.00	250	56	27	161	3.5	1.87	9.6	-0.4	59	4.4
BANSWARA	Sajjangarh	Jhalkiya	74.29	23.17	7.48	675.2	Nil	329	43	10	36	0.30	320	80	29	21	5.4	0.40	7.820	-1.0000	14	0.5
BANSWARA	Banswara	Talwara	74.3333	23.5667	7.89	750	Nil	244	25	122	12	0.00	280	40	44	43	1.4	0.02	7.4	-1.6	25	1.1
BANSWARA	Gangartalai	Gangar Talai	74.1698	23.2573	7.75	850	Nil	171	106	76	68	0.02	330	64	41	44	2.4	0.37	6.2	-3.8	23	1.1
BANSWARA	Bagidora	RAKHO	74.2792	23.3683	8.31	685	84	195	7	28	1.84	0.00	130	24	17	98	1	0.78	5.1	3.4	62	3.7
BANSWARA	Sajjangarh	Kharod Chatra	74.29	23.22	7.7	1920	Nil	439	213	320	302	0.23	550	60	97	315	7	1.40	4.269	-3.8000	56	5.8
BANSWARA	Ghatol	GANORA	74.2528	23.7667	7.34	1540	Nil	248	197	268	2.08	0.01	350	80	36	184	17	2.97	4.2	-2.9	55	4.3
BANSWARA	Sajjangarh	Samla Sahar	74.25	23.21	7.85	998.4	Nil	500	43	20	85	0.11	340	52	51	101	1.4	1.55	3.419	1.400	39	2.4
BANSWARA	Ghatol	ChanduJi Ka Guda	74.33	23.6667	8.35	1100	12	366	106	86	12	0.03	220	24	39	162	4.7	1.23	3.2	2.0	62	4.7
BANSWARA	Ghatol	SENWASA	74.3897	23.6561	8.02	760	Nil	293	57	27	35	0.00	280	60	32	46	1.9	1.07	3.1	-0.8	27	1.2
BANSWARA	Bagidora	Barodiya	74.3503	23.4167	8.12	1710	Nil	329	213	208	81	0.00	280	56	34	262	4.7	0.17	2.9	-0.2	67	6.8
BANSWARA	Sajjangarh	Maudi Maska	74.31	23.15	7.71	4250	Nil	340	1312	16	2	0.02	700	160	73	667	4.3	1.80	2.880	-8.426	68	11.0
BANSWARA	Banswara	Banswara1	74.45	23.5333	8.33	1290	60	183	106	198	41	0.01	420	64	63	104	1.1	1.65	2.5	-3.4	35	2.2
BANSWARA	Sajjangarh	Bhura Kua	74.31	23.225	8.09	890	Nil	366	43	59	27	0.00	270	72	22	81	0.55	0.05	2.3	0.6	40	2.1

BANSWARA	Banswara	Borwat	74.3844	23.5092	8.15	1010	Nil	427	57	28	51	0.00	270	44	39	108	1.5	0.97	2.2	1.6	47	2.9
BANSWARA	Ghatol	Rathor Ki Phadoli	74.4431	23.8944	8.45	590	36	244	35	31	16	0.01	210	28	34	60	10	0.04	1.8	1.0	41	1.8
BANSWARA	Anandpuri	Anandpuri	74.0238	23.3864	7.64	950	Nil	165	191	62	6	0.00	310	80	27	75	2.5	0.15	1.7	-3.5	35	1.9
BANSWARA	Anandpuri	CHHAJA	74.0586	23.4333	7.87	780	Nil	183	85	62	65	0.01	300	76	27	34	13	0.98	1.5	-3.0	23	0.9
BANSWARA	Garhi	Arthuna1	74.1	23.5	7.32	970	Nil	366	57	64	47	0.00	370	84	39	45	17	0.15	1.4	-1.4	24	1.0
BANSWARA	Bagidora	Bagidora	74.2667	23.4042	7.52	1075	Nil	329	142	42	23	0.00	340	88	29	88	6	1.77	1.1	-1.4	37	2.1
BANSWARA	Ghatol	Bhoongra	74.5056	23.6686	7.77	1250	Nil	537	64	69	26	0.00	350	92	29	126	2	0.12	1.1	1.8	44	2.9
BANSWARA	Kushalgarh	Charakni	74.3797	23.3128	8.27	775	Nil	305	35	45	48	0.00	230	56	22	72	4	1.00	0.9	0.4	41	2.1
BANSWARA	Garhi	Borigoan	74.1167	23.575	7.87	690	Nil	244	57	43	20	0.00	250	40	36	42	3.4	0.05	0.7	-1.0	28	1.2
BANSWARA	Banswara	Chiriyawasa	74.3775	23.5092	7.99	730	Nil	342	21	34	21	0.00	310	60	39	25	1.8	0.97	0.6	-0.6	15	0.6
BANSWARA	Sajjangarh	Sajjangarh	74.2876	23.2571	7.55	1080	Nil	165	156	144	38	0.00	400	100	36	64	1	0.60	0.5	-5.3	26	1.4
BANSWARA	Chhotisarwan	Chhoti Sarwan	74.6408	23.527	7.65	1085	Nil	201	142	156	16	0.00	450	88	56	41	4.1	0.04	0.5	-5.7	17	0.8
BANSWARA	Garhi	Kotra1	74.075	23.4544	7.66	910	Nil	281	43	144	11	0.00	355	84	35	45	3.1	1.13	0.2	-2.5	22	1.0
BANSWARA	Sajjangarh	CHOTA DUNGRA	74.2903	23.1722	7.8	850	Nil	390	71	36	6.6	0.02	300	72	29	77	1.75	1.94	0.2	0.4	36	1.9
BANSWARA	Chhoti Sarwan	Katumbi Dw	74.6167	23.5361	7.38	395	Nil	171	14	32	1	0.02	100	16	15	45	1.1	0.92	0.1	0.8	50	2.0
BARAN	Atru	ATRU1	76.6611	24.8575	7.71	1050	Nil	305	121	89	20.8	0.06	290	96	12	100	19	0.36	51.0	-0.8	45	2.6
BARAN	Anta	MANGROL	76.5125	25.325	7.88	1550	Nil	366	43	435	19	0.10	750	136	100	37	1.28	0.82	13.8	-9.0	10	0.6
BARAN	Kishanganj	KISHANGANJ1	76.65	25.1083	7.64	780	Nil	305	57	57	20	0.01	335	76	35	32	2.5	0.57	10.5	-1.7	18	0.8
BARAN	Chhipabarod	CHHIPA BAROD	76.7322	24.5942	7.8	1320	Nil	537	128	8	56	0.01	420	56	68	115	5.7	1.00	8.3	0.4	38	2.4
BARAN	Anta	ANTA1	76.3	25.1583	7.34	2130	Nil	317	78	724	28	0.01	710	192	56	200	4.13	0.58	7.2	-9.0	38	3.3
BARAN	Atru	UDPURIA	76.3292	25.3003	7.63	2480	Nil	451	418	47	330	0.01	850	124	131	195	2.79	0.35	5.3	-9.6	33	2.9
BARAN	Baran	BAMLA	76.475	24.9917	7.53	1000	Nil	329	99	113	20	0.01	400	120	24	60	13	0.45	5.1	-2.6	27	1.3
BARAN	Baran	Baran	76.52	25.1	7.69	730	Nil	305	64	70	8.4	0.05	210	32	32	95	5.18	0.69	5.0	0.8	50	2.9
BARAN	Kishanganj	BHANWARGARH	76.7936	25.0914	7.85	720	Nil	256	35	67	58	0.07	300	76	27	35	3.8	0.94	5.0	-1.8	21	0.9
BARAN	Chhabra	Chhabra_GWD	76.8433	24.6678	7.73	1100	Nil	415	106	23	54	0.09	400	104	34	70	5.9	0.51	4.6	-1.2	29	1.5
BARAN	Shahabad	Kasba Thana	77.3583	25.2083	7.68	1410	Nil	451	177	10	100	0.07	420	88	49	77	98	0.31	2.9	-1.0	41	1.6

BARAN	Anta	BOHAT	76.5042	25.2528	8.02	1210	Nil	525	85	42	26	0.02	400	76	51	96	7	0.61	1.8	0.6	35	2.1
BARAN	Shahabad	PAJAL TORI	77.2633	25.2633	7.85	550	Nil	268	21	32	22	0.03	280	64	29	9.0	2.44	0.24	0.9	-1.2	7	0.2
BARAN	Shahabad	KELWARA1	76.9	25.1333	7.65	570	Nil	232	28	40	21	0.01	250	72	17	17	2.5	0.26	0.8	-1.2	14	0.5
BARAN	Chhipabaro d	HARNAUDA	76.7	24.4361	7.81	2050	Nil	171	170	647	54	0.01	990	304	56	50	0.94	0.52	0.5	-17.0	10	0.7
BARAN	Shahabad	MAMONI	77.1056	25.1878	7.46	450	Nil	244	14	5	22	0.01	200	64	10	20	0.93	0.38	0.3	0.0	18	0.6
BARAN	Chhipabaro d	SARTHAL	76.6	24.4833	7.72	530	Nil	244	28	17	39	0.03	260	72	19	14	0.4	0.22	0.1	-1.2	11	0.4
BARAN	Kishanganj	Banthoni	76.7	25.0833	7.58	400	Nil	195	21	16	9	0.05	180	44	17	12	8	0.24	0.1	-0.4	17	0.4
BARAN	Shahabad	SHAHABAD1	77.1333	25.25	7.75	840	Nil	390	71	20	1.7	0.02	380	60	56	28	2.96	0.53	0.0	-1.2	15	0.6
BARMER	BAITU	SAWAU PADAM SINGH	71.8067	26.1503	8.31	6570	96	268	1227	946	233	0.01	1650	200	280	749	9	0.66	**450.0**	**-25.4**	**50**	**8.0**
BARMER	RAMSAR	RAMSAR	70.8719	25.7303	8.41	22750	120	1549	3793	4284	139	0.01	1100	120	195	4717	44	3.63	**112.0**	**7.4**	**90**	**61.8**
BARMER	Balotra	Thumbli	72.4886	26.2036	8.08	8470	Nil	842	2375	221	260	0.54	740	136	97	1718	9.2	2.20	51.3	-1.0	84	27.5
BARMER	GUDAMALANI	GUDAMALANI	71.6988	25.214	7.98	6310	Nil	671	1020	808	392	0.01	780	120	117	1090	7	3.13	29.0	-4.6	75	17.0
BARMER	SINDHRI	ARNIYALI	71.9675	25.4667	7.79	11930	Nil	604	2252	2178	23	0.01	500	100	61	2515	5.5	1.55	29.0	-0.1	92	48.9
BARMER	SAYLA	SAYLA	71.713	26.0274	8.04	4000	Nil	250	879	505	27	0.01	420	80	54	727	2.4	2.65	29.0	-4.3	79	15.4
BARMER	SINDHRI	KHARA MAHECHA	72.0265	25.5103	7.88	9110	Nil	830	1316	1878	70	0.01	1500	200	243	1401	8	1.31	**26.0**	**-16.4**	**67**	**15.7**
BARMER	Balotra	Thob	72.3583	26.05	7.99	3000	Nil	561	546	56	320	0.23	610	168	46	418	25	1.60	25.0	-3.0	61	7.4
BARMER	BAITU	SANTARA	71.9675	25.9975	8.02	3560	Nil	293	461	634	277	0.01	620	104	88	408	214	2.18	**24.0**	**-7.6**	**65**	**7.1**
BARMER	SINDHRI	BHOGINJI KA MEETHA	72.1257	25.5149	8.13	4600	Nil	360	859	601	200	0.01	300	72	29	920	3.1	2.00	**21.0**	**-0.1**	**87**	**23.1**
BARMER	BAITU	KOLOO	71.713	26.0274	7.81	16410	Nil	439	2964	3540	8.8	0.01	1700	280	243	2998	20	1.88	**19.0**	**-26.8**	**79**	**31.6**
BARMER	Sheo	GADRA ROAD	70.6376	25.7395	7.88	3850	Nil	647	563	576	1	0.01	280	48	39	752	11	0.32	**18.0**	**5.0**	**85**	**19.5**
BARMER	Sheo	Gujrokabera	71.332	26.2018	8.01	4230	Nil	512	864	398	69	0.01	220	24	39	865	12	1.25	**14.0**	**4.0**	**90**	**25.4**
BARMER	BAITU	BHADKA	71.35	25.8833	7.94	4450	Nil	317	709	922	1.08	0.01	500	88	68	789	10	1.13	**14.0**	**-4.8**	**78**	**15.3**
BARMER	BARMER	SASIO KA KUA	71.4125	25.7042	7.78	4580	Nil	372	659	897	142	0.01	540	112	63	798	14	1.82	**14.0**	**-4.7**	**76**	**14.9**
BARMER	BARMER	DHORIMANA	71.4352	25.2344	7.96	4815	Nil	476	925	595	104	0.18	580	88	88	837	7	1.78	**14.0**	**-3.8**	**76**	**15.1**
BARMER	SINDHAI	LOONAKALAN	71.9829	25.4481	8.01	12410	Nil	508	2056	2706	81	0.01	950	180	122	2415	7	1.21	**14.0**	**-10.7**	**85**	**34.1**

BARMER	BAITU	KERALA	71.9016	25.997	8.01	3590	Nil	561	496	496	143	0.01	1200	160	195	271	6	0.18	**12.0**	**-14.8**	**33**	**3.4**
BARMER	Sheo	PANCHLA	70.1667	25.9917	7.19	15490	Nil	390	3261	2720	1.4	0.11	1500	200	243	2856	42	1.77	**11.0**	**-23.6**	**81**	**32.1**
BARMER	Samdari	Karmawas	72.5811	25.7743	7.76	2700	Nil	281	702	163	22	0.22	430	104	41	448	5.9	0.40	10.5	-4.0	70	9.4
BARMER	Balotra	Balotra	72.2404	25.8218	8	6200	Nil	464	1524	677	19	0.65	340	60	46	1335	9.7	1.25	10.1	0.8	90	31.5
BARMER	CHAUHTAN	DHANAU	71.1339	25.2343	7.57	2370	Nil	153	503	278	69	0.01	340	44	56	386	5	0.73	**10.0**	**-4.3**	**71**	**9.1**
BARMER	Sheo	Bisukalan	71.1642	26.1429	7.78	6150	Nil	415	1247	930	1	0.01	1250	200	182	837	13	1.39	**9.4**	**-18.2**	**59**	**10.3**
BARMER	SHEO	KHADEEN	71.067	25.7337	7.92	1720	Nil	238	262	260	29	0.01	290	56	36	258	9.5	0.26	**8.0**	**-1.9**	**66**	**6.6**
BARMER	CHAUHTAN	SIYAGATALA	70.8653	25.3375	7.52	8910	Nil	244	1149	2235	378	0.11	2450	520	280	915	17	0.93	**7.8**	**-45.0**	**45**	**8.0**
BARMER	CHAUHTAN	SEDWA	71.692	25.0736	7.94	3220	Nil	305	489	578	80	0.01	700	120	97	414	8	0.45	**7.7**	**-9.0**	**57**	**6.8**
BARMER	Balotra	Doli	72.6667	26.0667	8.28	1220	Nil	305	184	160	6	0.11	280	64	29	169	28	0.55	6.9	-0.6	59	4.4
BARMER	CHOHTAN	TARLA	71.2167	24.8361	7.65	1920	Nil	171	248	236	273	0.01	550	64	95	138	86	0.13	**6.7**	**-8.2**	**43**	**2.6**
BARMER	BARMER	SANAWARA	71.4	25.4797	7.31	6320	Nil	354	1056	1256	84	0.01	760	144	97	1099	12	1.54	**6.6**	**-9.4**	**76**	**17.3**
BARMER	BARMER	SIHANI	71.2333	25.5858	8.17	1520	Nil	323	156	190	89	0.01	340	60	46	192	4.2	1.75	**6.0**	**-1.5**	**55**	**4.5**
BARMER	Sheo	Balasar	71.1068	26.1074	7.63	2000	Nil	366	284	272	18	0.01	440	72	63	258	3	0.65	**5.7**	**-2.8**	**56**	**5.3**
BARMER	BARMER	SANWLOR	71.2333	25.5858	7.76	3330	Nil	317	376	662	220	0.01	500	76	75	520	28	1.70	**4.7**	**-4.8**	**70**	**10.1**
BARMER	Shergarh	KumarokiDhani	72.12	26.2	7.75	4440	Nil	390	1007	384	89	0.01	540	56	97	777	1.7	1.03	**4.2**	**-4.4**	**76**	**14.5**
BARMER	CHAUHTAN	CHAUHTAN	71.075	25.475	7.67	2770	Nil	220	298	532	276	0.01	900	156	124	209	25	1.83	**4.2**	**-14.4**	**35**	**3.0**
BARMER	Siwana	Siwana Block HQ	72.4281	25.6636	7.87	2250	Nil	366	390	206	140	0.59	150	40	12	474	0.91	0.30	3.9	3.0	87	16.8
BARMER	GIDA	GIDA	71.2464	24.8438	7.62	550	Nil	195	50	28	13	0.01	220	52	22	20	9	1.25	**3.7**	**-1.2**	**20**	**0.6**
BARMER	BARMER	DERASAR	71.1633	25.7761	7.45	4710	Nil	226	922	756	94	0.01	1260	200	185	494	18	1.73	**3.2**	**-21.5**	**47**	**6.1**
BARMER	BAITU	MEGHWALO KI BASTI	71.7731	26.0282	7.62	21250	Nil	244	3020	5888	4.3	0.01	2300	300	377	3821	23	0.79	**1.4**	**-42.0**	**78**	**34.6**
BARMER	BARMER	BARMER	71.3972	25.7361	7.76	2320	Nil	439	383	244	1.13	0.01	350	84	34	368	9.1	1.30	**0.8**	**0.2**	**70**	**8.6**
BARMER	Pataudi	Pataudi Block HQ	72.2714	26.0823	7.5	2270	Nil	537	432	35	125	0.05	490	132	39	320	5.44	0.91	0.8	-1.0	59	6.3
BARMER	BAITU	BOTHIA	71.35	25.9	8.07	1165	Nil	189	170	176	1.13	0.01	250	72	17	150	5.7	1.20	**0.4**	**-1.9**	**57**	**4.1**
BHARATPUR	Nagar	Nagar	77.1	27.4167	8.2	3930	Nil	1000	596	353	19.3	0.20	400	72	54	760	1.16	3.40	112.1	8.4	81	16.5

BHARATPUR	Nagar	Pahari	77.0908	27.7039	8.17	5200	Nil	1427	695	730	20	0.15	150	28	19	1280	1.11	2.00	107.2	20.4	95	45.4
BHARATPUR	Kaman	Kaman	77.2697	27.6572	7.6	7340	Nil	732	1886	850	115	0.12	2320	208	438	880	8	0.87	100.0	-34.4	45	7.9
BHARATPUR	Nadbai	Nadbai	77.2014	27.2214	8.33	5220	60	1061	808	360	320	0.28	600	48	117	990	3.35	4.55	78.0	7.4	78	17.6
BHARATPUR	Nagar	Gopalgarh	77.0633	27.6547	7.82	6380	Nil	903	1375	667	98	0.05	940	80	180	1160	1.59	3.00	46.0	-4.0	73	16.5
BHARATPUR	Sewar	Sewar	77.4403	27.1822	7.72	6670	Nil	561	1418	958	70	0.45	1600	272	224	880	4	1.10	42.7	-22.8	55	9.6
BHARATPUR	Nagar	Gulpura	77.125	27.5333	8.04	1080	Nil	464	92	5	130	0.06	520	104	63	46	1.94	0.36	42.6	-2.8	16	0.9
BHARATPUR	Kaman	Jurahra	77.2267	27.7822	7.89	3880	Nil	659	808	318	11.4	0.74	1040	120	180	450	4.49	1.16	29.0	-10.0	49	6.1
BHARATPUR	Bayana	Kheria Mod	77.3833	26.95	8.1	940	Nil	561	43	28	13.2	0.01	120	16	19	210	0.3	5.80	29.0	6.8	79	8.3
BHARATPUR	Bayana	Kot1	77.4306	26.8042	7.75	840	Nil	305	78	72	12.6	0.03	300	76	27	65	4.82	0.40	29.0	-1.0	33	1.6
BHARATPUR	Roopwas	Khan Surjapur	77.6375	26.975	8.07	1730	Nil	744	220	25	34	0.02	370	36	68	280	0.5	1.48	27.0	4.8	62	6.3
BHARATPUR	Roopwas	Khanua	77.55	27.0333	7.52	2790	Nil	403	560	310	62	0.11	770	148	97	330	6	0.32	26.0	-8.8	49	5.2
BHARATPUR	Weir	Weir	77.1773	27.0126	8.27	1690	Nil	805	128	95	30	0.12	360	32	68	280	0.92	2.01	24.7	6.0	63	6.4
BHARATPUR	Sewar	Ludhawai_Gwd	77.395	27.175	7.92	7350	Nil	659	1843	696	55	0.13	1260	136	224	1220	1.32	1.04	24.0	-14.4	68	14.9
BHARATPUR	Deeg	Sihora	77.3	27.57	7.86	2590	Nil	403	574	169	30	0.23	940	140	143	163	40	1.40	20.5	-12.2	30	2.3
BHARATPUR	Roopwas	Roopwas	77.5908	26.9936	7.55	2370	Nil	573	362	208	140	0.05	560	120	63	330	28	0.61	13.2	-1.8	57	6.1
BHARATPUR	Bayana	Bawari Baroda	77.39	26.9639	7.93	800	Nil	403	43	13	11.3	0.01	230	36	34	85	1.18	0.72	10.9	2.0	45	2.4
BHARATPUR	Bayana	Salabad	77.315	26.9786	8.19	4660	Nil	732	822	610	92	0.06	710	72	129	800	18	0.21	10.8	-2.2	71	13.1
BHARATPUR	Deeg	Deeg1	77.3333	27.4667	7.5	11840	Nil	329	3829	751	65	0.05	2920	456	433	1650	1.64	1.08	8.2	-53.0	55	13.3
BHARATPUR	Deeg	Mandhera	77.3525	27.395	7.72	2600	Nil	476	454	114	240	0.16	1230	120	226	52	2	0.67	7.1	-16.8	9	0.6
BHARATPUR	Roopwas	Dahinagaon	77.4917	26.9958	7.46	2920	Nil	500	432	278	320	0.25	960	140	148	275	9	0.10	5.8	-11.0	39	3.9
BHARATPUR	Bayana	Bandh Bareta	77.3761	26.9044	7.75	670	Nil	354	14	30	2	0.01	290	88	17	25	1.18	0.26	5.2	0.0	16	0.6
BHARATPUR	Sewar	Chiksana	77.6667	27.1833	7.73	3100	Nil	378	659	331	1	0.05	580	116	71	460	7	0.64	4.7	-5.4	63	8.3
BHARATPUR	Kaman	Indroli	77.2833	27.61	8.18	770	Nil	329	78	29	3.7	0.01	370	72	46	20	3	0.50	4.1	-2.0	11	0.4

BHARATPUR	Bharatpur	Bharatpur1	77.5	27.2167	8.03	1160	Nil	317	156	123	1.5	0.04	400	68	56	95	5	0.49	3.1	-2.8	35	2.1
BHARATPUR	Kumher	Kumher	77.3833	27.3167	8.22	750	Nil	232	71	97	2.2	0.11	230	40	32	74	4.3	0.44	3.1	-0.8	42	2.1
BHARATPUR	Bayana	Bhagori_Dw	77.2514	26.9722	7.92	570	Nil	207	57	22	21	0.01	210	56	17	35	4.9	0.22	1.4	-0.8	28	1.1
BHARATPUR	Bayana	Bayana	77.2872	26.9189	7.9	1100	Nil	366	156	18	18	0.02	400	96	39	70	2	0.25	0.5	-2.0	28	1.5
BHILWARA	ASIND	ASIND	74.3347	25.7328	7.67	4890	Nil	488	1290	239	28	1.22	690	128	90	820	18	0.13	160.0	-5.8	72	13.6
BHILWARA	Sahara	POTLAN	74.2174	25.1368	7.23	3460	Nil	274	703	269	287	0.01	910	160	124	362	26	0.46	65.0	-13.7	47	5.2
BHILWARA	Sahara	Mahendragarh	74.3676	25.2614	7.66	1420	Nil	348	113	213	46	0.01	360	64	49	110	88	1.38	45.0	-1.5	49	2.5
BHILWARA	Hurda	GAGEDA	74.55	25.8667	7.92	1560	Nil	336	135	294	6.1	0.12	200	36	27	261	11	0.51	41.0	1.5	74	8.0
BHILWARA	Mandal	Mandal	74.5693	25.4533	7.24	2700	Nil	275	521	294	91	0.01	610	120	75	318	38	2.63	29.0	-7.7	55	5.6
BHILWARA	Hurda	GULABPURA	74.67	25.9	7.02	7000	Nil	415	2056	306	100	1.37	1680	320	214	897	11	0.25	29.0	-26.8	54	9.5
BHILWARA	Asind	Jeewaliya	74.5075	25.5444	7.57	2510	Nil	415	389	329	22	0.01	480	80	68	354	7	1.91	28.0	-2.8	62	7.0
BHILWARA	Mandal	Dahimatha	74.3008	25.5278	7.49	3780	Nil	128	725	696	39	0.01	820	112	131	487	10	1.61	25.0	-14.3	57	7.4
BHILWARA	Raipur	NANGPURA	74.1875	25.4542	7.27	4000	Nil	354	773	574	26	0.01	1540	200	253	209	8	0.38	23.0	-25.0	23	2.3
BHILWARA	Banera	RAILA ROAD	74.6	25.6333	7.45	3730	Nil	234	574	738	112	0.02	440	68	66	646	18	1.03	22.0	-5.0	76	13.4
BHILWARA	Raipur	Raipur	74.1611	25.4036	7.37	2940	Nil	262	532	382	128	0.01	660	100	100	363	20	1.26	21.0	-8.9	55	6.1
BHILWARA	Sahara	SALERA	74.1557	25.204	8.21	1490	Nil	187	213	268	7.04	0.01	300	64	34	202	4.8	1.24	19.0	-2.9	60	5.1
BHILWARA	Shahpura	Taswaria Khurd	74.8	25.5611	7.93	2630	Nil	805	319	202	24	2.25	320	56	44	466	9	0.11	19.0	6.8	76	11.3
BHILWARA	Suwana	HAMIRGARH	74.63	25.1806	7.68	1380	Nil	216	206	187	29	0.11	260	32	44	198	2.8	1.47	18.0	-1.7	63	5.3
BHILWARA	Raipur	PITAKHERA	74.1083	25.385	7.62	1610	Nil	244	262	216	6.67	0.01	350	52	54	200	18	1.31	18.0	-3.0	57	4.6
BHILWARA	Bijoliya	Rampuriya_Pz	75.3288	25.2935	7.34	2130	Nil	403	333	200	67	0.01	580	96	83	224	1.5	0.71	18.0	-5.0	46	4.0
BHILWARA	Sahara	GANGAPUR1	74.2597	25.2167	7.96	1250	Nil	189	198	65	148	0.01	240	40	34	176	5.5	1.55	16.0	-1.7	62	4.9
BHILWARA	Jahazpur	JAHAJPUR	75.275	25.6208	7.91	1800	Nil	275	283	235	36	0.14	390	60	58	227	14	0.01	16.0	-3.3	57	5.0
BHILWARA	Shahpura	KANCHAN-KALA	74.9056	25.7556	7.87	3160	Nil	537	567	342	42	1.42	440	96	49	540	18	0.22	15.0	0.0	73	11.2
BHILWARA	Shahpura	Bhojpur_Pz	74.8571	25.45	7.98	1440	Nil	256	227	167	14	0.01	340	56	49	166	18	1.60	13.0	-2.6	53	3.9
BHILWARA	Sahara	KOSHITHAL	74.182	25.3077	8.09	740	Nil	128	85	128	11	0.01	270	36	44	45	4.3	0.68	13.0	-3.3	28	1.2
BHILWARA	Kotri	PAROLI	75.0917	25.5178	7.37	1120	Nil	159	120	206	55	0.02	360	88	34	88	10	0.61	13.0	-4.6	36	2.0

BHILWARA	Mandalgarh	MANDALGARH1	75.0939	25.1833	7.58	1750	Nil	321	178	278	83	0.01	700	100	109	79	3	0.73	12.0	-8.7	20	1.3
BHILWARA	Jahazpur	AMARWASI	75.3542	25.7	7.83	1410	Nil	342	205	97	36	0.01	240	36	36	207	13	1.01	12.0	0.8	66	5.8
BHILWARA	Jahazpur	BORANI	75.3333	25.6833	7.94	1780	Nil	262	269	217	87	0.01	260	48	34	283	15	0.05	11.0	-0.9	71	7.6
BHILWARA	Kotri	Bhagwanpura	75.055	25.4692	7.89	1120	Nil	159	163	144	59	0.02	200	56	15	159	12	0.49	9.5	-1.4	64	4.9
BHILWARA	Shahpura	SOPURA	74.9	25.6042	7.85	897.7	Nil	390	78	20	10	1.95	220	52	22	110	4.08	0.10	9.2	2.0	53	3.2
BHILWARA	Suwana	Karoi Kalan	74.4251	25.2228	8.13	1050	Nil	201	142	147	2.69	0.01	270	24	51	117	3.6	1.61	8.9	-2.1	49	3.1
BHILWARA	hurda	hurda	74.6881	25.9023	8.12	3460	Nil	976	574	146	35	4.16	270	56	32	700	8	0.04	8.5	10.6	85	18.5
BHILWARA	Suwana	MANDAPIA RS	74.6375	25.2694	7.56	2110	Nil	195	518	139	23	0.01	710	128	95	156	7	0.33	8.0	-11.0	33	2.5
BHILWARA	Kotri	KOTARI	74.8917	25.3972	7.56	1210	Nil	262	135	139	63	0.01	380	64	54	93	19	1.35	7.2	-3.3	37	2.1
BHILWARA	Raipur	Thala_Pz	74.2044	25.4434	7.98	900	Nil	256	64	137	5.09	0.01	270	72	22	79	9.8	1.12	6.3	-1.2	41	2.1
BHILWARA	Kotri	SAWAIPUR	74.8667	25.3069	7.32	3020	Nil	268	468	428	226	0.02	620	112	83	407	8	0.70	6.2	-8.0	59	7.1
BHILWARA	Suwana	KODUKOTA	74.775	25.3706	7.84	600	Nil	159	78	55	1.6	0.02	220	30	35	36	5.1	0.53	5.9	-1.8	28	1.1
BHILWARA	Suwana	SUWANA1	74.7	25.35	8.21	995	Nil	247	78	172	3.05	0.01	300	40	49	90	3.2	0.48	5.2	-2.0	40	2.3
BHILWARA	Asind	BADNOR	74.2833	25.8333	7.69	2960	Nil	256	549	367	137	0.01	940	152	136	242	14	1.21	4.3	-14.6	37	3.4
BHILWARA	Bijoliya	MANGTALA	75.2975	25.3475	7.94	760	Nil	134	128	31	69	0.01	280	68	27	46	1.8	0.50	3.4	-3.4	27	1.2
BHILWARA	Mandalgarh	BIGOD	75.0297	25.2444	7.55	690	Nil	165	92	57	22	0.01	280	68	27	30	2	0.31	3.2	-2.9	19	0.8
BHILWARA	Banera	BANERAMATAJI	74.665	25.4875	7.34	770	Nil	189	71	118	3.97	0.01	320	76	32	24	11	0.28	2.3	-3.3	17	0.6
BHILWARA	Sahara	Sahara	74.2412	25.1894	7.87	1110	Nil	171	142	190	13	0.01	320	52	46	106	3.4	1.15	2.3	-3.6	42	2.6
BHILWARA	Mandalgarh	Ladpura	75.1214	25.1542	7.49	710	Nil	183	43	110	34	0.01	320	56	44	15	2.4	0.61	1.8	-3.4	10	0.4
BHILWARA	Mandalgarh	SALAWATIA	75.2611	25.1139	7.86	390	Nil	73	35	80	1.54	0.01	110	20	15	39	3.1	0.37	1.8	-1.0	45	1.6
BHILWARA	Suwana	SETHORIYA	74.436	25.1921	7.81	550	Nil	177	34	68	11	0.01	150	24	22	58	2.2	0.50	1.5	-0.1	46	2.1
BHILWARA	Mandalgarh	BIJOLIA	75.3228	25.17	7.5	970	Nil	140	163	112	28	0.01	240	56	24	108	11	0.37	1.3	-2.5	51	3.0
BHILWARA	Mandal	malas	74.3294	25.5242	8.24	6420	Nil	244	836	1632	157	0.01	1480	240	214	768	49	1.57	1.1	-25.6	54	8.7
BHILWARA	Mandalgarh	SURAS	74.9375	25.1994	7.65	510	Nil	110	64	62	1.06	0.01	190	40	22	26	3.4	0.26	0.6	-2.0	24	0.8
BHILWARA	Suwana	MCI (Pur)	74.5392	25.2999	7.69	520	Nil	171	64	24	1.98	0.01	210	36	29	21	4.2	0.39	0.5	-1.4	20	0.6
BHILWARA	Bijoliya	PAPARBAR	75.2952	25.0645	7.69	540	Nil	110	71	52	30	0.01	230	52	24	16	5.6	0.09	0.0	-2.8	15	0.5

BIKANER	Dungargarh	Dungargarh	73.9931	28.09	8.21	2790	Nil	927	369	80	32	0.11	80	16	10	599	12	0.66	100.9	13.6	94	29.1
BIKANER	Chhattargarh	Chhattargarh	73.1333	28.6667	8.01	2600	Nil	586	432	188	78	2.50	110	16	17	570	5.16	0.42	**80.0**	**7.4**	**92**	**23.6**
BIKANER	Bikaner	Arjansar	73.88	28.93	8.5	2000	72	476	291	126	10.8	7.35	120	20	17	436	3.86	0.16	**75.0**	**7.8**	**89**	**17.3**
BIKANER	Lunkaransar	Baderan	73.76	28.7	7.92	2630	Nil	464	312	420	60	0.02	150	28	19	550	1.8	13.5	60.6	4.6	89	19.5
BIKANER	Lunkaransar	Manaria	73.77	28.75	7.92	5450	Nil	659	638	1080	480	0.11	380	100	32	1172	40	4.45	54.3	3.2	87	26.1
BIKANER	Bikaner	Karmisar	73.2803	28.0006	7.75	3510	Nil	622	496	240	402	0.11	470	84	63	601	9.4	1.40	47.2	0.8	74	12.1
BIKANER	Lunkaransar	Raner	73.29	28.88	8.02	1060	Nil	480	50	40	29	0.02	50	12	5	222	5.5	2.00	45.0	6.9	91	13.6
BIKANER	Kolayat	Kolayat	72.9619	27.8414	7.92	4810	Nil	781	674	550	310	0.23	320	40	54	952	21	2.20	44.4	6.4	87	23.1
BIKANER	Chhattargarh	Sattasar	73.0803	28.5686	7.75	4300	Nil	256	1248	253	60	1.60	410	56	66	860	6	0.64	30.0	-4.0	82	18.5
BIKANER	Lunkaransar	lodera	73.9108	28.2811	7.94	2250	Nil	512	432	121	14.2	1.80	170	32	22	460	2.95	0.22	30.0	5.0	86	15.3
BIKANER	Lunkaransar	Malkisar	73.92	28.67	7.59	851	Nil	415	71	55	5	0.04	170	12	34	154	3.4	1.40	29.0	3.4	67	5.1
BIKANER	Lunkaransar	kaloo	73.8853	28.3889	8.27	3100	Nil	488	617	187	160	2.50	180	20	32	650	7	2.20	29.0	4.4	89	21.1
BIKANER	Kolayat	Godu	72.3	27.99	7.78	5250	Nil	329	1383	380	70	0.22	460	56	78	1020	5.7	3.50	26.4	-3.8	83	20.7
BIKANER	Lunkaransar	Hariasar	73.81	28.58	7.94	5600	Nil	451	1453	270	120	0.11	400	48	68	1121	1.8	12.6	25.6	-0.6	86	24.4
BIKANER	Kolayat	Bajju	72.51	27.93	8.09	2100	Nil	500	199	320	60	0.08	200	36	27	409	12	12.0	25.2	4.2	82	12.6
BIKANER	Chhattargarh	Sattasar	73.19	28.59	7.58	550.3	Nil	256	57	52	7.2	0.10	170	28	24	80	9.5	0.85	22.5	0.8	52	2.7
BIKANER	Panchoo	Panchoo	73.2122	27.5122	7.96	1890	Nil	403	383	25	55	0.02	220	40	29	332	3.4	0.75	21.3	2.2	77	9.7
BIKANER	Lunkaransar	Lakhansar	73.35	28.87	8.09	2690	Nil	580	420	305	115	0.22	140	20	22	601	32	1.50	17.8	6.7	91	22.1
BIKANER	Khajuwala	Khajuwala	72.5914	28.6931	7.57	11630	Nil	378	3120	1302	4	0.59	1900	260	304	1908	27	0.10	12.8	-31.8	69	19.0
BIKANER	Nokha	Nokha	73.4672	27.5525	8.05	2110	Nil	427	432	40	80	0.10	280	48	39	361	4.8	0.45	10.9	1.4	74	9.4
BIKANER	Lunkaransar	Khirera	73.56	28.48	7.61	1200	Nil	232	99	20	450	0.01	180	36	22	250	0.9	1.00	9.5	0.2	75	8.1
BIKANER	Bikaner	Lakhusar	73.19	28.32	7.81	9370	Nil	329	2552	770	240	0.32	850	280	36	1846	12	3.60	8.9	-11.6	83	27.5
BIKANER	Bikaner	Khara	73.39	28.2	7.5	8850	Nil	378	2552	825	10	0.21	1550	280	207	1488	5.5	0.52	8.6	-24.8	68	16.4
BIKANER	Lunkaransar	Kasturia	73.49	28.33	7.9	854.2	Nil	439	64	30	1	0.01	130	28	15	163	4.3	2.25	6.6	4.6	73	6.2

BIKANER	Lunkaransar	Kharbaro	73.41	28.93	7.72	749.7	Nil	354	64	35	7.2	0.03	50	4	10	169	8	2.20	6.3	4.8	88	10.4
BIKANER	Kolayat	Ranjitpura	72.13	28.03	7.58	2750	Nil	268	596	340	2	0.11	370	64	51	478	7	1.70	4.1	-3.0	74	10.8
BIKANER	Dungargarh	Lakhasar2	73.87	28.1	7.53	4010	Nil	220	1134	170	70	0.25	730	36	156	595	7	1.40	4.0	-11.0	64	9.6
BIKANER	Lunkaransar	Lunkaransar	73.75	28.4917	7.52	3920	Nil	220	920	440	44	0.23	750	132	102	563	7	1.10	3.9	-11.4	62	8.9
BIKANER	Lunkaransar	Binjawari	73.46	28.46	7.61	17320	Nil	256	5885	960	22	0.62	2100	380	280	3415	15	1.35	2.1	-37.8	78	32.4
BIKANER	Kolayat	Mankasar	72.49	28.04	8.24	1370	Nil	549	320	165	1	0.03	120	36	7	425	29	0.50	1.5	6.6	89	16.9
BUNDI	Bonli	BONALI	75.75	25.2667	8.08	922	Nil	403	99	5	11	0.45	130	20	19	164	4.62	2.66	30.0	4.0	74	6.3
BUNDI	Bundi	DELUNDA	75.9958	25.5417	7.94	3500	Nil	964	560	80	227	1.00	910	68	180	430	4.27	0.62	30.0	-2.4	51	6.2
BUNDI	Keshorai Patan	Dahi Khera	75.8667	25.4708	8.23	3000	Nil	854	284	394	33	0.60	410	48	71	520	1.16	1.33	29.0	5.8	73	11.2
BUNDI	Keshorai Patan	KESHORAIPATAN	76.1833	25.6667	8	2730	Nil	720	248	412	14.2	0.60	320	36	56	490	1.49	1.79	29.0	5.4	77	11.9
BUNDI	Keshorai Patan	GAINDOLI	76.0736	25.3911	8.17	1280	Nil	586	113	5	2.2	0.03	240	24	44	190	1.59	2.70	27.0	4.8	63	5.3
BUNDI	Keshorai Patan	MAIJA	75.79	25.4944	8.18	1280	Nil	586	92	33	1.7	0.40	220	20	41	198	1.57	2.00	15.0	5.2	66	5.8
BUNDI	Hindoli	SATUR	75.5582	25.4808	8.21	520	Nil	256	28	23	1.42	0.02	70	16	7	97	0.64	1.80	10.0	2.8	75	5.0
BUNDI	Keshorai Patan	LAKHERI	75.8875	25.4083	7.42	1690	Nil	378	347	10	90	0.20	470	100	54	190	1.5	0.50	7.5	-3.2	47	3.8
BUNDI	Keshorai Patan	KAPREN	75.9306	25.3189	7.92	3200	Nil	622	369	572	1.8	1.30	380	72	49	570	9.6	0.98	7.0	2.6	77	12.7
BUNDI	Talera	BALLOP	76.1667	25.5167	7.67	790	Nil	317	64	17	28	0.65	250	52	29	67	2.8	3.00	4.6	0.2	37	1.8
BUNDI	Bundi	RAJWAS	75.5583	25.4	7.47	1180	Nil	268	234	80	8.2	0.78	400	120	24	106	9	0.37	2.0	-3.6	38	2.3
BUNDI	Bundi	RAMNAGAR (JATAN)	75.5153	25.4372	8.26	444	Nil	183	43	15	1	0.05	160	40	15	30	2.74	0.47	1.3	-0.2	30	1.0
BUNDI	BUNDI	BUNDI	75.6483	25.4326	8.03	415	Nil	159	35	31	1	0.03	130	28	15	37	4.71	0.94	0.0	0.0	40	1.4
CHITTAURGARH	Kapasan	Mungana	74.27	24.88	7.62	1990	Nil	659	213	93	67	0.13	450	64	71	247	7	1.08	29.0	1.8	55	5.1
CHITTAURGARH	Dungla	Dungla	74.3259	24.5117	7.92	1500	Nil	403	163	177	1.68	0.02	200	52	17	253	1.7	1.03	28.0	2.6	73	7.8
CHITTAURGARH	Kapasan	KAPASAN1	74.3083	24.8611	8.01	3590	Nil	384	538	485	266	0.01	830	112	134	442	4.7	0.58	25.0	-10.3	54	6.7
CHITTAURGARH	Rashmi	RASHMI1	74.3625	25.0667	7.61	2260	Nil	329	397	269	24	0.01	630	152	61	230	3.7	0.25	24.0	-7.2	44	4.0
CHITTAURGARH	Chittaurgarh	Purohitokasavat	74.52	24.94	7.66	1270	Nil	427	128	54	58	0.01	460	80	63	82	0.76	0.33	12.0	-2.2	28	1.7

CHITTAURGARH	Dungla	Mahuda	74.3536	24.3572	8.28	630	Nil	207	35	43	61	0.01	280	52	36	14	3.6	0.38	9.3	-2.2	11	0.4
CHITTAURGARH	Gangrar	GANGRAR1	74.6333	25.05	7.75	1820	Nil	226	404	98	60	0.01	430	80	56	216	9	0.91	9.2	-4.9	53	4.5
CHITTAURGARH	Chittorgarh	Chittorgarh	74.6477	24.9079	7.07	810	Nil	238	106	54	1.02	0.11	280	42	43	48	18	0.53	6.9	-1.7	31	1.2
CHITTAURGARH	Bhadesar	BANSEN	74.45	24.7267	7.46	1410	Nil	220	241	86	115	0.01	610	148	58	45	1.2	0.62	6.5	-8.6	14	0.8
CHITTAURGARH	Nimbahera	Nimbahera	74.6628	24.6146	7.64	1060	Nil	244	106	151	27	0.01	460	104	49	34	0.54	0.55	6.4	-5.2	14	0.7
CHITTAURGARH	Chittaurgarh	NAGARI1	74.685	24.95	7.69	1040	Nil	214	134	139	12	0.02	250	48	32	124	0.42	0.13	6.3	-1.5	52	3.4
CHITTAURGARH	Bari Sadari	KALAKHET	74.515	24.28	8.14	880	Nil	244	64	117	30	0.00	180	36	22	120	2.6	1.25	4.7	0.4	59	3.9
CHITTAURGARH	Bhadesar	Bhadesar	74.5127	24.6838	7.82	640	Nil	171	64	79	7.4	0.01	280	46	40	19	2.4	0.41	2.3	-2.8	14	0.5
CHITTAURGARH	Begun	MENAL	75.1667	25.0778	7.75	800	Nil	183	28	196	4.74	0.01	360	72	44	16	4.7	0.34	2.2	-4.2	10	0.4
CHITTAURGARH	Chittaurgarh	Bojunda	74.5889	24.85	7.63	1000	Nil	226	106	147	12	0.01	300	56	39	93	1.8	0.96	1.2	-2.3	41	2.3
CHITTAURGARH	Begun	PARSOLI	74.8875	25.1364	7.58	700	Nil	159	57	122	13	0.01	330	76	34	10	1	0.26	0.6	-4.0	7	0.2
CHITTAURGARH	Bhopalsagar	Bhopalsagar	74.2065	24.8541	7.89	1920	Nil	226	291	339	9.6	0.01	410	56	66	225	51	1.49	0.1	-4.5	57	4.8
CHITTAURGARH	Bhainsrogarh	RAWATBHATA	75.5917	24.9333	7.8	450	Nil	189	50	1	2	0.01	160	48	10	30	4.15	0.43	0.0	-0.1	31	1.0
CHURU	Sardar Sahar	SARDARSHAHAR	74.4858	28.4389	7.88	4450	Nil	1074	596	409	200	0.60	170	12	34	1000	3.71	15.3	320.0	14.2	93	33.3
CHURU	Churu	DUDWA KHARA	75.0792	28.4708	8.01	13620	Nil	1293	3155	1109	800	0.03	1680	336	204	2600	6.0	10.7	260.0	-12.4	77	27.6
CHURU	Sujangarh	Sujangarh	74.4808	27.7069	7.92	11030	Nil	1013	2482	590	850	0.02	700	160	73	2283	12	15.3	250.0	2.6	88	37.5
CHURU	Rajgarh	NEEMA	75.4722	28.4667	8.31	4420	96	830	596	512	250	0.03	300	40	49	980	2.8	3.90	165.0	10.8	88	24.6
CHURU	RAJGARH	RAJGARH1	75.3747	28.6408	7.78	3400	Nil	647	369	215	700	0.02	660	92	105	560	1.76	14.8	110.0	-2.6	65	9.5
CHURU	Taranagar	Taranagar	75.0342	28.6879	8.88	2575	120	634	128	268	150	0.25	120	24	15	546	1.67	3.05	109.4	12.0	91	21.7
CHURU	Sujangarh	Bidasar	74.2831	27.8386	7.73	5210	Nil	390	1205	25	742	0.35	1580	272	219	488	6	0.48	29.0	-25.2	40	5.3
CHURU	Ratangarh	Bhojasar	74.5947	27.9717	7.42	7400	Nil	268	2155	179	550	1.85	1900	200	340	890	47	0.01	29.0	-33.6	51	8.9
CHURU	Ratangarh	Tidiyasar	74.53	28.07	7.56	10720	Nil	293	3191	660	27	0.65	1700	360	195	1723	8	0.65	28.3	-29.2	69	18.2
CHURU	Sardar Sahar	MELUSAR	74.7375	28.5042	7.85	3200	Nil	451	808	89	120	0.06	790	80	143	390	50	0.55	28.0	-8.4	54	6.0

CHURU	Ratangarh	Loha	74.62	28.01	7.82	795	Nil	390	14	20	35	0.15	90	32	2	102	67	1.20	27.8	4.6	77	4.7
CHURU	Bidasar	Bamboo	74.12	27.73	7.89	3740	Nil	183	1007	270	30	0.02	780	176	83	504	6	0.95	26.0	-12.6	59	7.8
CHURU	Sardar Sahar	Aspalsar	74.5044	28.5769	7.59	7620	Nil	439	2021	739	260	0.02	920	40	199	1500	9	0.51	24.0	-11.2	78	21.5
CHURU	Rajgarh	DADREWA	75.2333	28.6694	8.14	14000	Nil	598	3829	1450	205	0.05	1160	88	229	2945	5.6	0.94	23.0	-13.4	85	37.6
CHURU	Churu	Churu	74.9275	28.2955	8.11	7080	Nil	598	1503	1201	83	0.19	1060	48	229	1318	8	1.95	23.0	-11.4	73	17.6
CHURU	Sujjangarh	Guleriya	74.42	27.74	7.89	2560	Nil	586	362	235	210	0.02	370	100	29	456	42	2.20	16.9	2.2	74	10.3
CHURU	Bidasar	Soniyasar	74.0208	27.7631	7.68	4600	Nil	195	1007	828	95	2.45	1560	408	131	440	7	0.26	16.6	-28.0	38	4.8
CHURU	Sardar Sahar	MITTASAR	74.3836	28.4167	8.36	1300	72	281	163	133	23	0.02	90	12	15	302	4.49	1.70	16.0	5.2	88	13.8
CHURU	Sardar Sahar	MEHRASAR	74.5375	28.3572	8.27	4150	Nil	573	865	173	295	0.02	320	36	56	820	11	2.50	14.0	3.0	85	19.9
CHURU	Churu	BINASAR	74.875	28.2625	8	6000	Nil	537	1205	941	90	0.02	800	160	97	1100	4.52	1.13	13.0	-7.2	75	16.9
CHURU	Sardar Sahar	SADASAR	74.35	28.7	8.1	2250	Nil	378	518	133	40	0.04	170	28	24	480	3.64	2.00	12.0	2.8	86	16.0
CHURU	Churu	RAMPURA	74.8625	28.4667	8.01	6600	Nil	256	1659	566	285	0.02	920	176	117	1120	14	0.56	11.0	-14.2	73	16.1
CHURU	Churu	SIRSALA	75.1306	28.4333	8.12	12600	Nil	378	3403	1068	950	0.03	2020	144	404	2235	89	1.15	10.8	-34.2	71	21.6
CHURU	Ratangarh	Ratangarh	74.6039	28.0561	7.87	6450	Nil	476	1820	100	280	0.28	860	96	151	1112	8	0.68	9.4	-9.4	74	16.5
CHURU	Ratangarh	Parihara	74.5619	27.9244	7.54	7120	Nil	354	2084	179	320	1.28	1060	144	170	1160	76	0.62	2.3	-15.4	71	15.5
CHURU	Taranagar	SHAWA	74.8417	28.875	7.83	3000	Nil	244	333	793	42	0.02	1200	200	170	152	3.58	1.27	2.2	-20.0	22	1.9
CHURU	Sultanpur	RATTANPURA	75.2581	28.5347	7.91	1580	Nil	500	113	201	12.7	0.64	250	44	34	250	1.92	1.94	1.0	3.2	69	6.9
DAUSA	Lalsot	Lakhanpur	76.2561	26.52	8.43	1850	108	817	106	26	19	0.19	160	56	5	410	1.44	3.40	125.0	13.8	85	14.1
DAUSA	Dausa	Dausa1	76.3264	26.8983	8.04	3820	Nil	1293	503	179	100	0.02	230	36	34	830	6.0	1.36	100.8	16.6	89	23.8
DAUSA	Mahua	Nahara	76.9303	27.0431	8.04	2070	Nil	671	333	52	26	0.23	410	80	51	313	4.92	0.13	84.0	2.8	63	6.7
DAUSA	Dausa	Bhandarej	76.4	26.8678	7.96	1100	Nil	573	50	27	2	0.20	250	48	32	148	2.57	1.36	43.0	4.4	57	4.1
DAUSA	Mahua	Higetawari Dhani	77.0333	26.9	7.93	4100	Nil	561	666	766	8.8	0.12	510	84	73	780	2.5	0.74	29.0	-1.0	77	15.0
DAUSA	Sikrai	Sikrai	76.6892	26.9192	8.08	2060	Nil	525	383	38	47	0.05	320	72	34	335	1.33	0.25	29.0	2.2	70	8.1
DAUSA	Dausa	Jasuta	76.3333	26.9667	7.68	6000	Nil	939	1347	468	150	0.22	1380	152	243	860	28	2.35	28.0	-12.2	58	10.1

DAUSA	Mahua	Khedla	76.9817	26.9114	8.07	950	Nil	488	50	12	9.2	0.02	260	44	36	104	8	1.50	17.2	2.8	48	2.8
DAUSA	LAWAN	LAWAN1	76.2167	26.7833	7.6	4120	Nil	390	1099	145	69	0.25	690	120	95	635	8	0.50	12.2	-7.4	67	10.5
DAUSA	Dausa	Bapi	76.2917	26.975	7.57	5300	Nil	415	1489	240	7	0.05	1380	136	253	600	12	1.32	10.1	-20.8	49	7.0
DAUSA	Mahuwa	Mahuwa	76.8956	27.0306	7.8	6250	Nil	537	1524	672	18	0.05	1020	128	170	1050	4.41	0.30	8.4	-11.6	69	14.3
DAUSA	Lalsot	Lalsot	76.3289	26.6	8.02	770	Nil	281	92	17	21.3	0.12	280	24	54	50	7	0.12	5.1	-1.0	30	1.3
DAUSA	Bandikui	Bandikui	76.5683	27.0397	7.83	2300	Nil	403	425	68	200	0.02	610	64	109	253	3.14	0.15	2.2	-5.6	48	4.5
DHAULPUR	Saipau	Saipau	77.7464	26.8217	8.03	3240	Nil	1244	411	58	135	0.01	290	32	51	682	1.04	1.45	29.0	14.6	84	17.4
DHAULPUR	Rajakhera	Samaliyapura	78.0917	26.8472	8.15	2730	Nil	1074	255	239	20.7	0.18	380	40	68	517	3.34	0.68	29.0	10.0	75	11.5
DHAULPUR	Rajakhera	Mangraul	77.9583	26.8167	7.8	3100	Nil	817	411	260	117	0.05	290	68	29	610	1.34	0.01	23.3	7.6	82	15.6
DHAULPUR	Bari	Bari1	77.6106	26.6453	7.7	1050	Nil	512	28	82	60	0.12	290	56	36	140	1.84	0.57	12.4	2.6	51	3.6
DHAULPUR	Dhaulpur	Aathmeel	77.8019	26.6483	7.57	1320	Nil	329	156	88	140	0.25	410	108	34	112	42	0.57	8.1	-2.8	42	2.4
DHAULPUR	Dhaulpur	Dhaulpur	77.8917	26.7	7.81	3200	Nil	354	730	130	240	0.34	1210	236	151	200	4.73	0.30	8.0	-18.4	27	2.5
DHAULPUR	Rajakhera	Rajakhera	78.1706	26.9031	7.81	3170	Nil	573	553	414	20	0.29	680	80	117	466	5.54	0.34	6.1	-4.2	60	7.8
DHAULPUR	Baseri	Nakatpura	77.3875	26.5222	7.55	780	Nil	293	85	17	29	0.02	300	84	22	46	2.43	0.28	4.8	-1.2	26	1.2
DHAULPUR	Dhaulpur	Kanthri	77.7167	26.8583	7.52	900	Nil	390	92	11	23	0.01	370	96	32	50	2.9	0.55	4.7	-1.0	23	1.1
DHAULPUR	Bari	Gajpura	77.6906	26.5786	7.62	540	Nil	256	43	7	18	0.02	250	80	12	19	2.79	0.24	4.7	-0.8	15	0.5
DHAULPUR	Baseri	Angai	77.4731	26.605	7.91	1020	Nil	427	99	40	49	0.04	250	64	22	60	150	0.22	2.6	2.0	56	1.6
DHAULPUR	Baseri	Baseri	77.5464	26.7253	8.25	320	Nil	146	21	17	1	0.01	150	44	10	9.5	0.17	0.46	1.2	-0.6	12	0.3
DUNGARPUR	Bichhiwara	RATANPUR	73.45	23.7625	7.94	1570	Nil	232	199	288	12	0.00	330	52	49	209	0.41	0.83	10.0	-2.8	58	5.0
DUNGARPUR	Bichhiwara	NAVAL SHYAM	73.5742	23.8417	7.82	1335	Nil	354	206	54	31	0.00	400	68	56	123	1	1.57	3.8	-2.2	40	2.7
DUNGARPUR	Aspur	ASPUR1	74.0792	23.9583	7.92	770	Nil	256	71	58	11	0.01	210	48	22	78	5.1	1.19	3.2	0.0	46	2.3
DUNGARPUR	Sagwara	NAYAGAON1	74.0417	23.7158	7.98	940	Nil	342	92	52	8.4	0.00	300	52	41	82	0.41	1.19	2.7	-0.4	37	2.1
DUNGARPUR	DOVRA	DOVRA	73.7519	23.6902	7.65	830	Nil	189	135	55	14	0.00	250	60	24	76	2.3	0.19	2.6	-1.9	40	2.1
DUNGARPUR	Bichhiwara	NAYADERA	73.6833	23.8333	7.84	2360	Nil	439	475	132	8.1	0.00	450	80	61	334	5.4	2.44	2.5	-1.8	62	6.8
DUNGARPUR	Dungarpur	MANPUR2	73.7792	23.85	8	1100	Nil	238	149	134	4.4	0.00	350	76	39	85	14	0.50	2.4	-3.1	37	2.0

DUNGARPUR	Aspur	SABLA	74.18	23.8556	7.65	1170	Nil	165	170	196	4.2	0.00	350	60	49	106	5.7	0.41	2.4	-4.3	40	2.5
DUNGARPUR	Dungarpur	HATHAI	73.9008	23.8886	7.82	1065	Nil	329	85	134	1	0.00	370	88	36	74	2.9	0.67	2.3	-2.0	31	1.7
DUNGARPUR	Bichhiwara	GORADA	73.7244	23.6922	7.53	1040	Nil	214	113	154	27	0.00	370	92	34	69	1.1	0.55	2.2	-3.9	29	1.6
DUNGARPUR	Sagwara	Sagwara	74.0281	23.75	7.67	910	Nil	354	57	56	30	0.00	330	68	39	23	60	0.60	2.2	-0.8	28	0.6
DUNGARPUR	GALIAKOT	GALIAKOT	74.0208	23.5213	7.72	1610	Nil	226	293	173	28	0.00	320	44	51	186	64	0.07	2.0	-2.7	60	4.5
DUNGARPUR	Simalwara	Chitri	73.9667	23.5667	7.63	1220	Nil	461	71	120	4.5	0.00	340	52	51	125	1.3	0.86	2.0	0.8	45	2.9
DUNGARPUR	Bichhiwara	Beechiwara	73.5	23.7833	7.84	970	Nil	317	64	98	31	0.00	320	56	44	75	1.8	1.23	1.8	-1.2	34	1.8
DUNGARPUR	Aspur	Ramgarh2	73.9667	23.925	7.87	1800	Nil	226	248	247	132	0.00	480	80	68	193	3.1	0.03	1.6	-5.9	47	3.8
DUNGARPUR	SIMALWARA	SIMALWARA	73.7441	23.5716	7.66	630	Nil	171	74	64	1	0.00	230	52	24	39	2	0.42	1.4	-1.8	28	1.1
DUNGARPUR	Dungarpur	Dungarpur1	73.7208	23.8333	7.46	1120	Nil	244	149	137	5.4	0.00	290	76	24	124	2.1	0.94	1.2	-1.8	48	3.2
DUNGARPUR	Simalwara	KUA	73.9125	23.4667	7.72	1390	Nil	525	64	127	48	0.00	380	84	41	99	79	0.74	1.1	1.0	45	2.2
DUNGARPUR	JHONTHRI	JHONTHRI	73.7519	23.6902	7.64	760	Nil	177	85	92	19	0.12	220	40	29	74	1	1.21	1.1	-1.5	42	2.2
DUNGARPUR	Sagwara	BHILURA	74.0833	23.62	8.14	865	Nil	403	35	30	23	0.01	290	60	34	62	8	0.91	1.1	0.8	33	1.6
DUNGARPUR	Simalwara	PEETH	73.7625	23.5292	7.81	980	Nil	366	99	18	36	0.14	360	96	29	58	6	0.93	0.8	-1.2	27	1.3
DUNGARPUR	Dungarpur	Anteree	73.8478	23.7539	7.83	950	Nil	366	78	40	25	0.00	270	64	27	94	3	0.83	0.5	0.6	44	2.5
DUNGARPUR	Aspur	KABJA	74.07	23.85	7.66	920	Nil	329	35	122	16	0.00	410	64	61	22	3.2	0.26	0.5	-2.8	11	0.5
DUNGARPUR	Bichhiwara	KANABA	73.5667	23.8167	8.02	1500	Nil	220	255	186	12	0.16	360	36	66	179	1	1.12	0.1	-3.6	52	4.1
GANGANAGAR	Ganganagar	Ganganagar	73.8517	29.9087	8.04	2030	Nil	732	78	315	54	0.35	260	36	41	375	9	1.23	420.0	6.8	76	10.1
GANGANAGAR	Sadul Shahar	GANESHGARH	73.9	29.7458	7.58	3300	Nil	378	340	891	34	0.02	650	92	102	500	12	1.98	105.0	-6.8	63	8.5
GANGANAGAR	Suratgarh	Birdhwal1	73.9194	29.1167	8.1	2300	Nil	720	163	200	240	0.15	260	44	36	440	9	1.71	80.0	6.6	79	11.9
GANGANAGAR	Karanpur	Rupnagar	73.4411	29.7958	7.51	2600	Nil	415	234	739	33	0.05	930	188	112	240	19	2.90	60.0	-11.8	37	3.4
GANGANAGAR	Ganganagar	Tatarsar	73.7317	29.7911	7.69	2470	Nil	634	291	325	99	0.05	590	96	85	335	33	3.95	50.0	-1.4	57	6.0
GANGANAGAR	Gharsana	Gharsana	73.0778	29.0251	7.88	8075	Nil	366	922	2556	33	0.43	1250	360	85	1387	23	1.46	45.0	-19.0	71	17.1

GANGANAGAR	Sadulshahar	Sadulshahar	74.1973	29.8973	8.24	2950	Nil	317	269	811	10.1	0.05	610	116	78	383	41	0.20	42.0	-7.0	59	6.7
GANGANAGAR	Suratgarh	Piperan	73.905	29.2333	7.58	1520	Nil	390	220	131	60	0.03	240	40	34	250	34	4.38	30.0	1.6	71	7.0
GANGANAGAR	Sadul Shahar	SURANWALI	73.9167	29.6958	7.65	4350	Nil	134	305	1709	18	0.12	1630	384	163	310	31	3.15	26.0	-30.4	30	3.3
GANGANAGAR	Raisingh Nagar	RAISINGHNAGAR	73.45	29.5417	7.9	2100	Nil	525	241	209	107	0.05	690	116	97	168	18	1.05	24.0	-5.2	36	2.8
GANGANAGAR	Karanpur	KARANPUR1	73.45	29.8167	7.95	2950	Nil	146	255	1005	40	0.01	870	108	146	314	12	3.00	20.0	-15.0	45	4.6
GANGANAGAR	Sri Vijaynagar	Sri Vijaynagar	73.5343	29.2444	8.1	2410	Nil	268	78	891	13.9	0.05	780	120	117	220	11	0.75	19.0	-11.2	39	3.4
GANGANAGAR	Raisingh Nagar	GAJSINGHPURA	73.45	29.6333	8.18	810	Nil	244	71	101	9	0.03	310	56	41	44	8	0.88	12.0	-2.2	25	1.1
GANGANAGAR	Karanpur	KARANPUR1	73.45	29.8167	8.28	3560	Nil	512	709	336	35	0.52	200	72	5	735	4.68	2.00	12.0	4.4	89	22.6
GANGANAGAR	Anupgarh	ANUPGARH1	73.2189	29.1906	7.63	2700	Nil	390	440	204	288	0.40	540	124	56	375	24	0.31	11.0	-4.4	61	7.0
GANGANAGAR	Anupgarh	KHAL	73.3667	29.0833	7.8	1380	Nil	244	163	255	4.4	0.05	450	52	78	108	17	1.90	11.0	-5.0	36	2.2
GANGANAGAR	Suratgarh	LALGARIYA	73.7167	29.1	7.93	350	Nil	159	35	6	2	0.15	150	16	27	16	4.68	0.54	4.0	-0.4	21	0.6
HANUMANGARH	Rawatsar	PALLU	74.2	28.9167	8.11	11180	Nil	708	3013	1103	7.4	0.32	1000	160	146	2300	7	8.75	180.0	-8.4	83	31.6
HANUMANGARH	Sangariya	Sangariya	74.4636	29.8123	7.73	3100	Nil	342	865	62	31	0.23	820	272	34	350	9.0	0.28	120.0	-10.8	49	5.3
HANUMANGARH	Tibi	SALEWALI	74.4875	29.7	8.64	1520	60	171	220	195	13.6	0.22	300	48	44	211	9	1.40	68.0	-1.2	61	5.3
HANUMANGARH	Nohar	BHUKARKA	74.75	29.2333	7.97	1590	Nil	622	170	8	70	0.35	550	24	119	80	75	1.09	30.0	-0.8	33	1.5
HANUMANGARH	Rawatsar	BISRASAR	74.2778	28.8667	8.86	1050	60	281	71	134	62	0.25	230	20	44	152	47	1.90	29.0	2.0	63	4.4
HANUMANGARH	Rawatsar	DUDHAL	74.1333	28.9083	8.23	2000	Nil	622	156	79	320	0.02	200	16	39	400	3.21	0.89	29.0	6.2	81	12.3
HANUMANGARH	Rawatsar	RAWATSAR	74.4139	29.2528	8.02	2170	Nil	354	170	424	150	0.07	300	64	34	352	26	1.35	29.0	-0.2	73	8.8
HANUMANGARH	Tibi	Tibi	74.5056	29.5604	8.31	1200	72	183	99	145	100	0.45	300	32	54	156	5.32	0.69	29.0	-0.6	54	3.9
HANUMANGARH	Suratgarh	Suratgarh	73.9333	29.4667	7.83	890	Nil	476	35	25	8.4	0.03	210	44	24	116	12	1.20	27.0	3.6	56	3.5
HANUMANGARH	Sadulshahar	Kheruwala	74.2347	29.8439	7.47	630	Nil	183	28	122	3.94	0.02	280	60	32	17	4.95	0.55	20.0	-2.6	13	0.4
HANUMANGARH	Hanumangarh	PANDITAWALI	74.2	29.4125	7.56	5630	Nil	244	510	2104	20.5	0.64	1500	208	238	739	22	1.86	20.0	-26.0	52	8.3
HANUMANGARH	Bhadra	MALSISAR	75.0333	28.9708	7.59	2050	Nil	695	262	192	23	0.02	490	72	75	114	330	0.48	17.0	1.6	58	2.2

HANUMANGARH	Bhadra	DUNGRANA	75.0972	29.0139	7.79	14000	Nil	293	3864	1515	300	0.01	1720	88	365	2650	25	0.45	8.8	-29.6	77	27.8
HANUMANGARH	Hanumangarh	Hanumangarh Rau	74.2833	29.6167	7.81	1200	Nil	366	99	120	60	0.15	340	72	39	122	5.6	0.55	8.4	-0.8	44	2.9
HANUMANGARH	Rawatsar	GANDEHALI	74.5333	29.2167	7.69	2500	Nil	464	475	77	240	0.01	620	40	126	310	24	0.20	6.4	-4.8	53	5.4
HANUMANGARH	PILIBANGA	PILIBANGA	74.0858	29.4876	8.32	620	48	195	43	2	7.6	0.16	270	56	32	16	5.9	0.82	5.1	-0.6	13	0.4
HANUMANGARH	Rawatsar	PURABSAR	74.2833	29.0333	7.67	4150	Nil	195	666	912	123	0.05	1800	560	97	136	46	1.47	4.5	-32.8	16	1.4
HANUMANGARH	Bhadra	MUNSARI	75.0333	29.1	7.35	3100	Nil	305	503	104	700	0.05	1010	188	131	280	13	0.26	1.6	-15.2	38	3.8
HANUMANGARH	Bhadra	Bhadra	75.1622	29.1176	7.93	4935	Nil	415	865	1007	32	0.06	700	80	122	884	11	0.14	1.6	-7.2	73	14.5
HANUMANGARH	Sangaria	BOLANWALI	74.4097	29.8375	7.78	3020	Nil	342	482	490	90	0.12	680	120	92	392	11	1.26	1.4	-8.0	56	6.5
HANUMANGARH	Nohar	NOHAR1	74.7667	29.2806	8.27	1050	Nil	244	163	70	25	0.86	200	52	17	120	51	1.00	1.0	0.0	62	3.7
JAIPUR	Sanganer	GONER	75.8994	26.7556	8.54	2210	72	903	213	10	30	4.08	120	12	22	498	2.76	0.65	215.0	14.8	90	19.8
JAIPUR	Phagi	Majhi Renwal	75.6833	26.6958	7.92	8170	Nil	1525	1914	170	270	3.98	900	72	175	1587	5.49	0.28	185.0	7.0	79	23.0
JAIPUR	Chaksu	Tootoli	75.7994	26.6342	7.72	1350	Nil	342	135	110	145	1.66	370	88	36	150	9	0.02	86.0	-1.8	48	3.4
JAIPUR	Chaksu	SHIVDASPURA	75.8903	26.7136	8.04	1190	Nil	317	199	99	10.6	1.38	150	24	22	230	4.84	0.01	80.0	2.2	77	8.2
JAIPUR	Phagi	Chakwara	75.5125	26.6056	8.28	2520	Nil	360	447	265	69	0.02	190	40	22	491	2.2	0.42	75.0	2.1	85	15.5
JAIPUR	Phagi	Chittora	75.7019	26.6381	8.25	2900	Nil	427	468	358	77	0.01	180	36	22	584	2.3	1.72	59.0	3.4	88	18.9
JAIPUR	GOVINDGARH	Kanarpura	75.5717	27.1839	7.55	4810	Nil	451	1170	390	32	0.55	540	100	71	880	5.8	1.40	58.6	-3.4	78	16.5
JAIPUR	Dudu	MOZMABAD	75.3625	26.6833	7.55	4940	Nil	488	1319	186	58	1.64	1030	168	148	670	15	0.41	56.0	-12.6	59	9.1
JAIPUR	Viratnagar	Viratnagar	76.1722	27.4313	7.8	927.2	Nil	268	142	70	10	0.62	270	52	34	108	4.52	0.80	48.0	-1.0	47	2.9
JAIPUR	GOVINDGARH	Alisar	75.5825	27.2344	7.84	2350	Nil	403	440	195	27	0.21	220	48	24	440	3.3	0.95	29.0	2.2	81	12.9
JAIPUR	Govindgarh	Govindgarh	75.6534	27.2399	8.21	1150	Nil	451	128	45	29	0.02	90	12	15	246	2.53	1.10	29.0	5.6	86	11.3
JAIPUR	Phagi	Lasariya	75.5086	26.5572	8.03	6620	Nil	628	1418	639	156	0.01	840	108	139	1134	5.1	1.02	29.0	-6.5	75	17.0
JAIPUR	Dudu	NASNOTA	75.4433	26.8	7.4	6790	Nil	366	2092	364	52	1.44	2680	648	258	450	14	0.55	29.0	-47.6	27	3.8
JAIPUR	Phagi	Tickel	75.5017	26.7064	8.17	1750	Nil	256	262	230	62	0.01	260	40	39	281	4.1	1.12	29.0	-1.0	70	7.6
JAIPUR	Phagi	Chandama	75.66	26.5061	8.12	1480	Nil	549	163	45	23	0.10	210	36	29	245	3.3	0.10	29.0	4.8	72	7.4
JAIPUR	Phagi	Bhojpura	75.6136	26.6222	8.04	3840	Nil	708	837	240	55	3.45	560	68	95	690	3.39	0.05	28.0	0.4	73	12.7

JAIPUR	Chaksu	CHAKSU	75.95	26.6	8.21	1720	Nil	311	113	415	16	0.01	160	32	19	322	3.1	0.22	28.0	1.9	81	11.1
JAIPUR	Phagi	Ladana	75.5864	26.6514	8.34	1930	48	146	241	345	80	0.11	240	32	39	334	2.6	0.46	27.0	-0.8	75	9.4
JAIPUR	Phagi	Choru	75.45	26.5925	8	4320	Nil	439	1078	259	25	1.30	750	108	117	650	9.0	0.13	25.0	-7.8	66	10.3
JAIPUR	Jalsoo	Jalsoo	75.6209	27.1092	8.13	950.2	Nil	360	106	30	15.2	0.03	130	20	19	166	2.66	0.80	22.3	3.3	74	6.3
JAIPUR	BASSI	BASSI2	76.0631	26.8333	7.6	2850	Nil	610	596	45	37	0.20	640	68	114	358	4.51	0.13	18.7	-2.8	55	6.1
JAIPUR	Phagi	Nemeda	75.5136	26.5039	7.4	1760	Nil	390	305	19	165	0.13	640	172	51	110	20	0.13	18.0	-6.4	29	1.9
JAIPUR	GOVINDGARH	DHODSAR	75.6167	27.3028	7.86	1100	Nil	561	35	94	12.8	0.10	210	36	29	185	7	0.70	16.6	5.0	66	5.6
JAIPUR	Phagi	Madhorajpur	75.6558	26.5772	8.08	6910	Nil	281	1035	1612	103	0.01	1140	180	168	1063	6	0.47	16.0	-18.2	67	13.7
JAIPUR	JAMWA RAMGARH	MALAWALA	75.975	27.0028	8.14	1350	Nil	360	241	25	33	0.01	140	24	19	250	3.04	0.60	14.3	3.1	80	9.2
JAIPUR	Kotputli	Kotputli	76.1917	27.7044	8.09	1660	Nil	451	269	80	50	0.21	240	36	36	292	2.31	1.30	13.1	2.6	73	8.2
JAIPUR	Phagi	Didwata	75.73	26.4939	7.92	3000	Nil	622	503	63	330	0.03	780	84	139	320	65	2.00	11.6	-5.4	50	5.0
JAIPUR	Phagi	DAWACH	75.7542	26.5672	7.67	3930	Nil	159	631	828	93	0.01	940	168	126	468	7	1.62	11.0	-16.2	52	6.6
JAIPUR	Chaksu	THALLI	75.8572	26.6125	8.26	1210	Nil	214	99	266	13	0.01	210	32	32	180	3.5	0.42	9.9	-0.7	65	5.4
JAIPUR	GOVINDGARH	Niwana	75.7319	27.2756	8.2	873.8	Nil	476	50	85	27	0.01	150	28	19	196	1.4	0.85	9.4	4.8	74	7.0
JAIPUR	Dudu	SIROHIKHURD	75.15	26.7917	8.32	1170	12	323	92	138	54	0.11	200	40	24	185	1.7	0.64	8.6	1.7	67	5.7
JAIPUR	BASSI	Madhogarh	76.1658	26.7531	7.8	1980	Nil	244	461	135	8.7	0.21	480	136	34	234	4.6	0.25	8.4	-5.6	52	4.6
JAIPUR	PAOTA	Rajnota	76.1922	27.5969	8	1280	Nil	305	230	24	50	0.04	400	84	46	110	2.03	0.42	8.2	-3.0	38	2.4
JAIPUR	Dudu	MANGARWARA	75.2778	26.61	7.53	12410	Nil	366	1843	2912	334	0.01	2950	460	438	1492	9.8	0.62	7.2	-53.0	52	11.9
JAIPUR	JAMWA RAMGARH	Jamwa Ramgarh	76.0119	27.0178	7.9	681	Nil	305	64	30	21	0.10	290	60	34	45	2.8	0.12	6.3	-0.8	26	1.2
JAIPUR	SHAHPURA	Khora Ladkhani	76.0383	27.3031	7.5	620	Nil	280	43	10	15	0.03	240	68	17	32	2.77	0.30	6.0	-0.2	23	0.9
JAIPUR	Shahpura	Shahpura	75.9588	27.3786	7.65	2030	Nil	439	411	65	11	0.01	350	72	41	307	4.09	0.11	5.5	0.2	66	7.1
JAIPUR	JAMWA RAMGARH	Raiser	76.1153	27.1475	7.93	780.2	Nil	439	43	25	12	0.11	250	60	24	96	2.3	0.40	5.2	2.2	46	2.6
JAIPUR	JAMWA RAMGARH	DATAL GURJRAN	76.0667	27.1833	7.92	501.3	Nil	293	21	10	34	0.10	250	48	32	28	2.11	0.40	4.5	-0.2	20	0.8
JAIPUR	Sambher	Sambhar	75.22	26.9061	7.62	6430	Nil	256	943	1473	169	0.07	1380	240	190	843	5.6	1.53	4.2	-23.4	57	9.9
JAIPUR	VIRATNAGAR	Khatolai	76.0214	27.4269	7.83	521.6	Nil	260	28	15	20	0.02	220	44	27	28	2.88	0.14	4.0	-0.1	23	0.8

JAIPUR	JHOTWARA	Jaisingpur Khor	75.8806	26.9448	7.88	1050	Nil	220	135	45	150	0.10	440	104	44	44	3.3	0.16	3.3	-5.2	19	0.9
JAIPUR	Phagi	Parun	75.6067	26.5058	7.57	3600	Nil	586	730	226	150	0.09	930	172	122	420	19	0.45	3.2	-9.0	50	6.0
JAIPUR	Dudu	PALLUKHURD	75.325	26.7361	7.51	11020	Nil	403	1782	2314	311	0.01	2950	460	438	1176	9.9	0.63	2.9	-52.4	47	9.4
JAIPUR	Paota	Paota	76.0766	27.5846	7.76	3150	Nil	500	723	55	150	0.01	590	112	75	466	5.12	0.12	2.1	-3.6	63	8.3
JAIPUR	AMBER	AMBER	75.8667	26.9833	7.82	980	Nil	317	106	80	44	0.23	300	72	29	93	22	0.11	1.5	-0.8	43	2.3
JAIPUR	VIRATNAGAR	Palri	76.1139	27.3447	7.9	564.9	Nil	210	57	20	34	0.62	240	52	27	28	2.65	0.20	1.3	-1.4	21	0.8
JAIPUR	JAMWA RAMGARH	RASALA	76.2025	27.1142	7.96	3150	Nil	659	638	98	36	0.02	500	116	51	492	5.24	1.62	0.0	0.8	68	9.6
JAISALMER	Sankra	Lawan	72.03	26.522	7.89	4000	Nil	830	638	254	191	0.01	900	120	146	506	4	1.36	**24.0**	**-4.4**	**55**	**7.3**
JAISALMER	Sankra	RAJGARH1	71.5447	26.5378	7.78	6810	Nil	622	1205	1042	128	0.01	850	140	122	1167	18	2.44	**23.0**	**-6.8**	**75**	**17.4**
JAISALMER	Sankra	SRIBHADRIA	71.55	27.0833	7.49	5600	Nil	378	1092	875	46	0.01	600	100	85	989	44	0.69	**22.0**	**-5.8**	**79**	**17.6**
JAISALMER	Sam	Tanot	70.22	27.48	7.25	8860	Nil	415	1843	1354	97	0.01	1550	240	231	1317	17	0.52	**18.0**	**-24.2**	**65**	**14.5**
JAISALMER	Sam	Khariakua_DW	70.325	27.7167	7.55	13550	Nil	366	3615	1312	11	0.01	3600	400	632	1449	25	0.51	**15.0**	**-66.0**	**47**	**10.5**
JAISALMER	Sam	Ranau	70.45	27.5933	8.22	2270	Nil	415	320	259	78	0.01	170	24	27	440	7	3.53	**14.0**	**3.4**	**85**	**14.7**
JAISALMER	Sam	RAMA	71.043	26.5528	7.96	2010	Nil	244	482	115	1	0.01	260	56	29	338	8	1.72	**12.0**	**-1.2**	**74**	**9.1**
JAISALMER	Jaisalmer	Sataya_DW	71.6589	27.42	7.69	2980	Nil	476	284	654	13	0.01	440	88	54	468	26	1.82	**11.0**	**-1.0**	**70**	**9.7**
JAISALMER	Sankra	KALEWA	71.9042	26.8056	7.31	6350	Nil	561	1595	363	103	0.01	800	140	109	1058	62	1.67	**11.0**	**-6.8**	**75**	**16.3**
JAISALMER	Jaisalmer	CHANDAN	71.3	26.9917	6.88	3420	Nil	488	432	670	1	0.01	360	88	34	617	8	0.11	**11.0**	**0.8**	**79**	**14.1**
JAISALMER	Sankara	Sankara	71.5818	26.7277	7.146	4600	Nil	488	609	747	319	0.01	620	120	78	765	17	1.91	**10.0**	**-4.4**	**73**	**13.4**
JAISALMER	JAISALMER	GHANTIYALI	71.4631	27.4522	7.87	4590	Nil	366	837	756	29	0.01	360	84	36	886	10	1.06	**10.0**	**-1.2**	**84**	**20.3**
JAISALMER	Sankra	BHAINSARA	71.4917	26.6306	7.6	3120	Nil	500	425	392	175	0.01	540	80	83	463	12	0.57	**8.7**	**-2.6**	**65**	**8.7**
JAISALMER	JAISALMER	Baishaki	70.54	27.02	7.87	2730	Nil	647	397	242	18	0.01	400	80	49	436	15	2.49	**7.0**	**2.6**	**71**	**9.5**
JAISALMER	Jaisalmer	Dhaisar	71.213	26.5415	7.69	1610	Nil	317	198	230	29	0.01	260	64	24	248	8	1.01	**6.3**	**0.0**	**68**	**6.7**
JAISALMER	Sam	KURIA	70.4867	26.6186	7.9	3100	Nil	317	609	394	25	0.01	480	64	78	484	19	1.33	**6.2**	**-4.4**	**69**	**9.6**
JAISALMER	Sam	NATHU KA BERA	70.4153	27.8111	7.69	4790	Nil	281	1134	516	29	0.19	800	140	109	726	14	0.33	**5.3**	**-11.4**	**67**	**11.2**
JAISALMER	Sam	GOTARU	70.0375	27.3167	7.75	3020	Nil	305	567	424	17	0.01	720	128	97	361	5	0.93	**5.2**	**-9.4**	**52**	**5.8**

JAISALMER	Sam	Kodiyasar	71.275	26.4833	7.72	2350	Nil	366	425	257	1	0.01	260	38	40	418	6	2.37	**4.8**	**0.8**	**78**	**11.3**
JAISALMER	Sam	Longewala	71.7667	27.15	7.82	4350	Nil	342	822	702	3.64	0.01	900	160	122	583	10	1.80	**4.8**	**-12.4**	**59**	**8.4**
JAISALMER	Sam	SADEWALA	70.2444	27.6347	7.3	11510	Nil	295	3049	960	252	0.01	1300	280	146	2046	27	1.95	**4.7**	**-21.2**	**78**	**24.7**
JAISALMER	Sankra	LUNA KALAN	71.5708	26.6233	7.71	4670	Nil	671	851	480	76	0.01	400	72	54	871	44	1.12	**4.6**	**3.0**	**83**	**18.9**
JAISALMER	Sam	Kucheri	70.3325	27.0422	7.63	2260	Nil	268	439	248	36	0.01	180	28	27	427	20	1.06	**3.4**	**0.8**	**84**	**13.8**
JAISALMER	JAISALMER	Chodahariya	70.5533	27.06	7.88	4030	Nil	525	780	442	15	0.01	480	80	68	701	10	3.58	**2.7**	**-1.0**	**76**	**13.9**
JAISALMER	Jaisalmer	MOOLSAGAR	70.835	26.9125	8.02	1900	Nil	293	284	246	62	0.01	290	68	29	302	6	1.12	**2.2**	**-1.0**	**70**	**7.7**
JAISALMER	Sankra	GUDI KA TALA	71.6042	26.7625	7.68	2720	Nil	634	284	408	12	0.01	320	60	41	429	86	1.62	**1.7**	**4.0**	**77**	**10.4**
JAISALMER	Jaisalmer	Shekhowala	71.423	27.33	7.72	4430	Nil	268	1078	448	1	0.01	780	168	88	653	14	2.25	**1.1**	**-11.2**	**65**	**10.2**
JAISALMER	Sam	SAM1	70.5233	26.825	7.88	630	Nil	305	28	22	1.62	0.01	200	48	19	23	52	0.23	**0.8**	**1.0**	**37**	**0.7**
JAISALMER	JAISALMER	Jaisalmer	70.9068	26.904	7.83	4670	Nil	500	879	652	1	0.01	1200	144	204	512	21	1.34	**0.1**	**-15.8**	**49**	**6.4**
JALORE	JALORE	BAGRA	72.6	25.1922	7.54	6630	Nil	378	624	2009	35	0.01	1700	340	207	740	8	1.55	**42.0**	**-27.8**	**49**	**7.8**
JALORE	BHINMAL	BHAGALBHIM	72.2227	25.0188	7.91	4900	Nil	305	1120	515	94	0.01	440	72	63	925	2.3	2.89	29.0	-3.8	82	19.2
JALORE	RANIWARA	MAITRIWARA	72.1094	24.7094	7.83	2200	Nil	317	355	286	48	0.01	515	72	81	270	2	1.15	29.0	-5.1	53	5.2
JALORE	BHINMAL	BHINMAL	72.2625	25.0125	8.12	3500	Nil	732	496	416	12	0.01	400	88	44	618	7	2.27	**26.0**	**4.0**	**77**	**13.4**
JALORE	BHINMAL	LATHERMAIL	72.3461	25.0536	7.76	3020	Nil	281	673	286	34	0.01	420	76	56	502	2.2	1.69	**24.0**	**-3.8**	**72**	**10.7**
JALORE	CHITALWANA	DOONGRI	71.4083	24.9417	7.98	2830	Nil	268	312	590	168	0.01	660	148	71	343	9	1.38	**22.0**	**-8.8**	**53**	**5.8**
JALORE	CHITALWANA	HALIVAV	71.5939	24.9911	7.82	7700	Nil	281	1085	1900	146	0.01	1380	388	100	1136	5.3	1.05	**20.0**	**-23.0**	**64**	**13.3**
JALORE	RANIWARA	KAGMALA	72.3	24.8661	8.07	1600	Nil	195	298	108	130	0.01	350	80	36	206	4.9	0.97	**19.0**	**-3.8**	**56**	**4.8**
JALORE	SANCHORE	SANCHORE	71.7946	24.7585	7.66	8500	Nil	366	1333	1889	118	0.01	1380	240	190	1320	4.4	2.19	**19.0**	**-21.6**	**68**	**15.4**
JALORE	BHINMAL	NARTA	72.2748	25.0883	7.36	11500	Nil	537	2233	2040	30	0.01	2550	400	377	1470	9	0.63	**16.0**	**-42.2**	**56**	**12.7**
JALORE	JASWANTPURA	JASWANTPURA	72.4512	24.8176	7.72	1120	Nil	177	191	111	31	0.01	350	84	34	98	1.2	1.95	**12.0**	**-4.1**	**38**	**2.3**
JALORE	BHINMAL	KODI CHAMPAWAT	72.2701	24.9296	8.14	1680	Nil	329	255	186	13	0.01	545	104	69	134	3.4	1.35	**10.0**	**-5.5**	**35**	**2.5**
JALORE	JALORE	JALORE	72.6306	25.3346	7.56	4535	Nil	354	517	770	545	0.01	1220	312	107	451	54	1.76	**8.7**	**-18.6**	**46**	**5.6**
JALORE	RANIWARA	RANIWARA	72.2194	24.7716	8.01	1400	Nil	232	198	160	79	0.01	340	56	49	166	2.3	0.10	**6.8**	**-3.0**	**52**	**3.9**
JALORE	BHINMAL	KHANPUR	72.3538	25.0303	7.77	5690	Nil	305	1149	928	1.2	0.01	820	152	107	930	3.1	1.43	**3.3**	**-11.4**	**71**	**14.1**

JALORE	JALORE	BHAGLI	72.5958	25.2786	7.34	7810	Nil	317	1168	1832	107	0.01	2500	600	243	644	4	0.52	**2.6**	**-44.8**	**36**	**5.6**
JALORE	RANIWARA	HIRPURA	72.1169	24.7678	7.41	860	Nil	293	78	48	30	0.01	260	36	41	76	4.8	1.29	**2.4**	**-0.4**	**40**	**2.0**
JALORE	RANIWARA	DHANAWARA	72.2022	24.9675	7.86	4370	Nil	488	723	726	1.38	0.01	680	128	88	689	8	2.85	**1.0**	**-5.6**	**69**	**11.5**
JALORE	AHORE	GUDABALOTAN	72.8592	25.3403	8.62	860	60	256	92	5	18	0.30	70	12	10	185	0.77	4.47	**0.6**	**4.8**	**85**	**9.6**
JALORE	AHORE	AHORE	72.7936	25.3658	8.45	1530	60	403	191	42	29	0.25	90	12	15	320	0.85	7.00	**0.6**	**6.8**	**89**	**14.7**
JALORE	AHORE	NIMLA	72.8664	25.5308	8.36	4550	72	476	1035	311	66	0.03	210	24	36	950	64	3.40	**0.5**	**6.0**	**91**	**28.5**
JHALAWAR	Jhalara Patan	GANESHPURA	75.9597	24.4833	7.68	2540	Nil	793	440	147	7.32	0.12	580	76	95	390	2.69	0.43	14.8	1.4	59	7.0
JHALAWAR	Jhalara Patan	ANVLIKALAN	75.9153	24.4417	8.35	1070	36	427	28	70	27	0.06	130	20	19	190	3.37	0.98	4.9	5.6	76	7.2
JHALAWAR	Jhalara Patan	DOONGARGAON	76.375	24.4333	7.8	1130	Nil	329	177	42	1.6	0.10	160	40	15	176	20	0.75	4.8	2.2	72	6.0
JHALAWAR	Jhalara Patan	AKTASA	76.3028	24.4875	7.49	1500	Nil	476	206	33	65	0.02	460	80	63	133	15	0.42	3.9	-1.4	40	2.7
JHALAWAR	Jhalara Patan	GAGRON	76.1892	24.6608	7.43	920	Nil	378	71	45	65	0.02	400	100	36	51	0.8	0.65	3.1	-1.8	22	1.1
JHALAWAR	Khanpur	Piplaj	76.6722	24.35	7.82	1600	Nil	549	177	133	32	0.05	430	80	56	200	2.9	0.98	3.0	0.4	50	4.2
JHALAWAR	Manohar Thana	AKLERA	76.5611	24.4125	7.23	1120	Nil	390	149	5	48	0.42	420	48	73	71	0.99	0.47	1.9	-2.0	27	1.5
JHALAWAR	Bakani	ASALPUR	76.5042	24.2708	7.5	900	Nil	342	71	4	90	0.07	410	88	46	22	0.7	0.34	1.7	-2.6	11	0.5
JHALAWAR	Dag	GUNAVI	75.8833	23.995	7.83	1100	Nil	232	199	29	65	0.23	360	96	29	89	1.17	0.41	1.2	-3.4	35	2.0
JHALAWAR	Dag	KARVAN KALA	76.2583	24.5978	7.67	1200	Nil	183	262	36	37	0.05	190	32	27	184	9.8	5.00	1.1	-0.8	68	5.8
JHALAWAR	Jhalara Patan	GURARIYA JOGA	75.8358	24.3667	7.9	1570	Nil	488	177	22	145	0.02	590	88	90	93	0.58	0.73	1.0	-3.8	26	1.7
JHALAWAR	Manohar Thana	SAREDI	76.6722	24.35	7.78	990	Nil	403	43	63	99	0.36	410	56	66	58	2.47	0.68	0.8	-1.6	24	1.2
JHALAWAR	Jhalara Patan	MANDAWAR1	76.8083	24.2333	7.45	2800	Nil	525	596	82	83.5	0.04	900	140	134	240	2.52	0.79	0.7	-9.4	37	3.5
JHALAWAR	Jhalara Patan	JHALAWAR	76.15	24.5333	7.77	1400	Nil	305	241	102	38	0.06	490	96	61	110	2.73	1.26	0.6	-4.8	33	2.2
JHALAWAR	Jhalara Patan	JHALRAPATAN	76.7306	24.2822	7.92	530	Nil	171	78	31	1.7	0.05	210	48	22	34	1.59	0.29	0.4	-1.4	27	1.0
JHALAWAR	Manohar Thana	GAJWARA	76.7728	24.3397	7.58	800	Nil	281	71	22	95	0.02	380	84	41	23	0.86	0.17	0.3	-3.0	12	0.5
JHALAWAR	Jhalara Patan	Nahardi	76.4083	24.6939	7.6	370	Nil	171	21	13	2.4	0.02	150	40	12	16	2.36	0.20	0.2	-0.2	20	0.6
JHALAWAR	Jhalara Patan	BINDA	76.1872	24.4108	7.86	898	Nil	268	106	29	59	0.01	410	116	29	18	1.26	0.52	0.2	-3.8	9	0.4

JHALAWAR	Pirawa	PIRWA	76.1761	24.6161	7.9	835	Nil	73	191	82	1.69	0.04	140	28	17	128	2.28	1.18	0.2	-1.6	67	4.7
JHALAWAR	Jhalara Patan	MISHROLI	76.2	24.4467	7.73	500	Nil	220	50	10	2.5	0.32	200	36	27	28	2.43	0.28	0.2	-0.4	24	0.9
JHALAWAR	Manohar Thana	MANOHAR THANA1	75.8417	24.275	7.7	400	Nil	207	28	5	3.6	0.15	180	44	17	17	1.97	0.22	0.2	-0.2	18	0.5
JHALAWAR	Dag	DAG1	75.8347	23.9489	7.77	730	Nil	220	85	52	45	0.10	270	56	32	58	0.47	1.96	0.0	-1.8	32	1.5
JHALAWAR	Manohar Thana	JHIRI	75.8333	24.1778	8.39	380	36	98	35	13	1	0.01	50	8	7	72	1.21	0.94	0.0	1.8	76	4.4
JHUNJHUNU	ALSISAR	Birmi	75.1778	28.2	8.32	4650	90	360	1050	380	260	0.25	180	20	32	1093	1.8	6.50	350.0	5.3	93	35.4
JHUNJHUNU	Alsisar	Alsisar	75.2931	28.3037	8.13	5780	Nil	964	780	960	52	0.11	570	56	105	1089	2.69	4.20	86.2	4.4	81	19.8
JHUNJHUNU	Jhunjhunu	Jhunjhunu	75.3852	28.1135	8.15	1640	Nil	622	142	60	75	0.11	100	16	15	336	2.06	1.80	67.5	8.2	88	14.6
JHUNJHUNU	CHIRAWA	MANDRELA	75.4397	28.3125	8.31	3050	72	695	461	222	23	0.10	230	28	39	626	1.92	1.10	61.0	9.2	86	18.0
JHUNJHUNU	NAWALGARH	DIGHAL	75.3167	28.0458	8.22	1920	Nil	683	291	25	24	0.11	140	24	19	401	2.3	1.10	46.7	8.4	86	14.7
JHUNJHUNU	NAWALGARH	MUKUNDGARH	75.2167	27.9542	8.16	1650	Nil	537	234	40	62	0.23	170	24	27	317	2.2	0.65	29.4	5.4	80	10.6
JHUNJHUNU	JHUNJHUNUN	JAISINGHPURA	75.2583	28.0556	8.11	1910	Nil	537	312	65	35	0.02	180	28	27	368	1.87	0.55	29.0	5.2	82	11.9
JHUNJHUNU	ALSISAR	CHURELA	75.2583	28.1639	8.06	1640	Nil	488	262	30	35	0.65	140	24	19	319	1.38	1.55	27.4	5.2	83	11.7
JHUNJHUNU	NAWALGARH	MANDASI SANDASI	75.275	27.9958	8.11	1380	Nil	512	184	30	37	0.35	140	24	19	276	1.77	0.75	23.1	5.6	81	10.1
JHUNJHUNU	CHIRAWA	Khudana	75.5222	28.1875	8.12	654.9	Nil	293	28	55	11	0.02	100	24	10	115	1.09	2.90	17.7	2.8	71	5.0
JHUNJHUNU	JHUNJHUNUN	Math	75.4542	28.175	7.97	1680	Nil	342	305	275	105	0.02	260	52	32	374	2.5	0.28	16.6	0.4	76	10.1
JHUNJHUNU	UDAIPURWATI	BADAGAON	75.4964	28.025	7.85	1550	Nil	525	234	24	17	0.11	160	36	17	292	1.9	0.12	15.4	5.4	80	10.0
JHUNJHUNU	Surajgarh	Surajgarh	75.7279	28.3046	7.96	1620	Nil	378	298	45	44	0.11	160	40	15	300	2.3	0.60	11.8	3.0	80	10.3
JHUNJHUNU	Chirawa	Chirawa	75.6504	28.2309	7.97	1360	Nil	354	234	25	48	0.02	220	48	24	211	2.76	0.56	8.8	1.4	68	6.2
JHUNJHUNU	Udaipurwati	Udaipurwati	75.4854	27.7253	7.83	890	Nil	232	149	40	10	0.02	220	24	39	105	4.86	0.40	8.6	-0.6	52	3.1
JHUNJHUNU	Buhana	Buhana	75.8733	28.0241	6.84	180.7	Nil	37	43	10	3	0.04	50	12	5	23	1.2	0.14	4.5	-0.4	51	1.4
JHUNJHUNU	Nawalgarh	Nawalgarh	75.2533	27.8472	7.86	3010	Nil	281	720	70	220	0.65	470	100	54	473	3.06	0.20	4.2	-4.8	69	9.5
JHUNJHUNU	NAWALGARH	Parsarampura	75.3542	27.8122	8.07	645	Nil	190	120	20	20	0.11	200	16	39	75	2.24	0.20	2.5	-0.9	45	2.3
JHUNJHUN	Khetri	Khetri	75.7874	27.9998	7.85	1680	Nil	305	291	165	2	0.25	290	68	29	249	7	0.54	1.5	-0.8	65	6.3

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JODHPUR	Luni	Bhandu kalan Uranium Hotspot	72.9015	26.1294	8.09	13930	Nil	927	4538	1219	200	0.01	1000	100	182	3500	8	9.65	450.0	-4.8	88	48.1
JODHPUR	Luni	Khatawas Uranium Hotspot	72.8027	26.1193	7.94	17900	Nil	1135	5956	1454	70	0.01	1250	200	182	4434	19	3.15	350.0	-6.4	89	54.5
JODHPUR	Pipad City	Kheri Salwa Uranium Hot spot	73.3658	26.4352	8.39	4050	96	732	695	298	220	0.01	280	32	49	906	2.8	8.50	350.0	9.6	88	23.5
JODHPUR	Luni	Dhawa	72.7417	26.0583	8.2	6720	Nil	878	1453	763	110	0.95	300	24	58	1558	7	15.5	145.4	8.4	92	39.1
JODHPUR	Bhopalgarh	Ramdawas	73.3658	26.3658	8.18	7010	Nil	866	2056	144	280	0.01	650	80	109	1539	3.3	4.80	120.0	1.2	84	26.2
JODHPUR	Luni	Khudala	72.8439	26.1209	7.72	22920	Nil	708	8508	642	180	0.01	1800	240	292	5329	15	3.10	105.0	-24.4	87	54.6
JODHPUR	Pipad City	Kukunda Uranium Hotspot	73.3223	26.346	7.85	24290	Nil	671	9359	120	700	0.01	2800	340	474	5356	6	3.87	95.0	-45.0	81	44.0
JODHPUR	Bilara	Binawas Uranium Hotspot	73.3782	26.2907	7.67	16020	Nil	403	5672	627	80	0.01	2900	520	389	2818	19	0.88	90.0	-51.4	68	22.8
JODHPUR	Luni	Raron ki dhani	72.707	26.1944	8.1	13160	Nil	1061	3900	418	190	1.20	750	160	85	2855	11	3.80	77.4	2.4	89	45.3
JODHPUR	Bawari	Gangani	73.2119	26.51	7.82	10680	Nil	817	3049	211	610	0.23	950	140	146	2178	8	4.60	71.2	-5.6	83	30.7
JODHPUR	Bawari	Chabon ki dhani Block HQ	73.1671	26.6314	7.93	4860	Nil	769	1106	163	80	0.54	360	48	58	954	5.6	5.26	65.7	5.4	85	21.9
JODHPUR	Bhopalgarh	Devatra	73.38	26.51	7.78	3590	Nil	781	737	186	85	0.55	590	60	107	621	6	1.52	61.2	1.0	70	11.1
JODHPUR	Luni	Mogra	73.0331	26.1167	7.57	5590	Nil	647	1347	382	300	0.62	500	116	51	1167	30	1.90	59.5	0.6	84	22.7
JODHPUR	Mandore	Hemnagar	72.7817	26.2961	7.74	9060	Nil	671	2836	19	120	0.65	720	96	117	1816	6	3.00	49.2	-3.4	85	29.4
JODHPUR	Luni	Luni	73.0154	26.0102	7.71	15030	Nil	415	4963	1591	36	0.69	1640	240	253	3388	23	2.40	48.0	-26.0	82	36.4
JODHPUR	Bilara	Benan	73.4208	26.3167	8.2	9150	Nil	525	2765	156	380	1.60	230	48	27	2103	7	3.90	47.1	4.0	95	60.3
JODHPUR	Bilara	Olvi	73.4391	26.194	7.95	12650	Nil	573	3758	677	130	0.65	1100	168	165	2512	20	1.20	43.6	-12.6	83	32.9
JODHPUR	Mandore	Karani	72.825	26.2722	8.18	8230	Nil	964	2304	212	115	0.59	420	56	68	1810	4.5	1.63	29.0	7.4	90	38.4
JODHPUR	Mandore	Bisalpur	73.3139	26.2333	7.85	8080	Nil	378	2340	430	140	0.62	1380	320	141	1274	20	0.55	29.0	-21.4	67	14.9

JODHPUR	Luni	Kudi	73.0634	26.2088	8.07	2550	Nil	366	567	222	29	0.22	380	56	58	451	3.81	3.80	29.0	-1.6	72	10.1
JODHPUR	Bhopalgarh	Bhopalgarh Block HQ	73.4984	26.6475	7.76	2650	Nil	390	518	78	260	0.23	380	84	41	442	1.79	0.80	25.4	-1.2	72	9.9
JODHPUR	Mandore	Dangiyawas	73.2829	26.264	7.99	2620	Nil	439	425	259	290	0.66	450	76	63	464	9	1.40	25.3	-1.8	69	9.5
JODHPUR	Samdari	Samdari Block HQ	72.5756	26.8488	7.99	4620	Nil	537	1241	41	80	0.44	220	44	27	955	5.9	2.10	23.3	4.4	90	28.0
JODHPUR	Bawari	Soyla	73.3375	26.8208	7.97	4450	Nil	329	1276	27	190	0.65	570	132	58	771	9	1.45	21.8	-6.0	75	14.0
JODHPUR	Lohawat	LohawatBisna Bass	72.5883	26.9841	7.66	1660	Nil	268	227	224	66	0.01	340	40	58	188	64	0.73	**20.0**	**-2.4**	**59**	**4.4**
JODHPUR	Bhopalgarh	SArgiya Kallan	73.54	26.54	8.02	5300	Nil	512	1461	127	90	0.25	360	56	54	1070	2.99	1.38	19.4	1.2	87	24.5
JODHPUR	Bilara	Bilara Block HQ	73.7106	26.1969	7.71	4430	Nil	427	1078	352	24	0.14	500	89	67	809	3.34	2.00	18.8	-3.0	78	15.7
JODHPUR	Bhopalgarh	Daarmi	73.6397	26.7339	7.8	5096	Nil	427	1560	32	30	0.35	540	116	61	950	7	2.10	14.3	-3.8	79	17.8
JODHPUR	Bhopalgarh	Kumhara	73.5349	26.7296	8	3060	Nil	366	865	41	31	0.62	520	108	61	488	9.0	0.99	14.2	-4.4	67	9.3
JODHPUR	Bhopalgarh	Aartiya khurd	73.4127	26.5458	7.88	811	Nil	329	64	49	25	0.12	210	52	19	103	2.78	1.29	10.4	1.2	52	3.1
JODHPUR	Phalodi	Kolu	72.18	26.55	7.94	3600	Nil	464	340	896	5.1	0.12	500	64	83	595	8	0.67	**9.6**	**-2.4**	**72**	**11.6**
JODHPUR	Bilara	Borunda	73.7958	26.4692	7.57	5900	Nil	317	1595	480	29	0.12	710	144	85	1068	4.5	1.20	9.2	-9.0	77	17.4
JODHPUR	Bap	Bap	72.3462	27.3645	7.24	7870	Nil	512	1985	668	19	0.01	1140	200	156	1282	7	0.93	**8.9**	**-14.4**	**71**	**16.5**
JODHPUR	Pipad City	Pipad City	73.5497	26.3792	7.59	3780	Nil	586	744	218	240	0.22	530	84	78	653	5.6	1.40	8.4	-1.0	73	12.3
JODHPUR	Shekhala	ShekhalaGawn	72.3955	26.539	7.44	2380	Nil	317	391	335	32	0.01	480	88	63	305	40	1.31	**7.3**	**-4.4**	**60**	**6.1**
JODHPUR	Phalodi	Phalodi	72.3783	27.1225	7.69	1760	Nil	305	206	314	8.9	0.01	280	36	46	274	7	1.71	**7.1**	**-0.6**	**68**	**7.1**
JODHPUR	Bapini	Bapini	72.9827	26.9936	7.98	1310	Nil	439	106	134	5.85	0.01	230	28	39	193	7	0.29	**7.0**	**2.6**	**65**	**5.5**
JODHPUR	Osian	Osian	72.8964	26.7411	7.72	4510	Nil	354	922	598	45	0.01	560	96	78	777	6	1.51	**6.0**	**-5.4**	**75**	**14.3**
JODHPUR	Osian	Jhakan	73.09	27.01	7.88	2110	Nil	451	340	182	13	0.01	300	64	34	346	4.1	1.27	**4.9**	**1.4**	**72**	**8.7**
JODHPUR	Bap	NokhraCharna	72.89	27.23	7.41	5030	Nil	366	1163	534	18	0.01	860	160	112	754	14	1.47	**4.8**	**-11.2**	**66**	**11.2**
JODHPUR	Shergarh	Nahar Singh Nagar	72.2861	26.3897	7.76	5110	Nil	329	1319	356	64	0.01	660	104	97	868	8	0.74	**4.6**	**-7.8**	**74**	**14.7**
JODHPUR	Balesar	Balesar	72.4908	26.4023	7.45	2255	Nil	342	412	148	135	0.01	580	176	34	250	4	0.56	**3.5**	**-6.0**	**49**	**4.5**
JODHPUR	Mandore	Rajwa	72.84	26.33	7.5	2350	Nil	317	326	91	443	0.01	800	152	102	167	10	0.38	**2.2**	**-10.8**	**32**	**2.6**
JODHPUR	Shergarh	Shergarh	72.2794	26.3198	7.81	4530	Nil	354	794	789	36	0.01	400	80	49	856	5.5	1.08	**1.9**	**-2.2**	**82**	**18.6**

JODHPUR	Bilara	Bhavi	73.6067	26.2317	8.25	3660	Nil	842	624	328	75	0.06	160	28	22	840	3.08	6.60	1.5	10.6	92	28.9
JODHPUR	Tinwari	Tinwari	72.8836	26.5447	7.81	1000	Nil	281	56	144	48	0.01	280	76	22	100	5	0.62	**1.5**	**-1.0**	**44**	**2.6**
JODHPUR	Balesar	KuiJodha	72.4706	26.4433	7.85	740	Nil	329	35	33	19	0.01	250	24	46	52	6	0.34	**0.6**	**0.4**	**33**	**1.4**
JODHPUR	PALI	PALI	73.1445	26.1485	8.1	1000	Nil	317	113	96	43	0.07	200	32	29	165	1.82	2.17	**0.6**	**1.2**	**64**	**5.1**
JODHPUR	Luni	Bujawar	72.9083	26.225	7.86	503.1	Nil	232	43	1	7.4	0.05	190	68	5	29	4.4	0.21	0.4	0.0	27	0.9
JODHPUR	Dechu	DechuPz	72.3277	26.7714	7.72	6230	Nil	415	1341	835	12	0.01	780	120	117	1064	18	0.30	**0.3**	**-8.8**	**75**	**16.6**
JODHPUR	PALI	ROHIT	73.1603	26.1485	7.42	1280	Nil	232	206	243	42	0.35	110	16	17	300	9.8	2.40	**0.0**	**1.6**	**86**	**12.4**
KARAULI	Hindaun	Islampur	77.0167	26.7	8.1	4800	Nil	1098	794	310	270	0.19	700	72	126	860	0.79	3.25	77.0	4.0	73	14.1
KARAULI	Hindaun	Badh Kamla	76.925	26.6931	7.7	3500	Nil	586	525	317	250	0.26	600	80	97	510	37	1.35	71.3	-2.4	66	9.1
KARAULI	Nadauti	Sahar1	76.7114	26.6083	7.5	9900	Nil	354	1666	2040	1450	0.20	2220	384	306	1700	16	0.25	49.2	-38.6	63	15.7
KARAULI	Nadauti	Nadauti	76.6886	26.7175	8.1	2650	Nil	720	404	234	33	0.09	510	56	90	330	160	0.52	29.0	1.6	64	6.4
KARAULI	Hindaun	Gurla1	77.0042	26.6417	7.7	1020	Nil	439	99	34	65	1.90	370	60	54	100	2.87	0.90	14.2	-0.2	37	2.3
KARAULI	Karauli	Karsai	76.9333	26.425	7.14	6500	Nil	220	1418	278	1350	0.05	2620	712	204	430	4.93	0.12	11.2	-48.8	26	3.7
KARAULI	Karauli	Bhauapura	77.1822	26.5419	7.51	1200	Nil	378	184	36	4.17	2.28	270	76	19	155	13	4.00	9.0	0.8	57	4.1
KARAULI	Karauli	Keladevi	76.9333	26.3247	7.57	1150	Nil	403	135	70	5.82	0.10	420	96	44	79	8	0.70	8.7	-1.8	30	1.7
KARAULI	Todabhim	Todabhim	76.8211	26.8958	7.85	1370	Nil	390	220	104	10	0.22	390	96	36	162	5.54	0.70	8.1	-1.4	48	3.6
KARAULI	Hindaun	Hindaun	77.0333	26.7333	7.92	1780	Nil	634	241	75	19	0.26	380	84	41	230	59	0.39	7.8	2.8	60	5.1
KARAULI	Karauli	Bijalpur	76.8997	26.4675	7.66	900	Nil	500	35	56	23.4	0.15	320	76	32	94	12	0.40	5.3	1.8	41	2.3
KARAULI	Sapotra	Naroli Dang	76.6833	26.325	7.69	900	Nil	256	92	4	160	0.07	300	72	29	79	2.74	0.38	5.0	-1.8	37	2.0
KARAULI	Karauli	Lauhra	76.8461	26.3311	7.52	880	Nil	378	78	41	35	0.07	410	108	34	38	1.17	0.38	4.1	-2.0	17	0.8
KARAULI	Sapotra	Mandral	77.2422	26.3111	7.99	820	Nil	439	21	42	42	0.05	370	68	49	44	3.57	0.50	3.6	-0.2	21	1.0
KARAULI	Karauli	Karauli	77.0172	26.5014	8.13	4170	Nil	488	780	341	250	0.13	150	28	19	890	1.08	10.4	3.4	5.0	93	31.6
KARAULI	Karauli	Mamachari	76.95	26.4333	7.72	460	Nil	244	21	22	1.12	0.01	190	20	34	29	1.38	0.14	3.4	0.2	25	0.9
KARAULI	Sapotra	Sapotra1	76.7697	26.2794	7.78	950	Nil	464	64	10	65	0.02	380	80	44	71	2.07	0.47	0.7	0.0	29	1.6
KOTA	Itawa	GAINTA	75.8294	25.2233	8.19	1300	Nil	659	50	62	19	0.03	290	28	54	184	2.47	0.77	16.3	5.0	58	4.7
KOTA	Ladpura	GUDLI	75.9656	25.1211	8.08	1220	Nil	512	106	27	29	0.13	420	44	75	94	1.07	0.94	14.2	0.0	33	2.0
KOTA		ITAVA	76.3782	25.5387	8.14	1020	Nil	622	35	5	20	0.03	100	20	12	222	0.98	0.57	13.2	8.2	83	9.7
KOTA	Ladpura	KHERARASULPUR	75.85	25.1833	7.78	710	Nil	256	78	48	3.7	0.40	230	24	41	65	4.5	0.56	12.7	-0.4	39	1.9

KOTA	Sultanpur	DIGOD1	76.31	25.5758	7.82	2150	Nil	647	92	400	5.2	0.65	320	56	44	350	3.2	0.87	9.3	4.2	71	8.5
KOTA	Itawa	AYANA	75.7	25.0208	8.06	1550	Nil	488	64	250	32	0.01	180	44	17	275	1.58	0.86	8.3	4.4	77	8.9
KOTA	Ladpura	GIRDHARPURA	75.9153	25.2658	7.88	2530	Nil	525	610	18	26	0.15	560	72	92	355	1.28	0.82	7.8	-2.6	58	6.5
KOTA	Sangod	RAJGARH1	76.3	25.3667	7.86	1235	Nil	488	71	160	25	0.15	370	64	51	146	2.63	1.08	6.2	0.6	46	3.3
KOTA		BHAWaNIMANDI	76.4347	25.4458	7.84	1340	Nil	378	142	123	89	0.32	630	64	114	38	0.24	0.39	3.8	-6.4	12	0.7
KOTA		RAMGANHMANDI	75.9431	24.6469	7.6	1240	Nil	464	142	15	33	0.02	480	96	58	65	2.51	0.22	3.2	-2.0	23	1.3
KOTA		KANPUR	76.4347	25.4458	7.27	1100	Nil	354	177	8	20	0.23	400	92	41	75	3.28	0.63	2.0	-2.2	29	1.6
KOTA	Ladpura	KOTA1	76.205	25.1	7.63	450	Nil	195	35	17	2.3	0.04	170	36	19	25	5.16	0.18	0.6	-0.2	26	0.8
KOTA		BAKANI	75.9067	25.0408	7.68	1010	Nil	366	121	5	67	0.65	430	92	49	45	2.18	0.25	0.5	-2.6	19	0.9
KOTA	Ladpura	BORAWAS	76.0889	25.2417	7.63	580	Nil	220	64	11	17	0.04	190	60	10	24	42	0.22	0.0	-0.2	36	0.8
NAGAUR	Parbatsar	Bagot	74.5911	26.8131	8.1	5410	Nil	598	1276	44	500	0.01	520	48	97	1020	5.8	1.75	450.0	-0.6	81	19.5
NAGAUR	Degana	Chosli	74.255	26.9297	8.18	5200	Nil	793	1134	150	250	0.45	340	52	51	1048	2.37	4.80	236.0	6.2	87	24.7
NAGAUR	Degana	Degana	74.3547	26.8181	8.1	9240	Nil	805	2623	314	25	0.95	540	56	97	1919	3.2	2.50	92.6	2.4	89	35.9
NAGAUR	Merta	Dagawas Block HQ	74.058	26.6458	7.71	8700	Nil	732	2482	613	60	0.95	580	64	102	1938	3.14	3.10	58.8	0.4	88	35.0
NAGAUR	Didwana	Raghunathpura	74.5167	27.3753	7.92	5500	Nil	769	1383	614	102	0.55	370	36	68	1344	12	1.18	54.0	5.2	89	30.4
NAGAUR	Datau	Datau	74.4567	27.4906	7.87	3620	Nil	586	482	143	800	0.01	640	72	112	602	8	1.20	50.0	-3.2	67	10.3
NAGAUR	Jayal	Jayal Block HQ	74.1863	27.2186	7.9	4210	Nil	488	837	708	60	0.11	390	52	63	910	4.68	2.80	47.3	0.2	84	20.0
NAGAUR	Didwana	Singhana	74.5125	27.4753	8.06	3710	Nil	683	752	385	130	0.22	560	56	102	717	9	0.85	45.9	0.0	74	13.2
NAGAUR	Nagaur	Nagaur	73.75	27.1833	7.36	7500	Nil	293	1347	1580	380	0.66	1300	348	105	1285	7	2.70	43.9	-21.2	68	15.5
NAGAUR	Makrana	Makrana	74.7574	27.0256	7.77	1820	Nil	354	376	34	80	0.22	310	52	44	280	5.09	1.20	29.1	-0.4	66	6.9
NAGAUR	Ladnu	Sanward	74.5167	27.5167	7.74	3240	Nil	525	610	259	270	0.35	480	72	73	594	7	0.89	27.5	-1.0	73	11.8
NAGAUR	Parbatsar	Parbatsar Block HQ	74.7583	26.8847	8.14	1110	Nil	512	92	28	35	0.04	190	36	24	192	3.27	1.40	21.4	4.6	69	6.1
NAGAUR	Mundawa	Mundawa Block HQ	73.82	27.058	8.19	2200	Nil	525	255	222	198	0.65	250	40	36	432	2.34	3.20	20.3	3.6	79	11.9
NAGAUR	Riyan	Rian	74.25	26.5333	8.64	1260	48	305	170	75	2	0.11	60	12	7	274	1.71	2.25	13.7	5.4	91	15.4
NAGAUR	maulasar	Maulasar Block HQ	74.7382	27.2966	8.13	1600	Nil	464	262	262	28	0.14	270	36	44	356	3.22	0.76	12.9	2.2	74	9.4
NAGAUR	Ladnu	Ladnu	74.3908	27.6296	7.81	6200	Nil	342	152	434	520	0.66	970	16	13	993	138	1.30	9.3	-	71	13.9

		Block HQ							4					4	6					13.8		
NAGAUR	Kuchaman city	Kuchaman Block HQ	74.8591	27.1483	7.58	5410	Nil	390	1064	64	1350	0.55	1100	160	170	833	54	0.95	8.3	-15.6	63	10.9
NAGAUR	Nawa	Nawa	75.0021	27.0329	7.47	6710	Nil	305	2021	634	90	0.74	1060	200	136	1276	2	0.60	7.8	-16.2	72	17.0
NAGAUR	Didwana	Koliya	74.4833	27.3458	7.62	1440	Nil	342	262	12	90	0.12	440	72	63	122	25	0.90	5.8	-3.2	40	2.5
NAGAUR	Kheevsar	Kheevsar Block HQ	73.414	26.9647	7.82	8980	Nil	305	2659	506	21	0.95	1080	216	131	1595	5.02	2.45	4.7	-16.6	76	21.1
NAGAUR	Nagaur	Choti khatu	74.3458	27.1542	7.55	2080	Nil	329	369	28	480	0.65	780	136	107	195	3.71	0.60	4.0	-10.2	35	3.0
NAGAUR	Makrana	Rani gaon	74.4231	27.0889	7.72	333.4	Nil	122	35	24	4	0.06	120	28	12	25	4.48	0.40	2.1	-0.4	33	1.0
NAGAUR	Parbatsar	Rohindi	74.7092	26.8358	8.19	2300	Nil	403	397	456	20	0.01	210	40	27	535	9.9	0.95	0.0	2.4	85	16.0
PALI	Sojat	Kariasoda	73.6375	25.8333	8.17	3060	Nil	1000	362	413	4.2	0.11	340	40	58	657	1.17	1.80	75.3	9.6	81	15.5
PALI	Jaitaran	Bassi	74.0631	26.3294	8.15	1040	Nil	525	78	35	7	0.02	140	20	22	209	1.73	5.50	44.4	5.8	77	7.7
PALI	Jaitaran	Prathvipura	73.8167	26.2	8.04	5950	Nil	1098	1383	349	90	0.05	510	40	100	1273	13	2.60	29.0	7.8	85	24.5
PALI	RANI	RANI	73.3158	25.3425	7.65	4580	Nil	500	468	1152	17	0.16	1250	260	146	472	11	1.94	**28.0**	**-16.8**	**45**	**5.8**
PALI	Marwar Junction	Marwar Junction Block HQ	73.601	25.723	7.56	2970	Nil	451	581	286	120	0.22	640	108	90	431	9	0.75	24.5	-5.4	60	7.4
PALI	Sojat	Sojat Block HQ	73.6698	25.9283	8.19	5490	Nil	403	1843	13	21.1	0.40	380	84	41	1186	4.77	1.25	12.6	-1.0	87	26.5
PALI	DESURI	DESURI	73.5582	25.2763	7.9	2220	Nil	244	532	106	60	0.25	570	88	85	245	8	1.58	**3.5**	**-7.4**	**49**	**4.5**
PALI	BALI	RADAWAS	73.2917	25.1833	8.86	1250	72	354	149	18	34	0.09	120	8	24	250	7	2.00	**0.6**	**5.8**	**82**	**9.9**
PALI	DESURI	SADRI	73.4625	25.1792	8.08	520	Nil	232	35	3	28	0.05	210	36	29	26	3.11	1.13	**0.6**	**-0.4**	**22**	**0.8**
PALI	DESURI	GHANERAO	73.525	25.2333	8.5	2300	96	610	319	43	28	0.26	240	52	27	435	1.26	3.50	**0.6**	**8.4**	**80**	**12.2**
PALI	BALI	PERVA	73.2162	25.1583	8.06	780	Nil	256	92	31	42	0.08	240	36	36	63	27	1.30	**0.6**	**-0.6**	**42**	**1.8**
PALI	SUMERPUR	BALWANA	73.1586	25.1142	7.77	1340	Nil	183	191	73	217	0.02	300	68	32	172	1.95	1.32	**0.6**	**-3.0**	**56**	**4.3**
PALI	RANI	KIRWA	73.2583	25.4958	8.7	3520	84	598	588	288	3.4	0.05	70	12	10	780	4.52	2.54	**0.5**	**11.2**	**96**	**40.5**
PALI	SUMERPUR	NIMBORNATH	73.1625	25.2292	7.98	1850	Nil	171	440	154	15	0.40	480	92	61	200	16	1.05	**0.5**	**-6.8**	**49**	**4.0**
PALI	BALI	BALI	73.2832	25.1911	7.64	2020	Nil	342	355	85	180	0.06	510	56	90	220	23	0.82	**0.5**	**-4.6**	**50**	**4.2**
PALI	SUMERPUR	SUMERPUR	73.0907	25.1437	8.5	2400	96	464	404	62	19	0.15	260	24	49	435	1.29	6.14	**0.5**	**5.6**	**78**	**11.7**
PALI	PALI	GUNDOJ	73.3125	25.6083	7.95	8930	Nil	159	2021	426	1340	0.03	2260	416	297	940	160	1.15	**0.4**	**-42.6**	**50**	**8.6**
PALI	ROHAT	VAED	72.9667	25.7224	7.83	7920	Nil	329	1843	1133	340	0.40	1180	168	185	1350	170	2.83	**0.2**	**-18.2**	**73**	**17.1**

PALI	DESURI	RANAKPUR	73.4725	25.1164	8.28	590	Nil	268	50	1	4.6	0.09	180	24	29	51	6	1.40	**0.0**	**0.8**	**40**	**1.7**
PRATAPGARH	Pratapgarh	Kushalpura	74.68	23.88	8.22	410	Nil	140	43	5	16	0.02	80	20	7	53	1.8	0.70	9.309	0.695	59	2.6
PRATAPGARH	Pratapgarh	Motikheri	74.73	23.9	7.57	720	Nil	305	35	25	36	0.02	300	76	27	27	0.7	0.32	8.219	-1.000	17	0.7
PRATAPGARH	Peepalkhoont	Pipli Chowk Ghantiyali	74.6428	23.7728	7.96	960	Nil	378	85	38	12	0.00	350	84	34	56	9	0.53	2.8	-0.8	28	1.3
PRATAPGARH	Peepalkhoont	Peepalkhoont	74.5667	23.7958	7.74	820	Nil	256	57	67	61	0.00	290	52	39	56	1.1	0.03	2.1	-1.6	30	1.4
PRATAPGARH	Pratapgarh	Suhagpura	74.7072	23.9147	7.57	1760	Nil	195	376	186	5.47	0.08	260	80	15	285	10	1.10	2.0	-2.0	71	7.7
PRATAPGARH	Arnod	Ninor	74.8664	23.625	7.84	1100	Nil	378	113	52	30	0.00	300	48	44	115	1	0.62	1.2	0.2	46	2.9
PRATAPGARH	Pratapgarh	Punga Talab	74.575	24.075	7.72	700	Nil	281	50	36	14	0.01	300	84	22	23	1	0.24	1.2	-1.4	15	0.6
PRATAPGARH	Arnod	Arnod_Pz	74.8125	23.9	7.15	1210	Nil	244	184	78	76	0.00	310	68	34	133	6	0.59	0.7	-2.2	49	3.3
PRATAPGARH	Peepalkhoont	Lamba Dabra	74.6378	23.8439	8.23	510	Nil	159	57	41	1	0.11	100	20	12	70	2.6	0.06	0.6	0.6	61	3.0
PRATAPGARH	Pratapgarh	Barawarda	74.7028	24.1817	7.5	600	Nil	159	43	100	4	0.00	240	60	22	27	1.1	0.41	0.4	-2.2	20	0.8
PRATAPGARH	Dhariyawad	Jawahar Nagar	74.4797	24.0925	7.86	710	Nil	207	53	72	40	0.00	310	62	38	20	1.3	0.55	0.4	-2.8	13	0.5
PRATAPGARH	Pratapgarh	Datla Kund	74.72	23.96	7.87	680	Nil	250	71	2	32	0.02	300	84	22	19	0.3	1.60	0.315	-1.902	12	0.5
PRATAPGARH	Pratapgarh	Pateliya	74.69	23.91	7.44	260	Nil	98	14	26	28	0.06	140	32	15	7.1	0.4	0.20	0.305	-1.200	10	0.3
PRATAPGARH	Pratapgarh	RAJPURIA	74.9775	24.0333	8.34	1220	36	378	106	84	1	0.00	170	32	22	202	2.4	0.46	0.2	4.0	72	6.7
PRATAPGARH	Pratapgarh	Pratapgarh	74.7833	24.0353	7.84	840	Nil	256	78	85	13	0.00	360	80	39	29	0.3	0.14	0.2	-3.0	15	0.7
PRATAPGARH	Chhotisadri	Choti Sadri	74.7	24.3861	7.63	970	Nil	268	43	146	62	0.00	410	80	51	34	1.2	0.55	0.1	-3.8	16	0.7
PRATAPGARH	Pratapgarh	Devgarh	74.6586	24.0339	7.66	1340	Nil	256	241	98	19	0.00	430	96	46	109	5.2	0.59	0.0	-4.4	36	2.3
PRATAPGARH	Dhariyawad	Dhariwad	74.4583	24.0958	7.91	965	Nil	354	78	43	43	0.00	370	92	34	52	1.1	0.49	0.0	-1.6	24	1.2
PRATAPGARH	Chhotisadri	Dholapani	74.675	24.2667	7.92	830	Nil	342	57	48	2.62	0.00	250	60	24	75	3.8	0.79	0.0	0.6	40	2.1
PRATAPGARH	Arnod	Moheda	74.8583	23.775	7.72	1280	Nil	317	135	102	99	0.00	430	80	56	96	1.2	0.19	0.0	-3.4	33	2.0
PRATAPGARH	Pratapgarh	Mokhampura	74.8753	24.0242	7.86	1150	Nil	268	170	62	60	0.00	370	80	41	94	1.1	0.21	0.0	-3.0	36	2.1

PRATAPGARH	Dhariyawad	Mungana	74.4347	23.96	7.52	1310	Nil	317	191	62	73	0.00	410	92	44	110	5	0.54	0.0	-3.0	37	2.4
RAJSAMAND	Railmagra	Oda 1	74	25.03	7.69	2970	Nil	866	432	154	3.11	0.01	410	72	56	490	8	0.89	95.0	6.0	72	10.5
RAJSAMAND	Amet	NADIAWALA	73.8631	25.2028	7.26	3120	Nil	201	709	374	1	0.06	740	156	85	377	1.3	1.08	44.0	-11.5	53	6.0
RAJSAMAND	Deogarh	Deogarh	73.9058	25.5286	8.15	855	Nil	232	120	55	5.4	0.01	250	36	39	81	2.8	1.73	42.0	-1.2	42	2.2
RAJSAMAND	Bhim	Bhim	74.0792	25.7433	7.59	3180	Nil	293	638	414	13	0.01	630	24	139	437	9.8	2.61	29.0	-7.8	60	7.6
RAJSAMAND	Railmagra	GAVARDI	74.1	24.9039	7.69	3820	Nil	494	581	619	47	0.01	860	144	122	484	2.2	1.72	29.0	-9.1	55	7.2
RAJSAMAND	Amet	Gugli	73.88	25.23	7.55	3430	Nil	342	688	444	1	0.01	470	56	80	566	14	0.22	29.0	-3.8	73	11.4
RAJSAMAND	Rajsamand	MOKAMPURA	73.85	25.1308	7.65	2850	Nil	537	340	456	36	0.03	990	168	139	186	27	0.25	28.0	-11.0	31	2.6
RAJSAMAND	Amet	Amet	73.9215	25.3016	7.78	2850	Nil	586	354	417	7.76	0.01	910	144	134	235	3.6	1.40	18.0	-8.6	36	3.4
RAJSAMAND	Kumbhalgarh	JHILWARA	73.6708	25.2272	7.61	1210	Nil	281	135	168	5.43	0.01	450	92	54	69	5.7	0.12	14.0	-4.4	26	1.4
RAJSAMAND	Khamnor	KHAMNOR1	73.7333	24.9167	7.89	1120	Nil	165	191	91	68	0.01	340	76	36	97	9	1.41	14.0	-4.1	40	2.3
RAJSAMAND	Rajsamand	RAJSAMAND	73.8833	25.0667	7.47	1850	Nil	647	156	106	78	0.53	600	104	83	117	58	0.12	14.0	-1.4	35	2.1
RAJSAMAND	Bhim	GHATA	74.1833	25.7833	7.65	3060	Nil	403	525	309	164	0.01	600	104	83	420	14	1.22	14.0	-5.4	61	7.5
RAJSAMAND	Railmagra	RAILMAGRA1	74.1167	25.0333	7.09	2400	Nil	378	447	201	55	0.01	560	128	58	294	3.1	1.82	12.0	-5.0	53	5.4
RAJSAMAND	Kumbhalgarh	Kumbhalgarh	73.5739	25.135	7.08	1140	Nil	165	78	264	54	0.01	530	68	88	18	2.1	1.18	12.0	-7.9	7	0.3
RAJSAMAND	Bhim	BALI1	74.0833	25.8333	7.81	1010	Nil	177	113	182	8.26	0.01	390	60	58	49	8	1.18	10.0	-4.9	23	1.1
RAJSAMAND	Bhim	DEWAIR	73.8222	25.4208	7.71	800	Nil	287	50	81	5.6	0.01	330	72	36	31	3.1	1.56	8.6	-1.9	18	0.7
RAJSAMAND	Kumbhalgarh	DOWAS	73.5667	25.0386	7.68	920	Nil	146	78	211	7.92	0.01	370	88	36	39	4.5	0.45	6.4	-5.0	20	0.9
RAJSAMAND	Kumbhalgarh	KELWARA	73.6133	25.1	7.83	870	Nil	159	128	115	3.73	0.01	320	72	34	51	5.8	0.13	5.4	-3.8	27	1.2
RAJSAMAND	Railmagra	Khandel 1	74.08	25.12	7.44	690	Nil	183	64	98	1	0.01	250	64	22	41	4.7	0.19	4.0	-2.0	28	1.1
RAJSAMAND	Bhim	THIKARWAS	73.98	25.6	8.03	940	Nil	317	35	144	5.13	0.01	290	60	34	82	2.8	1.51	3.8	-0.6	39	2.1
SAWAI MADHOPUR	Bamanwas	Piplai	76.5528	26.5042	8.29	2530	Nil	1220	206	143	26	0.15	210	20	39	580	2.19	4.65	115.0	15.8	86	17.4
SAWAI		SULTANPUR	76.3858	26.2528	8.27	1710	Nil	878	85	30	40	0.01	100	12	17	375	0.56	4.55	62.0	12.4	89	16.3

MADHOPUR																						
SAWAI MADHOPUR	TONK	TONK	76.2542	26.3542	8.22	3570	Nil	805	624	149	108	0.65	190	28	29	736	3.56	4.07	60.0	9.4	89	23.2
SAWAI MADHOPUR	Gangapur	Gangapur2	76.7333	26.4833	8.25	3200	Nil	1061	454	156	150	0.52	500	44	95	600	0.5	3.70	30.0	7.4	72	11.7
SAWAI MADHOPUR	Bamanwas	Bamnawas	76.5611	26.55	7.48	5240	Nil	537	1049	896	100	0.06	1360	248	180	626	169	0.42	29.0	-18.4	54	7.4
SAWAI MADHOPUR	Bonli	BHADOTI	76.2667	25.9667	7.7	1880	Nil	610	248	42	59	0.03	390	44	68	255	1.59	1.36	29.0	2.2	59	5.6
SAWAI MADHOPUR	Bonli	MALARNACHOR	76.4583	26.0167	8.15	1450	Nil	634	142	10	30	0.02	160	48	10	275	2.1	1.82	28.0	7.2	79	9.5
SAWAI MADHOPUR	Gangapur	Sewa	76.8369	26.525	8.06	1800	Nil	781	199	40	80	0.05	290	44	44	340	1.16	1.30	20.3	7.0	72	8.7
SAWAI MADHOPUR	Sawai Madhopur	KUSHTALA	76.3806	26.3056	7.38	2900	Nil	390	489	288	200	0.16	910	180	112	250	18	2.00	15.0	-11.8	38	3.6
SAWAI MADHOPUR	SAWAI MADHOPUR	SAWAI MADHOPUR	76.356	26.0124	7.93	2880	Nil	671	347	422	13	0.03	360	52	56	520	2.17	0.62	5.0	3.8	76	11.9
SAWAI MADHOPUR	Sawai Madhopur	RANTHAMBOR	76.3611	26.0875	7.31	2230	Nil	439	340	59	300	0.01	680	152	73	182	55	0.58	4.0	-6.4	41	3.0
SAWAI MADHOPUR	Sawai Madhopur	SURWAL	76.3967	26.3667	7.94	1250	Nil	476	113	75	24	0.05	420	64	63	108	2.1	1.69	2.9	-0.6	36	2.3
SIKAR	Khandela	Khandela	75.4992	27.5978	7.41	2620	Nil	268	610	201	60	0.23	740	192	63	271	8	0.70	118.3	-10.4	45	4.3
SIKAR	Fatehpur	Fatehpur	74.9622	27.9814	8.21	2660	Nil	964	227	220	13	0.11	130	16	22	564	1.5	2.70	73.6	13.2	90	21.5
SIKAR	Srimadhopur	Srimadhopur	75.5873	27.4625	8.34	1520	36	320	260	60	31	0.35	120	20	17	302	3.43	0.40	64.3	4.0	85	12.0
SIKAR	Laxmangarh	Laxmangarh	75.0183	27.8433	8.89	1810	108	537	156	40	35	0.12	80	16	10	384	1.8	1.50	29.0	10.8	91	18.6
SIKAR	NEEM KA THANA	Barala	75.8817	27.7483	7.87	2010	Nil	390	291	270	11.4	0.10	350	52	54	305	9.8	0.98	29.0	-0.6	66	7.1
SIKAR	PATAN	PATAN	75.9833	27.8	7.28	7320	Nil	561	1524	910	320	0.29	2050	420	243	772	84	0.67	29.0	-31.8	47	7.4
SIKAR	Neem Ka Thana	Neem Ka Thana	75.794	27.7391	7.9	1710	Nil	232	355	55	170	0.02	450	60	73	199	5.51	0.72	29.0	-5.2	49	4.1

SIKAR	DantaRamgarh	Ramgarh	75.1822	27.2572	7.68	3150	Nil	345	720	50	280	0.11	470	20	102	509	2.5	0.80	24.0	-3.7	70	10.2
SIKAR	SRIMADHOPUR	Ajitgarh	75.8167	27.4175	7.66	1730	Nil	256	411	42	70	0.59	640	96	97	115	5.5	0.01	15.3	-8.6	29	2.0
SIKAR	Dhod	Dhod	74.9914	27.4983	7.98	981	Nil	366	85	60	31	0.02	100	24	10	186	3.7	1.23	12.9	4.0	80	8.1
SIKAR	Piprali	Piprali	75.2422	27.6475	7.7	570	Nil	220	28	30	42	0.10	200	60	12	38	4	0.15	4.1	-0.4	31	1.2
SIROHI	SIROHI	BARLOT	72.7167	24.9953	7.81	3080	Nil	439	602	302	13	0.01	480	88	63	487	1.8	1.52	**112.0**	**-2.4**	**69**	**9.7**
SIROHI	REODAR	GULABGANJ	72.675	24.675	7.11	1570	Nil	207	255	172	92	0.01	420	72	58	128	70	0.53	**0.7**	**-5.0**	**47**	**2.7**
SIROHI	ABUROAD	ABUROAD	72.771	24.4641	7.54	1300	Nil	181	241	136	22	0.01	390	68	54	120	1.5	0.26	**0.6**	**-4.8**	**40**	**2.6**
SIROHI	ABUROAD	MUNGTHALA	72.6833	24.4833	7.66	1750	Nil	378	135	220	178	0.01	290	72	27	268	2.3	0.44	**0.6**	**0.4**	**67**	**6.8**
SIROHI	SHEOGANJ	PALRI(M)	72.925	25.0153	7.95	2660	Nil	317	624	168	23	0.06	250	52	29	500	4.31	3.15	**0.6**	**0.2**	**81**	**13.7**
SIROHI	SIROHI	MERA KISHANGARH	72.7361	24.7694	7.52	2640	Nil	647	241	396	42	0.19	720	120	102	269	13	0.32	**0.6**	**-3.8**	**46**	**4.4**
SIROHI	ABUROAD	MANPUR	72.7592	24.5044	7.75	2250	Nil	293	383	279	61	0.01	480	80	68	298	1.6	2.00	**0.6**	**-4.8**	**58**	**5.9**
SIROHI	ABUROAD	MOUNT ABU	72.7102	24.5918	7.99	910	Nil	317	71	53	48	0.01	380	56	58	35	1.6	0.41	**0.6**	**-2.4**	**17**	**0.8**
SIROHI	REODAR	ANADARA	72.65	24.6333	7.46	1700	Nil	256	305	189	12	0.01	440	80	58	189	1.1	0.61	**0.6**	**-4.6**	**48**	**3.9**
SIROHI	SHEOGANJ	AMBESHWARJI	72.8917	24.9556	7.42	1240	Nil	226	170	177	1.5	0.01	350	60	49	121	5.5	2.61	**0.6**	**-3.3**	**44**	**2.8**
SIROHI	ABUROAD	SIYANA	72.7667	24.4167	7.76	2060	Nil	281	312	321	25	0.01	310	64	36	329	4.6	0.84	**0.6**	**-1.6**	**70**	**8.1**
SIROHI	REODAR	JEERAWAL	72.4917	24.6389	7.85	950	Nil	189	71	156	63	0.01	350	52	54	58	2.6	2.50	**0.6**	**-3.9**	**27**	**1.3**
SIROHI	REODAR	REODAR	72.5333	24.6333	7.52	2760	Nil	385	496	316	36	0.01	730	112	109	296	5.5	1.23	**0.6**	**-8.3**	**47**	**4.8**
SIROHI	PINDWARA	PINDWARA	73.0462	24.7921	7.66	750	Nil	165	152	16	9.4	0.01	260	46	35	53	3.5	0.44	**0.5**	**-2.5**	**32**	**1.4**
SIROHI	SHEOGANJ	SHEOGANJ	73.0451	25.145	7.56	6300	Nil	329	1645	514	270	0.05	1160	208	156	1000	13	2.17	**0.5**	**-17.8**	**65**	**12.8**
SIROHI	SIROHI	KALANDARI	72.6875	24.925	7.83	3210	Nil	732	482	275	39	0.01	720	140	90	400	14	2.32	**0.5**	**-2.4**	**55**	**6.5**
SIROHI	SIROHI	SIROHI	72.8667	24.8833	7.63	2300	Nil	347	347	342	19	0.01	480	88	63	304	9	0.85	**0.5**	**-3.9**	**58**	**6.0**
SIROHI	PINDWARA	VIRWARA	72.9875	24.8414	7.81	2840	Nil	488	365	408	95	0.01	970	120	163	207	1.8	0.87	**0.4**	**-11.4**	**32**	**2.9**
SIROHI	PINDWARA	SARUPGANJ	72.9361	24.6583	7.75	2800	Nil	293	447	472	41	0.14	470	96	56	425	5.9	0.58	**0.4**	**-4.6**	**66**	**8.5**
TONK	Tonk	Rustamganj	75.5856	25.9	8.28	1780	Nil	805	64	125	16.5	0.02	130	20	19	354	3.23	3.41	246.0	10.6	86	13.5
TONK	TONK	UNIYARA	76.0267	25.9156	8.13	2300	Nil	573	92	565	11.5	0.03	180	44	17	470	1.81	1.64	157.0	5.8	85	15.2
TONK	Tonk	Ghans	75.8839	25.9325	7.8	1520	Nil	610	142	37	23	0.06	150	24	22	285	1.76	4.84	86.0	7.0	81	10.1

TONK	Newai	NIWAI1	75.8333	26.0917	7.42	870	Nil	244	135	12	38	0.30	350	92	29	39	0.3	0.23	80.0	-3.0	20	0.9
TONK	Deoli	DEOLI	75.85	26.2417	8.11	2010	Nil	793	234	43	19.6	0.56	280	40	44	350	4.53	1.93	76.0	7.4	73	9.1
TONK	Tonk	Mehndwas	75.9333	26.3667	7.84	3760	Nil	805	780	203	9.2	0.25	350	40	61	750	4.77	2.45	62.0	6.2	82	17.4
TONK	Bonli	TOND	76.0783	25.9667	8.29	3570	Nil	854	730	75	55	0.02	180	28	27	770	3.16	1.70	58.0	10.4	90	25.0
TONK	Malpura	JAISINGHPUR	75.6833	25.9986	8.27	1800	Nil	793	128	53	21	0.18	140	28	17	355	3.07	4.58	58.0	10.2	85	13.0
TONK	Deoli	BANTHOLI	75.9661	25.975	7.56	4290	Nil	512	993	213	155	0.05	740	124	105	620	64	0.70	56.0	-6.4	66	9.9
TONK	Tonk	ARNIYALMAL	75.5667	25.8833	8.11	1150	Nil	378	156	34	24	0.03	300	44	46	130	5.63	1.45	30.0	0.2	49	3.3
TONK	Uniara	ALIGARH	75.8083	26.0583	7.99	1700	Nil	634	128	139	22	0.02	160	32	19	325	1.13	1.45	29.0	7.2	82	11.2
TONK	Uniara	DIKOLIYA	75.875	26.0583	7.8	2470	Nil	476	383	278	17	0.09	540	76	85	320	1.72	1.00	29.0	-3.0	56	6.0
TONK	Tonk	SOHELA	76.1792	25.8917	7.72	1060	Nil	366	128	48	8.8	0.40	230	48	27	141	3.6	1.08	29.0	1.4	57	4.0
TONK	Malpura	DEWAL1	75.1875	26.2383	7.84	1610	Nil	251	156	288	93	0.02	380	96	34	190	10	0.51	26.0	-3.5	53	4.2
TONK	Malpura	MALPURA1	75.725	26.1108	8.38	1780	84	451	255	19	10.3	0.20	150	28	19	345	4.81	2.30	22.0	7.2	83	12.2
TONK	Deoli	RAMTHALA	75.2806	25.8639	7.64	1040	Nil	140	135	186	24	0.02	400	92	41	54	5.2	0.61	15.0	-5.7	24	1.2
TONK	Uniara	JAINAGAR	75.4975	26.4086	7.38	1320	Nil	268	241	36	85	0.10	450	120	36	100	1.03	0.38	7.0	-4.6	33	2.0
TONK	Tonk	MAHUVA	75.3833	26.2833	7.95	940	Nil	378	99	19	6.4	0.15	220	56	19	110	13	0.21	3.5	1.8	54	3.2
TONK	Todaraisingh	TODARAISINGH1	75.4838	26.0245	7.63	1580	Nil	525	170	63	105	4.36	430	120	32	130	86	0.23	2.6	0.0	48	2.7
TONK	Uniara	Sop1	75.4889	26.0225	7.65	2270	Nil	500	326	265	52	0.50	450	92	54	340	1.47	0.52	1.8	-0.8	62	7.0
UDAIPUR	Badgaon	CHIRWA	73.75	24.7	7.81	1160	Nil	189	142	203	10	0.01	350	92	29	104	3.9	1.29	80.0	-3.9	40	2.4
UDAIPUR	Bhindar	KANOD	74.2667	24.4333	7.66	1990	Nil	220	340	289	41	0.00	460	86	60	242	10	0.33	23.0	-5.6	54	4.9
UDAIPUR	Sarada	SEMARI	73.85	24.0647	7.86	1170	Nil	274	64	244	13	0.12	270	76	19	143	5	1.97	20.0	-0.9	54	3.8
UDAIPUR	Gogunda	PUNAWALI	73.4292	24.8781	7.42	260	Nil	201	142	56	42	0.01	410	52	68	18	11	1.46	16.0	-4.9	11	0.4
UDAIPUR	Badgaon	KATHAR1	73.57	24.89	7.74	1280	Nil	250	177	172	1.58	0.01	430	72	61	94	6	1.40	14.0	-4.5	33	2.0
UDAIPUR	Jhadol	MANPUR	73.3158	24.2497	7.93	2110	Nil	201	454	232	4.23	0.00	400	68	56	300	3.3	0.97	14.0	-4.7	62	6.5
UDAIPUR	Bhindar	BHINDER	74.1669	24.5064	7.63	1170	Nil	134	128	249	37	0.01	430	92	49	70	4.6	1.61	12.0	-6.4	27	1.5
UDAIPUR	Gogunda	JASWANTGARH	73.4683	24.8	7.73	1580	Nil	183	142	369	59	0.01	410	60	63	138	63	1.48	11.0	-5.2	48	3.0
UDAIPUR	LASADIYA	LASADIYA	74.2391	24.2652	8.22	1220	Nil	189	142	172	90	0.00	330	72	36	124	9.2	0.68	11.0	-3.5	46	3.0
UDAIPUR	Salumber	BASSI	73.9853	24.1719	8.12	820	Nil	281	71	70	6	0.00	160	30	21	110	11	0.39	10.0	1.4	61	3.8
UDAIPUR	Mavli	Mavli1	73.983	24.783	7.11	5010	Nil	732	1156	174	114	0.01	1250	180	195	573	8	0.29	9.6	-13.0	50	7.0

UDAIPUR	Salumber	DEOLA	74.05	24.1667	8.06	1080	Nil	207	121	172	21	0.00	370	56	56	77	3.4	0.93	8.5	-4.0	32	1.7
UDAIPUR	Gogunda	Gogunda	73.5347	24.7501	7.61	950	Nil	155	135	136	15	0.01	340	84	32	62	2.5	1.45	7.1	-4.3	29	1.5
UDAIPUR	Bargaon	Bargaon	73.6776	24.6441	8.14	1370	Nil	214	156	272	3.68	0.02	510	88	71	81	2.6	1.25	6.5	-6.7	26	1.6
UDAIPUR	Bhindar	KHERODA	74.0592	24.5797	7.63	1470	Nil	238	142	270	64	0.01	500	84	71	106	3.8	1.43	6.3	-6.1	32	2.1
UDAIPUR	Bhindar	HARIYAB	73.9225	24.5467	7.64	1050	Nil	244	85	168	34	0.01	390	92	39	54	16	1.09	5.6	-3.8	26	1.2
UDAIPUR	Sarada	SARADA	73.8333	24.15	7.83	850	Nil	189	71	158	3	0.00	230	40	32	89	2.2	0.14	5.2	-1.5	46	2.6
UDAIPUR	Salumber	INTALIKHARA	73.9589	24.0058	8.39	1400	12	250	142	248	38	0.00	290	60	34	130	113	0.42	5.1	-1.3	60	3.3
UDAIPUR	Girwa	SAVINA	73.7139	24.5058	8.08	800	Nil	189	85	110	8.45	0.01	240	40	34	74	1.3	1.51	4.9	-1.7	40	2.1
UDAIPUR	Salumber	SALUMBER1	74.0467	24.1283	7.92	1020	Nil	238	71	199	6	0.00	300	48	44	94	7	0.56	4.8	-2.1	41	2.4
UDAIPUR	Girwa	KURABAR	73.9917	24.4483	7.53	1350	Nil	189	177	209	62	0.01	450	96	51	103	4.1	1.18	4.7	-5.9	34	2.1
UDAIPUR	Bhindar	BHATEWAR	74.0128	24.6167	7.61	1430	Nil	293	191	164	37	0.01	360	84	36	144	35	1.25	4.3	-2.4	50	3.3
UDAIPUR	Girwa	KANPUR	73.7764	24.57	7.78	2150	Nil	329	404	192	35	0.11	650	104	95	184	20	1.39	3.8	-7.6	40	3.1
UDAIPUR	JHADOL	JHADOL	73.4963	24.4138	7.75	1350	Nil	177	149	228	99	0.00	350	80	36	150	1.3	0.67	3.7	-4.1	48	3.5
UDAIPUR	Jhadol	SOM1	73.3431	24.1708	7.83	1110	Nil	189	177	139	5	0.00	350	72	41	93	4	0.38	3.5	-3.9	37	2.2
UDAIPUR	Rishabhdeo	KALAYANPURA	73.7583	24.0014	7.52	1790	Nil	220	241	170	243	0.00	600	84	95	118	32	0.65	3.3	-8.4	33	2.1
UDAIPUR	Sarada	DINGRI	73.8667	24.2167	8.09	4650	Nil	537	425	827	523	0.00	620	112	83	495	494	1.00	3.0	-3.6	73	8.6
UDAIPUR	Sayra	Sayra	73.4183	24.9779	7.5	1010	Nil	226	99	156	16	0.01	370	80	41	60	5.2	1.01	2.9	-3.7	27	1.4
UDAIPUR	Sarada	PARSHAD	73.7	24.1933	7.96	930	Nil	201	121	113	13	0.00	270	64	27	90	3.3	0.51	2.8	-2.1	43	2.4
UDAIPUR	Lasadiya	ARAMPUR	74.4167	24.2514	7.89	2360	Nil	262	340	356	140	0.00	510	104	61	268	71	0.73	2.3	-5.9	57	5.2
UDAIPUR	Jhadol	Ghori Mari	73.3878	24.3058	8.03	1230	Nil	159	170	152	104	0.00	460	76	66	53	33	0.61	2.3	-6.6	26	1.1
UDAIPUR	Jhadol	LUNIYARA	73.3856	24.3556	7.77	1000	Nil	189	113	151	33	0.00	250	44	34	115	1.6	0.68	2.0	-1.9	50	3.2
UDAIPUR	Girwa	PADUNA	73.6833	24.2722	8.09	1200	Nil	232	149	175	21	0.00	410	76	54	86	6	0.38	1.8	-4.4	32	1.8
UDAIPUR	Jhadol	AMALIA	73.3542	24.2289	8.01	755	Nil	159	78	130	1	0.00	260	48	34	50	8	0.29	1.6	-2.6	31	1.3
UDAIPUR	Jhadol	Garanwas	73.35	24.15	8.01	770	Nil	177	92	81	30	0.01	200	56	15	84	3.4	0.44	1.5	-1.1	48	2.6
UDAIPUR	Badgaon	SRIMALI KI KARIA	73.6331	24.7764	7.98	1175	Nil	281	128	160	8.73	0.01	360	84	36	105	1	1.01	1.0	-2.6	39	2.4
UDAIPUR	Kherwara	Neecha Talab	73.4333	24.0753	7.85	1670	Nil	189	312	224	6	0.00	450	92	54	175	5.2	0.56	1.0	-5.9	46	3.6
UDAIPUR	GIRWA	GIRWA	73.6944	24.5841	7.82	1110	Nil	207	142	170	7.6	0.00	300	56	39	100	32	0.46	1.0	-2.6	46	2.5
UDAIPUR	PHALASIYA	PHALASIYA	73.3752	24.2433	7.91	650	Nil	128	71	112	1.6	0.00	190	40	22	61	2	0.45	0.8	-1.7	42	1.9

UDAIPUR	Jhadol	Koliyari	73.3764	24.3333	8.04	1280	Nil	165	142	276	18	0.00	310	64	36	152	3.2	0.81	0.8	-3.5	52	3.8
UDAIPUR	RISHABHDEV	RISHABHDEV	73.6952	24.0708	8.05	800	Nil	244	64	86	22	0.24	370	60	54	14	1	0.45	0.6	-3.4	8	0.3
UDAIPUR	Kherwara	KHERWARA	73.6011	23.9833	8.06	1170	Nil	232	135	182	14	0.11	400	68	56	69	29	0.46	0.6	-4.2	32	1.5
UDAIPUR	Mavli	BHOYANA	73.9167	24.7167	7.66	4450	Nil	589	652	620	210	0.01	600	112	78	713	59	1.38	0.3	-2.3	73	12.7
UDAIPUR	Salumber	KHAIRKA	74.075	24.295	7.83	1420	Nil	317	163	188	28	0.00	520	76	80	87	4.1	0.55	0.0	-5.2	27	1.7