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भारत सरकार
GOVERNMENT OF INDIA
भारतीय भूवैज्ञानिक सर्वेक्षण
GEOLOGICAL SURVEY OF INDIA

आंध्र प्रदेश के वाई.एस.आर. कडपा और अनंतपुर जिलों के भागो में विशेष जोर देने के साथ जल में यूरेनियम संदूषण का भू-पर्यावरणीय मूल्यांकन:

GEO-ENVIRONMENTAL APPRAISAL IN PARTS OF Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH WITH SPECIAL EMPHASIS ON URANIUM CONTAMINATION IN WATER

धरातल पत्रक क्रमांक: 57 जे/3 और 57 जे/7
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कार्यसत्र 2022-2023 का प्रतिवेदन
Report for field season 2022-23

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सितम्बर, 2023
September, 2023

II in a scattered manner in the agricultural and grass land. Moderate to high values water in pre monsoon (Fig. 8.14-8.15)

Fig.8.14 Point anomaly map showing Calcium (mg/l) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

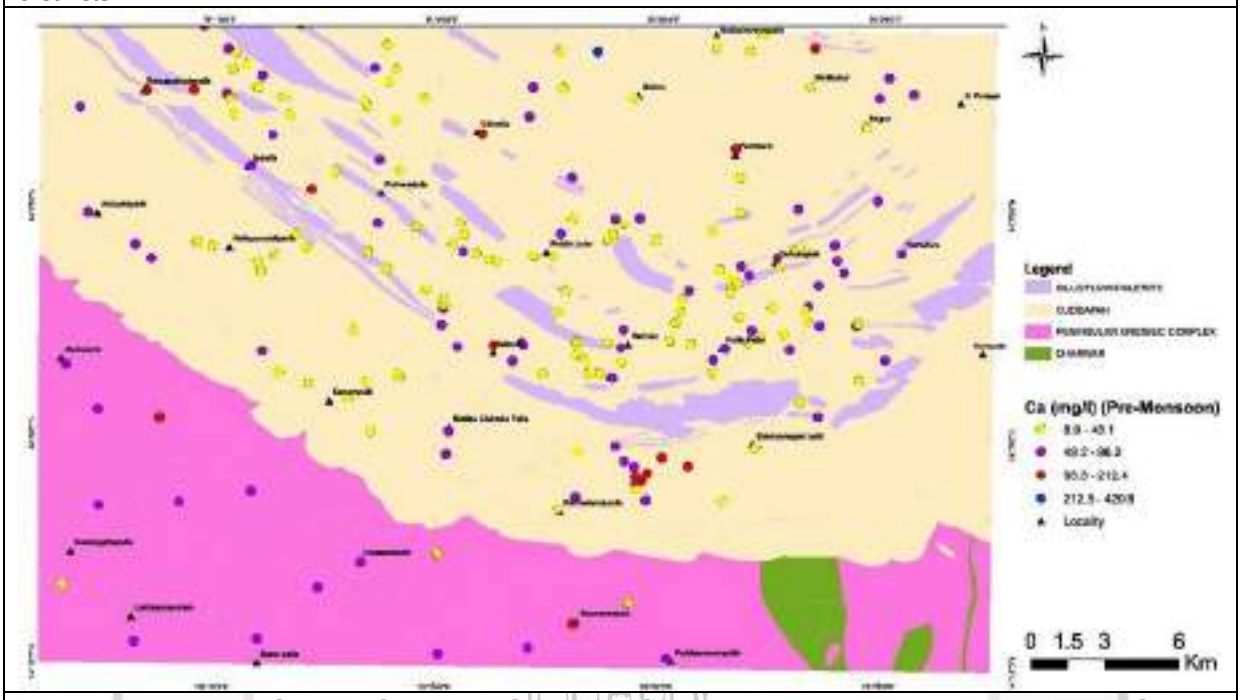
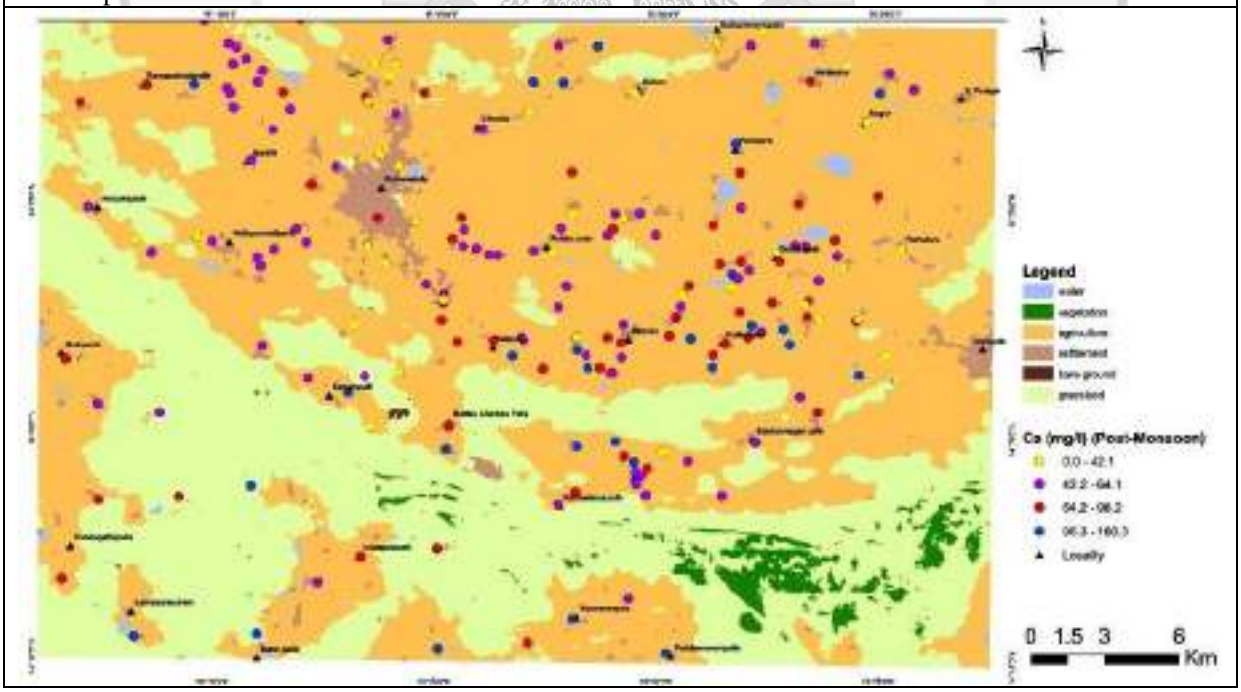


Fig.8.15 Point anomaly map showing Calcium (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Land cover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Magnesium (Mg^{2+}): Magnesium is the 8th most abundant element on earth crust and natural constituent of water. It is an essential for proper functioning of living organisms and found in minerals

like dolomite, magnetite etc. Human body contains about 25g of magnesium (60% in bones and 40% in muscles and tissues). According to BIS (2012) standards, the permissible range of magnesium in water should be 100 mg/l. The concentration of calcium of water in study area varied from 7.29 mg/L to 716.85 mg/L with an average value of 83.69 mg/L in pre monsoon and from 4.86 mg/L to 291.60 mg/L with an average value of 68.28 mg/L in post monsoon (Table 8.1).

Fig.8.16 Point anomaly map showing Magnesium (mg/l) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

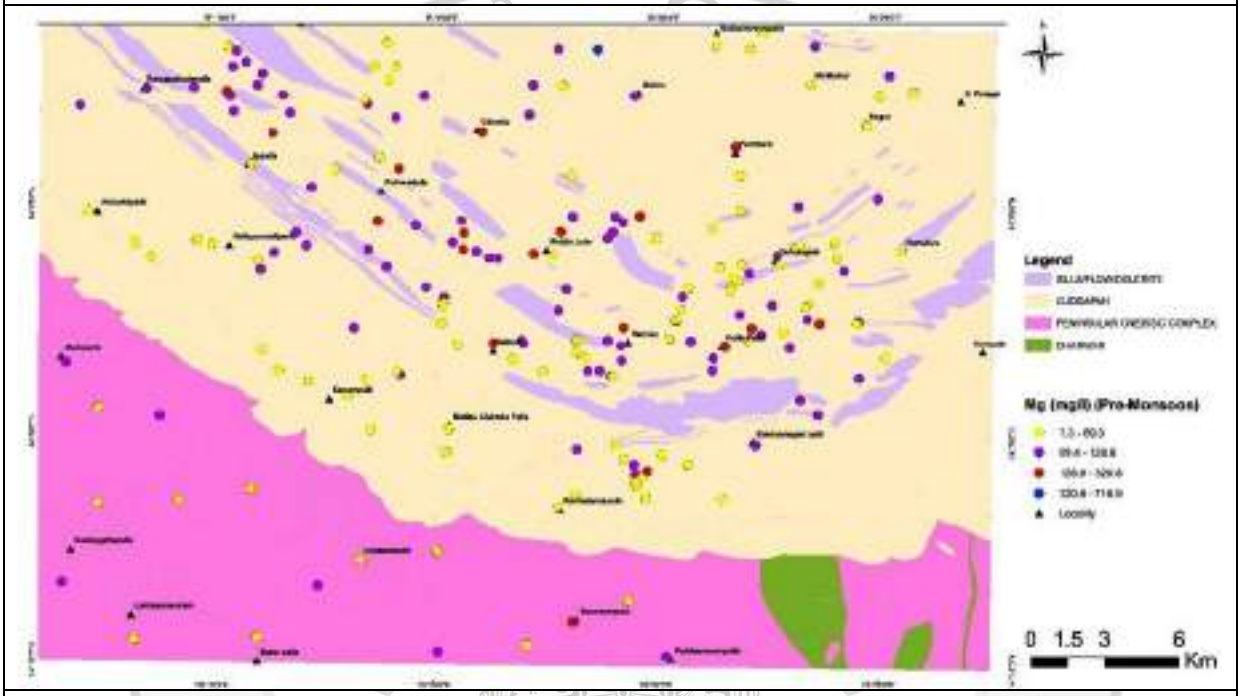
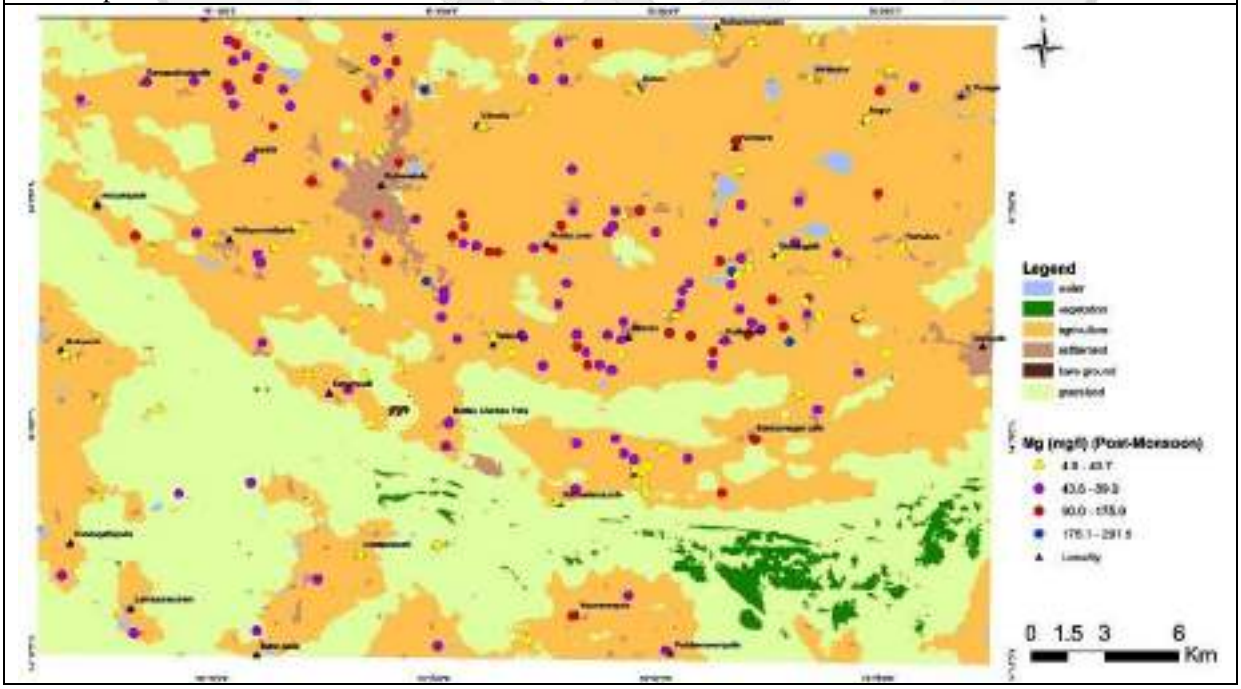


Fig.8.17 Point anomaly map showing Magnesium (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Higher magnesium value in 1 no. of water sample during pre-monsoon is falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 4 nos. of water samples during post-monsoon shows higher magnesium values falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land (Fig. 8.16-8.17)

Sodium (Na^+): Sodium is a silver white metallic element and found in less quantity in water. Proper quantity of sodium in human body prevents many fatal diseases like kidney damages, hypertension, headache etc. Sodium is dissolved from rock, salts, and soil. It is also found in oil field brine, sea water, industrial brine, and reclaimed effluent water etc. Moderate amounts of sodium have little effect on the usefulness of water. According to WHO (1984) standards, the permissible range of sodium in water should be 200 mg/l. The concentration of sodium of water in study area varied from 11.50 mg/L to 1775 mg/L with an average value of 168.26 mg/L in pre monsoon and from 0.18 mg/L to 921 mg/L with an average value of 134.95 mg/L in post monsoon (Table 8.1). Higher sodium value in 7 nos. of water sample during pre-monsoon is falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 9 nos. of water samples during post-monsoon shows higher sodium values falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land (Fig. 8.18-8.19).

Fig.8.18 Point anomaly map showing Sodium (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

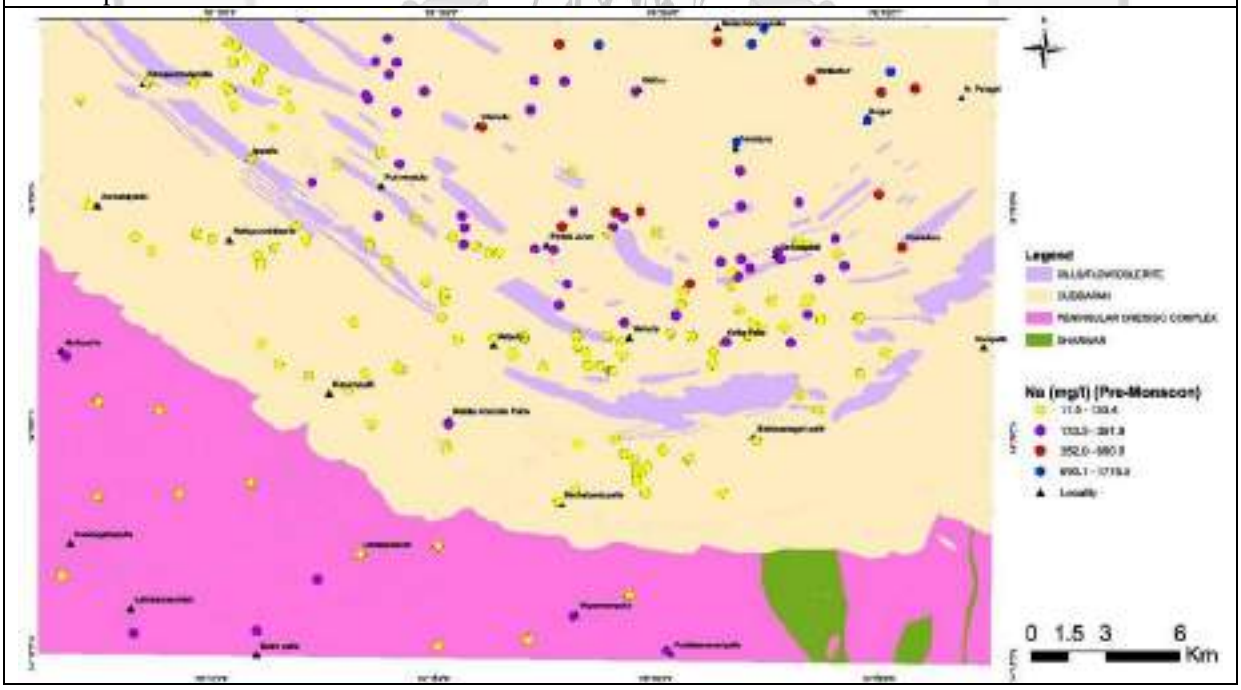
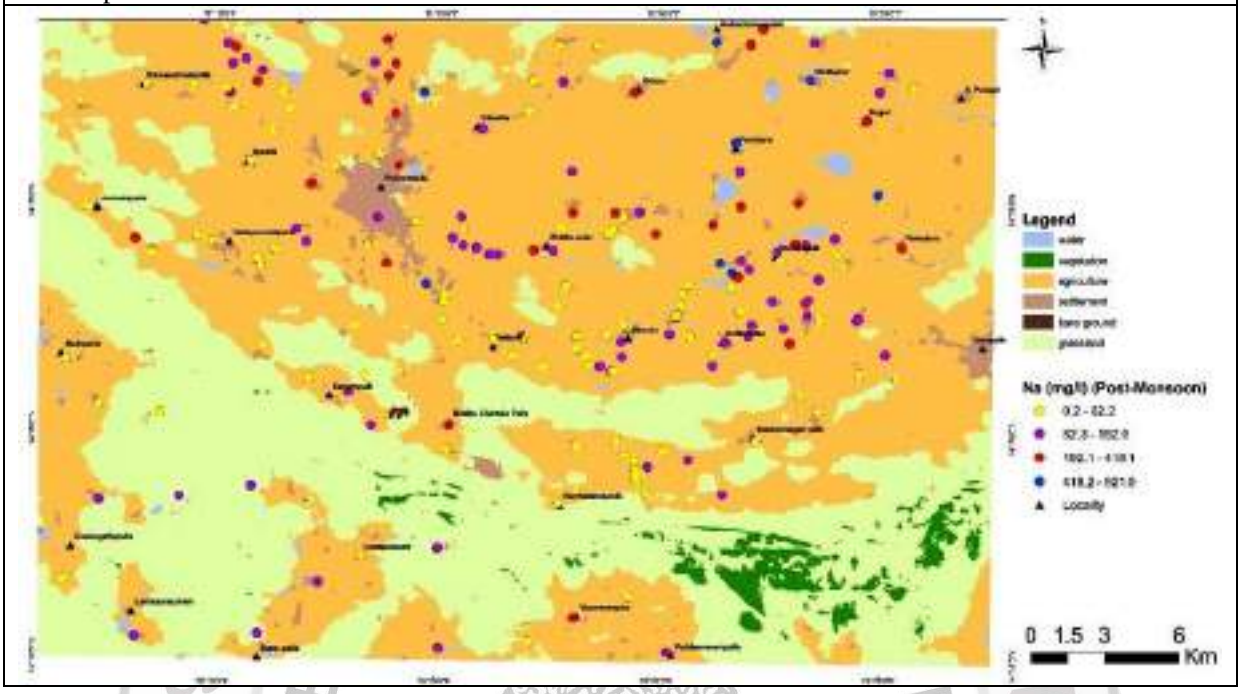


Fig.8.19 Point anomaly map showing Sodium (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Potassium (K^+): Potassium is silver white alkali which is highly reactive with water. Potassium is necessary for living organism functioning hence found in all human and animal tissues particularly in plants cells. The total potassium amount in human body lies between 110 and 140 g. It is vital for human body functions like heart protection, regulation of blood pressure, protein dissolution, muscle contraction, nerve stimulus etc. Potassium is deficient in rare but may led to depression, muscle weakness, heart rhythm disorder etc. According to WHO (2011) standards the permissible limit of potassium is 12 mg/1. The concentration of potassium in water in study area varied from 0.23 mg/L to 477.50 mg/L with an average value of 15.30 mg/L in pre monsoon and from 0.19 mg/L to 1347.70 mg/L with an average value of 27.22 mg/L in post monsoon (Table 8.1). Higher potassium value in 4 nos. of water samples during pre-monsoon are falling in the agricultural and grass land and over Tadpatri shale of Cuddapah Supergroup and PGC- II in a scattered manner, whereas 1 no. of water sample during post-monsoon shows higher potassium value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land. The results clearly indicate that high values show in potassium due to Potassium is dissolved from rock, fertilizer, salt, soil and irrigation water may significantly increase potassium concentrations in grasses, thus potentially creating concerns with lactation in animals (Fig. 8.20-8.21)

Fig.8.20 Point anomaly map showing Potassium (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

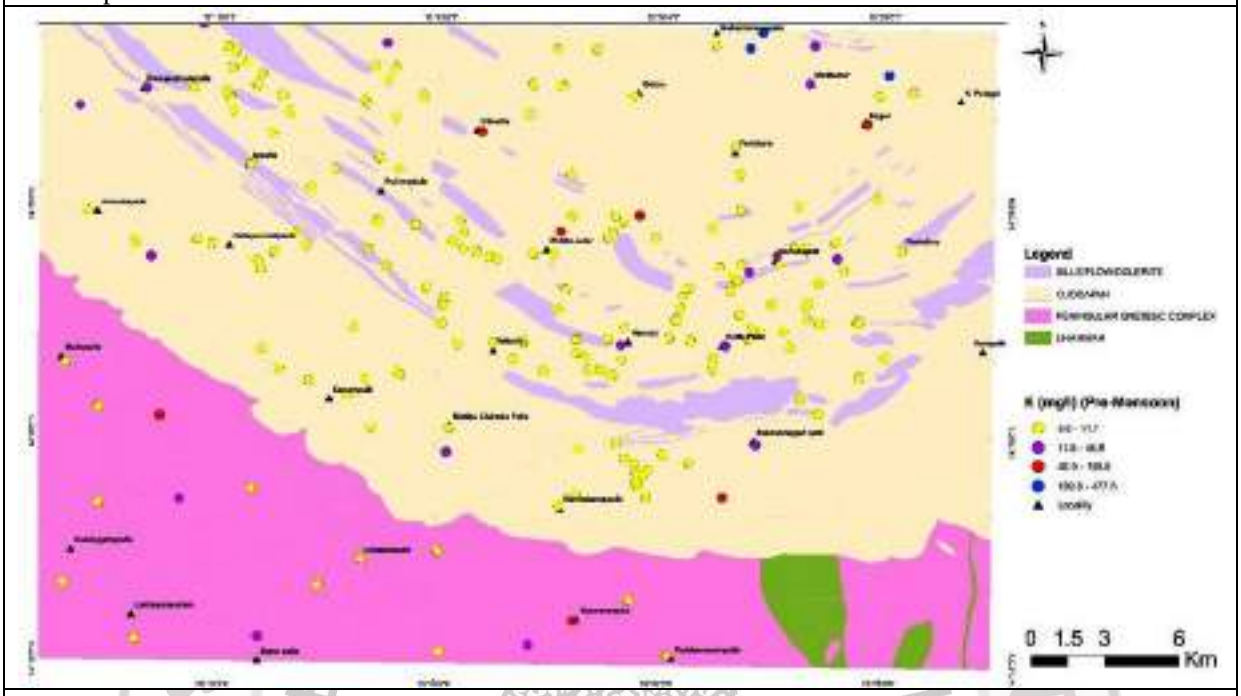
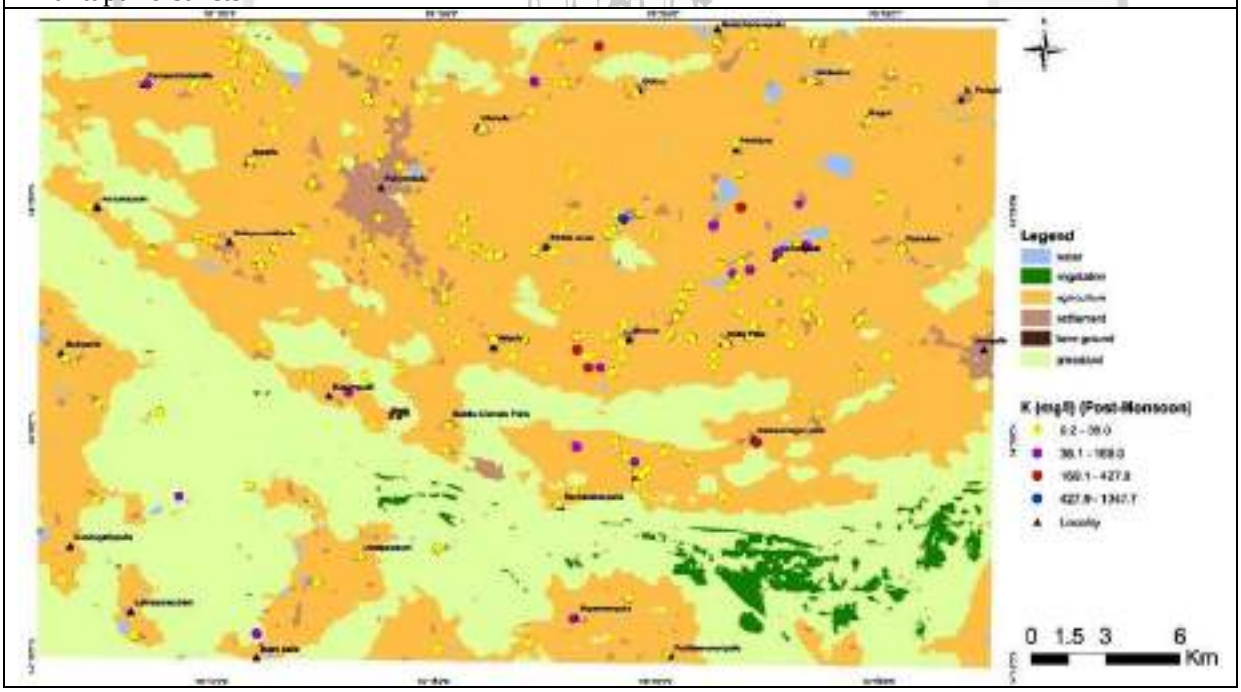


Fig.8.21 Point anomaly map showing Potassium (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Bicarbonates (HCO_3-): The relative amount of the anions depends on the pH of the water and other factors. Bicarbonates increase with the pH decreases. Bicarbonates ion served as the main buffer in aqueous freshwater systems and provides CO_2 for photosynthesis. According to ISI

standards the highest desirable limit is 300 mg/l and maximum permissible limit is 600 mg/l. The concentration of bicarbonates in water in study area varied from 85.43 mg/L to 1891.62 mg/L with an average value of 491.07 mg/Lin pre monsoon and from 6.10 mg/L to 1446.17 mg/L with an average value of 477.10 mg/Lin post monsoon (Table 8.1).

Fig.8.22 Point anomaly map showing Bicorbanate (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

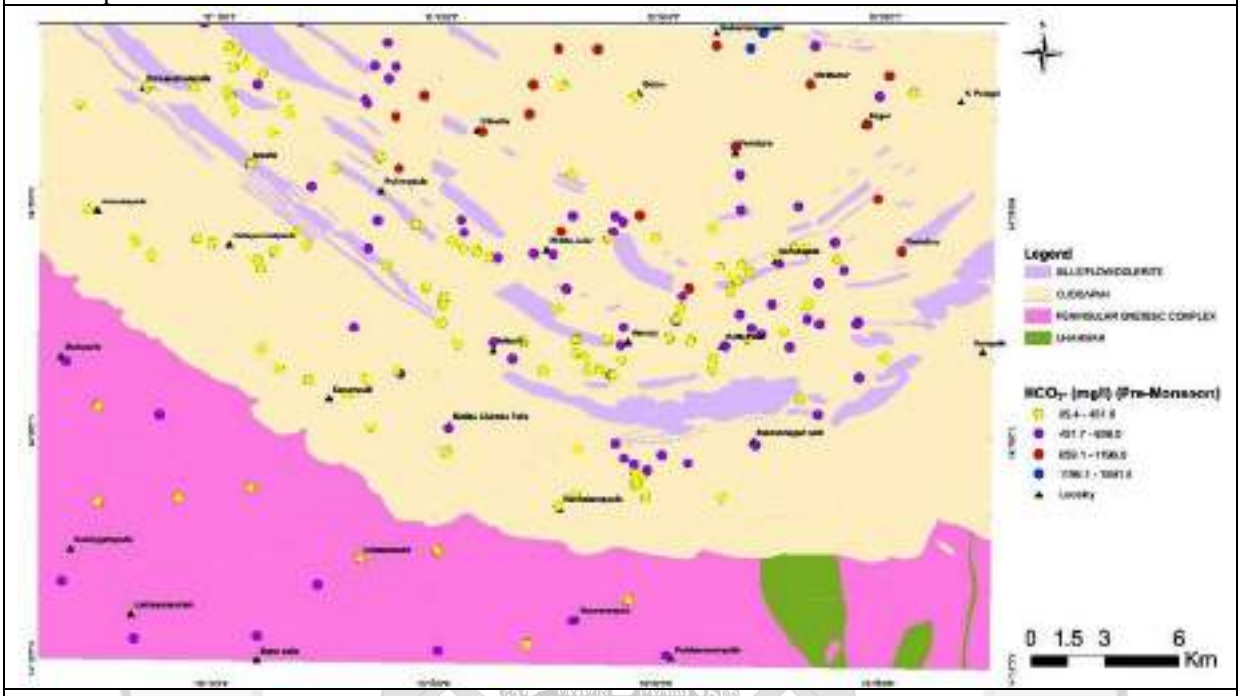
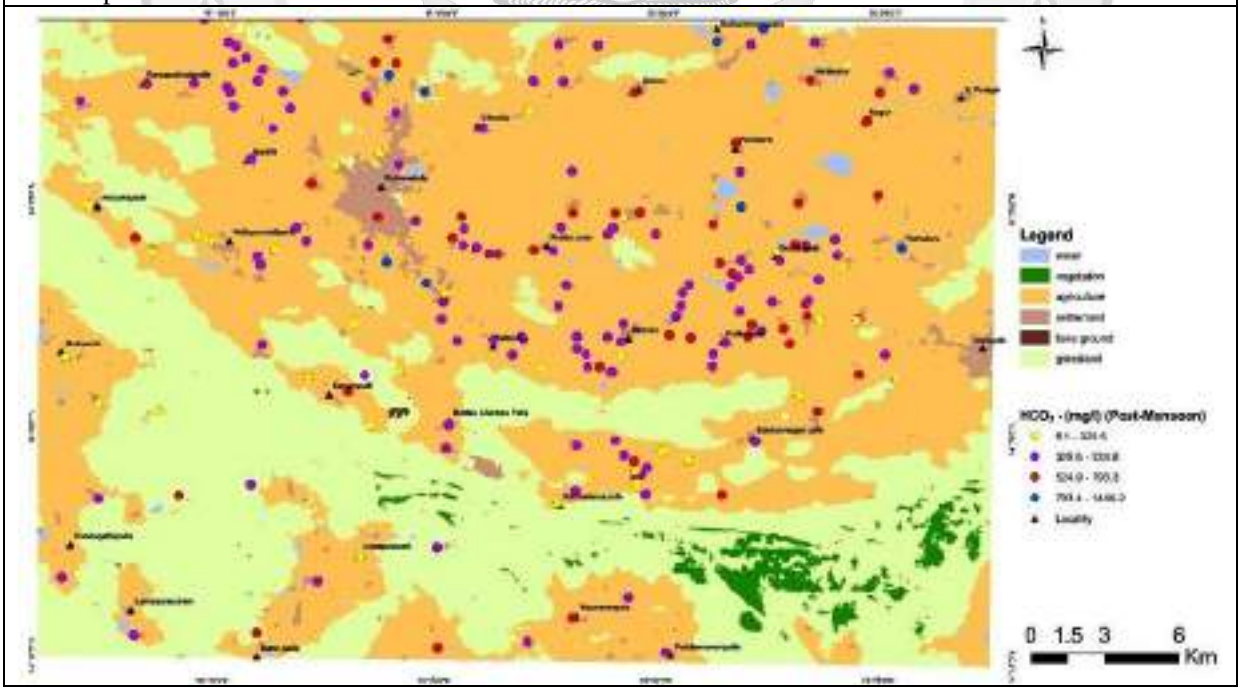


Fig.8.23 Point anomaly map showing Bicarbonates (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Higher bicarbonates value in 2 nos. of water samples during pre-monsoon are falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 9 nos. of water samples during post-monsoon show higher bicarbonates value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner. The higher concentration of bicarbonates in the water infers a dominance of mineral dissolution and irrigation activities (Fig.8.22-8.23).

Chlorides (Cl-): Chloride is one of the major inorganic anions in water and waste water. Chloride in drinking water is not generally harmful to human being until present in higher concentration. It is the most abundant anion in the human body and contributes significantly along with its associated cations, to the osmotic activity of the extra cellular fluid. According to BIS (2012) standards the highest desirable limit is 250 mg/l and maximum permissible limit is 1000 mg/l. The concentration of Chlorine in water in study area varied from 21.27 mg/L to 3403.20 mg/L with an average value of 203.62 mg/L in pre monsoon and from 3.54 mg/L to 1382.55 mg/L with an average value of 180.87 mg/L in post monsoon (Table 8.1). Higher chlorine value in 1 no. of water sample during pre-monsoon is falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 5 nos. of water samples during post-monsoon show higher chlorine value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner. It has key importance for metabolism activity in human body and other main physiological processes. High chloride concentration damages metallic pipes and structure, as well as harms growing plants (Fig.8.24-8.25).

Fig.8.24 Point anomaly map showing Chloride (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

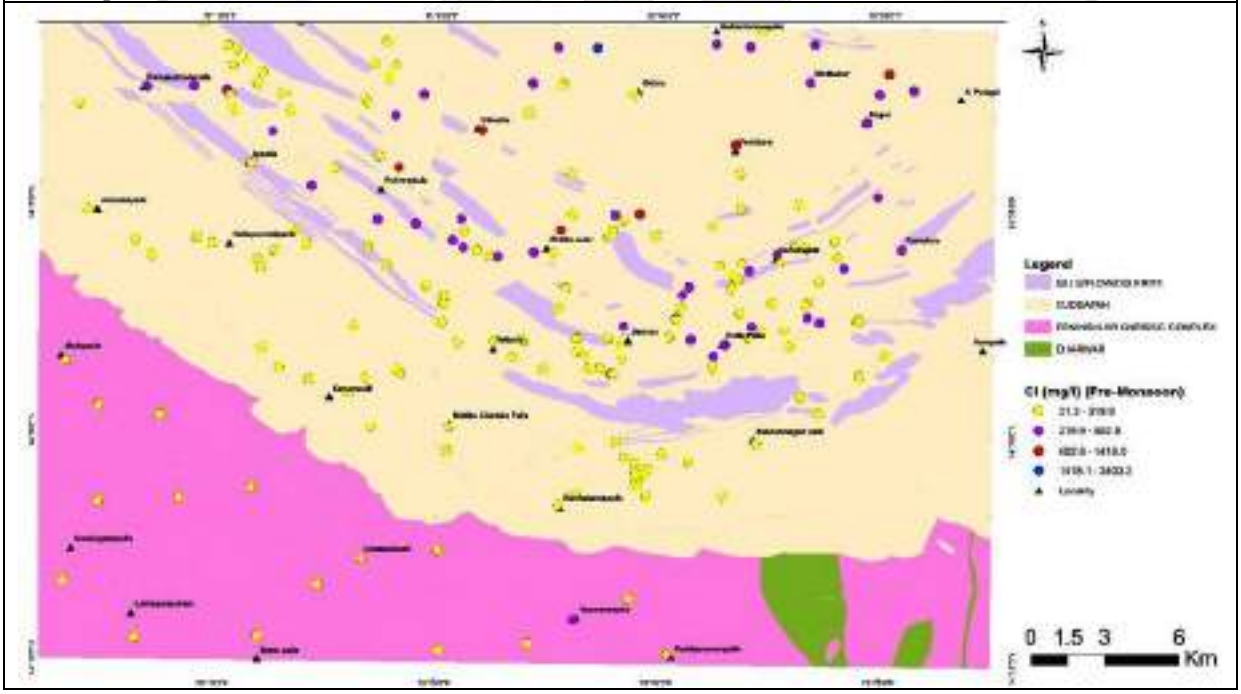
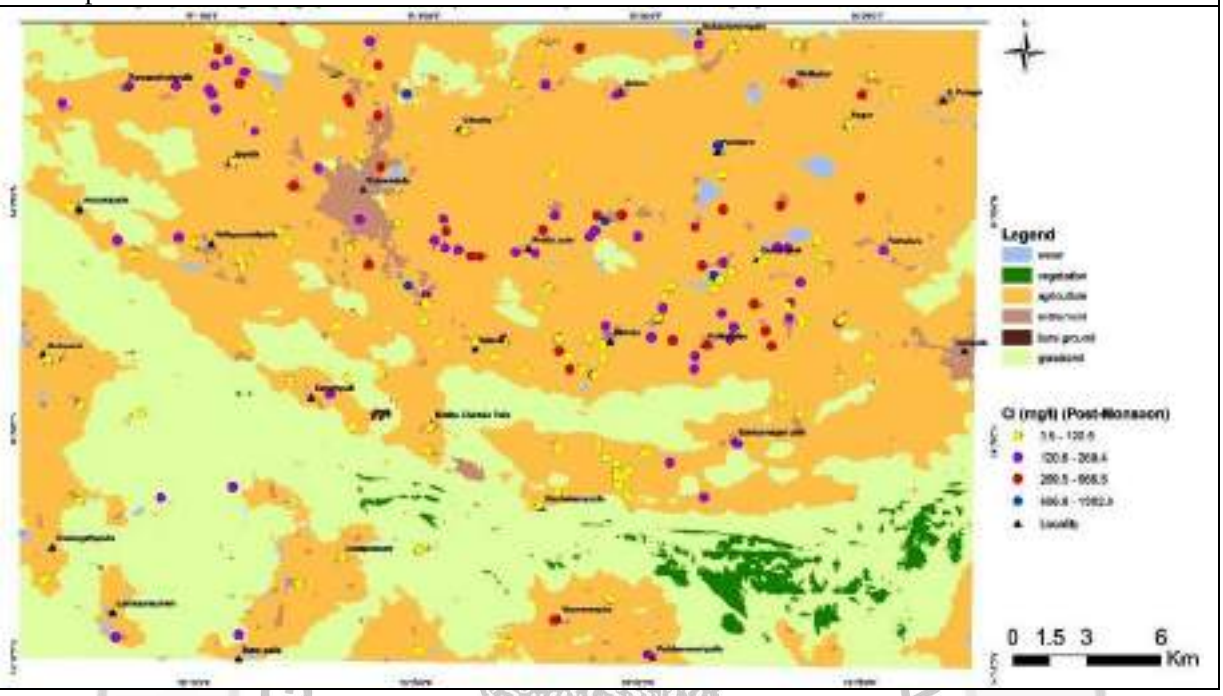


Fig.8.25 Point anomaly map showing Chloride (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Sulphates (SO_4^{2-}): Sulfate mainly is derived from the dissolution of salts of sulfuric acid and abundantly found in almost all waterbodies. High concentration of sulfate may be due to oxidation of pyrite and mine drainage etc. Sulfate concentration in natural water ranges from a few to a several 100 mg/liter, but no major negative impact of sulfate on human health is reported. According to W.H.O and ISI standards, the maximum permissible limits is 400 mg/l. and Bureau of Indian Standards the maximum permissible limit is 250 mg/L. The concentration of Sulphates in study area varied from 1.44 mg/L to 1228.50 mg/L with an average value of 76.19 mg/Lin pre monsoon and from 1.63 mg/L to 700 mg/L with an average value of 76.82 mg/Lin post monsoon (Table 8.1). Higher sulphate value in 1 no. of water sample during pre-monsoon is falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 8 nos. of water samples during post-monsoon show higher sulphate value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner (Fig..8.26-8.27).

Fig.8.26 Point anomaly map showing Sulphates (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

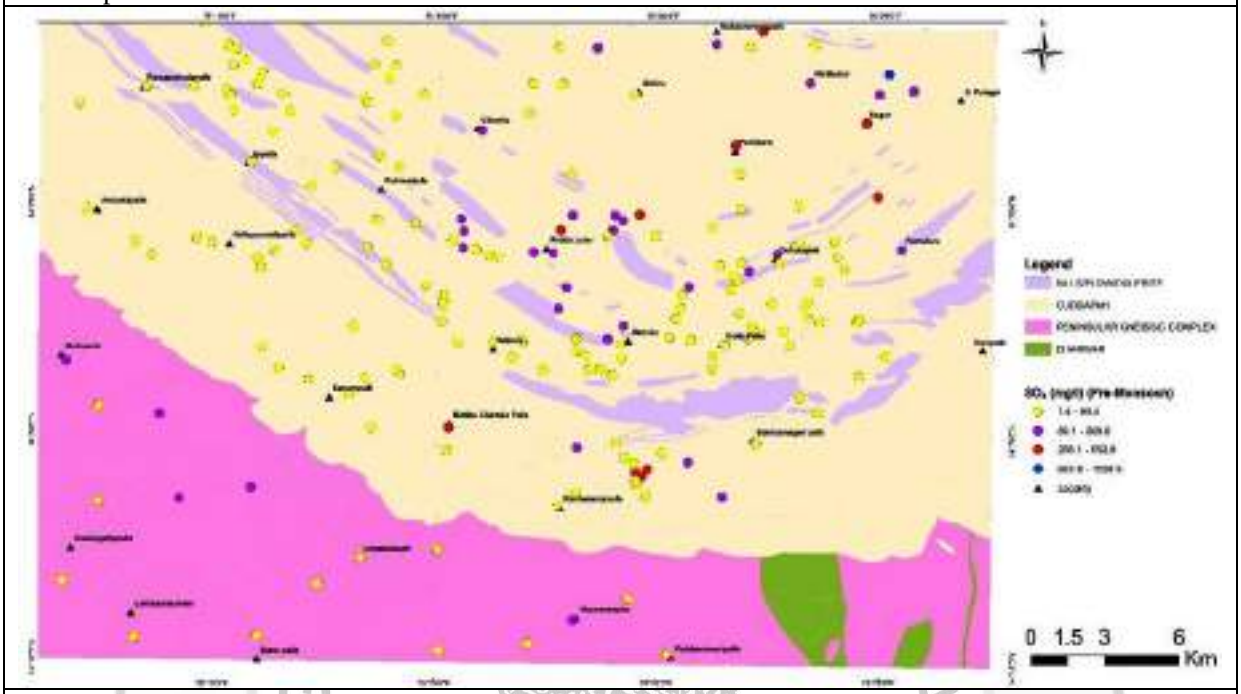
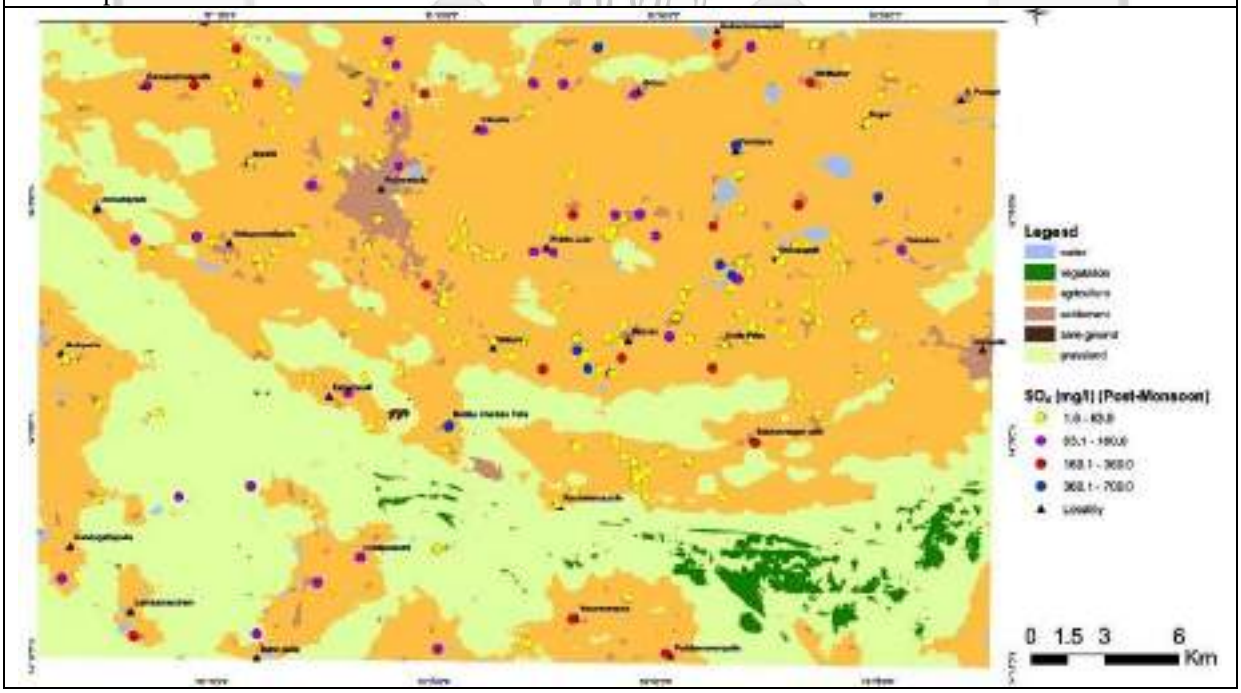


Fig.8.27 Point anomaly map showing Sulphates (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Nitrate (NO_3-): Nitrate, the end products of the biologic nitrification process, is the most ubiquitous chemical contaminant in the world's aquifers and the concentration levels are increasing. The distribution of NO_3- in groundwater is controlled by a number of factors. They include source

availability, thickness and composition of the vadose zone, precipitation, irrigation, ground waterflow, aquifer heterogeneity, dissolved oxygen concentrations and electron donor availability and dispersion. The concentration of Nitrates in water in study area varied from 0.5 mg/L to 2232 mg/L with an average value of 112.23 mg/L in pre monsoon and from 0.23 mg/L to 457.28 mg/L with an average value of 76.55 mg/L in post monsoon (Table 8.1). Higher sulphate value in 2 nos. of water samples during pre-monsoon is falling in the agricultural land and over Tadpatri shale of Cuddapah Supergroup in the northeast part of the study area, whereas 8 nos. of water samples during post-monsoon show higher nitrate value falling over Tadpatri shale of Cuddapah Supergroup and PGC-II in the agricultural land in a scattered manner (Fig. 8.28-8.29). More than 50 % of the samples from water samples NO_3–content exceeded the Indian drinking water standards of 45 mg/L (BIS 2012) in pre monsoon. Significant higher concentration of nitrate was found due to extensive paddy fields in northern part of the study area which needs ample of water for its growth and is the main crop of the area cultivated in the pre monsoon and associated excess use of fertilizers. So, the increase in the nitrate concentration in the pre monsoon may be attributed to the application of fertilizers during cultivation of paddy and cow dung used as manures is also a common practice in the study area. NO_3– being highly water soluble and low retention in soil matrix can easily find their way into the subsurface water through leaching. Thus a large portion of the fertilizers get leached into the groundwater due to rainfall infiltration leading to its nitrate contamination (Majumdar and Gupta 2000). Apart from agricultural sources, the other sources of NO_3–may be leaches from landfills, domestic wastes, sewerage leakage, poultry waste disposal, etc. (Ako et al. 2014; Karunanidhi et al. 2019). High NO_3–in the drinking water may be causative of a number of health risks, the most important being the methemoglobinemia (blue baby syndrome). Apart from this, high NO_3– consumption through drinking water may lead to hypertension, gastric cancer, goiter, thyroid disorder, respiratory problems and multiple sclerosis in the adults (Adimalla et al. 2018; Bao et al.2017; Suthar et al. 2009). Excess of nitrate may also be harmful to pregnant women and may lead to birth risk (Karunanidhi et al. 2019).

Fig.8.28 Point anomaly map showing Nitrates (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

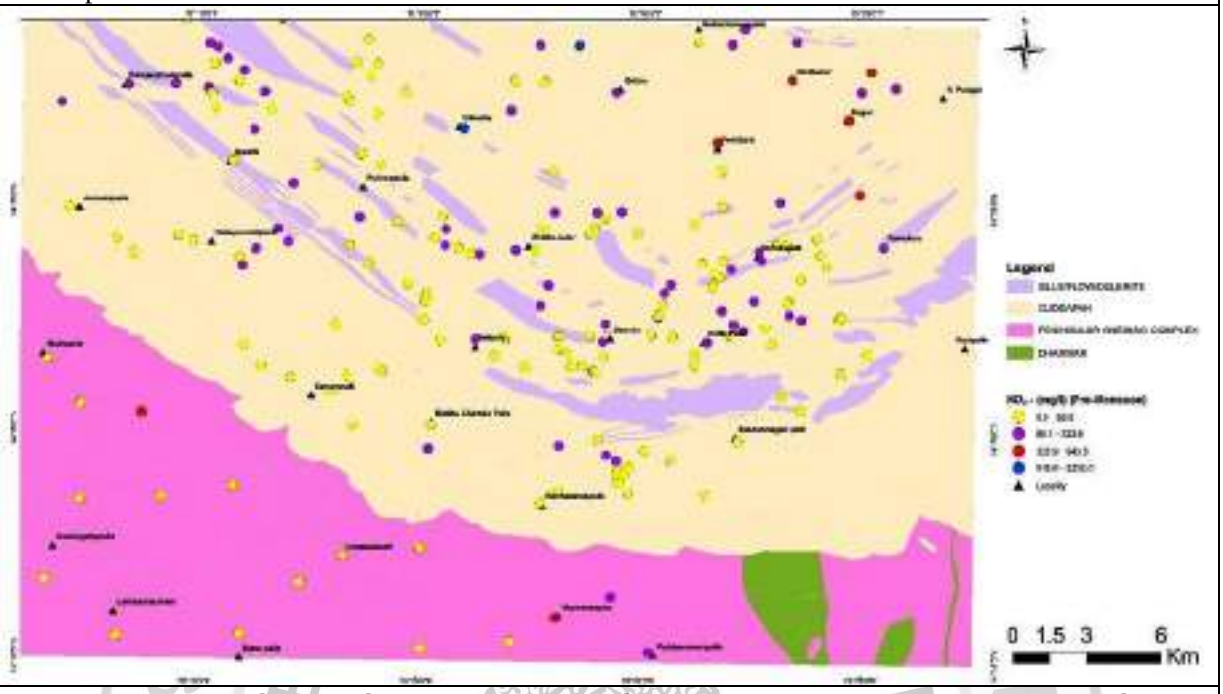
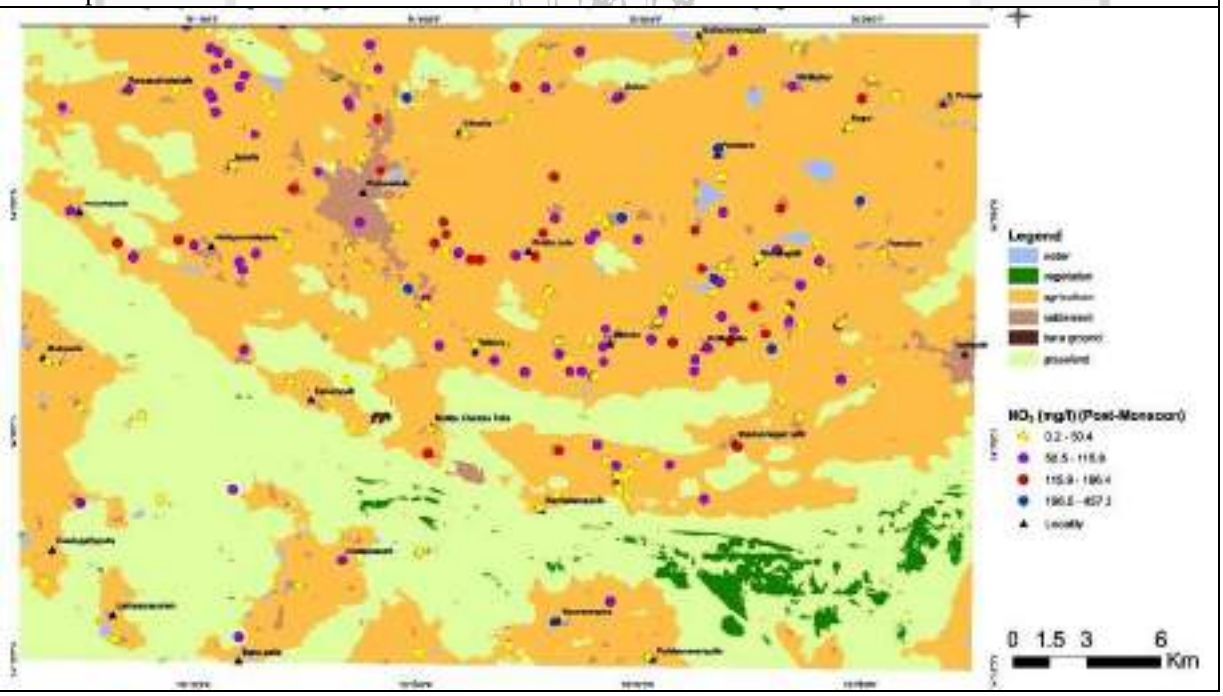


Fig.8.29 Point anomaly map showing Nitrates (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Chromium (Cr): Chromium is the 21st most abundant element in Earth's crust with an average concentration of 100 mg/litre. Chromium can be toxic to humans and produce skin irritations when external exposures occur. Liver and kidney damage may result from internal exposure.

Fig.8.30 Point anomaly map showing Chromium (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

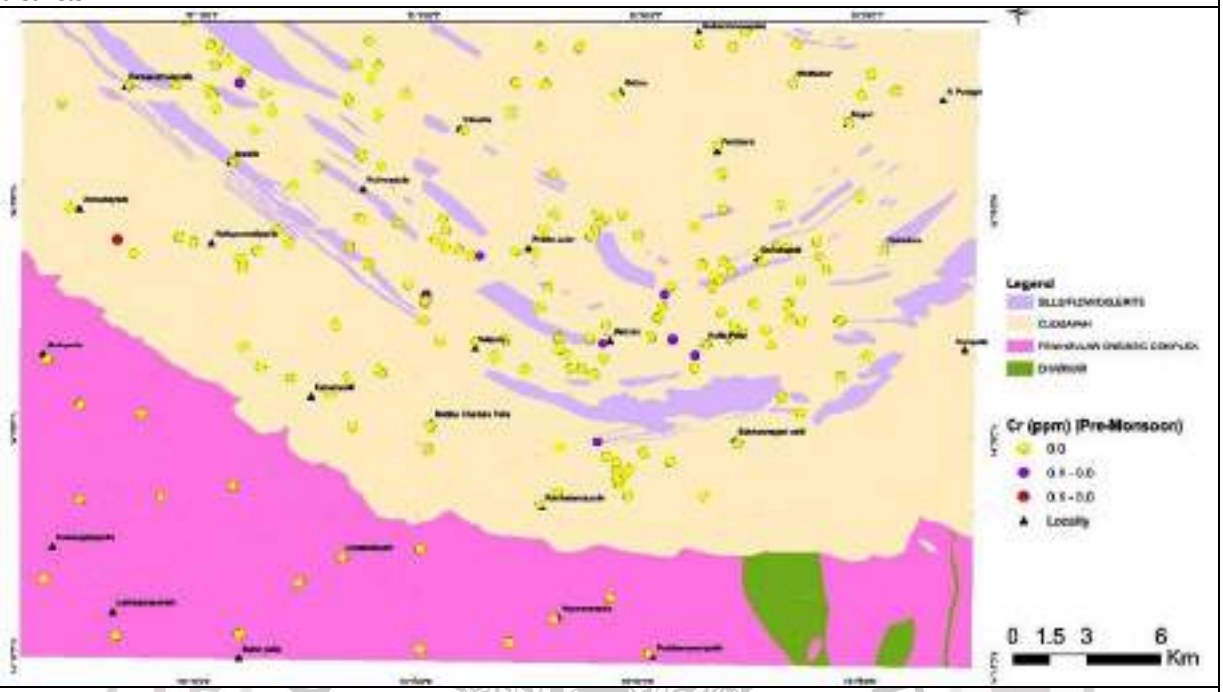
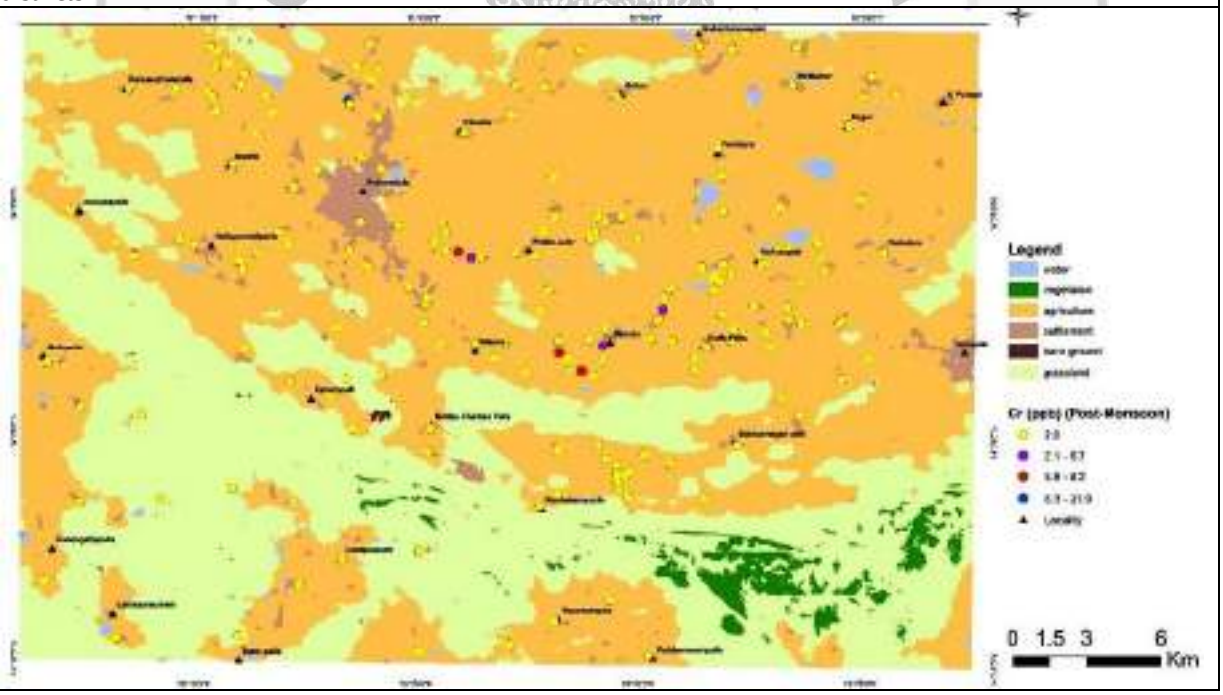


Fig.8.31 Point anomaly map showing Chromium (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



The concentrations range in soil is between 1 and 300 mg/litre, in sea water it is 5 to 800 mg/litre, and in rivers and lakes it varies from 26 mg/litre to 5.2 mg/litre. Maximum acceptable limit as per BSI for lead is 0.05 mg/l with no relaxation. The concentration of Chromium in water in study area varied from 0.01 ppm to 0.02 ppm with an average value of 0.01 ppm in pre monsoon and from 3.54 ppb to 1382.55 ppb with an average value of 180.87 ppb in post monsoon (Table 8.1). 1 no. of

water sample during post-monsoon show higher chromium value falling over Tadpatri shale of Cuddapah Supergroup and PGC-II in the agricultural land in the northern part of the study area (Fig.8.30-8.31)

Manganese (Mn): Both iron & manganese are highly deleterious constituents in water supplies. These metals can appreciably affect the taste of water. The permissible limit of manganese in drinking water as set by BIS is 0.1mg/l and agreeable limit is 0.3mg/l. The concentration of manganese in study area varied from 0.01 ppm to 6.56 ppm with an average value of 0.12 ppm in pre monsoon and 0.25 ppb to 413.43 ppb with an average value of 21.36 ppb in post monsoon (Table 8.1). Higher manganese value in only 1 no. of water sample during pre-monsoon is falling in the grass land and over PGC-II in the southwest part of the study area, whereas 4 nos. of water samples during post-monsoon show higher manganese value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner. Many samples from post monsoon having elevated values with compare to the pre monsoon (Fig.8.32-8.33).

Fig.8.32 Point anomaly map showing Manganese (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

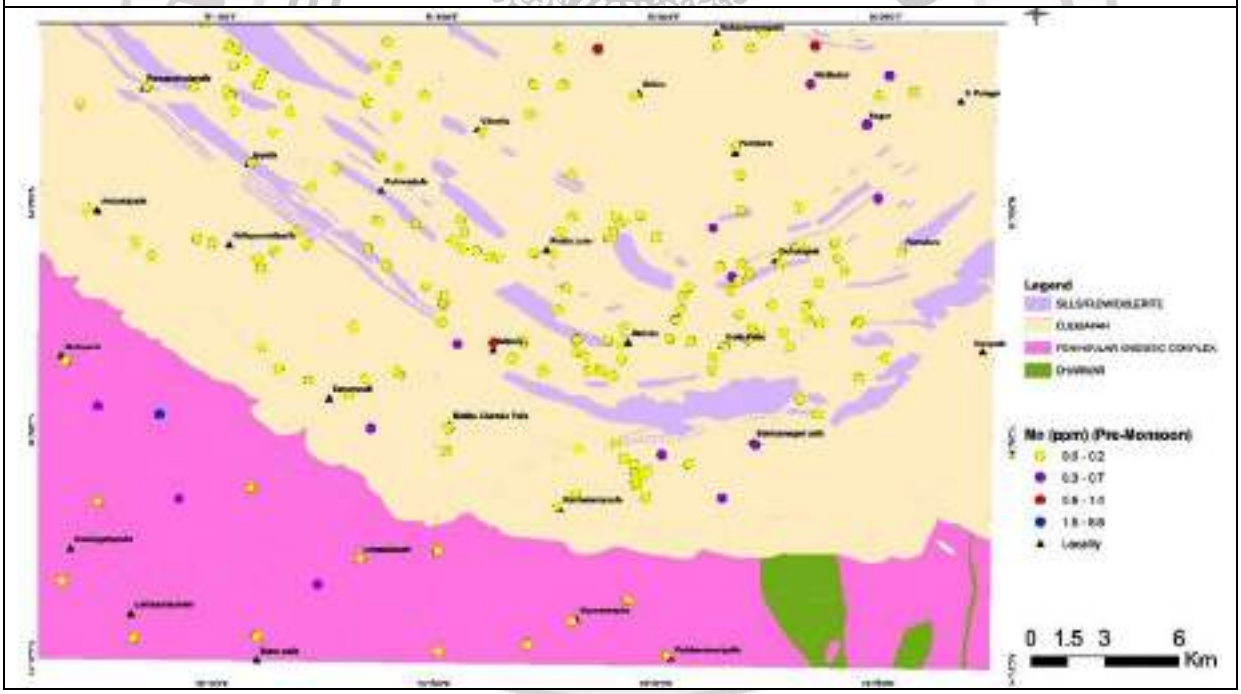
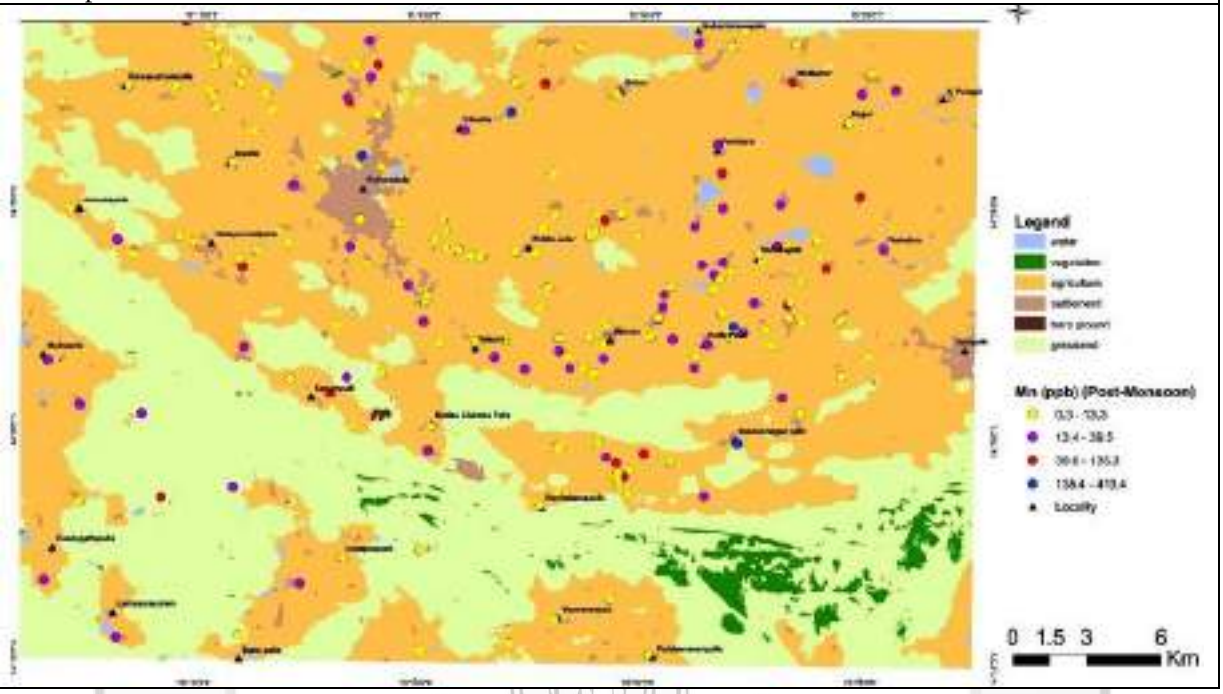


Fig.8.33 Point anomaly map showing Manganese (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Iron (Fe): Iron is an essential element in human nutrition, large quantities can cause unpleasant taste and encourage the growth of iron bacteria. Daily iron requirement ranges between 10 to 50mg/day (FAO/WHO 1988) and taste threshold of iron in water is 0.1mg/l and 0.2mg/l for ferrous and ferric iron respectively. The concentration of iron in study area varied from 0.01 ppm to 11.82 ppm with an average value of 0.49 ppm in pre monsoon and 50 ppb to 6795.96 ppb with an average value of 327.77 ppb in post monsoon (Table 8.1). Higher iron value in only 1 no. of water sample during pre-monsoon is falling in the agricultural land in the northeast part of the study area over Tadpatri shale of Cuddapah Supergroup, whereas 3 nos. of water samples during post-monsoon show higher iron value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner. Many water samples having high Fe values in post monsoon with compare to the pre monsoon (Fig.8.34-8.35).

Fig.8.34 Point anomaly map showing Iron (mg/l) concentrations in pre-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

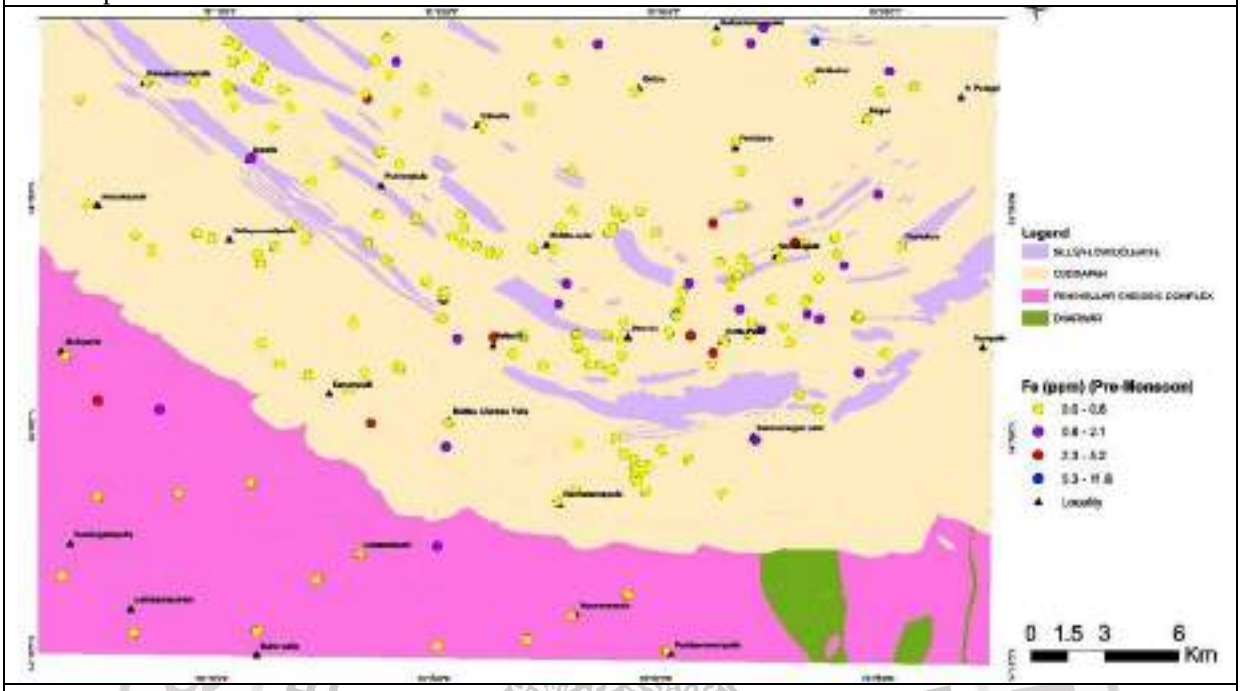
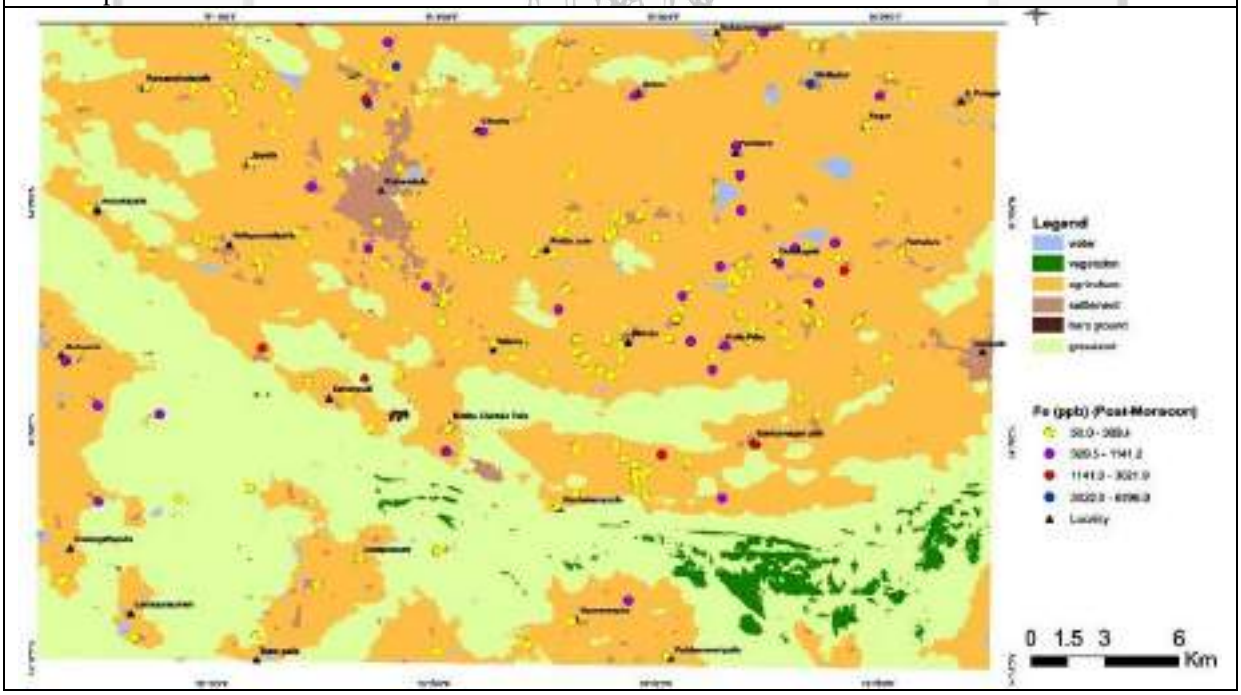


Fig.8.35 Point anomaly map showing Iron (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Nickel (Ni): Nickel may be present in some groundwater and surface water as a consequence of dissolution from nickel ore-bearing rocks or as mining or an industrial pollutant. Chronic exposure to nickel may lead to increase in body weight, induce heart and liver damage, dermatitis problems and adverse effects on kidney function, including tubular and glomerular lesions. The concentration of

nickel in study area varied from 0.01 ppm to 0.12 ppm with an average value of 0.04 ppm in pre monsoon and 0.50 ppb to 33.99 ppb with an average value of 1.73 ppb in post monsoon (Table 8.1). Only 2 nos. of water samples during post-monsoon show higher nickel value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner.

Fig.8.36 Point anomaly map showing Nikel (mg/l) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

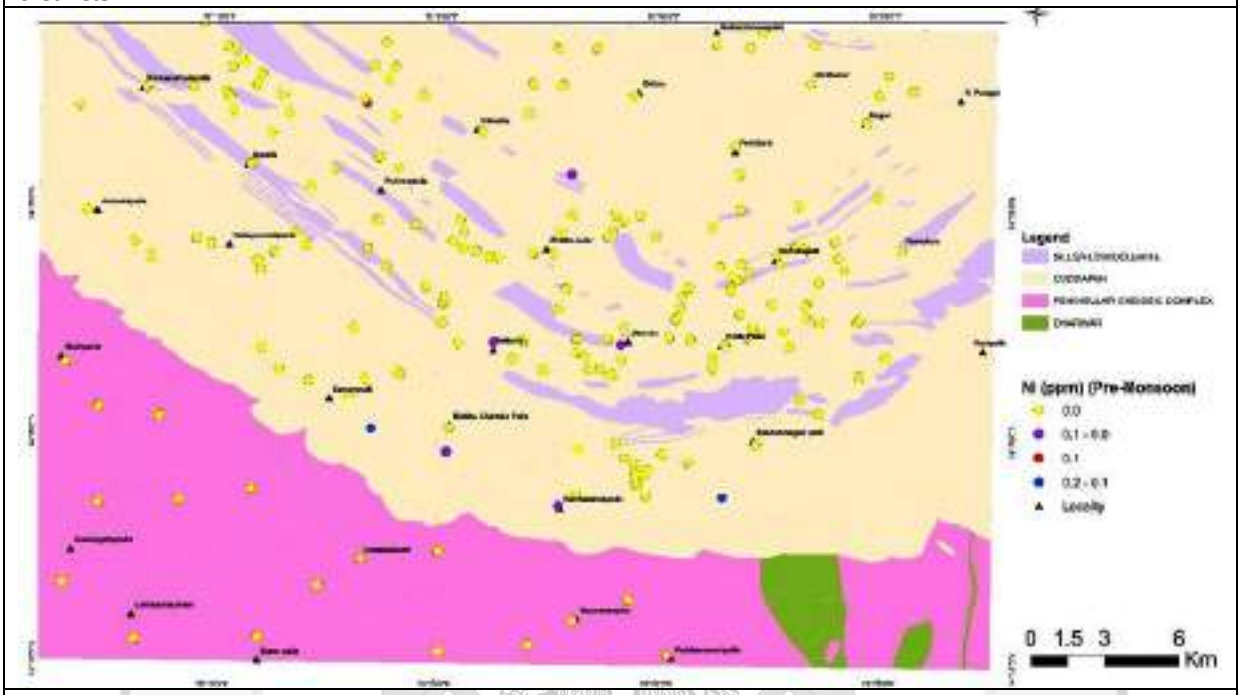
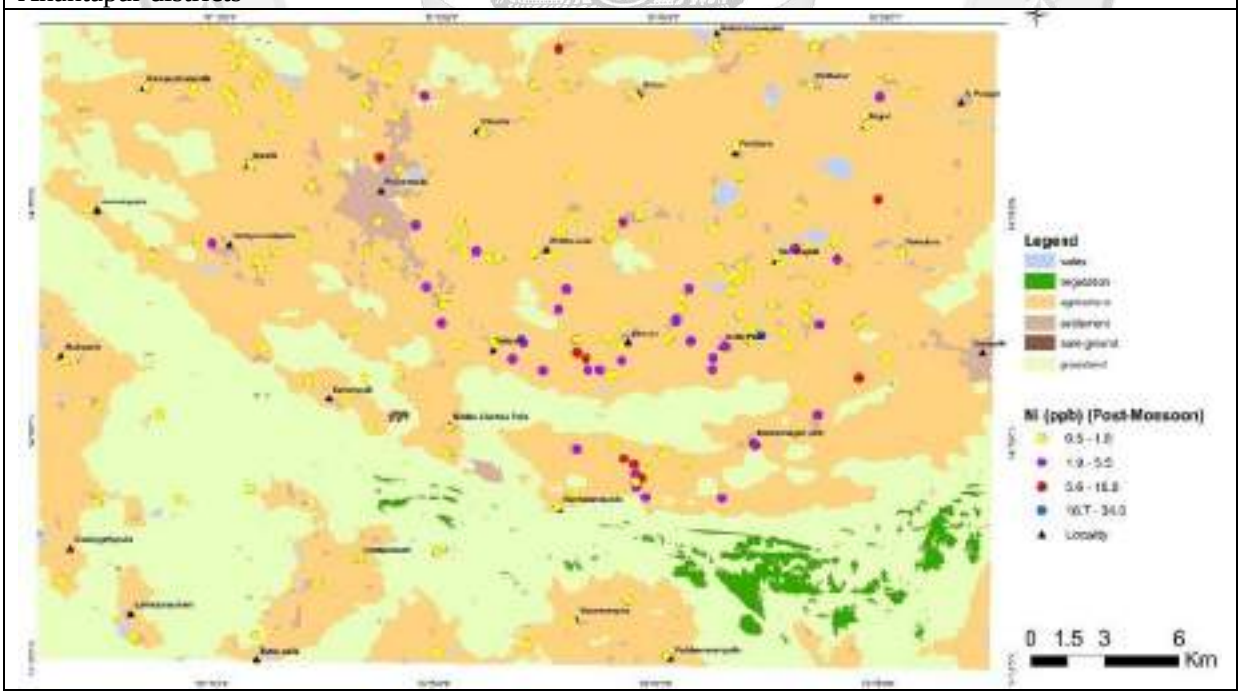


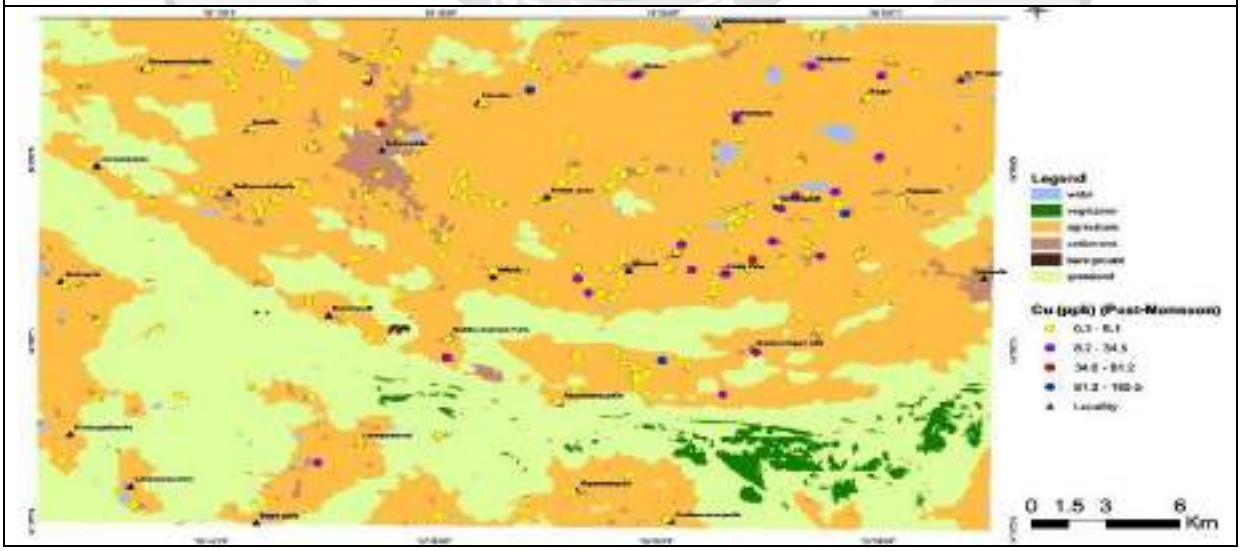
Fig.8.37 Point anomaly map showing Nickel (mg/l) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Copper (Cu): Copper is an essential element in human metabolism and does not constitute a health hazard, but does impart an undesirable taste to water when present in concentrations above 1 mg/L. At concentrations above 1.3 mg/L, intestinal distress may result. BIS recommends a permissible limit of 1.5 mg/l. In the water samples Cu values varies from 0.01 ppm to 0.12 ppm with an average of 0.02 ppm in pre monsoon and 0.25 ppb and 180.46 ppb with an average on 6.74 ppb in post monsoon (Table 8.1). 3 nos. of water samples during post-monsoon show higher Cu value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner (Fig.8.38-8.39)

Fig.8.38 Point anomaly map showing Copper (ppm) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

Fig.8.39 Point anomaly map showing Copper (ppb) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Fluoride (F): Fluorine is the lightest member of halogen group of elements and most electronegative of all elements. In solution it forms fluoride (F-). Fluoride forms strong solute complexes with many cations. The important fluoride-bearing minerals are; fluorite (fluorspar), fluorapatite, cryolite, biotite, muscovite, lepidolite, tourmaline, hornblende series minerals, glucophane-riebeckite may contain considerable per cent of fluoride. The geogenic fluoride contamination of groundwater is widespread in India. Endemic fluorosis is prevalent in India since 1937 (Shrott et al., 1937). Beside rocks, it is commonly present in plants, soil, phosphatic fertilizers and rock minerals. Fluoride is essential for normal bone growth, but their higher concentration in the ground water causes health hazards which are reported in many states of India. BIS recommends a permissible limit of 1.5 mg/l. In the water samples F values varies from 0.18 ppm to 5.64 ppm with an average of 1.36 ppm in pre monsoon and 0.16 ppm and 5.26 ppm with an average on 1.35 ppm in post monsoon (Table 8.1). Higher F value in 6 nos. of water samples during pre-monsoon are falling in the agricultural land of the study area over Tadpatri shale of Cuddapah Supergroup and PGC-II in a scattered manner, whereas 9 nos. of water samples during post-monsoon show higher F value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner.

Fig.8.40 Point anomaly map showing Fluorine (ppm) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

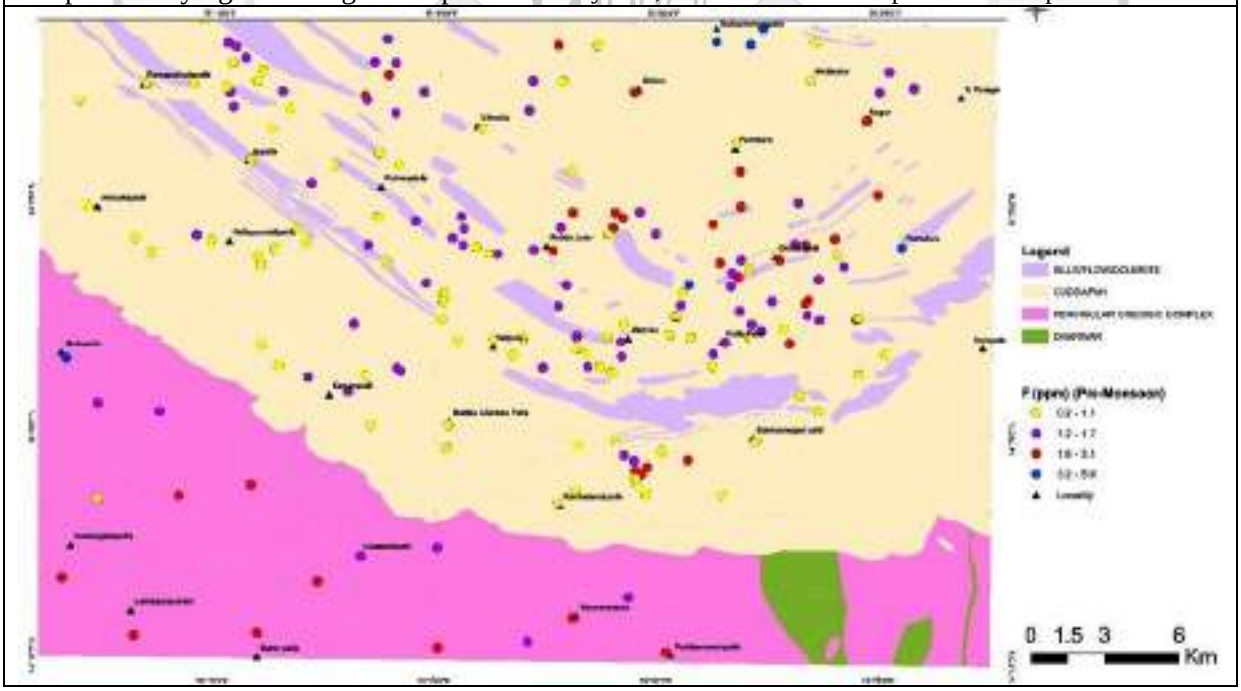
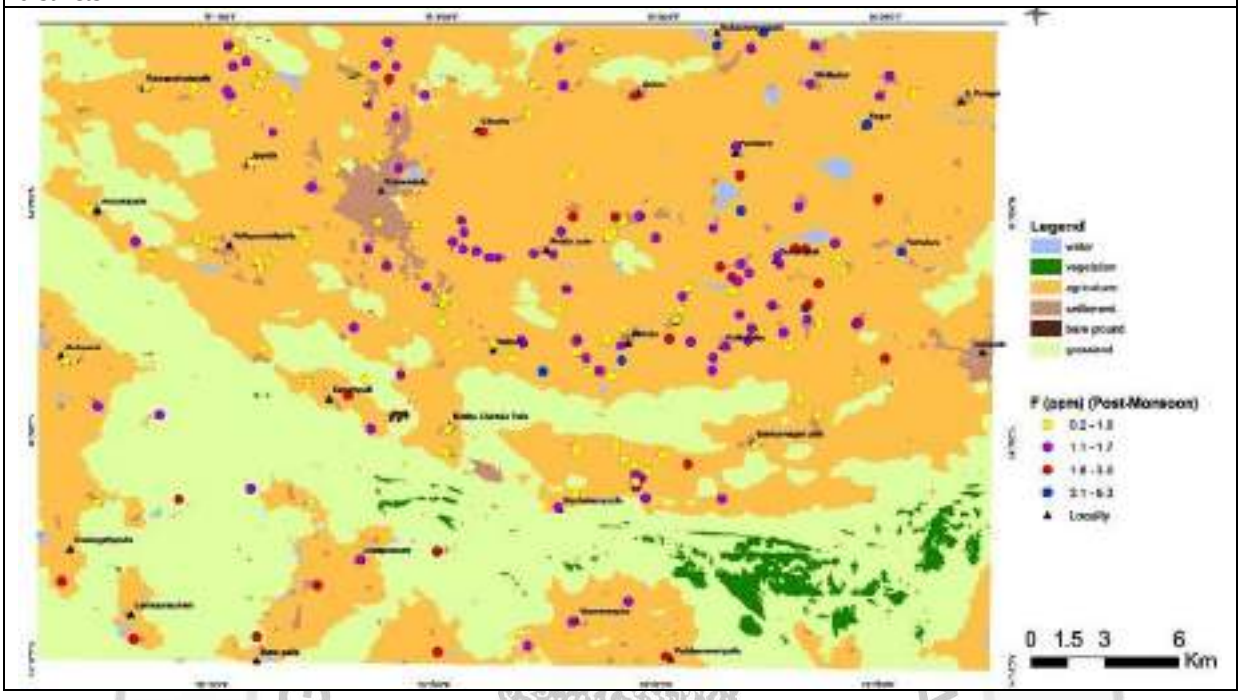


Fig.8.41 Point anomaly map showing Fluorine (ppm) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Zinc (Zn): Zinc occurs naturally, but it may also result from industrial pollution. According to SIFF (1987), no negative health effects of zinc in drinking water are known. Very high zinc concentrations may cause an acrid taste in the water. BIS has permissible limit of 5 mg/L, which is consistent to the guideline value of WHO and maximum agreeable limit of 15mg/l above which the water is undesirable to taste. Zinc can produce a chalky appearance in water and produce a disagreeable taste. In the water samples Zn values varies from 0.01 ppm to 4.03 ppm with an average of 0.21 ppm in pre monsoon and 1 ppb and 2303.83 ppb with an average on 100.70 ppb in post monsoon (Table 8.1). Higher Zn value in 1 no. of water sample during pre-monsoon is falling in the agricultural land of the study area over Tadpatri shale of Cuddapah Supergroup, whereas 3 nos. of water samples during post-monsoon show higher Zn value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner.

Cadmium (Cd): Cadmium accumulates in the body and has a toxic effect on several organs. Cadmium may be derived from older fittings in pipe work and on some occasions from cadmium mineralization in the ground. Cadmium is particularly soluble in soft and acidic water. BIS recommends a permissible limit of 0.003 mg/l with No Relaxation in the upper limit. In the water samples Cd values varies from 0.01 ppb to 4.78 ppb with an average

of 0.12 ppb in pre monsoon and 0.01 ppb and 2.13 ppb with an average on 0.10 ppb in post monsoon (Table 8.1). Higher Cd value in 1 no. of water sample during pre-monsoon is falling in the agricultural land of the study area over Tadpatri shale of Cuddapah Supergroup, whereas 6 nos. of water samples during post-monsoon show higher Cd value falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner.

Arsenic (As): Arsenic is the 20th most abundant element found in the earth's crust. It is released organically by natural processes such as decomposition and volcanic eruptions (geogenic) and from anthropogenic sources (human activities) and can be transported over long distances as water- or air-suspended particles and aerosols. Arsenic has been recognized as a toxic metalloid carcinogen element and is considered a human health hazard found worldwide in surface and ground water from natural and anthropogenic sources (Ambika and Natarajan, 2006). World average concentration of arsenic in the earth's crust ranges from 1.5 to 5 mg kg1 (DeMarco et al., 2003). World health organization has recently recommended the permissible limit standards for arsenic in drinking water 10– 20 lg L^{-1} instead of 40–50 lg L^{-1}. (Katsoyiannis et al.,2004). Arsenic in the water samples varies from 0.09 ppb to 9.17 ppb with an average of 0.86 ppb in pre monsoon and 0.5 ppb to 14.73 ppb with an average of 1.57 ppb in post monsoon (Table 8.1). Higher arsenic values in 3 nos. of water samples during pre-monsoon are falling in the agricultural land over Tadpatri shale of Cuddapah Supergroup in a scattered manner, whereas 5 nos. of water samples during post-monsoon shows higher arsenic values falling over Tadpatri shale of Cuddapah Supergroup in the agricultural land in a scattered manner (Fig.8.42-8.43)

Fig. 8.42 Point anomaly map showing Arsenic (ppb) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

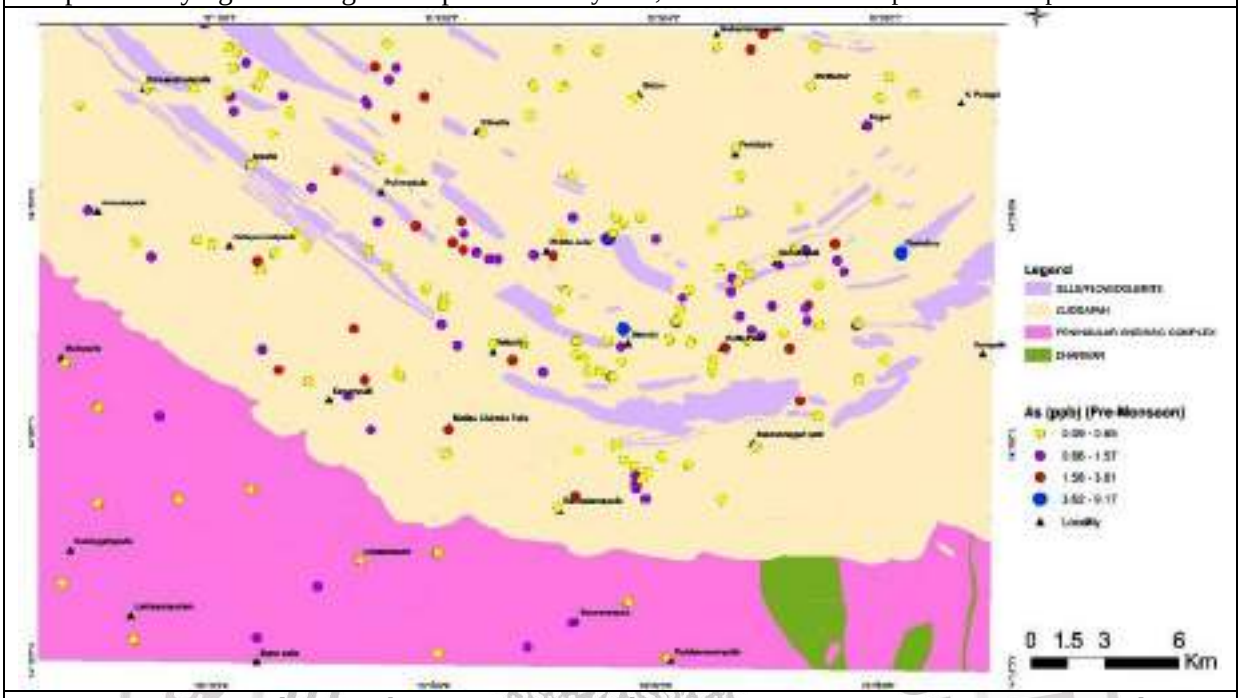
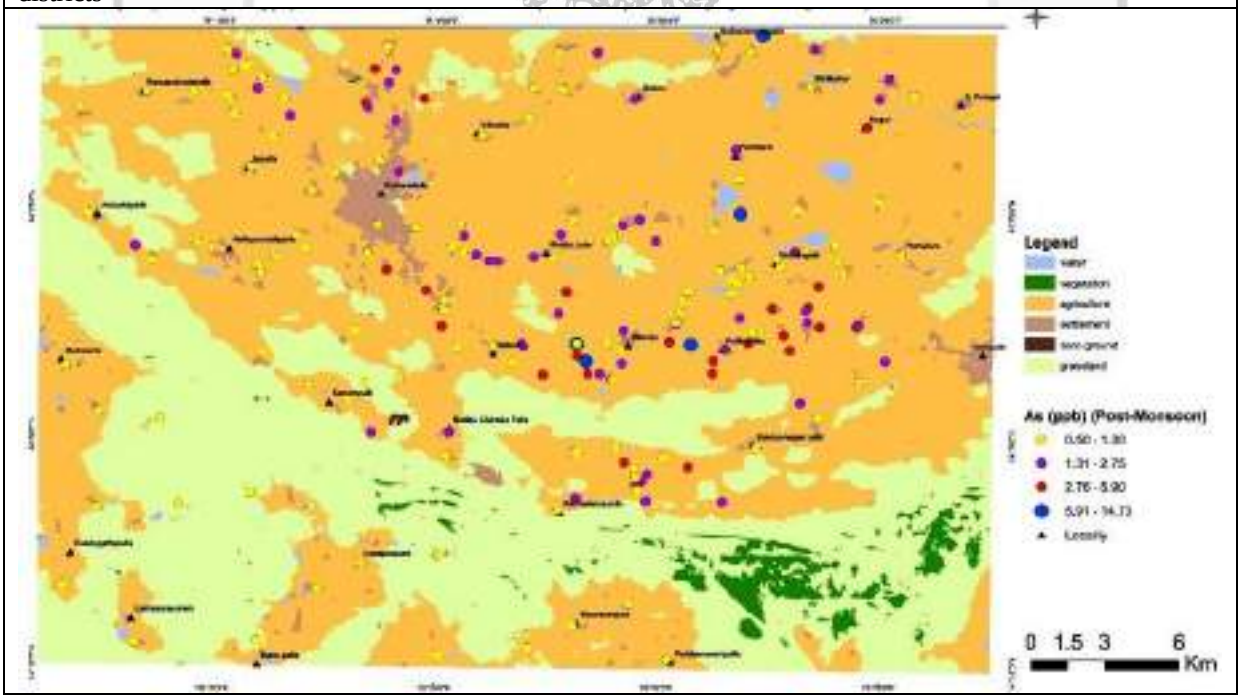


Fig.8.43 Point anomaly map showing Arsenic (ppb) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Selenium (Se): Selenium is a naturally occurring metalloid. Selenium is an essential trace mineral that is critical for human health. This trace nutrient plays a role in the reproductive, cognitive, and immune system for humans. The primary source of selenium intake is through food. Elevated levels of selenium have been associated with hair and

fingernail loss, nervous system damage, fatigue, irritability, numbness in fingers and toes, circulatory disorders, kidney failure, liver damage, and, in extreme cases, death. High levels of selenium exposure have been associated with brittle hair and hair loss and brittle broken finger nails, which is a condition known as selenosis. As per WHO, the recommended daily intake of selenium is 0.9 µg/kg of body weight for adults. Selenium in the water samples varies from 0.01 ppb to 1.61 ppb with an average of 0.28 ppb in pre monsoon and 50 ppb in all the water samples of post monsoon (Table 8.1). Higher selenium values in 9 nos. of water samples during pre-monsoon are falling in the agricultural and grass land over Tadpatri shale of Cuddapah Supergroup and PGC-II in a scattered manner in the western and southern part of the study area (Fig.8.44-8.45).

Fig.8.44 Point anomaly map showing Selenium (ppb) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

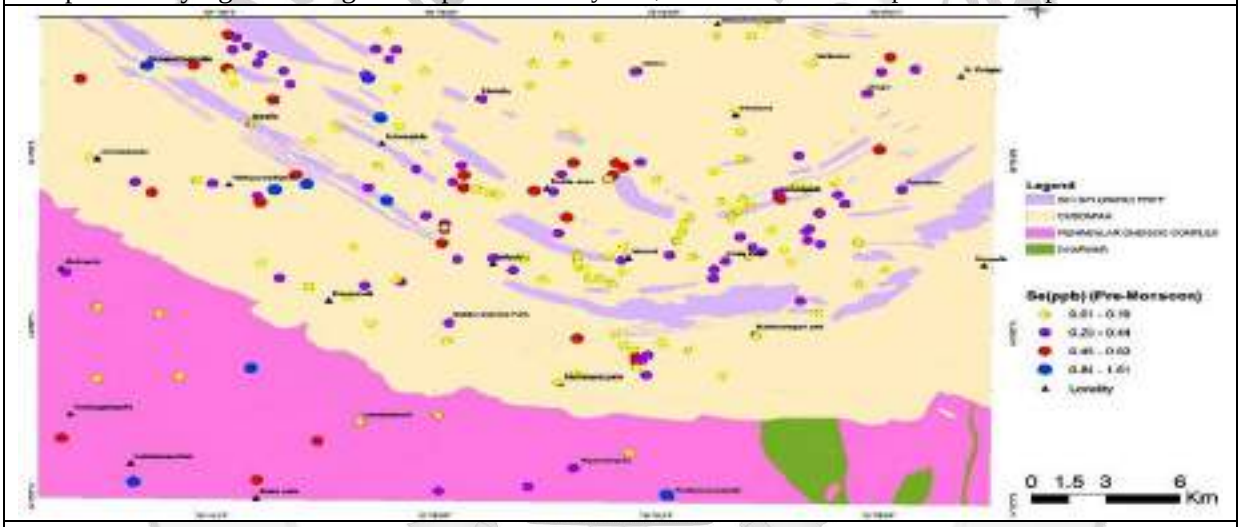
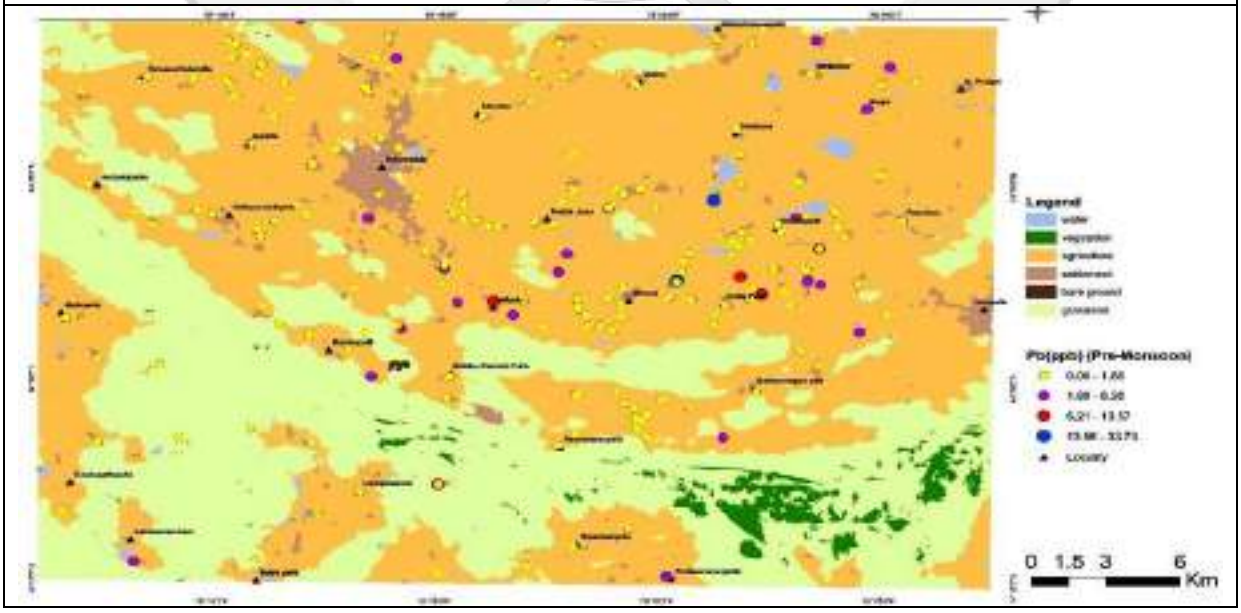


Fig.8.45 Point anomaly map showing Selenium (ppb) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Lead (Pb): The chemical symbol for lead of "Pb" comes from the Latin *plumbum*, the root for "plumbing". Lead is a toxic metal that is persistent in the environment and can accumulate in the body over time. Lead can enter drinking water when a chemical reaction occurs in plumbing materials that contain lead. This is known as corrosion – dissolving or wearing away of metal from the pipes and fixtures. This reaction is more severe when water has high acidity or low mineral content. Risk will vary depending on the individual, the chemical conditions of the water, and the amount consumed. For example, infants who drink formula prepared with lead-contaminated tap water may be at a higher risk of exposure because of the large volume of water they consume relative to their body size. Bathing and showering should be safe for you and your children because human skin does not absorb lead in water. Most children and adults who are exposed to lead have no symptoms. According to the World Health Organization and US Environmental Protection Agency guidelines, maximum allowable concentration of lead in drinking water are 0.01 mg/l and 0.015 mg/l.

Lead in the water samples varies from 0.02 ppb to33.73 ppb with an average of 1.74 ppb in pre monsoon and 0.25 ppb to 45.75 ppb with an average of 2.03 ppb in post monsoon (Table 8.1). Higher lead values in 2 nos. of water samples during pre-monsoon are falling in the agricultural land over Tadpatri shale of Cuddapah Supergroup in a scattered manner, whereas 3 nos. of water samples during post-monsoon shows higher lead values falling over Tadpatri shale of Cuddapah Supergroup in the agricultural and grass land in a scattered manner(Fig .8.46-8.47)

Fig.8.46 Point anomaly map showing Lead (ppb) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

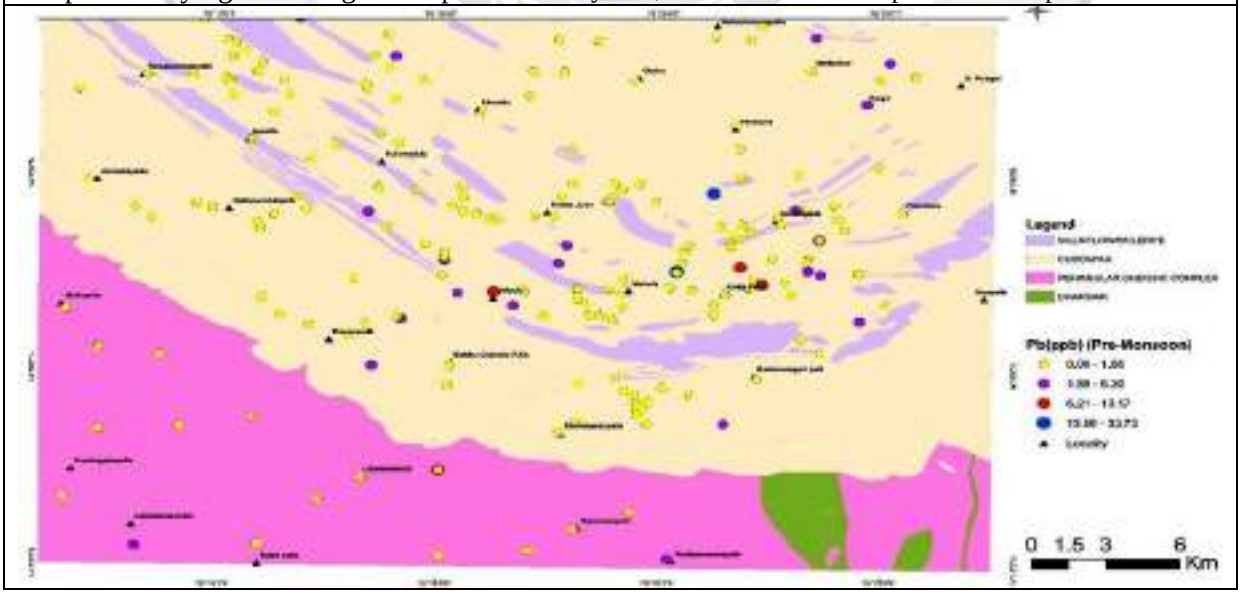
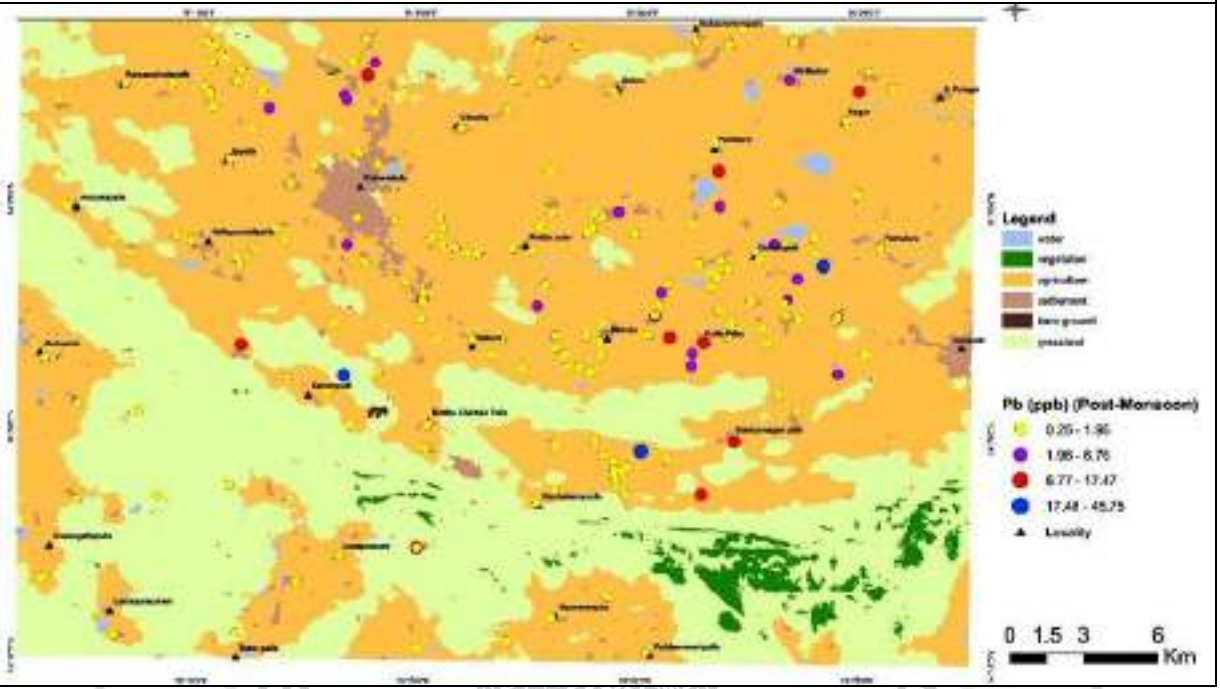


Fig.8.47 Point anomaly map showing Lead (ppb) concentrations in post-monsoon ground water samples overlying in Landuse- Landcover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts



8.3 Water Quality Index (WQI)

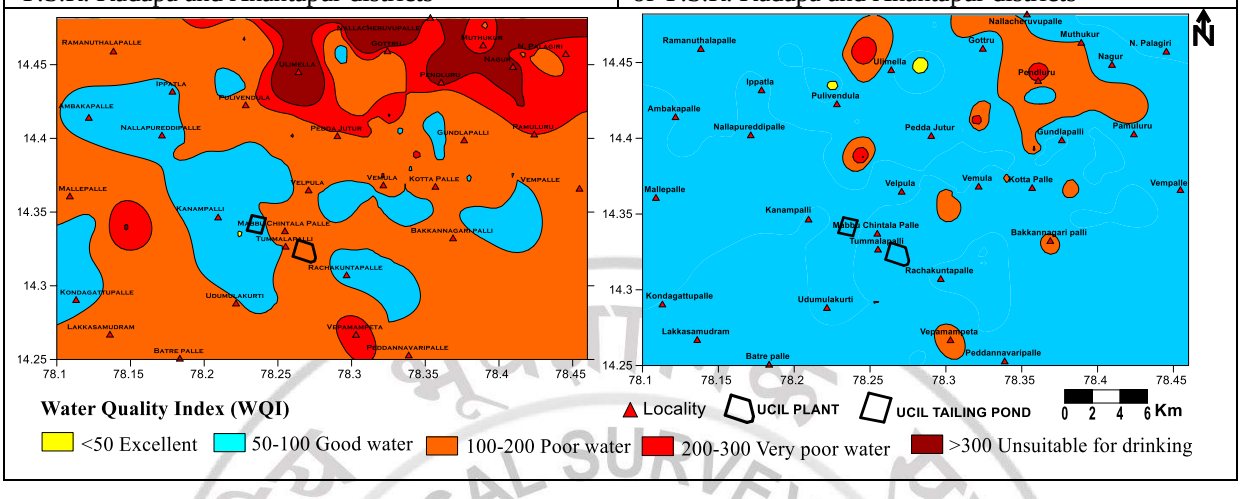
To get a comprehensive picture of overall quality of ground water, the WQI was used. WQI is defined as a rating reflecting the composite influence of different water quality parameters on the overall quality of water. The Indian standard specified for drinking water (BIS, 2012) was used for the calculation of WQI. After calculation of the WQI, proportionate point symbol map is prepared. It may show the poor water quality dominates the study area of both the pre and post monsoon except few scattered patches of area shows good water quality conditions. Vepamampeta, Ulimella, Pendluru, Nagur, Nallacheruvupalle villages have very poor water quality to unsuitable for drinking purposes. (Fig 8.48-8.49) (Table 8.4).

Table:8.4 Water quality index of ground water in pre and post monsoon

Range	Catageroy	Premonsoon		Post monsoon	
		No of samples	% of samples	No of samples	% of samples
<50	Excellent	1	0.5	3	1.51
50-100	Good	66	33	78	39.39
100-200	Poor	106	53	96	48.48
200-300	Very poor	15	7.5	16	8.08
>300	Unsuitable	12	6	5	2.52

Fig.8.48 Spatial distribution map showing Ground water Quality (Pre-monsoon) in the study area Parts of Y.S.R. Kadapa and Anantapur districts

Fig.8.49 Spatial distribution map showing Ground water Quality (Post-monsoon) in the study area Parts of Y.S.R. Kadapa and Anantapur districts



8.4 Pollution index of groundwater

Pollution index of groundwater (PIG) is a numerical scale, quantifying the extent of contamination. It reflects a composite influence of individual water quality measures on overall water quality of aquifer (N Subbarao 2012). The pollution index of groundwater (PIG) was initially proposed by Subba Rao in early 2012, and since then it has widely been used to assessment of variation in groundwater quality caused in various geochemical factors (Rao et al., 2018; Subba Rao, 2012). Five steps are involved in order to compute the PIG.

In the first step is to assign the relative weight (RW) for each chemical parameter. Generally, RW range from 1 to 5, depending upon its relative impact on human health. Maximum weight (5) was given to Cl−, SO4− , NO3− and F−, and minimum weight (1) was assigned to K+ and HCO3−.

In the second step, the weight parameter (WP) is calculated for each chemical parameter to evaluate its relative share on overall groundwater quality. The WP is computed by using the following equation:

WP = RW ΣRW. (2):

In the third step is to estimate the status of concentration (SC) which is computed by the following equation:

SC = Cni / DWQSni. (3):

where, C is the concentration of chemical parameter “n”, and DWQS is the drinking water quality standard “nth” parameter. In the fourth step, overall groundwater quality (OW) is calculated by multiplying the WP with SC which is clearly shown in Eq. (4):

$$OW = WP \times SC \quad (4)$$

Eventually, PIG is estimated by using the following equation:

$$PIG = \Sigma n\ i\ OW \quad (5)$$

Furthermore, Subba Rao (2012) categorized the pollution index of groundwater for five classes based on PIG values which are presented in Table.8.5

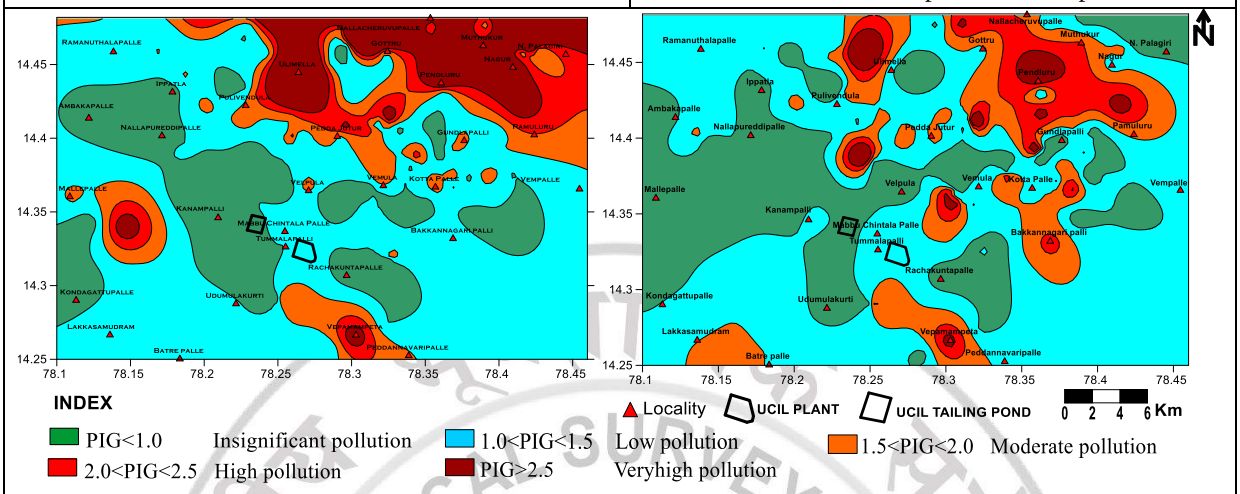
The computed index of PIG from the study area varies from 0.44 to 12.81 in PRM and 0.18 to 4.56 in POM. The index disseminates the area into zones of insignificant (PIG <1.0), low (PIG: 1.0 to 1.5), moderate (PIG: 1.5 to 2.0), high (PIG 2.0 to 2.5) and very high (PIG >2.5) pollution. According to the classification of PIG, 34% in PRM and 40.9% in POM of the total groundwater samples represent insignificant pollution, 40.5% in PRM and 35.85% POM samples shows low pollution. 12% in PRM and 13.13% in POM samples having moderate pollution. 6% in PRM and 3.53% in POM samples high pollution and 7.5% in PRM and 6.56 % POM samples elevated very high pollution in ground water (Table). Proportionate point symbol maps of Pollution index in ground water show high to very high pollution zones in the northern, southern, eastern part near Vepamampeta, Ulimella, Pulivendula, Pedda Jutur, Pendluru, Vemula, Kotta Palle, Muthukur, Nagur, Nallacheruvupalle villages whereas insignificant to moderate pollution zones are spread in a scattered manner both in Pre and post Monsoon data.

Table.8.5 Pollution Index of Ground water samples in pre and post monsoon

PIG	Catageroy	Premonsoon		Post monsoon	
		No of samples	% of samples	No of samples	% of samples
< 1.0	Insignificant pollution	68	34	81	40.9
1.0-1.5	Low pollution	81	40.5	71	35.85
1.5-2.0	Moderate pollution	24	12	26	13.13
2.0-2.5	High pollution	12	6	7	3.53
>2.5	Very high pollution	15	7.5	13	6.56

Fig.8.50 Spatial distribution map showing Ground water pollution zones in Pre-monsoon from the study area, Parts of Y.S.R. Kadapa and Anantapur districts

Fig.8.51 Spatial distribution map showing Ground water pollution zones in Pre-monsoon from the study area, Parts of Y.S.R. Kadapa and Anantapur districts

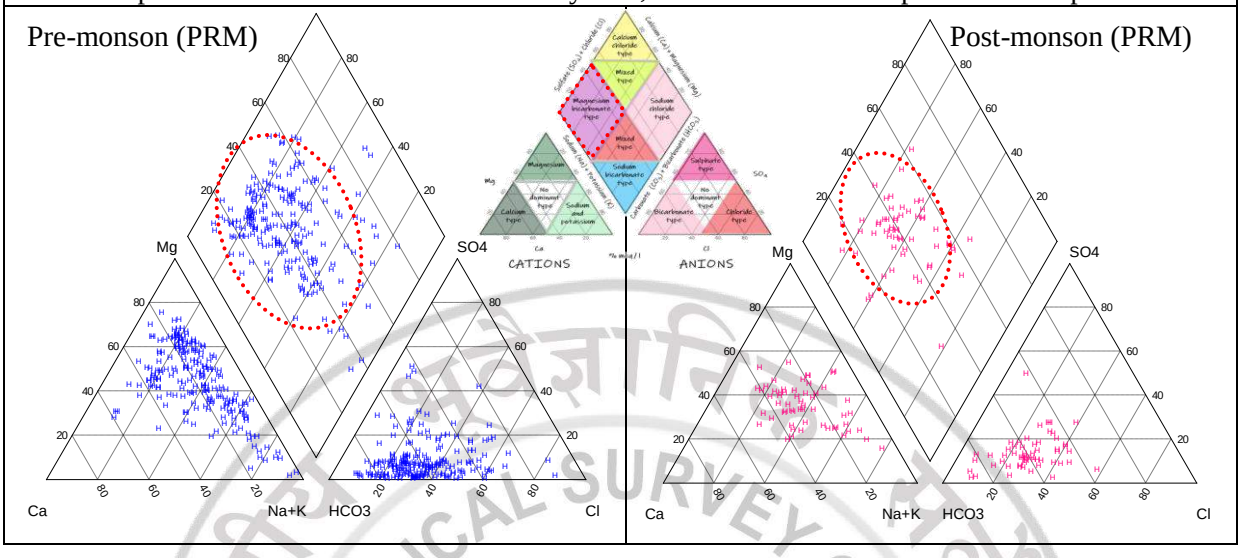


8.5 Hydrochemical facies

The geochemical evolution of groundwater can be understood by constructing Piper (1944) trilinear diagram and Durov (1948) plot.

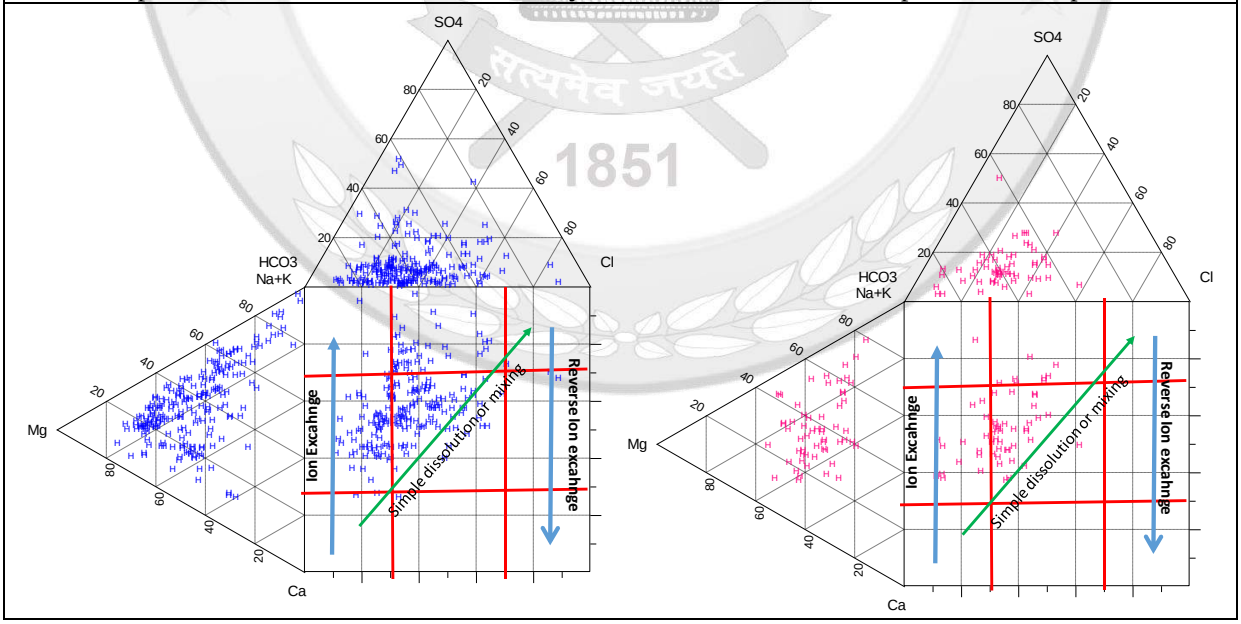
8.5.1 Piper diagram: It is a multifaceted plot wherein milliequivalents percentage concentrations of major cations (Ca^{2+}, Mg^{2+}, Na^{+} and K^{+}) and anions (HCO_3^{-}, SO_4^{2-}, and Cl^{-}) are plotted in two triangular fields, which were then projected further into the central diamond field which decides the water type / hydrochemical facies in a water sample. The hydrochemical facies of the groundwater for Tummalapalli area were studied, and it was observed that the dominant water facies is Magnesium bicarbonate to mixed type Mg-Ca-Na-HCO3-Cl and Na-Ca-Cl-HCO3 types in PRM and POM. The water quality type is observed from 80% of the groundwater sampling points due to a result of intensive soil-water-rock interactions, followed by mineral dissolution, ion exchange and evaporation processes in the groundwater system, which indicates the geogenic origin as the dominant controlling factor of the groundwater chemistry in the present study area (fig 8.52).

Fig. 8.52 Piper Trilinear diagram classifying major hydrochemical facies (Langguth, 1966) for ground water samples in PRM and POM from the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Durov diagram define the hydrochemical processes involved along with water type. It is a composite plot consisting of 2 ternary diagrams where the milliequivalents percentages of the cations of interest were plotted against that of anions of interest; sides form a central rectangular, binary plot of total cation vs. total anion concentrations. mixed water type prevail in the study area was supported by data plotted on Durov diagram. Based on the classification of Lloyd and Heathcoat (1985), this trend can be attributed to fresh recent recharge water exhibiting simple dissolution or mixing with no dominant major anion or cation.

Fig. 8.53 Durov plot depicting hydrochemical processes (Lloyd and Heathcoat (1985) for ground water samples in PRM and POM from the study area, Parts of Y.S.R. Kadapa and Anantapur districts



Both the diagrams reveal similarities and differences among water samples because those with similar qualities will tend to plot together as groups (Todd, 2001). Groundwater types assessed and compared with Durov and Piper diagrams illustrated that simple mineral dissolution or mixing processes is mainly responsible for variation in hydrogeochemistry of ground / surface water in the study area (Fig8.53)

8.6 Suitability of ground water for Irrigation

Water for the normal growth and crop production should satisfy the need of soil and plant of area. The high salt content in irrigation water causes an increase in soil solution osmatic pressure. The Sodium Absorption Ratio (SAR), percent Sodium (%Na), Residual Sodium Carbonate (RSC), Mg Ratio (MR), Corrosively Ratio (CR), Soluble Sodium Percentage (SSP) and Kelly's ratio (KR) parameters have been estimated which decides its suitability for irrigation purpose.

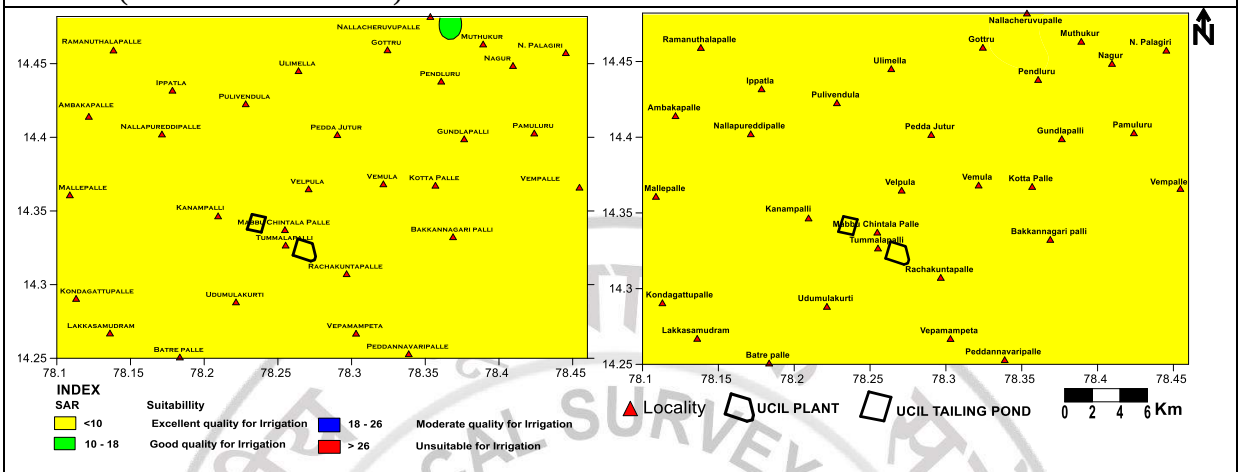
8.6.1 Sodium Adsorption Ratio (SAR):

A high sodium concentration changes soil properties and reduce soil permeability. The suitability of water for irrigation purpose is determined by following parameter

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

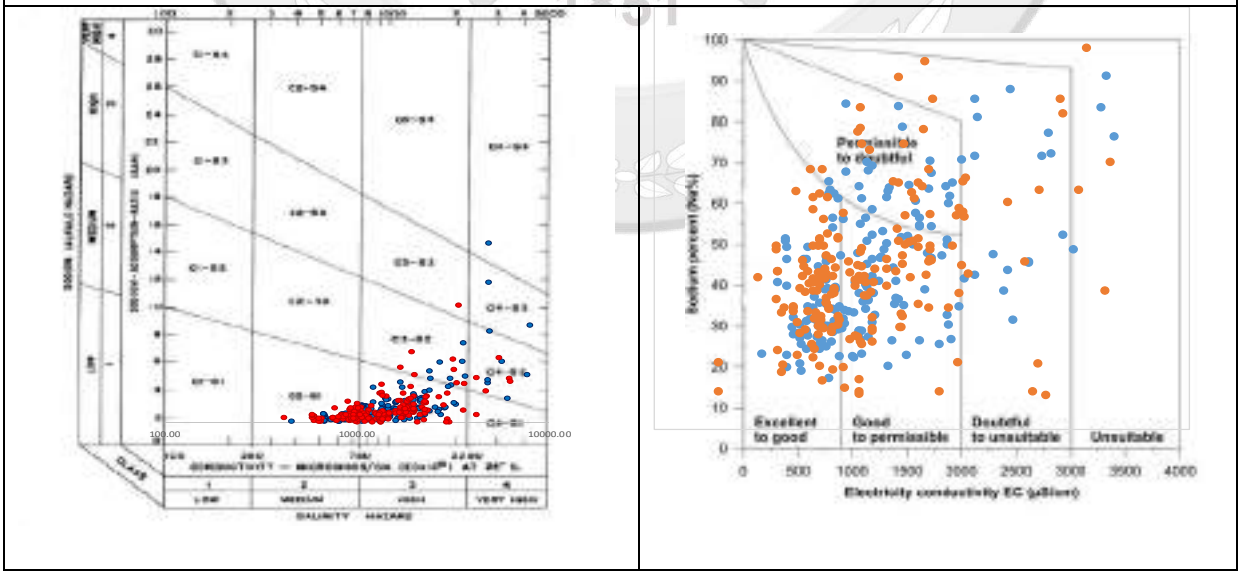
Water with SAR value ≤ 10 is considered as of excellent quality, 10 to 18 is good, between 18 to 26 is fair and above 26 is said to be unsuitable for irrigation. SAR value in pre monsoon water samples ranges from 0.09 to 14.28, which indicates that most of the water samples fall in excellent quality except two water samples collected near Kondareddipalli village. In post monsoon water samples, SAR value ranges from 0.01 to 9.33. So, all the water samples fall in excellent quality (Fig. 8.54)..

Fig. 8.54 Spatial distribution Map showing Sodium Absorption Ratio (SAR) for suitability of groundwater quality for irrigation purposes in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



Further, plotting obtained values of SAR (sodium hazard) and EC (salinity hazard) on the US Salinity Laboratory (USSL 1954) diagram, From the plot (Fig.), it is evident that groundwater of nearly 80% of the samples from PRM and POM are falls under water type C3-S1 (high salinity—low SAR) and 10% of the samples fall in C4-S1 and C4-S2(Very high salinity –low SAR)(Fig.8.55). Hence, the water of these sites cannot be used as irrigation water for the soils with limited drainage. However, in order to use the water of these site even for the soils with adequate drainage, special management practices for salinity control need to be implemented and only plants with high salt tolerance could be selected. 10% of the samples fall under C2-S1 (medium salinity—low SAR), such water can be used to irrigate soil with moderate leaching and only for those plants which are moderately salt tolerant and can grow without adopting any special practices for salinity control.

Fig. 8.55 Classification of irrigation water based on US Salinty Diagram (A) Wlicox Diagram diagram (B)



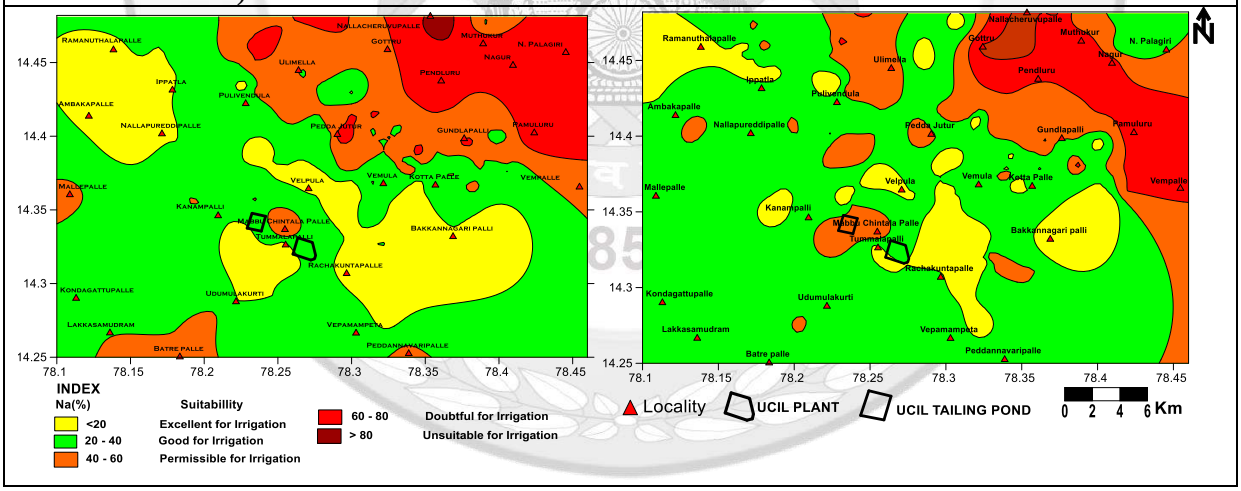
8.6.2 Percentage of Sodium (%Na):

The percentage Na (in meq L-1) is widely used for evaluating the suitability of water quality for irrigation (Wilcox, 1955). This value is defined by the expression;

$$\%Na = \frac{Na^{+} + K^{+}}{Na^{+} + K^{+} + Ca^{2+} + Mg^{2+}} \times 100$$

Sodium percent values varied in ground water samples from 5.06 to 84.20% in PRM and 0.52 to 91.69% in POM. 27% of PRM and 23% of POM samples having < 20% of sodium percentage in groundwater, it indicates that excellent water quality for irrigation. only 2% in PRM and 2% in POM samples having >80 % it indicating that these groundwater samples not suitable for irrigation and majority of the samples fall under good to doubtful nature sodium percentage is decreasing in POM with compared to the PRM (Fig. 8.56.). High %Na in irrigation water causes exchange of sodium in water, and exchange of calcium and magnesium in soil having poor internal drainage system. Futher wilicox diagram plotted to understand the irrigation quality of ground water. It revels that 80% of the samples having good for irrigation and 20% of samples having permissible to unsuitable condition (Fig)

Fig. 8.56 Spatial distribution Map showing Percent sodium (%Na) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



8.6.3 Residual Sodium Carbonate (RSC):

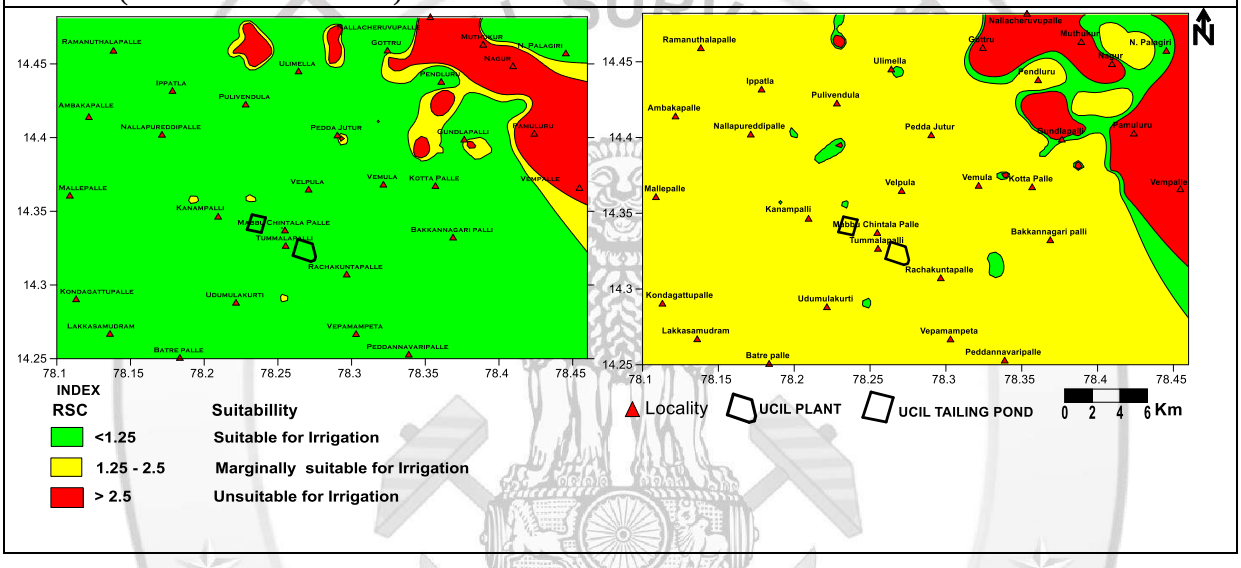
RSC is another parameter of the suitability of water for use in agricultural irrigation and is determined by the residual carbonate concentrations in the water. When the excess carbonate (residual) concentration becomes too high, the carbonates combine with calcium and magnesium that can cause an increase in sodium content in the soil. The end result is an

$$RSC = (CO_3 + HCO_3) - (Ca + Mg))$$

increase in SAR. A high RSC value (in meq/L) in water leads to an increase in the adsorption of sodium on soil. It is calculated by following formula;

The RSC values < 1.25 meq/L are considered as suitable for the irrigation, 1.25 to 2.5 indicates marginally suitable and if it is more than 2.5 are unsuitable for irrigation (Richards, 1954). The RSC values of water indicate that area 83% of PRM and 82 % of POM samples are good for irrigation. 9.5% of PRM and 9 % of POM samples are unsuitable for irrigation. (Fig. 8.57).

Fig. 8.57 Spatial distribution Map showing Residual sodium carbonate (RSC) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



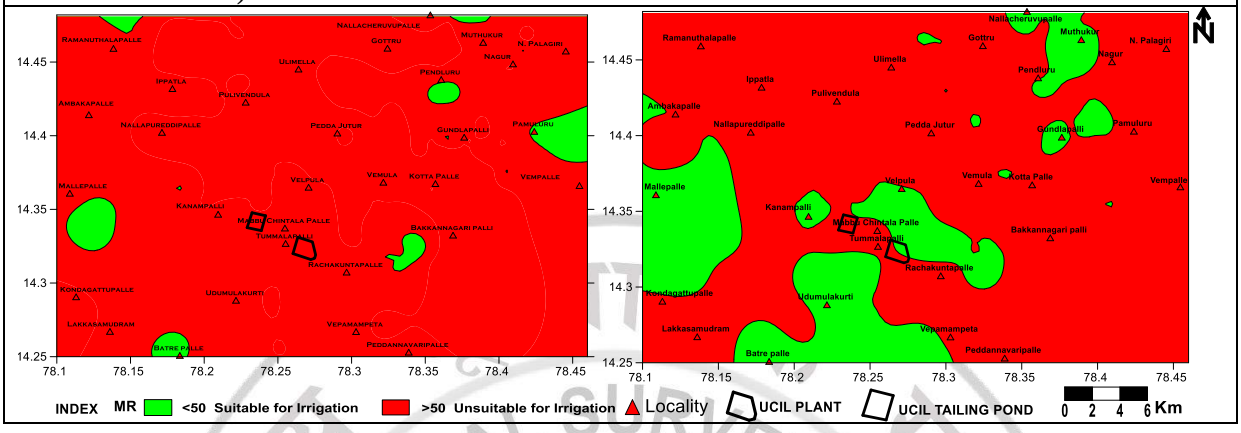
8.6.4 Magnesium Ratio (MR):

Magnesium ratio is calculated by the formula-

$$MAR = \left(\frac{Mg^{2+}}{Mg^{2+} + Ca^{2+}} \right) \times 100$$

Magnesium is essential for plant growth although it may be added with the soil aggrestion and cause friability of soil. MR values <50 is suitable for the irrigation and MR values > 50 are unsuitable (Szabolcs and Darab 1964). Excess amount of magnesium can affect the quality of soil and reduces the yield of crops. 9.5 % of the samples from PRM and 22.5 % from POM shows good for irrigation and 90.5 % of samples from PRM and 77.5 % from POM is not suitable for irrigation. High concentration of magnesium in water can increase the pH of soil that may causes loss of phosphorus.

Fig. 8.58 Spatial distribution Map showing Magnesium ratio (MR) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



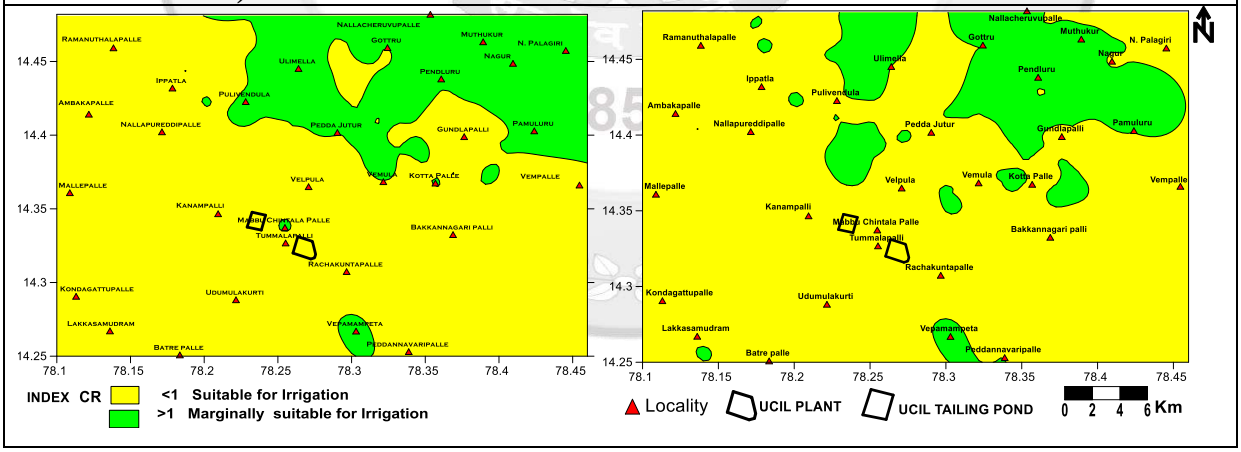
8.6.5 Corrosively Ratio (CR):

The corrosively ratio (in meq/L) is calculated by the following formula:

$CR = [(Cl^- / 35.5) + 2 (SO_4^{--} /96)] / 2 (HCO_3^- + CO_3^{2-} /100)$

In the study area, majority of the samples from PRM and POM are shows CR values ≤1 that indicates the transportation of groundwater through pipes. The value exceeds 1 that specifies the corrosive nature of groundwater and in such case, noncorrosive pipes are required for uplifting and transportation of groundwater (Fig. 8.59)

Fig. 8.59 Spatial distribution Map showing Corrosively Ratio (CR) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



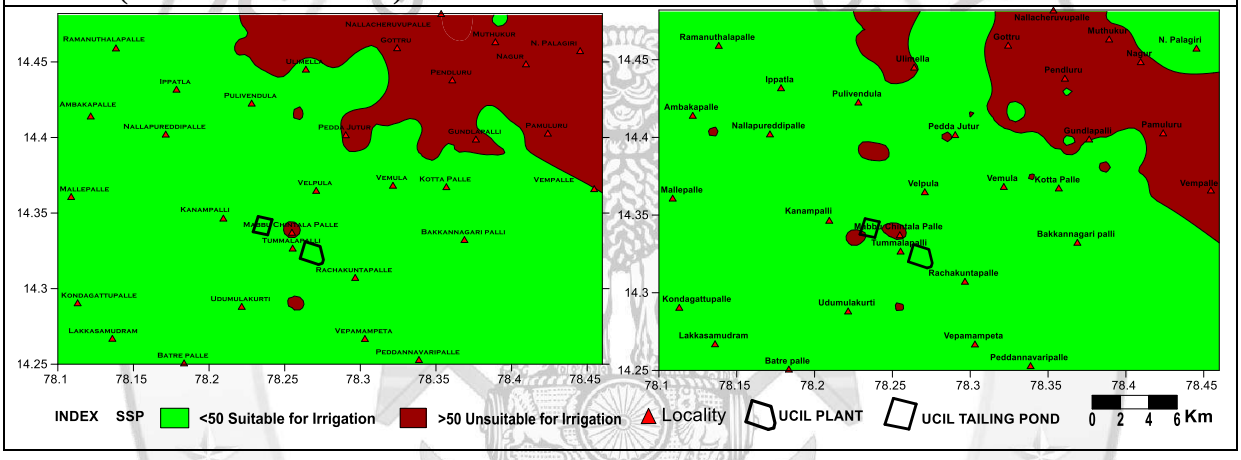
8.6.6 Soluble Sodium Percentage (SSP):

The soluble sodium percent is a measure of the tendency for a water to enter into cation exchange reactions (Khan and Abbasi 2013). It is the percent of total cations made up

by Na ions. The divalent cations normally occupy the exchangeable positions on clay minerals, the extensive displacement of calcium and magnesium ions by Na ions unless the SSP is considerably higher than 50% of the total concentration of the solutes is large (Hem 1989). Soluble sodium percent (SSP) is an important factor for the classification of irrigation water. SSP for groundwater samples of the study area was determined by the formula as: SSP = $[(Na^{+}+K^{+})/(Ca^{++}+Mg^{++}+Na^{+}+K^{+})]$ x100.

The groundwater having SSP values ≤ 50 is categorized as good quality whereas values >50 are unsuitable for irrigation. More than 70% of samples from PRM and POM is suitable for irrigation (Fig.8.60).

Fig. 8.60 Spatial distribution Map showing Soluble Sodium Percent (SSP) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



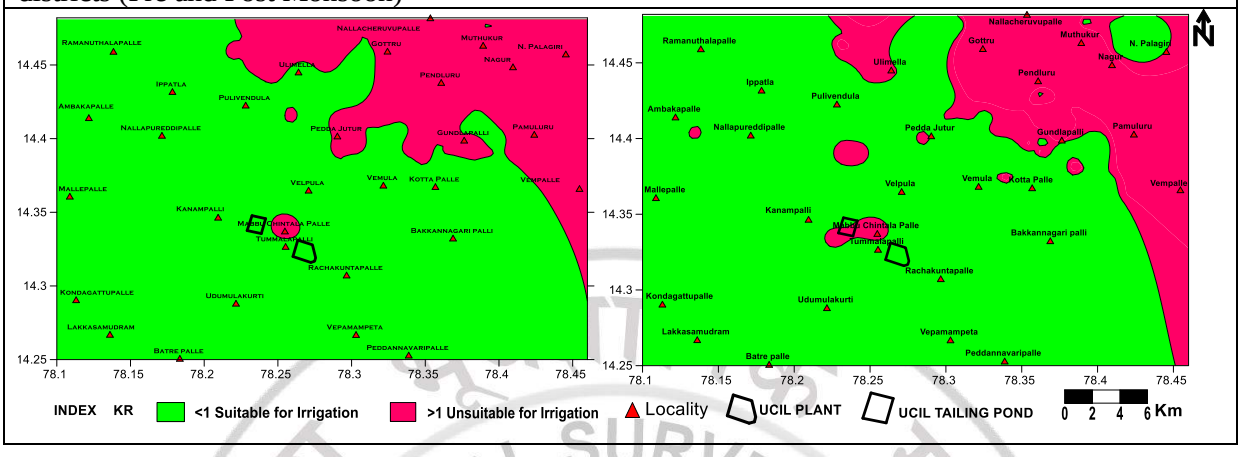
8.6.7 Kelly's ratio (KR):

Kelly's has given an equation which is expressed as

$$KR = \frac{Na^{+}}{Ca^{2+} + Mg^{2+}}$$

where cation concentration is given as meq/L. Kelly's ratio should be less than 1 considered as suitable for irrigation. If the value exceeds 1, the water is unfit for irrigation. In the study area 77.5% from PRM and 81% for POM samples are show suitable for irrigation and 22.5% of PRM and 19% of POM is considered unfit for irrigation. If high amount of sodium is in irrigation water, then sodium ions are absorbed by clay particles replacing the calcium and magnesium ions which causes the dispersion of clay particles and diminishes the permeability of soil and can eventually affect the internal drainage system (Fig.8.61).

Fig. 8.61 Spatial distribution Map showing Soluble Sodium Percent (SSP) for suitability of groundwater quality for irrigation purposes in in the study area Parts of Y.S.R. Kadapa and Anantapur districts (Pre and Post Monsoon)



Groundwater mechanism

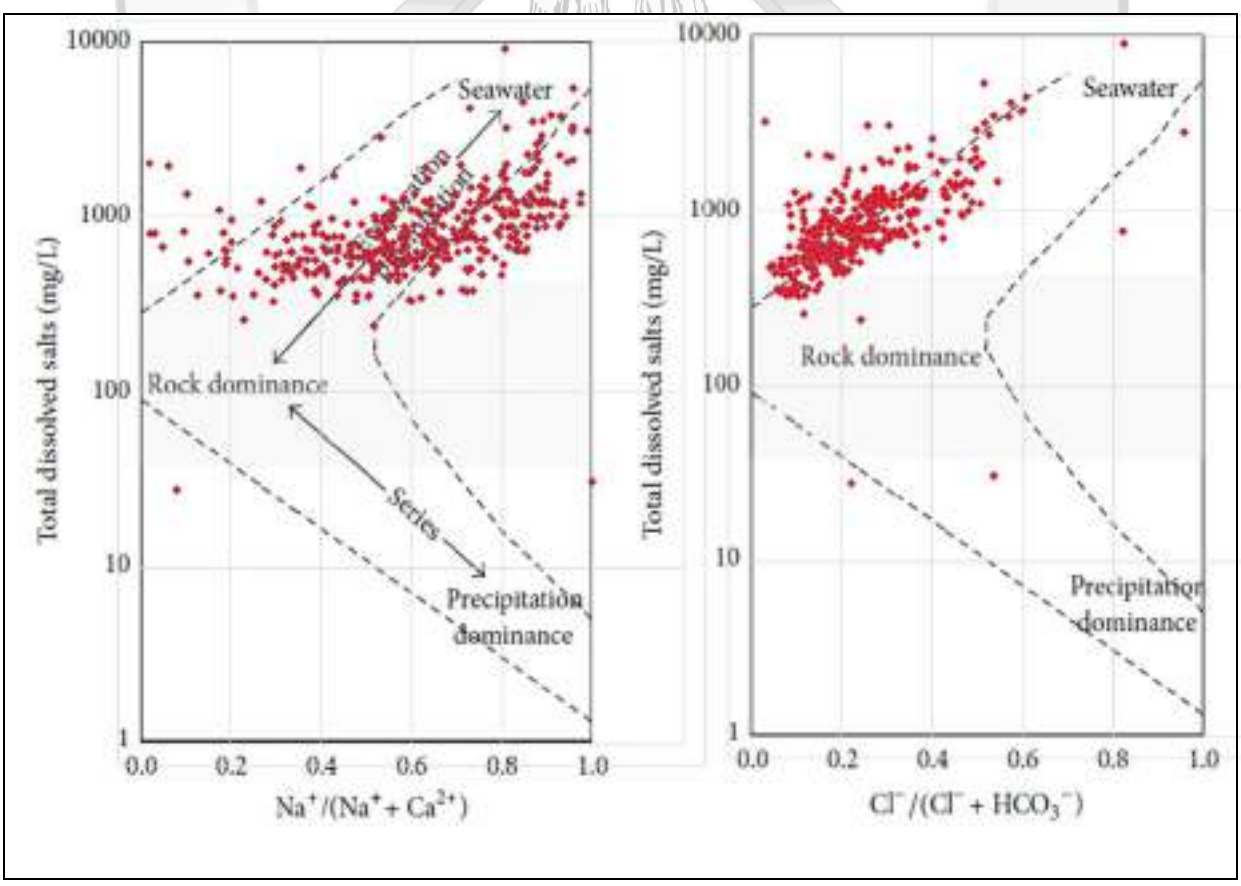
Natural ground water evaluation- Gibbs diagram

There are several factors that may be responsible for the hydrogeochemical transition of groundwater chemistry. Gaining a clear understanding of the main factors governing groundwater chemistry is important for various purposes such as groundwater quality protection and groundwater resources development. For studying the formation mechanisms of water, Gibbs (1970) proposed the well-known Gibbs diagrams (Fig.8.62). The Gibbs diagrams include two sub-diagrams. One represents the relationship between TDS and the weight ratio of Na+ versus (Na+ + Ca2+), and the other one denotes the relationship between TDS and the weight ratio of Cl- versus (Cl- + HCO3-). According to these diagrams, groundwater formation mechanisms include three types: rock dominance, evaporation dominance, and precipitation dominance (Gibbs 1970; Li et al. 2013). whereas all the ionic concentration is expressed in meq/l.

The predominant samples fall in the rock–water interaction dominance and evaporation dominance field of the Gibbs diagram (Fig.8.62) The rock-water interaction dominance field indicates the interaction between rock chemistry and the chemistry of the percolated waters under the subsurface and some samples are influenced, to some degree, by evaporation. This is happening where there is shallow groundwater level depth, especially in the Pediplain areas. According to field investigation, groundwater level depth in many parts of the study area is small (typically less than 3 m). High evaporation rate and shallow groundwater level depth have resulted in intense groundwater evaporation over the pediplain, and groundwater chemistry is therefore influenced also by evaporation. which indicate that chemical

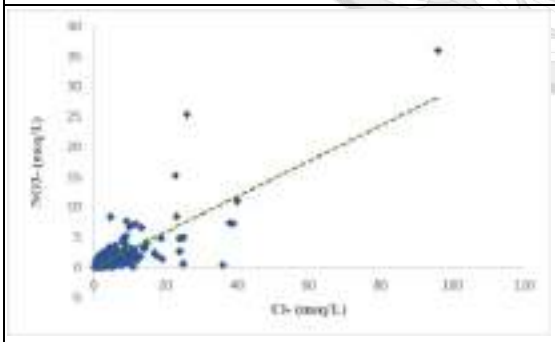
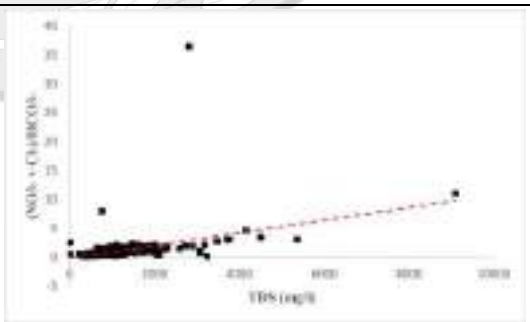
weathering of rock minerals is affecting the quality of groundwater. However, they are unable to analyze the impacts of human activities on groundwater chemistry, as the extent and degree of human activities are difficult to be quantified. Figure (8.62) suggests the major role of natural factors such as rock weathering and evaporation in the evolution of groundwater chemistry, but it does not necessarily mean that groundwater formation mechanisms are completely free from human interference. According to Li (2014), the impacts of human activities on the chemical compositions of groundwater can be divided into two categories: direct impacts and indirect impacts. Direct impacts of human activities are those that directly alter the contents of groundwater chemical compositions. On the contrary, indirect impacts do not alter the contents of groundwater chemical compositions directly, but they can indirectly influence the contents of groundwater chemical compositions by altering hydrodynamic conditions that may accelerate water–rock interaction processes and change groundwater evaporation intensity. However, with the increase of impacts from human activities, traditional Gibbs diagrams show some limitations as they are unable to identify the anthropogenic impacts on groundwater formation.

Fig:8.62 Gibbs diagrams indicating general mechanisms of groundwater evolution in the study area.



Effects related to Human Activities

Groundwater quality variation due to human activities is a complex process that is difficult to interpret, because it involves too many factors and uncertainties. The study area is a part of an agricultural rural area and also shows poor disposal conditions for household waste and septic tank spillages, animal waste, unlimited use of irrigation-return-flows and agricultural fertilizers, etc. Generally, they modify the groundwater chemistry due to the adding of additional concentrations of ions and thereby inferior groundwater quality occurs. To know the influence of non-geogenic sources on the chemistry of groundwater, the relationship of TDS and ($NO_3^- + Cl^-/HCO_3^-$) is widely used (Li et al. 2019; Subba Rao et al. 2021c). As NO3 - is recognized as a contaminant from human activities such as fertilizer application and domestic wastes, its relationships with physiochemical indices were used to interpret the impacts of human activities on groundwater quality in this study. As shown in (Fig.8.63), the correlation between NO3- and Cl- confirms the similar source of the two ions (Marghade et al. 2012; Li et al. 2016). Cl- and NO3- is significantly influenced by wastewater (Zheng et al. 2014). The positive correlation of TDS with (NO3 - + Cl-)/HCO3 - (Fig.8.64) also supports the anthropogenic inputs to groundwater (Marghade et al. 2012). This relation illustrates a linear trend obviously supporting the influence of the non-geogenic sources on the groundwater system. As a result, the impact of the anthropogenic source is masking the influence the geogenic source. This is the main reason that the groundwater quality in some areas in the present study region appears to be slightly brackish, depending upon the hydrogeological environmental conditions. The study area has a long history of agriculture and fertilizer application is prevalent in this area to guarantee the crop productivity. Therefore, NO3 - pollution is a common phenomenon here.

Fig:8.63 Scatter plot showing relationships between NO3 - and Cl- in ground water samples.	Fig.8.64 Scatter plot showing relationships between (NO3 - +Cl-)/ HCO3 Vs TDS
	

The above discussions show that groundwater in the study area is influenced by both natural and anthropogenic factors.

CHAPTER-9

SOIL, WATER AND ROCK INTERACTION: WITH SPECIAL REFERNCE TO THE URANIUM, THORIUM AND ARSENIC CONTAMINATION

9.1 Uranium: An Introduction

Uranium is a naturally occurring, abundant, naturally radioactive element with the atomic number 92. It is a metal in the actinide series of the periodic table and it is found in an average concentration of 2.77 mg/Kg in the Earth's crust having various chemical forms mixture of three radioactive isotopes with long half-lives which are identified by the mass numbers ^{238}U(99.27% by mass), ^{235}U(0.72%) and ^{234}U(0.0054%). Isotope ^{235}U is a valuable fuel for nuclear power plants. U.S. EPA and the WHO have set drinking water standards for Uranium in drinking water at 30 µg/L. Atomic Energy Regulatory Board, India has prescribed the maximum limit of U in drinking water at 60 µg/L (ppb) Bureau of Indian Standards does not specify a norm for uranium level. During the manufacture of nuclear fuel the concentration of 235U is increased. Depleted uranium (DU) is a waste product of this enrichment process and typically contains about 99.8% ^{238}U, 0.2% ^{235}U and 0.0006% ^{234}U in mass. Due to its high density and other physical properties, DU is used in munitions designed to penetrate armour plate. It occurs naturally in rocks and minerals such as granite, lignite, phosphate deposits and in uranium minerals such as uraninite, carnotite and pitchblende. U readily dissolves in oxygen-rich water which accounts for its presence in surface water, groundwater and sea water. In an oxidising environment where ground water contain appreciable amount of dissolved oxygen, oxidises U present in water and the leached U gets into the solution and transported through the ground water. Occurrence of Uranium in the groundwater is attributed from geogenic sources and anthropogenic sources.

9.2 Health hazards related to Uranium:

Exposure to Uranium in the natural environment occurs most commonly via oral exposures. Uranium enters the body by eating contaminated food or drinking water that contains it. Dermal exposures occur through skin contact with uranium powders or metals. Usually only those working with products or processes using uranium would be exposed in this way. Another possible route of exposure is from retained depleted uranium metal fragments (shrapnel) that embed in soft tissue. These fragments oxidize in situ and provide a

source of ongoing systemic absorption. Inhalation of uranium powder can also occur and is the primary exposure route for workers. Preliminary studies on the health effects of drinking uranium-tainted water among animals and humans have revealed that it causes Nephritis (kidney damage).

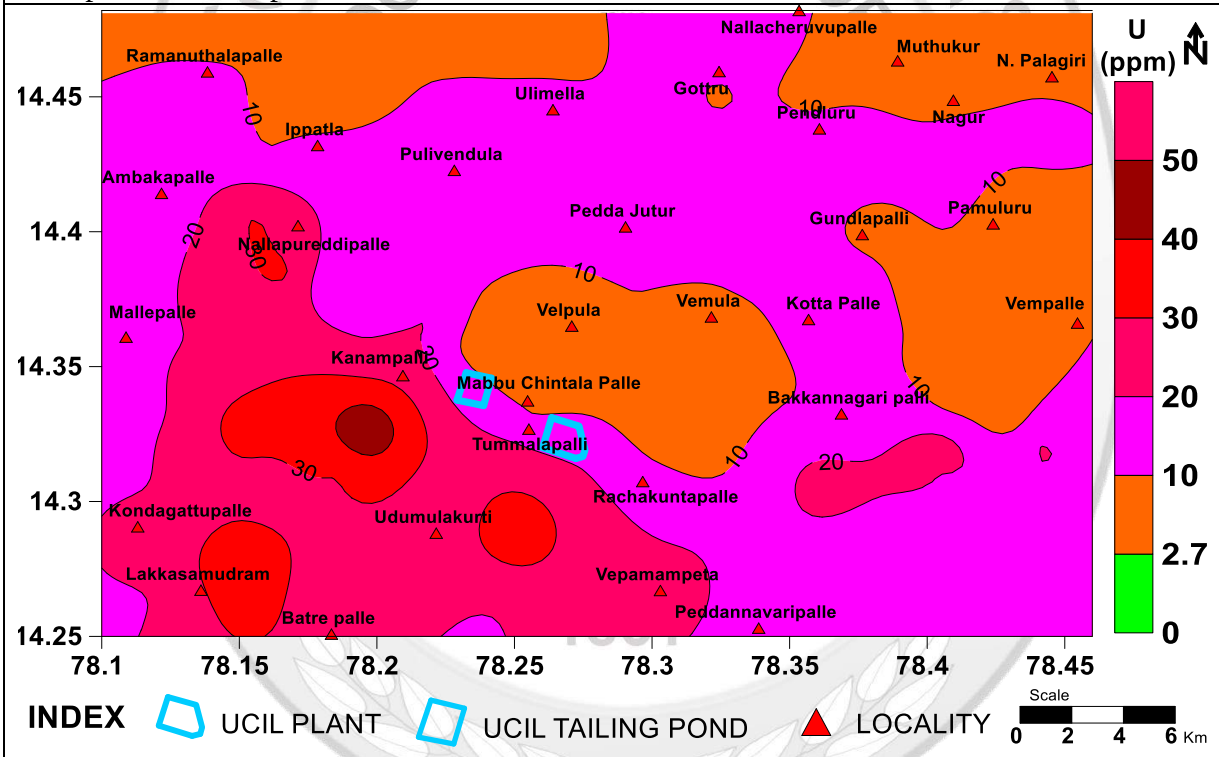
9.3 Spatial distribution of Uranium (ppm) in Soil, Regolith, C-horizon and Bed Rock.

Uranium (U): In the soil sample U values ranging from 4.15 to 50.47 ppm with mean value of 14.76. All the soil samples contain U values above the crustal abundance of 2.7 ppm (R.L. Rudnick and S. Gao, 2004) (Table 7.1). Uraniam having positive correlation with Al2O3 ,Na2O, K2O, Th, Zr, Nb, Be and Ta. High values obtained in pasuvuladhoddi, Palvldu, Gollapalli, Oddulapalli, Somalapalli, Balareddipalle, Batrepalli and Erraballe in south west .These areas are occupied by the PGC-II group of rocks having grey hornblende biotite granite gneiss, Pink granite and Hornblende biotite granite and Dugganagari palli, Giddangivari palli and Ashok naga, Nagur, Achavelli, mabbuchintalapalli, timmapuram areas. (Table 8.1, Fig.9.1). 04 nos. of both Regolith and C- Horizon samples area taken having uranium values are ranging from 11.41 ppm to 32.98 ppm in Regolith and C- horizon having 11.3 to 29.6 ppm. These values are suggested that regolith samples is more prone for uranium values in respect to C-horizon due weathering and dilustion of uranium bearing minerals in PGC-II group of rocks. While Cuddapah group of rocks having 4.68 to 29.7 ppm in Regolith samples and 2.91 to 40.86 ppm in C-Horizon. These values due intercalated package of dolomite, shale, dolostone hosted the lithological control of Uranium mineralistaion in that areas. The Bar graph shows U values in all the regolith and C-horizon samples are in some regolith samples are greater than that of C Horizon and vice versa. High uranium values repoted in SP 14 (Pernapadu area) underlained by Tadipatri shales and SP6 (Oddilapalli area) over on the PGC-II group of rocks. (Table.7.3) (Fig.7.13). Uranium is a radioactive substance. Scientists have detected no harmful radiation effects of natural levels of uranium. However, chemical effects may occur after the uptake of large amounts of uranium and these can cause health effects such as kidney disease.

Geo-accumulation index (Igeo) map of uranium for soil of study area is given as (Fig. 9.2). Majority of the area is falling under class 2 & 3 category, moderaltly contaminated to highly contaminated in terms of uranium for soil samples where the high I geo values are obtained by near Tummalapalli. UCIL, Nallacheruvu, Moilacheruvu, N.Palagiri, Nagur,

Kondareddy palli, Gotur, Chandragiri, Dugganagaripalli, Peddajuttur, Gundipalli and Kuppakutlapalli areas due to underlined rocks in the study area (Fig. 9.2). Enrichment factor map of soil and bar graph of regolith and C-horizon (sub surface soil) (Fig 9.3) suggesested that significant enrichement in South western part of the study area due to PGC-II group of rocks. Based on the Bed rock analytical data uranium values ranging from 7.33 to -201.82 ppm in PGC-II group of rocks and Dolomite, Shale and basic rocks in Cuddapah group of rocks values ranging from 5.92 to 24.74 ppm with an average of 15 ppm. The anomalous values are obtained in Banaguntapalli grey granite (201.82 ppm), PGC-II group of rocks.(Fig.9.6)zz Theses granitoids are the main source for releasing of uranium in ground water due to weathering and fracture/ joints fluoride bearing minerals in these rocks.

Fig.9.1 Descriptive statistics, Spatial distribution map showing Uranium (ppm) in soil samples and Bar graph for Regolith and C-horizon samples from Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh



Descriptive Statistics	
Uranium (ppm)	
Mean	14.8
Median	11.8
Standard Deviation	8.3
Kurtosis	2.8
Skewness	1.5
Range	46.3
Minimum	4.1
Maximum	50.5
Count	107

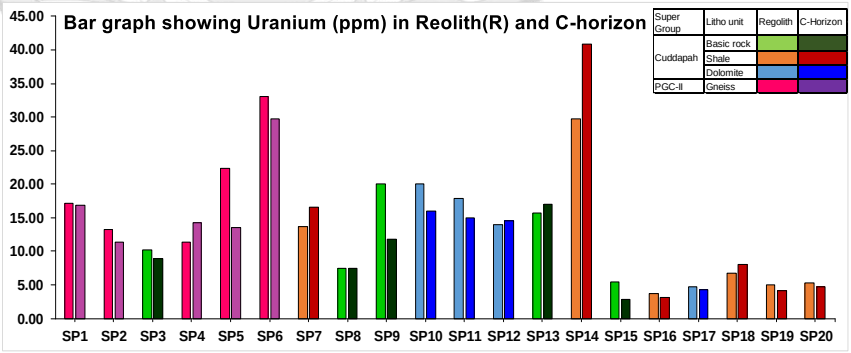
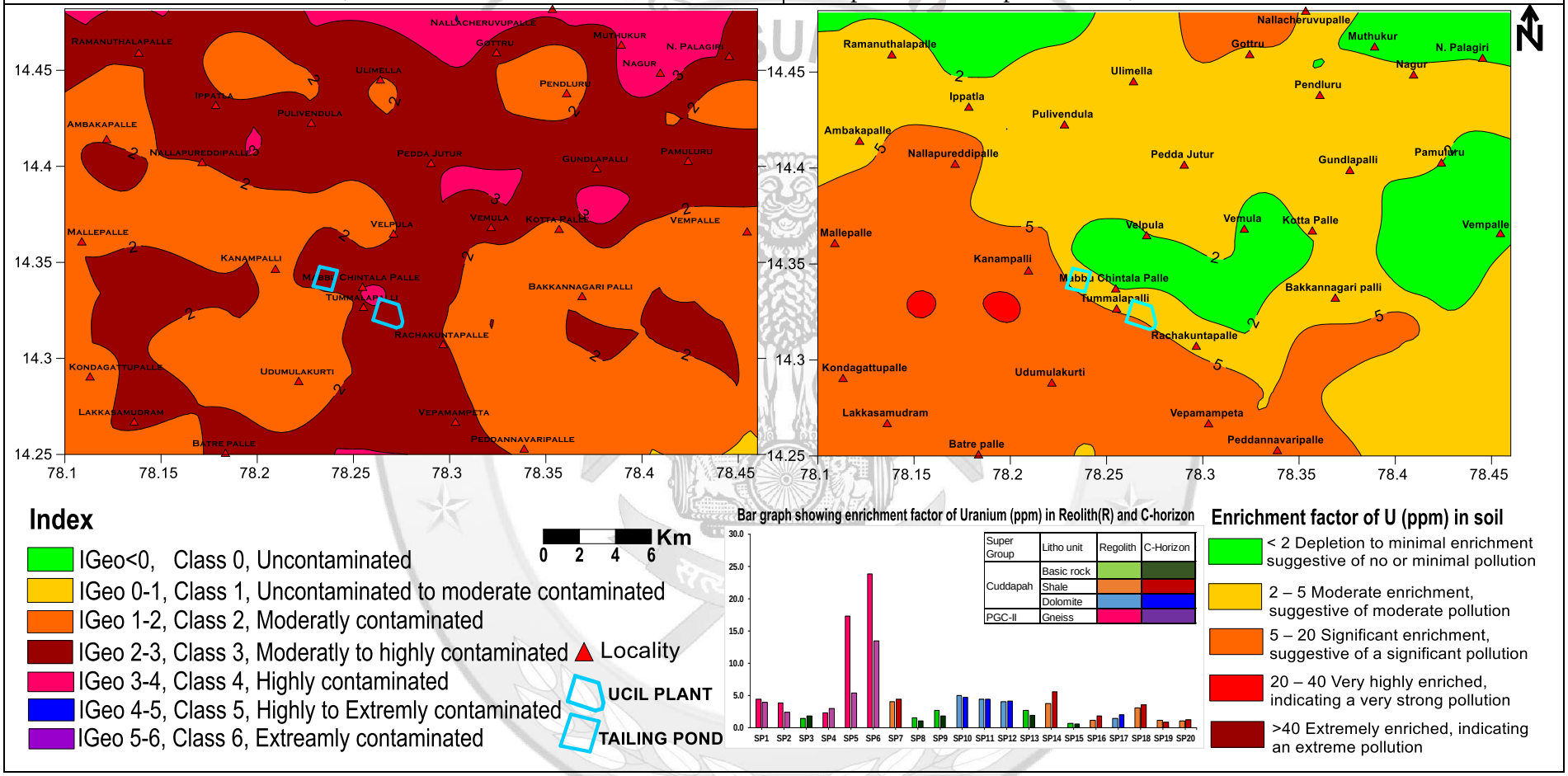


Fig:9.2 Geoaccumulation index map of Uranium (ppm) showing level of contamination in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

Fig:9.3 Spatial distribution of Enrichment factor map showing F (ppm) in Soil and Bar graph of Regolith and C-Horizon in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh



9.5 Spatial distribution of Uranium (ppb) in Ground water

The Uranium concentration in groundwater of this area ranges from 0.31 ppb and 1315.52 ppb in pre-monsoon water samples with the average value of 35.87 ppb and from 0.01 ppb and 635.71 ppb in post-monsoon water samples with average value of 18.83 ppb (Table). Based on the concentration of Uranium, the groundwater samples obtained from the study represents that more than 15% of the samples are having concentration beyond permissible limit in pre-monsoon data and 7% of the samples in post-monsoon data which is seen in the special the distribution map of Uranium. Higher U values in 3 nos. of water samples during pre-monsoon are falling in the agricultural and grass land over PGC-II in a scattered manner, whereas 3 nos. of water samples during post-monsoon shows higher U values falling over Tadpatri shale of Cuddapah Supergroup and PGC-II in the agricultural land in a scattered manner. The highest Uranium concentration (1315.52 ppb) during pre-monsoon is detected South of Lakkasamudram village. The highest Uranium concentration (635.71 ppb) during post-monsoon is detected near Mabbu Chintala Palle village (Fig 9.4-9.5)

Fig.9.4 Point anomaly map showing Uranium (ppb) concentrations in pre-monsoon ground water samples overlying in Geological map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

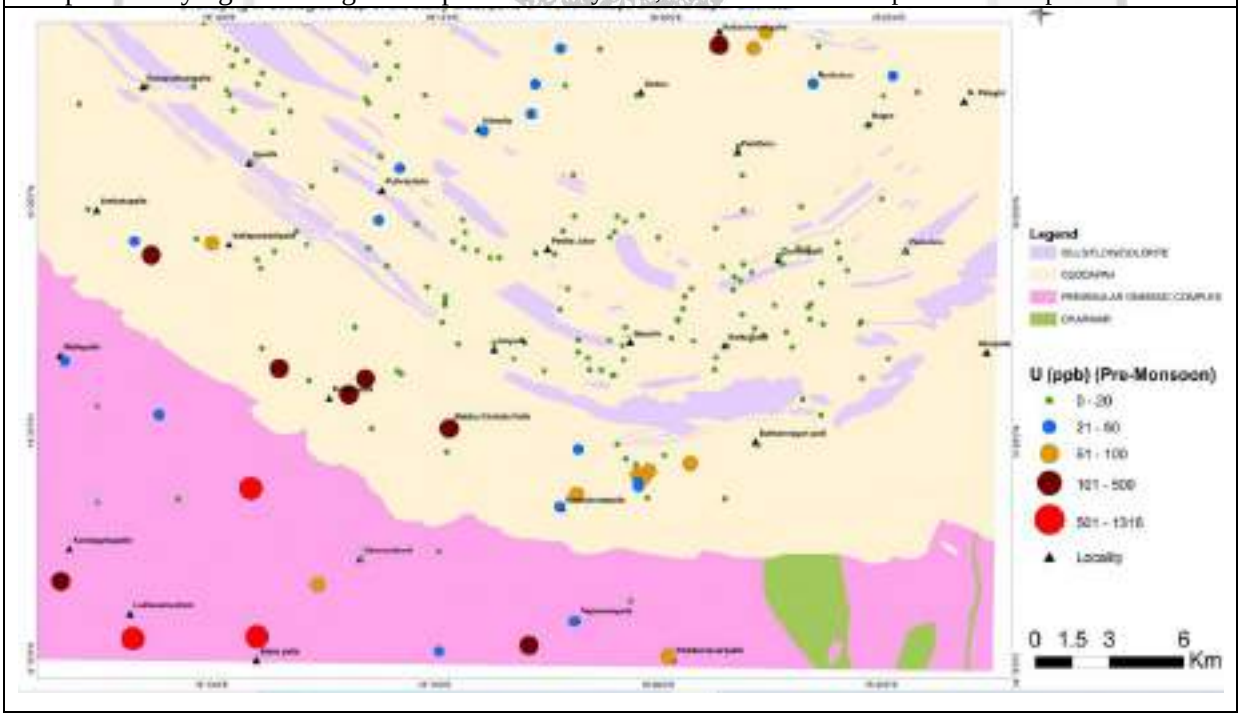


Fig.9.5 Point anomaly map showing Uranium (ppb) concentrations in post-monsoon ground water samples overlying in landuse-Land cover map of the study area, Parts of Y.S.R. Kadapa and Anantapur districts

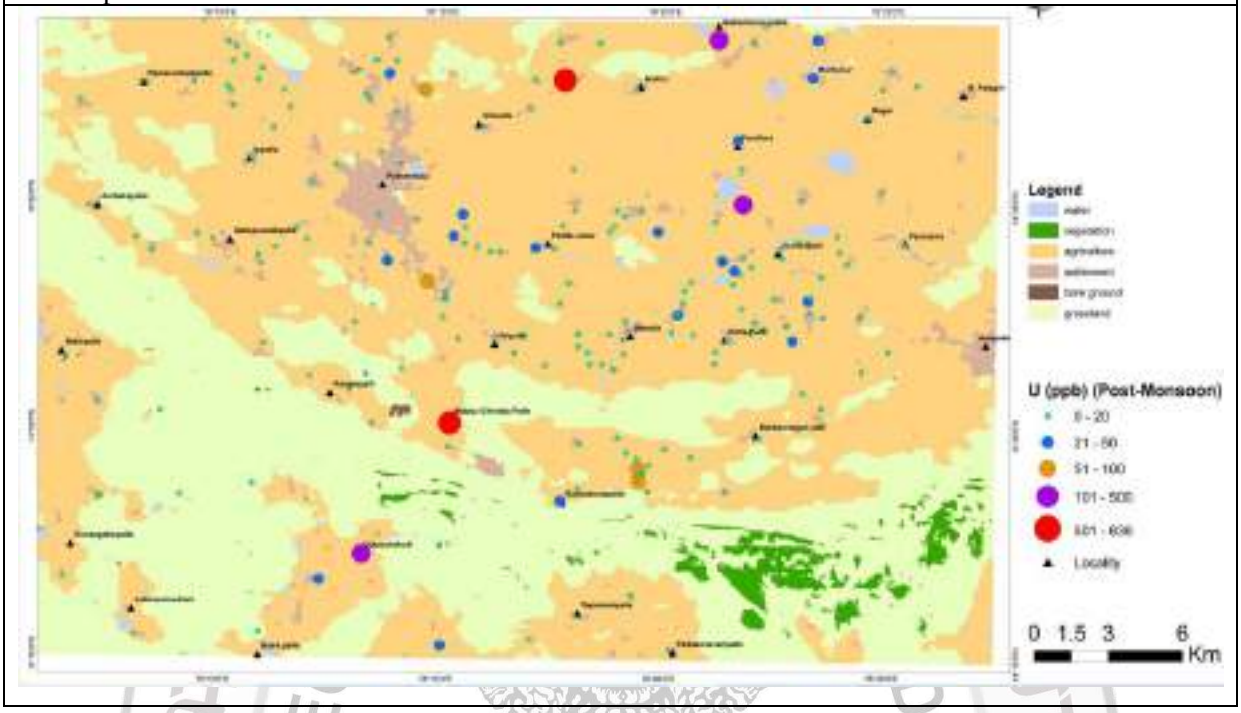


Fig.9.6 Geological map showing Uranium (ppm) concentrations in petrochemical samples in the Study area, Parts of Y.S.R. Kadapa and Anantapur districts

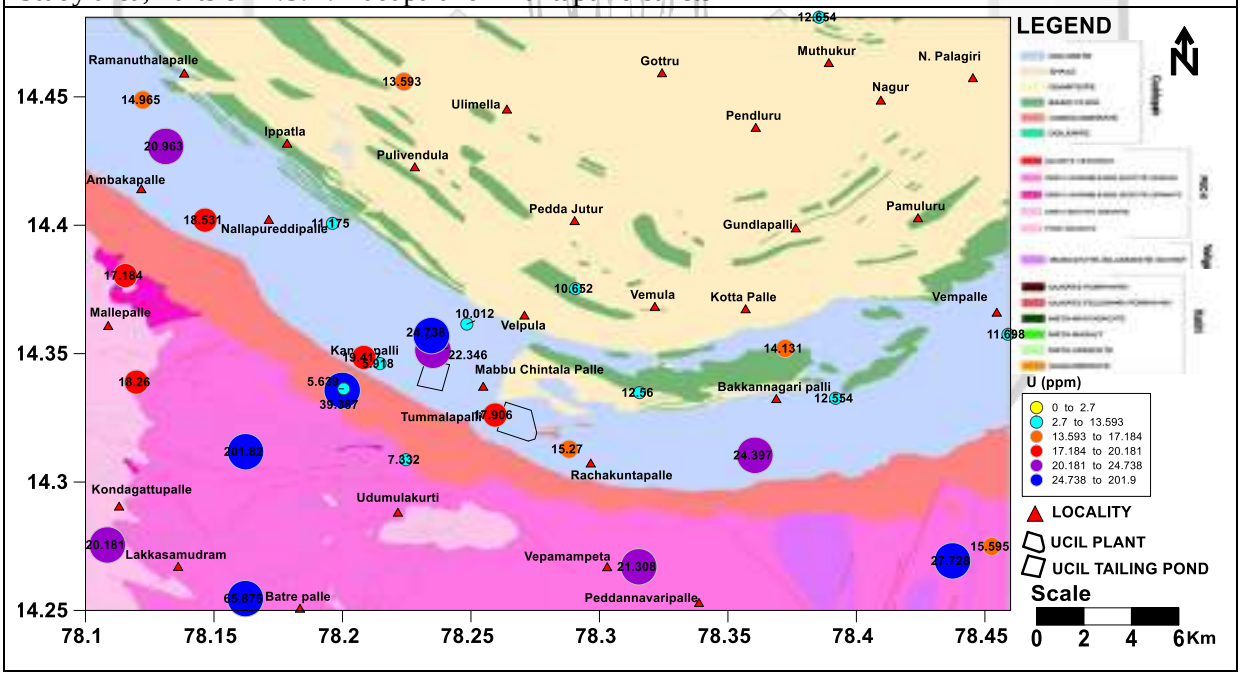


Fig:9.7 Geoaccumulation index map of Th (ppm) showing level of contamination in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

Fig:9.8 Spatial distribution of Enrichment factor map showing Th (ppm) in Soil and Bar graph of Regolith and C-Horizon in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

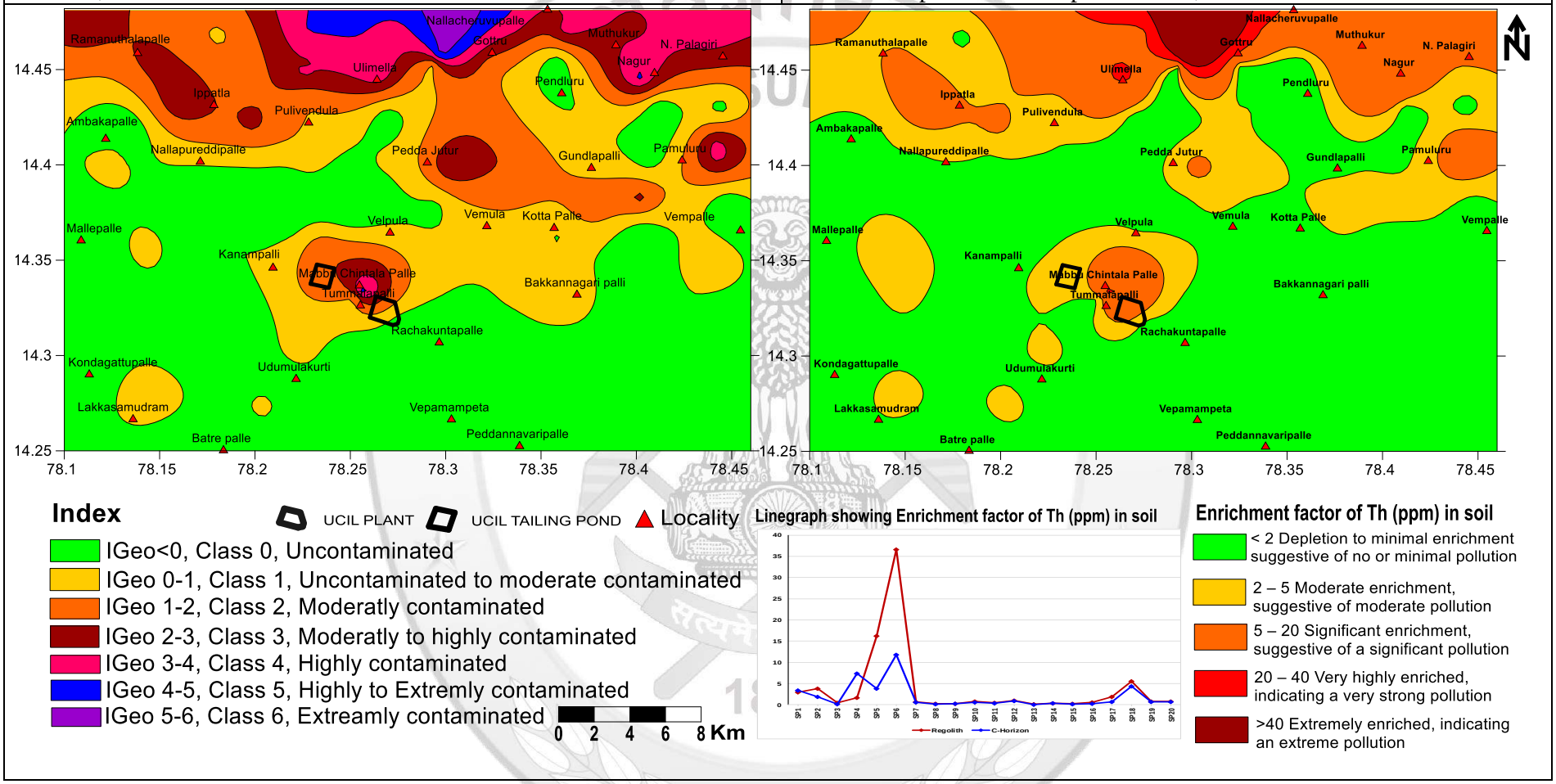
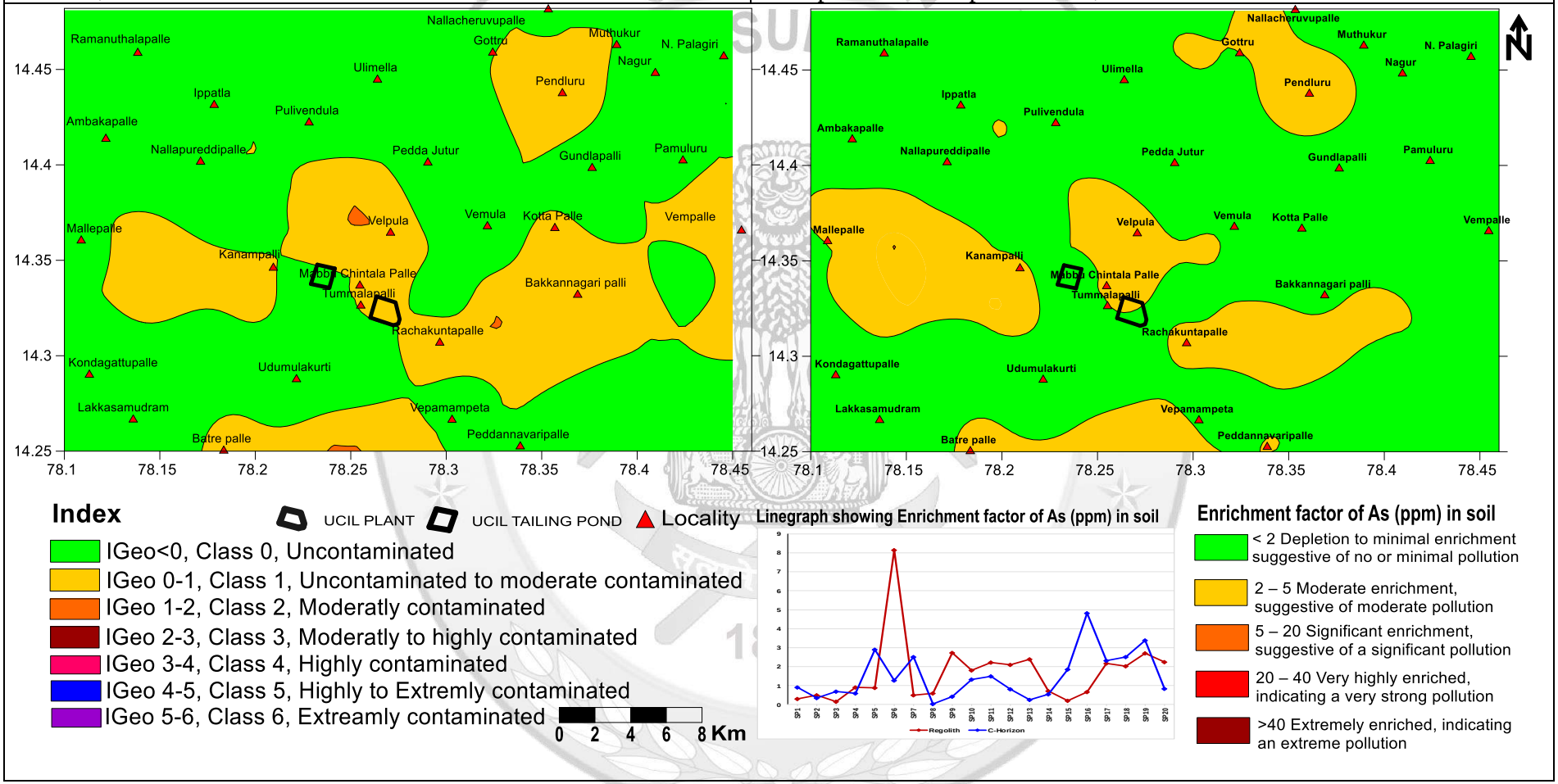


Fig:9.9 Geoaccumulation index map of As (ppm) showing level of contamination in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

Fig:9.10 Spatial distribution of Enrichment factor map showing As (ppm) in Soil and Bar graph of Regolith and C-Horizon in Tummalapalli area, Y.S.R Kadapa and Anantapur districts, Andhra Pradesh



CHAPTER 10

DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

10.1 DISCUSSIONS

To understand the uranium contamination in groundwater in parts of the Y,S.R. Kadapa and Ananthapur Districts, Andhra Pradesh, the analytical results of major oxides, trace elements, of soil, regolith, C-horizon, water and bedrock samples were considered. Based on the chemical data of soil, Regolith and C-Horizon samples, pre and post monsoon ground water samples, bed rock samples, assessment of Uranium contamination and their correlation with other elements has been worked. Spatial distribution maps and calculation of pollution indices like Igeo and enrichment factor were also carried out to get a comprehensive idea about the existing problem of groundwater contamination. For calculation of pollution indices of soil samples, background values considered as average crustal abundance calculated by (R. L. Rudnick and S. Gao, 2004**).** In soil samples spatial distributions shows that TiO2> Fe2O3> MnO> MgO> CaO> >P_2O_5> K_2O> Al_2O>SiO_2 >Na_2O and HREE distribution is high with compare to LREE. Trace elemental and heavy metal distribution is low to moderate with relative to average abundance. Based on the weathering indices pattern multiple classification viz., CIA, CIW, R, PWI, PIA and WIP has been carried out. These values of soil profile developed on Cuddapah super group of rocks shows low weathering indices in Regolith and in C-Horizon whereas soils on Peninsular Gneissic –II group of rocks show moderate to highly weathered indices.

The WQI spatial distribution map shows presence of poor water quality in the study area for pre monsoon; few scattered patch of area shows good water quality conditions. while post monsoon majority area falls under the Good water quality conditions. Ulimella, East of Pulivendula , Gotur, Peddajuttur,Nallacheruvu palli,N. palagiri, Pendaluru, pamaluru, Bakkanagari palli and Vepamampeta villages have very poor water quality which is unsuitable for drinking purposes.

According to the Pollution Index of ground water classification, the following has been noted:

1. 34% in PRM (pre-monsoon) and 41% in POM (post-monsoon) of the total groundwater samples represent insignificant pollution,
2. 40% in PRM and 36% POM samples shows low pollution.
3. 12% in PRM and 13% in POM samples having moderate pollution.
4. 6% in PRM and 4% in POM samples high pollution and
5. 7.5 % in PRM and 6.5% POM samples elevated very high pollution in ground water.

Pollution index of ground water shows that clusters of zones in and around Ulimella,East of Pulivendula , Gotur, Peddajuttur,Nallacheruvu palli,Gundi palli, Pendaluru, pamaluru, Bakkanagari palli and Vepamampeta villages areas. Insignificant pollution zone is observed from the Southern part of the study area.This indicates that the quality of groundwater in the study area is mainly influenced by the source of geogenic origin, but it is subsequently modified by the effects of anthropogenic sources.

The hydrochemical facies of the groundwater in the study area indicate that the dominant water facies is Magnesium bicarbonate to mixed type Mg-Ca-Na-HCO_3-Cl and Na-Ca-Cl-HCO_3 types in PRM and POM respectively. The water quality of 80% of the groundwater samples is due to the result of intensive soil-water-rock interactions, followed by mineral dissolution, ion exchange and evaporation processes in the groundwater system, which also indicate that the geogenic origin is the dominant controlling factor of the groundwater chemistry in the present study area.

Based on the Gibbs diagram, the rock-water interaction dominance field indicates interaction between rock chemistry and the chemistry of the percolated subsurface waters. Some samples are influenced, to some degree, by evaporation. The positive correlation between $NO3^-$ and Cl^- confirms the similar source of the two ions i.e., wastewater contamination due to anthropogenic activity. The positive correlation of TDS with $(NO_3^- + Cl^-)/HCO_3^-$ also supports the anthropogenic inputs to groundwater. These relations illustrate linear trend supporting the influence of the non-geogenic sources on the groundwater system. As a result, the impact of the anthropogenic source is masking the infuence the geogenic source. This is the main reason that the groundwater quality in some areas appears to be slightly brackish, depending upon the hydrogeological environmental conditions. The study area has a long history of agriculture and fertilizer application therefore; $NO3^-$ pollution is a common phenomenon.

Sodium adsorption ratio (SAR), residual sodium carbonate (RSC), and Kelly's ratio (KR) indicated that most of groundwater samples were safe for the irrigation use. sodium percent (Na%) Corrosivity ratio (CR), soluble sodium percent (SSP) shows North eastern part of the area is not suitable for irrigation. However, magnesium ratio indicated that the majority of the study area were unsuitable for irrigation use. Results of salinity hazard index diagrams shows that 80% of the samples from PRM and POM are falls under water type C3-S1 (high salinity—low SAR) and 10% of the samples fall in C4-S1 and C4-S2(Very high salinity –low SAR). Hence, the water of these sites cannot be used as irrigation water for the soils with limited drainage.

In soil samples of study area, uranium concentration varies from 4.1 ppm to 50.5 ppm. Overall the study area uranium concentration in the soil above the crustal abundance of 2.7 ppm. The high value zones are observed around the Nalupureddipalle, udumulakurthi, Kondareddypalle, Lakkasamudram, Batrepalli, Vepamammeta. These areas are mostly occupied by the Peninsular gneissic-II and Mabbuchintalapalli, Kanampalli, Rachakuntapalli,, Ramanathapalli, Gotur, Bakanagaripalli, N. Palagiri, Muthukuru, Vempalli, Gundlappalli areas overlie by Cuddapah super group of rocks. The Bar graph shows 04 nos. of both Regolith and C-Horizon samples area taken having uranium values are ranging from 11.41 ppm to 32.98 ppm in Regolith and C- horizon having 11.3 to 29.6 ppm. These values are suggested that regolith samples is more prone for uranium values in respect to C-horizon due weathering and dilustion of uranium bearing minerals in PGC-II group of rocks. While Cuddapah group of rocks having 4.68 to 29.7 ppm in Regolith samples and 2.91 to 40.86 ppm in C-Horizon. These values due intercalated package of dolomite, shale, dolostone hosted the lithological control of Uranium mineralistaion in that areas. The Bar graph shows U values in nearly 60 of the regolith samples are greater than that of C Horizon.it may suggested that regolith is more prone with compare to the c-horizon. High uranium values repoted in SP 14 (Pernapadu area) underlained by Tadipatri shales and SP6 (Oddilapalli area) over on the PGC-II group of rocks.

Geo-accumulation index (Igeo) map of uranium reveals that majority of the area is falling moderaltly contaminated to highly contaminated in terms of uranium for soil samples obtained by near Tummalapalli. UCIL, Nallacheruvu, Moilacheruvu, N.Palagiri, Nagur, Kondareddy palli, Gotur, Chandragiri, Dugganagaripalli, Peddajuttur, Gundipalli and Kuppakutlapalli areas due to underlined rocks in the study area . Enrichment factor map of soil and bar graph suggesested

that significant enrichement in South western part of the study area due to PGC-II group of rocks these may evident to bed rock analytical data uranium.Theses granitoids are the main source for releasing of uranium in ground water due to weathering and fracture/ joints fluoride bearing minerals in these rocks.

In the Ground water samples uranium concentrations are ranging from 0.31 ppb and 1315.52 ppb in PRM water samples with the average value of 35.87 ppb and from 0.01 ppb and 635.71 ppb in POM water samples with average value of 18.83 ppb. 15% of the samples in PRM and 7% of the samples in POM are having concentration beyond permissible limit 30 ppb (WHO 2011) and 60 ppb of (AERB 2007). Higher U values in 3 nos. of water samples during pre-monsoon are falling in the agricultural and grass land over PGC-II in a scattered manner, whereas 3 nos. of water samples during post-monsoon shows higher U values falling over Tadpatri shale of Cuddapah Supergroup and PGC-II in the agricultural land in a scattered manner. The highest Uranium concentration (1315.52 ppb) during pre-monsoon is detected South of Lakkasamudram village. The highest Uranium concentration (635.71 ppb) during post-monsoon is detected near Mabbu Chintala Palle village exceed the maximum permissible limit of (30 ppb by WHO and 60 ppb of AERB). Anthropogenic activities act as supplementary factor for further elevation of Uranium in the groundwater. Nearly 62 % samples exceeds the permissible limits. Excess use of chemical fertilizers, excessive ground water pumping can also cause of significant uranium enrichment in pre monsoon ground water samples in POM. Geomorphology, these areas are pediplain areas and landuse and land pattern shows most of the area under cultivation in barren lands and hill slope areas which were converted to cultivate lands. The uranium concentration is often found to be sporadic, uneven and varies with depth. The uneven distribution of uranium in the study area primarily due to variation in mineral assemblage of rocks, anisotropic nature of hard rocks aquifers and associated hydro chemical process.

10.2 CONCLUSION AND RECOMMENDATIONS

In the study area Uranium and Thorium concentrations are mostly controlled by geogenic factors which becomes enhanced by anthropogenic sources. Shallow level aquifer mainly effected due to intense activities, especially the over-exploitation of ground water for agricultural irrigation and domestic use can contribute to the problem of declining groundwater levels which

induces oxidizing condition that promotes the formation of soluble uranyl carbonate complexes (Coyte et al., 2018). As the water level declines, contaminants in the soil, like uranium and arsenic, can mobilize and pollute the water bodies

For safe drinking point of view water purifier plants are required for high uranium concentrated areas. During the execution of field work it has been recorded that UCIL plant and UCIL tailing pond near by villagers (Kanampalli, Rachakuntapalli, Bhummayareddypalli, Giddangivaripalli, Mabbu chintalapalli, Tummalapalli, were facing Skin allergies issues and health issues. It is noticed that people are living near to the tailing pond Kanampalli villagers aconsuming uranium contaminated water in summer due to lack of water which aggravate the Skin allaergies issues while dust received from tailing pond . In adjacent villages to the UCIL (Tummalapalli, Manbbuchintalapalli, Rachakuntapalli) UCIL had established overhead water tanks, solar light facility but regular monitoring and maintenance are required. It is also recommended to install extra filters pertaining to the fluoride and arsenic. The adverse health risks due to uranium exposure through drinking water should be controlled regularly in the areas that contain high levels of uranium than recommended concentration. Remedial actions strongly depend on uranium speciation, the presence of other contaminants and the general water composition. In general, the remediation technologies applied for uranium in natural water can be divided into physical, chemical, and biological categories. depicts different technologies and the principles based on which these technologies work for the remediation of uranium from groundwater/drinking water. Most of the uranium remediation research focused on chemical and physical adsorption which is acknowledged as a simple, effective, and economic technology, and has received increased attention in recent times. The physical categories are based on membrane separation technologies (reverse osmosis-RO), evaporation, coaguulation, and adsorption principles, and there have been several research studies in recent times for developing more efficient and up-scalable technologies for removing uranium from water. The reverse osmosis process involves high cost when it is applied at community levels. The application of adsorbents such as resin, activated carbon, activated silica, titanium adsorbent, and so on, have been well studied (Li and Zhang, 2012). Chemical remediation procedures include ion-exchange, defluoridization, precipitation, co-precipitation, and adsorption.Bioremediation methods

including the use of biochar, phytoreme-diation and microbial remediation are appropriate for large areas where water is contaminated by low concentrations of uranium.

Point-of-use water filtration systems are the best way to reduce the uranium in domestic drinking water if it is tested at a level higher than the recommended amount. Particularly, the use of novel composite materials, based mainly on hybrid metallic oxide nanoparticles and on composites based on graphene oxide (GO) (i.e., graphene-based hybrids), showed promising evidence to achieve efficient removal of toxic metals including uranium from water sources, even in full-scale applications (Tolkou et al., 2020) Abd El-Magied et al. (2021) developed a graphite adsorbent that showed considerable potential for the treatment of aqueous systems polluted by uranium. Recently Dinis and Fiúza (2021) reviewed the current developments in groundwater remediation technologies.

In soil, uranium enrichment is not observed while compared to the Thorium which may effect the agricultural activities in the study area as ground water are mostly used as irrigations. Apart from Uranium , Thorium, fluoride and Arsenic, nitrate pollution is noticed in the study area which increases periodically. Phytoremediation technology can be a good option to repair large areas of low concentration of uranium-contaminated soils. For reduction nitrate pollution, less use of nitrogen based fertilizers. More over detail studies are recommended for tracking pollution of Uranium. Proper facility on sanitization is required in places where ground water level is very shallow. Therefore, special measures are to be taken in order to diminish the fluoride and nitrate concentration in the groundwater of the study region.

Locality Index

SI.No.	Locality	Latitude (N)	Longitude (E)
1	Ramanuthalapalle	78.1384	14.4592
2	Udumulakurti	78.2216	14.2883
3	Ippatla	78.1785	14.4319
4	Pulivendula	78.2281	14.4227
5	Velpula	78.2708	14.3650
6	Vemula	78.3216	14.3684
7	Kotta Palle	78.3569	14.3674
8	Pamuluru	78.4240	14.4029
9	N. Palagiri	78.4453	14.4574
10	Ulimella	78.2640	14.4452
11	Pedda Jutur	78.2904	14.4018
12	Nagur	78.4095	14.4487
13	Muthukur	78.3893	14.4633
14	Nallacheruvupalle	78.3534	14.4820
15	Lakkasamudram	78.1361	14.2671
16	Batre palle	78.1835	14.2508
17	Mabbu Chintala Palle	78.2548	14.3373
18	Mallepalle	78.1088	14.3609
19	Vepamampeta	78.3030	14.2670
20	Peddannavaripalle	78.3388	14.2531
21	Kanampalli	78.2095	14.3466
22	Bakkannagari palli	78.3688	14.3325
23	Pendluru	78.3608	14.4381
24	Rachakuntapalle	78.2966	14.3074
25	Gundlapalli	78.3764	14.3989
26	Gottru	78.3244	14.4594
27	Vempalle	78.4546	14.3661
28	Ambakapalle	78.1217	14.4142
29	Nallapureddipalle	78.1713	14.4022
30	Kondagattupalle	78.1131	14.2906
31	Tummalapalli	78.2552	14.3268

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ANNEXURE-I

Field observation data sheet for Soil samples collected from Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

SNO	Sample no	X	Y	ELEVATION	Location
1	S01/22-23	78.11381	14.26283	456	Ramnagar
2	S02/22-23	78.15446	14.25571	500	Batrepalli
3	S03/22-23	78.1908	14.25874	492	Verrappagaripalli
4	S04/22-23	78.2399	14.25384	437	Yerrasanivaripalli
5	S05/22-23	78.25446	14.25315	434	Talapula
6	S06/22-23	78.29478	14.26018	399	Chandakavaripalli
7	S07/22-23	78.34387	14.25461	354	Peddanavaripalli
8	S08/22-23	78.35599	14.25421	355	Peddanavaripalli
9	S09/22-23	78.40512	14.25341	364	Vemalagondi
10	S10/22-23	78.45497	14.26432	246	Kumarkalva
11	S11/22-23	78.1103	14.28526	432	Gollapalli
12	S12/22-23	78.14543	14.27709	490	Balareddy palli
13	S13/22-23	78.2054	14.27453	488	Mudavaripalli
14	S14/22-23	78.21895	14.28537	507	Udumulakurthi
15	S15/22-23	78.24929	14.29185	534	Somalapalli
16	S16/22-23	78.31286	14.27416	391	Vemuripeta
17	S17/22-23	78.32851	14.27483	379	Gunduvaripalli
18	S18/22-23	78.375941	14.273993	396	North of Vemulagondi
19	S19/22-23	78.40588	14.30959	285	Ashoknagar
20	S20/22-23	78.45268	14.27485	248	Siddareddy palli
21	S21/22-23	78.11411	14.3078	451	Maddannagaripalli
22	S22/22-23	78.16051	14.30981	476	Odulapalle
23	S23/22-23	78.18678	14.31185	418	Gollapalli
24	S24/22-23	78.22459	14.30014	532	Chinnapalli
25	S25/22-23	78.27674	14.31613	377	Tummalapalli (East of UCIL)
26	S26/22-23	78.2964722	14.3123	370	Rachakuntapalli
27	S27/22-23	78.3223806	14.3149	375	Rachakuntapalli
28	S28/22-23	78.361	14.30925	301	Giddangivaripalli
29	S29/22-23	78.40472	14.31673	282	Ashoknagar
30	S30/22-23	78.44161	14.31971	260	Chintalamadugupalli
31	S31/22-23	78.119	14.33378	458	Thappetivaripalli
32	S32/22-23	78.1509	14.3285	540	Paividu
33	S33/22-23	78.19651	14.32622	410	Pashuvuladhoddi
34	S34/22-23	78.22988	14.3374	368	K Kothala
35	S35/22-23	78.25218	14.33002	38	Tummalapalli (West of

					UCIL)
36	S36/22-23	78.2990944	14.3275	358	Meddipentla
37	S37/22-23	78.3263333	14.3220	353	West of Bakkanagaripalli
38	S38/22-23	78.36226	14.32727	333	Bakkanavaripalli
39	S39/22-23	78.4081139	14.3400	237	NE of Bakkanagaripalli
40	S40/22-23	78.42825	14.3300	248	South of Tanda
41	S41/22-23	78.10984	14.3545	452	Mallepalli
42	S42/22-23	78.14328	14.35822	491	Paiguttavaripalli
43	S43/22-23	78.195375	14.3538	338	SE of Motntabpalle
44	S44/22-23	78.2182861	14.3665	353	North of Kanampalli
45	S45/22-23	78.2730861	14.3684	282	Near Velpula
46	S46/22-23	78.3117861	14.3595	259	South of Vemula
47	S47/22-23	78.3188917	14.3609	253	South of Vemula
48	S48/22-23	78.35907	14.36281	244	V Kothapalli
49	S49/22-23	78.40248	14.36142	227	Kuppalapalli
50	S50/22-23	78.4358028	14.3526	224	South of Chitaumdugupalli
51	S51/22-23	78.10797	14.37945	451	Basireddy palli
52	S52/22-23	78.1664	14.38492	326	Erraballe
53	S53/22-23	78.1834583	14.3798	328	South of Kothapalle
54	S54/22-23	78.2188139	14.3876	293	K. Velamavanipalli
55	S55/22-23	78.25142	14.37927	272	Bestavaripalli
56	S56/22-23	78.29444	14.37855	255	Kuppakutlapalli
57	S57/22-23	78.330456	14.37808	237	Gundipalli
58	S58/22-23	78.37625	14.37797	222	Dugganagari palli
59	S59/22-23	78.4018694	14.3829	209	West of Vempalli
60	S60/22-23	78.447875	14.3790	212	West of Vempalli
61	S61/22-23	78.12496	14.405716	325	Ambakapalli
62	S62/22-23	78.155518	14.40357	354	Nallupureddy palli
63	S63/22-23	78.19351	14.40393	296	Chandragiri
64	S64/22-23	78.22798	14.40149	269	Venkatapura
65	S65/22-23	78.26703	14.40082	250	Boggudupalli
66	S66/22-23	78.302311	14.399481	226	Peddajuttur
67	S67/22-23	78.33926	14.39996	227	Gollalaguduru
68	S68/22-23	78.37803	14.401551	221	Gundlapalli
69	S69/22-23	78.40635	14.40285	205	Kathaluru
70	S70/22-23	78.4425	14.40415	203	Ammagaripalli
71	S71/22-23	78.1287	14.41486	330	Ambakapalli
72	S72/22-23	78.16075	14.43309	305	Herojipuram
73	S73/22-23	78.19855	14.4213	277	Brammanapalli
74	S74/22-23	78.22772	14.43356	260	Pulivendula

75	S75/22-23	78.26948	14.42524	245	Chintalajuttur
76	S76/22-23	78.30198	14.42963	234	Chinnajuttur
77	S77/22-23	78.32944	14.4283	225	Gollalaguduru
78	S78/22-23	78.36645	14.43178	206	Pendaluru
79	S79/22-23	78.4121	14.42959	191	Aluvalapadu
80	S80/22-23	78.4444	14.42984	181	Obulareddypalli
81	S81/22-23	78.12325	14.4535	309	Gunakalavaripalli
82	S82/22-23	78.14683	14.45699	291	Chinnakudala
83	S83/22-23	78.190513	14.44727	257	Chinnarangapuram
84	S84/22-23	78.22605	14.44999	244	Peddarangapuram
85	S85/22-23	78.26472	14.44721	241	Ulimela
86	S86/22-23	78.29321	14.45247	228	Yerripalli
87	S87/22-23	78.32357	14.45288	221	Gotur
88	S88/22-23	78.35854	14.45365	214	Pendaluru
89	S89/22-23	78.40193	14.44557	189	Nagur
90	S90/22-23	78.43889	14.45617	185	Palagiri
91	S91/22-23	78.11073	14.47316	364	Gunkalapalli
92	S92/22-23	78.15211	14.47667	284	Lingala
93	S93/22-23	78.18123	14.46845	266	Erramreddypalli
94	S94/22-23	78.22856	14.47159	238	V Tummlapalli
95	S95/22-23	78.27383	14.46925	244	Atchavelle
96	S96/22-23	78.30642	14.47489	216	Achavelli
97	S97/22-23	78.33577	14.47303	210	Gotur
98	S98/22-23	78.36316	14.47199	202	Kondareddy Palli
99	S99/22-23	78.39856	14.47333	191	Moilacheruvu
100	S100/22-23	78.44246	14.47188	185	N. Palagiri
101	S101/22-23	78.2346	14.35703	347	Kanampalli
102	S102/22-23	78.25667	14.33352	346	mabbuchintalapalli
103	S103/22-23	78.297625	14.45796	225	South of Thimmapurampeta
104	S104/22-23	78.3582278	14.47604	199	Between Kondareddipalle and Nallacheruvupalle
105	S105/22-23	78.442025	14.41108	199	Ammagaripalle
106	S106/22-23	78.2545583	14.34093	332	Near Mabbu Chintapalle
107	S107/22-23	78.22635	14.45248	504	Near Udumalakurti

ANNEXURE-II

Field observation data sheet for Bedrock samples collected from Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

SNO	SAMPLE NO	X	Y	ROCK NAME	LOCATION
1	PCS 1/22-23	78.3919	14.3326	Dolomite	T Velamavaripalli
2	PCS 2/22-23	78.3156	14.3348	Dolomite	Bhumayagaripalli
3	PCS 3/22-23	78.2239	14.4559	Dolomite	Peddarangapuram
4	PCS 4/22-23	78.1223	14.4488	Stromotolitic dolomite	Gunakalapalli
5	PCS 5/22-23	78.2484	14.3615	Dolomite	Velpula
6	PCS 6/22-23	78.459	14.3575	Dolomite	Vempalli
7	PCS 7/22-23	78.3605	14.3104	Shale	Giddangivaripalli
8	PCS 8/22-23	78.2882	14.3128	Shale	Tummalapali(East of UCIL)
9	PCS 9/22-23	78.1465	14.402	Shale	Nallagunduvaripalli
10	PCS 10/22-23	78.2352	14.3513	Shale	K. Kotala
11	PCS 11/22-23	78.2083	14.3485	Shale	Kanampalli
12	PCS 12/22-23	78.3855	14.481	Shale	Moilalacheruvu
13	PCS 13/22-23	78.1312	14.4307	Shale	Ambakapalli
14	PCS 14/22-23	78.1622	14.2546	Grey granite	Batrepalli
15	PCS 15/22-23	78.1623	14.3118	Granite	Abbanaguntapalli
16	PCS 16/22-23	78.1198	14.3389	Granite	Tappitavaripalli
17	PCS 17/22-23	78.1085	14.2755	Grey hornblende biotite gneiss	Reddigaripalli
18	PCS 18/22-23	78.1999	14.3357	Grey hornblende biotite gneiss	Namalagundu
19	PCS 19/22-23	78.4374	14.2693	Grey hornblende biotite gneiss	Siddreddypalli
20	PCS 20/22-23	78.3153	14.267	Grey hornblende biotite gneiss	Vemupripeta
21	PCS 21/22-23	78.2346	14.357	Dolomite	K Kothala
22	PCS 22/22-23	78.2594	14.3261	Dolostone	Tummalapalli
23	PCS 23/22-23	78.4527	14.2749	Muscovite silimanite schist	Siddreddypalli
24	PCS 24/22-23	78.3723	14.352	Basic Rock	Kotthapalli
25	PCS 25/22-23	78.2907	14.3753	Basic rock	Velpula
26	PCS 26/22-23	78.2247	14.3087	Gniess	Old Kadiri Ghat road
27	PCS 27/22-23	78.1155	14.3804	HBL Granite	Basireddy palli
28	PCS 28/22-23	78.2146	14.3461	Shale dolomite interclation	Kanampalli
29	PCS 29/22-23	78.2005	14.3363	Quartzite	Namalagundu
30	PCS 30/22-23	78.1961	14.4007	Dolomite	Yerragundupalli

ANNEXURE-III

Field observation data sheet for Soil (R and C) collected from Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

SNO	X	Y	Sample no.		Location
1	78.1493	14.27935	R 1/22-23	Regolith	Balareddy palli
2	78.1493	14.27935	C 1/22-23	C-Horizon	Balareddy palli
3	78.22518	14.30368	R 2/22-23	Regolith	Chinnapalli
4	78.22518	14.30368	C 2/22-23	C-Horizon	Chinnapalli
5	78.29314	14.25961	R 3/22-23	Regolith	Peddanavaripalli
6	78.29314	14.25961	C 3/22-23	C-Horizon	Peddanavaripalli
7	78.31866	14.26243	R 4/22-23	Regolith	Peddanavaripalli
8	78.31866	14.26243	C 4/22-23	C-Horizon	Peddanavaripalli
9	78.43949	14.25517	R 5/22-23	Regolith	Errabommanapalli
10	78.43949	14.25517	C 5/22-23	C-Horizon	Errabommanapalli
11	78.16205	14.3119	R 6/22-23	Regolith	Odulapalle
12	78.16205	14.3119	C 6/22-23	C-Horizon	Odulapalle
13	78.23518	14.35128	R 7/22-23	Regolith	Mabbu chintalapalli
14	78.23518	14.35128	C 7/22-23	C-Horizon	Mabbu chintalapalli
15	78.2594	14.3261	R 8/22-23	Regolith	UCIL Plant
16	78.2594	14.3261	C 8/22-23	C-Horizon	UCIL Plant
17	78.3544	14.34924	R 9/22-23	Regolith	Puttakonamma
18	78.3544	14.34924	C 9/22-23	C-Horizon	Puttakonamma
19	78.44032	14.32267	R 10/22-23	Regolith	Chintalamadugupalli
20	78.44032	14.32267	C 10/22-23	C-Horizon	Chintalamadugupalli
21	78.13783	14.40886	R 11/22-23	Regolith	Ambakapalli
22	78.13783	14.40886	C 11/22-23	C-Horizon	Ambakapalli
23	78.21667	14.37307	R 12/22-23	Regolith	Yerragudipalli
24	78.21667	14.37307	C 12/22-23	C-Horizon	Yerragudipalli
25	78.28948	14.37587	R 13/22-23	Regolith	Velpula
26	78.28948	14.37587	C 13/22-23	C-Horizon	Velpula
27	78.3392	14.3988	R 14/22-23	Regolith	Pernapadu
28	78.3392	14.3988	C 14/22-23	C-Horizon	Pernapadu
29	78.43818	14.39458	R 15/22-23	Regolith	Vempalli
30	78.43818	14.39458	C 15/22-23	C-Horizon	Vempalli
31	78.1475	14.44938	R 16/22-23	Regolith	Chinnakudala
32	78.1475	14.44938	C 16/22-23	C-Horizon	Chinnakudala
33	78.2239	14.45593	R 17/22-23	Regolith	Peddarangapuram
34	78.2239	14.45593	C 17/22-23	C-Horizon	Peddarangapuram
35	78.25331	14.46224	R 18/22-23	Regolith	Pulivendula
36	78.25331	14.46224	C 18/22-23	C-Horizon	Pulivendula
37	78.38552	14.48104	R 19/22-23	Regolith	Moilacheruvu
38	78.38552	14.48104	C 19/22-23	C-Horizon	Moilacheruvu
39	78.4039	14.48318	R 20/22-23	Regolith	Ramreddipalli
40	78.4039	14.48318	C 20/22-23	C-Horizon	Ramreddipalli

ANNEXURE-IV

Field observation data sheet for Water sample collected from Y.S.R Kadapa and Anantapur districts, Andhra Pradesh

S. No.	X	Y	Location / Station	Mandal	District	Topo-sheet No	Date of Collection	Type of well	Depth of well (m)
1	78.2453	14.4909	T. TUMMALAPALLE	TUNDUR	YSR KADAPA	57J/3-C1	1-May-2022	BOREWELL	106.68
2	78.2299	14.4765	R. TUMMALAPALLE	PULIVENDULA	YSR KADAPA	57J/3-C1	1-May-2022	BOREWELL	106.68
3	78.2227	14.4542	PEDDA RANGAPURAM	PULIVENDULA	YSR KADAPA	57J/3-C1	1-May-2022	BOREWELL	39.624
4	78.2254	14.3357	K. KOTTAPALLE	VEMULA	YSR KADAPA	57J/3-C2	2-May-2022	BOREWELL	152.4
5	78.2536	14.3275	TUMMALAPALLE	VEMULA	YSR KADAPA	57J/3-C3	2-May-2022	BOREWELL	48.768
6	78.2544	14.336	MUBBICHINTALA	VEMULA	YSR KADAPA	57J/3-C2	2-May-2022	BOREWELL	91.44
7	78.2709	14.3675	VELLUPULA	VEMULA	YSR KADAPA	57J/7-A2	2-May-2022	BOREWELL	121.92
8	78.2997	14.429	BHUMAYAGARIPALLI	VEMULA	YSR KADAPA	57J/7-A1	2-May-2022	BOREWELL	335.28
9	78.2959	14.308	RACHKUNTAPALLI	VEMULA	YSR KADAPA	57J/7-A3	2-May-2022	BOREWELL	152.4
10	78.3187	14.367	VEMULA	VEMULA	YSR KADAPA	57J/7-A2	2-May-2022	BOREWELL	335.28
11	78.3157	14.3561	BACHAYAGARIPALLI	VEMULA	YSR KADAPA	57J/7-A2	2-May-2022	BOREWELL	91.44
12	78.3152	14.3561	CHINNARANGAPURAM	PULIVENDULA	YSR KADAPA	57J/7-A2	2-May-2022	BOREWELL	91.44
13	78.3996	14.3996	NALLAPUREDDYPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	2-May-2022	BOREWELL	304.8
14	78.1423	14.3979	NALLAGONDAVARIPALLI	PULIVENDULA	YSR KADAPA	57J/3-B2	2-May-2022	BOREWELL	152.4
15	78.1184	14.4144	AMBAKAPALLI	LINGALA	YSR KADAPA	57J/3-B2	2-May-2022	BOREWELL	152.4
16	78.1841	14.3645	MOTHNUNTALAPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	2-May-2022	BOREWELL	152.4
17	78.2021	14.4237	BRAHMANAPALLI	PULIVENDULA	YSR KADAPA	57J/3-C1	2-May-2022	BOREWELL	243.84
18	78.1793	14.4321	IPPTALA	PULIVENDULA	YSR KADAPA	57J/3-C1	2-May-2022	BOREWELL	45.72
19	78.1574	14.4596	CHINNAKUDALA	PULIVENDULA	YSR KADAPA	57J/3-B1	2-May-2022	BOREWELL	152.4
20	78.1398	14.4593	RAMNUTHALAPALLI	LINGALA	YSR KADAPA	57J/3-B1	2-May-2022	BOREWELL	457.2
21	78.1148	14.4526	GUNAKANAPALLI	LINGALA	YSR KADAPA	57J/3-B1	2-May-2022	BOREWELL	426.72
22	78.1609	14.483	PEDDA KUDALA	LINGALA	YSR KADAPA	57J/3-B1	3-May-2022	BOREWELL	152.4
23	78.1701	14.4745	AKKULAGARALAPALLI	LINGALA	YSR KADAPA	57J/3-B1	3-May-2022	BOREWELL	152.4
24	78.183	14.4648	ERRAMREDDIPALLI	PULIVENDULA	YSR KADAPA	57J/3-C1	3-May-2022	BOREWELL	182.88
25	78.197	14.4839	DONDLAVAGU	LINGALA	YSR KADAPA	57J/3-C1	3-May-2022	BOREWELL	45.72
26	78.2254	14.4682	LAVALAPURAM	PULIVENDULA	YSR KADAPA	57J/3-C1	3-May-2022	BOREWELL	152.4

27	78.2167	14.3479	KANAMPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	3-May-2022	BOREWELL	228.6
28	78.206	14.2785	B. KOTHAPALLI	TALLAPULA	ANANTHAPUR	57J/3-C3	3-May-2022	BOREWELL	137.16
29	78.2219	14.288	UDUMULAKURTHI	TALLAPULA	ANANTHAPUR	57J/3-C3	3-May-2022	BOREWELL	152.4
30	78.2509	14.2913	SOMAVALAPALLI	TALLAPULA	ANANTHAPUR	57J/3-C3	3-May-2022	BOREWELL	121.92
31	78.251	14.2913	ELLAGULABAYLU	TALLAPULA	ANANTHAPUR	57J/3-C3	3-May-2022	BOREWELL	137.16
32	78.2515	14.2548	MEDUKULLAPALLI	TALLAPULA	ANANTHAPUR	57J/3-C3	3-May-2022	BOREWELL	182.88
33	78.2851	14.2573	PEDDAPALLI	TALLAPULA	ANANTHAPUR	57J/7-A3	3-May-2022	BOREWELL	152.4
34	78.3018	14.2662	VEPAMMANIPETA	TALLAPULA	ANANTHAPUR	57J/7-A3	3-May-2022	BOREWELL	152.4
35	78.3228	14.2739	GUNDLAVARIPALLI	TALLAPULA	ANANTHAPUR	57J/7-A3	3-May-2022	BOREWELL	60.96
36	78.3371	14.254	PEDDANAVARIPALLI	TALLAPULA	ANANTHAPUR	57J/7-A3	3-May-2022	BOREWELL	188.976
37	78.2271	14.4116	PULIVENDULA	PULIVENDULA	YSR KADAPA	57J/3-C2	4-May-2022	BOREWELL	182.88
38	78.1835	14.2593	BATREPALLI	TALLAPULA	ANANTHAPUR	57J/3-C3	4-May-2022	BOREWELL	274.32
39	78.1372	14.258	GAJJAPPAGARIPALLI	TALLAPULA	ANANTHAPUR	57J/3-B3	4-May-2022	BOREWELL	182.88
40	78.1101	14.2787	REDDIVARIPALLE	TALLAPULA	ANANTHAPUR	57J/3-B3	4-May-2022	BOREWELL	109.728
41	78.1234	14.3076	MADDANAGARIPALLE	MUDIGUBBA	ANANTHAPUR	57J/3-B3	4-May-2022	BOREWELL	91.44
42	78.1536	14.3092	SABBANUTHALAPALLI	TALLAPULA	ANANTHAPUR	57J/3-B3	4-May-2022	BOREWELL	91.44
43	78.1806	14.3134	VELUPALLA	TALLAPULA	ANANTHAPUR	57J/3-C3	4-May-2022	BOREWELL	109.728
44	78.1228	14.3426	TAPATUVARIPALLI	MUDIGUBBA	ANANTHAPUR	57J/3-B2	4-May-2022	BOREWELL	109.728
45	78.146	14.3397	PEDDANAGARIPALLI	MUDIGUBBA	ANANTHAPUR	57J/3-B2	4-May-2022	BOREWELL	152.4
46	78.1106	14.3589	MALLEPALLI	MUDIGUBBA	ANANTHAPUR	57J/3-B2	4-May-2022	BOREWELL	85.344
47	78.2521	14.381	BESTAVARIPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	4-May-2022	BOREWELL	76.2
48	78.2592	14.4017	BOGGUDPALLI	PULIVENDULA	YSR KADAPA	57J/7-A2	4-May-2022	BOREWELL	152.4
49	78.293	14.4	PEDDA JUTTUR	VEMULA	YSR KADAPA	57J/7-A2	4-May-2022	BOREWELL	304.8
50	78.3002	14.414	CHINTLA JUTTUR	VEMULA	YSR KADAPA	57J/7-A2	4-May-2022	BOREWELL	182.88
51	78.3161	14.4141	GOLLAGUDUR	VEMULA	YSR KADAPA	57J/7-A2	4-May-2022	BOREWELL	91.44
52	78.3529	14.4103	PERNAPADU	VEMULA	YSR KADAPA	57J/7-B2	4-May-2022	BOREWELL	91.44
53	78.3635	14.3972	CHAGALLURU	VEMULA	YSR KADAPA	57J/7-B2	4-May-2022	BOREWELL	213.36
54	78.3848	14.4184	ALLAVALAPADU	VEMPALLI	YSR KADAPA	57J/7-A1	4-May-2022	BOREWELL	76.2
55	78.4148	14.4215	AYYAVARIPALLI	VEMPALLI	YSR KADAPA	57J/7-A1	4-May-2022	BOREWELL	106.68
56	78.4237	14.4024	PAMALURU	VEMPALLI	YSR KADAPA	57J/7-B2	4-May-2022	BOREWELL	76.2
57	78.2658	14.4445	ULIMELA	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	213.36
58	78.2836	14.451	YERRIPALLI	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	76.2

59	78.2849	14.4618	PATRAYUNIPETA	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	182.88
60	78.2942	14.475	ACHAVILLI	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	91.44
61	78.309	14.475	YADAVPETA/CHINAMPALLI	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	76.2
62	78.2962	14.4616	TIMMAPURAMPETA	PULIVENDULA	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	76.2
63	78.323	14.4583	GOTURU	TONDUR	YSR KADAPA	57J/7-A1	5-May-2022	BOREWELL	60.96
64	78.3535	14.4768	NALLACHERUNIPALLI	VEMULA	YSR KADAPA	57J/7-B1	5-May-2022	BOREWELL	91.44
65	78.3611	14.4401	PENDULURU	VEMULA	YSR KADAPA	57J/7-B1	5-May-2022	BOREWELL	60.96
66	78.3888	14.4632	MOTTUKUR	VEMPALLI	YSR KADAPA	57J/7-B1	5-May-2022	BOREWELL	60.96
67	78.4185	14.4664	RAMREDDIPALLI	VEMPALLI	YSR KADAPA	57J/7-B1	5-May-2022	BOREWELL	91.44
68	78.4102	14.4488	NAGURU	VEMPALLI	YSR KADAPA	57J/7-B1	5-May-2022	BOREWELL	91.44
69	78.3781	14.3974	GUNDLAPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	152.4
70	78.3839	14.4032	CHERLOPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	106.68
71	78.4022	14.3953	KATLURU	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
72	78.4078	14.3765	NANDIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	152.4
73	78.3934	14.3757	TALLAPALLE	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
74	78.3862	14.3481	TALLAPALLE-2	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
75	78.3931	14.3425	T.VEMULAVARIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	365.76
76	78.4083	14.3561	KUPALAPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
77	78.3698	14.3312	BAKKANAGARIPALLI	VEMPALLI	YSR KADAPA	57J/7-B3	5-May-2022	BOREWELL	91.44
78	78.3575	14.3117	GIDDANKIPALLI	VEMPALLI	YSR KADAPA	57J/7-B3	5-May-2022	BOREWELL	76.2
79	78.3886	14.3774	TATTIMUKALAPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
80	78.3753	14.3824	DAGGUNARIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
81	78.368	14.3738	AMMAYAGARIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	91.44
82	78.3579	14.3671	V. KOTHAPALLI	VEMULA	YSR KADAPA	57J/7-B2	5-May-2022	BOREWELL	335.28
83	78.3822	14.3671	TALLEPALE	VEMPALLI	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	91.44
84	78.3393	14.3763	CHAGALLURU-2	VEMULA	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	121.92
85	78.3393	14.3768	GONDIPALLE	VEMULA	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	45.72
86	78.3442	14.3882	RANGAVARIPALLI	VEMULA	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	45.72
87	78.2514	14.3746	BESTAVARIPALLI-2	VEMULA	YSR KADAPA	57J/7-C2	6-May-2022	BOREWELL	304.8
88	78.2573	14.3668	VELUPALLA-2	VEMULA	YSR KADAPA	57J/7-A2	6-May-2022	BOREWELL	182.88
89	78.2781	14.3618	VELUPALLA-3	VEMULA	YSR KADAPA	57J/7-A2	6-May-2022	BOREWELL	243.84
90	78.3171	14.3311	MEDIPENTLA	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	182.88

91	78.3205	14.3257	MEDIPENTLA-2	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	182.88
92	78.3243	14.3237	BHOMAYAGARIPALLI	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	304.8
93	78.327	14.3187	RACHKUNTAPALLI-2	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	304.8
94	78.3286	14.3117	RACHKUNTAPALLI-3	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	121.92
95	78.3252	14.3156	RACHKUNTAPALLI-4	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	152.4
96	78.325	14.3173	RACHKUNTAPALLI-5	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	152.4
97	78.3249	14.32	RACHKUNTAPALLI-6	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	304.8
98	78.3026	14.329	RACHKUNTAPALLI-7	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	182.88
99	78.3023	14.3125	RACHKUNTAPALLI-8	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	182.88
100	78.3291	14.3214	RACHKUNTAPALLI-9	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	182.88
101	78.3347	14.3272	MEDIPENTLA	VEMULA	YSR KADAPA	57J/7-A3	6-May-2022	BOREWELL	350.52
102	78.3445	14.3243	BAKKANAGARIPALLI-2	VEMPALLI	YSR KADAPA	57J/7-B3	6-May-2022	BOREWELL	182.88
103	78.4072	14.3759	NANDIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	182.88
104	78.4078	14.3766	NANDIPALLI-2	VEMPALLI	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	121.92
105	78.3928	14.3906	KATLURU	VEMPALLI	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	182.88
106	78.3986	14.4054	KATLURU-2	VEMPALLI	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	182.88
107	78.389	14.3829	DUGGNAGARIPALLI	VEMULA	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	68.58
108	78.3928	14.3906	MITTAPALLI	VEMULA	YSR KADAPA	57J/7-B2	6-May-2022	BOREWELL	91.44
109	78.3632	14.4168	PERNAPADU	VEMULA	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	121.92
110	78.3627	14.4296	PENLURU	VEMULA	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	91.44
111	78.3664	14.4759	KONDAREDDIPALLI	VEMULA	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	91.44
112	78.3709	14.4819	KONDAREDDIPALLI-2	VEMULA	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	60.96
113	78.3906	14.477	MOILACHERU	V.N. PALLI	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	60.96
114	78.4279	14.4606	PALLIGIRI	V.N. PALLI	YSR KADAPA	57J/7-C1	6-May-2022	BOREWELL	54.864
115	78.4151	14.4591	RAMREDDIPALLI-2	VEMPALLI	YSR KADAPA	57J/7-B1	6-May-2022	BOREWELL	60.96
116	78.3799	14.3726	MUSSIREDDIPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	243.84
117	78.3715	14.3715	KOTHAPALLI	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	91.44
118	78.3632	14.3788	KOTHAPALLI-2	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	182.88
119	78.3666	14.3696	KOTHAPALLI-3	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	243.84
120	78.3451	14.3689	GONDIPALLE-2	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	365.76
121	78.3535	14.363	V. KOTHAPALLI-2	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	213.36
122	78.3532	14.3586	V. KOTHAPALLI-3	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	91.44

123	78.3369	14.3699	GONDIPALLI-3	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	121.92
124	78.2982	14.3875	KUPPA KUNTLAPALLI	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	121.92
125	78.2952	14.3799	KUPPA KUNTLAPALLI-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	243.84
126	78.2896	14.3574	IMMAMNAGAR	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	310.896
127	78.3023	14.3644	VEMULA-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	213.36
128	78.3058	14.3623	KOTHAPALLI-4	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
129	78.3021	14.3688	VEMULA-3	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
130	78.311	14.3579	BACHAYAGARIPALLI-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	274.32
131	78.3065	14.3579	VEMULA-4	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	213.36
132	78.3191	14.3617	VEMULA-5	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	320.04
133	78.3197	14.3736	VEMULA-6	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
134	78.3134	14.4064	GOLLAGUDUR-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
135	78.2822	14.3676	VELPULA	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
136	78.2814	14.3687	VELPULA-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
137	78.2522	14.382	BESTAVARIPALLI-3	PULIVENDULA	YSR KADAPA	57J/3-C2	7-May-2022	BOREWELL	182.88
138	78.2641	14.4009	BUGGUDUPALLI	PULIVENDULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	182.88
139	78.2688	14.3986	BUGGUDUPALLI-2	PULIVENDULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	91.44
140	78.2723	14.3986	SIDDAMREDDIPALLI	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	213.36
141	78.3191	14.4122	GOLLALAGUDUR	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	76.2
142	78.3152	14.4084	GOLLALAGUDUR-2	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	121.92
143	78.3023	14.369	VEMULA-7	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	289.56
144	78.3134	14.4064	VEMULA-8	VEMULA	YSR KADAPA	57J/7-A2	7-May-2022	BOREWELL	304.8
145	78.3411	14.3806	GONDEPALLI	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	152.4
146	78.3417	14.3851	GONDEPALLI-2	VEMULA	YSR KADAPA	57J/7-B2	7-May-2022	BOREWELL	54.864
147	78.3137	14.369	VEMULA-9	VEMULA	YSR KADAPA	57J/7-A2	8-May-2022	BOREWELL	213.36
148	78.2454	14.3877	VEMARPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	91.44
149	78.2304	14.395	VEMARPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	213.36
150	78.2347	14.4307	PULIVENDULA-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	103.632
151	78.2333	14.4496	PEDDA RANGAPURAM-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	91.44
152	78.2305	14.4633	RACHUMARPALLI	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	182.88
153	78.2332	14.4679	RACHUMARPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	91.44
154	78.2438	14.4575	RACHUMARPALLI-3	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	91.44

155	78.2218	14.4559	PEDDA RANGAPURAM-3	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	152.4
156	78.2275	14.4348	PULIVENDULA-3	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	152.4
157	78.1872	14.4433	IPPTALA-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	274.32
158	78.1698	14.4583	IPPTLA-3	PULIVENDULA	YSR KADAPA	57J/3-B1	8-May-2022	BOREWELL	213.36
159	78.1723	14.4511	IPPTLA-4	PULIVENDULA	YSR KADAPA	57J/3-B1	8-May-2022	BOREWELL	182.88
160	78.171	14.4566	IPPTLA-5	PULIVENDULA	YSR KADAPA	57J/3-B1	8-May-2022	BOREWELL	243.84
161	78.1718	14.4673	THERNAMPALLI	LINGALA	YSR KADAPA	57J/3-B1	8-May-2022	BOREWELL	182.88
162	78.177	14.4691	THERNAMPALLI-2	LINGALA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	30.48
163	78.1731	14.4731	THERNAMPALLI-3	LINGALA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	76.2
164	78.1813	14.4607	ERRAMREDDIPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	365.76
165	78.191	14.4571	CHINNARANGAPURAM-2	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	182.88
166	78.1936	14.4508	CHINNARANGAPURAM-3	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	182.88
167	78.211	14.43	CHINNARANGAPURAM-4	PULIVENDULA	YSR KADAPA	57J/3-C1	8-May-2022	BOREWELL	182.88
168	78.2523	14.384	BESTAVARIPALLI-4	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	152.4
169	78.2003	14.4025	ERRABALE	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	365.76
170	78.1963	14.4071	BRAHMANAPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	304.8
171	78.1883	14.3998	NALLAPUREDDYPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	182.88
172	78.182	14.3968	KOTHAPALLI-5	VEMULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	213.36
173	78.1832	14.3936	CHANDRAGIRI	PULIVENDULA	YSR KADAPA	57J/3-C2	8-May-2022	BOREWELL	182.88
174	78.1649	14.4025	NALLAPUREDDIPALLI-3	PULIVENDULA	YSR KADAPA	57J/3-B2	8-May-2022	BOREWELL	335.28
175	78.1591	14.4042	NALLAPUREDDIPALLI-4	PULIVENDULA	YSR KADAPA	57J/3-B2	8-May-2022	BOREWELL	365.76
176	78.136	14.4029	AMBAKAPALLI-2	LINGALA	YSR KADAPA	57J/3-B2	8-May-2022	BOREWELL	182.88
177	78.4181	14.3634	KUPPALAPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	182.88
178	78.3879	14.3818	TATTIMAGULAPALLI	VEMPALLI	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	182.88
179	78.3877	14.4031	CHERLOPALLI-2	VEMPALLI	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	182.88
180	78.3771	14.4005	GUNDLAPALLI-2	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	45.72
181	78.3667	14.3941	CHAGALLERU	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	182.88
182	78.3599	14.3877	CHAGALLERU-2	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	106.68
183	78.3623	14.3912	CHAGALLERU-3	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	BOREWELL	243.84
184	78.3602	14.3926	CHAGALLERU-4	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	SURFACE WATER	0
185	78.3557	14.3961	CHAGALLERU-5	VEMULA	YSR KADAPA	57J/7-B2	9-May-2022	BORE WELL	121.92
186	78.3315	14.4065	GOLLALAGUDUR	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	60.96

187	78.3253	14.4145	GOLLALAGUDUR-2	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	60.96
188	78.2959	14.4084	GOLLALAGUDUR-3	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	182.88
189	78.2858	14.4003	PEDDA JUTTUR-2	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	259.08
190	78.2594	14.4076	YEDULA YENI	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	85.344
191	78.2584	14.4122	YEDULA YENI-2	VEMULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	182.88
192	78.2551	14.4042	BASIREDDIPALLI	PULIVENDULA	YSR KADAPA	57J/7-A2	9-May-2022	BORE WELL	182.88
193	78.2413	14.4103	PULIVENDULA -5	PULIVENDULA	YSR KADAPA	57J/3-C2	9-May-2022	BORE WELL	213.36
194	78.2235	14.4013	PULIVENDULA -6	PULIVENDULA	YSR KADAPA	57J/3-C2	9-May-2022	BORE WELL	91.44
195	78.2185	14.3725	KANAMPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	182.88
196	78.2362	14.3557	VEMMARPALLI	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	365.76
197	78.2228	14.3538	KANAMPALLI-3	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	298.704
198	78.2017	14.3529	KANAMPALLI-4	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	152.4
199	78.2348	14.3567	MOTHNUNTALAPALLI-2	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	182.88
200	78.1906	14.3571	MOTHNUNTALAPALLI-3	PULIVENDULA	YSR KADAPA	57J/3-C2	10-May-2022	BORE WELL	213.36

ANNEXURE-V

ANALYTICAL RESULTS OF MAJOR OXIDES, FLUORIDE AND ARSENIC OF SOIL SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in ppm)

SNO	Sample no	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	F	As
1	S01/22-23	39.96	14.87	4.97	0.09	2.16	13.33	0.88	1.46	0.57	0.09	328	11
2	S02/22-23	62.23	17.82	4.31	0.06	0.78	0.98	2.38	4.49	0.67	0.09	264	7
3	S03/22-23	54.35	14.62	4.62	0.06	2.08	4.51	1.58	2.58	0.60	0.29	260	5
4	S04/22-23	47.54	16.74	8.91	0.12	2.44	6.98	1.53	1.54	0.82	0.17	106	4
5	S05/22-23	51.87	15.33	5.19	0.07	2.59	4.81	1.55	2.39	0.58	0.15	264	8
6	S06/22-23	58.27	19.83	5.82	0.08	1.07	2.55	2.51	2.55	0.75	0.10	50	13
7	S07/22-23	62.17	17.46	4.87	0.07	1.08	1.49	2.46	3.09	1.30	0.09	50	10
8	S08/22-23	63.44	17.51	3.51	0.05	0.84	1.99	3.53	3.42	0.59	0.08	50	2
9	S09/22-23	64.16	15.61	7.02	0.09	1.47	1.60	1.41	2.07	0.65	0.07	50	1
10	S10/22-23	59.97	15.19	5.48	0.08	2.59	2.10	1.45	2.69	0.63	0.22	160	1
11	S11/22-23	57.43	19.08	5.75	0.10	1.93	2.61	2.20	2.40	0.89	0.14	144	2
12	S12/22-23	57.21	17.80	5.89	0.10	1.13	1.55	2.11	3.29	0.71	0.21	50	3
13	S13/22-23	65.99	16.83	3.25	0.05	0.41	1.08	2.99	4.72	0.59	0.09	50	5
14	S14/22-23	58.70	19.12	4.88	0.07	0.86	1.55	2.49	3.13	0.70	0.11	50	6
15	S15/22-23	63.25	17.20	3.68	0.05	0.57	0.53	2.89	4.54	0.77	0.09	50	4
16	S16/22-23	56.22	18.91	4.86	0.07	1.67	1.67	2.01	3.11	0.85	0.19	144	12
17	S17/22-23	58.18	17.68	6.78	0.09	1.82	2.10	1.98	2.55	1.05	0.13	50	9
18	S18/22-23	50.26	16.18	8.65	0.11	3.74	2.73	1.40	1.83	0.72	0.10	192	15
19	S19/22-23	56.99	16.07	7.32	0.23	1.55	1.17	0.47	2.07	1.01	0.14	50	2
20	S20/22-23	61.53	16.20	6.51	0.08	1.28	2.38	1.71	2.48	0.87	0.08	50	4
21	S21/22-23	54.34	19.11	6.71	0.09	1.96	2.46	1.77	2.41	0.67	0.11	108	11
22	S22/22-23	65.28	16.78	3.07	0.04	0.35	0.42	1.99	5.38	0.49	0.08	50	8
23	S23/22-23	56.96	18.98	6.83	0.05	1.89	0.74	2.66	2.83	0.55	0.10	50	8

24	S24/22-23	65.10	15.90	4.07	0.04	0.66	0.58	3.06	3.51	0.89	0.08	50	6
25	S25/22-23	57.14	17.35	7.28	0.14	1.21	1.07	0.59	2.95	0.92	0.22	50	12
26	S26/22-23	58.02	12.01	7.04	0.14	3.68	2.36	0.24	4.09	0.79	0.16	228	7
27	S27/22-23	63.25	9.97	7.50	0.12	1.53	1.35	0.13	0.93	1.00	0.15	404	0.5
28	S28/22-23	54.43	11.83	6.24	0.15	5.28	3.82	0.38	2.43	0.68	0.36	152	15
29	S29/22-23	52.81	13.88	7.41	0.14	2.77	3.95	0.24	2.56	0.72	0.23	50	22
30	S30/22-23	54.53	15.10	11.36	0.17	3.92	0.74	0.20	2.24	0.83	0.13	164	18
31	S31/22-23	56.12	19.70	4.71	0.08	1.06	2.42	2.04	2.96	0.84	0.14	50	19
32	S32/22-23	66.67	16.12	2.89	0.05	0.43	0.65	3.08	5.21	0.67	0.08	50	24
33	S33/22-23	64.60	17.80	3.53	0.05	0.32	0.80	3.45	4.95	0.70	0.06	50	12
34	S34/22-23	66.69	12.43	6.30	0.10	1.74	0.51	0.26	4.80	0.74	0.14	268	14
35	S35/22-23	57.72	13.61	7.90	0.20	2.46	1.51	0.25	2.89	0.87	0.22	376	10
36	S36/22-23	59.60	11.99	7.86	0.10	2.22	1.33	0.11	2.45	0.83	0.14	692	3
37	S37/22-23	62.62	11.47	7.70	0.12	2.57	1.55	0.14	2.14	1.11	0.12	472	0.5
38	S38/22-23	48.39	11.48	7.38	0.15	8.18	4.81	0.10	1.93	0.61	0.10	628	2
39	S39/22-23	44.84	11.78	8.84	0.13	2.59	10.78	0.23	1.22	1.41	0.18	493	5
40	S40/22-23	60.94	11.83	8.11	0.12	3.00	1.18	0.12	1.66	1.04	0.08	477	7
41	S41/22-23	64.60	17.52	3.44	0.06	0.71	1.49	2.86	3.46	0.78	0.11	204	6
42	S42/22-23	73.47	11.14	2.75	0.05	0.41	0.74	2.43	3.82	0.70	0.09	50	11
43	S43/22-23	61.21	15.71	5.43	0.07	1.43	1.09	1.63	3.00	0.82	0.10	50	4
44	S44/22-23	54.02	14.39	7.17	0.11	2.07	4.99	0.68	2.12	0.74	0.09	50	7
45	S45/22-23	58.78	12.41	6.71	0.11	2.11	2.50	0.29	2.54	0.83	0.17	552	0.5
46	S46/22-23	28.96	9.95	5.34	0.11	2.17	22.38	0.11	1.55	0.51	0.35	216	0.5
47	S47/22-23	46.23	10.56	7.03	0.11	3.96	8.51	0.28	1.41	0.76	0.19	50	0.5
48	S48/22-23	48.07	13.24	10.72	0.15	3.27	3.79	0.34	0.90	1.06	0.15	50	1
49	S49/22-23	48.54	11.33	12.34	0.18	3.62	3.52	0.38	0.78	1.46	0.13	50	3
50	S50/22-23	44.32	12.54	6.69	0.11	6.27	8.35	0.17	0.82	0.83	0.09	204	9
51	S51/22-23	62.99	14.80	4.94	0.06	1.34	1.04	0.78	2.86	0.68	0.16	252	7
52	S52/22-23	59.93	14.73	6.84	0.10	1.26	1.59	0.57	2.29	0.72	0.17	200	12

53	S53/22-23	61.25	11.77	6.13	0.12	3.05	2.08	0.46	2.02	0.69	0.12	496	4
54	S54/22-23	51.42	11.66	6.08	0.07	4.58	6.24	0.14	1.19	0.82	0.08	176	7
55	S55/22-23	50.75	10.91	7.08	0.10	3.51	8.02	0.29	1.33	0.99	0.08	50	6
56	S56/22-23	52.08	11.91	7.78	0.13	3.45	4.61	0.35	0.92	0.77	0.08	50	8
57	S57/22-23	48.84	11.19	10.74	0.15	5.10	3.78	0.65	1.23	0.93	0.14	50	2
58	S58/22-23	51.23	11.73	6.84	0.13	3.70	6.26	0.28	1.14	0.83	0.14	50	5
59	S59/22-23	58.56	11.74	8.54	0.18	2.16	2.12	0.32	1.26	1.13	0.10	219	0.5
60	S60/22-23	51.62	11.86	10.25	0.17	2.81	4.17	0.35	1.22	1.17	0.29	501	2
61	S61/22-23	54.15	13.45	6.47	0.16	2.90	3.35	0.51	3.31	0.71	0.27	220	5
62	S62/22-23	53.38	12.87	5.80	0.10	2.97	4.64	0.76	2.14	0.63	0.17	372	6
63	S63/22-23	57.51	13.20	6.30	0.09	2.52	2.46	0.63	2.35	0.70	0.16	580	12
64	S64/22-23	46.13	11.06	6.63	0.09	4.45	8.51	0.23	1.66	0.79	0.08	700	10
65	S65/22-23	49.31	14.63	8.22	0.17	2.28	4.80	0.11	0.55	0.62	0.06	432	18
66	S66/22-23	54.27	12.57	8.94	0.17	2.60	3.50	0.27	1.23	1.06	0.09	436	22
67	S67/22-23	61.02	12.70	9.35	0.17	1.67	1.35	0.28	1.53	1.02	0.11	436	21
68	S68/22-23	49.21	12.11	8.38	0.17	3.26	5.85	0.31	1.42	0.84	0.13	432	25
69	S69/22-23	59.98	12.62	7.85	0.12	2.00	2.17	0.22	1.12	0.94	0.13	516	18
70	S70/22-23	55.33	11.50	8.64	0.15	3.30	3.47	0.30	0.97	1.32	0.22	468	12
71	S71/22-23	57.46	14.38	7.31	0.17	2.14	1.80	0.24	2.38	0.86	0.19	536	15
72	S72/22-23	64.69	12.13	6.90	0.13	1.04	0.62	0.12	1.37	0.87	0.07	432	19
73	S73/22-23	49.14	11.00	5.96	0.12	3.94	8.28	0.55	1.78	0.68	0.16	440	20
74	S74/22-23	54.69	12.63	6.23	0.10	4.02	3.32	0.70	2.00	0.68	0.12	448	4
75	S75/22-23	58.15	14.87	6.49	0.10	2.07	1.47	0.84	2.63	0.74	0.19	256	11
76	S76/22-23	55.50	11.48	9.24	0.18	2.74	3.06	0.45	1.18	1.13	0.14	172	5
77	S77/22-23	52.42	11.30	7.70	0.15	3.06	5.68	0.37	1.34	1.00	0.17	256	17
78	S78/22-23	58.78	10.73	5.53	0.10	3.18	5.10	1.02	1.79	1.10	0.12	1196	9
79	S79/22-23	51.69	11.20	7.43	0.12	3.77	6.27	0.75	1.43	0.90	0.16	748	12
80	S80/22-23	57.01	13.10	7.70	0.13	3.31	6.34	0.60	1.37	1.10	0.14	596	3
81	S81/22-23	54.91	10.88	5.59	0.12	3.81	5.29	0.23	1.88	0.73	0.14	876	4

82	S82/22-23	48.04	11.69	6.94	0.12	3.09	8.51	0.34	1.38	0.72	0.11	384	6
83	S83/22-23	47.15	10.05	6.24	0.11	6.08	8.02	0.40	1.40	0.71	0.19	232	8
84	S84/22-23	59.91	15.27	6.48	0.09	1.74	1.13	0.66	2.57	0.73	0.07	544	5
85	S85/22-23	59.46	12.70	4.49	0.08	2.71	3.12	1.12	2.97	0.73	0.18	612	7
86	S86/22-23	54.62	13.19	7.64	0.12	2.69	3.14	0.82	2.06	0.79	0.11	472	16
87	S87/22-23	50.59	11.58	8.29	0.13	3.35	5.85	0.59	1.37	1.16	0.21	452	11
88	S88/22-23	50.48	10.74	7.91	0.15	2.59	7.71	0.35	1.02	1.15	0.15	332	8
89	S89/22-23	56.62	11.91	7.21	0.12	2.33	5.18	0.31	1.44	1.07	0.19	860	17
90	S90/22-23	56.56	11.88	8.34	0.14	2.89	3.81	0.66	1.64	1.51	0.51	588	14
91	S91/22-23	55.05	15.15	8.29	0.14	2.03	1.66	0.05	1.11	0.97	0.05	50	3
92	S92/22-23	54.51	12.67	7.35	0.12	2.83	5.11	0.17	1.07	0.94	0.10	108	17
93	S93/22-23	46.77	12.94	9.32	0.13	2.34	6.28	0.13	0.80	0.64	0.06	50	12
94	S94/22-23	56.40	12.26	8.39	0.12	2.17	2.58	0.29	1.76	0.82	0.27	256	8
95	S95/22-23	62.28	14.67	5.91	0.09	1.21	1.17	0.43	2.44	0.74	0.11	320	7
96	S96/22-23	62.06	14.97	3.77	0.07	1.78	2.69	1.56	3.16	0.84	0.11	276	11
97	S97/22-23	68.89	12.82	3.84	0.06	1.23	1.82	0.97	3.16	0.88	0.07	268	5
98	S98/22-23	57.95	14.21	6.90	0.10	1.68	2.08	0.37	1.90	0.80	0.18	300	8
99	S99/22-23	55.31	14.08	9.23	0.13	1.95	1.71	0.18	1.36	1.29	0.15	252	12
100	S100/22-23	53.93	11.50	9.91	0.17	2.95	3.01	0.28	1.02	1.37	0.16	128	7
101	S101/22-23	62.97	9.24	10.06	0.09	3.10	1.91	0.10	0.70	0.77	0.08	140	7
102	S102/22-23	58.99	12.16	7.03	0.11	3.54	0.64	0.05	2.10	0.50	0.09	940	10
103	S103/22-23	64.83	15.58	3.63	0.07	1.09	1.85	0.63	3.01	0.83	0.06	256	14
104	S104/22-23	60.80	12.49	5.43	0.09	1.84	3.88	0.86	2.23	0.90	0.15	484	12
105	S105/22-23	52.69	12.55	8.71	0.13	2.27	5.13	0.27	0.68	1.02	0.13	568	17
106	S106/22-23	56.11	12.65	6.57	0.12	2.34	3.71	0.05	1.31	0.67	0.18	352	21
107	S107/22-23	51.93	15.50	6.74	0.05	1.24	4.85	0.84	2.14	0.58	0.10	348	11

ANNEXURE-VI

ANALYTICAL RESULTS OF RARE EARTH ELEMENTS OF SOIL SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH

All values are in (ppm)

SNO	Sample no	La	Ce	Pr	Nd	Eu	Sm	Tb	Gd	Dy	Ho	Er	Tm	Yb	Lu
1	S01/22-23	35.50	67.78	8.70	30.81	1.22	6.05	0.84	5.15	4.94	0.91	3.10	0.52	3.41	0.56
2	S02/22-23	69.23	164.66	17.62	61.97	1.11	11.54	1.28	8.83	8.67	1.68	5.78	0.92	7.27	1.47
3	S03/22-23	69.26	150.66	18.41	63.09	1.57	10.79	1.25	7.96	6.78	1.34	3.59	0.70	4.26	0.73
4	S04/22-23	47.41	82.25	9.91	36.22	1.74	6.91	1.06	6.42	6.30	1.25	3.85	0.60	3.76	0.67
5	S05/22-23	59.41	138.28	15.46	53.51	1.42	9.74	1.08	6.96	6.51	1.23	3.91	0.61	4.07	0.69
6	S06/22-23	65.31	109.81	12.67	45.66	1.52	8.77	1.12	6.92	6.69	1.38	4.61	0.83	5.94	0.96
7	S07/22-23	63.99	92.05	11.51	41.67	1.85	8.26	0.91	5.95	5.38	1.00	3.66	0.54	4.30	0.73
8	S08/22-23	50.05	80.50	9.92	35.42	1.34	6.75	0.76	4.86	4.12	0.84	2.70	0.41	2.87	0.55
9	S09/22-23	60.63	101.26	11.87	42.83	1.11	8.12	1.12	6.86	7.66	1.66	5.03	0.79	5.08	0.77
10	S10/22-23	42.14	64.71	7.48	29.11	1.13	6.22	0.93	5.79	6.06	1.18	3.73	0.61	3.79	0.61
11	S11/22-23	51.37	82.74	10.94	41.25	1.70	7.58	0.87	6.40	5.47	1.12	3.37	0.56	4.09	0.68
12	S12/22-23	67.50	121.41	14.23	50.15	1.40	8.71	1.19	7.56	7.13	1.37	4.15	0.71	4.99	0.82
13	S13/22-23	37.14	78.34	8.51	29.72	1.13	6.76	1.02	5.48	6.30	1.28	4.54	0.76	6.01	1.14
14	S14/22-23	64.96	127.88	14.30	48.52	1.63	9.82	1.03	7.18	6.90	1.38	4.20	0.74	5.26	0.89
15	S15/22-23	75.67	173.53	19.25	66.82	2.09	14.93	2.13	13.45	14.13	2.86	9.75	1.90	13.84	2.50
16	S16/22-23	84.64	159.90	17.70	61.98	2.30	11.10	1.14	8.01	7.17	1.39	4.04	0.68	5.28	0.90
17	S17/22-23	49.89	66.36	8.41	33.53	1.88	7.10	0.93	5.46	5.97	1.19	4.26	0.71	4.85	0.82
18	S18/22-23	39.28	61.01	7.09	27.55	1.41	5.48	0.91	5.21	5.12	0.90	3.05	0.46	3.44	0.47
19	S19/22-23	52.46	87.07	10.39	38.22	1.56	7.99	1.15	7.38	7.62	1.47	4.59	0.77	5.30	0.88
20	S20/22-23	52.11	67.95	8.41	31.63	1.29	7.16	1.21	6.80	7.80	1.61	5.50	0.78	5.43	0.87
21	S21/22-23	54.28	100.75	10.53	39.93	1.62	7.53	0.96	5.53	4.25	0.89	2.56	0.46	3.25	0.54

22	S22/22-23	43.43	95.05	9.44	33.95	0.85	7.00	1.16	6.28	7.72	1.57	5.69	0.97	8.38	1.36
23	S23/22-23	113.50	244.94	26.04	88.70	1.74	15.75	1.93	11.90	11.97	2.39	7.46	1.20	8.89	1.54
24	S24/22-23	67.01	135.92	14.82	54.44	1.81	10.22	1.46	7.62	8.15	1.78	5.12	1.04	7.06	1.24
25	S25/22-23	47.98	73.89	9.28	34.51	1.19	6.77	0.97	5.96	5.92	1.17	3.78	0.54	3.76	0.73
26	S26/22-23	70.48	62.93	7.56	30.58	0.93	4.42	0.77	4.57	4.33	0.80	2.96	0.41	3.34	0.41
27	S27/22-23	86.77	58.63	6.17	22.07	1.33	5.22	0.65	4.03	4.02	0.70	2.30	0.37	2.07	0.40
28	S28/22-23	49.66	66.66	8.01	30.59	1.11	5.34	0.70	4.98	4.50	0.98	2.45	0.42	3.06	0.48
29	S29/22-23	42.79	57.78	7.55	29.55	1.35	5.14	0.69	4.90	5.04	1.02	3.05	0.53	3.13	0.49
30	S30/22-23	57.63	82.46	10.51	36.30	1.67	7.68	1.01	6.59	7.06	1.18	3.92	0.66	3.84	0.62
31	S31/22-23	68.65	113.85	14.17	49.48	1.81	9.11	0.99	6.88	5.61	1.12	3.51	0.61	4.80	0.62
32	S32/22-23	67.89	118.14	12.74	43.25	1.42	10.55	1.50	8.91	9.94	1.78	6.09	1.11	7.50	1.25
33	S33/22-23	46.38	100.91	9.39	32.81	1.16	8.04	1.37	7.77	9.94	2.23	8.34	1.43	10.30	1.90
34	S34/22-23	58.81	58.41	6.87	25.69	1.02	4.15	0.50	4.22	3.50	0.68	2.26	0.30	2.42	0.41
35	S35/22-23	93.20	76.89	10.20	34.70	1.52	6.37	0.95	6.55	5.63	1.00	3.44	0.55	3.59	0.50
36	S36/22-23	60.27	58.95	6.23	28.39	1.19	5.89	0.73	4.43	5.05	0.87	2.74	0.30	2.78	0.59
37	S37/22-23	64.81	57.04	6.07	27.60	1.14	4.89	0.81	4.70	4.65	0.96	3.02	0.32	2.53	0.36
38	S38/22-23	84.10	70.75	8.83	33.49	1.27	4.70	0.72	4.83	4.07	0.81	2.37	0.44	2.66	0.38
39	S39/22-23	43.01	53.12	6.33	23.79	1.43	4.64	0.75	4.55	4.82	0.93	2.97	0.44	2.81	0.46
40	S40/22-23	39.53	55.56	6.72	24.19	0.91	4.88	0.60	3.93	4.19	0.77	2.08	0.39	2.62	0.41
41	S41/22-23	100.82	82.75	10.54	38.23	1.57	6.22	0.91	5.55	5.48	1.09	3.64	0.65	5.41	0.99
42	S42/22-23	102.53	89.05	9.48	33.72	1.43	6.48	1.04	6.60	6.03	1.17	4.10	0.65	5.51	0.91
43	S43/22-23	122.36	142.70	18.05	63.66	1.62	10.43	1.47	9.94	8.77	1.63	5.15	0.81	6.36	1.10
44	S44/22-23	89.72	112.11	12.21	43.05	1.26	7.13	1.01	5.92	5.73	1.12	3.27	0.51	4.02	0.62
45	S45/22-23	82.83	71.66	19.30	50.17	1.07	5.67	0.85	4.99	4.59	0.93	2.51	0.38	2.78	0.42
46	S46/22-23	65.42	41.84	5.74	21.14	0.88	4.15	0.60	3.64	3.89	0.67	2.03	0.30	1.89	0.28
47	S47/22-23	68.59	44.24	5.65	19.18	1.18	4.25	0.58	3.63	4.03	0.68	2.01	0.40	2.34	0.42
48	S48/22-23	73.81	51.97	6.78	27.19	1.22	4.96	0.80	5.46	4.86	0.90	2.34	0.50	2.69	0.48

49	S49/22-23	70.19	52.36	7.14	25.49	1.64	4.96	0.91	5.64	6.27	1.19	3.29	0.53	3.35	0.53
50	S50/22-23	37.08	54.74	11.09	35.64	0.86	4.06	0.55	3.91	4.00	0.78	2.46	0.34	2.19	0.36
51	S51/22-23	78.87	136.86	15.05	53.34	1.50	8.92	1.35	8.65	7.48	1.43	4.80	0.82	5.34	0.97
52	S52/22-23	101.90	146.84	17.76	63.11	1.82	9.59	1.29	9.28	7.46	1.27	4.01	0.69	4.78	0.77
53	S53/22-23	79.60	79.21	9.49	35.13	1.30	5.95	0.86	5.23	5.11	0.98	3.07	0.47	3.47	0.54
54	S54/22-23	49.71	58.99	7.58	28.53	1.32	5.00	0.78	5.25	4.60	0.83	2.84	0.40	2.65	0.38
55	S55/22-23	70.52	51.59	6.88	25.75	1.37	4.40	0.80	4.56	4.67	0.87	2.34	0.51	2.79	0.37
56	S56/22-23	97.38	153.07	7.85	29.76	1.27	4.51	0.71	4.54	4.49	0.89	3.00	0.41	2.93	0.49
57	S57/22-23	71.95	47.89	6.06	22.82	1.07	4.24	0.71	4.43	4.34	0.85	2.79	0.34	2.72	0.36
58	S58/22-23	86.80	79.66	9.50	35.42	1.40	6.21	0.96	6.22	5.38	1.17	3.32	0.51	3.26	0.48
59	S59/22-23	39.54	78.66	8.81	31.31	1.58	6.11	0.84	5.74	5.57	1.15	3.23	0.46	3.10	0.51
60	S60/22-23	57.96	60.50	9.84	36.26	1.83	5.90	0.79	6.59	4.53	0.93	3.41	0.30	2.59	0.57
61	S61/22-23	81.85	79.65	9.26	33.27	1.06	5.28	0.82	5.46	4.87	0.80	2.65	0.44	2.96	0.49
62	S62/22-23	99.66	111.46	12.95	44.14	1.21	7.03	0.89	6.27	5.84	0.97	3.00	0.55	3.55	0.50
63	S63/22-23	79.02	118.38	14.18	47.55	1.09	7.00	1.01	6.11	5.41	1.06	3.13	0.50	3.18	0.58
64	S64/22-23	70.35	61.16	8.06	28.61	1.37	5.44	0.76	5.28	4.41	0.90	2.57	0.45	2.32	0.38
65	S65/22-23	63.54	50.29	5.74	21.39	1.00	4.10	0.68	4.20	4.16	0.71	2.14	0.37	2.29	0.41
66	S66/22-23	102.96	220.60	18.33	90.42	1.55	7.79	3.69	7.17	5.61	2.17	4.21	0.56	3.49	0.60
67	S67/22-23	85.83	76.90	12.32	43.23	1.44	6.60	1.03	6.85	6.03	1.10	3.95	0.58	4.08	0.61
68	S68/22-23	80.49	61.03	7.41	28.76	1.18	5.39	0.84	5.03	5.24	1.04	2.98	0.45	2.84	0.51
69	S69/22-23	55.30	77.83	8.57	31.41	1.29	6.21	0.94	4.97	5.30	1.01	3.51	0.56	3.17	0.61
70	S70/22-23	65.68	64.46	7.45	29.34	1.47	6.09	0.84	5.26	5.82	1.11	3.22	0.62	3.46	0.59
71	S71/22-23	113.74	87.61	10.64	39.79	1.53	7.09	0.92	6.20	6.11	1.07	3.67	0.54	3.70	0.53
72	S72/22-23	98.81	67.40	8.14	29.68	1.34	5.97	0.90	5.18	5.25	0.94	2.97	0.48	2.96	0.50
73	S73/22-23	79.50	80.42	9.05	32.38	1.31	5.79	0.93	5.15	4.78	0.95	2.93	0.48	2.71	0.50
74	S74/22-23	72.29	93.31	10.42	35.76	1.18	6.76	0.97	5.61	5.65	1.01	3.26	0.53	3.15	0.57
75	S75/22-23	60.65	86.47	9.89	34.90	1.22	6.20	0.93	5.21	4.91	1.00	3.10	0.48	3.07	0.61

76	S76/22-23	43.48	59.78	7.15	26.59	1.54	6.19	1.02	5.57	6.23	1.25	3.96	0.55	3.81	0.63
77	S77/22-23	64.53	76.78	9.36	36.87	1.48	7.05	1.04	6.18	6.05	1.27	3.96	0.57	3.65	0.63
78	S78/22-23	62.29	80.55	9.31	34.78	1.39	6.79	1.13	7.07	7.55	1.33	4.08	0.67	4.52	0.79
79	S79/22-23	66.07	64.23	7.42	29.47	1.36	6.23	0.91	5.31	5.64	1.06	3.19	0.41	3.35	0.53
80	S80/22-23	63.87	65.25	7.87	29.19	1.19	5.86	0.90	5.84	5.92	1.06	3.21	0.52	3.60	0.59
81	S81/22-23	46.37	60.70	7.27	26.12	1.15	5.16	0.73	4.50	4.30	0.89	2.57	0.42	2.67	0.44
82	S82/22-23	47.81	65.85	7.73	29.30	1.20	5.69	0.79	4.87	4.86	0.96	2.88	0.43	3.14	0.51
83	S83/22-23	60.76	57.59	7.01	25.76	1.12	4.85	0.75	3.86	4.61	0.97	3.04	0.45	2.91	0.47
84	S84/22-23	50.05	111.58	11.25	39.76	1.17	7.63	0.93	6.21	5.72	1.11	3.17	0.49	3.30	0.53
85	S85/22-23	48.87	89.61	9.84	33.19	1.32	6.42	0.93	5.16	5.68	1.08	3.44	0.58	4.50	0.71
86	S86/22-23	44.42	74.99	7.88	30.30	1.09	5.54	0.80	5.57	4.79	0.91	3.07	0.47	3.03	0.48
87	S87/22-23	65.55	63.17	7.61	30.01	1.33	5.93	0.95	5.46	6.20	1.15	3.37	0.55	3.47	0.57
88	S88/22-23	64.04	66.07	8.46	30.30	1.46	6.18	1.07	6.09	6.45	1.25	3.88	0.56	4.12	0.64
89	S89/22-23	71.83	65.92	7.45	28.69	1.28	5.73	0.91	4.91	5.31	1.00	3.08	0.52	3.21	0.59
90	S90/22-23	58.88	64.04	8.24	28.62	1.50	5.52	0.98	5.87	6.37	1.21	3.85	0.56	3.78	0.64
91	S91/22-23	121.53	88.79	10.77	39.88	1.64	7.60	1.14	6.69	6.31	1.22	3.80	0.60	3.67	0.65
92	S92/22-23	41.38	64.51	7.37	28.94	1.35	5.50	0.86	4.93	5.24	0.96	3.03	0.46	2.98	0.47
93	S93/22-23	22.51	44.85	4.90	17.95	0.82	3.61	0.57	3.20	3.40	0.70	2.25	0.29	2.02	0.37
94	S94/22-23	35.87	68.14	7.97	27.02	1.10	5.33	0.81	4.64	4.65	0.95	2.84	0.44	3.11	0.53
95	S95/22-23	47.94	88.27	9.02	30.93	1.09	5.72	0.79	4.80	4.78	0.88	2.76	0.44	3.18	0.54
96	S96/22-23	51.94	108.30	12.68	42.15	1.34	8.50	1.14	7.04	7.30	1.46	4.68	0.80	5.65	0.97
97	S97/22-23	52.77	81.55	9.86	34.98	1.17	7.25	1.13	6.27	6.84	1.39	4.87	0.81	5.81	1.16
98	S98/22-23	50.18	104.48	10.66	36.96	1.18	6.87	0.91	5.34	5.29	1.01	2.95	0.47	3.29	0.52
99	S99/22-23	35.52	68.95	7.79	29.42	1.36	5.66	0.83	4.85	5.22	0.96	3.02	0.47	3.00	0.48
100	S100/22-23	34.25	73.17	8.16	30.81	1.44	6.11	1.03	5.78	6.10	1.23	3.65	0.56	3.63	0.58
101	S101/22-23	35.83	42.25	5.62	20.85	0.95	4.09	0.66	3.80	3.87	0.77	2.25	0.33	2.21	0.34
102	S102/22-23	38.76	53.12	5.76	20.43	1.67	7.46	0.60	3.68	3.20	0.65	1.78	0.28	1.86	0.27

103	S103/22-23	44.34	90.55	9.29	34.08	1.22	6.75	1.04	5.81	6.14	1.28	3.96	0.70	4.78	0.85
104	S104/22-23	43.84	78.95	9.24	32.40	1.18	6.32	0.88	5.17	5.56	1.05	3.54	0.54	3.56	0.60
105	S105/22-23	37.31	61.19	6.68	25.58	1.34	4.92	0.92	5.49	5.61	1.08	3.36	0.46	3.19	0.53
106	S106/22-23	30.72	56.06	6.61	25.07	1.05	4.94	0.73	4.55	4.48	0.85	2.46	0.42	2.81	0.42
107	S107/22-23	86.01	180.41	20.02	66.52	1.59	10.72	1.17	7.37	6.44	1.18	3.62	0.56	4.41	0.69

ANNEXURE-VII

ANALYTICAL RESULTS OF TRACE ELEMENTS OF SOIL SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in ppm)

SNO	Sample no	Ba	Ga	Sc	V	Th	Pb	Ni	Co	Rb	Sr	Y	Zr	Nb	Cr	Cu	Zn	Be	Ge	Mo	Sn	Hf	Ta	W	U
1	S01/22-23	384	20	12	88	18	19	40	13	106	372	29	326	22	61	37	33	3.60	1.65	0.62	2.50	11.67	1.87	0.25	18.54
2	S02/22-23	590	21	2	53	296	17	15	7	290	154	33	1738	42	50	16	32	3.62	1.11	1.47	2.50	45.09	5.98	0.50	32.65
3	S03/22-23	490	23	7	56	123	24	36	10	156	300	34	546	25	58	30	59	4.12	0.98	0.25	2.50	20.96	4.97	0.25	21.28
4	S04/22-23	447	20	14	106	13	23	62	30	90	245	26	321	17	61	106	76	2.43	1.35	0.50	2.50	13.32	3.07	0.25	17.91
5	S05/22-23	403	26	11	75	57	28	38	12	154	311	35	321	27	68	39	53	3.53	1.31	0.25	2.50	13.72	5.59	0.25	23.04
6	S06/22-23	376	25	9	90	100	34	37	9	92	618	25	1114	36	96	29	29	4.54	1.62	0.55	2.50	24.06	3.73	0.25	21.29
7	S07/22-23	669	17	5	86	105	18	28	10	81	311	22	1260	25	75	23	31	2.76	1.08	0.63	2.50	25.50	2.00	0.84	17.01
8	S08/22-23	879	17	2	55	34	25	16	7	104	433	14	635	11	52	21	26	2.94	0.91	0.61	2.50	20.88	1.16	0.25	18.48
9	S09/22-23	343	19	9	83	28	21	61	11	60	141	26	605	13	186	36	35	1.78	1.68	0.84	2.50	18.06	2.03	0.81	10.21
10	S10/22-23	281	21	10	79	21	27	36	14	132	168	31	346	14	86	36	84	3.48	1.12	0.25	2.50	12.83	4.82	2.35	14.75
11	S11/22-23	482	24	11	117	34	32	39	17	118	554	26	684	26	94	47	48	5.14	1.48	0.81	2.50	22.17	5.42	0.25	24.16
12	S12/22-23	377	25	7	110	52	38	43	18	253	179	31	416	30	50	55	56	4.29	1.84	0.25	2.50	15.14	4.09	0.55	33.96
13	S13/22-23	613	19	2	43	269	11	12	6	243	287	20	1584	35	43	17	21	3.33	1.16	0.64	2.50	34.91	3.24	0.25	28.77
14	S14/22-23	565	22	6	74	173	17	19	13	117	256	26	1104	26	42	34	35	4.20	0.87	0.95	2.50	27.80	3.77	5.18	25.00
15	S15/22-23	514	17	2	52	854	1	10	9	60	116	26	1924	50	23	16	17	4.83	1.23	0.25	2.50	50.34	4.77	2.21	37.90
16	S16/22-23	793	23	7	80	178	18	26	12	93	396	29	1211	25	52	26	47	4.61	0.92	0.25	2.50	33.18	3.06	2.70	22.52
17	S17/22-23	605	19	9	114	77	22	83	15	79	335	26	1030	19	156	49	46	2.76	1.28	0.52	2.50	19.91	1.33	0.70	17.58
18	S18/22-23	322	22	17	136	8	14	135	25	59	165	26	187	10	346	65	55	2.06	1.07	0.53	2.50	6.28	1.27	2.88	11.66
19	S19/22-23	379	16	13	138	23	19	80	21	75	87	31	924	14	181	47	34	1.99	1.07	1.03	2.50	21.04	0.93	5.97	18.77
20	S20/22-23	352	20	9	122	18	28	43	14	115	224	26	499	15	106	42	27	2.24	1.05	0.55	2.50	14.19	2.11	0.84	14.27
21	S21/22-23	490	25	11	115	21	26	54	17	109	369	27	310	17	144	56	44	3.90	1.34	0.89	2.50	5.64	1.80	1.26	18.71
22	S22/22-23	390	20	2	47	203	20	16	7	376	94	37	854	35	36	10	10	3.08	1.41	0.54	2.50	25.15	5.41	4.04	27.10
23	S23/22-23	317	33	8	69	98	24	17	12	160	84	32	552	56	29	24	20	7.00	1.10	0.93	2.50	15.59	3.93	1.35	30.53
24	S24/22-23	462	18	2	54	215	1	16	8	127	132	17	1047	42	47	18	16	3.65	1.22	0.64	2.50	22.68	5.21	1.70	22.22

25	S25/22-23	528	21	10	140	25	34	63	22	142	96	34	695	17	98	83	53	3.65	1.16	1.58	2.50	14.01	0.73	0.25	17.93
26	S26/22-23	730	17	10	132	12	21	65	20	118	96	33	359	12	138	60	35	1.05	2.38	1.24	2.50	11.56	1.25	2.47	11.77
27	S27/22-23	8281	15	13	136	8	16	62	26	115	150	24	209	12	93	87	56	1.54	1.77	1.02	2.50	4.30	0.64	1.52	7.32
28	S28/22-23	543	18	14	151	11	29	58	19	94	87	34	286	12	159	53	36	2.39	1.42	2.82	2.50	6.27	0.81	0.25	24.53
29	S29/22-23	518	19	13	142	11	22	84	21	100	82	32	293	12	139	46	51	2.95	1.11	1.89	2.50	3.62	0.44	0.25	28.68
30	S30/22-23	271	22	14	199	11	21	66	30	82	44	33	358	14	164	97	17	3.91	1.69	2.86	2.50	11.48	1.25	0.25	20.63
31	S31/22-23	604	23	7	75	53	35	33	13	161	355	29	568	27	63	38	45	4.30	1.30	0.77	2.50	9.27	3.70	0.25	18.29
32	S32/22-23	511	16	2	34	350	8	7	8	276	146	18	1254	32	41	14	17	3.83	1.26	0.58	2.50	19.43	3.29	0.25	34.58
33	S33/22-23	507	17	2	37	617	1	8	7	181	155	14	2027	42	46	18	34	5.60	1.27	3.57	2.50	22.61	3.62	7.09	50.47
34	S34/22-23	1088	15	4	118	8	21	77	18	153	61	32	371	13	151	34	34	1.90	1.38	1.56	2.50	43.77	0.52	1.65	18.18
35	S35/22-23	1007	22	12	149	11	27	86	27	120	76	34	332	14	152	77	50	2.48	1.70	1.58	2.50	12.88	1.51	0.83	15.26
36	S36/22-23	4646	20	12	128	4	17	110	26	168	94	30	237	13	119	59	52	1.43	1.23	1.88	2.50	5.46	1.25	2.15	6.67
37	S37/22-23	1701	15	11	150	7	14	69	20	96	92	28	377	14	117	48	41	1.03	1.82	1.19	2.50	9.55	1.23	1.96	7.93
38	S38/22-23	597	22	21	87	10	16	62	19	81	53	38	189	12	181	45	19	1.67	1.50	0.97	2.50	9.18	1.09	2.42	11.27
39	S39/22-23	904	15	15	207	8	18	42	33	63	125	26	262	15	67	86	48	1.46	1.06	1.02	2.50	8.47	0.77	2.84	4.15
40	S40/22-23	898	20	14	157	8	14	76	20	87	62	28	311	13	154	52	38	1.36	1.96	0.98	2.50	6.83	0.74	3.35	5.25
41	S41/22-23	697	18	4	74	82	32	16	8	182	422	19	1006	33	60	28	25	3.27	1.38	1.53	2.50	34.06	1.72	0.58	18.84
42	S42/22-23	525	15	2	56	165	15	11	10	200	170	18	1220	25	50	23	15	2.35	1.13	0.53	2.50	34.22	4.33	0.25	20.40
43	S43/22-23	507	22	8	90	157	15	41	10	149	138	34	815	28	73	42	41	2.77	1.23	0.80	2.50	28.28	1.50	0.25	22.62
44	S44/22-23	497	20	12	125	34	21	50	17	116	151	32	352	18	94	63	38	3.01	1.37	0.95	2.50	20.49	1.63	0.25	20.26
45	S45/22-23	1368	19	12	115	19	18	67	18	134	107	32	378	14	139	58	57	2.55	1.65	0.63	2.50	8.51	0.74	1.55	7.86
46	S46/22-23	963	11	12	82	4	16	61	21	66	142	24	114	9	70	51	63	1.27	1.15	0.25	2.50	3.43	0.10	2.31	6.85
47	S47/22-23	1877	15	17	115	7	18	110	30	80	216	28	183	10	277	64	45	0.78	0.79	0.55	2.50	9.29	1.16	1.88	6.81
48	S48/22-23	1060	19	19	179	6	17	81	33	58	205	26	183	12	137	102	54	1.86	1.59	0.54	2.50	13.45	2.44	0.25	11.65
49	S49/22-23	633	19	22	221	5	15	68	41	46	151	27	209	12	107	118	73	1.18	1.31	0.25	2.50	16.55	2.23	0.25	9.07
50	S50/22-23	700	16	17	117	6	19	55	19	60	221	27	225	11	76	60	41	1.47	1.15	0.25	2.50	4.43	0.52	3.35	6.16
51	S51/22-23	398	22	4	63	124	19	34	7	214	214	37	607	26	66	37	32	3.66	1.20	0.60	2.50	26.28	4.12	0.25	16.73
52	S52/22-23	505	23	7	81	77	26	48	14	156	168	33	495	24	70	55	63	4.11	1.78	1.22	2.50	19.32	2.40	0.25	31.56
53	S53/22-23	1090	21	12	97	33	19	75	19	122	104	32	328	16	127	53	35	2.61	1.44	0.74	2.50	18.10	1.63	0.25	11.96

54	S54/22-23	2385	17	16	75	10	16	66	14	101	108	32	246	14	125	46	35	2.04	1.53	0.25	2.50	13.15	1.37	0.25	11.07
55	S55/22-23	1249	15	16	133	7	13	49	25	68	129	27	249	12	99	66	40	1.58	1.39	0.25	2.50	28.84	3.42	0.25	9.07
56	S56/22-23	388	17	18	124	7	19	123	27	63	188	28	220	13	447	77	41	1.68	1.31	0.25	2.50	43.95	2.35	0.25	10.18
57	S57/22-23	1020	21	21	171	8	17	207	38	62	149	28	175	11	725	74	61	1.70	1.34	0.25	2.50	14.22	1.14	0.25	10.14
58	S58/22-23	723	19	16	113	8	23	64	25	84	178	31	238	14	95	64	46	1.73	1.87	0.25	2.50	20.98	1.52	0.25	12.71
59	S59/22-23	1202	19	16	150	8	26	63	28	90	148	29	295	16	100	89	58	1.64	1.71	0.80	2.50	6.16	0.95	8.13	6.43
60	S60/22-23	2756	18	18	188	6	20	59	35	78	207	26	197	12	100	105	65	1.70	0.98	0.58	2.50	6.92	1.09	4.62	8.64
61	S61/22-23	590	22	10	107	23	26	66	19	131	118	34	317	16	118	49	48	2.97	1.22	1.66	2.50	24.72	3.00	1.60	14.23
62	S62/22-23	706	24	11	85	39	21	55	17	128	153	34	279	19	93	51	53	3.20	1.54	1.14	2.50	19.26	1.44	0.25	30.84
63	S63/22-23	496	24	9	96	39	22	49	15	138	168	33	288	22	94	49	47	2.87	0.91	0.52	2.50	16.20	1.75	0.25	14.78
64	S64/22-23	663	17	16	107	9	21	63	19	87	272	31	220	12	133	56	33	1.86	1.38	0.25	2.50	15.71	1.33	0.95	14.30
65	S65/22-23	277	19	16	126	8	28	192	34	46	126	23	186	9	866	112	42	1.14	1.91	0.25	2.50	11.40	1.53	0.25	11.41
66	S66/22-23	393	20	16	195	10	28	76	29	70	121	29	256	15	165	91	62	2.18	3.24	0.81	2.50	14.71	0.95	0.25	12.39
67	S67/22-23	316	20	12	117	11	24	46	23	93	71	29	363	15	99	50	43	2.25	1.77	0.25	2.50	11.38	1.84	0.25	11.49
68	S68/22-23	529	18	15	134	7	21	69	31	77	163	29	198	12	139	67	51	1.87	1.12	0.25	2.50	28.01	0.40	0.25	8.55
69	S69/22-23	432	15	8	121	11	29	57	21	82	177	26	354	14	94	66	36	1.69	1.08	0.25	2.50	21.21	0.79	0.25	10.47
70	S70/22-23	372	18	19	157	11	19	74	27	64	139	29	308	16	110	68	49	1.73	1.07	0.25	2.50	22.06	0.43	0.25	9.08
71	S71/22-23	692	21	11	135	14	27	77	23	116	114	31	366	14	123	68	51	2.64	1.14	1.06	2.50	20.85	0.49	0.73	16.38
72	S72/22-23	1438	17	7	110	11	28	64	18	102	84	25	407	15	91	54	20	2.23	0.99	1.06	2.50	21.11	0.10	0.25	9.20
73	S73/22-23	676	16	13	97	15	22	81	21	109	155	32	259	16	231	57	47	2.16	0.74	0.61	2.50	14.72	0.21	0.25	16.11
74	S74/22-23	392	21	14	99	40	22	97	19	130	176	36	349	17	332	52	37	2.24	0.84	0.25	2.50	17.29	0.10	0.25	11.45
75	S75/22-23	411	24	11	102	31	27	61	18	185	123	37	355	19	105	48	40	2.43	0.96	0.25	2.50	13.82	0.37	0.25	12.60
76	S76/22-23	433	18	16	173	14	22	64	33	78	126	29	348	15	112	61	50	1.52	1.01	0.25	2.50	19.34	0.72	0.25	11.43
77	S77/22-23	380	18	16	146	14	27	53	26	87	139	31	303	15	107	62	47	2.33	0.77	0.25	2.50	23.71	0.30	0.25	11.79
78	S78/22-23	521	16	12	105	31	21	54	19	107	184	29	504	18	149	51	34	2.75	1.10	0.25	2.50	31.18	0.10	0.25	13.99
79	S79/22-23	721	18	14	128	11	20	70	29	85	163	29	264	13	163	71	45	1.76	1.26	0.51	2.50	21.83	0.53	0.25	11.60
80	S80/22-23	747	15	13	128	15	22	53	23	74	189	28	425	15	128	67	42	1.64	0.81	0.25	2.50	23.49	0.60	0.25	12.29
81	S81/22-23	780	16	12	90	8	24	67	19	97	107	32	318	13	130	60	53	1.67	0.72	0.70	2.50	20.54	0.29	0.25	11.40
82	S82/22-23	569	18	16	116	9	15	69	25	78	141	29	193	12	134	68	56	1.77	0.78	0.25	2.50	13.32	0.10	0.25	11.24

83	S83/22-23	716	16	18	95	12	21	114	26	86	202	33	231	12	408	60	84	1.78	0.87	0.77	2.50	12.34	0.10	0.54	6.61
84	S84/22-23	461	21	7	93	42	32	51	15	192	202	34	397	21	120	50	28	2.66	0.81	0.53	2.50	17.44	0.40	0.25	13.37
85	S85/22-23	499	19	9	81	86	23	34	13	190	205	37	630	21	97	37	37	3.12	1.16	0.25	2.50	26.76	0.33	0.75	11.83
86	S86/22-23	377	21	13	114	19	24	87	26	133	142	32	286	16	126	49	42	1.61	1.08	0.25	2.50	22.16	0.48	0.25	10.72
87	S87/22-23	431	17	17	143	16	19	63	30	89	162	31	301	15	115	66	49	1.68	1.05	0.25	2.50	18.83	0.35	0.25	9.36
88	S88/22-23	425	16	16	143	12	24	55	30	75	125	29	320	15	92	77	50	1.64	0.92	0.25	2.50	18.30	0.10	0.25	7.66
89	S89/22-23	725	14	9	109	16	26	53	22	90	166	28	492	16	149	65	42	1.64	0.65	0.25	2.50	21.38	0.10	2.37	9.29
90	S90/22-23	388	17	12	143	19	24	55	33	83	155	28	349	18	115	81	89	1.41	1.05	0.25	2.50	15.62	0.10	0.25	9.11
91	S91/22-23	446	20	10	120	18	28	82	15	93	97	30	458	17	109	68	31	2.96	0.99	0.25	2.50	16.19	0.10	0.25	8.39
92	S92/22-23	448	17	11	122	15	26	60	17	71	199	28	393	14	112	59	30	1.48	1.57	0.25	2.50	8.55	0.56	0.62	5.80
93	S93/22-23	354	16	14	121	6	17	99	27	70	164	25	205	11	242	107	31	1.36	1.17	0.25	2.50	5.49	0.10	0.25	4.68
94	S94/22-23	505	19	8	122	27	23	61	24	124	177	29	351	15	93	79	57	2.12	0.99	0.55	2.50	7.20	0.10	0.25	6.29
95	S95/22-23	481	19	4	84	33	33	48	11	214	187	33	423	19	82	47	23	2.10	1.26	0.25	2.50	8.99	1.43	0.25	7.54
96	S96/22-23	571	16	4	58	168	14	29	14	174	234	32	979	26	95	33	25	2.63	1.16	0.85	2.50	25.23	2.02	0.25	15.60
97	S97/22-23	486	14	2	59	229	5	26	9	173	191	33	1304	24	103	31	16	1.99	1.11	0.59	2.50	28.61	1.88	0.25	15.40
98	S98/22-23	496	21	7	83	28	30	58	15	156	198	30	332	19	84	61	37	2.66	1.48	0.25	2.50	8.61	1.34	0.58	8.70
99	S99/22-23	279	21	10	156	11	22	70	27	89	137	27	325	15	119	109	53	1.99	1.39	0.25	2.50	8.30	0.76	0.25	6.07
100	S100/22-23	400	20	18	158	8	25	72	34	70	123	30	334	16	119	90	61	2.17	1.46	0.52	2.50	7.36	0.39	0.25	6.13
101	S101/22-23	1422	16	14	126	7	15	68	32	47	59	24	176	11	112	92	50	1.77	1.42	0.88	2.50	3.80	0.50	0.25	6.14
102	S102/22-23	11972	16	9	118	7	19	120	26	270	152	28	163	9	243	68	25	3.25	1.80	2.52	2.50	9.30	0.47	0.25	8.86
103	S103/22-23	445	17	2	73	124	18	32	9	217	185	35	1010	23	90	39	16	2.48	1.32	0.25	2.50	22.97	2.09	0.25	12.14
104	S104/22-23	469	15	5	82	42	24	40	15	151	239	28	494	18	102	47	29	2.29	1.19	0.52	2.50	12.62	0.80	0.25	9.72
105	S105/22-23	304	15	12	165	5	19	64	33	49	188	23	209	12	74	92	42	1.58	1.33	0.25	2.50	6.25	0.23	0.25	5.48
106	S106/22-23	1114	17	8	89	10	21	115	27	92	127	27	259	13	215	79	36	1.81	1.09	0.57	2.50	5.40	0.27	0.25	6.23
107	S107/22-23	468	23	7	70	109	25	33	14	157	245	34	548	26	50	56	27	5.12	1.16	0.25	2.50	14.90	1.46	0.25	11.18

ANNEXURE-VIII

ANALYTICAL RESULTS OF MAJOR OXIDES, FLUORIDE AND ARSENIC OF SOIL(R and C) SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in ppm)

SNO	Sample no.		SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	F	As
1	R 1/22-23	Regolith	53.81	18.39	7.20	0.12	0.81	1.64	1.55	3.33	0.84	0.12	192	2
2	C 1/22-23	C-Horizon	48.82	23.94	8.01	0.10	0.82	0.97	1.08	3.33	0.64	0.08	233	7
3	R 2/22-23	Regolith	55.36	20.02	6.49	0.07	1.02	0.83	0.62	4.34	0.66	0.11	515	3
4	C 2/22-23	C-Horizon	48.41	23.35	8.93	0.05	1.09	0.64	0.20	3.98	0.35	0.10	679	3
5	R 3/22-23	Regolith	42.87	19.06	13.07	0.21	2.62	2.75	0.59	1.15	0.67	0.08	258	2
6	C 3/22-23	C-Horizon	39.34	13.90	9.15	0.13	3.79	11.94	0.96	0.87	0.36	0.06	311	6
7	R 4/22-23	Regolith	50.74	15.78	9.36	0.15	2.83	4.09	0.82	1.33	0.94	0.11	279	8
8	C 4/22-23	C-Horizon	43.51	18.08	8.92	0.12	2.37	7.21	0.92	1.65	0.93	0.18	291	5
9	R 5/22-23	Regolith	62.06	20.12	2.40	0.06	0.53	0.75	2.36	5.19	0.45	0.08	222	2
10	C 5/22-23	C-Horizon	49.86	28.37	4.71	0.06	0.62	0.54	0.50	2.98	0.28	0.07	691	13
11	R 6/22-23	Regolith	62.20	19.11	2.58	0.04	0.41	0.64	2.56	4.94	0.55	0.08	108	20
12	C 6/22-23	C-Horizon	52.80	26.05	4.11	0.05	0.55	0.48	1.60	3.55	0.38	0.07	271	5
13	R 7/22-23	Regolith	70.12	9.93	6.38	0.10	0.99	0.73	0.22	1.99	0.81	0.10	471	3
14	C 7/22-23	C-Horizon	66.33	11.18	7.10	0.11	0.81	0.89	0.12	3.39	0.79	0.10	771	17
15	R 8/22-23	Regolith	35.91	12.76	8.99	0.12	4.49	13.81	0.30	1.28	0.39	0.18	352	5
16	C 8/22-23	C-Horizon	38.85	12.95	13.90	0.24	4.67	8.80	0.75	0.87	0.46	0.21	208	0.5
17	R 9/22-23	Regolith	46.87	15.33	14.18	0.19	1.85	2.53	0.85	0.64	1.54	0.10	50	37
18	C 9/22-23	C-Horizon	40.23	11.90	12.21	0.13	5.33	10.16	0.60	0.24	0.87	0.08	214	5

19	R 10/22-23	Regolith	49.14	13.01	7.59	0.17	3.66	7.01	0.18	1.96	0.87	0.09	443	13
20	C 10/22-23	C-Horizon	40.75	13.06	6.36	0.14	4.18	13.37	0.14	1.79	0.62	0.10	515	8
21	R 11/22-23	Regolith	46.12	10.15	7.58	0.13	7.69	6.19	0.24	1.67	0.68	0.18	647	16
22	C 11/22-23	C-Horizon	31.47	10.97	6.31	0.09	5.20	18.16	0.23	1.26	0.41	0.16	531	9
23	R 12/22-23	Regolith	55.36	12.27	6.49	0.12	2.67	4.86	0.24	1.78	0.80	0.09	295	13
24	C 12/22-23	C-Horizon	60.19	12.31	6.56	0.12	2.11	1.37	0.11	1.82	0.79	0.07	587	5
25	R 13/22-23	Regolith	32.44	12.29	11.02	0.20	5.13	14.02	0.05	0.43	0.48	0.10	50	25
26	C 13/22-23	C-Horizon	30.35	8.28	16.58	0.28	8.75	10.73	0.05	0.21	0.51	0.08	110	4
27	R 14/22-23	Regolith	53.59	14.79	14.72	0.14	1.10	0.91	0.15	1.31	0.97	0.10	438	10
28	C 14/22-23	C-Horizon	54.96	15.35	13.80	0.12	1.26	0.80	0.12	1.53	0.92	0.09	334	7
29	R 15/22-23	Regolith	44.73	21.09	15.39	0.10	0.80	0.76	0.05	1.13	1.18	0.07	50	3
30	C 15/22-23	C-Horizon	40.85	12.39	10.76	0.08	2.11	18.37	0.05	0.58	0.87	0.08	321	19
31	R 16/22-23	Regolith	36.28	7.84	6.24	0.07	7.99	15.34	0.05	3.06	0.67	0.15	641	4
32	C 16/22-23	C-Horizon	29.77	4.61	3.27	0.08	13.22	19.62	0.05	1.42	0.29	0.09	721	15
33	R 17/22-23	Regolith	47.13	11.83	6.28	0.11	4.49	9.32	0.79	1.72	0.73	0.12	329	13
34	C 17/22-23	C-Horizon	30.49	6.76	4.08	0.09	5.83	22.37	0.79	0.87	0.41	0.10	214	9
35	R 18/22-23	Regolith	58.90	14.14	4.14	0.08	2.04	3.89	1.15	3.45	0.77	0.08	147	8
36	C 18/22-23	C-Horizon	50.68	13.65	4.19	0.09	3.67	7.64	1.75	2.77	0.63	0.06	489	10
37	R 19/22-23	Regolith	53.23	18.84	8.53	0.09	1.72	1.13	0.25	3.49	0.74	0.06	445	22
38	C 19/22-23	C-Horizon	51.82	16.99	8.97	0.14	2.29	3.47	0.76	2.94	0.54	0.05	397	29
39	R 20/22-23	Regolith	51.61	20.19	9.86	0.08	1.60	0.90	0.42	3.61	0.82	0.08	437	21
40	C 20/22-23	C-Horizon	50.14	17.95	7.57	0.06	2.30	5.47	0.25	3.73	0.52	0.06	417	6

ANNEXURE-IX

ANALYTICAL RESULTS OF RARE EARTH ELEMENTS OF SOIL(R and C) SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH

(All values are in (ppm)

SNO	Sample no.		La	Ce	Pr	Nd	Eu	Sm	Tb	Gd	Dy	Ho	Er	Tm	Yb	Lu
1	R 1/22-23	Regolith	82.75	149.64	21.14	74.33	1.90	13.69	1.80	10.68	11.10	2.12	6.73	1.15	8.07	1.32
2	C 1/22-23	C-Horizon	192.65	359.95	50.22	172.38	2.41	26.80	2.53	17.36	14.87	2.45	8.21	1.38	9.49	1.48
3	R 2/22-23	Regolith	90.36	175.06	22.59	72.00	1.90	12.87	1.24	8.99	8.19	1.47	5.13	0.76	5.44	0.89
4	C 2/22-23	C-Horizon	67.87	131.38	15.40	50.65	0.96	8.56	0.99	6.25	6.19	1.06	3.43	0.62	3.96	0.69
5	R 3/22-23	Regolith	57.15	80.14	12.31	41.53	1.33	7.50	1.05	6.44	6.27	1.06	3.31	0.53	3.55	0.67
6	C 3/22-23	C-Horizon	47.30	31.89	5.55	22.14	0.89	3.63	0.63	3.64	4.58	0.79	2.53	0.41	2.95	0.43
7	R 4/22-23	Regolith	58.04	100.58	13.23	44.12	1.70	7.87	1.04	6.15	4.72	1.11	3.28	0.56	3.32	0.50
8	C 4/22-23	C-Horizon	181.38	246.62	42.73	142.24	4.35	20.00	1.81	12.62	9.48	1.59	4.56	0.69	4.71	0.65
9	R 5/22-23	Regolith	53.66	114.01	13.24	43.67	1.15	7.90	0.93	7.01	4.65	0.91	2.86	0.48	3.26	0.53
10	C 5/22-23	C-Horizon	29.68	70.88	6.03	23.44	0.44	3.28	0.41	2.87	1.77	0.42	1.06	0.22	1.28	0.22
11	R 6/22-23	Regolith	90.71	188.45	19.89	67.65	1.76	12.43	1.71	11.36	10.99	2.41	7.75	1.25	9.87	1.66
12	C 6/22-23	C-Horizon	87.62	213.84	18.67	64.89	1.55	10.80	1.61	10.23	9.26	1.77	6.94	1.11	8.45	1.45
13	R 7/22-23	Regolith	49.31	55.64	6.66	24.53	1.36	5.82	0.84	4.67	5.01	0.91	3.63	0.49	3.29	0.58
14	C 7/22-23	C-Horizon	40.58	55.30	6.93	27.07	1.73	7.89	0.71	4.54	4.18	0.96	2.32	0.41	2.74	0.34
15	R 8/22-23	Regolith	53.36	41.72	6.27	24.47	1.54	5.22	0.93	6.26	6.16	1.24	3.93	0.51	3.62	0.56
16	C 8/22-23	C-Horizon	52.25	62.39	7.22	31.12	1.71	7.50	1.36	7.91	8.78	1.78	5.45	0.75	4.78	0.79
17	R 9/22-23	Regolith	40.66	45.90	6.49	25.35	1.30	5.63	1.08	5.75	5.54	1.21	3.67	0.55	4.04	0.66
18	C 9/22-23	C-Horizon	33.64	31.98	5.32	19.54	1.22	4.97	0.73	5.33	4.85	0.86	3.07	0.31	3.11	0.43
19	R 10/22-23	Regolith	41.62	70.28	8.63	30.55	1.64	5.71	0.98	5.41	5.59	0.87	2.95	0.51	3.38	0.52
20	C 10/22-23	C-Horizon	42.53	49.86	7.78	24.30	1.14	5.01	0.86	4.38	4.59	1.07	3.12	0.51	3.42	0.50
21	R 11/22-23	Regolith	38.21	45.51	5.33	23.47	0.91	4.63	0.67	4.10	3.28	0.89	2.05	0.44	2.60	0.43
22	C 11/22-23	C-Horizon	40.57	37.13	4.89	18.70	0.93	5.02	0.84	4.50	3.47	0.77	1.57	0.33	2.40	0.28
23	R 12/22-23	Regolith	62.69	63.84	7.73	30.16	0.99	6.29	0.80	5.07	4.85	0.93	2.79	0.52	3.45	0.57
24	C 12/22-23	C-Horizon	63.74	60.59	7.62	29.05	1.27	5.36	0.82	5.29	4.04	0.86	2.07	0.44	2.47	0.47

25	R 13/22-23	Regolith	44.25	36.13	3.77	24.84	0.69	3.22	0.51	3.03	3.31	0.57	1.98	0.35	3.44	0.63
26	C 13/22-23	C-Horizon	21.03	34.03	3.25	14.08	0.69	3.28	0.40	3.04	2.16	0.43	1.52	0.20	1.01	0.20
27	R 14/22-23	Regolith	111.89	79.59	9.48	37.09	1.52	6.28	1.40	8.49	9.71	1.95	5.16	0.87	5.54	0.99
28	C 14/22-23	C-Horizon	99.51	87.83	10.10	35.51	1.48	8.98	1.42	7.49	7.29	1.93	4.80	0.65	5.05	0.88
29	R 15/22-23	Regolith	69.17	57.63	11.95	44.46	1.97	6.78	1.14	7.21	7.22	1.45	4.31	0.70	3.88	0.65
30	C 15/22-23	C-Horizon	57.48	32.59	6.02	23.27	1.44	5.28	1.03	5.69	5.84	1.21	3.66	0.50	2.98	0.47
31	R 16/22-23	Regolith	56.40	46.24	6.45	20.98	1.29	4.64	0.74	4.44	3.83	0.73	2.40	0.35	2.35	0.37
32	C 16/22-23	C-Horizon	49.58	33.39	4.55	15.89	0.93	3.54	0.59	3.33	3.19	0.57	1.71	0.30	1.32	0.23
33	R 17/22-23	Regolith	52.83	58.79	6.96	26.07	1.19	5.20	0.80	4.17	4.10	0.81	2.64	0.37	2.78	0.48
34	C 17/22-23	C-Horizon	44.99	45.18	5.10	17.98	0.81	3.95	0.52	3.49	3.27	0.60	2.09	0.25	1.95	0.25
35	R 18/22-23	Regolith	58.08	78.63	8.68	31.36	1.14	5.93	0.75	4.50	4.52	0.94	2.86	0.44	3.16	0.52
36	C 18/22-23	C-Horizon	59.19	89.73	8.85	30.22	0.88	5.39	0.71	4.24	4.07	0.79	2.50	0.39	3.26	0.48
37	R 19/22-23	Regolith	74.49	69.92	10.96	37.77	1.32	8.17	0.86	6.21	5.60	1.02	2.95	0.48	3.16	0.46
38	C 19/22-23	C-Horizon	66.24	81.96	10.05	36.98	1.30	7.23	0.79	5.03	4.67	0.91	2.82	0.40	2.82	0.39
39	R 20/22-23	Regolith	79.15	79.74	10.72	35.79	1.61	6.89	0.98	5.43	5.53	1.09	3.26	0.55	3.20	0.47
40	C 20/22-23	C-Horizon	73.79	80.15	10.01	37.63	1.18	6.25	0.79	5.46	4.97	0.88	2.85	0.40	2.59	0.36

ANNEXURE-X

ANALYTICAL RESULTS OF TRACE ELEMENTS OF SOIL (R and C) SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in ppm)

SNO	Sample no.		Ba	Ga	Sc	V	Th	Pb	Ni	Co	Rb	Sr	Y	Zr	Nb	Cr	Cu	Zn	Be	Ge	Mo	Sn	Hf	Ta	W	U
1	R 1/22-23	Regolith	471	29	24	126	45	31	40	21	203	112	46	498	43	73	32	47	3.71	1.04	3.27	2.50	18.06	0.78	15.51	17.11
2	C 1/22-23	C-Horizon	580	38	28	111	57	34	31	19	219	78	67	594	38	28	25	51	4.98	1.12	0.78	2.50	18.05	0.92	7.43	16.81
3	R 2/22-23	Regolith	465	30	16	86	51	14	30	31	224	61	52	476	27	101	3	18	4.43	0.93	0.99	2.50	16.90	0.53	8.90	13.20
4	C 2/22-23	C-Horizon	297	38	20	75	35	15	55	36	207	37	55	266	16	83	0.5	13	5.54	0.95	1.22	2.50	8.09	0.59	15.60	11.30
5	R 3/22-23	Regolith	287	25	54	213	13	14	195	48	46	139	32	200	11	844	68	64	2.96	1.35	0.25	2.50	8.24	0.43	0.88	10.17
6	C 3/22-23	C-Horizon	150	20	46	121	2	13	123	32	46	141	27	84	6	482	61	60	1.91	0.95	0.25	2.50	6.68	0.93	3.22	8.97
7	R 4/22-23	Regolith	350	22	38	151	33	14	115	37	47	215	30	338	16	529	57	84	2.53	1.13	0.25	2.50	14.46	0.89	0.25	11.41
8	C 4/22-23	C-Horizon	644	24	33	150	138	29	89	33	12	351	35	461	18	296	71	88	2.95	0.80	0.25	2.50	16.75	0.23	1.58	14.26
9	R 5/22-23	Regolith	396	25	8	31	81	50	14	7	364	100	44	390	36	73	5	34	4.22	1.90	0.52	2.50	9.99	1.09	8.76	22.30
10	C 5/22-23	C-Horizon	199	40	26	47	37	51	41	6	227	47	63	205	27	60	12	43	2.86	1.04	1.30	2.50	3.74	0.40	5.50	13.54
11	R 6/22-23	Regolith	408	24	11	41	197	20	14	8	293	67	43	755	58	70	3	12	5.07	2.17	0.25	2.50	27.82	1.09	0.25	32.98
12	C 6/22-23	C-Horizon	324	36	23	45	101	37	25	10	230	43	64	461	61	51	4	13	5.56	2.20	1.12	2.50	14.14	1.44	6.20	29.69
13	R 7/22-23	Regolith	6167	15	18	88	9	16	80	42	128	59	26	219	11	123	39	64	1.78	1.51	1.53	2.50	11.07	1.15	0.71	13.65
14	C 7/22-23	C-Horizon	1.80%	16	15	96	8	13	91	35	265	93	27	158	11	84	49	67	5.54	0.94	1.02	2.50	11.79	0.52	7.37	16.57
15	R 8/22-23	Regolith	2256	19	18	107	4	9	52	40	62	67	29	120	8	49	64	89	2.25	0.98	0.60	2.50	2.84	0.43	2.01	7.45
16	C 8/22-23	C-Horizon	3466	19	26	128	4	14	39	89	48	73	24	124	6	30	68	152	1.40	0.86	0.25	2.50	2.08	0.24	0.89	7.52
17	R 9/22-23	Regolith	597	25	52	294	9	6	95	58	21	99	26	169	12	195	80	106	2.23	1.97	0.25	2.50	16.12	0.59	8.72	20.09
18	C 9/22-23	C-Horizon	453	19	49	230	7	7	138	57	12	87	25	87	7	479	64	101	1.10	1.58	0.25	2.50	48.31	0.46	12.80	11.75
19	R 10/22-23	Regolith	748	22	32	121	13	9	62	24	80	59	35	224	14	158	31	33	2.33	2.37	0.83	2.50	14.86	0.80	2.46	20.10
20	C 10/22-23	C-Horizon	874	20	28	101	7	12	61	27	79	86	33	150	12	128	25	29	1.95	0.76	0.57	2.50	14.06	1.29	1.71	16.04
21	R 11/22-23	Regolith	2747	20	37	128	7	5	68	31	102	72	34	166	9	193	55	49	2.49	1.95	0.25	2.50	6.46	0.35	2.86	17.90
22	C 11/22-23	C-Horizon	9581	16	34	89	5	1	67	31	106	82	28	92	8	91	55	47	0.74	2.93	0.25	2.50	6.78	0.69	11.38	14.96
23	R 12/22-23	Regolith	1874	17	25	106	13	13	67	28	101	62	33	337	13	140	38	41	2.79	1.67	0.25	2.50	16.77	1.21	11.04	13.90
24	C 12/22-23	C-Horizon	765	21	25	121	12	14	87	25	89	40	33	255	14	151	32	45	2.89	2.44	0.25	2.50	8.51	0.72	2.25	14.57

25	R 13/22-23	Regolith	143	14	39	119	4	9	753	112	33	54	26	97	8	2582	54	55	1.36	1.45	0.25	2.50	15.21	1.56	4.63	15.70
26	C 13/22-23	C-Horizon	126	15	44	129	2	7	1325	220	17	43	22	78	6	4066	51	55	0.78	0.68	1.45	2.50	11.67	0.67	0.25	16.94
27	R 14/22-23	Regolith	246	21	26	112	11	14	44	30	55	33	31	245	14	95	16	55	4.59	2.92	5.86	2.50	21.69	0.49	4.51	29.71
28	C 14/22-23	C-Horizon	205	21	24	108	11	13	44	32	64	28	33	216	13	80	16	55	5.97	3.33	0.25	2.50	9.76	0.92	0.25	40.86
29	R 15/22-23	Regolith	130	27	39	294	9	13	130	37	46	31	36	212	13	155	102	68	2.91	1.47	0.97	2.50	5.66	0.93	0.57	5.44
30	C 15/22-23	C-Horizon	179	15	30	150	4	8	81	32	34	103	27	110	9	61	70	60	0.94	0.89	0.25	2.50	5.42	0.31	0.93	2.91
31	R 16/22-23	Regolith	401	16	26	99	8	15	33	18	124	185	41	127	8	80	16	24	1.59	1.63	0.25	2.50	5.25	0.58	0.25	3.74
32	C 16/22-23	C-Horizon	161	11	36	45	2	15	30	22	70	123	37	66	5	74	9	27	1.04	1.02	0.25	2.50	4.36	0.30	0.25	3.16
33	R 17/22-23	Regolith	1663	19	24	86	25	16	114	25	111	193	33	234	14	371	40	52	1.90	1.51	0.25	2.50	8.48	1.50	0.25	4.68
34	C 17/22-23	C-Horizon	647	13	28	76	6	15	72	29	54	318	27	93	9	120	34	28	1.46	0.87	0.25	2.50	5.89	0.32	0.25	4.30
35	R 18/22-23	Regolith	519	18	14	70	48	21	36	9	199	194	37	512	18	102	19	32	1.89	0.82	0.25	2.50	15.04	1.71	0.25	6.74
36	C 18/22-23	C-Horizon	730	18	18	82	38	20	46	16	151	405	32	303	17	108	22	29	2.70	1.06	0.25	2.50	15.06	1.75	0.53	7.99
37	R 19/22-23	Regolith	368	28	23	123	15	5	47	23	147	52	44	198	13	130	23	26	4.08	2.08	0.25	2.50	5.84	1.28	0.59	4.95
38	C 19/22-23	C-Horizon	349	27	21	103	12	10	42	22	123	68	37	130	11	122	37	58	3.20	2.30	0.25	2.50	3.78	0.90	1.83	4.09
39	R 20/22-23	Regolith	439	26	21	122	16	11	63	26	153	51	44	285	15	173	18	54	3.06	1.70	0.25	2.50	7.26	1.19	0.52	5.25
40	C 20/22-23	C-Horizon	413	28	22	91	11	15	47	20	176	52	46	130	11	116	4	75	3.81	1.85	0.25	2.50	3.46	0.95	0.75	4.76

ANNEXURE-XI

ANALYTICAL RESULTS OF MAJOR OXIDES, FLUORIDE AND ARSENIC OF BED ROCK SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in (ppm)

SNO	Sample no	SiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	F	As
1	PCS 1/22-23	8.60	1.17	1.47	0.04	20.56	25.96	0.05	0.34	0.04	0.01	140	6
2	PCS 2/22-23	11.56	1.88	1.00	0.02	20.62	22.64	0.05	1.10	0.07	0.02	190	3
3	PCS 3/22-23	64.15	13.27	8.91	0.10	4.76	0.64	4.94	0.05	0.44	0.09	155	4
4	PCS 4/22-23	16.10	0.88	0.71	0.02	21.62	23.35	0.05	0.20	0.03	0.01	50	3
5	PCS 5/22-23	7.68	0.95	1.03	0.04	21.43	24.56	0.05	0.24	0.03	0.02	183	3
6	PCS 6/22-23	33.78	4.66	2.43	0.07	15.26	14.84	0.05	1.03	0.19	0.04	414	7
7	PCS 7/22-23	41.26	11.53	9.12	0.08	7.22	12.62	0.05	3.77	0.44	0.08	358	21
8	PCS 8/22-23	59.07	15.54	12.01	0.14	2.34	0.33	0.14	6.57	0.66	0.05	346	35
9	PCS 9/22-23	31.17	5.71	4.34	0.03	14.44	15.29	0.05	2.94	0.25	0.05	350	7
10	PCS 10/22-23	53.84	11.50	9.82	0.03	2.49	5.75	0.05	4.01	0.73	0.10	1822	4
11	PCS 11/22-23	51.28	10.75	8.40	0.06	6.16	7.02	0.11	4.61	0.41	0.12	334	7
12	PCS 12/22-23	57.03	18.69	8.77	0.05	2.61	0.52	0.21	4.19	0.67	0.05	264	21
13	PCS 13/22-23	55.34	12.56	10.02	0.06	10.54	0.11	0.05	5.99	0.86	0.02	3422	6
14	PCS 14/22-23	72.99	13.27	2.16	0.04	0.64	1.17	2.65	5.46	0.26	0.18	1670	4
15	PCS 15/22-23	71.68	13.80	2.45	0.04	0.96	1.13	2.81	5.13	0.21	0.11	706	1
16	PCS 16/22-23	71.56	11.83	3.80	0.08	1.84	1.82	3.13	3.38	0.36	0.18	466	2
17	PCS 17/22-23	63.96	12.45	7.66	0.09	3.91	4.70	2.68	2.08	0.62	0.29	292	12
18	PCS 18/22-23	68.42	13.17	4.31	0.06	1.89	3.44	3.26	2.69	0.52	0.21	682	11
19	PCS 19/22-23	70.43	13.76	3.82	0.04	1.51	3.19	3.35	1.46	0.43	0.17	362	2
20	PCS 20/22-23	73.56	12.25	2.36	0.05	1.18	1.68	2.68	4.67	0.24	0.13	946	18
21	PCS 21/22-23	30.83	2.33	55.63	0.11	0.51	0.96	0.05	0.05	0.16	0.15	140	258
22	PCS 22/22-23	35.83	5.03	3.12	0.06	15.26	13.78	0.05	1.77	0.19	0.07	366	15

23	PCS 23/22-23	50.76	24.94	7.21	0.14	3.84	0.25	0.40	6.26	0.88	0.02	198	3
24	PCS 24/22-23	49.88	13.89	15.07	0.17	5.57	6.71	3.09	1.38	0.91	0.13	106	4
25	PCS 25/22-23	31.00	5.02	15.18	0.17	28.76	3.16	0.25	0.23	0.29	0.05	50	5
26	PCS 26/22-23	64.88	10.25	1.58	0.01	0.15	0.42	0.90	4.71	0.10	0.03	50	10
27	PCS 27/22-23	70.43	12.94	2.47	0.04	0.64	1.71	2.50	5.67	0.21	0.08	1100	13
28	PCS 28/22-23	35.58	5.32	3.79	0.09	9.92	18.19	0.11	1.51	0.27	0.06	356	7
29	PCS 29/22-23	84.22	5.84	3.31	0.02	0.71	0.77	0.11	1.46	0.23	0.05	216	9
30	PCS 30/22-23	41.06	11.12	5.95	0.08	6.36	11.79	0.67	2.16	0.61	0.13	292	11

ANNEXURE-XII

ANALYTICAL RESULTS OF RARE EARTH ELEMENTS OF BED ROCK SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in ppm)

SNO	Sample no	La	Ce	Pr	Nd	Eu	Sm	Tb	Gd	Dy	Ho	Er	Tm	Yb	Lu
1	PCS 1/22-23	7.40	10.49	1.24	4.86	0.16	1.10	0.11	0.87	0.97	0.24	0.56	0.06	0.53	0.11
2	PCS 2/22-23	10.03	11.62	1.65	7.16	0.21	1.11	0.19	1.13	1.08	0.23	0.50	0.12	0.43	0.08
3	PCS 3/22-23	16.63	13.95	2.21	10.42	1.21	3.01	0.58	3.52	3.49	0.81	1.77	0.35	2.33	0.47
4	PCS 4/22-23	23.70	10.82	1.38	3.81	0.11	0.51	0.06	0.68	0.39	0.10	0.15	0.04	0.34	0.04
5	PCS 5/22-23	10.96	10.09	1.40	5.51	0.32	1.12	0.25	1.21	1.49	0.29	0.69	0.08	0.53	0.09
6	PCS 6/22-23	18.09	25.27	2.75	10.25	0.37	1.77	0.23	1.77	1.58	0.34	0.79	0.15	1.13	0.15
7	PCS 7/22-23	95.37	80.02	8.20	35.48	1.43	6.51	0.79	5.68	5.34	1.08	2.59	0.37	2.65	0.42
8	PCS 8/22-23	113.17	97.58	9.64	33.50	1.39	6.78	0.75	5.41	6.15	0.95	3.09	0.40	2.83	0.55
9	PCS 9/22-23	77.85	36.84	3.46	14.29	0.70	3.11	0.32	2.42	1.86	0.54	1.45	0.17	1.49	0.18
10	PCS 10/22-23	89.94	58.89	8.70	34.30	1.15	6.67	0.76	4.60	5.05	1.01	2.68	0.39	2.35	0.37
11	PCS 11/22-23	96.89	72.75	8.59	31.98	0.95	6.65	0.69	5.35	4.11	0.93	2.52	0.42	2.59	0.42
12	PCS 12/22-23	83.32	150.13	16.77	60.29	1.70	11.43	1.36	10.47	8.04	1.46	4.05	0.56	3.26	0.50
13	PCS 13/22-23	131.19	57.17	5.31	21.27	0.74	3.88	0.41	3.19	3.46	0.73	2.22	0.35	2.05	0.29
14	PCS 14/22-23	151.54	335.30	36.81	123.81	1.10	21.40	2.13	15.86	12.53	2.32	6.51	1.04	7.75	1.24
15	PCS 15/22-23	107.60	216.83	23.20	71.52	1.12	10.95	0.99	8.16	5.80	0.97	2.70	0.40	2.82	0.43
16	PCS 16/22-23	70.82	104.12	10.68	37.32	1.07	5.95	0.54	3.76	3.16	0.59	1.67	0.27	1.99	0.34
17	PCS 17/22-23	95.27	170.27	19.47	66.50	2.69	11.16	0.93	7.85	5.45	1.07	3.19	0.40	2.82	0.41
18	PCS 18/22-23	66.54	112.71	12.69	44.37	2.12	8.04	0.92	5.96	5.70	1.01	3.31	0.49	3.76	0.56
19	PCS 19/22-23	33.70	57.26	6.57	24.20	0.87	5.51	0.88	5.26	5.24	0.94	2.46	0.40	2.32	0.35
20	PCS 20/22-23	69.66	129.20	13.04	45.09	1.59	7.01	0.61	4.78	3.26	0.57	1.73	0.31	1.57	0.32
21	PCS 21/22-23	30.61	20.41	4.50	20.72	1.51	5.99	0.88	6.16	6.84	1.23	3.26	0.51	3.40	0.48

22	PCS 22/22-23	26.33	36.94	3.95	15.89	0.43	2.74	0.29	2.41	2.09	0.44	1.22	0.17	1.16	0.19
23	PCS 23/22-23	42.04	104.96	7.05	25.45	0.62	5.31	0.81	4.83	4.71	0.87	2.79	0.39	2.63	0.49
24	PCS 24/22-23	23.33	30.42	3.60	15.22	1.32	3.87	0.74	4.59	5.06	1.02	2.87	0.42	2.72	0.44
25	PCS 25/22-23	24.36	17.42	2.22	8.07	0.34	1.59	0.27	1.71	1.53	0.31	1.02	0.12	0.85	0.14
26	PCS 26/22-23	37.88	63.87	6.96	24.69	0.58	4.89	0.56	3.48	3.26	0.57	2.07	0.38	2.84	0.50
27	PCS 27/22-23	113.48	249.64	27.09	89.03	1.08	14.24	1.52	9.75	7.83	1.43	4.60	0.70	4.70	0.70
28	PCS 28/22-23	19.16	27.97	3.35	13.38	0.58	2.65	0.36	2.49	2.26	0.45	1.47	0.19	1.26	0.19
29	PCS 29/22-23	27.20	37.49	4.97	18.46	0.57	3.29	0.33	2.23	1.63	0.35	1.00	0.15	1.07	0.18
30	PCS 30/22-23	46.80	94.89	10.76	36.69	1.22	6.70	0.92	5.44	5.22	1.00	3.38	0.50	3.38	0.57

ANNEXURE-XIII

ANALYTICAL RESULTS OF TRACE ELEMENTS OF BED ROCK SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH (All values are in (ppm)

SNO	Sample no	Ba	Ga	Sc	V	Th	Pb	Ni	Co	Rb	Sr	Y	Zr	Nb	Cr	Cu	Zn	Be	Ge	Mo	Sn	Hf	Ta	W	U
1	PCS 1/22-23	278	2.5	9	10	2	6	6	3	6	29	5	20	2.5	7.5	15	0.5	0.58	0.10	0.63	2.50	4.27	0.42	0.25	12.554
2	PCS 2/22-23	200	5	12	10	4	4	7	1	15	22	11	27	2.5	7.5	2	0.5	0.40	0.47	0.25	2.50	3.94	0.27	0.25	12.56
3	PCS 3/22-23	845	17	10	88	17	6	38	15	2.5	54	22	179	20	70	18	42	1.44	1.12	0.25	2.50	3.92	0.29	0.25	13.593
4	PCS 4/22-23	138	2.5	9	10	4	5	7	3	7	17	2.5	17	2.5	7.5	0.5	12	0.15	0.16	0.25	2.50	4.34	0.28	0.25	14.965
5	PCS 5/22-23	120	2.5	11	10	2	6	5	1	6	21	12	17	2.5	7.5	0.5	0.5	0.50	0.16	0.25	2.50	3.28	0.37	0.25	10.012
6	PCS 6/22-23	437	8	10	50	8	3	23	8	25	27	10	53	2.5	31	3	15	0.66	2.03	0.25	2.50	3.75	0.34	0.25	11.698
7	PCS 7/22-23	520	19	20	107	16	12	68	10	112	21	25	121	2.5	109	1	13	7.50	3.25	0.65	2.50	13.33	0.61	0.25	24.397
8	PCS 8/22-23	722	25	22	151	15	17	72	26	138	50	22	127	6	103	38	21	1.59	4.48	3.21	2.50	4.30	0.45	2.37	15.27
9	PCS 9/22-23	4687	11	16	63	7	7	32	11	66	63	9	54	2.5	78	2	14	0.82	1.88	1.09	2.50	18.01	0.52	0.25	18.531
10	PCS 10/22-23	10000	21	17	64	5	8	66	14	93	193	22	138	8	26	28	59	2.80	2.84	0.25	2.50	12.84	0.77	0.25	22.346
11	PCS 11/22-23	2088	16	15	99	11	10	65	23	113	55	20	116	2.5	73	5	34	2.69	2.73	1.06	2.50	6.21	0.61	0.25	19.417
12	PCS 12/22-23	598	31	24	124	21	8	55	29	187	26	38	119	13	42	8	11	2.70	3.37	0.25	2.50	3.68	0.56	1.29	12.654
13	PCS 13/22-23	1180	21	17	84	7	9	91	27	143	19	17	145	9	37	8	32	1.18	3.36	2.25	2.50	13.81	0.68	0.25	20.963
14	PCS 14/22-23	897	19	4	22	185	70	16	6	471	143	57	652	62	7.5	9	54	4.21	2.02	5.20	2.50	16.09	2.03	0.56	65.875
15	PCS 15/22-23	960	21	4	26	77	49	11	3	368	126	26	333	30	7.5	10	44	2.98	1.88	2.13	2.50	8.21	0.63	1.37	201.82
16	PCS 16/22-23	1087	19	2	45	32	147	16	8	151	359	15	267	14	7.5	10	97	2.28	0.94	1.97	2.50	7.97	0.60	0.25	18.26
17	PCS 17/22-23	1393	21	13	106	20	22	45	23	72	518	24	240	16	92	37	78	2.12	1.83	0.98	2.50	6.00	0.70	0.25	20.181
18	PCS 18/22-23	948	19	8	67	35	24	21	10	129	270	30	345	22	29	22	46	2.11	1.58	4.80	2.50	5.33	0.62	4.85	39.387
19	PCS 19/22-23	550	21	6	68	17	23	15	9	88	194	26	171	17	23	37	37	2.57	1.48	2.59	2.50	6.83	1.10	0.25	27.728
20	PCS 20/22-23	1427	20	2	21	64	39	8	5	226	424	14	247	12	7.5	6	53	3.66	1.48	1.01	2.50	9.35	0.74	0.25	21.308
21	PCS 21/22-23	232	7	18	112	5	16	144	6	21	23	27	35	11	58	121	222	3.54	1.84	8.61	2.50	3.52	0.29	0.25	24.738
22	PCS 22/22-23	3713	9	9	46	7	9	23	18	47	63	12	68	2.5	38	7	25	1.14	1.82	0.78	2.50	3.10	0.51	0.25	17.906
23	PCS 23/22-23	450	47	33	223	14	10	192	36	229	28	15	233	22	515	12	50	1.69	1.64	1.24	2.50	4.85	0.35	4.15	15.595
24	PCS 24/22-23	1036	20	37	203	4	11	82	54	45	165	23	100	8	87	138	118	0.99	2.46	1.05	2.50	1.47	0.10	1.22	14.131

25	PCS 25/22-23	146	10	15	85	2	6	1235	153	7	43	10	42	5	3085	57	91	0.50	1.64	0.50	2.50	3.16	0.28	0.89	10.652
26	PCS 26/22-23	738	27	4	10	53	22	4	6	509	64	16	219	29	7.5	0.5	10	3.27	1.14	0.57	2.50	8.91	1.99	0.25	7.332
27	PCS 27/22-23	659	24	5	20	123	55	8	7	423	133	43	356	32	7.5	12	48	3.60	1.13	2.13	2.50	13.83	4.59	0.25	17.184
28	PCS 28/22-23	2112	6	16	59	7	6	20	10	39	66	14	73	2.5	56	0.5	25	1.18	0.77	3.37	2.50	6.29	0.57	0.25	5.918
29	PCS 29/22-23	519	9	6	43	10	6	16	3	48	27	9	136	2.5	7.5	9	16	1.09	0.78	5.32	2.50	8.11	1.88	4.90	5.639
30	PCS 30/22-23	422	18	14	88	33	20	32	18	121	156	25	317	13	53	44	47	2.41	1.14	4.38	2.50	13.61	1.09	8.93	11.175

ANNEXURE-XIV

ANALYTICAL RESULTS OF MAJOR ANIONS AND CATIONS OF GROUNDWATER SAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH

All values are in (ppb)

SL. No.	Location / Station	pH		E C in mS/cm		TDS (ppm)		TH (ppm)		Ca (ppm)		Mg (ppm)		Na (ppm)		K (ppm)		HCO3 (ppm)		Cl (ppm)		SO4 (ppm)		NO3 (ppm)		F (ppm)	
		PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM
1	T. TUMMALAPALLE	7.00	7.10	7750.00	1930.00	4512.00	1254.00	1650.00	300.00	180.36	40.08	291.60	48.60	1000.00	326.00	20.34	1.30	915.30	512.57	1418.00	212.70	360.00	200.00	682.00	110.60	1.09	2.23
2	R. TUMMALAPALLE	7.40	7.20	1600.00	1850.00	859.00	1091.00	280.00	400.00	24.05	48.10	53.46	68.04	172.00	217.00	46.79	26.30	610.20	610.20	85.08	212.70	33.60	87.00	70.00	58.30	1.49	1.21
3	PEDDA RANGAPURAM	7.30	7.20	1560.00	1880.00	892.00	1270.00	440.00	640.00	28.06	32.06	89.91	136.08	155.00	211.00	0.24	0.50	463.75	610.20	198.52	283.60	51.70	145.00	84.20	88.00	1.37	1.26
4	K. KOTTAPALLE	6.80	7.50	460.00	770.00	259.00	468.00	190.00	180.00	38.08	32.06	23.09	24.30	11.50	99.50	6.67	3.50	207.47	305.10	28.36	70.90	6.88	45.00	18.00	5.55	0.27	1.23
5	TUMMALAPALLE	6.84	7.20	1090.00	1260.00	623.00	787.00	440.00	550.00	80.16	108.22	58.32	68.04	36.00	45.00	13.46	4.20	390.53	390.53	70.90	113.44	28.35	61.00	97.50	148.80	0.32	0.32
6	MUBBICHINTALA	7.30	7.40	2280.00	1980.00	1302.00	1285.00	420.00	400.00	72.14	72.14	58.32	53.46	325.80	277.00	4.62	4.70	610.20	512.57	141.80	56.72	298.50	474.96	27.40	32.30	0.97	0.94
7	VELLUPULA	6.86	7.30	2082.00	800.00	1161.00	494.00	880.00	350.00	112.22	68.14	145.80	43.74	66.60	33.00	8.84	2.50	610.20	451.55	212.70	24.82	15.00	22.50	227.30	23.05	0.36	0.69
8	BHUMAYAGARIPALLI	7.20	7.30	1100.00	1340.00	629.00	814.00	440.00	460.00	84.17	96.19	55.89	53.46	43.10	97.98	11.57	1.80	414.94	414.94	70.90	106.35	38.00	57.60	71.70	146.30	0.77	0.81
9	RACHKUNTAPALLI	7.21	7.50	730.00	660.00	385.00	419.00	270.00	260.00	46.09	48.10	37.67	34.02	29.10	38.00	7.31	6.70	250.18	286.79	46.09	46.09	16.43	51.75	48.75	18.00	0.76	1.10
10	VEMULA	7.25	7.30	1420.00	1360.00	760.00	857.00	480.00	430.00	56.11	80.16	82.62	55.89	79.10	97.00	20.59	34.80	463.75	512.57	113.44	120.53	23.00	49.92	100.80	104.60	1.20	1.15
11	BACHAYAGARIPALLI	7.30	7.70	1170.00	890.00	615.00	554.00	420.00	330.00	56.11	52.10	68.04	48.60	60.80	65.10	3.55	3.04	451.55	366.12	85.08	92.17	22.20	32.50	42.60	36.30	0.71	0.79
12	CHINNARANGAPURAM	7.10	7.30	2150.00	1886.00	1208.00	1083.00	600.00	560.00	72.14	80.16	102.06	87.48	195.20	167.00	3.04	2.41	512.57	512.57	311.96	255.24	36.10	74.00	173.80	103.10	0.75	0.79
13	NALLAPUREDDYPALLI	7.25	7.20	1190.00	1003.00	640.00	639.00	440.00	380.00	64.13	64.13	68.04	53.46	46.90	50.00	17.39	20.40	439.34	427.14	85.08	77.99	17.00	37.00	72.20	74.50	0.78	0.85
14	NALLAGONDAVARIPALLI	7.16	7.30	991.00	750.00	527.00	472.00	380.00	270.00	54.11	64.13	59.54	26.73	26.50	40.50	16.96	13.60	341.71	244.08	77.99	63.81	33.15	32.50	50.00	81.75	0.55	0.35
15	AMBAKAPALLI	7.26	7.30	868.00	750.00	472.00	466.00	345.00	270.00	54.11	54.11	51.03	32.81	31.90	38.50	7.46	13.60	317.30	250.18	53.18	63.81	20.00	30.00	59.70	80.50	0.84	0.36
16	MOTHNUNTALAPALLI	7.41	7.30	690.00	962.00	360.00	603.00	240.00	340.00	50.10	56.11	27.95	48.60	46.00	70.00	1.20	11.80	317.30	366.12	21.27	70.90	7.88	60.00	11.15	61.50	0.99	0.62
17	BRAHMANAPALLI	7.10	7.20	2150.00	2203.00	1257.00	1328.00	660.00	680.00	112.22	88.18	92.34	111.78	203.00	206.00	2.00	1.90	512.57	561.38	311.96	326.14	69.00	89.76	152.60	160.00	1.33	1.37
18	IPPTALA	7.20	7.30	995.00	950.00	564.00	561.00	380.00	360.00	70.14	64.13	49.82	48.60	44.60	49.50	11.70	13.50	366.12	390.53	106.35	92.17	28.25	35.50	29.10	18.80	0.56	0.62
19	CHINNAKUDALA	7.25	7.20	1750.00	1468.00	974.00	880.00	640.00	570.00	128.26	112.22	77.76	70.47	95.30	70.40	8.90	9.05	390.53	390.53	226.88	141.80	89.00	190.00	108.60	47.00	0.79	0.83

20	RAMNUTHALAPALLI	7.10	7.30	1640.00	1468.00	944.00	914.00	700.00	530.00	128.26	92.18	92.34	72.90	58.20	60.00	17.80	54.30	414.94	488.16	226.88	141.80	22.00	90.00	145.10	104.20	0.39	0.39
21	GUNAKANAPALLI	7.30	7.30	1360.00	1311.00	737.00	790.00	550.00	500.00	96.19	92.18	75.33	65.61	46.50	48.00	18.10	36.00	414.94	414.94	127.62	134.71	19.30	61.50	99.90	98.50	0.59	0.56
22	PEDDA KUDALA	7.36	7.60	1460.00	1400.00	800.00	843.00	440.00	460.00	88.18	56.11	53.46	77.76	121.30	98.00	18.50	24.70	475.96	475.96	127.62	106.35	32.80	101.50	67.40	87.30	0.89	0.90
23	AKKULAGARALAPALLI	7.70	7.60	1330.00	1250.00	751.00	769.00	410.00	410.00	60.12	60.12	63.18	63.18	115.10	104.00	1.50	1.30	353.92	439.34	155.98	106.35	10.85	63.00	127.50	102.00	1.11	1.12
24	ERRAMREDDIPALLI	7.30	7.50	1520.00	1311.00	832.00	779.00	510.00	450.00	56.11	56.11	89.91	75.33	103.20	93.00	3.90	3.70	390.53	439.34	212.70	148.89	18.00	48.00	108.60	84.80	1.03	1.00
25	DONDLAVAGU	7.03	7.30	2700.00	1732.00	1638.00	1006.00	920.00	680.00	120.24	80.16	150.66	116.64	211.60	87.00	1.40	1.30	463.75	366.12	326.14	340.32	69.00	50.00	475.00	106.50	0.90	0.88
26	LAVALAPURAM	7.50	7.90	1400.00	1150.00	742.00	744.00	370.00	390.00	52.10	40.08	58.32	70.47	151.10	128.00	0.90	1.03	524.77	561.38	113.44	85.08	28.95	61.00	15.70	14.40	1.34	1.40
27	KANAMPALLI	7.30	7.50	880.00	1598.00	438.00	1016.00	310.00	500.00	46.09	104.21	47.39	58.32	45.40	133.00	4.20	58.10	366.12	622.40	35.45	155.98	11.50	95.00	23.50	29.50	1.35	2.40
28	B. KOTHAPALLI	7.20	7.60	1790.00	1154.00	939.00	743.00	500.00	360.00	60.12	60.12	85.05	51.03	168.70	120.30	3.00	2.81	579.69	500.36	184.34	92.17	58.05	103.00	24.00	5.80	2.51	2.38
29	UDUMULAKURTHI	7.10	7.60	1120.00	881.00	635.00	523.00	450.00	310.00	84.17	80.16	58.32	26.73	51.70	42.50	0.80	6.40	427.14	268.49	85.08	77.99	31.30	67.50	61.20	57.25	1.50	1.18
30	SOMAVALAPALLI	7.15	7.50	750.00	970.00	346.00	625.00	270.00	310.00	20.04	80.16	53.46	26.73	33.10	94.50	1.20	1.00	335.61	512.57	24.82	63.81	6.23	41.50	1.00	2.65	1.60	1.92
31	ELLAGULABAYLU	7.25	7.60	1950.00	1985.00	1190.00	1284.00	380.00	460.00	56.11	80.16	58.32	63.18	125.60	112.00	245.00	259.00	585.79	585.79	184.34	184.34	48.40	124.00	112.80	102.10	2.30	2.16
32	MEDUKULLAPALLI	7.20	7.50	1660.00	1485.00	889.00	936.00	550.00	520.00	64.13	104.21	94.77	63.18	130.20	122.10	2.50	3.50	573.59	561.38	120.53	113.44	64.35	135.00	60.90	50.40	1.90	1.90
33	PEDDAPALLI	7.23	7.50	1100.00	780.00	597.00	482.00	380.00	325.00	56.11	76.15	58.32	32.81	57.30	38.50	30.00	13.22	427.14	390.53	63.81	21.27	37.00	38.50	32.00	21.50	1.56	1.46
34	VEPAMMANIPETA	7.25	7.40	3300.00	2860.00	1965.00	1898.00	840.00	760.00	112.22	144.29	136.08	97.20	275.40	248.00	88.80	169.00	561.38	659.02	411.22	297.78	151.20	235.00	445.40	303.00	2.00	1.73
35	GUNDLAVARIPALLI	7.40	7.70	860.00	785.00	502.00	478.00	370.00	370.00	38.08	60.12	66.83	53.46	25.10	21.50	6.60	2.03	347.81	360.02	35.45	17.73	19.95	45.75	96.80	56.25	1.40	1.48
36	PEDDANAVARIPALLI	7.30	7.60	1900.00	1740.00	1052.00	1082.00	520.00	600.00	72.14	104.21	82.62	82.62	199.00	164.00	3.74	2.00	512.57	488.16	212.70	184.34	50.95	240.50	115.90	4.20	2.20	2.20
37	PULIVENDULA	7.04	7.50	2405.00	1956.00	1317.00	1108.00	800.00	660.00	56.11	72.14	160.38	116.64	173.60	145.00	4.74	4.50	585.79	610.20	368.68	269.42	35.50	22.50	159.60	104.50	0.86	0.98
38	BATREPALLI	7.23	7.60	1600.00	1597.00	896.00	1006.00	440.00	460.00	96.19	108.22	48.60	46.17	147.80	133.20	29.10	39.50	500.36	536.98	141.80	127.62	72.60	149.50	52.30	72.10	2.26	2.31
39	GAJJAPPAGARIPALLI	7.38	7.60	1730.00	1743.00	930.00	1106.00	500.00	620.00	88.18	104.21	68.04	87.48	166.60	155.00	4.10	5.70	524.77	512.57	170.16	198.52	79.35	204.00	30.70	35.10	3.12	2.95
40	REDDIVARIPALLE	7.45	7.80	1050.00	1001.00	531.00	632.00	360.00	460.00	18.04	76.15	76.55	65.61	74.00	53.40	0.60	0.90	457.65	512.57	35.45	49.63	37.05	68.00	7.70	2.80	2.73	2.68
41	MADDANAGARIPALLE	7.20	7.70	970.00	1040.00	531.00	613.00	315.00	310.00	54.11	72.14	43.74	31.59	76.00	85.00	0.60	1.70	341.71	353.92	70.90	92.17	20.95	53.00	55.60	60.70	0.77	0.75
42	SABBANUTHALAPALLI	7.17	7.60	1315.00	1603.00	731.00	1005.00	420.00	500.00	64.13	92.18	63.18	65.61	91.00	109.00	30.70	57.30	366.12	634.61	99.26	155.98	112.05	109.50	44.20	25.50	2.70	2.38
43	VELUPALLA	7.39	7.50	1360.00	1448.00	756.00	906.00	460.00	540.00	72.14	104.21	68.04	68.04	98.00	100.00	5.10	23.40	378.32	451.55	120.53	141.80	127.50	124.50	31.40	67.00	2.15	1.70
44	TAPATUVARIPALLI	7.40	7.80	600.00	600.00	357.00	363.00	205.00	200.00	54.11	54.11	17.01	15.80	42.00	49.80	5.10	16.21	268.49	311.20	24.82	24.82	48.10	7.95	0.95	3.04	1.42	1.24

45	PEDDANAGARIPALLI	6.90	7.80	2750.00	601.00	1710.00	359.00	940.00	200.00	168.34	48.10	126.36	19.44	127.00	49.50	117.20	15.81	610.20	317.30	170.16	21.27	106.40	7.30	521.00	3.04	1.50	1.25
46	MALLEPALLI	7.40	6.90	1900.00	1002.00	1072.00	583.00	500.00	340.00	80.16	72.14	72.90	38.88	205.00	71.40	2.30	1.60	536.98	329.51	177.25	99.26	157.75	48.00	45.20	50.00	3.82	0.73
47	BESTAVARIPALLI	7.35	7.00	970.00	851.00	526.00	527.00	390.00	390.00	60.12	72.14	58.32	51.03	41.30	39.10	3.70	3.30	384.43	390.53	85.08	77.99	3.00	14.75	38.90	29.50	0.95	0.92
48	BOGGUDPALLI	6.97	7.10	2570.00	1101.00	1468.00	676.00	800.00	400.00	80.16	44.09	145.80	70.47	220.00	86.00	3.20	3.50	414.94	451.55	326.14	134.71	114.30	31.00	323.80	29.20	1.10	1.22
49	PEDDA JUTTUR	7.20	7.10	1703.00	1838.00	978.00	1182.00	200.00	580.00	36.07	32.06	26.73	121.50	299.00	187.10	1.15	7.12	500.36	488.16	99.26	226.88	199.00	124.50	8.40	183.50	3.03	1.50
50	CHINTLA JUTTUR	7.07	7.35	2400.00	1826.00	1426.00	1208.00	440.00	440.00	40.08	32.06	82.62	87.48	351.90	235.00	2.22	1.83	585.79	561.38	155.98	170.16	223.00	237.50	210.00	99.00	3.06	2.93
51	GOLLAGUDUR	7.04	7.30	3100.00	2322.00	1779.00	1369.00	560.00	480.00	80.16	48.10	87.48	87.48	460.00	302.20	2.40	1.80	634.61	610.20	365.14	354.50	238.40	159.98	156.40	40.20	2.14	2.30
52	PERNAPADU	7.26	7.20	1070.00	2700.00	584.00	1727.00	230.00	560.00	38.08	80.16	32.81	87.48	138.00	319.00	1.20	80.50	402.73	683.42	85.08	368.68	36.50	205.00	5.00	167.90	1.85	1.40
53	CHAGALLURU	7.17	7.40	1120.00	1130.00	628.00	690.00	255.00	400.00	58.12	80.16	26.73	48.60	138.00	96.30	4.60	4.10	366.12	353.92	127.62	155.98	33.00	50.00	15.20	38.00	1.46	1.40
54	ALLAVALAPADU	7.15	7.30	1900.00	2985.00	1098.00	1819.00	520.00	560.00	68.14	88.18	85.05	82.62	195.50	362.00	2.00	81.16	524.77	683.42	177.25	368.68	65.10	222.50	183.00	195.50	1.52	1.40
55	AYYAVARIPALLI	7.30	7.35	3680.00	4200.00	2314.00	2594.00	580.00	720.00	80.16	88.18	92.34	121.50	575.00	623.00	1.70	1.70	683.42	781.06	368.68	524.66	348.70	502.00	428.40	254.20	1.92	1.85
56	PAMALURU	7.60	7.90	2730.00	2012.00	1563.00	1229.00	260.00	220.00	56.11	24.05	29.16	38.88	506.00	367.00	0.90	1.00	854.28	829.87	233.97	127.62	110.50	117.50	101.20	42.10	4.52	4.30
57	ULIMELA	6.70	7.70	6100.00	1055.00	4166.00	652.00	1820.00	250.00	200.40	48.10	320.76	31.59	540.00	127.00	75.05	1.50	683.42	439.34	921.70	70.90	116.50	99.84	1574.50	2.80	0.39	1.99
58	YERRIPALLI	7.30	8.30	2200.00	61.00	1221.00	31.00	460.00	30.00	56.11		77.76	7.29	276.00	1.40	3.83	0.20	732.24	6.10	184.34	7.09	32.40	4.80	142.60	3.10	1.26	0.16
59	PATRAYUNIPETA	7.40	7.20	2140.00	1330.00	1202.00	885.00	480.00	510.00	56.11	120.24	82.62	51.03	276.00	51.10	2.15	60.20	732.24	463.75	226.88	99.26	22.10	86.50	88.00	133.00	1.08	0.88
60	ACHAVILLI	7.52	7.50	3020.00	963.00	1736.00	574.00	540.00	360.00	48.10	44.09	102.06	60.75	437.00	66.00	6.51	8.40	927.50	414.94	311.96	99.26	76.60	22.00	186.00	19.00	1.96	1.16
61	YADAVPETA/CHINAMPALLI	6.50	7.40	15750.00	2976.00	9097.00	1883.00	4000.00	1000.00	420.84	112.22	716.85	174.96	1775.00	62.10	3.10	300.27	732.24	366.12	3403.20	382.86	99.00	540.00	2232.00	87.00	0.27	0.31
62	TIMMAPURAMPETA	7.68	7.40	1150.00	1415.00	648.00	910.00	280.00	540.00	28.06	112.22	51.03	63.18	142.60	95.00	4.01	23.10	390.53	451.55	155.98	141.80	16.20	121.00	11.20	77.00	0.69	1.72
63	GOTURU	8.30	7.80	1800.00	1704.00	967.00	1142.00	400.00	140.00	32.06	24.05	77.76	19.44	230.00	338.00	0.80	0.90	439.34	659.02	155.98	170.16	54.30	115.00	103.00	70.50	2.29	1.96
64	NALLACHERUNIPALLI	7.90	7.90	3600.00	3425.00	2048.00	2109.00	280.00	140.00	40.08	32.06	43.74	14.58	690.00	717.60	1.41	1.11	1195.99	1415.66	262.33	212.70	250.70	247.50	26.00	15.90	3.70	3.50
65	PENDULURU	7.30	7.40	5700.00	5510.00	3504.00	3468.00	840.00	750.00	112.22	140.28	136.08	97.20	920.00	921.00	7.91	6.30	707.83	671.22	822.44	886.25	546.90	700.00	525.20	306.00	1.01	1.10
66	MOTTUKUR	7.35	7.70	3560.00	3185.00	2256.00	2095.00	380.00	320.00	48.10	80.16	63.18	29.16	621.00	584.00	38.30	27.15	732.24	707.83	354.50	467.94	268.00	360.00	415.60	114.20	0.83	1.04
67	RAMREDDIPALLI	7.40	7.40	8050.00	930.00	5375.00	531.00	640.00	275.00	56.11	46.09	121.50	38.88	1276.50	84.64	477.50	4.38	756.65	396.63	808.26	63.81	1228.50	37.82	943.50	12.52	1.55	1.31
68	NAGURU	7.60	7.87	4950.00	1330.00	3079.00	781.00	340.00	200.00	40.08	36.07	58.32	26.73	874.00	213.05	189.50	0.63	1073.95	634.61	475.03	85.08	375.10	8.11	409.60	21.08	1.85	3.32
69	GUNDLAPALLI	7.65	7.30	1740.00	920.00	1014.00	531.00	240.00	320.00	28.06	73.15	41.31	33.41	282.90	63.57	9.20	1.17	524.77	439.34	127.62	42.54	45.30	8.11	157.20	39.41	2.78	1.47

70	CHERLOPALLI	7.35	7.38	1200.00	1880.00	667.00	1101.00	315.00	410.00	42.08	60.12	51.03	63.18	128.00	242.42	1.55	1.37	372.22	659.02	81.54	219.79	51.40	5.38	83.00	104.64	1.35	2.10
71	KATLURU	7.40	7.42	2000.00	600.00	1132.00	329.00	550.00	250.00	56.11	40.08	99.63	36.45	205.85	16.84	1.56	10.44	659.02	292.90	269.42	35.45	9.60	5.57	86.55	5.02	1.60	0.81
72	NANDIPALLI	7.35	7.32	990.00	1760.00	521.00	1004.00	425.00	460.00	28.06	46.09	86.27	83.84	31.74	192.00	0.39	1.29	469.85	488.16	63.81	283.60	4.80	5.47	18.20	92.24	0.98	1.63
73	TALLAPALLE	7.38	7.40	2260.00	420.00	1231.00	240.00	860.00	135.00	72.14	28.06	165.24	15.80	122.82	30.22	1.96	7.16	488.16	152.55	439.58	49.63	22.08	8.64	107.53	6.94	1.47	0.59
74	TALLAPALLE-2	7.34	7.00	950.00	650.00	509.00	354.00	375.00	287.50	23.05	48.10	77.15	40.70	44.16	12.51	2.74	8.02	442.40	286.79	60.27	49.63	11.04	17.52	20.05	1.87	0.99	0.59
75	T.VEMULAVARIPALLI	7.20	6.97	1070.00	1200.00	573.00	651.00	505.00	550.00	52.10	92.18	91.13	77.76	12.42	21.39	1.96	2.66	475.96	536.98	70.90	92.17	7.20	1.63	45.77	35.06	0.78	0.82
76	KUPALAPALLI	7.23	6.90	1250.00	1210.00	676.00	678.00	480.00	575.00	36.07	120.24	94.77	66.83	64.63	6.56	3.13	12.32	536.98	536.98	92.17	77.99	37.44	8.78	19.10	56.77	0.81	0.57
77	BAKKANAGARIPALLI	7.08	7.19	1460.00	2080.00	807.00	1347.00	570.00	680.00	36.07	56.11	116.64	131.22	65.32	6.53	13.69	271.08	573.59	512.57	120.53	198.52	24.96	174.05	79.09	196.38	0.57	0.31
78	GIDDANKIPALLI	8.27	7.11	1290.00	1700.00	827.00	973.00	340.00	500.00	28.06	48.10	65.61	92.34	31.51	160.24	185.33	0.66	366.12	561.38	106.35	205.61	180.96	6.58	5.46	115.83	0.18	1.65
79	TATTIMUKALAPALLI	7.52	7.07	1840.00	1690.00	1053.00	984.00	550.00	470.00	36.07	72.14	111.78	70.47	169.28	171.72	1.17	0.66	536.98	549.18	248.15	205.61	12.48	11.81	144.58	115.03	1.62	1.65
80	DAGGUNARIPALLI	7.54	7.05	1430.00	2160.00	796.00	1208.00	530.00	820.00	46.09	92.18	100.85	143.37	84.41	115.92	0.78	5.83	518.67	494.26	148.89	382.86	4.80	8.74	92.45	156.30	1.53	1.47
81	AMMAYAGARIPALLI	7.18	7.20	2190.00	1680.00	1214.00	971.00	920.00	555.00	84.17	100.20	172.53	74.12	75.90	127.58	7.04	5.51	488.16	549.18	368.68	205.61	37.44	8.83	168.60	112.72	1.53	1.03
82	V. KOTHAPALLI	7.28	7.46	2310.00	1770.00	1343.00	1012.00	780.00	530.00	72.14	84.17	145.80	77.76	163.99	162.29	12.90	1.09	610.20	488.16	311.96	276.51	11.52	22.75	251.70	88.41	1.07	1.65
83	TALLEPALE	7.45	7.65	1860.00	3590.00	1060.00	2027.00	480.00	1290.00	52.10	112.22	85.05	245.43	205.62	230.92	0.78	1.45	659.02	671.22	219.79	666.46	18.72	61.78	74.40	298.26	1.85	0.94
84	CHAGALLURU-2	7.45	7.70	1860.00	3210.00	1077.00	1986.00	450.00	400.00	44.09	128.26	82.62	19.44	219.19	548.78	0.78	7.04	646.81	951.91	212.70	382.86	9.12	128.40	111.60	186.75	1.86	3.63
85	GONDIPALLE	7.33	7.56	1370.00	1010.00	769.00	554.00	320.00	480.00	36.07	84.17	55.89	65.61	163.53	10.26	5.87	2.07	85.43	445.45	389.95	70.90	55.68	5.42	8.60	42.99	0.98	0.72
86	RANGAVARIPALLI	7.57	7.53	3080.00	1010.00	1885.00	566.00	460.00	410.00	72.14	72.14	68.04	55.89	489.90	42.41	7.43	2.03	854.28	433.24	354.50	70.90	179.52	14.54	189.00	43.37	3.64	0.74
87	BESTAVARIPALLI-2	7.48	7.63	960.00	990.00	517.00	537.00	400.00	450.00	50.10	78.16	66.83	61.97	34.73	18.33	3.13	3.95	439.34	433.24	70.90	81.53	9.60	11.62	12.40	16.18	0.88	0.73
88	VELUPALLA-2	7.40	7.45	900.00	1100.00	490.00	630.00	355.00	440.00	60.12	92.18	49.82	51.03	42.32	46.28	1.96	7.19	427.14	445.45	63.81	85.08	4.80	15.89	6.20	60.40	0.81	0.72
89	VELUPALLA-3	7.35	7.15	1160.00	1090.00	641.00	631.00	460.00	440.00	72.14	110.22	68.04	40.10	51.52	42.96	5.87	8.91	475.96	457.65	106.35	77.99	12.00	9.79	33.48	61.32	0.81	0.68
90	MEDIPENTLA	7.30	7.15	1150.00	1100.00	659.00	619.00	460.00	500.00	80.16	100.20	63.18	60.75	46.46	18.19	10.56	8.09	475.96	463.75	77.99	77.99	11.04	12.48	78.12	57.98	0.76	0.68
91	MEDIPENTLA-2	7.33	7.35	1300.00	970.00	755.00	535.00	500.00	400.00	92.18	78.16	65.61	49.82	65.78	36.34	4.69	4.54	524.77	433.24	85.08	77.99	9.12	6.86	111.60	16.10	1.28	0.68
92	BHOMAYAGARIPALLI	7.34	7.43	1340.00	1340.00	785.00	802.00	550.00	575.00	92.18	120.24	77.76	66.83	51.75	2.83	5.47	69.64	488.16	536.98	77.99	92.17	61.92	8.11	118.25	113.45	1.56	0.84
93	RACHKUNTAPALLI-2	7.07	7.64	1780.00	840.00	1090.00	476.00	780.00	275.00	212.42	50.10	60.75	36.45	45.54	66.08	8.21	0.78	451.55	427.14	42.54	31.91	434.40	6.67	8.40	22.48	2.20	1.32
94	RACHKUNTAPALLI-3	7.53	7.63	740.00	830.00	410.00	477.00	305.00	265.00	66.13	64.13	34.02	25.52	28.06	68.31	2.74	0.90	366.12	414.94	39.00	35.45	7.20	8.54	9.30	19.87	0.45	1.32
95	RACHKUNTAPALLI-4	7.43	7.55	680.00	640.00	361.00	359.00	310.00	290.00	36.07	64.13	53.46	31.59	12.19	9.50	2.35	7.27	335.61	286.79	35.45	42.54	7.20	11.42	8.68	15.98	0.44	1.14

96	RACHKUNTAPALLI-5	7.36	7.14	680.00	1340.00	380.00	806.00	300.00	570.00	78.16	128.26	25.52	60.75	17.02	4.51	1.96	70.69	329.51	524.77	38.99	99.26	7.20	7.06	9.30	114.62	0.43	0.85
97	RACHKUNTAPALLI-6	7.15	7.33	1610.00	640.00	955.00	364.00	730.00	240.00	120.24	50.10	104.49	27.95	30.59	32.41	6.26	7.35	427.14	286.79	42.54	42.54	344.16	10.85	44.00	16.71	2.10	1.14
98	RACHKUNTAPALLI-7	7.25	7.03	1160.00	1340.00	681.00	825.00	460.00	550.00	44.09	128.26	85.05	55.89	52.44	13.89	4.30	70.34	378.32	500.36	49.63	92.17	116.64	10.22	97.20	148.31	1.03	0.85
99	RACHKUNTAPALLI-8	7.27	7.46	810.00	920.00	448.00	508.00	330.00	410.00	56.11	78.16	46.17	52.25	28.98	21.62	8.99	2.27	390.53	439.34	46.08	49.63	4.80	6.58	18.60	29.01	0.35	0.82
100	RACHKUNTAPALLI-9	7.07	7.55	1900.00	920.00	1132.00	549.00	800.00	230.00	104.21	80.16	131.22	7.29	64.17	104.17	7.43	2.39	463.75	433.24	56.72	49.63	420.00	11.14	63.30	29.23	2.20	0.82
101	MEDIPENTLA	6.74	7.65	1300.00	590.00	717.00	332.00	580.00	205.00	120.24	38.08	68.04	26.73	30.59	34.89	2.23	10.95	579.69	280.69	99.26	39.00	2.40	5.28	39.75	5.22	0.70	0.86
102	BAKKANAGARIPALLI-2	6.92	9.08	1370.00	1370.00	810.00	727.00	600.00	440.00	156.31	52.10	51.03	75.33	35.65	107.85	5.36	7.86	488.16	299.00	49.63	155.98	180.00	20.54	32.21	72.55	2.22	2.32
103	NANDIPALLI	6.93	9.33	1420.00	1390.00	825.00	702.00	415.00	500.00	92.18	48.10	44.96	92.34	133.40	85.01	2.70	7.66	518.67	219.67	155.98	163.07	7.20	25.58	70.68	71.92	1.09	2.32
104	NANDIPALLI-2	6.95	8.25	1410.00	990.00	796.00	568.00	480.00	230.00	70.14	40.08	74.12	31.59	101.43	121.44	2.66	0.31	500.36	433.24	163.07	85.08	7.68	5.95	70.69	17.28	1.08	1.83
105	KATLURU	7.20	7.75	1350.00	1880.00	798.00	1034.00	300.00	710.00	62.12	64.13	35.24	133.65	171.58	104.79		1.33	506.47	640.71	134.71	233.97	11.52	5.42	71.86	98.05	2.14	2.10
106	KATLURU-2	7.20	7.55	1360.00	930.00	788.00	560.00	370.00	220.00	58.12	80.16	54.68	4.86	141.91	111.83		1.06	518.67	414.94	127.62	60.27	15.84	6.14	71.50	41.53	2.15	1.38
107	DUGGNAGARIPALLI	7.24	7.58	1180.00	1360.00	674.00	779.00	370.00	420.00	56.11	72.14	55.89	58.32	100.74	119.26		0.39	433.24	500.36	127.62	148.89	3.84	6.00	62.91	66.97	2.15	2.22
108	MITTAPALLI	7.06	7.59	2670.00	1360.00	1487.00	816.00	960.00	200.00	56.11	44.09	199.26	21.87	171.35	220.27	0.43	0.39	549.18	512.57	496.30	141.80	7.68	7.25	219.46	65.55	1.70	2.22
109	PERNAPADU	7.45	8.04	1230.00	3350.00	711.00	2083.00	250.00	420.00	32.06	56.11	41.31	68.04	166.29	418.14	1.41	270.49	475.96	1446.17	134.71	297.78	1.44	5.95	40.89	79.25	2.27	5.26
110	PENLURU	7.45	7.74	1230.00	1060.00	740.00	605.00	140.00	300.00	44.09	72.14	7.29	29.16	216.66	104.74	1.33	1.41	469.85	500.36	134.71	70.90	7.68	17.95	39.21	1.93	2.25	1.80
111	KONDAREDDIPALLI	7.65	7.35	4890.00	1440.00	3083.00	879.00	100.00	250.00	10.02	46.09	18.23	32.81	928.05	214.04	256.50	2.07	1708.56	488.16	602.65	113.44	73.92	92.69	145.80	78.28	5.64	1.60
112	KONDAREDDIPALLI-2	7.68	7.76	4900.00	1950.00	3247.00	1184.00	150.00	115.00	40.08	36.07	12.15	6.08	891.25	393.07	281.99	1.29	1891.62	903.10	70.90	120.53	652.80	30.53	138.25	41.10	5.61	4.23
113	MOILACHERU	7.20	7.57	2100.00	1020.00	1239.00	580.00	640.00	300.00	128.26	56.11	77.76	38.88	179.63	92.99	13.72	5.43	530.87	439.34	326.14	85.08	7.20	19.49	182.31	12.22	0.55	1.30
114	PALLIGIRI	7.95	7.52	2430.00	930.00	1478.00	515.00	320.00	335.00	56.11	55.11	43.74	47.99	409.40	59.36	0.35	0.27	366.12	402.73	439.58	74.45	205.44	17.47	98.72	14.27	1.29	0.86
115	RAMREDDIPALLI-2	8.03	7.20	2400.00	2260.00	1451.00	1277.00	260.00	820.00	56.11	120.24	29.16	126.36	430.10	141.08	0.23	1.52	463.75	610.20	439.58	340.32	117.12	41.18	95.02	132.76	1.27	1.20
116	MUSSIREDDIPALLI	7.71	7.32	940.00	2340.00	519.00	1335.00	345.00	780.00	36.07	112.22	61.97	121.50	57.04	174.18	0.23	7.59	347.81	549.18	102.81	411.22	3.84	5.23	44.41	166.97	0.88	1.50
117	KOTHAPALLI	7.52	7.63	1420.00	930.00	814.00	517.00	460.00	320.00	46.09	50.10	83.84	47.39	114.08	66.24	0.43	0.27	457.65	402.73	163.07	74.45	13.44	16.56	111.98	15.43	1.56	0.86
118	KOTHAPALLI-2	7.44	7.42	1420.00	1460.00	801.00	806.00	505.00	600.00	36.07	92.18	100.85	89.91	93.61	58.12	0.43	2.42	463.75	488.16	155.98	191.43	21.12	6.48	108.14	66.11	1.58	1.11
119	KOTHAPALLI-3	7.65	7.40	930.00	1810.00	511.00	1034.00	355.00	610.00	32.06	72.14	66.83	104.49	50.14	130.73	0.27	7.47	329.51	591.89	106.35	205.61	8.16	30.91	45.52	120.94	0.85	1.08
120	GONDIPALLE-2	7.40	7.26	1430.00	2250.00	772.00	1227.00	600.00	1020.00	46.09	128.26	117.86	170.10	51.52	47.06	1.88	1.76	396.63	634.61	226.88	340.32	3.84	15.55	80.95	135.41	1.05	1.20

121	V. KOTHAPALLI-2	7.38	7.44	1430.00	1460.00	801.00	793.00	530.00	620.00	72.14	72.14	85.05	106.92	83.49	48.97	1.88	2.39	366.12	475.96	233.97	198.52	17.76	6.43	82.26	66.00	1.15	1.15
122	V. KOTHAPALLI-3	7.45	7.45	990.00	1800.00	557.00	1093.00	390.00	530.00	32.06	112.22	75.33	60.75	47.38	168.41	1.17	1.80	378.32	439.34	77.99	170.16	5.28	209.42	85.86	100.66	1.00	1.55
123	GONDIPALLI-3	7.39	7.66	990.00	2010.00	564.00	1166.00	370.00	640.00	36.07	92.18	68.04	99.63	56.35	165.72	1.21	2.46	372.22	732.24	77.99	155.98	9.12	97.01	87.45	103.77	1.00	2.92
124	KUPPA KUNTLAPALLI	7.37	7.74	1470.00	910.00	874.00	493.00	420.00	390.00	36.07	50.10	80.19	64.40	143.52	29.05	1.13	1.21	463.75	457.65	106.35	35.45	104.16	13.82	117.97	18.90	1.57	1.32
125	KUPPA KUNTLAPALLI-2	7.30	7.60	1470.00	940.00	888.00	516.00	370.00	405.00	28.06	64.13	72.90	59.54	166.52	27.35	1.09	4.14	451.55	402.73	92.17	74.44	136.80	9.94	113.75	30.23	1.54	0.89
126	IMMAMNAGAR	6.90	7.00	810.00	1090.00	441.00	683.00	367.50	390.00	42.08	72.14	63.79	51.03	16.33	67.48	1.17	5.98	402.73	213.57	24.82	70.90	9.60	179.42	36.35	101.60	1.43	4.20
127	VEMULA-2	6.93	7.07	870.00	3050.00	461.00	2005.00	355.00	970.00	28.06	160.32	69.26	138.51	34.96	3.61	2.74	425.02	341.71	427.14	95.72	368.68	9.12	552.00	12.13	96.20	0.62	0.32
128	KOTHAPALLI-4	7.03	7.79	870.00	1050.00	464.00	587.00	345.00	375.00	28.06	64.13	66.83	52.25	39.56	62.31	2.74	10.91	353.92	445.45	88.63	95.72	9.12	8.54	12.42	20.35	0.62	1.11
129	VEMULA-3	7.26	8.00	820.00	1050.00	438.00	586.00	380.00	380.00	28.06	64.13	75.33	53.46	12.88	59.85	1.17	11.22	402.73	445.45	31.91	95.72	5.28	8.54	36.06	20.33	1.44	1.11
130	BACHAYAGARIPALLI-2	7.25	7.65	1130.00	1480.00	628.00	875.00	395.00	460.00	36.07	72.14	74.12	68.04	75.21	101.87	4.69	45.12	421.04	598.00	120.53	113.44	6.24	9.22	53.40	99.58	0.97	1.17
131	VEMULA-4	7.30	7.35	1030.00	2930.00	559.00	1936.00	415.00	900.00	32.06	128.26	81.41	140.94	44.16	8.88	2.74	427.75	414.94	390.53	92.17	368.68	8.64	513.12	43.85	109.52	1.17	0.31
132	VEMULA-5	7.32	6.90	1040.00	1090.00	569.00	689.00	390.00	340.00	28.06	64.13	77.76	43.74	57.96	90.16	2.74	6.37	439.34	213.57	85.08	63.81	5.28	202.70	42.97	83.81	1.17	4.16
133	VEMULA-6	7.12	7.49	2890.00	1120.00	1648.00	653.00	920.00	390.00	72.14	64.13	179.82	55.89	234.60	72.45	10.95	9.27	585.79	366.12	496.30	148.89	105.60	18.75	190.38	59.63	0.79	0.97
134	GOLLAGUDUR-2	7.19	7.61	2900.00	1123.00	1642.00	634.00	920.00	390.00	56.11	64.13	189.54	55.89	236.90	69.90	10.95	11.28	610.20	353.92	510.48	134.71	65.76	18.50	199.20	62.88	0.81	0.95
135	VELPULA	7.30	7.76	1160.00	1030.00	653.00	622.00	460.00	350.00	56.11	48.10	77.76	55.89	48.99	82.20	10.17	2.44	372.22	427.14	134.71	106.35	26.40	22.50	70.90	42.75	0.89	1.05
136	VELPULA-2	7.25	7.70	1160.00	1260.00	637.00	690.00	505.00	410.00	56.11	44.09	88.70	72.90	28.52	92.50	9.78	3.66	414.94	463.75	127.62	134.71	4.80	29.50	67.85	28.95	0.89	1.25
137	BESTAVARIPALLI-3	7.38	8.01	1130.00	980.00	634.00	540.00	400.00	335.00	46.09	36.07	69.26	59.54	72.91	64.68	4.69	3.16	414.94	378.32	120.53	92.17	6.24	21.13	59.99	31.14	0.98	0.86
138	BUGGUDUPALLI	7.46	7.82	1370.00	1390.00	730.00	798.00	560.00	470.00	46.09	44.09	108.14	87.48	54.51	101.35	4.69	5.48	427.14	451.55	212.70	163.07	5.28	39.50	36.57	80.74	1.00	1.15
139	BUGGUDUPALLI-2	7.54	7.55	1350.00	1980.00	732.00	1210.00	485.00	640.00	36.07	56.11	95.99	121.50	84.41	167.60	4.69	15.91	427.14	524.77	198.52	311.96	15.84	57.00	35.20	157.83	1.03	1.54
140	SIDDAMREDDIPALLI	7.47	7.46	1670.00	1990.00	921.00	1217.00	620.00	640.00	36.07	52.10	128.79	123.93	93.61	172.40	8.60	14.75	488.16	536.98	241.06	311.96	11.04	52.00	103.25	160.80	1.10	1.57
141	GOLLALAGUDUR	7.31	7.85	1610.00	4220.00	1000.00	2829.00	370.00	130.00	32.06	40.08	70.47	7.29	201.10	45.75	1.00	1347.70	561.38	61.02	113.44	1276.20	195.25	47.50	42.39	26.48	2.24	0.52
142	GOLLALAGUDUR-2	7.33	7.44	1620.00	1170.00	996.00	673.00	370.00	430.00	28.06	76.15	72.90	58.32	209.70	52.15	0.99	10.66	549.18	402.73	106.35	134.71	199.50	12.50	41.22	81.91	2.19	0.85
143	VEMULA-7	7.34	7.82	1050.00	830.00	635.00	477.00	350.00	275.00	28.06	32.06	68.04	47.39	89.80	59.23	1.66	2.87	439.34	390.53	99.26	56.72	44.00	18.88	34.87	20.83	1.31	1.22
144	VEMULA-8	7.38	7.63	1400.00	1150.00	780.00	696.00	470.00	440.00	24.05	64.13	99.63	68.04	93.55	55.85	3.71	10.22	439.34	427.14	219.79	134.71	35.00	15.25	35.08	85.93	1.01	0.84
145	GONDEPALLI	7.50	7.76	1050.00	1120.00	638.00	651.00	340.00	370.00	28.06	56.11	65.61	55.89	92.00	70.85	1.65	10.64	451.55	378.32	99.26	148.89	41.50	15.75	33.21	60.90	1.32	0.97

146	GONDEPALLI-2	7.37	7.70	1680.00	990.00	981.00	568.00	580.00	400.00	36.07	42.08	119.07	71.69	117.85	43.40	7.47	1.23	475.96	475.96	255.24	77.99	45.75	14.13	108.57	25.82	1.03	1.19
147	VEMULA-9	7.34	7.53	1100.00	1020.00	643.00	571.00	460.00	390.00	32.06	72.14	92.34	51.03	43.90	39.60	0.57	2.50	414.94	390.53	56.72	92.17	100.50	27.75	63.21	46.79	0.31	0.95
148	VEMARPALLI	7.32	7.14	1060.00	6290.00	613.00	3716.00	440.00	1250.00	28.06	60.12	89.91	267.30	46.65	810.00	1.16	3.05	451.55	915.30	99.26	1347.10	20.25	211.25	51.65	457.28	1.07	1.09
149	VEMARPALLI-2	7.15	7.70	1010.00	2290.00	554.00	1349.00	420.00	500.00	24.05	8.02	87.48	116.64	33.90	298.40	2.59	0.44	378.32	829.87	99.26	340.32	31.00	36.50	43.80	41.20	0.73	1.06
150	PULIVENDULA-2	7.25	7.54	3210.00	2300.00	1773.00	1341.00	880.00	560.00	48.10	40.08	184.68	111.78	300.10	249.60	2.52	8.31	683.42	463.75	680.64	382.86	54.00	116.50	85.00	147.23	0.92	1.43
151	PEDDA RANGAPURAM-2	7.47	7.60	2010.00	2310.00	1234.00	1392.00	440.00	600.00	32.06	56.11	87.48	111.78	289.30	252.20	0.46	8.59	756.65	488.16	283.60	397.04	52.25	117.00	26.26	150.41	1.14	1.39
152	RACHUMARPALLI	7.49	8.01	1420.00	1750.00	879.00	998.00	280.00	280.00	24.05	16.03	53.46	58.32	211.20	256.90	3.00	0.33	573.59	842.08	155.98	113.44	56.00	30.00	23.16	6.11	1.97	2.88
153	RACHUMARPALLI-2	7.51	7.63	1470.00	1990.00	912.00	1176.00	300.00	510.00	16.03	28.06	63.18	106.92	213.75	217.20	2.29	0.59	610.20	549.18	134.71	276.51	71.75	123.50	36.21	86.39	1.43	1.37
154	RACHUMARPALLI-3	7.40	7.18	1990.00	6340.00	1200.00	3779.00	390.00	1400.00	8.02	80.16	89.91	291.60	292.15	804.00	0.42	3.12	756.65	915.30	269.42	1382.55	45.50	210.00	32.29	448.00	1.14	1.06
155	PEDDA RANGAPURAM-3	7.45	7.12	1430.00	1740.00	879.00	998.00	300.00	690.00	16.03	72.14	63.18	123.93	204.95	84.85	2.92	1.60	573.59	414.94	163.07	319.05	52.50	35.00	24.87	107.36	2.01	0.93
156	PULIVENDULA-3	7.08	8.15	1040.00	62.50	604.00	28.00	440.00	25.00	72.14	2.00	63.18	4.86	30.90	0.18	2.87	0.19	421.04	12.20	92.17	3.54	41.25	9.00	43.89	0.23	0.74	0.16
157	IPPTALA-2	7.04	7.05	2150.00	1360.00	1106.00	769.00	740.00	580.00	72.14	56.11	136.08	106.92	92.50	45.50	0.69	2.21	384.43	475.96	397.04	170.16	35.50	27.50	137.00	69.37	0.86	1.22
158	IPPTLA-3	7.12	7.13	2160.00	1370.00	1125.00	771.00	780.00	570.00	64.13	56.11	150.66	104.49	83.65	42.50	0.69	1.91	414.94	488.16	397.04	163.07	39.25	32.50	136.01	71.18	0.85	1.25
159	IPPTLA-4	7.27	7.23	1350.00	1150.00	683.00	679.00	510.00	460.00	40.08	64.13	99.63	72.90	49.65	50.30	1.62	2.74	402.73	414.94	148.89	141.80	35.00	27.50	61.24	65.21	1.14	1.00
160	IPPTLA-5	7.28	7.31	1340.00	1370.00	710.00	849.00	520.00	420.00	40.08	56.11	102.06	68.04	51.00	125.80	1.58	4.74	451.55	475.96	141.80	170.16	35.25	47.50	61.56	84.84	1.16	1.30
161	THERNAMPALLI	7.30	7.38	1200.00	1330.00	627.00	785.00	420.00	420.00	40.08	60.12	77.76	65.61	50.00	103.95	2.61	5.90	353.92	390.53	141.80	163.07	26.50	52.50	71.58	94.46	0.97	1.14
162	THERNAMPALLI-2	7.36	7.40	1410.00	1311.00	742.00	785.00	420.00	460.00	36.07	52.10	80.19	80.19	87.10	88.65	1.88	3.89	366.12	451.55	177.25	170.16	41.00	35.00	94.50	78.28	1.13	1.06
163	THERNAMPALLI-3	7.39	7.38	1470.00	2240.00	766.00	1409.00	430.00	600.00	36.07	64.13	82.62	106.92	93.45	252.50	7.06	1.65	366.12	488.16	170.16	425.40	48.25	175.00	104.10	84.87	1.08	0.92
164	ERRAMREDDIPALLI-2	7.40	7.49	1570.00	2260.00	874.00	1424.00	440.00	600.00	32.06	64.13	87.48	106.92	128.15	271.00	1.51	1.56	488.16	512.57	191.43	425.40	47.50	170.00	86.86	71.67	1.02	0.94
165	CHINNARANGAPURAM-2	7.43	7.52	1410.00	1050.00	766.00	616.00	450.00	390.00	32.06	68.14	89.91	53.46	87.05	59.45	1.85	2.81	402.73	402.73	170.16	85.08	43.25	62.50	94.99	38.50	1.11	0.89
166	CHINNARANGAPURAM-3	7.44	7.75	1210.00	1030.00	639.00	627.00	440.00	360.00	40.08	44.09	82.62	60.75	48.55	74.85	2.50	2.55	366.12	451.55	141.80	99.26	28.50	25.00	71.10	44.50	0.97	1.02
167	CHINNARANGAPURAM-4	7.40	7.64	1032.00	1070.00	588.00	598.00	360.00	390.00	40.08	52.10	63.18	63.18	65.70	55.10	1.87	3.08	439.34	317.30	70.90	127.62	55.00	17.50	22.09	85.27	0.96	0.51
168	BESTAVARIPALLI-4	7.30	7.65	1130.00	1070.00	590.00	625.00	390.00	380.00	36.07	52.10	72.90	60.75	53.15	54.05	2.40	10.58	390.53	329.51	106.35	127.62	18.75	30.00	60.64	88.32	1.04	0.52
169	ERRABALE	7.15	7.69	1400.00	990.00	697.00	606.00	450.00	290.00	44.09	50.10	82.62	40.10	62.70	95.88	3.04	5.60	366.12	445.45	155.98	67.36	34.50	28.75	90.58	45.79	0.53	0.85
170	BRAHMANAPALLI-2	7.18	7.86	1490.00	980.00	772.00	604.00	500.00	290.00	44.09	50.10	94.77	40.10	62.90	96.90	2.76	5.80	378.32	439.34	177.25	67.36	48.75	30.00	109.73	44.56	0.59	0.83

171	NALLAPUREDDYPALLI-2	7.19	7.81	1380.00	850.00	706.00	453.00	440.00	265.00	40.08	50.10	82.62	34.02	68.10	47.75	2.98	4.92	366.12	274.59	163.07	67.36	33.50	25.00	91.76	55.45	0.51	1.01
172	KOTHAPALLI-5	7.47	7.55	810.00	990.00	433.00	587.00	290.00	365.00	24.05	54.11	55.89	55.89	31.95	48.05	5.30	20.65	317.30	414.94	53.18	70.90	31.75	25.00	36.36	58.77	0.78	0.87
173	CHANDRAGIRI	7.22	7.54	1480.00	990.00	749.00	598.00	450.00	360.00	32.06	54.11	89.91	54.68	78.55	45.50	2.66	21.56	366.12	414.94	163.07	70.90	52.00	31.25	107.15	66.08	0.59	0.87
174	NALLAPUREDDIPALLI-3	7.47	7.60	880.00	750.00	438.00	443.00	300.00	250.00	26.05	46.09	57.11	32.81	27.25	38.10	4.29	13.59	305.10	231.88	53.18	60.27	31.75	30.00	51.87	80.15	0.88	0.34
175	NALLAPUREDDIPALLI-4	7.52	7.70	780.00	1050.00	350.00	651.00	265.00	350.00	24.05	40.08	49.82	60.75	24.55	77.55	2.64	1.29	311.20	219.67	35.45	127.62	20.00	77.50	2.09	131.32	1.09	0.78
176	AMBAKAPALLI-2	7.03	7.82	820.00	1920.00	493.00	1220.00	345.00	460.00	56.11	28.06	49.82	94.77	26.18	265.05	3.75	7.07	305.10	610.20	67.36	233.97	38.25	70.00	64.60	147.27	0.63	1.62
177	KUPPALAPALLI	7.07	7.51	1060.00	1010.00	630.00	648.00	370.00	210.00	68.14	28.06	48.60	34.02	67.75	144.50	0.45	0.50	439.34	439.34	70.90	99.26	36.50	45.00	69.15	26.64	0.90	1.87
178	TATTIMAGULAPALLI	7.27	7.82	1110.00	1360.00	681.00	915.00	300.00	180.00	28.06	20.04	55.89	31.59	123.10	265.00	0.45	0.80	451.55	683.42	99.26	92.17	39.00	62.50	58.15	22.70	1.90	3.32
179	CHERLOPALLI-2	7.35	7.57	1100.00	1200.00	657.00	748.00	320.00	230.00	20.04	56.11	65.61	21.87	118.30	132.20	0.43	59.95	439.34	500.36	99.26	127.62	38.50	30.00	44.64	13.48	1.94	1.81
180	GUNDLAPALLI-2	7.22	7.61	2160.00	900.00	1323.00	466.00	500.00	90.00	64.13	26.05	82.62	6.08	247.60	103.85	18.18	47.92	414.94	311.20	311.96	49.63	151.25	27.50	193.44	13.52	0.80	1.49
181	CHAGALLERU	7.31	7.58	2180.00	1020.00	1270.00	584.00	480.00	190.00	72.14	56.11	72.90	12.15	257.45	102.30	18.06	48.82	414.94	366.12	311.96	106.35	160.00	20.00	124.00	13.13	0.79	1.54
182	CHAGALLERU-2	7.63	7.59	860.00	970.00	488.00	573.00	265.00	325.00	26.05	34.07	48.60	58.32	69.10	73.55	1.61	3.41	360.02	421.04	85.08	106.35	30.25	27.50	6.20	12.45	1.55	1.02
183	CHAGALLERU-3	7.59	7.75	1080.00	1370.00	638.00	870.00	250.00	230.00	24.05	48.10	46.17	26.73	137.60	212.05	0.81	1.70	427.14	475.96	99.26	106.35	55.00	110.00	12.40	72.82	2.09	1.62
184	CHAGALLERU-4	7.54	7.31	880.00	4710.00	505.00	3193.00	260.00	1350.00	30.06	140.28	44.96	243.00	78.05	602.50	2.32	72.81	378.32	793.26	88.62	850.80	21.13	500.00	7.44	297.95	1.30	1.79
185	CHAGALLERU-5	7.62	7.45	1070.00	3640.00	650.00	2277.00	260.00	680.00	28.06	88.18	46.17	111.78	136.95	528.00	0.79	22.86	427.14	634.61	99.26	623.92	57.25	395.00	18.60	118.54	2.06	2.09
186	GOLLALAGUDUR	7.62	7.62	840.00	1700.00	506.00	1019.00	270.00	370.00	26.05	44.09	49.82	63.18	71.30	220.00	1.56	1.00	353.92	500.36	85.08	177.25	25.75	130.00	29.26	76.41	1.54	1.41
187	GOLLALAGUDUR-2	7.34	7.69	4820.00	2280.00	2909.00	1410.00	950.00	740.00	80.16	56.11	182.25	145.80	637.80	183.00	79.57	9.93	854.28	536.98	850.80	283.60	391.00	140.00	164.92	262.73	1.67	1.33
188	GOLLALAGUDUR-3	7.44	7.70	4830.00	1730.00	2739.00	958.00	800.00	670.00	80.16	64.13	145.80	123.93	625.90	70.00	79.72	2.21	793.26	366.12	886.25	319.05	400.00	35.00	35.96	119.04	1.62	1.05
189	PEDDA JUTTUR-2	7.85	7.75	2010.00	1660.00	1253.00	1025.00	680.00	370.00	32.06	48.10	145.80	60.75	179.55	221.50	1.14	0.90	561.38	536.98	226.88	163.07	162.75	122.50	161.20	79.58	1.44	1.41
190	YEDULA YENI	7.92	7.50	1970.00	1720.00	1161.00	940.00	620.00	670.00	28.06	56.11	133.65	128.79	174.05	69.75	1.17	2.21	524.77	353.92	212.70	311.96	158.25	35.00	131.44	119.39	1.45	1.05
191	YEDULA YENI-2	7.68	7.49	1980.00	1990.00	1188.00	1138.00	460.00	590.00	28.06	80.16	94.77	94.77	254.20	172.30	0.89	4.44	561.38	622.40	241.06	233.97	136.75	27.50	88.04	143.91	1.32	1.33
192	BASIREDDIPALLI	7.60	7.47	1700.00	1990.00	855.00	1146.00	580.00	580.00	36.07	80.16	119.07	92.34	92.95	175.95	2.53	4.51	366.12	634.61	269.42	219.79	57.50	30.00	52.70	154.63	1.49	1.34
193	PULIVENDULA -5	7.61	7.63	1680.00	940.00	868.00	545.00	580.00	370.00	36.07	42.08	119.07	64.40	94.50	44.30	2.58	2.22	378.32	451.55	269.42	60.27	53.00	17.50	60.76	38.23	1.54	0.87
194	PULIVENDULA -6	7.51	7.66	1540.00	970.00	858.00	564.00	460.00	415.00	48.10	42.08	82.62	75.33	122.75	44.20	5.56	1.10	512.57	457.65	191.43	81.53	37.50	17.50	55.80	22.16	1.27	1.16
195	KANAMPALLI-2	7.34	8.05	1210.00	590.00	655.00	331.00	430.00	175.00	32.06	34.07	85.05	21.87	59.80	51.55	7.72	1.50	536.98	280.69	99.26	24.82	35.00	23.75	7.44	1.34	1.17	1.36
196	VEMMARPALLI	7.38	8.11	1550.00	590.00	814.00	336.00	440.00	175.00	32.06	36.07	87.48	20.66	119.75	53.23	5.65	1.50	524.77	280.69	184.34	28.36	41.25	22.50	21.70	1.31	1.26	1.37

197	KANAMPALLI-3	7.45	7.92	680.00	880.00	374.00	543.00	195.00	290.00	26.05	60.12	31.59	34.02	51.58	68.10	2.29	8.22	299.00	390.53	39.00	53.18	24.75	37.50	15.50	42.38	0.89	0.79
198	KANAMPALLI-4	7.54	7.81	680.00	810.00	376.00	443.00	190.00	285.00	22.04	60.12	32.81	32.81	57.50	53.25	1.67	4.34	286.79	305.10	35.45	70.90	25.00	22.50	25.08	12.25	1.32	1.01
199	MOTHNUNTALAPALLI-2	7.53		670.00		380.00		185.00		22.04		31.59		61.58		1.63		317.30		35.45		23.75		9.30		1.31	
200	MOTHNUNTALAPALLI-3	7.39		670.00		387.00		185.00		24.05		30.38		60.08		2.29		317.30		35.45		25.00		15.50		0.89	

ANNEXURE-XIV

ANALYTICAL RESULTS OF TRACE ELEMENTS OF GROUND WATERSAMPLES FROM Y.S.R KADAPA AND ANANTAPUR DISTRICTS, ANDHRA PRADESH

All values are in (ppb)

SL. No.	Location / Station	As (ppb)		Cr (ppm)		Pb (ppb)		Zn (ppm)		Fe (ppm)		Ni (ppm)		Cu (ppm)		Cd (ppb)		Mn (ppm)		Uranium (ppb)	
		PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM	PRM	POM
1	T. TUMMALAPALLE	0.14	1.10		2.00	1.45	0.88	0.18	104.74	0.73	540.04		0.50	0.01	7.09	0.10	0.01	0.07	18.54	4.50	4.05
2	R. TUMMALAPALLE	0.62	1.02		2.00	1.59	1.88	0.06	60.27	0.36	552.42		0.50	0.01	3.80	0.23	0.01	0.02	15.28	5.30	5.86
3	PEDDA RANGAPURAM	0.99	1.74		2.00	1.50	2.60	0.31	152.29	2.95	4525.69	0.08	1.30	0.04	8.59	0.13	0.02	0.19	61.61	4.25	7.18
4	K. KOTTAPALLE	1.46	1.43		2.00	2.83	0.25	0.75	23.80	2.69	163.40	0.12	0.50	0.12	3.51	0.04	0.01	0.43	13.32	0.85	5.63
5	TUMMALAPALLE	0.43	0.50		2.00	1.10	1.22	0.12	158.21	0.91	365.21	0.02	1.13	0.02	10.74	0.05	0.01	0.08	25.67	4.26	10.82
6	MUBBICHINTALA	2.01	2.54		2.00	0.02	0.25	0.10	10.47	0.03	50.00	0.01	0.50		0.83	4.78	0.22	0.01	0.25	495.16	635.71
7	VELLUPULA	0.19	0.50		2.00	13.57	0.88	4.03	18.13	3.36	50.00	0.02	0.50	0.05	1.18	0.30	0.01	1.12	0.25	3.35	3.63
8	BHUMAYAGARIPALLI	0.36	0.50		2.00	0.50	0.25	0.09	32.64	0.07	50.00	0.04	0.50	0.02	2.51	0.03	0.01	0.02	0.25	5.56	3.77
9	RACHKUNTAPALLI	0.14	0.50		2.00	1.37	0.25	0.19	27.84	0.07	50.00	0.04	0.50	0.03	1.13	0.04	0.01	0.02	1.51	48.87	36.22
10	VEMULA	0.93	1.06	0.01	5.31	1.11	0.25	0.09	7.83	0.06	50.00	0.03	0.50	0.04	0.25	0.07	0.01	0.02	0.25	5.51	4.38
11	BACHAYAGARIPALLI	0.62	0.50		2.00	0.79	0.25	0.14	9.12	0.09	50.00		0.50		0.87	0.02	0.01	0.08	0.25	3.40	1.13
12	CHINNARANGAPURAM	0.99	1.35		2.00	0.19	0.25	0.09	9.43	0.04	50.00		0.50		1.50	0.09	0.01	0.02	0.25	17.05	5.80
13	NALLAPUREDDYPALLI	0.74	0.50		2.00	0.86	0.25	0.05	18.93	0.06	50.00		2.33	0.01	3.23	0.04	0.01	0.01	0.25	7.42	3.13
14	NALLAGONDAVARIPALLI	1.44	0.50		2.00	0.54	0.25	0.11	34.24	0.07	50.00	0.01	1.36	0.01	1.26	0.14	0.01	0.01	3.76	211.70	0.90
15	AMBAKAPALLI	0.73	0.50		2.00	0.16	0.25	0.12	35.71	0.06	50.00		1.27		0.88	0.09	0.01	0.01	1.57	7.37	1.45
16	MOTHNUNTALAPALLI	0.72	0.50		2.00	0.38	17.47	0.03	446.38	0.04	3021.90		1.27		5.73	0.04	0.04		31.94	9.06	4.23
17	BRAHMANAPALLI	0.88	1.11		2.00	0.10	0.74	0.08	22.94	0.04	419.13		1.53		2.70	0.05	0.01	0.01	39.45	10.50	11.44
18	IPPTALA	0.28	0.50		2.00	0.64	0.25	0.11	21.44	0.99	221.35		0.50		1.75	0.02	0.01	0.09	3.38	1.28	1.56
19	CHINNAKUDALA	0.46	0.50		2.00	0.45	0.25	0.10	35.97	0.17	50.00		0.50		1.06	0.17	0.02	0.05	1.24	7.48	8.96

20	RAMNUTHALAPALLI	0.35	0.50		2.00	0.71	0.25	0.09	14.17	0.12	50.00		0.50		2.20	0.02	0.01	0.02	0.25	1.36	1.18
21	GUNAKANAPALLI	0.59	0.50		2.00	0.43	0.25	0.04	24.89	0.08	50.00		0.50	0.01	6.00	0.04	0.01	0.01	0.25	4.66	3.78
22	PEDDA KUDALA	1.22	0.50		2.00	0.15	0.25	0.04	19.78	0.05	50.00		1.03		2.01	0.15	0.06	0.01	13.92	2.48	0.04
23	AKKULAGARALAPALLI	0.52	0.50		2.00	1.88	0.25	0.05	18.67	0.03	50.00		0.50		1.05	0.09	0.01		1.45	2.16	0.03
24	ERRAMREDDIPALLI	0.58	0.50		2.00	0.06	0.25	0.04	38.29	0.04	50.00		0.50		0.99	0.03	0.01	0.01	1.85	2.55	0.51
25	DONDLAVAGU	0.16	2.55		8.19	3.55	0.57	0.64	73.25	1.51	2148.71		0.50	0.01	2.19	0.04	0.01	0.12	10.30	1.94	0.96
26	LAVALAPURAM	3.40	3.23		2.00	0.37	0.25	0.04	13.60	0.06	50.00		0.50		0.25	0.05	0.01	0.01	0.25	4.04	0.69
27	KANAMPALLI	0.92	0.50		2.00	0.28	0.25	0.15	64.64	0.05	50.00		0.50		3.08	0.03	0.01	0.01	69.92	187.36	0.58
28	B. KOTHAPALLI	1.11	0.50		2.00	0.83	1.68	0.02	393.17	0.12	50.00		1.25	0.01	12.79	0.12	0.01	0.37	29.32	94.29	21.15
29	UDUMULAKURTHI	0.24	0.50		2.00	0.32	0.25	0.04	39.33	0.07	50.00		0.50		1.72	0.02	0.01	0.01	0.25	12.01	404.15
30	SOMAVALAPALLI	0.27	0.50		2.00	7.49	8.41	1.12	471.06	0.98	1096.27		0.50	0.01	5.46	0.47	0.51	0.43	58.25	6.12	13.21
31	ELLAGULABAYLU	0.26	0.50		2.00	1.37	1.37	0.32	133.72	0.79	309.44		1.25	0.01	10.75	0.11	0.01	0.09	5.97	19.53	16.77
32	MEDUKULLAPALLI	0.42	0.50		2.00	0.14	0.25	0.05	22.14	0.04	50.00		0.50		3.69	0.05	0.01	0.01	0.25	39.47	26.38
33	PEDDAPALLI	0.79	0.50		2.00	0.33	0.25	0.02	28.02	0.04	50.00		0.50		1.63	0.05	0.01	0.01	0.25	150.14	12.85
34	VEPAMMANIPETA	0.75	1.28		2.00	0.18	0.25	0.06	16.43	0.07	50.00		0.50		2.89	0.12	0.01	0.04	0.74	44.78	10.79
35	GUNDLAVARIPALLI	0.51	0.50		2.00	0.45	0.25	0.20	13.89	0.25	739.04		0.50	0.01	6.10	0.04	0.01	0.01	9.89	5.76	0.04
36	PEDDANAVARIPALLI	0.45	0.50		2.00	2.17	0.25	0.10	5.08	0.13	50.00		0.50	0.02	0.98	0.30	0.01	0.02	0.25	71.89	0.86
37	PULIVENDULA	1.03	0.50		2.00	0.37	0.25	0.05	6.64	0.04	50.00		1.19		1.15	0.04	0.01	0.01	0.25	24.73	0.26
38	BATREPALLI	0.66	0.50		2.00	0.68	0.25	0.10	2.61	0.06	50.00		0.50	0.01	4.12	0.07	0.01	0.03	0.25	683.23	7.69
39	GAJJAPPAGARIPALLI	0.47	0.50		2.00	2.70	0.25	0.05	1.00	0.04	50.00		0.50	0.01	1.45	0.27	0.01	0.13	33.80	1315.52	13.49
40	REDDIVARIPALLE	0.26	0.50		2.00	0.55	0.25	0.09	11.22	0.04	50.00		0.50	0.01	1.52	0.08	0.01	0.01	15.51	340.35	19.68
41	MADDANAGARIPALLE	0.12	0.50		2.00	0.80	0.25	0.19	13.41	0.41	605.11		0.50		1.23	0.06	0.01	0.05	8.39	14.14	0.14
42	SABBANUTHALAPALLI	0.45	0.50		2.00	0.35	0.25	0.06	17.91	0.39	50.00		0.50		0.25	0.05	0.01	0.32	54.15	15.30	0.27
43	VELUPALLA	0.25	0.50		2.00	0.35	0.25	0.03	4.04	0.06	50.00		0.50		0.85	0.07	0.01	0.12	34.30	923.39	5.41
44	TAPATUVARIPALLI	0.18	0.50		2.00	0.95	0.25	0.42	66.59	2.78	1137.93		0.50		0.25	0.03	0.01	0.32	33.13	3.33	0.01
45	PEDDANAGARIPALLI	1.27	0.50		2.00	0.67	0.25	0.26	81.20	1.76	1141.21	0.01	0.50	0.03	0.25	0.16	0.01	6.56	35.47	22.44	0.01
46	MALLEPALLI	0.28	0.50		2.00	0.23	0.25	0.02	33.01	0.05	566.50		0.50		1.60	0.11	0.01	0.04	14.92	29.69	0.13
47	BESTAVARIPALLI	0.33	0.50		2.00	2.73	0.25	1.23	78.98	1.90	193.49		0.50	0.01	0.59	0.07	0.01	0.17	6.42	1.67	0.01

48	BOGGUDPALLI	1.82	0.50		2.00	1.28	0.25	0.53	1.00	0.21	50.00		0.50	0.01	0.25	0.07	0.01	0.06	0.25	6.75	0.08
49	PEDDA JUTTUR	3.61	0.50		2.00	0.49	0.25	0.08	30.27	0.05	50.00		0.50		0.83	0.19	0.01	0.01	5.62	5.51	0.08
50	CHINTLA JUTTUR	1.29	0.50		2.00	0.21	0.25	0.07	25.70	0.08	50.00		0.50		0.87	0.11	0.01	0.01	3.19	13.12	0.14
51	GOLLAGUDUR	0.20	0.50		2.00	0.48	0.25	0.18	74.48	0.20	50.00		0.50		0.96	0.04	0.01	0.03	10.27	14.91	0.18
52	PERNAPADU	0.25	0.50		2.00	20.78	0.25	1.36	184.37	5.15	205.87		0.50	0.02	1.57	0.06	0.01	0.31	15.04	2.18	0.10
53	CHAGALLURU	0.21	0.50		2.00	0.90	0.25	0.32	69.30	0.08	50.00		0.50		1.20	0.03	0.01	0.06	14.37	4.32	0.04
54	ALLAVALAPADU	0.16	0.50		2.00	1.17	0.25	0.19	204.27	1.78	173.81		0.50	0.02	1.81	0.02	0.01	0.12	15.60	6.78	0.12
55	AYYAVARIPALLI	0.25	0.50		2.00	1.60	0.25	0.15	100.85	1.91	260.67		5.82	0.05	9.21	0.02	0.01	0.34	45.17	9.23	0.22
56	PAMALURU	6.44	0.50		2.00	1.01	0.25	0.13	81.53	0.34	235.36		0.50	0.01	3.20	0.07	0.01	0.04	17.00	7.79	0.08
57	ULIMELA	0.19	0.50		2.00	0.04	0.25	0.05	135.70	0.07	446.21		0.50		1.39	0.04	0.01	0.02	33.69	24.39	0.01
58	YERRIPALLI	0.21	0.50		2.00	0.85	0.25	0.08	195.93	0.30	144.79		1.06		170.61	0.09	0.01	0.06	301.14	28.31	0.01
59	PATRAYUNIPETA	0.24	0.50		2.00	0.24	0.25	0.03	12.26	0.02	50.00		0.50		1.99	0.02	0.01	0.01	0.25	29.54	0.03
60	ACHAVILLI	0.22	0.50		2.00	0.14	0.25	0.05	11.44	0.03	50.00		16.58		5.63	0.16	0.01	0.02	6.63	35.40	0.04
61	YADAVPETA/CHINAMPALLI	0.10	2.75		2.00	0.28	0.25	1.20	22.41	1.53	50.00		0.50		1.08	0.09	0.01	0.98	0.73	13.12	5.56
62	TIMMAPURAMPETA	0.18	0.50		2.00	0.47	0.56	0.12	28.32	0.32	50.00		0.50		6.07	0.03	0.01	0.03	63.05	13.65	503.92
63	GOTURU	0.47	1.64		2.00	1.34	0.82	0.11	62.03	0.58	474.04		0.50		8.80	0.07	0.01	0.05	9.78	13.11	17.24
64	NALLACHERUNIPALLI	0.16	0.50		2.00	0.80	1.01	0.16	123.50	0.20	149.45		0.50		5.04	1.05	0.01	0.06	14.05	116.50	170.99
65	PENDULURU	0.12	2.60		2.00	0.27	1.20	0.11	90.47	0.75	675.87		1.12		10.94		2.13	0.19	25.98	12.16	23.73
66	MOTTUKUR	0.19	1.22		2.00	0.23	2.62	0.14	219.16	0.70	6795.96		1.71	0.01	21.43	0.04	1.28	0.25	92.50	22.90	37.24
67	RAMREDDIPALLI	0.16	1.57		2.00	2.97	0.25	0.58	19.98	1.09	155.10		0.50	0.01	1.60	0.04	0.01	0.52	2.80	28.14	18.72
68	NAGURU	0.75	3.33		2.00	4.44	0.25	1.24	23.71	0.38	50.00		0.50	0.03	0.89	0.22	0.43	0.45	0.65	11.61	12.34
69	GUNDLAPALLI	1.47	0.50		2.00	0.49	0.88	0.11	104.64	0.03	558.88		1.43		13.71	0.18	0.01	0.01	12.86	4.65	2.13
70	CHERLOPALLI	0.29	2.60		2.00	2.91	2.87	0.49	297.29	2.36	464.63		2.03	0.01	10.72	0.05	0.43	0.20	18.78	1.44	17.53
71	KATLURU	0.96	0.50		2.00	1.69	32.79	0.62	313.16	0.88	2964.10		0.50	0.01	180.46	0.11	0.01	0.08	135.27	13.13	0.89
72	NANDIPALLI	0.21	1.38		2.00	0.08	6.76	0.04	294.15	0.04	1610.15		1.11		15.89	0.01	0.01	0.01	46.08	1.11	4.46
73	TALLAPALLE	0.37	4.02		2.00	4.41	1.23	0.57	46.23	1.18	50.00		1.99	0.02	9.72	0.35	0.01	0.11	12.11	3.25	1.52
74	TALLAPALLE-2	3.00	1.84		2.00	0.35	0.52	0.04	21.82	0.06	50.00		0.50	0.01	3.71	0.40	0.01	0.02	23.83	5.71	3.16

75	T.VEMULAVARIPALLI	0.43	0.50		2.00	1.03	0.99	0.04	90.44	0.21	222.45		1.89		3.01	0.01	0.43	0.01	5.24	3.24	1.82
76	KUPALAPALLI	0.14	0.50		2.00	2.55	6.06	1.96	2303.83	1.08	191.08		10.21		4.36	0.02	0.85	0.11	11.91	1.48	3.44
77	BAKKANAGARIPALLI	0.14	0.50		2.00	1.63	13.73	0.65	763.51	2.12	1642.60		2.13		11.41	0.05	0.01	0.27	413.43	5.19	1.39
78	GIDDANKIPALLI	0.13	1.76		2.00	4.53	14.77	0.19	1682.06	0.44	546.56	0.11	5.28	0.01	15.03	0.07	0.01	0.22	36.53	1.10	6.23
79	TATTIMUKALAPALLI	1.02	2.07		2.00	6.20	0.75	0.84	22.26	1.90	50.00		0.50		1.61	0.05	0.01	0.12	5.84	4.80	9.57
80	DAGGUNARIPALLI	0.92	3.82		2.00	0.23	1.17	0.04	106.33	0.03	164.04		1.41		9.46	0.04	0.01	0.01	19.05	7.84	17.03
81	AMMAYAGARIPALLI	0.69	0.50		2.00	0.53	1.24	0.01	281.30	0.09	50.00		0.50		81.18	0.01	0.43	0.01	377.13	7.47	0.46
82	V. KOTHAPALLI	1.86	1.45		2.00	1.25	14.18	0.23	1659.95	0.03	475.75		5.53	0.01	13.13	0.51	0.43	0.01	18.88	8.48	6.18
83	TALLEPALE	2.06	3.90		2.00	1.02	1.07	0.03	45.59	0.04	50.00		1.29		2.28	0.04	0.43	0.01	4.65	6.81	24.41
84	CHAGALLURU-2	2.04	1.95		2.00	0.71	2.17	0.04	317.74	0.03	1469.20		1.97		34.51	0.02	0.01	0.01	59.54	6.78	33.52
85	GONDIPALLE	0.44	0.50		2.00	33.73	0.25	0.87	37.02	4.08	50.00		2.45	0.01	4.14	1.04	0.85	0.44	3.34	0.31	5.92
86	RANGAVARIPALLI	0.39	1.11		2.00	1.39	0.25	0.32	35.17	1.89	50.00		2.34	0.02	4.54	0.15	0.01	0.19	2.94	17.23	6.49
87	BESTAVARIPALLI-2	1.04	2.91		2.00	0.78	1.39	0.04	22.94	0.10	50.00		4.46		4.04	0.08	0.01	0.15	14.43	4.83	11.87
88	VELUPALLA-2	1.57	0.50		2.00	2.16	1.14	0.06	21.55	2.15	50.00		0.50		2.69	0.04	1.28	0.67	6.43	3.85	5.30
89	VELUPALLA-3	2.35	0.50		2.00	3.00	1.18	0.03	21.46	0.05	50.00		2.01		2.69	0.35	0.01	0.03	20.46	10.10	5.01
90	MEDIPENTLA	0.28	0.50	0.01	2.00	0.55	0.76	0.03	17.10	0.19	50.00		1.41		2.22	0.10	0.01	0.02	5.00	4.28	5.05
91	MEDIPENTLA-2	0.29	5.16		2.00	0.24	0.25	0.04	20.19	0.10	50.00		5.75		3.56	0.03	0.01	0.03	38.99	6.79	12.04
92	BHOMAYAGARIPALLI	0.41	0.50		2.00	1.29	0.66	0.04	47.37	0.13	50.00		7.06		3.98	0.04	0.01	0.03	49.38	6.45	6.28
93	RACHKUNTAPALLI-2	0.21	2.18		2.00	0.33	1.84	0.05	21.76	0.15	113.07		5.82	0.01	2.42	0.46	0.85	0.05	65.90	55.16	4.62
94	RACHKUNTAPALLI-3	0.82	1.64		2.00	1.21	0.53	0.07	14.99	0.06	50.00		2.07	0.01	1.10	0.05	0.43	0.01	5.75	13.44	4.38
95	RACHKUNTAPALLI-4	0.72	0.50		2.00	0.57	0.60	0.07	24.15	0.04	50.00		2.34		2.56	0.06	0.01	0.01	3.65	32.48	80.66
96	RACHKUNTAPALLI-5	0.72	1.42		2.00	1.21	0.25	0.39	16.23	0.08	50.00		1.61		2.52	0.06	0.01	0.01	1.57	32.66	6.06
97	RACHKUNTAPALLI-6	0.69	1.01		2.00	0.37	0.25	0.27	28.20	0.15	50.00		2.38		1.66	1.09	0.01	0.07	1.87	96.45	76.42
98	RACHKUNTAPALLI-7	0.27	1.27		2.00	0.45	0.25	0.10	18.66	0.40	50.00		3.96		2.59	0.17	0.01	0.05	1.23	49.66	6.06
99	RACHKUNTAPALLI-8	1.62	2.52		2.00	1.81	0.25	0.04	13.36	0.10	50.00		0.50	0.01	1.70	0.02	0.01	0.04	0.25	73.12	2.66
100	RACHKUNTAPALLI-9	0.15	2.33		2.00	0.45	0.25	0.05	13.92	0.19	50.00		1.67	0.01	1.64	0.35	0.01	0.07	0.25	64.43	2.56
101	MEDIPENTLA	0.21	0.50		2.00	1.00	45.75	1.07	269.72	0.43	2645.09		1.44		152.91	0.02	0.01	0.47	87.96	6.02	0.57

102	BAKKANAGARIPALLI-2	0.50	3.09		2.00	0.19	0.52	0.06	7.42	0.06	50.00		0.50		2.07	0.15	0.01	0.05	0.63	51.37	8.25
103	NANDIPALLI	0.94	3.16		2.00	0.44	1.75	0.09	4.56	0.06	50.00		0.50		1.84	0.01	0.01	0.03	0.83	2.75	8.34
104	NANDIPALLI-2	0.96	2.69		2.00	0.21	0.25	0.01	7.12	0.04	50.00		0.50		0.54	0.03	0.01	0.03	0.25	2.15	4.65
105	KATLURU	1.71	3.14		2.00	0.41	3.61	0.02	213.72	0.52	400.83		4.31		8.07	0.02	0.01	0.06	17.09	7.81	17.82
106	KATLURU-2	1.70	1.17		2.00	0.77	1.10	0.02	84.39	0.56	497.09		1.08		11.10	0.02	0.01	0.07	12.79	8.11	1.84
107	DUGGNAGARIPALLI	1.65	4.25		2.00	0.83	3.17	0.02	122.59	0.05	406.41		1.53		4.17	0.03	0.01	0.01	6.60	5.70	7.35
108	MITTAPALLI	0.51	3.47		2.00	8.79	3.66	1.52	129.05	1.30	389.87		0.50	0.01	4.05	0.09	0.01	0.13	6.18	10.88	7.62
109	PERNAPADU	0.17	14.73		2.00	0.72	2.25	0.04	111.07	0.05	657.67		0.50		6.15	0.05	0.12	0.03	16.56	5.86	103.74
110	PENLURU	0.17	0.50		2.00	0.54	10.65	0.18	387.57	0.10	671.21		1.20		4.93	0.05	0.01	0.01	52.33	5.80	3.92
111	KONDAREDDIPALLI	2.07	0.50		2.00	1.46	0.25	0.22	12.66	0.97	50.00		0.50	0.01	0.25	0.31	0.01	0.08	0.60	63.93	5.30
112	KONDAREDDIPALLI-2	2.17	6.64		2.00	1.78	1.86	0.24	81.89	1.14	345.67		1.16	0.01	7.79	0.33	0.01	0.08	12.51	66.06	11.13
113	MOILACHERU	0.34	1.48		2.00	3.03	0.25	0.78	11.31	11.82	141.91		1.05	0.01	0.70	0.08	0.01	1.40	1.98	2.17	20.52
114	PALLIGIRI	0.34	1.08		2.00	0.49	0.25	0.02	15.12	0.09	50.00		0.50		0.56		0.01	0.01	15.72	4.03	1.71
115	RAMREDDIPALLI-2	0.34	2.48		2.00	0.17	11.70	0.01	401.04	0.12	834.77		1.86		14.92		0.08	0.01	32.76	3.85	11.76
116	MUSSIREDDIPALLI	0.51	3.64		2.00	0.09	0.25	0.03	16.05	0.05	50.00		1.36		0.25		0.01	0.01	2.34	1.21	10.07
117	KOTHAPALLI	0.84	1.27		2.00	10.23	0.25	0.57	18.05	1.38	50.00		21.87	0.01	0.25	0.07	0.01	0.07	15.12	7.98	1.66
118	KOTHAPALLI-2	0.88	1.71		2.00	10.17	0.25	0.57	51.23	1.43	50.00		0.50	0.01	0.25	0.06	0.01	0.07	0.25	7.91	7.58
119	KOTHAPALLI-3	0.50	4.08		2.00	0.32	0.58	0.02	66.85	0.05	50.00		1.16		3.15		0.06	0.02	3.87	1.25	16.81
120	GONDIPALLE-2	0.51	7.35	0.01	2.00	1.13	12.88	0.56	383.12	2.33	884.59		4.29		11.74	0.01	0.18	0.09	35.00	6.80	10.73
121	V. KOTHAPALLI-2	0.57	5.90	0.01	2.00	1.42	2.14	0.56	53.23	2.39	159.01		2.82		0.25	0.01	0.08	0.09	8.01	6.67	7.21
122	V. KOTHAPALLI-3	0.36	4.25		2.00	0.89	3.31	0.06	225.20	0.20	613.45		2.23		3.52		0.07	0.03	14.91	0.69	3.57
123	GONDIPALLI-3	0.36	3.58		2.00	0.18	0.89	0.06	23.20	0.13	50.00		1.67		0.25		0.05	0.04	1.33	0.47	15.27
124	KUPPA KUNTLAPALLI	0.45	3.01		2.00	3.30	0.91	0.31	17.22	1.14	50.00		4.06	0.01	0.25	0.02	0.04	0.03	4.26	3.08	4.45
125	KUPPA KUNTLAPALLI-2	0.43	1.75		2.00	3.79	2.82	0.31	185.69	1.17	339.38		1.87	0.01	0.25	0.02	0.08	0.03	12.99	2.97	1.92
126	IMMAMNAGAR	0.71	3.02		2.00	0.22	1.77	0.07	129.28	0.05	100.69		3.35		0.88	0.03	1.65	0.01	18.90	2.84	3.73
127	VEMULA-2	0.31	3.71		6.37	0.90	1.21	0.09	52.79	0.19	50.00		6.34		20.00	0.03	0.12	0.03	30.24	5.99	2.54
128	KOTHAPALLI-4	0.25	7.32		2.00	0.36	1.04	0.04	32.25	0.14	50.00		10.99		0.25	0.02	0.08	0.02	10.99	5.68	6.44

129	VEMULA-3	0.55	7.07		2.00		1.40	0.02	32.22	0.04	50.00		1.99		0.25	0.05	0.09	0.01	12.54	2.68	6.54
130	BACHAYAGARIPALLI-2	0.39	2.38		7.39		0.94	0.02	17.43	0.05	50.00		2.31		0.25	0.02	0.05	0.01	1.34	4.71	6.95
131	VEMULA-4	0.45	3.28		2.00	1.31	1.38	0.88	55.42	0.04	114.78		4.02		17.80	0.04	0.14	0.03	30.56	4.09	2.57
132	VEMULA-5	0.44	2.68		2.00	1.81	1.60	0.93	128.57	0.09	50.00		3.83		0.25	0.05	1.53	0.03	17.84	4.07	3.72
133	VEMULA-6	7.84	2.36		2.00		0.68	0.05	22.06	0.07	50.00		1.23		0.25	0.60	0.02	0.02	1.64	8.23	5.16
134	GOLLAGUDUR-2	9.17	3.07		2.00	2.82	1.28	0.12	25.01	0.33	50.00		1.76		0.25	0.60	0.05	0.76	3.00	8.14	5.24
135	VELPULA	0.31	2.46		2.00		0.72	0.02	17.63	0.06	50.00		1.99		0.25	0.03	0.03	0.01	3.22	4.43	9.30
136	VELPULA-2	0.29	2.06		2.00		1.67	0.07	21.93	0.08	50.00		33.99		0.25	0.02	0.05	0.01	4.07	4.52	7.64
137	BESTAVARIPALLI-3	0.37	1.91		2.00		2.35	0.03	17.32	0.05	50.00		1.88		0.25	0.02	0.06	0.01	5.73	4.52	3.27
138	BUGGUDUPALLI	0.84	2.65		7.02		0.82	0.06	15.23	0.05	50.00		2.15		0.25	0.04	0.03	0.05	1.13	6.73	5.04
139	BUGGUDUPALLI-2	0.80	2.46		4.21		0.78	0.03	14.56	0.07	50.00		0.50		2.39	0.03	0.01	0.02	1.21	6.83	18.83
140	SIDDAMREDDIPALLI	0.95	2.03	0.01	2.00		0.68	0.02	14.57	0.03	50.00		0.50		2.07	0.02	0.01	0.01	1.28	4.33	18.27
141	GOLLALAGUDUR	0.16	2.05		2.00		1.95	0.03	51.56	0.06	119.26		3.60		4.49	0.07	0.03	0.01	51.09	12.83	1.97
142	GOLLALAGUDUR-2	0.14	0.50		2.00		0.63	0.01	18.53	0.03	50.00		0.50		1.76	0.04	0.01	0.01	3.19	12.41	8.39
143	VEMULA-7	0.44	0.50		2.00		1.31	0.02	11.24	0.04	50.00		0.50		2.31	0.03	0.03	0.01	5.32	6.42	7.82
144	VEMULA-8	0.76	0.50		2.00		0.62	0.02	17.62	0.06	50.00		0.50		1.74	0.03	0.01	0.02	2.50	7.10	8.08
145	GONDEPALLI	0.49	0.50		5.71		1.52	0.13	57.33	0.11	50.00		1.69		27.71	0.05	0.07	0.01	33.03	6.56	4.18
146	GONDEPALLI-2	0.96	0.50	0.01	2.00		2.30	0.02	165.41	0.04	466.27		0.50		4.22	0.03	0.40		20.34	4.54	6.03
147	VEMULA-9	0.32	1.25		2.00		0.25	0.13	23.37	0.04	50.00		0.50		2.37	0.02	0.01		1.02	0.92	12.97
148	VEMARPALLI	0.28	3.15		2.00	0.09	1.14	0.33	27.99	0.58	491.74		3.78		4.60	0.23	0.01	0.04	16.47	2.67	93.52
149	VEMARPALLI-2	0.63	3.40		2.00		0.75	0.02	18.01	0.05	50.00		0.50		0.83	0.04	0.01	0.01	1.35	4.36	25.37
150	PULIVENDULA-2	0.62	1.51		2.00		0.58	0.02	25.02	0.09	50.00		0.50		0.72	0.04	0.01	0.01	0.92	31.86	11.77
151	PEDDA RANGAPURAM-2	1.92	1.53		2.00		0.62	0.01	27.25	0.04	50.00		0.50		0.98	0.03	0.01	0.01	1.24	11.35	12.26
152	RACHUMARPALLI	1.41	2.18		2.00		8.87	0.03	337.34	0.03	50.00		0.50		0.64	0.03	0.10	0.04	22.54	6.41	25.96
153	RACHUMARPALLI-2	0.79	2.06		2.00	3.79	3.44	0.46	142.56	1.12	4565.04		1.56		7.88	0.08	0.01	0.19	67.85	7.47	13.40
154	RACHUMARPALLI-3	1.92	3.23		2.00		0.25	0.03	30.15	0.07	128.64		3.60		3.01	0.03	0.03	0.01	11.90	11.54	95.02
155	PEDDA RANGAPURAM-3	1.38	3.65		21.95		6.12	0.02	86.35	0.03	2288.50		0.50		2.68	0.03	0.01	0.04	15.56	6.53	4.54
156	PULIVENDULA-3	0.61	0.50		2.00		1.25	0.02	190.64	0.05	50.00		7.96		65.11	0.04	1.60		379.29	4.46	0.80

157	IPPTALA-2	0.45	0.50		2.00	0.17	0.88	0.15	25.40	0.17	50.00		0.50		1.25	0.02	0.01	0.02	1.43	3.01	5.42
158	IPPTLA-3	0.43	0.50		2.00		1.04	0.04	20.09	0.14	50.00		0.50		0.92	0.03	0.01	0.05	0.74	3.42	5.56
159	IPPTLA-4	0.72	0.50		2.00	0.02	0.62	0.03	34.30	0.25	50.00		0.50		0.51	0.03	0.01	0.03	0.25	2.90	4.57
160	IPPTLA-5	0.71	1.16		2.00		0.90	0.18	19.11	0.29	50.00		0.50		1.10	0.03	0.01	0.03	2.28	2.90	6.75
161	THERNAMPALLI	0.61	0.50		2.00		0.71	0.11	17.00	0.09	50.00		0.50		0.90	0.02	0.01	0.01	0.61	2.10	5.32
162	THERNAMPALLI-2	0.72	0.50		2.00		0.87	0.03	23.86	0.08	50.00		0.50		1.54	0.03	0.01	0.01	2.51	2.55	6.15
163	THERNAMPALLI-3	0.50	2.02		2.00		1.02	0.03	18.96	0.10	50.00		0.50		3.07	0.02	0.01	0.01	6.14	2.39	15.89
164	ERRAMREDDIPALLI-2	0.62	2.13	0.01	2.00	0.26	0.78	0.05	18.16	0.57	50.00		0.50		2.63	0.03	0.01	0.06	4.76	3.88	16.21
165	CHINNARANGAPURAM-2	0.71	0.50		2.00		0.70	0.02	18.58	0.07	50.00		0.50		0.90	0.03	0.01	0.01	2.77	2.57	10.78
166	CHINNARANGAPURAM-3	0.58	1.34		2.00		2.17	0.05	29.54	0.07	50.00		0.50		1.97	0.03	0.01	0.01	4.39	2.11	14.04
167	CHINNARANGAPURAM-4	2.55	0.50		2.00	0.11	0.70	0.01	20.50	0.05	50.00		0.50		1.05	0.03	0.01	0.01	0.25	8.59	4.64
168	BESTAVARIPALLI-4	0.47	0.50	0.01	2.00		0.82	0.02	19.91	0.05	50.00		0.50		1.35	0.02	0.01		1.61	3.31	4.68
169	ERRABALE	0.35	0.50		2.00		0.25	0.10	23.31	0.11	50.00		0.50		0.98	0.05	0.01	0.02	0.25	6.77	12.79
170	BRAHMANAPALLI-2	0.29	0.50		2.00		0.25	0.11	30.11	0.20	50.00		0.50		1.03	0.02	0.25	0.02	1.39	3.20	12.26
171	NALLAPUREDDYPALLI-2	0.32	0.50		2.00	0.25	1.21	0.16	25.61	0.16	50.00		0.50		1.07	0.03	0.01	0.01	3.84	6.72	14.47
172	KOTHAPALLI-5	2.64	0.50		2.00	0.04	1.12	0.04	33.87	0.14	50.00		0.50		3.36	0.11	0.01	0.02	4.25	6.52	11.08
173	CHANDRAGIRI	0.31	0.50		2.00		0.87	0.02	37.81	0.24	50.00		0.50		3.04	0.02	0.01	0.03	48.99	3.37	11.05
174	NALLAPUREDDIPALLI-3	0.33	0.50		2.00		0.70	0.05	40.51	0.05	50.00		2.18		1.32	0.06	0.01	0.01	9.86	68.16	6.60
175	NALLAPUREDDIPALLI-4	0.31	0.50		2.00		0.77	0.01	20.36	0.04	50.00		0.50		1.03	0.02	0.01		0.60	3.07	2.22
176	AMBAKAPALLI-2	0.35	2.59	0.02	2.00		0.79	0.05	19.66	0.49	50.00	0.01	0.50		2.30	0.03	0.01	0.02	19.41	39.65	13.20
177	KUPPALAPALLI	0.15	1.38		2.00		1.56	0.01	22.73	0.07	50.00		0.50		1.40	0.02	0.01	0.02	9.86	1.10	8.03
178	TATTIMAGULAPALLI	1.50	2.56		2.00		0.59	0.02	23.37	0.05	50.00		0.50		0.25	0.03	0.01	0.01	26.72	4.33	21.65
179	CHERLOPALLI-2	1.44	0.50		2.00		0.80	0.03	14.55	0.04	50.00		0.50		0.70	0.02	0.01		8.13	4.49	2.70
180	GUNDLAPALLI-2	0.10	0.50		2.00		1.26	0.05	29.86	0.10	50.00		0.50		0.91	0.02	0.01	0.02	5.92	6.09	2.49
181	CHAGALLERU	0.09	0.50		2.00		1.48	0.01	36.41	0.10	50.00		0.50		1.46	0.01	0.01	0.02	8.90	6.17	2.35
182	CHAGALLERU-2	0.99	0.50		2.00	1.00	0.60	0.12	31.73	0.10	50.00		0.50		1.05	0.03	0.01	0.01	8.18	6.53	10.03
183	CHAGALLERU-3	0.56	0.50		2.00		0.74	0.02	26.74	0.05	50.00		0.50		0.73	0.06	0.01	0.01	0.61	7.37	9.06
184	CHAGALLERU-4	0.71	1.30		2.00		1.52	0.06	115.30	0.22	213.42		1.11		4.95	0.07	0.06	0.37	37.87	4.62	38.27
185	CHAGALLERU-5	0.62	0.50		2.00		1.39		107.68	0.01	450.43		0.50		4.14	0.27	0.01		21.44	7.67	34.83

186	GOLLALAGUDUR	0.95	1.90		2.00		1.51	0.11	36.02	0.08	125.15		0.50		2.06	0.04	0.01	0.01	11.01	6.66	21.45
187	GOLLALAGUDUR-2	0.11	2.31		2.00		5.15	0.20	62.33	0.52	50.00		0.50		1.53	0.09	0.05	0.17	5.57	16.30	18.24
188	GOLLALAGUDUR-3	0.15	2.65		2.00	0.15	1.68	0.20	112.20	0.63	50.00		0.50		1.79	0.10	0.01	0.19	1.67	15.18	11.97
189	PEDDA JUTTUR-2	1.11	1.96		2.00		1.02	0.07	35.66	0.11	113.06		0.50		1.62	0.04	0.01	0.02	10.76	10.68	21.55
190	YEDULA YENI	1.08	2.46		2.00		1.55	0.08	108.16	0.12	50.00		0.50		1.96	0.04	0.01	0.02	1.67	10.72	11.97
191	YEDULA YENI-2	2.09	0.50		2.00		0.92	0.02	20.23	0.07	50.00		0.50		1.76	0.04	0.01	0.02	1.66	15.17	21.37
192	BASIREDDIPALLI	2.99	0.50		2.00	0.49	1.37	0.14	19.66	0.08	50.00		0.50		2.37	0.05	0.01	0.01	4.99	6.62	20.92
193	PULIVENDULA -5	2.67	0.50		2.00	1.08	0.70	0.12	20.26	0.07	50.00		3.36		0.91	0.03	0.01		0.55	6.13	4.66
194	PULIVENDULA -6	0.37	0.50		2.00	4.66	2.32	0.02	146.09	0.09	417.72		0.50	0.02	3.96	0.03	0.38	0.02	17.48	10.29	5.99
195	KANAMPALLI-2	2.18	0.50		2.00	0.33	0.25	0.04	16.29	0.07	50.00		0.50		0.94	0.02	0.01	0.01	0.25	2.76	18.12
196	VEMMARPALLI	0.39	0.50		2.00	5.76	0.96	0.01	17.20	0.08	50.00		0.50	0.03	0.93	0.04	0.01	0.02	1.16	10.44	17.79
197	KANAMPALLI-3	1.67	0.50		2.00	0.68	26.57	0.05	312.92	0.09	1855.10		1.43		4.70	0.02	0.01	0.01	27.42	232.43	14.02
198	KANAMPALLI-4	0.65	0.50		2.00		1.10	0.03	22.88	0.03	125.44		0.50		0.90	0.06	0.01		2.08	9.51	13.83
199	MOTHNUNTALAPALLI-2	0.64				0.70		0.04		0.09						0.02		0.01		9.67	
200	MOTHNUNTALAPALLI-3	1.66				1.00		0.03		0.10						0.02		0.01		234.66	