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REPORT OF THE CHIEF SECRETARY, GOVERNMENT OF ANDHRA PRADESH IN COMPLIANCE WITH HON'BLE NGT, CHENNAI ORDERS IN O.A.NO.259 OF 2020 (SZ) & O.A .NO.2 OF 2021 (SZ)

PREAMBLE

The above two cases have been registered as Suo Motu by this Hon'ble Tribunal on the basis of the newspaper reports published in The Indian Express dated 09.12.2020 and also in The Times of India dated 09.12.2020 under the caption "**Andhra Town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples", "Heavy metal content in water caused mysterious disease in Andhra Pradesh"** respectively and a news item in NDTV dated 09.12.2020 under the caption **"Lead, Nickel found in blood of people with mystery illness in Andhra",** in "The Hindu" dated 15.12.2020 under the caption "Mystery illness raises Concerns over Kolleru pollution".

OPPERATIVE PORTION OF THE HON'BLE NATIONAL GREEN TRIBUNAL (SZ) ORDERS.

ORDER DATED 16-12-2020 IN O.A No.259 of 2020 IN PARA No. 8 IS AS FOLLOWS

8. The District Collector, West Godavari District, 3rd respondent Ministry of Health, Medical and Family Welfare and the 4th respondent Andhra Pradesh State Pollution Control Board are directed to submit their independent reports regarding the above issue.

ORDER DATED 07- 06 -2021 IN O.A No.259 of 2020 AND OA NO.2 OF 2021 IN PARA NOs. 15 & 17 IS AS FOLLOWS

15. As regards the Solid Waste Management Rules, 2016 is concerned, they have not mentioned anything about the existing legacy waste and what are all the steps taken by them to dispose of the legacy waste, if any, in a scientific manner as provided under the Solid Waste Management Rules, 2016.

17. The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be taken for improving the water quality in that lake.

ORDER DATED 26- 10 -2021 IN PARA NOs. 5, 7, 8 & 9 IS AS FOLLOWS:-

5. District Collector is directed to look into the issue mentioned in the newspaper report mentioned above and file a detailed report regarding the action taken for protecting the lake from pollution as well as encroachments. It is also mentioned in the report that unauthorised roads and buildings were also constructed in the Kolleru lake which had, as per the revenue record, having original extent of nearly 95,000 ha. of which 20,000 ha. is said to have been encroached.

7. Considering the fact that Kolleru Lake is a notified Wet Land and it may be under the control and maintenance of Forest Department, we feel that it is necessary to implead the Principal Chief Conservator of Forests, Head of Forest Forces, Andhra Pradesh and also District Forest Officer, West Godavari District as additional respondents 9 and 10 in O.A. No. 2 of 2021 and office is

directed to carry out the amended in the cause title. Mrs. Madhuri Donti Reddy had taken notice for those Government Departments as well.

8. District Collector as well as the Forest Department through PCCF are directed to submit a report regarding the nature of encroachments, steps taken by them to remove the encroachments and protect the water body and if there is any scheme launched by the Government of Andhra Pradesh to protect this water body, then what is the stage of its implementation etc before the next hearing date apart from filing the report directed by this Tribunal in the previous orders by the Pollution Control Board.

9. They are directed to file the report along with map of Kolleru Lake depicting encroachments on or before 23.12.2021 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

ORDER DATED 03- 01-2022 IN PARA NOs. 4 TO 6 IS AS FOLLOWS:-

4. It is seen from the report that there are certain deficiencies noted stating that complete survey as required has not been conducted. It is also mentioned in the report that out of 2,25,50 Acres of total lake area, only 34.24% of lake has been declared as Kolleru Wildlife Sanctuary. It is also mentioned that to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by involving all the stakeholders working in Kolleru Lake Basin to manage the Kolleru Lake/wetland holistically.

5. It is also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department is also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They are also directed to file an independent report in this aspect before this Tribunal.

6. The State of Andhra Pradesh is directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.

ORDER DATED 30- 03 -2022 IN PARA NOs. 4, 5, 6 & 7 IS AS FOLLOWS:-

4...The Agriculture Department was also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They were also directed to file an independent report in this aspect before this Tribunal.

5. The State of Andhra Pradesh was directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.

6. It is seen from the newspaper report that in spite of directions given by this Tribunal to conduct scientific study and for removal of encroachments and hand over the lake area to the Forest Department as part of the wildlife sanctuary, certain illegal activities of creating fish ponds in the wildlife sanctuary are being undertaken at Pedayaganamalli Village, Eluru Mandal.

7. The Chief Secretary, State of Andhra Pradesh is directed to conduct an enquiry through the respective District Collector and the Conservator of Forests to look into the issue referred to in the newspaper report mentioned above and submit a factual as well as action taken report by the respective departments in this regard.

ORDER DATED 04- 04-2022 IN PARA NOs. 7 & 8 IS AS FOLLOWS:-

7. The Government was directed to conduct a comprehensive and scientific study with the help of expert in the field of wet land/lake management and as to how the Kolleru Lake Basin can be managed holistically. As regards this study is concerned, the Learned Counsel for the State of Andhra Pradesh submitted that a high level committee has been constituted for this purpose and they are undertaking study in this regard. Though, declared as a Ramsar site as per the schedule attached to the Wetland Conservation and Management Rules, 2010, only a portion of land has been declared as Wildlife Sanctuary and handed over to the Forest Department. We have opined that considering the importance of the lake and its biological diversity and ecosystem, the entire area will have to be identified and handed over to the Forest Department and they wanted some time for this purpose.

8. Considering the fact that the present disaster due to unknown disease, itself could be due to some damage caused to environment especially water quality in Kolleru Lake, we feel that some more time can be granted to State of Andhra Pradesh to conduct the holistic study as suggested by the Principal Chief Conservator of Forests and come with a proper report before this Tribunal on or before 24.05.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

HIGH LEVEL JOINT COMMITTEE RECOMMENDATIONS

The Committee, after several rounds of in-depth deliberations, arrived at several recommendations which can be broadly categorised as short term action strategies and long term preventive strategy.

The preventive strategy will involve the following:

1. Involving reputed national Institutions like AIIMS, IICT, NEERI on a long-term basis by the District Administration. The teams will make a deep-dive to understand further the nature of the episode. It would require systematic sampling of all likely sources from origin to human consumption. Water, food air and soil analysis on a long term basis need to be done with a proper research design and sample design. Data collected needs to be analysed to arrive at a long term strategy. The study must go beyond the Eluru city and shall include the West Godavari and East Godavari Districts due to the similar nature of topography, irrigation and agro climatic conditions. Teams from AIIMS, New Delhi, IICT Hyderabad, PHFI with its Indian Institute of Public Health, Hyderabad would conduct these studies which shall be assisted by the District Collectors.

2. A Multidisciplinary Health and Environment Monitoring Framework need to be developed for these studies. A Monitoring cell for this purpose will be opened under the aegis of EFS&T Department with representation (not below the cadre of Joint Director) from Department of Health, Agriculture, Environment, Animal Husbandry and Municipal administration. All line departments shall give necessary assistance to this multi-agency, multi-disciplinary team.

3. A high level committee under the Chairpersonship of Chief Secretary to the Government may be set up with senior officers from Department of Health, Agriculture, Environment, Animal Husbandry, Irrigation and Municipal Administration.

4. This high level committee shall get action plans prepared by all the line departments for monitoring water, food, air , soil , Agriculture, Aquaculture residues etc. on regular basis. Further, the implementation of these action plans shall be monitored by the High level committee constituted.

5. Surveillance plan of action for identifying source of heavy metals in blood in Eluru Municipal Corporation area needs to be developed by the Municipal Department in co-ordination with the Andhra Pradesh Pollution Control Board. A statistical database with periodical updating needs to be developed for items like water supply including both surface and ground water at all possible tapping points. All food sources shall also be closely monitored for heavy metals. Further industrial sources including sewerage and solid waste management practices of the Eluru Corporation shall be closely monitored for finding out and eradicating presence of heavy metal in the human beings in Eluru area. This activity shall be coordinated by the AP Pollution Control Board.

6. A broad study of the entire West Godavari District with regards to above parameters is required for a comparative study with Eluru Municipal Corporation area. If required both districts of East and West Godavari shall be included in these studies. The AP Pollution Control Board shall undertake this study in coordination with Municipal Corporation, Eluru.

7. Since the pesticides are likely to contribute to such episodes, it is very crucial that the banned compounds like DDT, DDE Endosulfan should not reach upto the agricultural fields. Strict implementation by the regulatory authorities is required for this. Department of Agriculture is advised to submit a detailed action plan within one month to achieve this goal.

8. Promotion of organic and nature-based farming should find key place in the agricultural policy. Zero Budget Natural Farming (ZBNF) wing of Agriculture Department to identify all villages in and around Eluru Municipal Corporation area for promoting agriculture of vegetables following the organic farming methods. Dedicated outlets to be opened in Eluru Municipal Corporation area for marketing and sale of the organically grown products. Department of Agriculture should also submit a detailed action plan for this within one month.

9. Surveillance plan of action for monitoring the quality of milk needs to be developed by the Animal Husbandry Department within one month.

10. Usage of Chemicals for Aqua farming in areas surrounding the Eluru city needs to be reduced in the long run by the Fisheries Department. Surveillance plan of action for monitoring the aquaculture in the West Godavari District to identify and stop usage of any banned products needs to be developed by the Fisheries Department within one month.

11. Setting up of state of art labs at Vizag, Guntur and Tirupati under the aegis of Health Department. These labs should have the capacity to detect all kinds of organo-chlorines and organo-phosphates in all mediums like water, food, blood, serum etc., They should also be able to detect all kinds of heavy metals especially lead, nickel, and mercury etc. in all mediums like blood, blood serum, water milk and vegetables etc. further each district also should have one lab for water and food analysis. Samples from different sources, establishments and locations in the entire state need to be randomly checked periodically in these labs. A scientific matrix of sampling needs to be evolved so that regular surveillance on food materials and water is maintained in the district labs. Regional labs should have advanced facilities at par with research institute labs for testing blood and serum.

12. Irrigation Department should take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal at the earliest.

The steps to be taken up in the short term for immediate action are detailed below

1. Irrigation Department should take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month.

2. The municipal water supply management forms the corner stone. Regular testing along with documentation needs to be ensured. While the water samples tested by the MA&UD indicated that the water supplied by Eluru Municipal Corporation is safe and as per standard, periodic checking must be ensured to rule out any contaminants. Similar system must be brought in place for all municipal water supply systems in the State.

3. The municipal water quality needs to be checked for more parameters like organo-chlorines and organo-phosphates on a periodical basis. Currently the water samples are checked for certain parameters like TDS etc., only.

4. Stand-alone RO units should also be checked for presence of heavy metals in water used by Institute for Preventive Medicine (IPM), AP Vijayawada.

5. Solid waste management in Eluru needs to be analysed for any likelihood of heavy metals leaching into the soil and then reaching to the human food chain through ground water. This task shall be taken up by the Municipal Administration and Urban Development (MA&UD) Department.

6. Periodical inspections of prominent Rythu- Bazaars and market places and sample collection for heavy metals and pesticides presence should be taken up by the Marketing Department.

7. Entire distribution network including pumps, ESLRs and pipelines should be thoroughly checked for material integrity and the same should be done on a regular basis in future. Steps should be taken to keep the entire system under positive pressure at all times in future. This should be done by the Municipal Administration and Urban Development (MA&UD) Department.

8. Testing of Pesticides / Weedicides / Fertilizers etc., being used in the district must be taken up by Agriculture Department to ensure proper quality.

The Govt. Andhra Pradesh constituted a Multi- Disciplinary Committee headed by the Chief Secretary to Government on 10.12.2020 (G.O. RT. No. 1946 dt. 10.12.2020), to investigate the resources of episode on long term basis to suggest remedial measures to prevent re-occurrence of such incidents in future. Further, GoAP constituted High Level Committee headed by the Chief Secretary to Government on 09.02.2021 (G.O.Rt.No.63, dated 09.02.2021) to monitor the implementation of the recommendations made by the Multi Disciplinary Committee on sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari.

The Govt. of Andhra Pradesh submitted the Multi- Disciplinary Committee report with recommendations to the Hon'ble NGT on 30.03.2021. The Hon'ble NGT, Chennai vide its order dated.07.06.2021 heard the issues related to Kolleru Lake Pollution also in addition to the incident on sudden convulsions and issued various directions to the Government Departments in A.P. Action taken and implementation plan with preventive measures by the various departments are submitted as follows:

A: Medical and Health Department:

1. An incident of sudden convulsions cases reported in Eluru Municipal Corporation, West Godavari District on 5th to 10th December, 2020. On 5th December 2020 afternoon, number of cases were reported at District Hospital, Eluru with symptoms of convulsions and loss of consciousness who had no previous history of seizures or other neurological conditions, fever, headache, vomiting, diarrhea, head injury or trauma. After 5pm large numbers of cases were reported with similar symptoms.
2. The District Medical and Health Department was alerted immediately after receiving the information from the District Hospital. The Government involved various departments like Municipal Administration, Zilla Parishad, District Malaria Department, District Public Health Laboratory, and Animal Husbandry for Outbreak Emergency Response and Preparedness planning. All Outbreak Emergency Response and Preparedness activities were implemented with immediate effect on 05.12.2020 in the view of prevention and control for early identification and case management.
3. The GoAP constituted a Multi- Disciplinary Committee headed by the Chief Secretary to Government on 10.12.2020 (G.O. RT. No. 1946 dt. 10.12.2020), to investigate the resources of episode on long term basis and to suggest remedial measures to prevent re-occurrence of such incidents in future.

Implementation plan: Preventive measures

The Medical & Health Department will regularly conduct health checkups in and around the affected areas of Dakshinapuveedhi, Fish market area, Padamaraveedhi, Sunkaravarithota, Thangellamudi and Vengaigudem to monitor the health issues if any.

B. Eluru Municipal Corporation:

In all 62 wards and 22 village secretaries in Eluru constituency, active surveillance was conducted. 24/7 paramedical teams were deployed to conduct house to house survey. Super sanitation activities like removal of old debris and silt from drains, Fogging and Spraying Chlorination tests, Leakage identification and correction, removal of old pipes passing through culverts, disconnection of hand bores which are connected to municipal supply head water works was done. Chlorination was done in all the affected and unaffected areas of the Municipal Corporation.

Implementation plan: Preventive measures

The Eluru Municipal Corporation is regularly conducting more parameter tests in the drinking water supply to the public in the corporation area to identify any contamination in order to take immediate action for ensuring safe drinking water supply.

The Eluru Municipal Corporation intensified the sanitation at affected areas of Dakshinapuveedhi, Fish market area, Padamaraveedhi, Sunkaravarithota, Thangellamudi and Vengaigudem for maintaining hygienic conditions in the areas.

C: Agriculture Department:

- The Special Chief Secretary, Agriculture & Cooperation Department is the Member in the Multi-Disciplinary Committee for investigation of outbreak – sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari as per the GO Rt.1946 dated 10.12.2020 of General Administration (SC.I) Department.
- A High Level Committee was constituted to examine the action plans prepared by all the Line Departments for monitoring water, food, air, soil, Agriculture, Aquaculture residues etc. on regular basis as per the GO Rt.63 dated 09.02.2021 of Health, Medical & Family Welfare (B2) Department. The Special Chief Secretary, Agril & Cooperation Department is the Member of the Committee.
- The CIPMC, Vijayawada has drawn 7 Samples each from Tap Water, Fish Pond Water, Tomato, Bitter Gourd, Green Chilli, Plain Gourd and Paddy and sent to NIPHM for analysis.
- In three samples drawn from Green Chillies was found to be more than the Food Safety and Standards Authority of India (FSSAI) Maximum Residue Limits (MRLs) i.e Novaluron with 0.05 mg/Kg against 0.01 mg/Kg, Pyriproxyfen with 0.77 mg/Kg (0.02) and Flubendamide 0.04 mg/Kg (0.02) .
- Based on the suggestions, the team has collected 20 Soil Samples from 10 locations in Paddy fields in different depths i.e 0-15 cm & 15-30 cm on 13.12.2020, 14.12.2020 and also interacted with the farmers.
- The team also preparing project for long term monitoring of heavy metals and pesticides in soil, water and plant of rice-based ecosystem in the Godavari Delta.
- These soil samples analyzed for fertility status (at RARS, Maruteru), heavy metal load (at RARS, Anakapalli) and pesticide contamination in ANGRAU (RARS, Tirupathi) and NIPHM laboratories.

The preliminary findings are:

- Soils are found to be non saline, medium in organic carbon and available nitrogen content and high in available potassium status.
- Heavy metals ie Chromium (Cr), Cobalt (Co), Nickel (Ni), Cadmium (Cd) and Lead (Pb) are present within the permissible limits.
- In none of the samples pesticides are found above maximum residue limit. However, pesticides residues (ppm) of Tricyclazole (0.043), Hexaconazole (0.043) in sample no 1, Tricyclazole (0.036), Chlorpyriphos(0.464) in sample no 7, Tricyclazole (0.023), Butachlor (0.066) in sample no 8, Butachlor (0.078) in sample no11, Tricyclazole (0.024) in sample no 13 and Tricyclazole (0.019) in sample no 15.
- No significant difference was noticed with respect to proximity and direction towards epicentre.
- Further, variation is not noticed between surface and sub surface samples, indicates that no pattern of accumulation effect of contaminants / nutrients.
- Based on the results, it can be assumed that soils are safe, cause of ailment is not from soil or no residues are present in it. The ailment is not caused due to soil / contaminants are not present in the soil.

- Ailment might have caused from water/ other food materials ie milk, vegetables, rice etc.
- The team is of the opinion that regular holistic monitoring of soil, water, plant and animal produce is required in a project mode.

Implementation plan: Preventive measures

The following initiatives / actions were taken:

- Dr.YSR Polambadis (Farmer Field Schools) have been evolved to be an effective tool for tackling the problem of indiscriminate use of chemicals in Agriculture and to counteract the adverse effects caused by their usage. During the other training programmes being organized by the Dept, awareness is being created on IPM practices and safe & judicious use of pesticides in Field, Vegetable and fruit crops.
- The Government of Andhra Pradesh have organized the Farmer Field Schools (FFS) in the name of *Dr. YSR Polambadi* as *Rythu Bharosa Kendras (RBK)* centric in each Gram Panchayat in the State to educate the farmers on the need for reducing the usage of chemical pesticides in plant protection operations and to shift to integrated approaches like IPM, INM, IDM as an integral part of Integrated Crop Management (ICM) for prosperity in Agriculture.
- Farmers are being advised to use Biorational insecticides for use in vegetables and other crops which are low risk to non-target organisms, high target specificity and versatility in application in place of Organo Phosphate chemical pesticides.
- The Department of Agriculture has organized 5037 Farmers Field Schools (FFS) i.e Dr.YSR Polambadis in Rabi 2019- 20 covering 1.51 lakh farmers, followed by 10790 FFSs in Kharif 2020 educating 3.23 Lakh farmers and organized 8640 FFSs during the Rabi season 2020-21 to train 2.59 Lakh farmers and 16,284 Polambadis were organized during 2021-22 to train 4.88 Lakh farmers in all major field crops like Rice, Cotton, Pulses, Maize, Millets, Ground nut etc.
- The Department of Horticulture have organized Thota Badis in the State to create awareness and to train the farmers on judicious and safe use of Pesticides on vegetables and orchard crops.
- By establishing (11) bio control labs, government has been enhancing the production of bio control agents like Trichoderma Viridi, Pseudomonas fluorescens and Metarrhizium and promoting the use of bio control agents.
- In addition to that Botanical pesticides (Neem based products) are promoted by conducting demos at Gram Panchayat level at each Rythu Bharosa Kendralu (RBKs), a novel one stop shop for extending both technical know-how through capacity building and pre tested Agri Inputs delivery.
- Educating the Farming community about Good Agricultural Practices (GAPs) to reduce use of Chemical pesticides through District Resource Center (DRC) of State Agricultural Department, KVKs, DATTC, Agricultural Universities, CIPMC etc.
- In addition to this DRCs are conducting regular field diagnostic visits and creating awareness among farmers on IPM and organic farming.
- Maximum Residue Limits (MRLs) of pesticides are being monitored at farm gate level by taking samples and analyzing by NIPHM and creating awareness accordingly through Farm Field Schools i.e Dr. YSR Polambadi and Thota badi.
- Promotion of Organic Farming in the farmers' fields.

The Agriculture Department will continue the above measures to implement the IPM practices and safe & judicious use of pesticides in Field, Vegetable and fruit crops.

D. Water Resources Department:

The River Thammileru before entering into Eluru city in Eluru Disrict bifurcates into East Thammileru and West Thammileru arms and flows in the middle of the Eluru city and crosses GNT road and Eluru canal (Krishna Delta) before entering into Kolleru lake. The lengths of East Thammileru river of 2.08 KM and West Thammileru river of 4.2 KM, the local drains from the Eluru city are the ones that carry domestic effluents letting into Thammileru river and adjoins into East locks and West locks of Eluru canal of Krishna Delta respectively. The municipal drainage inlets are having shuttering arrangements and maintained by the municipal department during floods. But the effluents from municipal drains are being merged into the Eluru canal, subsequently entering into the inlet water source of Pampulacheruvu which is the drinking water reservoir for Eluru city where water is pumped into reservoir on Eluru canal of Krishna delta at KM 60.390.

The Water Resources Department, GoAP., has further informed that cleaning of Eluru Canal in the Eluru Municipal limits was already taken up in the Month of May and June – 2021 and water was supplied through Krishna Eluru Canal during Khariff Season for Drinking water purpose and removal of weed and desilting of Eluru Canal between Km 60.100 to Km 65.000 (in between West lock and East lock) Estimate was prepared and submitted to Commissioner, CADA, Vijayawada. Soon after receipt of the approval from the CADA the work will be taken up in the Month of May & June 2022.

Implementation plan: Preventive measures

The Water Resources Department engaged the consultant for carrying out water quality assessment of various drains, complete GIS map for Kolleru Lake with in-falling drains, boundaries, lake morphology, annual rain fall, etc. with following objectives and suggest remedial measures for restoration of water quality of the lake duly involving other stakeholder departments like Forest, Agriculture, Municipal and Fisheries.

Objectives of the study:

- To collect and analyze secondary data and captured primary data for evaluating the impact of all physiochemical, bacteriological and heavy metal, industrial effluents, and agricultural residues of all notified major drains in close consultation with the A.P pollution control board, Agriculture/ Fisheries departments (to avoid duplication of efforts).
- To suggest a few alternative measures to mitigate the pollution levels in Kolleru Lake and its in falling drains depending on site conditions, and present the best results as a Feasibility Study Report containing short-term and long-term measures.
- To integrate the data as well as the results with state WRIS and India WRIS as a dynamic system, to be updated by the department after the expiry of the contract.

- To carry out capacity building of the department to enable undertaking of similar works in the future.

E. DEPARTMENT OF REVENUE

The action taken by the then District Collectors, West Godavari & Krishna Districts. (Presently this Kolleru lake area comes under Eluru District after formation of new districts.)

The Government involved various departments like Municipal Administration, Zilla Parishad, District Malaria Department, District Public Health Laboratory and Animal Husbandry for Outbreak Emergency Response and Preparedness planning. All Outbreak Emergency Response and Preparedness activities were implemented with immediate effect on 05.12.2020 in view of prevention and control for early identification and case management.

Day wise activities were planned and Active Surveillance system was established for ensuring quality and emergency care management. Paramedical teams were deployed to conduct house to house survey. Day wise super sanitation drive was planned. Ambulance services (108) were mapped to multiple areas covering Eluru constituency for shifting of patients in view of emergencies. Elaborate arrangements were made to ensure quality medical care in all village and ward secretariats, UPHCs and PHCs in Eluru, District Hospital-Eluru, ASRAM Hospital, Andhra Hospitals and Chaitra Hospital were all covered.

The Hon'ble Deputy Chief Minister and Hon'ble Minister of Health and Family Welfare A.P, Principal Secretary Health, Commissioner of Health and Family Welfare A.P, District Collector and Magistrate, W.G District, Joint Collector VSWS & Development; W.G District, Director of Health and Family Welfare A.P and State Medical and Health Team, State Surveillance Unit, District Medical and Health Officer and team, Medical Superintendent and District coordinator for Health Services and team, District Surveillance unit, District Municipal and Mandal Administration and other district and state teams came into force for the prevention and control of the outbreak.

The Collector and District Magistrate, West Godavari has submitted a report on 02.04.2022 about offence cases registered and details of Proclainers seized and further informed that necessary action being taken as per the provision of Wildlife Protection Act, 1972 against people who were attempting illegal bund formation. Further, on the said issue, the Divisional Forest Officer, Wild Life Management Division, Eluru has reported that, an offence case was registered vide O.R.No.72/2021-22, dt. 26.03.2022 against A1. Bale Nageswara Rao A2. Bale Putta Swami A3. Ghantasala Daveedu Raju from Pedayaganamalli village involved in illegal repair work of old tank in Sy.No.1100 & 1101 (Govt., Land) to an area of Acre. 95.00 cents and seized a Proclainer (Tata Hitachi) and filed the case before the Hon'ble Add. Judicial Magistrate of First Class Court, Eluru. Further he stated that the staff have breached the bunds at various lengths on three sides of the tank on 30.03.2022 to make the area unsuitable for aquaculture.

Implementation plan: Preventive measures

The District Administration will take necessary action as per the provision of Wildlife Protection Act, 1972 for attempting illegal bund formation and also wherever possible

illegally constructed bunds were breached already to certain extent and further maximum portion of bunds will be removed to make the area unsuitable for aquaculture.

F. Forest Department:

The Forest Department, Govt. of AP submitted report to the Hon'ble Tribunal including to conduct a comprehensive scientific study to save the wildlife sanctuary as well as the lake against pollution.

Kolleru lake is an important wetland in Andhra Pradesh. Out of the total area of the lake which is upto +10 feet MSL contour (Ac. 225250) only upto +5 feet MSL contour (Ac. 77138) has been declared as a wildlife sanctuary in the year 1999. After "Operation Kolleru – 2006", the sanctuary lands were consolidated by the Revenue Department of both the Districts and handed it over to the Forest Department. Since then, the Forest Department is managing the sanctuary effectively despite of all hurdles. The seasonal encroachments in the area mostly for aquaculture have been tackled by registering offense cases, demolishing the bunds, conducting village level awareness programmes.

Forest Department is implementing various activities through State and Central Schemes. The main activities implemented broadly in the sanctuary area are protection, wildlife habitat improvement, ecotourism, development of bird congregation site, infrastructure development, etc. Overall, an amount of Rs. 30 crore (Approx) has been spent in the sanctuary area from 2006-07 to 2020-21. Some of the important State and Central Schemes being implemented currently in the sanctuary area are CAMPA, BIOSAP, 04-sanctuaries, 06-Development of National Park & Sanctuaries, Centrally Sponsored Schemes – Conservation of Natural Resources & Aquatic Ecosystem etc.,

Implementation plan: Preventive measures

1. **Protection:** Establishment of base camps, strike force, check posts for regular patrolling, collecting intelligence, preventing encroachment activities, checking vehicle movement that carries fertilizers, chemicals, and fish feed into sanctuary area etc. Presently, 5 base camps, 1 strike force, and 6 check posts are functioning from various locations in the sanctuary area.
2. **Habitat improvement:** The activities like desilting drains, demolition of old bunds, removal of water hyacinth and other weeds, formation of mounds, planting of trees for bird nesting, installation of artificial perching stands, releasing fish fingerlings (food for aquatic birds) etc., are being taken up to create a favourable environment for the wildlife to survive.
3. **Research & Monitoring:** Regular census is being conducted to enumerate different bird species and their population. Research related to tagging of birds was conducted earlier by BNHS. Presently, through M.S. Swaminathan Research Foundation (MSSRF), a study is being conducted on socio-economic and livelihood assessment of communities living in and around Kolleru Wildlife Sanctuary.
4. **Ecotourism:** The ecotourism facility at Aatapaka and Madhavapuram in the sanctuary caters to the visitors and acts as a Conservation Education Centre. Presently facilities like Environmental Education Centre, watch tower, boating are being maintained by the Department. These facilities are being managed by local communities under the supervision of the Forest Department.

5. **Awareness creation:** Regular village level awareness programmes are being taken up and competitions for school and college students are being conducted during World Wetland Day, World Environment Day, Wildlife Week etc., mainly for gaining their support in the protection and conservation of this wetland.

G: A.P. Pollution Control Board:

The APPCB inspected the affected areas of Eluru town from 5th to 11th December, 2020, monitored Ambient Air Quality and collected water samples at various locations of drinking water sources in major affected areas.

The Andhra Pradesh Pollution Control Board (APPCB) approached CSIR-NEERI, Hyderabad Zonal office to undertake environmental assessment study comprising of ambient air, surface water, ground water and soil components. Accordingly, CSIR-NEERI, Hyderabad Zonal office submitted report. The CSIR-NEERI vide report dated 06.1.2021 recommended to conduct periodic assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for atleast next 6 months.

The APPCB monitored Ambient Air Quality and collected water samples at the same locations from February, 2021 to June, 2021 as earlier, as conducted by NEERI. Out of 18 locations, samples of ground water (11) and surface water (7) were collected in and around Eluru and submitted report to Hon'ble tribunal. As per the analysis results, standards for surface water, ground water and results of AAQ monitoring are within CPCB / APPCB standards.

Further, APPCB has monitored water quality of Kolleru lake, its inlet streams / drains and the lake outlet, Upputeru i.e., lake points at nine (9) locations; inlet points at thirteen (13) locations and lake out Upputeru during the period of six months from August, 2021 to January, 2022.

Interpretation of results:

- The neutral pH value of all the locations of lake, inlets and outlets suggests that acidic or alkaline effluents are not joining the lake
- The analysis results of lake points obtained during the period of six months from August, 2021 to January, 2022 suggest that there is no consistency in the values of DO, BOD & TDS in the same location and varying place to place within the lake. This could be because of varying amounts of rain fall in the catchments of various inlet drains and varying amounts of organic and inorganic contaminants joining the lake.
- DO values in the lake observed to be between zero (nil) & 8.40 mg/lit and BOD values found to be between 0.8 & 20.2 mg/lit. The low values of DO (<4.0 mg/lit), high values of BOD (>3.0 mg/lit) at certain times at certain locations and presence of water soluble phosphates within the lake is attributed to the joining of untreated domestic sewage and aqua culture pond effluents into the lake through various inlet streams and drains. Domestic sewage is entering the lake mainly from Vijayawada city through Budameru rivulet, Eluru town through East & West Tammileru rivulets and Gudivada town through Chandrayya drain. Apart from these major Urban Local Bodies, Domestic sewage from various villages located in the vicinity of these inlet drains and effluents of thousands of aqua

culture ponds located in the periphery and within the lake are also responsible for low DO and high BOD contents in the lake.

- However, these domestic and aqua culture pond effluents are either getting diluted with rain water during monsoon season or getting self purified while flowing in the drains.
- Low values of DO (<4.0 mg/lit) and high values of BOD (>3.0 mg/lit) at times and at certain locations as observed during the six months period monitoring rendering the lake water unfit for potable purpose (Class A & C), bathing purpose Class B and propagation of wildlife and fisheries (Class D).
- Growth of water hyacinth within the lake portions indicate that the lake is enriched with plant nutrients like Nitrogen & Phosphorous. However, it is a good sign that lake water does not contain appreciable amount of toxic metal and the concentrations of metals are not exceeding the acceptable and permissible standard of drinking water (IS: 10500:2012).
- Further, the lake water or the lake sediments does not contain the organocloro or organo phosphorous pesticide residues even in detectable concentrations. May be because of dilution affect and flushing out these contaminants through flooding during monsoon season.

Implementation plan: Preventive measures

The APPCB will conduct the periodic water quality monitoring in and around the Kolleru lake area and reports will be submitted to the Hon'ble NGT.

Further, the State of Andhra Pradesh has entrusted to conduct a comprehensive scientific study to the A.P. Pollution Control Board as suggested by the Principal Chief Conservator of Forest as well as in the Hon'ble NGT order to protect the water body and remove the encroachments, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.

A.P. Pollution Control Board entrusted the National Environmental Engineering Research Institute (NEERI), Hyderabad to take up comprehensive scientific study in the Kolleru lake area. The NEERI scientific team viz., Dr. Shaik Basha, Scientist and Head, CSIR-NEERI, HZC; Dr. Ramya Sanam, Principal Scientist; Dr. Karthik Raghunathan, Senior Scientist visited the Kolleru lake area on 13th May, 2022 for the study and also interacted with the stake holder Government Departments.

(Photographs attached).

Meanwhile APPCB will conduct the periodic water quality monitoring in and around the Kolleru lake area and reports will be submitted to the Hon'ble NGT.

I HIGH LEVEL JOINT COMMITTEE RECOMMENDATIONS ON PREVENTIVE STRATEGY - ACTION TAKEN BY THE CONCERNED DEPARTMENTS

The Committee, after several rounds of in-depth deliberations, arrived at several recommendations which can be broadly categorised as short term action strategies and long term preventive strategy.

The preventive strategy will involve following:

1. Involving reputed national Institutions like AIIMS, IICT, NEERI on a long-term basis by the District Administration. The teams will make a deep-dive to understand further the nature of the episode. It would require systematic sampling of all likely sources from origin to human consumption. Water, food air and soil analysis on a long term basis need to be done with a proper research design and sample design. Data collected needs to be analysed to arrive at a long term strategy. The study must go beyond the Eluru city and shall include the west Godavari and East Godavari districts due to the similar nature of topography irrigation and agro climatic conditions. Teams from AIIMS, New Delhi, IICT Hyderabad, PHFI with its Indian Institute of Public Health, Hyderabad would conduct these studies which shall be assisted by the District Collectors.

Reply: The Andhra Pradesh Pollution Control Board (APPCB) approached CSIR-NEERI, Hyderabad Zonal office to undertake environmental assessment study comprising of ambient air, surface water, ground water and soil components. Accordingly, CSIR-NEERI, Hyderabad Zonal office submitted report. In the report, it was recommended to conduct periodic assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months. The APPCB monitored Ambient Air Quality and collected water samples at the same locations from February, 2021 to June, 2021 as earlier, as conducted by NEERI. Out of 18 locations, samples of ground water (11) and surface water (7) were collected in and around Eluru and submitted report to Hon'ble tribunal.

2. *A Multidisciplinary Health and Environment Monitoring Framework need to be developed for these studies. A Monitoring cell for this purpose will be opened under the aegis of EFS&T department with representation (not below the cadre of Joint Director) from department of Health, Agriculture, Environment, Animal Husbandry and Municipal administration. All line departments shall give necessary assistance to this multi-agency, multi-disciplinary team.*

Reply: The Govt. Andhra Pradesh constituted a Multi- Disciplinary Committee headed by the Chief Secretary to Government on 10.12.2020 (G.O. RT. No. 1946 dt. 10.12.2020), to investigate the resources of episode on long term basis on to suggest remedial measures to prevent re-occurrence of such incidents in future. The Govt. of Andhra Pradesh submitted the Multi- Disciplinary Committee report with recommendations to the Hon'ble NGT on 30.03.2021.

3. A high level committee under the Chairpersonship of Chief Secretary to the government may be set up with senior officers from department of Health, Agriculture, Environment, Animal Husbandry, Irrigation and Municipal administration.

AND

4. This high level committee shall get action plans prepared by all the line departments for monitoring water, food, air , soil , Agriculture, Aquaculture residues etc. on regular basis. Further, the implementation of these action plans shall be monitored by the High level committee constituted.

Reply: The GoAP constituted High Level Committee headed by the Chief Secretary to Government on 09.02.2021 (G.O.Rt.No.63, dated 09.02.2021) to monitor the implementation of the recommendations made by the Multi Disciplinary Committee on sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari.

The Medical and Health Department; Eluru Municipal Corporation; Agriculture Department; Revenue Department; Water Resources Department; Forest Department and A.P. Pollution Control Board submitted the action taken reports in compliance with the Hon'ble NGT directions in OA No.259 of 2020 & OA No. 2 of 2021.

5. Surveillance plan of action for identifying source of heavy metals in blood in Eluru Municipal Corporation area needs to be developed by the municipal department in co-ordination with the Andhra Pradesh Pollution Control Board. A statistical database with periodical updating needs to be developed for items like water supply including both surface and ground water at all possible tapping points. All food sources shall also be closely monitored for heavy metals. Further industrial sources including sewerage and solid waste management practises of the Eluru corporation shall be closely monitored for finding out and eradicating presence of heavy metal in the human beings in Eluru area. This activity shall be coordinated by the AP Pollution Control Board.

Reply: The Eluru Municipal Corporation is regularly conducting more parameter tests in the drinking water supply to the public in the corporation area to identify any contamination in order to take immediate action for ensuring safe drinking water supply.

The Eluru Municipal Corporation intensified the sanitation at affected areas of Dakshinapuveedhi, Fish market area, Padamaraveedhi, Sunkaravarithota, Thangellamudi and Vengaigudem for maintaining hygienic conditions in the areas.

The APPCB monitored Ambient Air Quality and collected water samples at the same locations from February, 2021 to June, 2021 as earlier, as conducted by NEERI. Out of 18 locations, samples of ground water (11) and surface water (7) were collected in and around Eluru and submitted report to Hon'ble Tribunal.

6. A broad study of the entire West Godavari district with regards to above parameters is required for a comparative study with Eluru Municipal Corporation area. If required both districts of East and West Godavari shall be included in these studies. The AP Pollution Control Board shall undertake this study in coordination with Municipal corporation, Eluru.

Reply: A.P. Pollution Control Board approached the NEERI to submit detailed project proposals for conducting Comprehensive Scientific Study (Holistic study) to save the Kolleru Wildlife Sanctuary and Wetland / Kolleru Lake. The NEERI accepted the request of the A.P. Pollution Control Board and submit the detailed comprehensive scientific study in order to protect the water body.

7. Since the pesticides are likely to contribute to such episodes, it is very crucial that the banned compounds like DDT, DDE Endosulfan should not reach up to the agricultural fields. Strict implementation by the regulatory authorities is required for this. Department of Agriculture is advised to submit a detailed action plan within one month to achieve this goal.

AND

8. Promotion of organic and nature-based farming should find key place in the agricultural policy. ZBNF wing of agriculture department to identify all villages in and around Eluru Municipal Corporation area for promoting agriculture of vegetables following the organic farming methods. Dedicated outlets to be opened in Eluru Municipal Corporation area for marketing and sale of the

organically grown products. Department of Agriculture should also submit a detailed action plan for this within one month.

AND

10. Usage of Chemicals for Aqua farming in areas surrounding the Eluru city needs to be reduced in the long run by the fisheries department. Surveillance plan of action for monitoring the aquaculture in the west Godavari district to identify and stop usage of any banned products needs to be developed by the fisheries department within one month.

Reply: Agriculture Department. The CIPMC, Vijayawada has drawn 7 Samples each from Tap Water, Fish Pond Water, Tomato, Bitter Gourd, Green Chilli, Plain Gourd and Paddy and sent to NIPHM for analysis.

In three samples drawn from Green Chillies was found to be more than the Food Safety and Standards Authority of India (FSSAI) Maximum Residue Limits (MRLs) i.e Novaluron with 0.05 mg/Kg against 0.01 mg/Kg, Pyriproxyfen with 0.77 mg/Kg (0.02) and Flubendamide 0.04 mg/Kg (0.02).

Based on the suggestions, the team has collected 20 Soil Samples from 10 locations in Paddy fields in different depths i.e 0-15 cm & 15-30 cm on 13.12.2020, 14.12.2020 and also interacted with the farmers.

The team also preparing project for long term monitoring of heavy metals and pesticides in soil, water and plant of rice-based ecosystem in the Godavari Delta. These soil samples analyzed for fertility status (at RARS, Maruteru), heavy metal load (at RARS, Anakapalli) and pesticide contamination in ANGRAU (RARS, Tirupathi) and NIPHM laboratories.

9. Surveillance plan of action for monitoring the quality of milk needs to be developed by the Animal Husbandry department within one month.

Reply: The Animal & Husbandry Department will prepare surveillance plan of action for monitoring of quality of milk in and around affected areas in Eluru Municipal Corporation area.

11. Setting up of state of art labs at Vizag, Guntur and Tirupati under the aegis of Health Department. These labs should have the capacity to detect all kinds of organo- chlorines and organo-phosphates in all mediums like water, food, blood, serum etc., They should also be able to detect all kinds of heavy metals especially lead, nickel, and mercury etc. in all mediums like blood, blood serum, water milk and vegetables etc. further each district also should have one lab for water and food analysis. Samples from different sources, establishments and locations in the entire state need to be randomly checked periodically in these labs. A scientific matrix of sampling needs to be evolved so that regular surveillance on food materials and water is maintained in the district labs. Regional labs should have advanced facilities at par with research institute labs for testing blood and serum.

Reply: The Public Health Department in coordination with Medical & Health Department and Municipal Administration & Urban Development will develop necessary labs to collect the required samples as per the above recommendations.

12. Irrigation Department should take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal at the earliest.

Reply: The Water Resources department, GoAP., had identified the locations where car wash and battery residues are being let into the Eluru canal from local area i.e., from Green City to Jute Mill in Eluru Town i.e., chainage from Km 58.500 to Km. 61.653 of Krishna Eluru Canal.

The Water Resources Department engaged the consultant for carrying out water quality assessment of various drains, complete GIS map for Kolleru Lake with in-falling drains, boundaries, lake morphology, annual rain fall, etc.

The Water Resources Department, GoAP., has further informed that cleaning of Eluru Canal in the Eluru Municipal limits was already taken up in the Month of May and June – 2021.

II HIGH LEVEL COMMITTEE RECOMMENDATIONS FOR SHORT TERM FOR IMMEDIATE ACTION - ACTION TAKEN BY THE CONCERNED DEPARTMENTS

1. Irrigation Department should take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month.

Reply: The Water Resources department, GoAP., had identified the locations where car wash and battery residues are being let into the Eluru canal from local area i.e., from Green City to Jute Mill in Eluru Town i.e., chainage from Km 58.500 to Km. 61.653 of Krishna Eluru Canal.

The Water Resources Department engaged the consultant for carrying out water quality assessment of various drains, complete GIS map for Kolleru Lake with in-falling drains, boundaries, lake morphology, annual rain fall, etc.

The Water Resources Department, GoAP., has further informed that cleaning of Eluru Canal in the Eluru Municipal limits was already taken up in the Month of May and June – 2021.

2. The municipal water supply management forms the corner stone. Regular testing along with documentation needs to be ensured. While the water samples tested by the MA&UD indicated that the water supplied by Eluru Municipal Corporation is safe and as per standard, periodic checking must be ensured to rule out any contaminants. Similar system must be brought in place for all municipal water supply systems in the State.

AND

3. The municipal water quality needs to be checked for more parameters like organo-chlorines and organo-phosphates on a periodical basis. Currently the water samples are checked for certain parameters like TDS etc., only.

AND

4. Stand-alone RO units should also be checked for presence of heavy metals in water used by Institute for Preventive Medicine(IPM), AP Vijayawada.

AND

5. Solid waste management in Eluru needs to be analysed for any likelihood of heavy metals leaching into the soil and then reaching to the human food chain through ground water. This task shall be taken up by the Municipal Administration and Urban Development (MA&UD) department.

AND

7. Entire distribution network including pumps, ESLR's and pipelines should be thoroughly checked for material integrity and the same should be done on a regular basis in future. Steps should be taken to keep the entire system under positive pressure at all times in future. This should be done by the Municipal Administration and Urban Development (MA&UD) department.

Reply: The Eluru Municipal Corporation is regularly conducting more parameter tests in the drinking water supply to the public in the corporation area to identify any contamination in order to take immediate action for ensuring safe drinking water supply.

The Eluru Municipal Corporation intensified the sanitation at affected areas of Dakshinapuveedhi, Fish market area, Padamaraveedhi, Sunkaravarithota, Thangellamudi and Vengaigudem for maintaining hygienic conditions in the areas.

6. Periodical inspections of prominent Rythu- bazaars and market places and sample collection for heavy metals and pesticides presence should be taken up by the Marketing department.

AND

8. Testing of Pesticides / Weedicides / Fertilizers etc., being used in the district must be taken up by Agriculture department to ensure proper quality.

Reply:

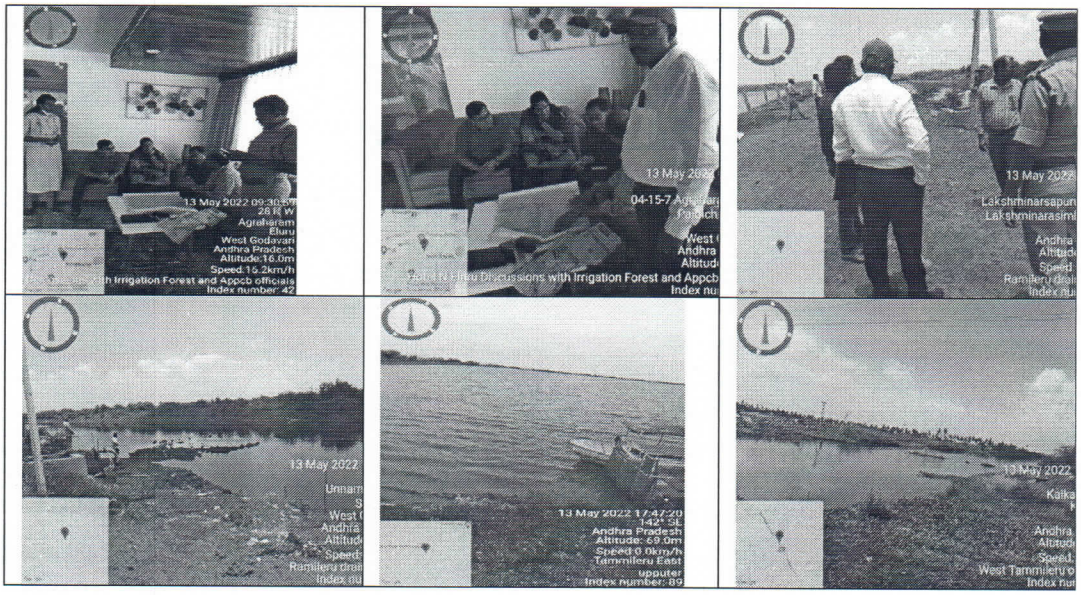
- Dr.YSR Polambadis (Farmer Field Schools) have been evolved to be an effective tool for tackling the problem of indiscriminate use of chemicals in Agriculture and to counteract the adverse effects caused by their usage. During the other training programmes being organized by the Dept, awareness is being created on IPM practices and safe & judicious use of pesticides in Field, Vegetable and fruit crops.
- The Government of Andhra Pradesh have organized the Farmer Field Schools (FFS) in the name of *Dr. YSR Polambadi* as *Rythu Bharosa Kendras (RBK)* centric in each Gram Panchayat in the State to educate the farmers on the need for reducing the usage of chemical pesticides in plant protection operations and to shift to integrated approaches like IPM, INM, IDM as an integral part of Integrated Crop Management (ICM) for prosperity in Agriculture.
- Farmers are being advised to use Biorational insecticides for use in vegetables and other crops which are low risk to non-target organisms, high target specificity and versatility in application in place of Organo Phosphate chemical pesticides.
- The Department of Agriculture has organized 5037 Farmers Field Schools (FFS) i.e Dr.YSR Polambadis in Rabi 2019- 20 covering 1.51 lakh farmers, followed by 10790 FFSs in Kharif 2020 educating 3.23 Lakh farmers and organized 8640 FFSs during the Rabi season 2020-21 to train 2.59 Lakh farmers and 16,284 Polambadis

were organized during 2021-22 to train 4.88 Lakh farmers in all major field crops like Rice, Cotton, Pulses, Maize, Millets, Ground nut etc.

- The Department of Horticulture have organized Thota Badis in the State to create awareness and to train the farmers on judicious and safe use of Pesticides on vegetables and orchard crops.
- By establishing (11) bio control labs, government has been enhancing the production of bio control agents like Trichoderma Viridi, Pseudomonas fluorescens and Metarrhizium and promoting the use of bio control agents.
- In addition to that Botanical pesticides (Neem based products) are promoted by conducting demos at Gram Panchayat level at each Rythu Bharosa Kendralu (RBKs), a novel one stop shop for extending both technical know-how through capacity building and pre tested Agri Inputs delivery.
- Educating the Farming community about Good Agricultural Practices (GAPs) to reduce use of Chemical pesticides through District Resource Center (DRC) of State Agricultural Department, KVKs, DATTC, Agricultural Universities, CIPMC etc.
- In addition to this DRCs are conducting regular field diagnostic visits and creating awareness among farmers on IPM and organic farming.
- Maximum Residue Limits (MRLs) of pesticides are being monitored at farm gate level by taking samples and analyzing by NIPHM and creating awareness accordingly through Farm Field Schools i.e Dr. YSR Polambadi and Thota badi.
- Promotion of Organic Farming in the farmers' fields.

Observations of the Chief Secretary to Government, Andhra Pradesh

- The Chief Secretary, GoAP reviewed the concerned Departments on 08.03.2021 & 06.04.2022 to monitor the implementation of the recommendations made by the Multi Disciplinary Committee being monitored by the High Level Committee constituted by the Govt., and to develop specific action plan by the Department concerned, in compliance with the Hon'ble NGT directions.
- In compliance with the Hon'ble NGT directions, the State of Andhra Pradesh has entrusted to conduct a comprehensive scientific study to the A.P. Pollution Control Board as suggested by the Principal Chief Conservator of Forest as well in the Hon'ble NGT order to protect the water body and remove the encroachments, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.
- The NEERI scientific team viz., Dr Shaik Basha, Scientist and Head, CSIR-NEERI, HZC; Dr Ramya Sanam, Principal Scientist; Dr Karthik Raghunathan, Senior Scientist from Hyderabad and Nagpur along with Regional Officer, APPCB, Eluru, State Forest Department and Irrigation Department officials visited the Wildlife Sanctuary and lake on May 13th 2022. The NEERI team along with other officials visited the Sanctuary and various major drains like Tammileru, Ramileru, Budameru, Potaraju drain, Kolleru lake, Madhavapuram lake, and outlet of Kolleru (Upputeru). The NEERI team collected all the relevant information required for the preparation of the proposal. A scientific proposal, on a comprehensive study to save the Wildlife sanctuary and lake, containing both scope of work and the financial components will be prepared and submitted to the A.P. Pollution Control Board.



- The concerned Departments will implement the recommendations of the Comprehensive Scientific Study of NEERI to save the Kolleru Wildlife Sanctuary and Kolleru Lake.
- Meanwhile, APPCB will conduct the periodic water quality monitoring in and around the Kolleru lake area and reports will be submitted to the Hon'ble NGT.
- Further, Forest Department and Revenue Department will regularly monitor the Kolleru lake area in order to protect from the encroachments and to save the water quality of the Kolleru Lake. Periodical reports will be submitted to Hon'ble NGT with relevant details.

Conclusion:

- Based on the recommendations of the High Level Joint Committee, the action taken by the concerned departments with preventive strategies on long term measures and action taken on short term measures, which were submitted by the concerned departments are herewith enclosed.
- I prefer calling for video conferences with all the concerned Departments regularly and would like to file the consolidated periodical reports of Action Taken Reports to the Hon'ble NGT for consideration.
- Further, the concerned Departments will be reviewed periodically to implement the recommendations of the Comprehensive Scientific Study being submitted by NEERI, to save the Kolleru Wildlife Sanctuary and Kolleru Lake and submit reports to Hon'ble NGT.

It is therefore prayed that this Hon'ble Tribunal may be pleased to record the report and pass appropriate orders in the matter.

Dr. Sameer Sharma I.A.S
Chief Secretary to Government of Andhra Pradesh

Item No.02:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 259 of 2020 (SZ)

(Through Video Conference)

IN THE MATTER OF

Tribunal on its own motion-SUO MOTU Based on The News item in The Indian Express, Newspaper, Dated 09.12.2020, Andhra Town Eluru hit by 'mystery' Illness, Traces of lead, nickel in blood samples," News item In the Times of India Newspaper dt: 09.12.2020,"Heavy Metal Content in water caused mysterious disease in Andhra Pradesh," & News Item in NDTV, dt: 09.12.2020, "Lead, Nickel found in Blood of people with mystery illness in Andhra".

...Applicant(s)

Versus

1) The Chief Secretary to Govt. of Andhra Pradesh
1st Block, 1st Floor, Interim Government Complex,
A.P.Secretariat Office, Velagapudi,
Guntur, Andhra Pradesh 522 237

2) Special Chief Secretary of Andhra Pradesh,
Department of Environment, Forest, Science and Technology,
4th Block, Ground Floor, Room No. 268,
A.P. Secretariat Office, Velagapudi,
Guntur, Andhra Pradesh 522 237.

3) The Special Chief Secretary to Government
Department of Health, Medical & Family Welfare
5th Block, Ground Floor, Room No. 157,
A.P. Secretariat Office, Velagapudi 522 237.

4) The Chairman,

Andhra Pradesh Pollution Control Board,
D. No. 33-26-14 D/2, Near Sunrise Hospital,
Pushpa Hotel Centre, Chalamalavari Street,
Kasthuribaipet Vijayawada 520010.

5) The District Collector,
West Godavari District
Collectorate office,
Ameenapet, Eluru,
West Godavari District 534 006.

6) The Commissioner,
Eluru Municipal Corporation
Chundurivari Choultry Street,
Eluru, West Godavari District 534 001.

7) The Tahsildar,
Denduluru Mandal,
West Godavari District 534 432.

...Respondent(s)

Date of hearing: 16.12.2020.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE MR. SAIBAL DASGUPTA, EXPERT MEMBER

For Applicant(s): By Court

For Respondent(s): Smt. Maduri Donti Reddy (R1 to R7)

ORDER

1. The above case has been Suo Motu registered by this Tribunal on the basis of the news paper report published in The Indian Express dated, 09.12.2020, the Hindu dated, 09.12.2020 and also in The Times of India dated, 09.12.2020 under the caption **"Andhra town Eluru hit by 'mystery' illness, traces of lead,**

nickel in blood samples" and **"Heavy metal content in water caused mysterious disease in Andhra Pradesh"** respectively and news item in NDTV on 09.12.2020 regarding the presence of Nickel & Lead found in patients' blood samples in Eluru area of Andhra Pradesh causing concern about the health of the people. It is alleged in all these news paper that the blood samples reports show high level of metals respectively.

2. The common allegation in these news paper reports is regarding some mysterious disease which has affected the health of the people who are admitted in the hospital and the cause of disease is not known and when the blood samples were taken, high level Lead and Nickel were found that was supposed to be a reason for the unknown disease.
3. It is also seen from all the reports that these chemicals are likely to cause epilepsy, vomiting, breathing problem, conversions, temporary loss of memory, giddiness and other symptoms. It is also seen from the report that the World Health Organisation (WHO), National Institute of Virology (NIV), Indian Council of Research and Centre for Disease Control, Indian Institute of Chemical Technology (IICT), National Institute of Nutrition (NIN) and All India Institute of Medical Sciences (AIIMS) are looking into the issue to trace the cause. If it is due to any industrial pollution or excess use of any fertilizer or pesticides of

prohibited nature, then that will have to be looked into by the authorities as it is affecting environment which is within the jurisdiction of this Tribunal to entertain the matter.

4. So considering the allegations in the news paper reports, we are satisfied that there arises a substantial question of environment which requires the interference of this Tribunal for resolving the same. So, the matter is admitted.

5. When the matter came up for hearing for admission today through Video Conference, Smt. Maduri Donti Reddy represented all the respondents (R1 to R7) and official respondents. So, service is complete.

6. The learned standing counsel appearing for the respondents submitted that the Government is seriously looking into the issue and some steps have been taken to ascertain the reason for the same and if some time is granted, they may be able to come with the report regarding the source and course of action to be adopted by the Government to mitigate the situation.

7. So under such circumstances, before appointing a committee to go into the issue regarding the source of such disease or health issue and the remedial measure to be taken and the nature of water quality in that area and if there is any directions to be issued for providing clean water, till the water quality in that area is restored to its original position, whether this is caused as

a water bone disease due to some industrial pollution or contamination, we feel it appropriate to obtain a report from the authorities concerned as some steps are being taken in this regard by the Government. So under such circumstances, we grant some time to the Government Departments to submit their independent response regarding the outcome of their enquiry that is being undertaken by them in this regard.

8. The District Collector, West Godavari District, 3rd respondent Ministry of Health, Medical and Family Welfare and the 4th respondent Andhra Pradesh State Pollution Control Board are directed to submit their independent reports regarding the above issue.

9. The official respondents are directed to submit an interim report regarding the status of the steps taken to resolve the issue involved in this case and the remedial measures to be taken by them to mitigate the issue and submit the report to this Tribunal on or before 12.01.2021 by e-filing in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF along with necessary hard copies to be produced as per rules.

10. The Registry is directed to communicate this order to the official respondents immediately by e-mail along with the copy of the paper reports and the gist of the Suo – Motu proceedings

with full cause title, so as to enable them to comply with the direction and also to file their independent responses regarding the action to be taken from their side to avoid such things regularly.

11. For appearance of parties and submitting their independent responses and also filing an interim report or status report, post on 12.01.2021.

.....J.M.
(Justice K. Ramakrishnan)

.....E.M.
(Shri. Saibal Dasgupta)

O.A. No.259/2020
16th December, 2020. Sr.

Item No. 12 & 13:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Original Application No.259 of 2020 (SZ)
With
Original Application No.02 of 2021 (SZ)

(Through Video Conference)

IN THE MATTER OF

Tribunal on its own motion
Suo Motu based on the news item in
The Indian Express, Newspaper dt. 09.12.2020,
"Andhra town Eluru hit by 'mystery' illness,
Traces of lead, nickel in blood samples",
News item in The Time of India, Newspaper
Dt. 08.12.2020, "Heavy metal content in water
Caused mysterious disease in Andhra Pradesh" &
News item in NDTV, dt. 09.12.2020,
"Lead, Nickel found in blood of people with
Mystery illness in Andhra"

...Applicant(s)

Versus

The Chief Secretary of Govt. of Andhra Pradesh

And Ors.

…Respondent(s)

With

Tribunal on its own motion
Suo Motu based on the news item in
The Hindu, edition dated 15.12.2020,
"Kolleru (West Godavari Dt.) "Mystery illness raises
Concerns over Kolleru Pollution"

...Applicant(s)

Versus

The Chief Secretary to Govt. of Andhra Pradesh,

Andhra Pradesh and Ors.

…Respondent(s)

Date of hearing: 07.06.2021.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE MR. Dr. K. SATYAGOPAL, EXPERT MEMBER

O.A. No.259/2020:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R7.

O.A. No.02/2021:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R8.

ORDER

1. The above two cases have been Suo Motu registered by this Tribunal on the basis of the newspaper reports published in The Indian Express dated, 09.12.2020 and also in The Times of India dated, 08.12.2020 under the caption ***"Andhra Town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples"***, ***"Heavy metal content in water caused mysterious disease in Andhra Pradesh"*** respectively and a news item

published in NDTV dated 09.12.2020 under the caption ***"Lead, Nickel found in blood of people with mystery illness in Andhra Pradesh"*** and also in The Hindu dated 15.12.2020 under the caption ***"Mystery illness raises concerns over Kolleru Pollution"***.

2. Further, this Tribunal also considered the directions given by the Principal Bench of National Green Tribunal, New Delhi in ***O.A. No.176 of 2019 (A.P. Chandrashekar Vs. State of Andhra Pradesh & Ors.)*** dated, 05.01.2021 in respect of the alleged pollution in Kolleru Lake and on the basis of the report submitted by the District Magistrate, Machilipatnam of Krishna District, the Principal Bench had disposed of the matter and it is not known as to whether the recommendations made by the District Magistrate in that case has been implemented or not.

3. Since the learned counsel appearing for the State respondents in both the cases submitted that the State of Andhra Pradesh had already appointed a high level committee to go into the question and certain reports have been obtained and on that basis, steps will be taken to redress the issue, this Tribunal has not appointed any separate committee to go into the question.

4. When the matter came up for hearing today through Video Conference, Mrs. Madhuri Donti Reddy represented respondents 1 to 7 in O.A. No.259/2020 and respondents 1 to 8 in O.A. No.02/2021.

5. In O.A. No.259/2020, the Andhra Pradesh Pollution Control Board had submitted a status report dated 12.01.2021 which reads as follows:-

"Report submitted by Andhra Pradesh Pollution Control Board in pursuance to the order dated 16.12.2020 in O.A. No.259 of 2020 passed by the Hon'ble National Green Tribunal, Southern Bench, Chennai.

Introduction: The present report is submitted in pursuance to the order dt. 16.12.2020 of this Hon'ble Tribunal in O.A. No. 259 of 2020, whereby SUO - MOTU notice was issued to the Andhra Pradesh Pollution Control Board "APPCB" hereinafter and the Board was directed to file a report.

The Chairman, Andhra Pradesh Pollution Control Board (APPCB) is respondent No. 4.

The APPCB is primarily submitting the present report submitting the following:

Details of the incident:

An unusual incident occurred in Eluru town on the evening of 05.12.2020, leading to sudden hospitalization of people residing in the region, exhibiting symptoms of convulsions, vomiting, drowsiness etc.

II. Monitoring conducted by APPCB & its inferences:

1. APPCB officials carried out ambient air quality monitoring on 06.12.2020 at the following locations to assess the ambient air concentrations of PM_{10}, SO_2, NO_2, Ammonia and Heavy metals.

a) Sanivarapupeta, Eluru municipality

b) Dakshinapuveedhi, Eluru municipality

c) Vangayagudem, Eluru municipality

The analysis results are enclosed as Annexure - I. The following inferences were drawn from the results:

The ambient air concentrations of PM_{10}, SO_2, NO_2 & NH_3 were observed to be within the limits of NAAQ Standards.

Heavy metal concentrations of Lead, Nickel and Arsenic in particulate matter were also within the limit of NAAQS.

2. APPCB officials also carried out Surface Water

sampling on 06.12.2020 from the following locations, to assess the quality of the surface water, which are the primary sources of drinking water supply to Eluru town.

a) Reservoir (Godavari Water) (Water supply for Eluru Municipality) near Denduluru

b) Pampulacheruvu Outlet, Eluru Municipality

c) Kotadibba Water Tank, Eluru Municipality

d) J.P. Colony Water Tank, Eluru Municipality

e) Gandhi Colony Water Tank, Eluru Municipality

f) Panchyathi Water Tank, ZP High School, Sanivarapupeta, Eluru

g) Ashok Chakaram Road, 6B - 11-20, Eluru

h) Ashok Chakaram Road, 6A - 12 -20, Eluru

i) D.No.6A - 11-21, Vadiragudem, Eluru

j) D.No.6A - 11-31, Vadiragudem, Eluru

k) Krishna Canal, near Pampala Cheruvu

l) Pond - 1 of Pampala Cheruvu

m) Pond - 2 of Pampala Cheruvu

The analysis results are enclosed as Annexure - II. The following inferences were drawn from the results:

<u>Physicochemical analysis:</u>

The analysis results for physico - chemical parameters viz., pH, Dissolved oxygen, COD, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

<u>Heavy metal analysis:</u>

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc and Cadmium and the results are within norms except Iron reported to be 2.18 mg/lt at pond - 2 of Pampula cheruvu against the standard of 0.3 mg/lt.

3. As per the instructions of the Administration, West Godavari District and Commissioner, Health & Family Welfare, Govt. of AP, the officials of APPCB again collected surface water samples on 08.12.2020 from the following locations for the complete analysis of physicochemical parameters, heavy metals, Bacteriological and pesticides.

a) Eluru Canal (Godavari Water) near Denduluru (V & M)

b) Reservoir (Godavari Water- Water supply from Eluru Municipal Corporation), near Denduluru (V & M)

c) Intake well of water treatment plant (Godavari water) of Eluru Municipal Corporation

d) Treated water sample collected before chlorination

e) Treated water sample collected after chlorination

f) Treated water sample collected Kotadibba water tank

g) H/o Sri Vemula Gopiah, D.No: 6A-11-31, Vadiragudem, 5th Division

h) Krishna Canal, Near Postal Colony

i) Pond - 1 of Pampula Cheruvu, Eluru Municipal Corporation

j) Pond - 2 of Pampula Cheruvu, Eluru Municipal Corporation.

The analysis results are enclosed as Annexure - III. The following inferences were drawn from the results:

<u>Physicochemical analysis:</u>

The analysis results for physico - chemical parameters viz., pH, Turbidity, Dissolved oxygen, COD, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

<u>Heavy metal analysis:</u>

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc, Cadmium, Mercury, Barium, Aluminium, Manganese and Silver.

Concentration The concentration of Lead in Kotadibba water tank (overhead tanks) was observed to be 0.0174 mg / l which is slightly higher than the standard of 0.010 mg/l.

The concentration of Mercury in Eluru canal was observed to be 0.0011 mg/l which is slightly higher than the standard of 0.0010 mg / l.

<u>Organo Chlorine Pesticides:</u>

Analysis was carried out for residues of Organochlorine pesticide namely Alpha - BHC, Beta - BHC, Gamma - BHC, 4,4'

- DDD, 4,4'DDE, 4,4'DDT, Aldrin, Dieldrin, Endosulphan - 1, Endosulphan Sulphate, Endrin, Heptachlor, Heptachlor Epoxide, Methoxychlor, Endosulphon II, Delta - BHC and Endrin aldehyde.

No traces of organochlorine pesticides were detected in surface water samples.

Bacteriological Analysis:

Analysis was carried out for the presence of T-Coli & F - Coli bacteria.

In treated water samples, the T - Coli & F - Coli bacteria were absent.

4. APPCB officials carried out simultaneous sampling of Ground Water at the following locations during the visit of NEERI officials on 12.12.2020.

a) H/o D.No.6A-11-17, Dakshinapuveedhi.

b) Near Varasiddi Vinayaka Temple, Kothapeta.

c) H/o S. Nageswararao, Thurupuveedhi.

d) H/o D.No.38-5-7, Padmaraveedhi.

e) Near Graveyard, Tangellamudi, Thurupuveedhi.

f) H/o D.No.2-11-7 / 2, S. Satyanarayana house.

g) H/o D.No.17-3-4, Md. Saleem house, Vangayagudem.

h) At DFC Food Court, RR Peta.

i) Agri gold Apartment, Pathebadh.

j) H/o D.No.21-379, Ponangi.

The analysis results are enclosed as Annexure - IV. The following inferences were drawn from the results:

Physicochemical analysis:

The analysis results for physico - chemical parameters viz., pH, Turbidity, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

Heavy metal analysis:

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc, Cadmium, Mercury Barium, Aluminium, Manganese and Silver.

The concentration of Manganese in Turupuveedhi was

observed to be 1.495 mg/l which is higher than the standard of 0.1 mg/1.

The concentration of Mercury in RR Peta was observed to be 0.0012 mg / l which is slightly higher than the standard of 0.0010 mg / 1.

Organochlorine Pesticides:

Analysis was carried out for residues of Organochlorine pesticide namely Alpha - BHC, Bela - BHC, Gamma - BHC, 4,4' - DDD, 4,4'DDE 4,4' DDT, Aldrin, Dieldrin, Endosulphan - 1 Endosulphan Sulphate, Endrin Heptachlor, Heptachlor Epoxide, Methoxychlor, Endosulphon - II, Delta - BHC and Endrin aldehyde.

No traces of organochlorine pesticides were detected in surface water samples.

III. Study conducted by CSIR - NEERI, Hyderabad and its inferences:

APPCB entrusted the study of air and water quality in and around the affected areas of Eluru to CSIR - NEERI, Hyderabad. The CSIR - NEERI carried out the studies during the period from 10.12.2020 to 12.12.2020. The CSIR - NEERI submitted the report on 21.12.2020, which is enclosed as Annexure - V.

The CSIR - NEERI in their report stated that:

Ambient Air Quality:

In the ambient air quality study it is found that the concentrations of particulate matter were found to be high and exceeding the NAAQS largely in the study area. Higher values of particulate matter may be due to vehicular traffic, re - suspended road dust, burning of solid waste, windblown dust and agricultural and construction activities. Gaseous pollutants are found to be very low and not significant.

The heavy metals in the particulate matter are found to be higher in terms of arsenic, boron, copper and zinc.

The arsenic concentrations in the particulate matter are exceeding the NAAQS at all locations except at Pattebada. Higher levels of these may be due to vehicle transportation, waste incineration or burning, oil and coal

combustion, sewage sludge incineration, and construction activities.

Ground and Surface water Quality:

The overall water quality for Surface and Ground water is satisfactory. In terms of heavy metals, Iron and Manganese were found to be slightly higher than BIS Standards for Drinking which may be due to geological Origin.

Presence of Mercury in Surface and Ground water is alarming and it needs deeper scientific study to ascertain the reasons for high levels of Mercury

Organochlorine pesticides like Alpha - HCH, Beta - HCH. Gamma - HCH, Delta - HCH, Aldrin, Dicofol, Alpha endosulfan, pp - DDE pp '- DDD Beta - Endosulfan, Endosulfan Sulfate, Heptachlor. Heptachlor epoxide were analyzed in groundwater and surface water samples and the concentration of all compounds were observed to be below detectable level. Similarly, organophophate pesticides and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion, Chloropyrifos, Pendimethalin, Butachlor, Profenofos, Quinalfos and Ethion were analyzed and found below detectable levels in all samples except for choloropyrifos in ground water.

Soil Quality:

The texture of most of the soil sample collected is sandy clay loam with moderately fine texture ranging moderate to strong Alkaline pH. The soils are having low CEC with Normal ESP.

The heavy metal concentrations in the study area are below Screening and response levels as per MoEF & CC Guidance Document for assessment and remediation of Contaminated sites in India.

Organochlorine and organophosphate pesticides concentration in soil samples were observed to be below detectable level.

Remarks:

1. As mentioned in the news papers the suspected cause for the incident reported by the All India Institute of Medical

Sciences (AIMS) is due to the presence of Lead and Nickel found in excess to the desirable limits in the blood samples of affected people. Further AIIMS indicated the symptoms of affected people may be due to Organochlorine pesticides.

2. From the studies conducted by CSIR - NEERI, it was observed that there was no contamination of surface and ground water of Eluru town due to Lead and Nickel. Even as per APPCB analysis reports there was no contamination of surface and ground water of Eluru town due to Lead and Nickel except at one location i.e. Kotadibba water tank (overhead tank) the concentration of lead is 0.0174mg / l, slightly higher than the standard of 0.010mg / 1.

3. In Surface water, high levels of Mercury ranging from 1.0 to 9.0 ppb were reported by CSIR - NEERI, the maximum found in location at Krishna Canal. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.1 ppb, the maximum value reported in Eluru canal, Near Denduluru which is marginally higher than the standard.

4. In Ground water high levels of Mercury ranging from 1.1 to 26 ppb were reported by CSIR - NEERI, the maximum found in location at RR Peta. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.2 ppb, the maximum value reported at the same location RR Peta which is marginally higher than the standard.

5. Other heavy metal concentrations in surface and ground water are observed to be within the norms except Iron and Manganese detection in few locations at slightly higher concentrations.

6. Organochlorine pesticide residues were not detected in the analysis carried out by both CSIR - NEERI and APPCB in ground and surface water. CSIR - NEERI reported presence of Chloropyriphos in excess of the standard in ground water samples at 1 location (Opposite to H.No: 21-379, Construction land, Ponangi).

7. As per Ambient air quality monitoring (conducted from 10.12.2020 to 12.12.2020) of CSIR - NEERI, higher concentrations of Particulate matter are reported. Ambient air

concentration of Lead and Nickel is found to be within the whereas slightly higher concentrations of Arsenic was reported which may be due to vehicle transportation, waste incineration or burning, Oil & Coal combustion and construction activities. APPCB carried out AAQM at 3 locations from 06.12.2020 to 07.12.2020. Concentrations of Particulate matter and Heavy metals (Lead, Arsenic and Nickel) are within the NAAQ standards.

8. CSIR - NEERI recommended that Periodic Assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months to ascertain the occurrence of certain heavy metals in ambient air and presence of mercury in both groundwater and surface water.

9. The Government of A.P. constituted a multi disciplinary committee headed by the Chief Secretary to the Government to investigate source of episode and suggest remedial measures to prevent any occurrence of such events in future. (Annexure - VI)

10. APPCB proposes to carry out Air and water quality monitoring on monthly basis for a period of six months to ascertain the presence of Mercury in Surface and Ground water samples and presence of heavy metal concentrations in Ambient air.

The above report is placed before the Hon'ble Tribunal for its kind consideration to pass appropriate directions."

6. It is seen from the remarks that high level mercury was found in certain areas as per the report submitted by the CSIR, NEERI and other heavy metal concentrations were also found in the surface and ground water.

7. The Andhra Pradesh Pollution Control Board also filed another status report dated Nil e-filed on 17.02.2021 and received on 19.02.2021, wherein, they have reported as follows:-

> ***"Status report on Hon'ble NGT order dated 06.01.2021 in O.A.No.2 of 2021 and in OA No. 259 of 2020***
>
> *It is to submit that the Hon'ble NGT has taken up Suo Motu in O.A.No.02 of 2021 the incident of* ***"Mystery illness raises concerns over Kolleru pollution"*** *based on news paper clipping published in Hindu Newspaper on 15.12.2020 status. It is alleged that large scale pollution is caused in Kolleru Lake and other water bodies in AP and people are suffering from Mysterious diseases on account of drinking of the polluted water in Kolleru Lake. The Hon'ble NGT vide order dated 06.01.2021 in OA No.2 has directed to post the matters along with matters of OA No. 259 of 2020.*
>
> *The Board submitted report in O.A.No.259 of 2020 to the Hon'ble Tribunal in December 2020 regarding deaths in Eluru on account of mysterious disease. It was submitted that:*
>
> *1. As mentioned in the news papers, the suspected cause for the incident reported by All India Institute of Medical Sciences (AIIMS) is due to the presence of Lead and Nickel found in excess to the desirable limits in the blood samples of affected people. Further, AIIMS indicated the symptoms of affected people may be due to Organochlorine pesticides.*
>
> *2. From the studies conducted by CSIR-NEERI, it was observed that there was no contamination of surface and ground water of Eluru town due to Lead and Nickel. Even as per APPCB analysis reports, there was no contamination of surface and ground water of Eluru town due to Lead and Nickel except at one location i.e. Kotadibba water tank (overhead tank) the concentration of*

lead is 0.0174mg/l, slightly higher than the standard of 0.010mg/l.

3. In Surface water, high levels of Mercury ranging from 1.0 to 9.0 ppb were reported by CSIR-NEERI, the maximum found in location at Krishna Canal. As per APPCB results, the concentration of Mercury is ranging from 0.0 to 1.1 ppb, the maximum value reported in Eluru canal, Near Denduluru which is marginally higher than the standard.

4. In Ground water, high levels of Mercury ranging from 1.1 to 26 ppb were reported by CSIR-NEERI, the maximum found in location at RR Peta. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.2 ppb, the maximum value reported at the same location RR Peta which is marginally higher than the standard.

5. Other heavy metal concentrations in surface and ground water are observed to be within the norms except Iron and Manganese detection in few locations at slightly higher concentrations.

6. Organochlorine pesticide residues were not detected in the analysis carried out by both CSIR-NEERI and APPCB in ground and surface water. CSIR-NEERI reported presence of Chloropyriphos in excess of the standard in ground water samples at 1 location (Opposite to H.No: 21-379, Construction land, Ponangi).

7. As per Ambient air quality monitoring (conducted from 10.12.2020 to 12.12.2020) of CSIR-NEERI, higher concentrations of Particulate matter are reported. Ambient air concentration of Lead and Nickel is found to be within the norms whereas slightly higher concentrations of Arsenic was reported which may be due to vehicle transportation, waste incineration or burning, Oil & Coal combustion and construction activities. APPCB carried out AAQM at 3 locations from 06.12.2020 to 07.12.2020.

Concentrations of Particulate matter and Heavy metals (Lead, Arsenic and Nickel) are within the NAAQ standards.

8. CSIR-NEERI recommended that Periodic Assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months to ascertain the occurrence of certain heavy metals in ambient air and presence of mercury in both groundwater and surface water.

9. The Government of A.P. constituted a multi disciplinary committee headed by the Chief Secretary to the Government to investigate source of episode and suggest remedial measures to prevent any occurrence of such events in future.

10.APPCB proposes to carry out Air and water quality monitoring on monthly basis for a period of six months to ascertain the presence of Mercury in Surface and Ground water samples and presence of heavy metal concentrations in Ambient air.

As regards to the apprehensions of the people that polluted water of Kolleru Lake might cause mysterious diseases as reported in Eluru and the surrounding areas, the following report is submitted on Kolleru lake pollution for kind perusal:

A. About Kolleru Lake:

1) Kolleru Lake is one of the largest fresh water Eco System (Wetland) in India of international importance recognized under Ramsar Convention (Iran 1971). The Kolleru lake is located in between Latitudes 16°13' & 16°45' North and Longitudes 81°05' & 81°21' East and is about 35 Km away from the coast i.e. Bay of Bengal. It is formed between the alluvial plains of Godavari and Krishna Rivers due to natural geological formation covering 7 mandals in West Godavari District and 3 mandals in Krishna District

of Andhra Pradesh with an extent of 30,855.20Ha (77,138 Acres) upto +5' contour of the Lake. Several drains from upstream are ending in Kolleru lake and outlet of Kolleru lake is through Upputeru to Bay of Bengal

2) Hydrology and drainage:

Kolleru Lake is spreading over an area of 2,25,000 acresupto +10' contour with rich biodiversity. Water spread area of Kolleru lake is as follows:

Upto +10' contour MSL	*2,25,250 Acres*
Upto +7' Contour MSL	*1,68,750 Acres*
Upto +5' contour MSL	*77,138 Acres*
Mean Sea Level (MSL)	

3) Catchment Area:

The total catchment area of Kolleru Lake is 11,90,750 Acres. Out of which, the catchment area in upland area is 8,50,750 Acres and 3,40,000 Acres in delta area. Four streams namely Budameru, Ramileru, Tammileru&Gunderu and drains in Krishna and West Godavari Districts join the lake and the Upputeru drain is the only outlet from Kolleru Lake to the sea i.e., Bay of Bengal.

4) Declared the Kolleru Lake as "KolleruWildlife Sanctuary" and also protected area under Wildlife Protection Act, 1972.

The Government of Andhra Pradesh vide G.O.Ms No.120, Environment, Forest, Science and Technology (Forest-III) Department Dt.04.10.1999 under Section 26-A of the Wild Life (Protection) Act, 1972, declared 308.55 Sq.Km (30,855.20 Ha) area as "The Kolleru Wild Life Sanctuary" covering 45 villages in West Godavari District and 29 villages in Krishna District for protection of birds and other wildlife.

B. Action taken by APPCB:

APPCB is not issuing consents/permissions to any industry to discharge treated/untreated effluents to outside the industry premises or to any drains/canals within the radius of 10 KM from +5 contour of Kolleru Wildlife Sanctuary. The Board is also not permitting any new industrial activities within the radius of 10 KM from +5 contour of Kolleru Wildlife Sanctuary. Hence, no pollution due to industrial discharges.

C. Monitoring of water quality of Kolleru Lake and the drains joining into Kolleru Lake by APPCB:

The APPCB has been monitoring the water quality of Kolleru Lake, the drains joining into the Lake and its outlet every month at the following locations in West Godavari District & in Krishna District.

Drain Sampling points:

West Godavari District:

1) West Thammileru.

2) East Thammileru.

3) Bulusuvagu drain.

4) Thokalapalli drain.

5) Pandikodu drain.

6) Kovvali drain.

7) Mondikodu drain.

Krishna District:

8) Chandraiah drain at Gudivada.

9) Budameru drain at Puttagunta.

10) Narasannapalem drain at Arugolanu.

11) Polraj drain at Pillipadu.

12) West Tammileru, Vangayagudem.

Lake sampling points:

West Godavari District:

1) Gudivakalanka bridge.

2) Kokkirayalanka bridge.

3) Chettunnapadu bridge.

Krishna District:

4) Pedaedlagadi

5) Chinaedlagadi

6) Kolletikota

7) Circarcanal

8) Srungavarappadu

Outlet of Kolleru Lake:

9) Upputeru at Alapadu bridge, Krishna District.

The samples are tested for physio-chemical and bacteriological parameters. The monitoring results for the period from 2010–2020 are enclosed as ***Annexure-I****.*

Inference on drain points data:

The average pH value in all the drains joining into the Kolleru lake are observed to be in the range of 7.03 to 8.20 over the period against the suggested range of 6.5 to 8.5. As per the 'CPCB Primary Water Quality Criteria' for designated best uses of water, water quality is suitable for the propagation of Wildlife and Fisheries.

The average Dissolved Oxygen (DO) values in the major drains joining into Kolleru lake are observed to be in the range of 3.0 mg/l to 7.0 mg/l over the period. As per the 'CPCB Primary Water Quality Criteria' for designated best uses of water, water quality is suitable for the propagation of Wildlife and Fisheries. The required DO value for propagation of Wildlife and Fisheries is 4.0 mg/l only.

Inference on Lake points data:

The average pH values in the lake over the period are observed to be in the range from 7.2 to 8.0 as against the suggested range of 6.5 to 8.5 vide 'CPCB Primary Water Quality Criteria' for designated best uses of water, indicating the water is suitable for propagation of Wildlife and Fisheries.

The average DO values, which were around 2 mg/l earlier (2010 to 2012), is observed to be improved to about 6.0 mg/l during the last 5 years (2015 to 2020) in the Kolleru Lake and its outlet Upputeru which indicates the water quality of the lake is improved. The required DO levels for the propagation of Wildlife and Fisheries in the lake is 4.0 mg/l only as per the 'CPCB Primary Water Quality Criteria' for designated best uses of water.

The analytical data is compared with CPCB Primary Water Quality Criteria of surface water for designated best use and observed that it falls into Class-D i.e. Propagation of Wildlife and Fisheries, which indicates the water is suitable for propagation of Wildlife and Fisheries.

Pesticides residues in the drains and lake:

In addition, samples are also tested for pesticide residues during the years 2019 and 2020 and observed that pesticide concentrations are below detectable limits except Heptachlor Epoxide which is also below drinking water standards. Copy of the analysis report is enclosed as ***Annexure-II****.*

D. STP construction by Eluru Municipal Corporation:

Eluru Municipal Corporation is constructing of 5 MLD STP and civil works were completed to 60%.

It is submitted that the Board has further taken the following actions after submitting the action taken report to Hon'ble NGT in OA No.259/2020 on 05.01.2021:

The Board collected drinking water samples of 9 Municipalities (Akiveedu, Bhimavaram, Palakole, Narsapuram, Tadepalligudem, Nidadavole, Jangareddygudem, Tanuku) and 1 Nos of Municipal Corporation (Eluru Municipal Corporation) on 09.01.2021 & 10.01.2021 and analyzed and observed that proper chlorination is required as coliforms are present in the treated water of these Urban Local Bodies (ULBs). Other parameters are meeting the drinking water standards. Analysis reports are enclosed as ***Annexure – III.***

As suggested by NEERI, Board conducted Ambient Air Quality Monitoring from 05.02.2021 to 06.02.2021 for Heavy Metals in Eluru city and also collected Surface and Ground water samples in the same locations to ascertain the presence of Mercury and analysis is under progress.

The Board collected the samples of drinking water supplied to the people of Pulla (V) located at a distance of about 25 km from Eluru city, wherein few mysterious disease cases were registered on 19.01.2021. As per the analysis, the samples were meeting the drinking water standards of ISI0500:2012. Analysis report enclosed as Annexure-IV.

The Government has constituted a Multi-Disciplinary Committee headed by the Chief Secretary to Government to Investigate the source of episode. The committee recommended continuing the services of AIIMS (All India Institution of Medical Sciences) and IICT (Indian Institute of Chennai Technology) to investigate the source of episode on long term basis and to suggest remedial measures to prevent reoccurrence of such incidents in future.

The board has been monitoring the Kolleru lake on regular basis. As per the findings of the analysis of water of drains as well as Lake water, no pesticides residues beyond standards was observed. Further, no industrial discharges are allowed in to Kolleru Lake. The Hon'ble NGT disposed O.A. No.176 of 2019 on Kolleru Lake pollution on 05.01.2021 with observation that no further orders appears to be necessary. The

Hon'ble NGT observed that there is an improvement in the water quality of Kolleru Lake waters in respect of pH and Dissolved Oxygen (DO) when compared to CPCB primary water quality criteria for designated best uses of water, indicating and suitability of water in the lake for the propagation of wildlife and fisheries, as per the regular monitoring carried out by the Andhra Pradesh Pollution Control Board.

No industrial effluents are joining into the Kolleru Lake and lake water is not the drinking water source to any village as it falls under Class -D as per CPCB Primary Water Quality criteria and is suitable for propagation of Wildlife & Fisheries only. Further, observed that the convulsion illness cases were registered in the month of December, 2020 in Eluru Town and its surrounding villages only and no cases were registered around the Kolleru lake area.

The above report is placed before the Hon'ble Tribunal for its kind consideration to pass appropriate directions."

8. It is very surprising to see from the report that no industrial effluents are joining in Kolleru Lake though large number of reports have alleged that industrial effluents are being discharged into the lake. It is also reported that the lake water is not the drinking water source to any of the villages, as it falls under Class - D as per CPCB Primary Water Quality criteria and it is suitable for propagation of wildlife and fisheries only. It is also mentioned in the report that no cases were registered around the Kolleru lake area.

9. It may be mentioned here that water bodies are intended for using it not only for the drinking purpose but also for irrigation purpose. It is understood that Kolleru Lake is one of the largest fresh water lake in

Andhra Pradesh. If that be the case, the authorities are expected to maintain the lake and improve the water quality into either Category - A or Category - B, instead of keeping in the Category - D.

10. Nothing is mentioned in the report regarding the steps taken by the authorities for improving the water quality, when it is the biggest fresh water body available in the Andhra Pradesh and it is also mentioned in the report itself that it is one of the largest fresh water ecosystem (wet land) in India of international importance recognized under the Ramsar Convention. If that be the case, there is a responsibility cast on the authorities to take steps to improve the water quality and make use of the same for drinking and irrigation purposes as well, so as to protect the water body and quality of the water.

11. When this was pointed out, the learned counsel appearing for the State departments submitted that they will come with a further action taken report or any plan for the State Government to improve the water quality in that lake. The APPCB should also file a factual report on the pollution of Kolleru lake caused by Industries, Agricultural operations & sewage discharge. They are expected to carry out the analysis scientifically by collecting the samples at (1) inlets and outlets of the Industrial zones which are ultimately draining into the Kolleru Lake, (2) confluence points of major drains into the Kolleru Lake – surface water samples and sediment

samples to be tested, (3) in case any settling ponds have been established prior to the joining of the drains into the lake, then samples of both surface water and the sediments in the settling ponds should be tested. The APPCB is expected to undertake the study comprehensively and not resort to filing a report based on cursory studies. The report has to be approved by the Chairman prior to submission.

12. As regards the report of the committee is concerned, the State of Andhra Pradesh has filed a report of the multi disciplinary committee dated Nil e-filed on 30.03.2021 and received on 31.03.2021 wherein, after making lot of discussion, source of the outbreak and recommendations have been made which reads as follows:-

> *"SOURCE OF THE OUTBREAK*
>
> *According to the experts, toxins are likely to be the most probable cause of this outbreak Among the toxins, the pesticides are most likely to present similar encephalopathy. Among pesticides also, organo - chlorides are most likely to be the cause of the outbreak.*
>
> *From the epidemic curve with a sudden onset on 4 December and steep rise, peaking was observed between 5th and 7th December. Subsequently the cases started declining from the 8th onwards. There was no case reported from 130 December onwards. After analyzing the above epidemic curve, case sheets of the patients, reports from different labs and inputs from different expert agencies involved, it can be categorized as a point source outbreak which was non-propagative in nature. It was a case of acute exposure to a substance rather being a chronic one. It is indicative of a common single exposure*

source. Another important observation is that whatever was the source is no more there in the system as no case has been reported 13th December onwards.

The likely source of such kind of encephalopathy can be water, milk, vegetables and fruits. Nickel was found in Milk, but nickel cannot cause such encephalopathy and hence can be ruled out. The source cannot be meat or fish as 87% of the patients did not consume non vegetarian food in the last couple of days prior to the incident. Vegetables like tomato and brinjal have been found with Metribuzin (herbicide). But had it been the source, the geographical expanse would not have been confined to urban area alone. It would have spread to rural areas as well. So vegetables can be the source only if some contamination occurred after the arrival of the vegetables to the market in Eluru and the vegetables got contaminated after the stock arrived in the market.

Coming to the likelihood of water being the source of contamination. None of the agencies have reported the presence of organo - chlorines in the water samples taken from the source, reservoir and the storage tank. So the central water supply was clean. The water samples collected from the households had some presence of Triazophos (organo phosphate compound) but the concentration was not too high and also the control samples also found the presence of Triazophos. Thus, contamination of water locally being the source cannot be substantiated or ruled out either. This requires a detailed study of the water supply system of Eluru municipal corporation over the next few months to arrive at a conclusion.

Thus there is a need of involving reputed national Institutions like AIIMS, IICT, NEERI on a long term basis to find out the exact source and also to prevent the event from reoccurring. The teams will make a deep - dive to unearth the most likely source of the episode. It would require systematic sampling of all likely culprits from origin to human consumption.

Since water test results from all agencies indicated that there is no presence of heavy metals or pesticides beyond the allowed limits, it can be safely said that the present water supply is potable and safe for Human Consumption.

RECOMMENDATIONS

The Committee, after several rounds of in depth deliberations, arrived at several recommendations which can be broadly categorized as short term action strategies and long term preventive strategy.

The preventive strategy will involve following:

1. Involving reputed national Institutions like AIIMS, IICT, NEERI on a long - term basis by the District Administration. The teams will make a deep - dive to understand further the nature of the episode. It would require systematic sampling of all likely sources from origin to human consumption. Water food air and sail analysis on a long term basis need to be done with a proper research design and sample design. Data collected needs to be analyzed to arrive at a long term strategy. The study must go beyond the Eluru city and shall include the west Godavari and East Godavari districts due to the similar nature of topography irrigation and agro climatic conditions. Teams from AIIMS, New Delhi, IICT Hyderabad, PHFI with its Indian Institute of Public Health, Hyderabad would conduct these studies which shall be assisted by the District Collectors.

2. A Multidisciplinary Health and Environment Monitoring Framework need to be developed for these studies. A Monitoring cell for this purpose will be opened under the aegis of EFS & T department with representation (not below the cadre of Joint Director) from department of Health, Agriculture, Environment, Animal Husbandry and Municipal administration. All line departments shall give necessary assistance to this multi-agency, multi-disciplinary team.

3. A high level committee under the Chairpersonship of Chief Secretary to the government may be set up with senior officers from department of Health, Agriculture, Environment, Animal Husbandry, Irrigation and Municipal administration.

4. This high level committee shall get action plans prepared by all the line departments for monitoring water, food, air, soil, Agriculture, Aquaculture residues etc. on a regular basis. Further, the implementation of these action plans shall be monitored by the High level committee constituted.

5. Surveillance plan of action for identifying source of heavy metals in blood in Eluru Municipal Corporation area needs to be developed by the municipal department in co - ordination with the Andhra Pradesh Pollution Control Board. A statistical database with periodical updating needs to be developed for items like water supply including both surface and ground water at all possible tapping points. All food sources shall also be closely monitored for heavy metals. Further industrial sources including sewerage and solid waste management practices of the Eluru corporation shall be closely monitored for finding out and eradicating presence of heavy metal in the human beings in Eluru area. This activity shall be coordinated by the AP Pollution Control Board.

6. A broad study of the entire West Godavari district with regards to above parameters is required for a comparative study with Eluru Municipal Corporation area. If required both districts of East and West Godavari shall be included in these studies. The AP Pollution Control Board shall undertake this study in coordination with Municipal corporation, Eluru.

7. Since the pesticides are likely to contribute to such episodes, it is very crucial that the banned compounds like DDT, DDE Endosulfan should not reach up to the agricultural fields. Strict implementation by the regulatory authorities is required for this. Department of Agriculture is advised to submit a detailed action plan within one month to achieve this goal.

8. Promotion of organic and nature - based farming should find key place in the agricultural policy. ZBNF wing of agriculture department to identify all villages in and around Eluru Municipal Corporation area for promoting agriculture of vegetables following the organic farming methods. Dedicated outlets to be opened in Eluru Municipal Corporation area for marketing and sale of the organically grown products. Department of Agriculture should also submit a detailed action plan for this within one month.

9. Surveillance plan of action for monitoring the quality of milk needs to be developed by the Animal Husbandry department within one month.

10. Usage of Chemicals for Aqua farming in areas surrounding the Eluru city needs to be reduced in the long run by the fisheries department. Surveillance plan of action for monitoring the aquaculture in the west Godavari district to identify and stop usage of any banned products needs to be developed by the fisheries department within one month.

11. Setting up of state of art labs at Vizag, Guntur and Tirupati under the aegis of Health Department. These labs should have the capacity to detect all kinds of organo - chlorines and organo - phosphates in all mediums like water, food, blood, serum etc. They should also be able to detect all kinds of heavy metals especially lead, nickel, and mercury etc. in all mediums like blood, blood serum, water milk and vegetables etc. Further each district also should have one lab for water and food analysis. Samples from different sources, establishments and locations in the entire state need to be randomly checked periodically in these labs. A scientific matrix of sampling needs to be evolved so that regular surveillance on food materials and water is maintained in the district labs. Regional labs should have advanced facilities at par with research institute labs for testing blood and serum.

12. Irrigation Department should take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal at the earliest.

The steps to be taken up in the short term for immediate action are detailed below

1. Irrigation Department should take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month.

2. The municipal water supply management forms the cornerstone. Regular testing along with documentation needs to be ensured. While the water samples tested by the MA & UD indicated that the water supplied by Eluru Municipal Corporation is safe and as per standard, periodic checking must be ensured to rule out any contaminants. Similar system must be brought in place for all municipal water supply systems in the State.

3. The municipal water quality needs to be checked for more parameters like organo - chlorines and organo - phosphates on a periodical basis. Currently the water samples are checked for certain parameters like TDS etc. only.

4. Stand - alone RO units should also be checked for presence of heavy metals in water used by Institute for Preventive Medicine (IPM), AP Vijayawada.

5. Solid Waste management in Eluru needs to be analyzed for any likelihood of heavy metals leeching into the soil and then reaching to the human food chain through ground water. This task shall be taken up by the Municipal Administration and Urban Development (MA & UD) department.

6. Periodical inspections of prominent Rythu-bazaars and market places and sample collection for heavy metals and

pesticides presence should be taken up by the Marketing department.

7. Entire distribution network including pumps, ESLR's and pipelines should be thoroughly checked for material integrity and the same should be done on a regular basis in future. Steps should be taken to keep the entire system under positive pressure at all times in the future. This should be done by the Municipal Administration and Urban Development (MA&UD) department.

8. Testing of pesticides/ weedicides/ fertilizers etc. being used in the district must be taken up by Agriculture Department to ensure proper quality."

13. Certain short term and long term measures were also provided to meet the situation and also identified the possible source of contaminants/pollutants in Eluru canal, as certain heavy organo-chlorines and organo-phosphates and other heavy metals like Mercury, Lead and Nickel. As the presence of heavy metals shows that either it should have been caused through food chain or through water, that is the reason why the irrigation department was directed to conduct a detailed study to identify the possible sources of contamination especially organo-chlorides and also to take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month. Certain directions have been given to other departments as well, so as to restrict/prevent pollution either to the water or to the soil which has caused on account of mysterious disease found in that area.

14. It is also mentioned in the recommendation that the municipal water quality needs to be checked for more parameters like organo-chlorines and organo-phosphates on a periodical basis. Apart from that, they are also directed to monitor the level of heavy metals like Lead, Mercury and Nickel as well by conducting analysis and resort to the remedial measures to remove those metals from the water.

15. As regards the Solid Waste Management Rules, 2016 is concerned, they have not mentioned anything about the existing legacy waste and what are all the steps taken by them to dispose of the legacy waste, if any, in a scientific manner as provided under the Solid Waste Management Rules, 2016.

16. When this was pointed out, the learned counsel appearing for the State of Andhra Pradesh submitted that they will come with a detailed further report regarding the study, if any, done on the basis of the recommendations and also the remedial measures, if any, taken to mitigate the circumstances.

17. The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be

taken for improving the water quality in that lake.

18. The respective departments are directed to submit a report to this Tribunal on or before 28.07.2021 by e-filing in the form of Searchable PDF/ OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

19. The Registry is directed to communicate this order to the official respondents including the Principal Chief Conservator of Forest & Head of Forest Force, State of Andhra Pradesh and Chief Secretary, Principal Secretaries for Environment and Irrigation of State of Andhra Pradesh, Andhra Pradesh Pollution Control Board by e-mail immediately for their information and submission of report as directed.

20. For consideration of further reports, post on 28.07.2021.

Sd/-
.....J.M.
(Justice K. Ramakrishnan)

Sd/-
.....E.M.
(Dr. K. Satyagopal)

O.A. No. 259/2020,
O.A. No.02/2021,
07th June, 2021. Mn.

Item No.17 & 18:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

(*Through Video Conference)*

Original Application No. 259 of 2020 (SZ)

IN THE MATTER OF

Tribunal on its own motion-SUO MOTU Based on The News item in The Indian Express, Newspaper, Dated 09.12.2020, Andhra Town Eluru hit by 'mystery' Illness, Traces of lead, nickel in blood samples," News item In the Times of India Newspaper dt: 09.12.2020,"Heavy Metal Content in water caused mysterious disease in Andhra Pradesh," & News Item in NDTV, dt: 09.12.2020, "Lead, Nickel found in Blood of people with mystery illness in Andhra".

...Applicant(s)

Versus

The Chief Secretary to Govt. of Andhra Pradesh
And others.

...Respondent(s)

With

Original Application No. 02 of 2021 (SZ)

IN THE MATTER OF

Tribunal on its own motion-SUO MOTU Based on The News item in The Hindu, Edition Dated: 15.12.2020, Kollery (West Godavari District.) "Mystery illness raises Concerns over Kolleru pollution

...Applicant(s)

Versus

The Chief Secretary to Government of Andhra Pradesh
Andhra Pradesh Secretariat,

Guntur, Andhra Pradesh and others.

Date of hearing: 26.10.2021

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE DR. K. SATYAGOPAL, EXPERT MEMBER

Original Application No. 259/2020(SZ)

For Applicant(s): Suo motu

For Respondent(s): Smt. Maduri Donti Reddy for R1 to R7

Original Application No. 02/2021(SZ)

For Applicant(s): suo motu

For Respondent(s): Smt. Maduri Donti Reddy for R1 to R8

ORDER

1. As per order dated 07.06.2021, this Tribunal had considered the status report submitted by the Andhra Pradesh Pollution Control Board dated 12.01.2021 in O.A. No. 259 of 2020 which was extracted in para 5 of the order and also considered another report submitted by the Pollution Control Board dated nil,e-filed on 17.02.2021 which was extracted in para 6 of the order and also considered the report of the Multi Disciplinary Committee dated Nil e-filed on 30.03.2021 which was extracted in para 12 of the order and then passed the following order:

> *8. It is very surprising to see from the report that no industrial effluents are joining in Kolleru Lake though large number of reports have alleged that industrial effluents are being discharged into the lake. It is also reported that the lake water is not the drinking water source to any of the villages, as it falls under Class - D as per CPCB Primary Water Quality criteria and it is suitable for propagation of wildlife and fisheries only. It is also mentioned*

in the report that no cases were registered around the Kolleru lake area.
9. It may be mentioned here that water bodies are intended for using it not only for the drinking purpose but also for irrigation purpose. It is understood that Kolleru Lake is one of the largest fresh water lake in 21 Andhra Pradesh. If that be the case, the authorities are expected to maintain the lake and improve the water quality into either Category - A or Category - B, instead of keeping in the Category - D.
10.Nothing is mentioned in the report regarding the steps taken by the authorities for improving the water quality, when it is the biggest fresh water body available in the Andhra Pradesh and it is also mentioned in the report itself that it is one of the largest fresh water ecosystem (wet land) in India of international importance recognized under the Ramsar Convention. If that be the case, there is a responsibility cast on the authorities to take steps to improve the water quality and make use of the same for drinking and irrigation purposes as well, so as to protect the water body and quality of the water.
11.When this was pointed out, the learned counsel appearing for the State departments submitted that they will come with a further action taken report or any plan for the State Government to improve the water quality in that lake. The APPCB should also file a factual report on the pollution of Kolleru lake caused by Industries, Agricultural operations & sewage discharge. They are expected to carry out the analysis scientifically by collecting the samples at (1) inlets and outlets of the Industrial zones which are ultimately draining into the Kolleru Lake, (2) confluence points of major drains into the Kolleru Lake – surface water samples and sediment 22 samples to be tested, (3) in case any settling ponds have been established prior to the joining of the drains into the lake, then samples of both surface water and the sediments in the settling ponds should be tested. The APPCB is expected to undertake the study comprehensively and not resort to filing a report based on cursory studies. The report has to be approved by the Chairman prior to submission....
.... 13.Certain short term and long term measures were also provided to meet the situation and also identified the possible source of contaminants/pollutants in Eluru canal, as certain heavy organo-chlorines and organo-phosphates and other heavy metals like Mercury, Lead and Nickel. As the presence of heavy metals shows that either it should have been caused through food chain or through water, that is the reason why the irrigation department was directed to conduct a detailed study to identify the possible sources of contamination especially organo-chlorides and also to take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month. Certain directions have been given to other departments as well, so as to restrict/prevent pollution either to the water or to the soil which has caused on account of mysterious disease found in that area. 29 14.It is also mentioned in the recommendation that the municipal water quality needs to be checked for more parameters like organo-chlorines and organophosphates on a periodical basis. Apart from that, they are also directed to monitor the level of heavy metals like Lead, Mercury and Nickel as well by conducting analysis and resort to the remedial measures to remove those metals from the water.

15.As regards the Solid Waste Management Rules, 2016 is concerned, they have not mentioned anything about the existing legacy waste and what are all the steps taken by them to dispose of the legacy waste, if any, in a scientific manner as provided under the Solid Waste Management Rules, 2016.

16.When this was pointed out, the learned counsel appearing for the State of Andhra Pradesh submitted that they will come with a detailed further report regarding the study, if any, done on the basis of the recommendations and also the remedial measures, if any, taken to mitigate the circumstances.

17.The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be 30 taken for improving the water quality in that lake.

18.The respective departments are directed to submit a report to this Tribunal on or before 28.07.2021 by e-filing in the form of Searchable PDF/ OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

19.The Registry is directed to communicate this order to the official respondents including the Principal Chief Conservator of Forest & Head of Forest Force, State of Andhra Pradesh and Chief Secretary, Principal Secretaries for Environment and Irrigation of State of Andhra Pradesh, Andhra Pradesh Pollution Control Board by e-mail immediately for their information and submission of report as directed.

2. The case was posted to 28.07.2021 for consideration of further report and thereafter the matter has been adjourned from time to time either at the request of the State Department or by notification for submission of the report. Lastly as per order dated 23.09.2021, it was adjourned to today for submission of report.

3. We have received a letter from Andhra Pradesh Pollution Control Board seeking three months time for filing the report as directed by this Tribunal in respect of Kolleru Lake.

4. It is also seen from the latest report published in Eenadu Daily dated 25.10.2021 that there are large scale encroachment into Kolleru Lake, which

is one of the reason stated for pollution caused in the lake. There are large number of fish ponds established by encroaching into the Kolleru Lake and it is not known as to whether these fish ponds are authorised one or unauthorised one. If it is unauthorised one, then it is for the authorities to take appropriate action to remove the unauthorised fish ponds, so as to save the Kolleru Lake from encroachments and pollution.

5. District Collector is directed to look into the issue mentioned in the newspaper report mentioned above and file a detailed report regarding the action taken for protecting the lake from pollution as well as encroachments. It is also mentioned in the report that unauthorised roads and buildings were also constructed in the Kolleru lake which had, as per the revenue record, having original extent of nearly 95,000 ha. of which 20,000 ha. is said to have been encroached.

6. The Hon'ble Apex Court in several cases and also the National Green Tribunal have reiterated the responsibility of the State to protect the water bodies from pollution and also from encroachments and also given directions to remove the encroachments and restore it to its original position. In spite of that, such newspaper reports are being published alleging encroachments in the water bodies and in-action on the part of the authorities in removing the encroachments and protecting the water bodies.

7. Considering the fact that Kolleru Lake is a notified Wet Land and it may be under the control and maintenance of Forest Department, we feel that it is

necessary to implead the Principal Chief Conservator of Forests, Head of Forest Forces, Andhra Pradesh and also District Forest Officer, West Godavari District as additional respondents 9 and 10 in O.A. No. 2 of 2021 and office is directed to carry out the amended in the cause title. Mrs. Madhuri Donti Reddy had taken notice for those Government Departments as well.

8. District Collector as well as the Forest Department through PCCF are directed to submit a report regarding the nature of encroachments, steps taken by them to remove the encroachments and protect the water body and if there is any scheme launched by the Government of Andhra Pradesh to protect this water body, then what is the stage of its implementation etc before the next hearing date apart from filing the report directed by this Tribunal in the previous orders by the Pollution Control Board.

9. They are directed to file the report along with map of Kolleru Lake depicting encroachments on or before 23.12.2021 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

10. The Registry is directed to communicate this order along with the newspaper report to the Pollution Control Board, District Collector, District Forest Officer, West Godavari as well as PCCF & HOFF, State of Andhra Pradesh for their information and compliance of the direction.

11. For consideration of further report, post on 23.12.2021.

.....J.M.
(Justice K. Ramakrishnan)

.....E.M.
(Shri. Dr. K. Satyagopal)

O.A. No.259/2020 (SZ) &
O.A. No. 02/2021 (SZ)
26th October, 2021. AM

Item No. 13 & 14:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Original Application No.259 of 2020 (SZ)
With
Original Application No.02 of 2021 (SZ)

(Through Video Conference)

IN THE MATTER OF

Tribunal on its own motion
Suo Motu based on the news item in
The Indian Express, Newspaper dt. 09.12.2020,
"Andhra town Eluru hit by 'mystery' illness,
Traces of lead, nickel in blood samples",
News item in The Time of India, Newspaper
Dt. 08.12.2020, "Heavy metal content in water
Caused mysterious disease in Andhra Pradesh" &
News item in NDTV, dt. 09.12.2020,
"Lead, Nickel found in blood of people with
Mystery illness in Andhra"

...Applicant(s)

Versus

The Chief Secretary of Govt. of Andhra Pradesh

And Ors.

…Respondent(s)

With

Tribunal on its own motion
Suo Motu based on the news item in
The Hindu, edition dated 15.12.2020,
"Kolleru (West Godavari Dt.) "Mystery illness raises
Concerns over Kolleru Pollution"

...Applicant(s)

Versus

The Chief Secretary to Govt. of Andhra Pradesh,

Andhra Pradesh and Ors.

…Respondent(s)

Date of hearing: 03.01.2022.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE Dr. SATYAGOPAL KORLAPATI, EXPERT MEMBER

O.A. No.259/2020:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R7.

O.A. No.02/2021:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R8.

ORDER

1. As per order dated 26.10.2021, this Tribunal had considered the request made by the Andhra Pradesh Pollution Control Board, District Collector and other departments and also considered the latest newspaper report

published in Eenadu Daily dated 25.10.2021 regarding large scale encroachment into the Kolleru Lake and directed the authorities to file an independent report regarding the same. This Tribunal had also directed the Forest Department to file an independent report regarding these aspects and posted the case to 23.12.2021 for that purpose. On 23.12.2021, the case was adjourned to today by notification.

2. We have received the letter dated 21.12.2021 sent by the District Collector, West Godavari, Eluru addressed to the Registrar, National Green Tribunal, Southern Zone, Chennai supposed to be the report which was sought for from him. This Tribunal, in several occasions directed the parties to file a proper report, instead of sending in the letter form through their counsel. When this was pointed out, the learned counsel appearing for the State of Andhra Pradesh submitted that they will rectify the same and file a proper report regarding the same.

3. We have also received the report submitted by the Principal Chief Conservator of Forests and Head of Forest Force signed on 14.12.2021, e-filed on 02.01.2022 which reads as follows:-

REPORT FILED BY THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS AND HEAD OF FOREST FORCE, ANDHRA PRADESH BEFORE THE NATIONAL GREEN TRIBUNAL, SOUTHERN ZONE, CHENNAI IN O.A. NO.259(SZ) OF 2020& 02/2021 (SZ)

1. SUO MOTO cases were registered by the Hon'ble National Green Tribunal (Southern Zone), Chennai, based on the Newspaper reports published in the Times of India, dated.08.12.2020; Indian Express, dated.09.12.2020 and in the Hindu, dt. 15.12.2020, under the captions "***heavy metal content in water caused mysterious disease in Andhra Pradesh***", "***Andhra town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples***", and "***mystery illness raises concerns over Kolleru pollution***" respectively and a news item telecasted in NDTV, dated.09.12.2020 under the caption "***Lead, Nickel found in Blood of people with a mystery illness in Andhra Pradesh***".

2. It is respectfully submitted that the Hon'ble NGT (SZ), Chennai in their order dt.26.10.2021, directed to implead the Prl. Chief Conservator of Forests & Head of Forest Force, Andhra Pradesh and also the District Forest Officer, West Godavari District as additional respondents 9 and 10 in O.A. No. 2 of 2021. Consequent to the notification of a part of Kolleru Lake as a Wildlife Sanctuary by the Government of Andhra Pradesh, the Kolleru Wildlife Sanctuary has been under the administrative control of the Andhra Pradesh Forest Department. Hence, the Prl. Chief Conservator of Forests & Head of Forest Force, Andhra Pradesh is impleaded as 9th respondent.

3. It is respectfully submitted that, Kolleru Lake is one of the largest freshwater ecosystems (Wetland) in India of International importance recognized under the Ramsar Convention (Iran 1971) in the year 2002. Out of the total area of the lake which is up to +10 feet MSL contour (Ac. 2,25,250), only up to +5 feet MSL contour (Ac.77,138) has been declared as Wildlife Sanctuary in the year 1999. Further, as per the direction of the Hon'ble Supreme Court of India in I.A. no. WP(C) no.202 of 1995, a total of 1776 no. of tanks (1140 in West Godavari district + 636 in Krishna district) covering an area of about 43,724 acres (28,949 acres in West Godavari + 15,775 acres in Krishna) have been demolished under "Operation Kolleru" within the notified area of Kolleru Wildlife Sanctuary, up to +5' contour. After operation Kolleru, the sanctuary lands were consolidated by the Revenue Department of West Godavari and Krishna Districts and handed over to the Forest Department.

4. There are mainly three categories of lands that exist inside the Sanctuary area *viz.*, Government, D-Patta, and Ziroyati lands. The area of the Ziroyati land i.e., Ac.14,861.33 is with individual farmers. The D-Pattas granted inside the Sanctuary area were cancelled at the time of notification. Traditionally, the villagers were practicing either agriculture or aquaculture activities in the area. After the "Operation Kolleru 2006", the Revenue Department from both the Districts i.e. West Godavari and Krishna has consolidated the area, village-wise and handed it over to

the Forest Department. But, the survey did not take place to demarcate the physical boundary of the Sanctuary, which runs along the +5 feet MSL contour as per the notification. During "Operation Kolleru-2006", the aquaculture tank bunds inside the Wildlife Sanctuary were partially demolished and the villagers again resorted to aquaculture activities by strengthening the partially demolished bunds. The encroachments are seasonal in nature. During monsoon season, the area within the +5 feet contour of MSL is generally flooded and once the water level recedes post-monsoon, the villagers try to repair the bunds of old tanks and start aquaculture activities. The Ziroyati lands are yet to be acquired by the Government from the farmers by paying suitable compensation. Though the D-Patta lands were cancelled at the time of notification, the farmers claim that they still have rights over those lands.

5. There is a lot of pressure from local villagers to carry out aquaculture activities and several complex issues involved from paying compensation to downsizing the Sanctuary boundary. Forest Department is making concerted efforts in protecting the sanctuary area despite all hurdles. So far, 544 cases have been registered related to encroachment, mainly for aquaculture in all the categories of the lands since 2006-07 and the cases are under trial in various courts. The details of cases registered from 2006-07 to 2021-22 (up to 31-10-2021) are given below;

ABSTRACT OF ENCROACHMENT CASES REGISTERED FROM 2006-07 TO 2021-22 (up to 31-10-2021) IN KOLLERU WLS

Year of Encroachment Case booked	No. of cases booked	The extent of Encroachment (Acres)		
		Govt.	Ziroyati	Total
2006-07	3	0	3.03	3.03
2007-08	1	0	0	0
2008-09	11	170.00	258.71	428.71
2009-10	23	307.95	471.31	779.26
2010-11	36	321.61	355.24	676.85
2011-12	11	182.21	40.88	223.09
2012-13	18	237.83	122.45	360.28
2013-14	5	28.62	22.53	51.15
2014-15	19	586.80	193.88	780.68
2015-16	33	361.37	33.48	394.85
2016-17	74	737.83	172.51	910.34
2017-18	95	2329.59	244.69	2574.28
2018-19	55	2428.97	25.71	2454.68
2019-20	46	1665.47	95.27	1760.74
2020-21	65	1305.45	1009.33	2314.78
2021-22	59	1204.12	825.24	2029.36
TOTAL::	**554**	**11867.82**	**3874.26**	**15742.08**

6. However, in some areas cases were registered multiple times since aquaculture activities were attempted in the same location every year. Accordingly, the area has been reconciled and arrived to an extent of 9522.10 Acres. (Govt. land: 6680.73 Acres. Zeroyati land: 2841.37 Acres.). District -wise particulars are given below and a map is enclosed depicting the encroachments based on the cases registered so far.

ABSTRACT OF AREA UNDER ENCROACHMENT BASED ON CASES REGISTERED FROM 2006-07 TO 2020-21 IN KOLLERU WLS

Sl. no.	District	Mandal	Area of the Mandal (Acres)	Extent of Encroachment (Acres)		
				Govt. Land	Zeroyati Land	Total
1	West Godavari	Eluru	23900	2052.24	303.51	**2355.75**
2		Denduluru	586	0	158.54	**158.54**
3		Pedapadu	789	0	179.20	**179.20**
4		Nidamarru	6838	0	495.08	**495.08**
5		Unguturu	134	0	30.81	**30.81**
6		Bhimadole	20323	1617.69	834.28	**2451.97**
7		Akiveedu	6914	580.150	517.37	**1097.520**
		Total	**59484**	**4250.08**	**2518.79**	**6768.87**
1	Krishna	Kaikaluru	10295	2539.63	308.66	**2848.29**
2		Mandavalli	7359	71.02	13.92	**84.94**
		Total	**17654**	**2430.65**	**322.58**	**2753.23**
	WLS TOTAL		**77138**	**6680.73**	**2841.37**	**9522.10**

Activities taken up by the Forest Department in the Sanctuary area:

7. The Sanctuary area is generally managed based on the prescriptions provided in the approved Management Plan. The previous Integrated Management Plan for Kolleru Wildlife Sanctuary was prepared by WISA (Wetlands International-South Asia):2008 for a period of 5 years under an assignment from the Forest Department, Government of Andhra Pradesh. The present Management Plan for Kolleru WLS is being prepared by involving Bombay Natural History Society (BNHS), Mumbai and it is under progress.

8. Forest Department is implementing various activities through State and Central schemes. The main activities implemented broadly in the Sanctuary area are Protection, Wildlife Habitat Improvement, Ecotourism, Development of bird congregation sites and infrastructure development etc., Overall, an amount of Rs.30 crore(approx.) has been spent in the sanctuary area from 2006-07 to 2020-21. Some of the important State and Central schemes being implemented currently in the sanctuary are CAMPA, BIOSAP, 04-Sanctuaries, 06-Development of National Parks & Sanctuaries, Centrally Sponsored Schemes - Conservation of Natural Resources & Aquatic Ecosystems etc., A brief note in this regard is annexed hereto.

9. The important activities being taken by Forest Department in the Sanctuary area are;

1. Protection: Establishment of base camps, strike force, check posts for regular patrolling, collecting intelligence, preventing encroachment activities, checking vehicle movement that carries fertilizers, chemicals, and fish feed into Sanctuary area etc. Presently 5 base camps, 1 strike force and 6 check posts are functioning from various locations in the Sanctuary area.

2. Habitat improvement: The activities like desilting of drains, demolition of old bunds, removal of water hyacinth and other weeds, formation of mounds, planting trees for bird nesting, installation of artificial perching stands, releasing fish fingerlings (food for aquatic birds) etc., are being taken up to create a favourable environment for the wildlife to survive.

3. Research & Monitoring: Regular censuses are being conducted to enumerate different bird species and their population. Research related to tagging of birds was conducted earlier by BNHS. Presently through M.S. Swaminathan Research Foundation (MSSRF), a study is being conducted on Socio-economic and livelihood assessment of communities living in and around Kolleru WLS.

4. Ecotourism: The ecotourism facility at Aatapaka and Madhavapuram in the sanctuary caters to visitors and acts as a Conservation Education Centre. Presently facilities like Environmental Education Centre, watchtower, boating are being maintained by the department. These facilities are being managed by local communities under the supervision of the Forest Department.

5. Awareness creation: Regular village level awareness programmes are being taken up and competitions for school and college students are being conducted during World Wetland Day, World Environment Day and Wildlife Week etc., mainly for gaining their support in the protection and conservation of this wetland.

10. Further, Forest Department is not only implementing various developmental activities but also constantly monitoring the sanctuary area and taking strict actions against the illegal activities despite all hurdles. The seasonal encroachments in the Sanctuary area mostly for aquaculture have been tackled by registering offence cases, demolishing the bunds, conducting village level programmes. The department is taking the best possible efforts to prevent and remove all kinds of encroachments in the sanctuary area.

11. It is respectfully submitted that, the Map of Kolleru Wildlife Sanctuary depicting encroachments along with a report in the form of Searchable PDF/OCR supportable PDF is enclosed herewith. Necessary hard copies are also enclosed herewith which are as follows;

- Note on schemes under implementation (ANNEXURE - I).
- A detailed note on Kolleru Wildlife Sanctuary is also enclosed herewith for kind perusal (ANNEXURE – II).
- Map of Kolleru Wild Life Sanctuary (ANNEXURE – III).

This is submitted for kind information.

14.12.21

Prl. Chief Conservator of Forests &
Head of Forest Force
Andhra Pradesh

ANNEXURE - I

Brief Note on schemes being implemented in Kolleru Wildlife Sanctuary

Andhra Pradesh Forest department is implementing various activities through State and Central schemes. The main activities implemented broadly in the sanctuary area are Protection, Wildlife Habitat Improvement, Ecotourism, Development of bird congregation sites and infrastructure development etc. Overall, an amount of Rs.30 crore (approx.) has been spent in the sanctuary area from 2006-07 to 2020-21.

The Scheme-wise activities being taken up by the Andhra Pradesh Forest Department in the sanctuary area are broadly as follows;

1. CAMPA:

a. Wildlife Habitat Improvement in protected areas

i. Boundary Demarcation by the erection of stone monoliths/cairns

b. Water Resource Management in Protected Areas

ii. Construction of water conservation structures

iii. Development and maintenance of Check dams

c. Forest & Wildlife Protection

iv. Construction of boundary pillars

2. BIOSAP

v. Habitat Improvement

3. 04-Sanctuaries:

d. Habitat Improvement and Protection

vi. Maintenance of existing bird roosting stands

4. Vanavihari (Eco-tourism):

vii. Maintenance of EECs

Centrally Sponsored Schemes

5. Conservation of Natural Resources & Aquatic Ecosystems

e. Sustainable resource development and livelihood improvement

viii. Release of fish seed (fingerlings) into Kolleru WLS at strategic points

14.12.21

Prl. Chief Conservator of Forests &
Head of Forest Force,
Andhra Pradesh

ANNEXURE –II

NOTE ON KOLLERU LAKE & KOLLERU WILDLIFE SANCTUARY

BACKGROUND:

1. Kolleru Lake is one of the largest freshwater ecosystems (Wetland) in India of international importance recognized under the Ramsar Convention (Iran 1971) in the year 2002. It is a naturally formed lake between the alluvial plains of river Godavari and Krishna deltas and acts as a natural flood balancing reservoir. The lake with its variety of habitats supports rich biodiversity including some endangered species and supports the livelihoods of a large population living in and around the wetland system.

History:

2. The lake has been under tremendous pressure due to unsustainable developmental activities, particularly agriculture and aquaculture, which have led to the construction of hydraulic structures, roads, bunds and other infrastructure within its basin. The area under cultivation within the lake increased since 1940 when the British government granted *pattas* (title deeds) on payment of market value for the land. In 1954, the government initiated cooperative farming in the region inducing the formation of 93 farming societies on 850 sq. km. of the lake bed. The native paddy varieties were gradually replaced with shorter, high-yielding varieties that required the application of high dosages of chemical fertilizers and pesticides. By 1969, almost the entire lake was brought under cultivation and huge bunds were constructed to keep water out to protect the crops. As floods threatened cultivated areas almost every year, several control measures were also initiated during this period. However, the entire area was ravaged by a cyclone in 1969 which led to the near-complete destruction of agriculture. By the time flood control measures were completed, most of the people had become disillusioned with agriculture and had abandoned it. The roads and bridges that came up with agricultural development coupled with the increased demand for fish created a new livelihood opportunity and vast market for fish by 1978. Land use shifted to pisciculture which suddenly became profitable and by 1984, 5000 acres of government land within the lake bed was converted to fish tanks under the management of cooperative societies. The land was arbitrarily and haphazardly notified for pisciculture in total disregard to natural drainage patterns. High-profit margins subsequently induced contractors and private entrepreneurs into the Kolleru Lake area, who intensified aquaculture without adopting any environmental safeguards.

3. Realizing the rapid degradation of Kolleru Lake, the Government of Andhra Pradesh constituted several committees to propose measures for its restoration. Most of these committees, however, suggested engineering solutions aimed at agriculture and fisheries development and flood control. The measures proposed were aimed at the diversion of water to the upstream reaches reducing flows to the lake. The report of the expert committee on floods of deltaic areas on Krishna, Godavari and Guntur Districts by the Mitra Committee in 1966 suggested the construction of reservoirs at Budameru and Tammileru for storage of floodwaters (Mitra, 1966). Widening of Upputeru was proposed to drain the floodwaters with the lake levels controlled through the construction of a regulator (Mitra, 1966; Sreeramakrishnaiah, 1987; Ramakrishnan, 1980). Pandurangam (1976) recommended the construction of 71 tanks and necessary development to promote fisheries. Construction of roads, school buildings, hospitals, electrification and development of piggery, duckery, and dairy farms for socio-economic benefit were also recommended.

Area:

4. The Kolleru lake spreads over an area of 2,25,250 acres up to +10 feet contour MSL with rich biodiversity. The water spread area of Kolleru lake is as follows:

Up to +10 feet contour MSL	2,25,250 acres
Up to +7 feet Contour MSL	1,68,750 acres
Up to +5 feet contour MSL	77,138 acres
Up to +3 feet contour MSL	33,750 acres

Declaration of Kolleru wildlife sanctuary:

5. Govt. have issued a draft preliminary notification declaring Kolleru lake as a Wildlife Sanctuary vide G.O.Ms.No.76, EFS&T (For.III) Dept, dated. 25-9-1995. Later, the Govt. have issued a final notification of the sanctuary vide G.O.Ms.No. 120, EFS&T (For.III) Dept., dated.4-10-1999. The Kolleru Wildlife Sanctuary spreads over 9 Mandals, i.e., 7 Mandals in West Godavari and 2 Mandals in Krishna District with an extent of 30,855.20 ha or 77,138 acres up to +5 feet contour MSL. Out of this, 14861.33 Acres are privately owned Patta lands.

The sanctuary area details are as follows:

Sl. no.	District	Name of the Mandal	Area in Acres
1	West Godavari	Eluru	23900
2		Unguturu	134
3		Pedapadu	789
4		Denduluru	586
5		Akiveedu	6914
6		Nidamarru	6838
7		Bhimadolu	20323
	West Godavari district total		**59484**
8	Krishna	Kaikaluru	10295
9		Mandavalli	7359
	Krishna District Total		**17654**
	Total		**77138**

Status of WPs filed in the Hon'ble High Court of Andhra Pradesh:

6. Aggrieved by the notification orders issued by Government, several hundreds of illegal fish tank owners and other groups have filed several writ-petitions in Hon'ble High Court challenging the notification issued in 1999. After hearing all the writ-petitions, the Hon'ble High Court has bunched all the writ-petitions and treated them as a single case proclaimed the judgment on 30-7-2001, declaring the final notification issued by the State Govt. vide G.O.Ms.No.120 as valid and issued the following directions to the Government of A.P.;

- The final notification issued is valid.
- The Govt. should take all the steps to bring back Kolleru to its pristine glory.
- No pisciculture/aqua-culture/shrimp culture should be permitted inside the sanctuary except traditional methods of fishing and traditional agriculture in their Patta lands, till such time their agriculture lands are acquired by Government.
- All encroachments within Kolleru sanctuary up to +5' contour should be removed.

- Government should take adequate steps in stoppage of effluents into Kolleru lake.

Steps taken by Govt. of A.P after the Hon'ble High Court orders, dt.30.7.2001:

7. In order to implement the Hon'ble High Court orders, the Government have taken several steps. Taskforce teams were formed to prevent illegal encroachments. The Forest Department has removed 54 illegal fish tanks and faced threats and very difficult situations. Motivation camps were conducted to educate the local people on the adverse effects of floods like crop damages, deterioration of water quality, dangerous effects of pollution due to excessive usage of chemical fertilizers, feed, and pesticides by the illegal fish tank owners, etc. A total of 731 cases were booked for habitat destruction etc., from 30-7-2001 to 17.11.2005. Pollution control measures were taken by monitoring the water quality in 19 stations.

PIL filed by NGO (Nallamalai Foundation) before the CEC:

8. As the matter stands at this stage, the Executive Director, Nallamalai Foundation (NGO) filed an IA No.381/2005 before the Central Empowered Committee (CEC), constituted by the Hon'ble Supreme Court of India in W.P. (C) No.202/95 and 171/96 praying for the direction to the State Govt. on;

1. Immediate eviction of all encroachments in the sanctuary.
2. To expedite the acquisition of private Patta lands.
3. Cancellation of D-Form pattas (2,882 acres). (These D-Form pattas were cancelled by the Collector, West Godavari District on 11.8.2005 and 20.10.2005, and by the District Collector, Krishna on 10.1.2002 and 21.2.2002).
4. To bring back the Kolleru Lake to its pristine glory.

9. Hon'ble CEC has called for objections and conducted several hearings at New Delhi and also in Hyderabad wherein all the people representatives, several illegal fish tank owners, a large number of advocates have presented their cases before the committee and filed their affidavits during January-March, 2006. After the final hearing, the CEC has submitted its report to the Hon'ble Supreme Court of India during the month of March 2006.

Directions of the CEC of Hon'ble Supreme Court of India:

10. While dealing with a petition in IA No.1486-1487, Dt.20.3.2006, the Central Empowered Committee appointed by the Hon'ble Supreme Court of India, vide Para No.54 of their report; issued the following directions;

a. Use or transportation of inputs for pisciculture such as chemical fertilizer, farmyard manure, poultry manure, DOB, oil cakes etc., shall not be allowed in Kolleru Wildlife Sanctuary.
b. All fish tanks constructed inside the sanctuary shall be demolished in a time-bound manner starting from the big to the smaller ones. The tanks of an area of more than 100 acres (cumulative) shall be demolished within a period of 15 days and the remaining tanks shall be demolished by 31st May 2006.

Judgment of Hon'ble Supreme Court of India and action taken by the Govt. of A.P:

11. Aggrieved by the order of the CEC, the Kolleru Food Industries have filed a Writ Petition No.1486-1487 before the Hon'ble Supreme Court of India and the Supreme Court in their judgment Dt:10.04.2006 have upheld the directions issued by the CEC. As per the direction of the Hon'ble Supreme Court of India, under "Operation Kolleru" totally, 1776 tanks (1140 in West Godavari + 636 in Krishna district) covering an area of about 43,724 acres (28,949 acres in West Godavari + 15,775 acres in Krishna) have been demolished in Kolleru wildlife sanctuary up to +5' contour. The demolition work has been taken up and completed by 15.6.2006 as per the orders of the Hon'ble Supreme Court and CEC. The demolition was carried out by the revenue department under the supervision of District Collectors.

Post "Operation Kolleru-2006"

12. After the completion of "Operation Kolleru" in 2006, the revenue department from both the districts consolidated the lands falling up to +5 feet contour MSL and handed them over to the forest department for management. The Kolleru Wildlife Sanctuary is under the administrative control of the Wildlife Management Division, Eluru. Unlike the regular reserve forest blocks, the boundary of the sanctuary is described in terms of +5 feet MSL contour line in the notification. Through G.O no.144, EFS&T (For.II) dept., dt.15.11.2006 staff were recruited on a contract basis under various categories to effectively manage the sanctuary area.

Details of private Patta lands owned by farmers:

13. Traditional agriculture in privately owned lands is permitted as per G.O. Ms.No.120, EFS & T (For.III) Dept., dt.4.10.1999. The Patta lands owned by private owners having legal rights to practice traditional agriculture within the sanctuary area up to +5' contour is 14,861.33 acres out of the total sanctuary area of 77,138 acres. The details are given below:

Sl. no.	Name of the Mandal	No. of villages	No. of Ryots	The Extent of area (Acres)
	West Godavari Dist.			
1.	Eluru	7	399	823.61
2.	Pedapadu	3	199	496.52
3.	Denduluru	2	111	380.28
4.	Bhimadolu	5	1167	2426.87
5.	Nidamarru	11	4126	6150.63
6.	Unguturu	1	30	146.46
7.	Akiveedu	10	1981	3475.1
	Total	**39**	**8013**	**13899.47**
	Krishna District			
1.	***Kaikaluru***	10	125	571.45
2.	***Mandavalli***	5	71	390.41
	Total	**15**	**196**	**961.86**
	Grand total	**54**	**8209**	**14861.33**

14. As per G.O.Ms.No.120, dated.4.10.1999 and the judgment of the Hon'ble High Court, dated.30.7.2001 and also as per the Hon'ble Supreme Court of India's orders in April 2006, the owners of the agriculture lands can practice traditional agriculture without using pesticides and chemicals. But the farmers are agitating to permit them to use chemical fertilizers to get more yields, which is illegal. Otherwise, they are requesting to pay adequate compensation to their lands.

15. The Dist. Collector, West Godavari indicated Rupees Six Hundred Twenty-Five Crore Forty-Eight lakh (Rs.625.48 crore) and the Dist. Collector, Krishna has indicated Rupees Thirty crore (Rs.30.00 crore) to acquire an extent of 13,899.47 acres and 961.86 acres respectively. Accordingly, the Govt. have proposed to pay the total compensation of rupees Six hundred fifty five crore and forty eight lakh (Rs.655.48 crore) for paying compensation to the agriculture landowners to an extent of 14,861.33 acres from accumulated Compensatory Afforestation Management & Planning Agency (CAMPA) and requested Hon'ble Minister for Environment, Forests & Climate Change to consider this proposal. But the Union Minister, MoEF & CC, GoI in National Board for Wildlife Meeting held by him on 22-12-2009 has decided and informed that CAMPA funds cannot be used for acquisition of private lands and the question of payment of compensation to the farmers from CAMPA funds cannot be considered.

A.P. State Legislative Assembly resolution on 04.09.2008:

16. The A.P Legislative Assembly on 4-9-2008 had adopted a resolution to request the National Board of Wildlife, GoI and the Central Empowered Committee for reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet contour to +3 feet contour to mitigate the problems of the farmers.

17. The Ministry of Environment, Forests & Climate Change, GoI has been addressed accordingly vide EFS&T Lr.No.5876/For.II (2) 2006, dated. 17.10.2008 to place the matter before the National Board for Wildlife. The issue was discussed in the 17th meeting of the Standing Committee of the National Board for Wildlife on 22.12.2009 and the Chairman decided to visit the site. Hon'ble Union Minister for Environment, Forests & CC visited the Kolleru WLS along with the public representatives on 27.2.2010 and announced that a committee will be formed to look into the problems of the people and environmental issues. The Government of India have constituted a 7-member committee vide GoI F.No.6-118/2008/WL-1, Dt: 29.4.2010 headed by Dr. P. A. Azeez, SACON. The Committee has visited the Kolleru lake from 20th to 25th September 2010 and the report was submitted to the Government of India in April 2011.

18. The committee was not in agreement with the proposed reduction of the area from +5 feet contour to +3 feet contour as this would seriously affect the conservation of wildlife especially the migratory birds. The committee felt that it is not advisable to reduce the sanctuary area as it would not be a viable solution for socio-economic and ecological issues confronting the stakeholders and local communities dependent on the lake. The committee has stressed the need for appropriate relocation and rehabilitation policy to be adopted in acquiring the private lands below the +5 feet MSL contour level. The GoI has accepted the committee report and directed the State Government to implement the recommendations of the Committee vide F.No.6-118/2008/WL-I, Dt: 6.6.2012.

19. While is so, the Government of India have formulated the Wetlands (Conservation & Management) Rules, 2010 under the Environment (Protection) Act, 1986 (the same are amended subsequently in 2017). According to these rules, the entire Kolleru Lake up to +10 feet contour MSL (901 sq.km) will be under the purview of the Wetlands (Conservation & Management) Rules, 2010. Consequent to this and because of severe public opposition, the Government of Andhra Pradesh in letter No.10295/For-II (2)/2010-2, dt: 29.01.2011, has requested the Government of India to drop the proposals of bringing the entire lake under the purview of Wetlands (Conservation & Management) Rules, 2010 and also requested that these rules may be applied to the areas in Kolleru lake which remain underwater for most of the period of the year (up to +3 contour level).

A.P State Legislative Assembly Resolution on 23.12.2014:

20. The Andhra Pradesh Legislative Assembly have adopted the following resolution on 23.12.2014. "Kolleru Lake has been declared as Wildlife Sanctuary up to +5 feet Contour vide G.O. Ms.No.120, EFST&T (For.III) Dept., dated 04.10.1999 over an area of 30,855.20 Hectares, which includes 14,861.33 acres of Ziroyathi lands of which 13,899.47 acres is in West Godavari District 961.86 acres in Krishna District.

21. That these farmers are not getting adequate income from traditional agriculture without utilizing chemical fertilizers as per GO.Ms.No.120 EFS&T (For-III) Dept., dt.04.10.1999. The compensation proposed to be paid for acquiring these lands will cause a heavy financial burden on the state exchequer.

22. This House resolved to request the National Board for Wildlife, Government of India and the "Central Empowered Committee" to recommend for reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet Contour to +3 feet Contour to mitigate the problems of the farmers.

23. The above-said resolution was placed before State Board for Wildlife Andhra Pradesh. The State Board for Wildlife in its meeting held on 13.08.2015 recommended the reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet Contour to +3 feet Contour to the National Board for Wildlife.

24. The Standing Committee of the National Board for Wildlife in its 35th meeting held on 18th Aug 2015 discussed the proposal for boundary alteration of Kolleru Wildlife Sanctuary. The Standing Committee decided to constitute a Working Group to study all aspects of the matter. The Working Group will include member Prof R.Sukumar, representative of Wildlife Institute of India, a nominee of Wildlife Division of the Ministry and a representative of the State Forest Department of Andhra Pradesh. The Group visited the Kolleru Wildlife Sanctuary area during the second week of December 2015 and brainstormed on all aspects of the proposal and to suggest viable options, including rationalization of boundaries of the Sanctuary, for conservation of the wetland and the Sanctuary while ensuring that no hardships are caused to the bonafide owners of the lands in the area.

25. Further, in the Standing Committee of National Board for Wildlife in its 37th Meeting held on 26-02-2016, Chairman requested Dr. Sukumar and the site inspection team to interact with the state Government of Andhra Pradesh and finalize the report with the recommendations for the part of the Sanctuary area, which is suitable for de-notification, which would cater to the needs of the local and owners while preserving the Kolleru Bird Sanctuary.

26. Further, in the 40th Meeting of Standing Committee of National Board for Wildlife held on 3rd January 2017, member Dr.Sukumar, described the recommendations made in the report,

- No compromise with the ecological balance by a drastic reduction in sanctuary area as per Andhra Pradesh State Assembly Resolution.
- Deletion of private Ziroyati lands from the sanctuary, i.e., approx. 5533.3 ha located inside the north-eastern boundary of Kolleru WLS except major rivers/streams flowing within this area retaining 10 m on either side of the stream/river by the government to ensure the environmental water flow into sanctuary.
- Based on the authentic information on the extent of lands assigned to Scheduled Castes and Backward Class communities, the genuine D-Patta

cooperative societies be accommodated adjoining the Ziroyati lands to be deleted. Their process of rehabilitation should be ensured that these lands do not fall into the hands of 'Benami' owners.

- The government should be prepared to invest resources in R&R to resolve the rehabilitation cost of remaining Ziroyati landowners.
- The above actions may be started after the compilation of reliable data on the actual boundary of Kolleru WLS and the preparation of an integrated management plan.
- Within the rationalized boundaries of sanctuary, the important areas of bird congregation should be declared as core zones free of human disturbances and the rest buffer areas can be used for traditional fishing without the construction of bunds.
- Ecologically Sensitive Zone (ESZ) should be declared up to the present boundary or may be extended to a distance recommended by experts on wetland ecology.

27. Further, the Standing Committee of the National Board for Wildlife in its 48th meeting held on 27.03.2018 recommended for deletion of Ac.19797.69 cents (Approx. Ac.20000 cents) of private Ziroyati lands and D-Patta lands as per the resolution passed by the Government of Andhra Pradesh. Hon'ble CEC addressed the Chief Secretary, A.P vide letter dated 25.07.2018 (F.No.2-77/CEC/SC/2018-Pt.VI) advised no further action may be taken to implement the decision of the Standing Committee of National Board for Wildlife taken at its meeting held on 27.03.2018.

Encroachment status within Kolleru WL Sanctuary (up to +5 feet contour):

28. There are mainly three categories of the lands that exist inside the sanctuary area (Government, D-Patta & Ziroyati). Traditionally the villagers are practicing either agriculture or aquaculture activities in the area. The D-Patta lands were cancelled at the time of notification. After the "Operation Kolleru-2006", the revenue department from both the districts consolidated the area village-wise and handed it over to the forest department. The survey did not take place to demarcate the sanctuary boundary and as per the notification, the boundary of the sanctuary runs along the +5 feet of contour MSL. During "Operation Kolleru-2006" the aquaculture tank bunds inside the Wildlife Sanctuary were only partially demolished and the villagers again resorted to aquaculture activities by strengthening the partially demolished bunds. The encroachments are seasonal in nature, during monsoon season the area within +5 feet of contour MSL generally flooded and once the water level recedes post-monsoon, the villagers will try to repair the bunds of old tanks and start aquaculture activities. The Ziroyati lands are yet to be acquired by Government from the farmers by paying compensation. Though the D-Patta lands were cancelled at the time of notification, the farmers feel that still they have rights over those lands.

29. There is a lot of pressure from local villagers to carry out aquaculture activities and several complex issues involved from paying compensation to downsizing the sanctuary boundary. The Forest Department is taking concerted efforts in protecting the sanctuary area despite all hurdles. So far 544 cases have been registered related to encroachment in all the categories of the land since 2006-07 and the cases are under trial in various courts. The details of cases booked from 2006-07 to 2021-22 (up to 31-10-2021) are given below.

ABSTRACT OF ENCROACHMENT CASES REGISTERED FROM 2006-07 TO 2021-22 (up to 31-10-2021) IN KOLLERU WLS

Year of Encroachment Case booked	No. Cases booked	The Extent of Encroachment (Acres)		
		Govt.	Ziroyati	Total
2006-07	3	0	3.03	3.03
2007-08	1	0	0	0
2008-09	11	170.00	258.71	428.71
2009-10	23	307.95	471.31	779.26
2010-11	36	321.61	355.24	676.85
2011-12	11	182.21	40.88	223.09
2012-13	18	237.83	122.45	360.28
2013-14	5	28.62	22.53	51.15
2014-15	19	586.80	193.88	780.68
2015-16	33	361.37	33.48	394.85
2016-17	74	737.83	172.51	910.34
2017-18	95	2329.59	244.69	2574.28
2018-19	55	2428.97	25.71	2454.68
2019-20	46	1665.47	95.27	1760.74
2020-21	65	1305.45	1009.33	2314.78
2021-22	59	1204.12	825.24	2029.36
TOTAL:	**554**	**11867.82**	**3874.26**	**15742.08**

30. However, in some areas cases were registered multiple times since aquaculture activities were attempted in the same location every year. Accordingly, the area has been reconciled and arrived to an extent of 9522.10 Acres. (Govt land: 6680.73 Acres. Ziroyati land: 2841.37 Acres.). District-wise particulars are given below and the map is enclosed depicting the encroachment based on the cases registered so far.

ABSTRACT OF AREA UNDER ENCROACHMENT BASED ON CASES REGISTERED FROM 2006-07 TO 2020-21 IN KOLLERU WLS

Sl. no.	District	Mandal	Area of the Mandal (Acres)	Extent of Encroachment (Acres)		
				Govt. Land	Ziroyati Land	Total
1	West Godavari	Eluru	23900	2052.24	303.51	**2355.75**
2		Denduluru	586	0	158.54	**158.54**
3		Pedapadu	789	0	179.20	**179.20**
4		Nidamarru	6838	0	495.08	**495.08**
5		Unguturu	134	0	30.81	**30.81**
6		Bhimadole	20323	1617.69	834.28	**2451.97**
7		Akiveedu	6914	580.150	517.37	**1097.520**
		Total	**59484**	**4250.08**	**2518.79**	**6768.87**

1	Krishna	Kaikaluru	10295	2539.63	308.66	**2848.29**
2		Mandavalli	7359	71.02	13.92	**84.94**
		Total	**17654**	**2430.65**	**322.58**	**2753.23**
	WLS TOTAL		**77138**	**6680.73**	**2841.37**	**9522.10**

Activities have been taken up by the Forest department in the sanctuary area:

31. Forest Department is implementing various activities through state and central schemes. The main activities implemented broadly in the sanctuary area are Protection, wildlife habitat improvement, ecotourism, development of bird congregation site, infrastructure development, etc. Overall, an amount of Rs.30 crore (approx.) has been spent in the sanctuary area from 2006-07 to 2020-21. Some of the important state and central schemes being implemented currently in the sanctuary are CAMPA, BIOSAP, 04-Sanctuaries, 06-Development of National Park & Sanctuaries, Centrally Sponsored Schemes - Conservation of Natural Resources & Aquatic Ecosystem etc.,

32. The important activities being taken by Forest Department in the sanctuary area are;

1. **Protection:** Establishment of base camps, strike force, check posts for regular patrolling, collecting intelligence, preventing encroachment activities, checking vehicle movement that carries fertilizers, chemicals, and fish feed into sanctuary area etc. Presently 5 base camps,1 strike force, and 6 check posts are functioning from various locations in the sanctuary area.
2. **Habitat improvement:** The activities like desilting drains, demolition of old bunds, removal of water hyacinth and other weeds, formation of mounds, planting of trees for bird nesting, installation of artificial perching stands, releasing fish fingerlings (food for aquatic birds) etc., are being taken up to create a favourable environment for the wildlife to survive.
3. **Research & Monitoring:** Regular census is being conducted to enumerate different bird species and their population. Research related to tagging of birds was conducted earlier by BNHS. Presently through MS Swaminathan Research Foundation (MSSRF), a study is being conducted on Socio-economic and livelihood assessment of communities living in and around Kolleru WLS.
4. **Ecotourism:** The ecotourism facility at Aatapaka and Madhavapuram in the sanctuary caters to the visitors and acts as a Conservation Education Centre. Presently facilities like Environmental Education Centre, watch tower, boating are being maintained by the department. These facilities are being managed by local communities under the supervision of the forest department.
5. **Awareness creation:** Regular village level awareness programmes are being taken up and competitions for school and college students are being conducted during world wetland day, world environment day, wildlife week etc., mainly for gaining their support in the protection and conservation of this wetland.

33. Forest Department is not only implementing various developmental activities but also constantly monitoring the sanctuary area and taking strict actions against the illegal activities. The department is taking the best possible efforts to prevent and remove all kinds of encroachments in the sanctuary area. The sanctuary area is generally managed based on the prescriptions provided in the approved Management Plan. The previous Integrated Management Plan for Kolleru Wildlife Sanctuary was prepared by WISA (Wetlands International-South Asia):2008 for a period of 5 years under an assignment from the Forest Department, Government of

Andhra Pradesh. The present management plan for Kolleru WLS is being prepared by involving Bombay Natural History Society (BNHS), Mumbai and it is under progress.

Conclusion:

34. It is submitted that Kolleru lake is an important wetland in Andhra Pradesh. Out of the total area of the lake which is up to +10 feet MSL contour (Ac. 225250) only up to +5 feet MSL contour (Ac.77138) has been declared as a wildlife sanctuary in the year 1999. After "Operation Kolleru -2006", the sanctuary lands were consolidated by the revenue department of both the districts and handed it over to the Forest Department. Since then, the forest department is managing the sanctuary effectively despite all hurdles. The seasonal encroachments in the area mostly for aquaculture have been tackled by registering offense cases, demolishing the bunds, conducting village level awareness programmes etc.

35. Further, only 34.24% of the lake has been declared as Kolleru WLS out of the total lake area of Ac.2,25,250. The water quality in the lake not only depends on the activities carried out inside the sanctuary area (up to +5 feet MSL contour) but also based on the activities happening in the lake basin area. **Hence, to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by involving all the stakeholders working in Kolleru lake basin to manage the Kolleru lake/wetland holistically.**

4. It is seen from the report that there are certain deficiencies noted stating that complete survey as required has not been conducted. It is also mentioned in the report that out of 2,25,50 Acres of total lake area, only 34.24% of lake has been declared as Kolleru Wildlife Sanctuary. It is also mentioned that to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by

involving all the stakeholders working in Kolleru Lake Basin to manage the Kolleru Lake/wetland holistically.

5. It is also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department is also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They are also directed to file an independent report in this aspect before this Tribunal.
6. The State of Andhra Pradesh is directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.
7. The learned counsel appearing for the District Collector – Krishna District as well as the Andhra Pradesh Pollution Control Board wanted some time to file their independent reports regarding these aspects.
8. They are directed to submit the respective reports to this Tribunal on or before 10.02.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

9. The Registry is directed to communicate this order to the official respondents including the Principal Secretary for Agriculture, State of Andhra Pradesh and also the Chief Secretary, State of Andhra Pradesh by e-mail for their information and compliance of the direction in respect of the study to be conducted as suggested by the Principal Chief Conservator of Forest to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention.

10. For consideration of further reports, post on 10.02.2022.

Sd/-
.....J.M.
(Justice K. Ramakrishnan)

Sd/-
.....E.M.
(Dr. Satyagopal Korlapati)

O.A. No.259/2020 (SZ) &
O.A. No.02/2021 (SZ)
03rd January, 2022. Mn.

Item No.1 & 2:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

(Through Video Conference)

Original Application No.259 of 2020 (SZ)
With
Original Application No.02 of 2021 (SZ)

IN THE MATTER OF

Tribunal on its own motion
Suo Motu based on the news item in
The Indian Express, Newspaper dt. 09.12.2020,
"Andhra town Eluru hit by 'mystery' illness,
Traces of lead, nickel in blood samples",
News item in The Time of India, Newspaper
Dt. 08.12.2020, "Heavy metal content in water
Caused mysterious disease in Andhra Pradesh" &
News item in NDTV, dt. 09.12.2020,
"Lead, Nickel found in blood of people with
Mystery illness in Andhra"

And

The Chief Secretary of Govt. of Andhra Pradesh

And Ors.

…Respondent(s)

With

Tribunal on its own motion
Suo Motu based on the news item in
The Hindu, edition dated 15.12.2020,
"Kolleru (West Godavari Dt.) "Mystery illness raises
Concerns over Kolleru Pollution"

And

The Chief Secretary to Govt. of Andhra Pradesh,

Andhra Pradesh and Ors.

…Respondent(s)

Date of hearing: 30.03.2022.

CORAM:

HON'BLE Mr. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE Dr. SATYAGOPAL KORLAPATI, EXPERT MEMBER

O.A. No.259/2020:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R7.

O.A. No.02/2021:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R10.

O R D E R

1. The above cases have been posted to 10.02.2022 for consideration of further reports by order dated 03.02.2022. Subsequently, the matter has been adjourned from time to time by successive notifications and lastly, it

was adjourned to today by notification dated 02.03.2022. But today, by notification, it was adjourned to 28.04.2022.

2. Today, we come across another newspaper report published in Eenadu dated 30.03.2022, alleging that ponds are being dug illegally in the Kolleru Wildlife Sanctuary. So, in order to ascertain the genuineness of the allegations made in the newspaper report, we feel it appropriate to advance the hearing today.

3. As per order dated 03.01.2022, this Tribunal had considered the report wherein, it was mentioned that out of 2,25,250 Acres of total lake area, only 34.24% of lake has been declared as Kolleru Wildlife Sanctuary. It was also mentioned that to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by involving all the stakeholders working in Kolleru Lake Basin to manage the Kolleru Lake/wetland holistically.

4. It was also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department was also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They were also directed to

file an independent report in this aspect before this Tribunal.

5. The State of Andhra Pradesh was directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.

6. It is seen from the newspaper report that in spite of directions given by this Tribunal to conduct scientific study and for removal of encroachments and hand over the lake area to the Forest Department as part of the wildlife sanctuary, certain illegal activities of creating fish ponds in the wildlife sanctuary are being undertaken at Pedayaganamalli Village, Eluru Mandal.

7. The Chief Secretary, State of Andhra Pradesh is directed to conduct an enquiry through the respective District Collector and the Conservator of Forests to look into the issue referred to in the newspaper report mentioned above and submit a factual as well as action taken report by the respective departments in this regard.

8. We have not received any further report in continuation of the order passed by this Tribunal on 03.01.2022. This aspect also will have to be considered by the Chief Secretary while filing the report as directed by this Tribunal on the basis of the newspaper report.

9. They are directed to submit the respective reports to this Tribunal on or before **04.04.2022** by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

10. Even if they are not able to file the detailed report, they are directed to file an interim report to the allegations made in the newspaper report and action taken on that aspect, if any illegal activities are going on.

11. The Registry is directed to communicate this order along with the copy of the newspaper report mentioned above to the official respondents including the Chief Secretary to Government, State of Andhra Pradesh by e-mail immediately for their information and compliance of directions.

12. For consideration of further reports, post on 04.04.2022.

Sd/-
Justice K. Ramakrishnan, JM

Sd/-
Dr. Satyagopal Korlapati, EM

O.A. No.259/2020 (SZ) &
O.A. No.02/2021 (SZ)
30th March 2022. Mn.

Item No.07 & 08:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 259 of 2020 (SZ)

IN THE MATTER OF

Tribunal on its own motion-SUO MOTU Based on The News item in The Indian Express, Newspaper, Dated 09.12.2020, Andhra Town Eluru hit by 'mystery' Illness, Traces of lead, nickel in blood samples," News item In the Times of India Newspaper dt: 09.12.2020,"Heavy Metal Content in water caused mysterious disease in Andhra Pradesh," & News Item in NDTV, dt: 09.12.2020, "Lead, Nickel found in Blood of people with mystery illness in Andhra".

With

The Chief Secretary to Govt. of Andhra Prades And others.

...Respondent(s)

And

Original Application No. 02 of 2021 (SZ)

IN THE MATTER OF

Tribunal on its own motion-SUO MOTU Based on The News item in The Hindu, Edition Dated: 15.12.2020, Kollery (West Godavari District.) "Mystery illness raises Concerns over Kolleru pollution

With

The Chief Secretary to Government of Andhra Pradesh
Andhra Pradesh Secretariat,
Guntur, Andhra Pradesh and others.

.....Respondent(s)

Date of hearing: 04.04.2022.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE DR. SATYAGOPAL KORLAPATI, EXPERT MEMBER

HON'BLE DR. VIJAY KULKARNI, EXPERT MEMBER

O.A. No. 259 of 2020(SZ)

For Applicant(s): Suo Motu

For Respondent(s): Ms. Madhuri Donti Reddy for R1 to R7

O.A. No. 02 of 2021(SZ)

For Applicant(s): Suo Motu

For Respondent(s): Ms. Madhuri Donti Reddy for R1 to R10

ORDER

1. The above was posted to today for consideration of further report.

2. On 30.03.2022, this Tribunal has passed the following order:

> 1.The above cases have been posted to 10.02.2022 for consideration of further reports by order dated 03.02.2022. Subsequently, the matter has been adjourned from time to time by successive notifications and lastly, it was adjourned to today by notification dated 02.03.2022. But today, by notification, it was adjourned to 28.04.2022.
>
> 2. Today, we come across another newspaper report published in Eenadu dated 30.03.2022, alleging that ponds are being dug illegally in the Kolleru Wildlife Sanctuary. So, in order to ascertain the genuineness of the allegations made in the newspaper report, we feel it appropriate to advance the hearing today.
>
> 3. As per order dated 03.01.2022, this Tribunal had considered the report wherein, it was mentioned that out of 2,25,250 Acres of total lake area, only 34.24% of lake has been declared as Kolleru Wildlife Sanctuary. It was also mentioned that to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by involving all the stakeholders working in Kolleru Lake Basin to manage the Kolleru Lake/wetland holistically.
>
> 4. It was also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department was also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area.

They were also directed to file an independent report in this aspect before this Tribunal.

5. The State of Andhra Pradesh was directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.

6. It is seen from the newspaper report that in spite of directions given by this Tribunal to conduct scientific study and for removal of encroachments and hand over the lake area to the Forest Department as part of the wildlife sanctuary, certain illegal activities of creating fish ponds in the wildlife sanctuary are being undertaken at Pedayaganamalli Village, Eluru Mandal.

7. The Chief Secretary, State of Andhra Pradesh is directed to conduct an enquiry through the respective District Collector and the Conservator of Forests to look into the issue referred to in the newspaper report mentioned above and submit a factual as well as action taken report by the respective departments in this regard.

8. We have not received any further report in continuation of the order passed by this Tribunal on 03.01.2022. This aspect also will have to be considered by the Chief Secretary while filing the report as directed by this Tribunal on the basis of the newspaper report.

9. They are directed to submit the respective reports to this Tribunal on or before 04.04.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

10. Even if they are not able to file the detailed report, they are directed to file an interim report to the allegations made in the newspaper report and action taken on that aspect, if any illegal activities are going on.

11. The Registry is directed to communicate this order along with the copy of the newspaper report mentioned above to the official respondents including the Chief Secretary to Government, State of Andhra Pradesh by e-mail immediately for their information and compliance of directions.

3. The case was posted to today for consideration of further report.

4. We have received a report submitted by the Forest Department in the form of communication between Divisional Forest Officer and the Principal Chief Conservator of Forests in respect of newspaper issue, which was referred to in the order mentioned above, dated 02.04.2022, e-filed on 03.04.20222 which reads as follows:

GOVERNMENT OF ANDHRA PRADESH
Revenue Department
Office of the Collector & District Magistrate, West Godavari, Eluru.

L.Dis.No.D2/e -1839660/2021 Dated: 02.04.2022.

From:
Sri V. Prasanna Venkatesh, I.A.S.,
Collector & District Magistrate,
West Godavari, Eluru

To,
The Chief Secretary
Government of Andhra Pradesh.

Sir,

Sub: **National Green Tribunal**: O.A.No.259/ 2020 & O.A No.2 of 2021 – Suo Moto order - Eluru Mandal – Pedayaganamalli Village - Action taken report on the adverse News item i.e., **"కొల్లేరులో మళ్ళీ అక్రమ తవ్వకాలు"** (Eenadu)– Report Submitted – Regarding.

Ref: 1. Original Application No. 2 of 2021 & 259 of 2020 (SZ) of item No. 1 & 2 of National Green Tribunal, Southern Zone Chennai, order dated 30.03.2022 received through mail.
2. Rc.No.326/2022/WL-O, O/o the Divisional Forest Officer, Wild life Management Division, Eluru, dt: 02.04.2022

***

I invite attention to the reference 1st cited, wherein the Assistant Judicial, National Green Tribunal Southern Zone has communicated orders issued on 30.3.2022 with a direction to conduct an enquiry on the adverse newspaper report i.e., **"కొల్లేరులో మళ్ళీ అక్రమ తవ్వకాలు"** and to submit a factual as well as action taken report by 04.04.2022.

The main contents in the news item "కొల్లేరులో మళ్ళీ అక్రమ తవ్వకాలు" published in Eenadu newspaper on 30.03.2022.

Illegal formation of tanks started again in Kolleru wildlife sanctuary as the water flow is receded due to summer season. A new 200 acres illegal tank is being excavated at Pedayaganamalli village of Eluru Mandal within the +5 contour of Kolleru Wildlife Sanctuary. The officials of forest department are not responding to the illegal activities within sanctuary and taking bribe. Illegal excavations of tanks are being carried out in Gudiwakalanka & Prattikollalanka area of Eluru Mandal.

In this regard, I submit that, I along with the Divisional Forest Officer, Wild Life Management Division, Eluru has jointly inspected the said location on 02.04.2022. During, the joint inspection it was observed that, strengthening the bund of *existing old tank* was attempted by the local villagers which was demolished earlier during '*Operation Kolleru*' and there is no new tank formed in that location. An offence case was also registered on 26.03.2022 by the forest department staff well before the adverse news item published in Eenadu Newspaper on 30.03.2022 and breaching of illegally formed bund is also going on and necessary instructions were issued to the forest department field staff to completely remove the bund to ensure no aquaculture activities can take place in that location.

Further, on the said issue, the Divisional Forest Officer, Wild Life Management Division, Eluru has reported that, an offence case was registered vide O.R.No.72/2021-22, dt.26.03.2022 against A1. Bale Nageswara Rao A2. Bale Putta swami A3. Ghantasala Daveedu Raju from Pedayaganamalli village involved in illegal repair work of old tank in Sy.no.1100 & 1101 (Govt land) to an area of Acre.95.00 cents and seized a Proclainer (Tata Hitachi) and filed the case before the Hon'ble Add. Judicial Magistrate of First-class court, Eluru. Further he stated that the staff have breached the bunds with various lengths on the three sides of the tank on 30.03.2022 to make the area unsuitable for aquaculture.

Further, in the same location 3 offence cases were registered in *previous year* vide O.R.No.41/2021-22 dt.27.06.2021, O.R.No.44/2021-22, dt.30.06.2021, O.R.No.47/2021-22, dt.02.07.2021 for attempting illegal repair work of old tank in Sy.no.1100 & 1101 (Govt land) to an area of Acre.95.00 cents and seized 4 Proclainers and the cases were filed before the Hon'ble Add. Judicial Magistrate of First-class court, Eluru.

In view of the above, I submit that, necessary action is being taken as per the provision of Wildlife Protection Act,1972 for attempting illegal bund formation and also wherever possible illegally constructed bunds were breached already to certain extent and further maximum portion of bunds will removed to make the area unsuitable for aquaculture.

The report of the DFO, Wildlife Management, West Godavari, Eluru along with the Photographs of our inspection are herewith enclosed for kind perusal.

Encl: Reference cited and inspection photos.

Yours faithfully,

21/4/2022

Collector & District Magistrate,
West Godavari, Eluru.

5. It is seen from the report that even before the issue has been published in the newspaper, they have already taken action in respect of the encroachments into the forest area and in respect of bunds of the Kolleru Lake and as such there is no necessity to pass any further direction in respect of the newspaper report referred to in the order dated 30.03.2022.

6. As regards the further direction that out of 2,25,250 acres of total lake area only 34.24 per cent of lake area has been declared as Kolleru Wildlife Sanctuary and due to usage of organophosphate chemical pesticides, some amount of chemical pesticides were also found in the lake and the drinking water. The Agriculture Department will also have to take some steps in this regard to educate the farmers to restrain use of such chemicals in agricultural activities in that area.

7. The Government was directed to conduct a comprehensive and scientific study with the help of expert in the field of wet land/lake management and as to how the Kolleru Lake Basin can be managed holistically. As regards this study is concerned, the Learned Counsel for the State of Andhra Pradesh submitted that a high level committee has been constituted for this purpose and they are undertaking study in this regard. Though, declared as a rasar site as per the schedule attached to the Wetland Conservation and Management Rules, 2010, only a portion of land has been declared as Wildlife Sanctuary and handed over to the Forest Department. We have opined that considering the importance of the lake and its biological diversity and ecosystem, the entire area will have to be identified and handed over to the Forest Department and they wanted some time for this purpose.

8. Considering the fact that the present disaster due to unknown disease, itself could be due to some damage caused to environment especially water

quality in Kolleru Lake, we feel that some more time can be granted to State of Andhra Pradesh to conduct the holistic study as suggested by the Principal Chief Conservator of Forests and come with a proper report before this Tribunal on or before 24.05.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

9. The Registry is directed to communicate this order to the official respondents including the Principal Chief Conservator of Forest, Wildlife & Head of Forest Force and Chief Secretary for their information and compliance of direction.

10. For consideration of further report, post on 24.05.2022.

.....J.M.
(Justice K. Ramakrishnan)

.....E.M.
(Dr. Satyagopal Korlapati)

.....E.M.
(Dr. Vijay Kulkarni)

O.A. No. 259/2020(SZ)&
O.A. No. 02/2021(SZ)
4th April, 2022. (AM)

GOVERNMENT OF ANDHRA PRADESH
ABSTARCT

GAD – Constitution of Multi-Disciplinary Committee for investigation of outbreak – sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari and to suggest remedial measures -Orders-Issued.

GENERAL ADMINISTRATION (SC.I) DEPARTMENT

G.O.RT.No. 1946 Dated: 10-12-2020.

Read:

Report from Commissioner, Health & Family Welfare, AP on sudden convulsions in Eluru, West Godavari, dated: 10.12.2020.

-:o:-

ORDER:

Commissioner, Health & Family Welfare has brought to the notice of the Government that some residents of Eluru Municipal Corporation, West Godavari District have developed sudden convulsions from 5.12.2020 and as on 10.12.2020 at 8 AM, a total of 597 persons have reported with such symptoms and they are being treated in the Government Hospitals at District Hospital Eluru and GGH Vijayawada. Among them, 515 persons were discharged after recovery.

2. Further, to mitigatethis sudden epidemic, Government have made elaborate arrangements in providing medical care in all the Ward Secretariats,UPHCs in Elurutown,District Hospital Eluru and GGH Vijayawada.

3. After careful examination of the situation, the Government hereby constitutesaMulti-Disciplinary Committee with the following members to investigate the source of the infection, thoroughly examine various cause/s of the incident and suggest remedial measures to prevent any occurrence of such events in future in the State.

1	Chief Secretary to the government	Chairperson
2	Spl Chief Secretary to Government, Agriculture, and Cooperation Department	Member
3	Spl Chief Secretary to Government, Animal Husbandry Dairy Development and Fisheries Department	Member
4	Spl Chief Secretary to Government, Environment, Forest, Science and Technology Department	Member

contd.2.

5	Spl Chief Secretary to Government, Water Resources Department	Member
6	Secretary to Government, Municipal Administration and Urban Development Department.	Member
7	Commissioner, Health & Family Welfare	Member
8	District Magistrate, West Godavari, Eluru	Member
9	Dr.MukeshTripathi, Director & CEO of AIIMS(Mangalagiri)	Member
10	Dr.AhmadullahShariff, HOD Clinical ecotoxicology, AIIMS(Delhi)	Member
11	Dr.Rakesh K Mishra, Director CCMB	Member
12	Dr.Chandrasekar, Director IICT	Member
13	Dr. J JBabu, Scientist NIN	Member
14	Dr.Jamshed Nair, Associate Professor, Dept of Emergency Medicine, AIIMS (New Delhi)	Member
15	Dr.SanketKulkarni, Deputy Director NCDC (Delhi)	Member
16	Dr.Avinash, Scientist D, ICMR - NIV (Pune)	Member
17	Dr.Asish K Satapathy, National Professional Officer, NPSP WHO, South Region, Bangalore	Member
18	Dr. B Chandrasekhar Reddy, Neurophysician, Govt. of AP	Member
19	Dr.Malathi, Neurophysician, Siddartha Medical College	Member
20	Dr. Mohan, Medical Superintendent, DH Eluru	Member
21	Principal Secretary to Govt., HM&FW Dept.,	Member-Convenor

2. The Government hereby requests the above Committee to submit its comprehensive report with detailed plan of action to avert such incidents in future immediately.

contd..3.

3. The Principal Secretary, Health, Medical and Family Welfare shall take further necessary action in the matter.

(BY ORDER AND IN THE NAME OF THE GOVERNER OF ANDHRA PRADESH)

NILAM SAWHNEY
CHIEF SECRETARY TO GOVERNMENT

To
All the Members of the Committee
Copy to:
The Principal Secretary to Hon'ble Chief Minister
The O.S.D to Hon'bleDy Chief Minister and Minister for H,FW and ME

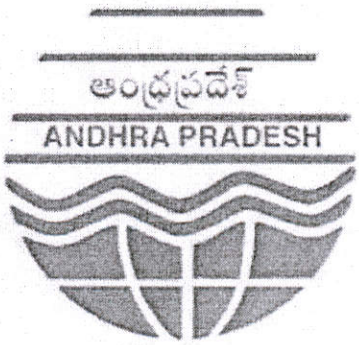
/ Forwarded :: By Order /

SECTION OFFICER

Annexure-V

19

Preliminary Assessment of Environmental status at Eluru immediate after the Outbreak



Sponsor
Andhra Pradesh Pollution Control Board
Visakhapatnam

CSIR-National Environmental Engineering Research Institute

Hyderabad Zonal Centre
Uppal Road, Hyderabad-500007

December 21, 2020

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Chapter 1

Introduction

1.1 Preamble

Eluru, a city with an area of 14.5 sq km and district headquarters of West Godavari district in Andhra Pradesh, India. It is 6th biggest city in the State with a population of 3.5 lakhs and one of the 14 municipal corporations in the Eluru revenue division. Eluru is at 16°42′42″N 81°06′11″E and it is built on Tammileru river having an elevation of 22 m (72 ft) lies on the Eastern coastal plains. The city is at a halfway distance between Krishna and Godavari rivers and at a distance of 50 kilometres inland from the Bay of Bengal. The canals of Tammileru river, Godavari and Krishna rivers pass through the city, before the river. The Eluru canal from Krishna empties into Kolleru Lake near the city.

Eluru Outbreak

In the early December 2020, there was an outbreak of a disease of its own kind whose symptoms and causes were unknown to the experts in the city of Eluru. The first case was reported on December 5, 2020 followed by hundreds of people falling prey to this idiopathic disease. The first case was found in One-Town area before affecting the other parts of the city as well as Eluru (rural) and Denduluru village areas. It has been indicated by the experts from Clinical Ecotoxicology Facility, AIIMS, New Delhi that traces of heavy metals (nickel and lead) have been found in the blood samples and this out-break is due to the contamination. Symptoms of headache, vomiting, dizziness, convulsions, seizures, nausea, anxiety, loss of consciousness and other neurological symptoms have been observed in most of the patients which is similar to epilepsy. A sudden commencement of vomiting after complaining of burning eyes was recorded for most of the children who were suffering with this disease.

Hundreds of children and people aged between 20-30 have been suffering with this disease and it has also been recorded that the symptoms for all the age groups was the same. By the night of December 7, 2020, 400 people have been affected by this out-break. Samples of blood, urine etc. were of the residents of Eluru were collected to analyse the causes of this sudden illness. Surface water, ground water milk, vegetables, fish, fruit samples were also collected by experts to thoroughly study the cause.

While AIIMS confirmed that traces of heavy metals were found in the blood samples, study also confirmed that due to the dumping of pesticides and fertilizers into the two canals originating from Rajahmundry (Godavari) and Vijayawada (Krishna) which run through the city of Eluru could be one of the causes of this illness. The AIIMS team has also confirmed that most of the cases are observed in the areas where the water supply is from Pumpula Cheruvu supplied by the Eluru Municipal Corporation.

The rate of new cases has been drastically decreasing since December 8 but then the people who were initially affected with this illness and discharged suffered a second seizure and were readmitted. As on December 12, 2020, no new cases were recorded in the city. It was also found that neighbouring parts of Eluru were also affected by this mysterious disease. It has been confirmed that it is not a contagious disease and advanced studies are being done in order to understand the main cause of this situation.

Andhra Pradesh Pollution Control Board (APPCB) approached CSIR-NEERI Hyderabad Zonal Centre on December 9, 2020 to undertake environmental assessment study comprising of ambient air, surface water, groundwater and soil components.

1.2 Objectives

The preliminary objective of the present study to ascertain the environmental quality for Air, Surface Water, Groundwater & Soil Quality in the effected area of Eluru region immediate after the outbreak.

1.3 Scope of work

The salient features of the scope of work and methodology are as follows:

- Assessment of present status of Air, Water and Soil components of environment
- Identification of impacts due to Out Break
- Assessment of ambient air quality (AAQ) monitoring stations at selected locations for monitoring the existing levels of various air pollutants in ambient air for PM10, PM2.5, Sulphur Dioxide, Oxides of Nitrogen, Hydrogen Sulphide, Ammonia, Chlorine and Heavy Metals.
- Assessment of Ground and Surface water quality for physical, chemical and biological parameters (physico-chemical parameters like: pH, SS, TDS, Fluoride, salinity, total alkalinity, Total hardness, sulphates, nitrate, phosphate, lead,

Chloride, Total coliforms, DO, BOD, COD & Metals (Fe, Ni, Zn, Pb, Cr, Cd, Cu, Mn, Hg As); Biological parameters: surface water and total coliforms and Faecal coliforms

- Collection of soil samples and characterisation with reference to relevant physic-chemical parameters like pH, Conductivity, Organic Carbon, Texture, Bulk Density, Particle Density, Porosity, water holding capacity, Available N, P & K and elements (As, B, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn)

1.4 Layout of the report

The report is presented in the following structure:

Chapter 1: Introduction (this chapter)

Chapter 2: Environmental Quality Status

Chapter 3: Conclusion and Recommendations

Chapter 2

Environment Quality Status

2.1 Air Quality

Ambient air quality (AAQ) in the affected areas of Eluru has been monitored during 10-12 December 2020. AAQ monitoring has been carried out at Dakhnina Veedhi, Pattebada and Ponangi and Santhi Nagar. The monitoring locations are shown in **Fig.2.1.1** and coordinates of these are given in **Table 2.1**. The 24 hr. avg. concentrations of particulate matter size less than 10 µm (PM10) and particulate matter size less than 2.5 µm (PM2.5) and gaseous pollutants, sulphur dioxide (SO2), oxides of nitrogen (NOX), ammonia (NH3), hydrogen sulphide (H2S) and 1 hrly. avg. concentrations of chlorine (Cl2) were monitored and analysed. The heavy metals, lead (Pb), arsenic (As), nickel (Ni), zinc (Zn), copper (Cu), cadmium (Cd), chromium (Cr), boron (B), manganese (Mn) and ferrous (Fe) are analysed in the particulate matter. The instruments and methods used for monitoring/sampling and analysis are given in **Table 2.2**. The monitored AAQ values of different pollutants are compared with their respective National Ambient Air Quality Standards (NAAQS, as given in Annexure I).

Particulate Matter

The concentrations or ambient levels of different air pollutants are given in **Table 2.3** The 24 hrly average PM10 concentrations are found to be ranging from 138 - 169 µg/m3 at Dakshina Veedhi, 125 - 189 µg/m^3 at Pattebada, 173 - 221 µg/m^3 at Ponangi and 131 - 158 µg/m^3 at Santhi Nagar, respectively. It is observed that the PM10 concentrations are found to be exceeding the NAAQS for PM10 (100 µg/m3) at all locations.

The 24 hrly average PM2.5 concentrations are found to be ranging from 55 - 125 µg/m^3 at Dakshina Veedhi, 57 - 100 µg/m^3 at Pattebada, 77 µg/m^3 at Ponangi and 36 - 105 µg/m^3 at Santhi Nagar, respectively. The PM2.5 concentrations are also exceeding the NAAQS for PM2.5 (60 µg/m^3) at all locations.

Higher values of particulate matter observed at Pattebada may be due to vehicular traffic and re-suspended road dust as the location is nearby the road on which high traffic volume is observed and also it is adjacent to the vegetable market. Higher values of particulate matter are noticed at Ponangi where it is in very close proximity to the solid waste dumping site (SWDS) and adjacent to road. Also some construction

activity is observed near this location. Smoke is observed at the Ponangi SWDS and is visibly blown towards the monitoring location.

Gaseous Pollutants

The AAQ levels of gaseous pollutants SO_2, NO_X and NH_3 are found to be varying from 2 - 7 µg/m^3, 7 - 20 µg/m^3 and 10 - 68 µg/m^3 at all locations. These concentrations were well below their respective NAAQS values as given in Table 3. Similarly the AAQ levels of H_2S are found to ranging from 1 - 4 µg/m^3 at all locations and are very low.

Chlorine concentrations are observed to varying between 0.031 to 0.294 ppm at all locations (Table 3). The concentration of chlorine gas in ambient air quality is well below 4.0 ppm (Ref: Indian Standard: Code of Safety for Chlorine).

Particulate Associated Heavy Metals/Toxic Pollutants

Airborne particles are important carriers of metals, some of which possess toxic properties. The elevated metal concentrations can pose a serious risk to human health. Fossil fuel utilization, such as liquid fuel for vehicular exhaust and lubricant residues, are considered as important contributors. Heavy metals like lead, arsenic, nickel, copper cadmium, chromium, zinc, boron, manganese and ferrous associated with particulate matter were determined.

Lead (Pb)

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions are vehicles such as cars and trucks and industrial sources like lead smelters, waste incinerators, utilities, and lead-acid battery manufacturers. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. Lead is persistent in the environment and accumulates in soils and sediments through deposition from air sources, direct discharge of waste streams to water bodies, mining, and erosion. The observed Pb concentration at all the locations ranged from 0.01 - 0.04 µg/m^3 (Table 2.4), which are below the NAAQS (1 µg/m3) at all locations in the study area.

Nickel (Ni)

Nickel is a naturally occurring element and can be combined with other metals, such as iron, copper, chromium and zinc, to form alloys. These alloys are used to make coins, jewelry, and items such as valves and heat exchangers. Most nickel is used to make stainless steel. Nickel can be released into ambient air from oil and coal combustion, nickel metal refining, sewage sludge incineration, and other sources. Respiratory effects are associated with chronic exposure to nickel in the air, which can cause chronic bronchitis, lung and nasal sinus cancers. The nickel concentrations were found to be varying from ND – 12.6 ng/m^3 and are found to be below the NAAQS (Ni - 20 ng/m^3) at all the locations in the study area (Table 2.4.

Arsenic (As)

Arsenic (As) is a naturally occurring element widely distributed in the earth's crust. Inorganic forms of arsenic are found throughout the environment. It is released into the air by volcanoes, weathering of arsenic-containing minerals and ores, and commercial or industrial processes. Metal smelters release elevated inorganic arsenic into the air. Other air sources of inorganic arsenic exposure include burning of plywood treated with an arsenic wood preservative. Acute (short-term) high-level inhalation exposure to arsenic dust or fumes can cause gastrointestinal effects (nausea, diarrhea, abdominal pain) and nervous system disorders. Chronic (long-term) inhalation exposure to inorganic arsenic can cause irritation of the skin and mucous membranes and lung cancer. The arsenic concentrations were found to be varying from 2.2 - 17.8 ng/m^3 in the study area (Table 2. 4). The arsenic concentrations are found to be exceeding the NAAQS (As - 6 ng/m^3) at all the locations, except at Pateebada. The higher concentrations of arsenic in the study area are may be due to the geo-genic and burning of plywood or waste.

Cadmium (Cd)

Cadmium is a chemical element and a natural component of the earth's crust. Human activities can increase human exposure to cadmium through mining and combustion, which bring more cadmium into the air, water, and soil. Cadmium metal and cadmium salts have low volatility and exist in air primarily as fine suspended particulate matter. It enters the air from burning coal and household wastes, and from metal mining

and refining processes. Atmospheric concentrations of cadmium are generally highest in the vicinity of cadmium-emitting industries such as smelters, municipal incinerators, or fossil fuel combustion facilities. The cadmium concentrations were found to be varying from ND - 9.3 ng/m^3 in the study area (Table 2.4).

Chromium

Chromium emissions to air may be from chromite ore refining, ferrochromium production, refractory production, chromium chemicals production, chromium plating, steel production, leather tanning, coal and oil combustion, cement production, municipal refuse and sewage sludge incineration, cooling towers, asbestos mining and milling, and coke ovens. The chromium concentrations were found to be varying from ND - 4.8 ng/m^3 in the study area (Table 2.4).

Zinc (Zn)

Zinc occurs naturally in air, water and soil, but zinc concentrations are rising unnaturally, due to addition of zinc through human activities. Most zinc is added during industrial activities, such as mining, coal and waste combustion and steel processing. Some soils are heavily contaminated with zinc, and these are to be found in areas where zinc has to be mined or refined, or were sewage sludge from industrial areas has been used as fertilizer. Although humans can handle proportionally large concentrations of zinc, too much zinc can still cause eminent health problems, such as stomach cramps, skin irritations, vomiting, nausea and anaemia. Very high levels of zinc can damage the pancreas and disturb the protein metabolism, and cause arteriosclerosis. The zinc concentrations were found to be varying from ND - 12.9 µg/m^3 in the study area (Table 2.4), except at Ponangi where Zn is not detected. Higher values of zinc may be due to coal and waste combustion and sewage sludge from industrial areas used as fertilizer.

Iron (Fe)

Ferrous emissions to air from iron ore mining, windblown dust, haul road emissions due to vehicular transport, re-suspended road dust, etc. The ferrous concentrations were found to be varying from 0.2 - 2.4 µg/m^3 at all locations in the study area (Table 2.4).

Boron (B)

Boron emissions to air may be from industry producing or using it, glass production, burning wood and coal, sewage and waste sludge treatment. Boron can enter the body either by inhalation of air containing boron. Ingestion of high levels of boron can result in a range of adverse health effects including nausea, vomiting, abnormally low blood pressure, convulsions and red lesions on the skin. Ingestion of extremely high levels of boron can lead to an increase in heart rate and the skin may turn blue in colour. High level exposure can affect the central nervous system, kidneys and liver and in extreme cases may result in death. The boron concentrations were found to be varying from ND - 13.7 $\mu g/m^3$ at all locations in the study area, except at Ponangi where B is not detected.

Copper (Cu)

Copper is a very common substance that occurs naturally in the environment and spreads through the environment through natural phenomena. Copper can be released into the environment by both natural sources and human activities. Examples of natural sources are wind-blown dust, decaying vegetation, forest fires and sea spray. Examples of human activities that contribute to copper release are mining, metal production, wood production and phosphate fertilizer production. The copper concentrations were found to be varying from 4.6 - 39.4 ng/m^3 at all locations in the study area (Table 2.4).

Manganese

Manganese (Mn) is an element widely distributed in the earth's crust. The most common manganese mineral is pyrolusite (MnO_2), usually mined in sedimentary deposits by open-cast techniques. Manganese occurs in most iron ores, coal, crude oil. Manganese is mainly used in metallurgical processes, as a deoxidizing and de-sulfurizing additive and as an alloying constituent. It is also used in the production of dry-cell batteries, in chemical manufacturing, in the manufacture of glass, in the leather and textile industries, and as a fertilizer. Organic carbonyl compounds of manganese are used as fuel-oil additives, smoke inhibitors and anti-knock additives in petrol. Crustal manganese enters the atmosphere by a number of natural and anthropogenic processes, which include the suspension of road dusts by vehicles and wind erosion and

the suspension of soils, particularly in agricultural, construction and quarrying activities. The manganese concentrations were found to be varying from 0.05 - 0.12 $\mu g/m^3$ at all locations in the study area (Table 2.4).

From the ambient air quality study, it is found that the concentrations of particulate matter are found to be high and exceeding the NAAQS in the study area. Higher values of particulate matter may be due to vehicular traffic, re-suspended road dust, burning of solid waste, windblown dust and agricultural and construction activities. Gaseous pollutants are found to be very low and not significant.

The heavy metals in the particulate matter are found to be higher in terms of arsenic, boron, copper and zinc. The arsenic concentrations in the particulate matter are exceeding the NAAQS at all locations except at Pattebada. Higher levels of these metals may be due to the vehicle transportation, waste incineration or burning, oil and coal combustion, sewage sludge incineration, and construction activities.

2.2 Water Quality

To understand the status of the surface water and groundwater quality in Eluru affected areas, a total of 18 samples consisting of eleven groundwater seven surface water/drinking water were collected. The details of the sampling locations for groundwater and surface water are depicted in **Fig 2.2.1** and presented in **Table 2.2.2.** The groundwater samples were collected from Dajshinapu Veedhi, Vangayagudem, Ponnangi, Padamara Veedhi, Turpu Veedhi, Kothapeta which are the affected areas and surface water/drinking water samples were collected with respect to the drinking water distribution system to the Eluru city. The collected samples were analysed for physico-chemical parameters, heavy metals and pesticides. The determination of physico-chemical parameters of water samples was carried out by adopting standard protocols given by APHA (2012).

Heavy metals like Arsenic (As), Boron (B), Barium (Ba), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Iron (Fe), Manganese (Mn), Nickle (Ni), Lead (Pb), Zinc (Zn) and Mercury (Hg) were determined by ICP-MS and the results are presented below:

Groundwater Quality

Physical Parameters

The Physical parameters like pH, Temperature, Turbidity, TSS and TDS were observed in the range of 7.08-7.97, 26.9-31.5°C, 0.1-0.3 NTU, 0.3-18 mg/l, and 715-2190 mg/l, respectively and the values are within in the permissible limits of BIS (**Table 2.6 & 2.7**). However TDS at EGW-4 is observed more than 2000 mg/l which may be attributed due to the dumping yard located adjacent to the EGW 4.

Inorganic Parameters

The Inorganic parameters such as Total Hardness, Calcium, Magnesium, Total Alkalinty, Sulphate, Chloride and Fluoride were observed in the range of 180-716 mg/l, 29-152 mg/l, 12-81 mg/l, 240-560 mg/l, 28-129 mg/l, 118-876 mg/l and 0.11-0.84mg/l,

respectively and the values are within in the permissible limits of BIS (**Table 2.8 & 2.9**). However Total Hardness at EGW-4 is observed more than the permissible Limit which may be attributed due to the underlying geology of study area.

Nutrient Parameters

The Nutrient parameters i.e Nitrite, available P, Total P, Available N and TKN were observed in the range of 0.001-0.027mg/l, 0.044-0.511 mg/l, 0.062-0.536 mg/l, BDL and 3-18mg/l, respectively, and the observed values are in within normal range (**Table 2.10 & 2.11**).

The Nitrate values were observed in the range of 0.2-84mg/l. All the values are within in the permissible limits of BIS except for EGW2,EGW5, EGW8 which may due to drains flowing to the side of those groundwater locations.

Demand and Microbial Parameters

The microbial MPN index ranged from 170 to >1600 CFU/100ml at all locations. The groundwater resources in the study area were contaminated with coliform bacteria. This may be due to leakage/discharge from septic tanks, lack of sewage and solid waste disposal systems which were the main threats to water resources.

Heavy Metals:

The Heavy metal analysis revealed that the values are within permissible limits of BIS for As, B, Cd, Cr, Cu, Pb, Ni & Zn. At few locations, Fe and Mn showed slightly elevated values which may be attributed to geogenic origin. However Hg was observed to be in the range of below detectable level to 26 µg/l. In many locations, mercury was observed to be more the permissible limits of BIS Standards (**Table 2.14**).

Pesticides:

Organochlorine pesticides like Alpha-HCH, Beta-HCH, Gamma-HCH, Delta-HCH, Aldrin, Dicofol, Alpha-endosulfan, pp-DDE, pp'-DDD, Beta-Endosulfan, Endosulfan Sulfate, Heptachlor, Heptachlor epoxide were analysed in ground water samples and the concentration of

all compounds were observed to be below detectable level. Similarly, organophophate pesticides and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion, Chloropyrifos, Pendimethalin, Butachlor, Profenofos, Quinalfos and Ethion were analysed and found below detectable levels in all samples except for chloropyrifos. The levels of chloropyrifos in ground water ranged from 4.49 µg/l at EGW11 to 83.04 µg/l at EGW11 **(Table 2.15)**

Surface water Quality

Surface water samples (Table 2.16) were collected from the Eluru area and analysed for Physico-chemical parameters.

The physical parameters like pH, Temperature, Turbidity, TSS and TDS were observed in the range of 7.57-8.45, 26.4-29.5 ^{0}C, 0.2-2.0 NTU, 1.2-29 mg/l, and 215-379 mg/l, respectively(**Table 2.17 & 2.18**).

The Inorganic parameters such as Total Hardness, Calcium, Magnesium, Total Alkalinty, Sulphate, Chloride and Fluoride were found in the range of 64-120 mg/l, 13-32 mg/l, 6-12 mg/l, 84-156 mg/l, 1.0-28 mg/l, 53-112 mg/l, and 0.10-0.32 mg/l, respectively. (**Table 2.19 & 2.20**)

The Nutrient parameters including Nitrite, AVP, TP, AN,TKN were observed in the range of 0.002-0.021mg/l, 0.044-0.160mg/l, 0.063-0.232mg/l, BDL and 3-13mg/l respectively, and the values are in within normal range (**Table 2.21 & 2.22**). The Nitrate values were observed in the range of 0.2-53 mg/l.

The microbial parameters, total coliform and faecal coliform were observed to be in the range of 300-TNC and ND to 620 CFU/100ml, respectively.

The Heavy metal analysis indicate that the concentrations are within permissible limits of BIS (**Table 2.25**) for As, B, Cd, Cr, Cu, Fe, Mn, Pb, Ni and Zn. Mercury in surface water samples ranged from 1.0 µg/l ESW 5 to 9.0 µg/l at ESW 3.

Organochlorine pesticides like Alpha-HCH, Beta-HCH, Gamma-HCH, Delta-HCH, Aldrin, Dicofol, Alpha-endosulfan, pp-DDE, pp'-DDD, Beta-Endosulfan, Endosulfan Sulfate, Heptachlor, Heptachlor epoxide were analysed in surface water samples and the concentration of all compounds were observed to be below detectable level. Similarly, organophophate pesticides and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion, Chloropyrifos, Pendimethalin, Butachlor, Profenofos ,Quinalfos and Ethion were analysed and found below detectable levels in all samples **(Table 2.26)**

2.3 Soil Quality

Physiographically, the West Godavari District is divided into 2 natural regions. viz., Alluvial plain and upland areas. The alluvial plain covers 30% of the area in southern part of the Eluru – Kovuru railway line while uplands which include agency area constitutes 70% of the total district area. The important landforms in the district include Structural hills, Pediplain, Pediment inselberg complex, Coastal landforms and Valley fills.

The different type of soils encountered in the district are red soils, black cotton soils, deltaic alluvial soils and coastal sands The red soils are seen mostly around Chintalapudi, Koyyalagudem, Nallajerla and southeast Polavaram villages. They are permeable and well drained to moderately well drained. The black cotton soils are encountered in around Eluru, Nidamarru places in the district. Deltaic alluvial soils are very deep and highly fertile. These are seen mostly in around Polavaram, Kovvuru, Nidadavolu and Tanuku places. The coastal sands are seen occurring as patches in the south west and southern most parts of the district. The principal crop grown in the district is paddy. The other important crops grown in the district are sugarcane, cashew nut, mango, coconut and tobacco.

Representative soil samples (Four) were collected from depth of 0-15 cm, at each identified locations/ for the analysis of physico-chemical characteristics and Heavy metals to represent existing soil quality status. The locations and names of villages are given in Table 2.27 and their relative locations are as depicted in Fig.2.3.1.

Methodology

The standard methods have been followed for the analysis of soil samples. The international pipette method (Black, 1965 and Piper 1966) was adopted for determination of particle size analysis. The textural diagram was derived using "SEE soil class 2.0 version based on the United States Department of Agriculture (USDA) classification of soils.

The chemical characteristics of soil and Soluble cations & anions were determined by preparing soil extract in distilled water in ratio 1:2 (Jackson, 1967). Exchangeable cations and CEC were determined by Centrifuge / Sodium saturation method. (EPA 9081, C A Black 1965) . Organic carbon was determined by Walkey and

Black method (1979). Heavy metals in soil were determined by extracting soil with conc. H2SO4 and conc. HNO3 followed by analysis on Inductively Coupled Plasma Spectrometer (ICP) (APHA, 2017). Mercury was analyzed in Direct Mercury Analyzer 80 (DMA) (USEPA, Method 7473).

Physical Characteristics

Physical characteristics of soil samples are delineated through specific parameters, viz., particle size distribution and texture. The particle size distribution in terms of percentage of total sand, silt and clay is furnished in Table 2.28

Particle size distribution also known as gradation, refers to the proportions by dry mass of a soil distributed over specified particle-size ranges. Soil particles vary greatly in size, and soil scientists classify soil particles into sand, silt, and clay. Starting with the finest, clay particles are smaller than 0.002mm in diameter. The size of soil particles is important. The amount of open space between the particles influences how easily water moves through a soil and how much water the soil will hold. Too much clay, in proportion to silt and sand, causes a soil to take in water very slowly. Such a soil gives up its water to plants slowly. Fine sand content (40.83 to 74.07%) is predominant followed by Silt (5.62 to 23.49 %) and clay (2.04 to 22.46%) in the soil samples.

Texture indicates the relative content of particles of various sizes, such as sand, silt and clay in the soil. Texture influences the ease with which soil can be worked, the amount of water and air it holds, and the rate at which water can enter and move through soil. Soil texture is a classification of soil based on its physical texture and characteristics, particularly the size of the particles that make up the soil. The texture of most of the soil sample collected is sandy clay loam which is moderately fine texture.

Chemical Characteristics

The collected soil samples were analyzed for various chemical parameters, viz. pH, electrical conductivity, soluble cations and anions, Sodium Absorption Ration (SAR) content in the soil samples are presented in Tables 2.29 & 2.30.

pH is an important parameter to indicate of the alkaline or acidic nature of the soil. It also affects the microbial population as well as the solubility of metal ions and regulates nutrient availability. Variation in pH indicated that soil samples are moderate to strongly alkaline in nature with pH variation from 7.3 to 8.9.

The soluble salts were determined from soil saturated extract (1:2). The soluble salts in soil samples are expressed in terms of electrical conductivity (EC) and have been observed in the range: 0.21 to 1.26 mS/cm (Table 3), which fall in the salt free category (<2 mS/cm). Amongst the soluble cations, Ca^{2+} and Mg^{2+} are observed in the range of 0.03 to 0.09 and 0.15 to 3.85 meq/100g and Na^{+}, and K^{+} are in the ranges of 0.10 to 2.24 meq/100 gm and 0.002 to 0.21 meq/100g of soil extract, respectively. The most important anions present in soluble state in the soil are chlorides and sulphates. Chlorides ranged from 0.36 to 2.00 meq/100gm and sulphates content ranged from 0.003 to 0.016 meq/100gm. Soil samples from the study area are found to be in Non-Salinized range with respect to Chloride.

Sodium adsorption ratio (SAR), along with pH, characterizes salt-affected soils. It is an easily measured property that gives information on the comparative concentrations of Na^{+}, Ca^{2+}, and Mg^{2+} in soil solutions. The SAR of a soil extract takes into consideration that the adverse effect of sodium is moderated by the presence of calcium and magnesium ions. When the SAR rises above 12 to 15, serious physical soil problems arise and plants have difficulty in absorbing water. SAR of soil samples of the study area are normal ranged from 0.90 to 5.62.

Exchangeable cations refer to the positively charged ions which are loosely attached to the edge of clay particles or organic matter in the soil. The capacity of negatively charged clays and organic matter to adsorb cations by simple physical attractive force is called the cation exchange capacity (CEC) of a soil. The CEC of a soil together with exchangeable bases, provides a measure for evaluating the fertility status of soil. Amongst the exchangeable cation, the concentration of calcium and magnesium vary from 0.020 to 0.034 meq/100gm and 2.12 to 2.74 meq/100gm, respectively. Exchangeable Magnesium concentration were observed to be more predominant amongst the exchangeable cations. Whereas Exchangeable sodium and potassium are

in the range of 0.01 to 0.21 meq/100gm and 0.03 to 0.12 meq/100gm of soil respectively (Table 3.5). CEC of soil samples were observed to be low (< 5) which varied from 2.15 to 3.56 cmol (p+) kg^{-1} .

Exchangeable sodium percentage (ESP) is varied from 5.0 to 6.2. The presence of sodium in exchangeable form may have deleterious effect on the chemical and physical properties of soil. ESP of soil is below 5 can be considered as normal in respective alkalinities level. Alkali soils are characterized by high sodicity (ESP > 15) and pH (pH > 8.3), and contain Na^+ as the dominant ions and tend to have low salinities and high pH values, which cause an increase in swelling and dispersion. So, Soils of the study area are normal with respect to exchangeable sodium percentage which is below 15.

Organic matter present in soil influences its physical and chemical properties. It commonly accounts for as much as one third or more of the cation exchange capacity of the surface soil and is responsible for stability of soil aggregates. Organic carbon in soil samples vary in the range 0.50 to 1.48% which is medium to fertile range as per soil fertility ratings of ICAR listed in Annexure I.

Heavy metals

Soil samples were also analyzed for heavy metals such as Arsenic (BDL), Boron (BDL to 2.23 mg/kg) Cadmium (BDL), Chromium (9.7 to 33.6 mg/kg), Cobalt (2.4 to 5.2 mg/kg), Copper (7.9 to 15.1 mg/kg), Iron (5251 to 11745 mg/kg), Mercury (0.01 to 0.76 mg/kg), Manganese (84.7 to 282 mg/kg), Nickel (7 to 14.5 mg/kg), Lead (2.5 to 4.8 mg/kg) and Zinc (12.1 to 19.2 mg/kg). The observed concentrations are presented in Table 2.31. The heavy metal concentrations in the study area are below Screening and response levels as per MoEF&CC Guidance Document for assessment and remediation of Contaminated sites in India **(Annexure V).**

Organochlorine pesticides like Alpha-HCH, Beta-HCH, Gamma-HCH, Delta-HCH, Aldrin, Dicofol, Alpha-endosulfan, pp-DDE, pp'-DDD, Beta-Endosulfan, Endosulfan Sulfate, Heptachlor, Heptachlor epoxide were analysed in soil samples and the concentration of all compounds were observed to be below detectable level. Similarly, organophophates and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion,

Chloropyrifos, Pendimethalin, Butachlor, Profenofos, Quinalfos and Ethion were analysed and found below detectable levels in all samples.

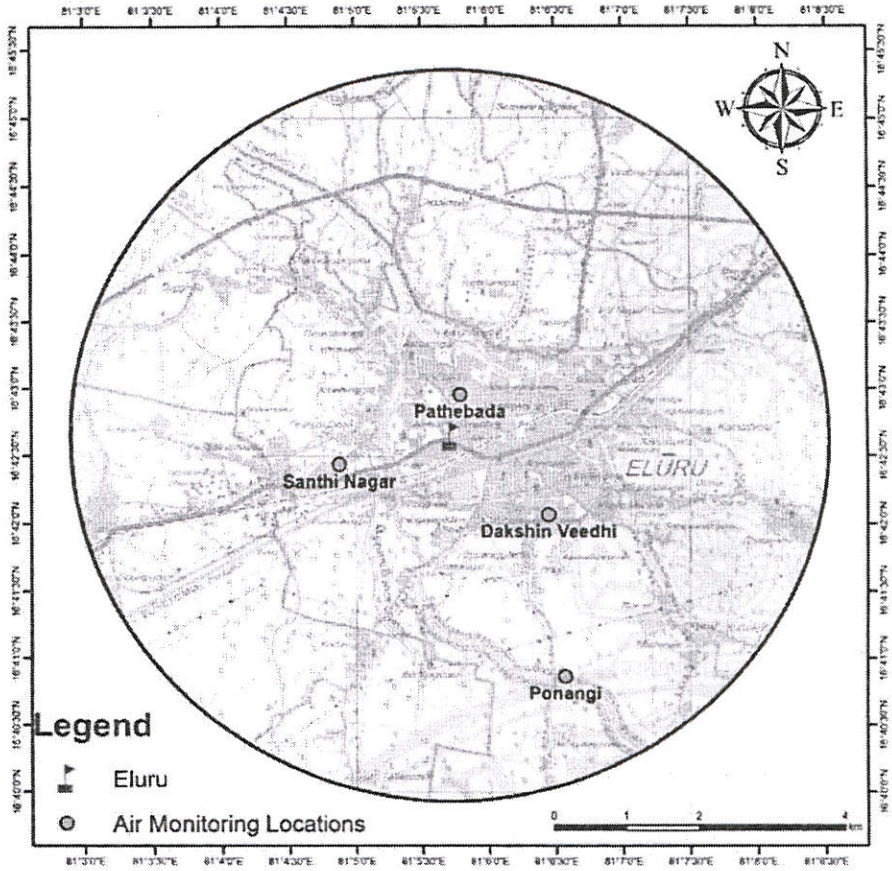


Fig. 2.1.1 AAQ locations in the study area

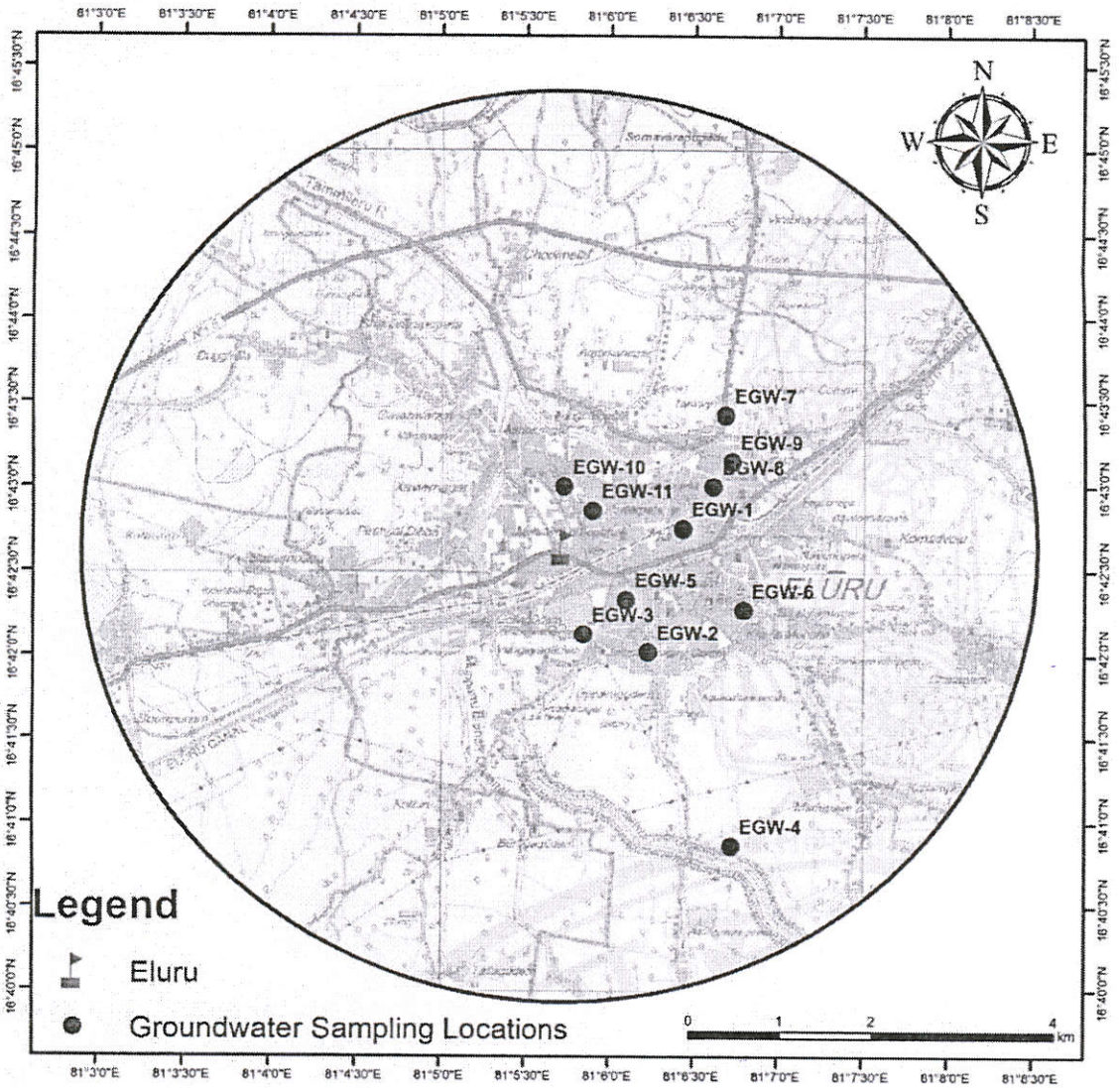


Fig. 2.2.1 : Groundwater sampling locations in the study area

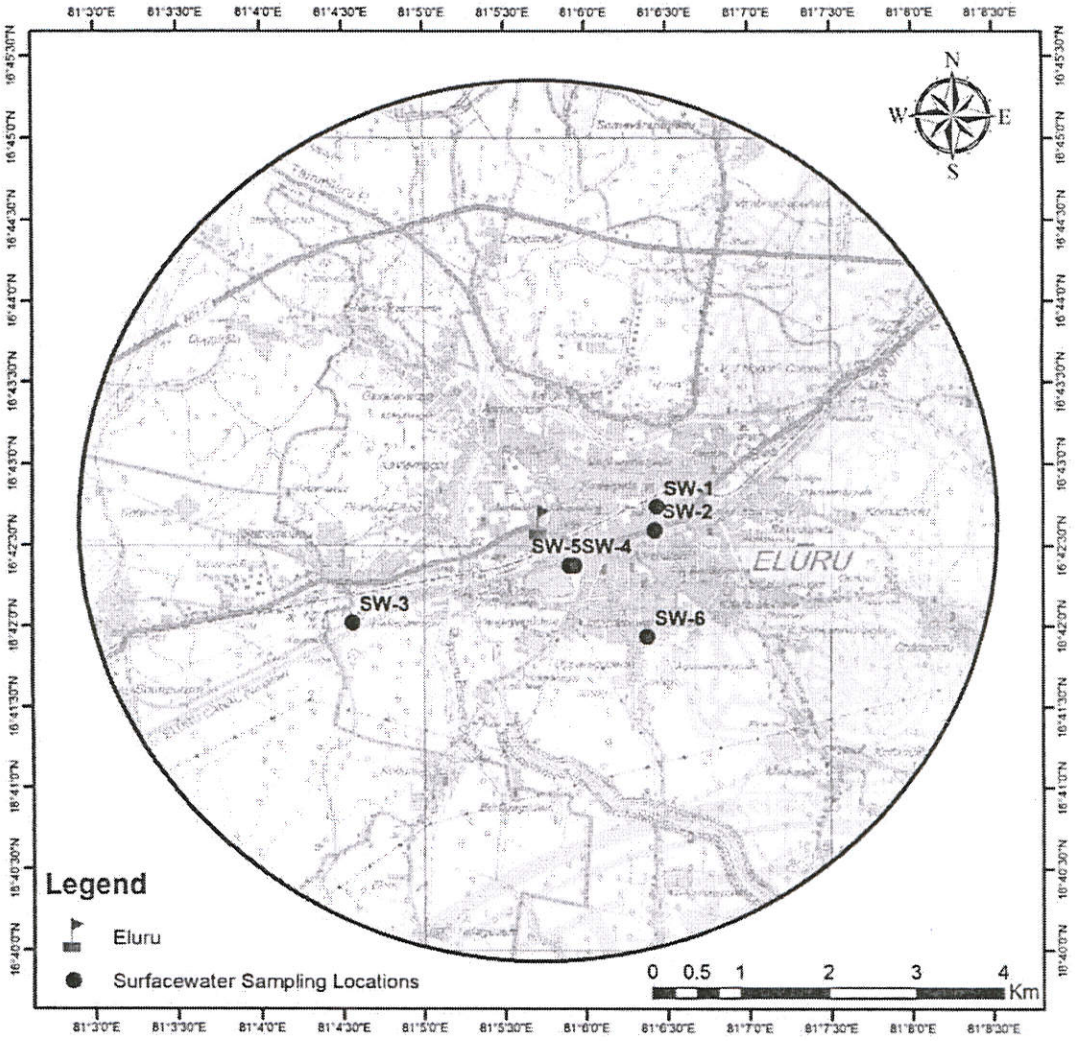


Fig. 2.2.2 : Surface Water sampling locations in the study area

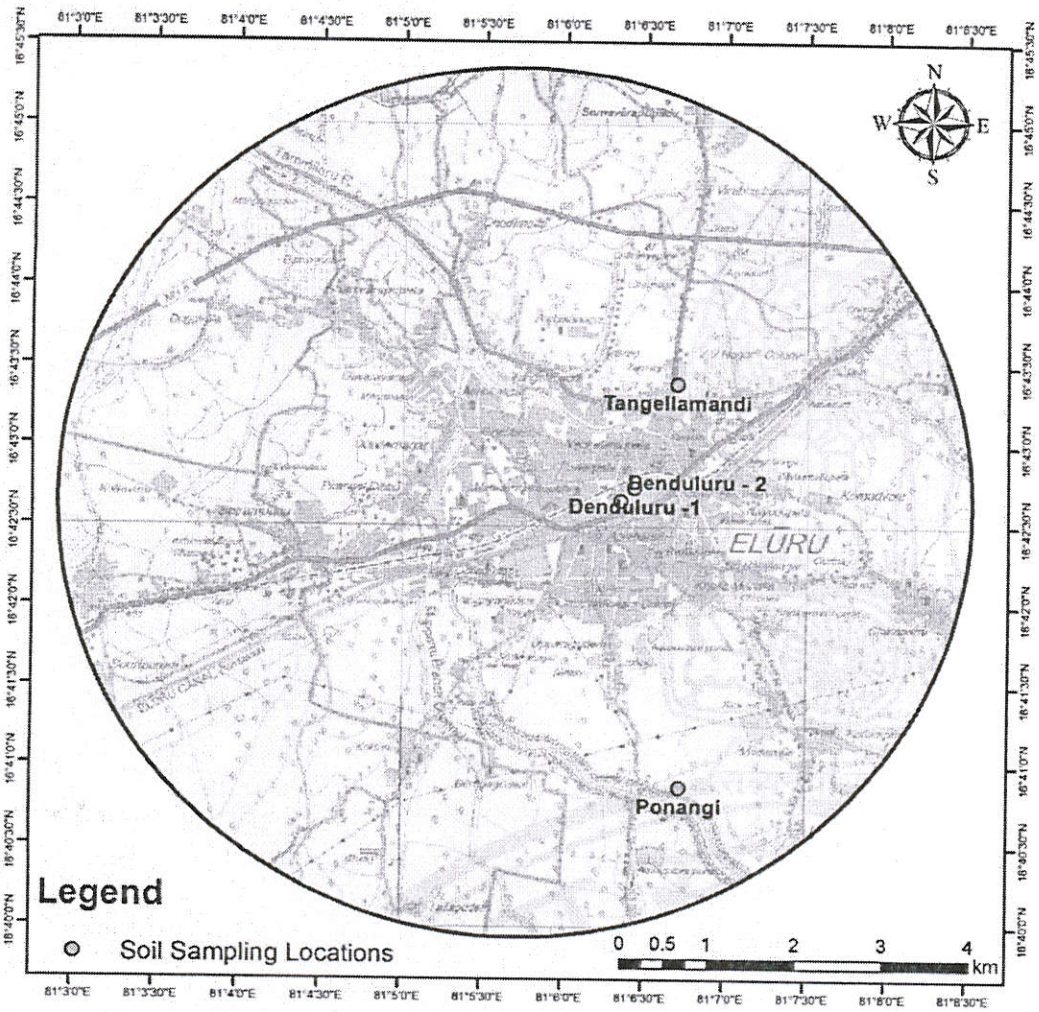


Fig. 2.3.1 : Soil sampling locations in the study area

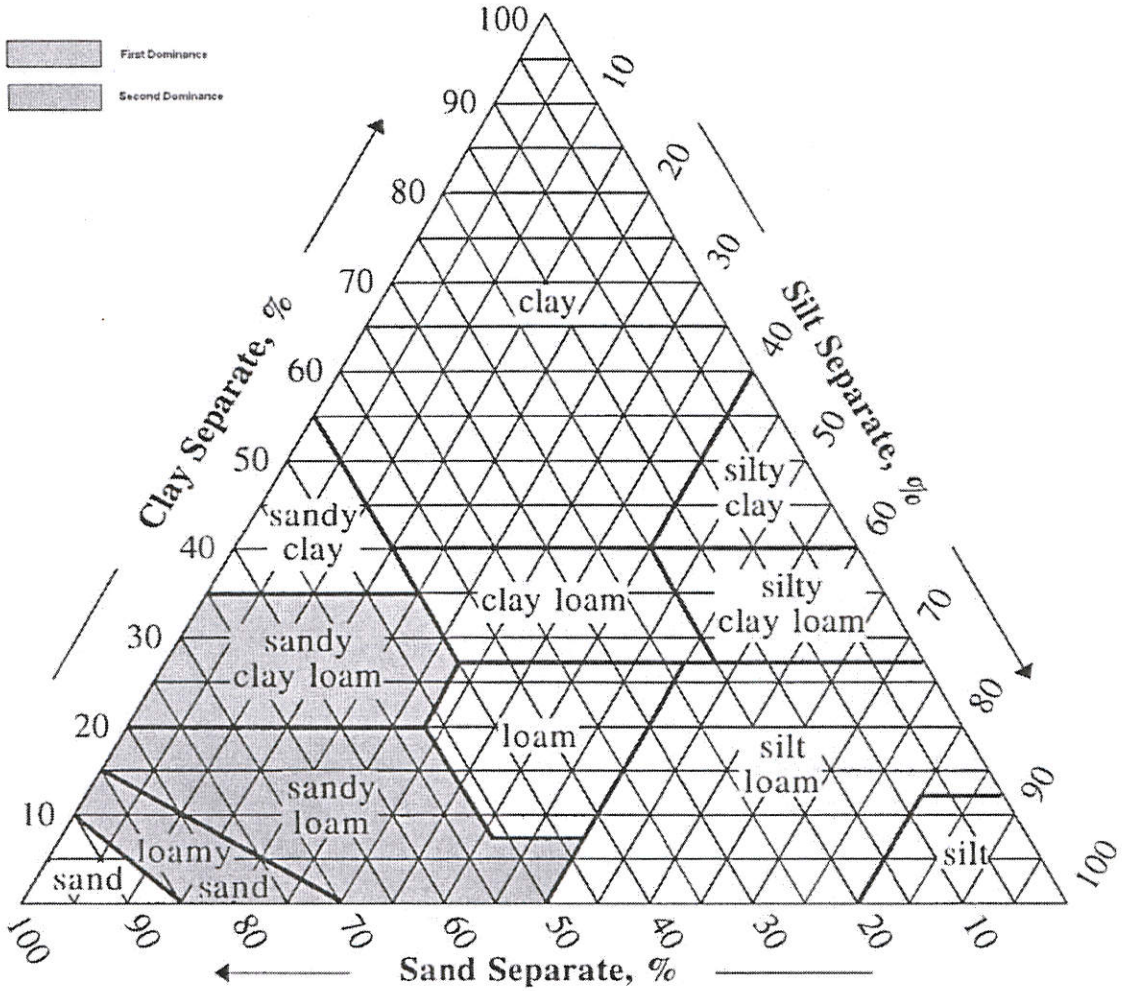


Fig. 2.3.2: Predominant Soil Texture in Study Area

Table 2.1: Details of Ambient Air Quality Sampling Locations

S.No.	Location Name	GPS Co-ordinates	
		Latitude	Longitude
1.	Dakshina Veedhi	16° 42' 03.79"	81° 06' 27.06"
2.	Pathebada	16° 42' 56.81"	81° 05' 46.87"
3.	Ponangi	16° 40' 51.44"	81° 06' 34.13"
4.	Santhi Nagar	16° 42' 26.15"	81° 04' 52.72"

Table 2.2: Methods Used for Ambient Air Quality Monitoring and Analysis

Sr. No.	Parameter	Method
1.	Particulate Matter size < 10 microns or PM_{10}	Gravimetric
2.	Particulate Matter size less than 2.5 microns or $PM_{2.5}$	Gravimetric
3.	Sulphur Dioxide (SO_2)	EPA Improved West and Geake Method
4.	Oxides of Nitrogen (NO_X)	Modified Jacobs-Hoechheiser Method
5.	Ammonia (NH_3)	Nesslers Method
6.	Hydrogen sulphide (H_2S)	Colorimetric method
7.	Chlorine (Cl_2)	Colorimetric method
8.	Lead (Pb)	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
9.	Arsenic(As)	
10.	Nickel (Ni)	
11.	Zinc (Zn)	
12.	Cadmium (Cd)	
13.	Copper (Cu)	
14.	Boron (B)	
15.	Chromium (Cr)	
16.	Manganese (Mn)	
17.	Ferrous (Fe)	

Table 2.3: Ambient Air Quality Particulate and Gaseous Pollutants at Eluru [Min-Max]

AAQM- 24hrly							* 1hrly
Locations	PM_{10}	$PM_{2.5}$	SO_2	NO_x	NH_3	H_2S	Cl_2*
	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	ppm
Dakshina Veedhi	138-169	55-125	2-4	8-10	13-68	1	0.036
Pathebada	125-189	57-100	4-7	11-16	19	1	0.031
Ponangi	173-221	77	3-5	7-9	10-11	4	0.294
Santhi Nagar	131-158	36-105	2-4	12-20	19-21	1	0.177
NAAQS	**100**	**60**	**80**	**80**	**400**	-	-

Table 2.4: Ambient Air Quality Heavy Meatls at Eluru [Min-Max]

AAQM- 24hrly										
Locations	Pb	Ni	As	Cd	Cr	Zn	Fe	B	Cu	Mn
	µg/m³	ng/m³	ng/m³	ng/m³	ng/m³	µg/m³	µg/m³	µg/m³	ng/m³	µg/m³
Dakshina Veedhi	0.03 - 0.04	2.7-12.6	4.6-7.0	ND	3.3-3.7	ND-3.1	1.3-2.4	ND-3.2	28.3-39.4	0.07-0.12
Pathebada	0.04 - 0.04	3.4-4.1	2.2-5.0	ND	1.8-2.6	ND-12.9	1.8-2.1	ND-13.7	28.1-38.1	0.09-0.10
Ponangi	0.01 - 0.03	0.8-1.1	6.8-13.0	ND - 9.3	2.4-2.6	ND	0.2-0.7	ND	5.0-10.3	0.05-0.11
Santhi Nagar	0.02 - 0.03	ND-3.8	8.5-17.8	ND	ND-4.8	ND-4.3	0.4-1.7	ND-4.9	4.6-15.3	0.05-0.12
NAAQS	**1**	**20**	**6**	-	-	-	-	-	-	-

ND - Not Detected

Table 2.5: Details of Groundwater Sampling Locations (December 2020)

S. No	Sample Code	Sample Location	GPS Location	Water Level (m)	Elevation (m)	Source Type	Site Observations
1.	E-GW-1	Powerpet PCB office	17°25'23.10"N 78°32'17.19"E	37m	61m	Bore-well	--
2.	E-GW-2	Dakshinapadu veedhi	16°42'00.86"N 81°06'14.12"E	0.68m	16m	Hand pump	Inside house with H.No: 6A-11-17 Reference PCB list number-1
3.	E-GW-3	Vangayagudem	16°42'07.32"N 81°05'50.58"E	--	20m	Bore-well	Subhramanyam colony inside house along the road. Reference: PCB list number-6
4.	E-GW-4	Ponangi	16°40'51.75"N 81°06'43.47"E	12.56m	11m	Bore-well	Opposite to H.No: 21-379 Construction land
5.	E-GW-5	Padamara veedhi	16°42'19.75"N 81°06'06.38"E	--	16m	Bore-well	Near Venkateswara Swamy temple lane, H.No: 3B-5-7; Reference: PCB list number-4
6.	E-GW-6	Thurupu Veedhi	16°42'16.14"N 81°06'47.39"E	1.30m	24m	Hand pump	The hand pump is inside the house, beside petrol bunk lane, 3rd house
7.	E-GW-7	Tangellamudi	16°43'25.06"N 81°06'41.47"E	--	19m	Hand pump	Christain grave yard, main road, pump is not able to open as it was too weak
8.	E-GW-8	Kothapeta	16°43'00.34"N 81°06'36.96"E	40.77m	19m	Bore-well	Beside Venkateswara Swamy temple Reference: PCB list number-2
9.	E-GW-9	Lakshmivarapu peta	16°43'08.34"N 81°06'43.58"E	--	27m	Bore-well	Opposite to millennium church, 2nd house lane Reference: PCB list number-8
10.	E-GW-10	Pathebada Eluru	16°42'59.52"N 81°05'43.45"E	--	23m	Bore-well	Agri gold appartments, beside Ganesh bar lane Reference: PCB list number-10
11.	E-GW-11	RR peta Eluru	16°42'51.44"N 81°05'53.52"E	--	30m	Bore-well	Anantha laxmi nilayam, deccan fried chicken building, RR peta Reference: PCB list number-9

Table 2.6: Groundwater Quality - Physical Parameters (December 2020)

Sr. No	Sample Code	pH	Temperature (°C)	Turbidity (NTU)	TSS (mg/l)
1.	EGW-1	7.28	30.9	0.3	5.0
2.	EGW-2	7.76	30.8	0.1	4.6
3.	EGW-3	7.28	30.6	0.1	1.8
4.	EGW-4	7.08	31.3	0.1	2.2
5.	EGW-5	7.79	30.5	0.1	4.1
6.	EGW-6	7.49	28.8	0.2	8.7
7.	EGW-7	7.66	28.3	0.1	0.6
8.	EGW-8	7.26	30.7	0.3	18.0
9.	EGW-9	7.20	31.5	0.1	0.3
10.	EGW-10	7.97	27.6	0.1	1.0
11.	EGW-11	7.79	26.9	0.1	4.8
IS: 10500-2012 Desirable		**6.5-8.5**	-	**1**	-
Permissible		**NR**	-	**5**	-

Table 2.7: Groundwater Quality - Physical Parameters (December 2020)

Sr. No	Sample Code	Odour	TDS (mg/l)	Conductivity (µS/cm)
1.	EGW-1	Agreeable	900	1554
2.	EGW-2	Agreeable	1330	2280
3.	EGW-3	Agreeable	782	1283
4.	EGW-4	Agreeable	2190	4040
5.	EGW-5	Agreeable	1176	2090
6.	EGW-6	Agreeable	715	1246
7.	EGW-7	Agreeable	926	1589
8.	EGW-8	Agreeable	1710	2960
9.	EGW-9	Agreeable	1052	1870
10.	EGW-10	Agreeable	762	1301
11.	EGW-11	Agreeable	814	1328
IS: 10500-2012 Desirable		**Agreeable**	**500**	-
Permissible		**Agreeable**	**2000**	-

Table 2.8: Groundwater Quality- Inorganic Parameters (December 2020)

Sr. No	Sample Code	Total Hardness (as $CaCO_3$)	Calcium (as Ca)	Magnesium (as Mg)	Sodium (as Na)	Potassium (as K)
		mg/l				
1.	EGW-1	188	29	28	266	13
2.	EGW-2	180	48	14	332	40
3.	EGW-3	224	51	17	216	10
4.	EGW-4	716	152	81	454	8
5.	EGW-5	388	90	39	257	26
6.	EGW-6	280	93	12	113	45
7.	EGW-7	268	69	23	205	38
8.	EGW-8	236	94	37	434	20
9.	EGW-9	208	59	14	312	8
10.	EGW-10	344	82	34	148	6
11.	EGW-11	212	61	14	208	18
IS: 10500-2012 Desirable		**200**	**75**	**30**	-	-
Permissible		**600**	**200**	**100**	-	-

Table 2.9: Groundwater Quality- Inorganic Parameters (December 2020)

Sr. No	Sample Code	Total Alkalinity (as $CaCO_3$)	Sulphate (as SO_4)	Chloride (as Cl)	Salinity	Fluoride (as F)
		mg/l			‰	mg/l
1.	EGW-1	424	73	158	0.28	0.12
2.	EGW-2	552	89	187	0.33	0.11
3.	EGW-3	408	38	134	0.24	0.56
4.	EGW-4	428	129	876	1.58	0.48
5.	EGW-5	408	62	266	0.48	0.54
6.	EGW-6	376	44	118	0.21	0.63
7.	EGW-7	388	65	181	0.33	0.38
8.	EGW-8	535	99	473	0.85	0.77
9.	EGW-9	560	96	169	0.31	0.84
10.	EGW-10	240	28	238	0.43	0.48
11.	EGW-11	292	40	185	0.33	0.67
IS: 10500-2012 Desirable		**200**	**200**	**250**	-	**1.0**
Permissible		**600**	**400**	**1000**	-	**1.5**

Table 2.10: Groundwater Quality – Nutrient Parameters (December 2020)

Sr. No.	Sample Code	Nitrate (as NO_3)	Nitrite (as N-NO_2)	Ammonical -N	TKN
		mg/l			
1.	EGW-1	6.5	0.002	BDL	5
2.	EGW-2	84	0.009	BDL	18
3.	EGW-3	6.4	0.002	BDL	6
4.	EGW-4	0.2	0.001	BDL	18
5.	EGW-5	67	0.002	BDL	18
6.	EGW-6	0.2	0.002	BDL	11
7.	EGW-7	29	0.027	BDL	9
8.	EGW-8	80	0.001	BDL	5
9.	EGW-9	2.8	0.001	BDL	7
10.	EGW-10	14	0.001	BDL	3
11.	EGW-11	39	0.002	BDL	6
IS: 10500-2012 Desirable		45	-	-	-
Permissible		NR	-	-	-

Table 2.11: Groundwater Quality-Nutrient & Special Parameters (December 2020)

Sr. No.	Sample Code	Available Phosphorus	Total Phosphorus	Silica
		mg/l		
1.	EGW-1	0.078	0.096	19
2.	EGW-2	0.511	0.536	35
3.	EGW-3	0.052	0.068	24
4.	EGW-4	0.056	0.077	26
5.	EGW-5	0.047	0.068	25
6.	EGW-6	0.348	0.371	32
7.	EGW-7	0.163	0.189	31
8.	EGW-8	0.078	0.102	22
9.	EGW-9	0.044	0.062	19
10.	EGW-10	0.078	0.106	25
11.	EGW-11	0.047	0.072	23
IS: 10500-2012 Desirable		-	-	-
Permissible		-	-	-

Table2.12: Groundwater Quality – Demand Parameters and TOC (December 2020)

Sr. No.	Sample Code	DO	BOD	COD	TOC
		mg/l			
1.	EGW-1	3.9	<1	12	2.169
2.	EGW-2	4.4	3.9	16	0.235
3.	EGW-3	3.9	<1	44	6.604
4.	EGW-4	5.0	<1	54	0.521
5.	EGW-5	5.2	<1	24	10.01
6.	EGW-6	2.3	6.8	20	0.261
7.	EGW-7	2.7	6.0	16	0.764
8.	EGW-8	3.9	<1	20	0.588
9.	EGW-9	2.3	1.0	24	8.338
10.	EGW-10	3.2	1.2	20	4.315
11.	EGW-11	3.8	1.0	32	0.561
IS: 10500-2012 Desirable		-	-	-	-
Permissible		-	-	-	-

Table2.13: Groundwater Quality – Microbiological Parameters (December 2020)

Sr. No.	Sample Code	MPN INDEX
1.	EGW-1	240
2.	EGW-2	>1600
3.	EGW-3	1600
4.	EGW-4	>1600
5.	EGW-5	>1600
6.	EGW-6	>1600
7.	EGW-7	>1600
8.	EGW-8	350
9.	EGW-9	1600
10.	EGW-10	170
11.	EGW-11	920

Table2.14: Groundwater Quality –Heavy Metals (December 2020)

Sr. No	Sample Code	As	B	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Zn	Hg
		µg/l										
1.	EGW-1	0.311	384	0.199	1.9	ND	490	ND	ND	0.28	19.3	5.8
2.	EGW-2	1.346	297	0.54	ND	1.2	452	179	ND	0.76	720	1.5
3.	EGW-3	1.379	82	ND	ND	ND	617	ND	ND	ND	ND	0.4
4.	EGW-4	0.046	138	1.89	ND	ND	398	111	0.85	ND	1.7	1.3
5.	EGW-5	0.652	168	ND	ND	ND	835	9.1	ND	ND	4.1	0.8
6.	EGW-6	1.939	198	ND	ND	ND	2118	1135	8.75	0.35	103	0.6
7.	EGW-7	0.636	174	ND	ND	ND	358	ND	ND	0.12	11	ND
8.	EGW-8	1.319	149	ND	ND	1.4	474	48.8	1.34	ND	5.4	1.1
9.	EGW-9	0.162	228	1.37	2.37	15.5	329	38.9	ND	0.48	13.8	1.8
10.	EGW-10	0.480	224	ND	ND	ND	701	ND	ND	ND	142	ND
11.	EGW-11	0.338	230	ND	ND	ND	363	40.8	3.42	ND	0.2	26
IS: 10500-2012 Desirable		**10**	**500**	**3**	**50**	**50**	**300**	**100**	**20**	**10**	**5000**	**1**
Permissible		**50**	**1000**	**NR**	**NR**	**1500**	**NR**	**300**	**NR**	**NR**	**15000**	**NR**

Table 2.15: Groundwater Quality –Pesticides (December 2020)

Sr. No	Sample Code	Pesticides Detected	Concentrations (ppb)	Comment
1.	EGW-1	ND	-	-
2.	EGW-2	ND	-	-
3.	EGW-3	ND	-	-
4.	EGW-4	Chloropyrifos	83.04	Compound confirmed on GC-MS
		Methyl Chlorpyrifos & Chlorpyrifos	Quantification not performed	Compound screened in GC-MS
5.	EGW-5	ND	-	GC-MS
6.	EGW-6	ND	-	GC-MS
7.	EGW-7	ND	-	GC-MS
8.	EGW-8	Chlorpyrifos	<0.5	Compounds not confirmed on GC-MS
		Pendimethlin	<0.5	
9.	EGW-9	ND	-	-
10.	EGW-10	ND	-	-
11.	EGW-11	Chloropyrifos	4.49	Compound confirmed
Detection Limit of GC-MS		0.5 ppb		

Table 2.16: Details of Surface Water Sampling Locations (December 2020)

S. No	Sample Code	Sample Location	GPS Locations	Elevation (m)	Source Type	Site Observations
1.	ESW1	Denduluru Godavari Canal	16°42'44.14"N 81°06'26.37"E	11m	Surface water	Godavari Canal Water (Pumphouse-1) Sewage entering to canal
2.	ESW2	Denduluru Godavari Canal Storage tank	16°44'35.74"N 81°09'25.41"E	19m	Surface water	Summer Storage Tank
3.	ESW3	Krishna Canal	16°42'00.75"N 81°04'33.15"E	18m	Surface water	Opposite to church (main road) Reference: PCB list number-8
4.	ESW4	Pampula cheruvu pound-2	16°42'20.64"N 81°05'39.30"E	20m	Surface water	Reference: PCB list number-10
5.	ESW5	Inlet water of treatment plant	16°42'22.14"N 81°05'56.11"E	22m	Inlet water of water treatment plant	PCB list number-3 Capacity: 30MLD + 8MLD
6.	ESW6	Outlet water after Chlorination	16°42'22.35"N 81°05'54.02"E	21m	Water Treatment plant outlet	Capacity: 30MLD + 85MLD Reference: PCB list number-5
7.	ESW7	J.P Colony over head tank	16°41'55.66"N 81°06'22.46"E	18m	Drinking water	Treated water from treatment plant installed in this overhead tank and supplied to the village

Table 2.17: Surface water Quality - Physical Parameters (December 2020)

Sr. No	Sample Code	pH	Temperature (°C)	Turbidity (NTU)	TSS (mg/l)
1.	ESW1	7.47	26.8	1.5	12.5
2.	ESW2	8.45	29.7	2.0	16.8
3.	ESW3	7.57	27.9	1.5	29
4.	ESW4	8.21	29.1	0.7	23
5.	ESW5	7.67	26.5	0.5	16.1
6.	ESW6	7.80	26.7	0.6	1.2
7.	ESW7	8.16	26.4	0.2	3.2

Table 2.18: Surface water Quality - Physical Parameters (December 2020)

Sr. No	Sample Code	Odour	Colour (Hazen)	TDS (mg/l)	Conductivity (µS/cm)
1.	ESW1	Agreeable	32	173	260
2.	ESW2	Agreeable	22	215	370
3.	ESW3	Agreeable	26	379	686
4.	ESW4	Agreeable	35	318	589
5.	ESW5	Agreeable	34	245	450
6.	ESW6	Agreeable	24	256	434
7.	ESW7	Agreeable	19	221	391

Table 2.19: Surface water Quality- Inorganic Parameters (December 2020)

Sr. No	Sample Code	Total Hardness (as $CaCO_3$)	Calcium (as Ca)	Magnesium (as Mg)	Sodium (as Na)	Potassium (as K)
		mg/l				
1.	ESW1	56	14	5	33	5
2.	ESW2	68	13	9	46	7
3.	ESW3	120	32	10	102	8
4.	ESW4	92	18	12	92	8
5.	ESW5	64	16	6	68	8
6.	ESW6	116	26	12	46	6
7.	ESW7	116	29	11	40	4

Table 2.20: Surface water Quality- Inorganic Parameters (December 2020)

Sr. No	Sample Code	Total Alkalinity (as $CaCO_3$)	Sulphate (as SO_4)	Chloride (as Cl)	Salinity	Fluoride (as F)
		mg/l			‰	mg/l
1.	ESW1	76	1.0	10	0.02	0.26
2.	ESW2	88	1.7	53	0.10	0.10
3.	ESW3	156	28	95	0.17	0.13
4.	ESW4	116	6	112	0.20	0.21
5.	ESW5	108	9	63	0.11	0.12
6.	ESW6	92	28	59	0.11	0.10
7.	ESW7	84	12	64	0.12	0.32

Table 2.21: Surface water Quality – Nutrient Parameters (December 2020)

Sr. No.	Sample Code	Nitrate (as NO_3)	Nitrite (as N-NO_2)	Ammonical -N	TKN
		mg/l			
1.	ESW1	53	0.001	BDL	6
2.	ESW2	0.38	BDL	BDL	3
3.	ESW3	3.77	0.021	BDL	6
4.	ESW4	0.20	BDL	BDL	13
5.	ESW5	0.93	0.002	BDL	7
6.	ESW6	4.10	BDL	BDL	6
7.	ESW7	1.63	BDL	BDL	6

Table 2.22: Surface water Quality: Nutrient & Special Parameters (December 2020)

Sr. No.	Sample Code	Available Phosphorus	Total Phosphorus	Silica
		mg/l		
1.	ESW1	0.025	0.035	16
2.	ESW2	0.047	0.063	12
3.	ESW3	0.160	0.232	15
4.	ESW4	0.077	0.094	11
5.	ESW5	0.062	0.084	12
6.	ESW6	0.100	0.136	3.6
7.	ESW7	0.059	0.102	12

Table 2.23: Surface water Quality – Demand Parameters and TOC (December 2020)

	Sample Code	DO	BOD	COD	TOC
		mg/l			
1.	ESW1	4.9	2.2	16	7.435
2.	ESW2	7.9	4.3	56	4.735
3.	ESW3	4.5	2.7	24	3.095
4.	ESW4	8.2	5.6	76	5.569
5.	ESW5	6.4	1.9	56	3.496
6.	ESW6	7.0	<1	40	4.734
7.	ESW7	6.1	<1	40	3.295

Table 2.24: Surface water – Microbiological Parameters (December 2020)

Sr. No.	Sample Code	TC	FC
		CFU/100ml	
1.	ESW1	TNC	ND
2.	ESW2	760	20
3.	ESW3	600	20
4.	ESW4	300	ND
5.	ESW5	TNC	620
6.	ESW6	560	20
7.	ESW7	340	20

Table 2.25: Surface water Quality –Heavy Metals (December 2020)

Sr. No	Sample Code	As	B	Cd	Cr	Cu	Fe	Mn	Ni	Pb	Zn	Hg
		µg/l										
1.	ESW1	ND	36.6	0.119	ND	ND	63	142.8	ND	ND	0.4	4.5
2.	ESW2	0.062	ND	ND	ND	ND	13	ND	ND	ND	ND	1.0
3.	ESW3	1.026	25.6	0.86	ND	ND	454	50.6	ND	ND	ND	9.0
4.	ESW4	0.322	ND	ND	ND	ND	1	ND	ND	ND	ND	1.2
5.	ESW5	1.546	22.6	0.26	ND	ND	330	49.7	ND	0.29	1.9	1.0
6.	ESW6	0.133	19.6	0.133	18.5	ND	161	ND	6.95	ND	ND	2.1
7.	ESW7	0.457	116.6	0.06	ND	ND	395	79.8	ND	ND	13.8	7.2

Table 2.26: Surface water Quality – Pesticides (December 2020)

Sr. No	Sample Code	Pesticides Detected	Concentrations (ppb)	Comment
1.	ESW1	Lambda	<0.5	Compounds not confirmed on GC-MS
		Methyl Parathion	<0.5	
2.	ESW2	Chlorpyrifos	<0.5	Compound not confirmed on GC-MS
3.	ESW3	Lambda Cyhalothrin	<0.5	Compounds not confirmed on GC-MS
4.	ESW4	Chlorpyrifos	<0.5	Compounds not confirmed on GC-MS
		Alachlor	<0.5	
5.	ESW5	Chloropyrifos	<0.5	Compounds not confirmed on GC-MS
		Alachlor	<0.5	
6.	ESW6	ND	-	-
7.	ESW7	Alachlor	<0.5	Compounds not confirmed on GC-MS
Detection Limit of GC-MS		**0.5 ppb**		

Table 2.27 : Soil Sampling Locations

S. No	Sample Locations	GPS Location	Elevation (m)	Sample Type	Remarks
1.	Denduluru 1	16°45'01.41"N 81°09'50.80"E	13	Agriculture Field	Agriculture field, beside main road.
2.	Denduluru 2	16°45'02.92"N 81°09'51.01"E	18	Agriculture field	Agriculture field along road
3.	Ponangi	16°45'01.41"N 81°09'50.80"E	11	--	Open ground ZPHS High School
4.	Tangellamandi	16°45'22.92"N 81°06'41.65"E	21	--	Beside hero Showroom

Table 2.28 : Particle size distribution of soil samples

S.No	Sampling Locations	Particle Size Distribution (%)				Soil Texture
		Coarse sand	Fine sand	Silt	Clay	
1.	Denduluru 1	6.11	68.52	23.33	2.04	loamy sand (LS)
2.	Denduluru 2	7.46	65.34	5.62	21.58	sandy clay loam (SCL)
3.	Ponangi	13.22	40.83	23.49	22.46	sandy clay loam (SCL)
4.	Tangellamandi	2.03	74.07	6.95	16.95	sandy loam (SL)

Table 2.29 : Chemical Properties of Soil Extract (water soluble)

S.No	Sampling Locations	pH	EC	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	SO_4^{-}	Cl^{-}	SAR
			mS/cm	--------(meq/100gm)----------						
1.	Denduluru 1	7.9	0.78	0.07	3.12	2.24	0.205	0.010	2.00	5.62
2.	Denduluru 2	7.4	0.21	0.09	0.15	0.10	0.103	0.003	0.36	0.90
3.	Ponangi	7.3	1.26	0.03	3.85	1.66	0.002	0.016	0.92	3.77
4.	Tangellamandi	8.9	0.50	0.03	1.31	0.50	0.066	0.008	0.40	1.92

Table 2.30 : Exchangeable Cations

S.No	Sampling Locations	Organic Carbon (%)	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CEC	ESP
			←------(meq/100gm)----→				cmol (p+) kg^{-1}	%
1.	Denduluru 1	1.48	0.020	2.74	0.05	0.12	2.79	6.2
2.	Denduluru 2	0.50	0.024	2.58	0.01	0.11	2.15	5.0
3.	Ponangi	0.67	0.020	2.24	0.21	0.03	3.56	5.8
4.	Tangellamandi	0.47	0.034	2.12	0.19	0.07	3.21	5.9

Table 2.31 : Heavy Metals in Soil Samples

S.No	Sampling Locations	As	B	Cd	Co	Cr	Cu	Fe	Mn	Ni	Pb	Zn
		------mg/kg--------										
1.	Denduluru 1	BDL	BDL	BDL	2.4	9.7	7.9	5251	84.7	7	2.5	12.1
2.	Denduluru 2	BDL	21.8	BDL	5.2	33.6	15.1	11684	282	14.5	4.8	19.2
3.	Ponangi	BDL	22.3	BDL	4.2	30.2	10.1	11745	131	12.7	4.7	13
4.	Tangellamandi	BDL	11.4	BDL	4.4	14.6	13.6	6085	207	8.5	4.4	12.3

Chapter 3

Conclusion & Recommendations

3.1 Conclusion

The present preliminary study was aimed to assess the status of Environmental Quality in and around the Affected area of Eluru Outbreak incident. The conclusions are drawn as follows;

- In the ambient air quality study it is found that the concentrations of particulate matter were found to be high and exceeding the NAAQS largely in the study area. Higher values of particulate matter may be due to vehicular traffic, re-suspended road dust, burning of solid waste, windblown dust and agricultural and construction activities. Gaseous pollutants are found to be very low and not significant.
- The heavy metals in the particulate matter are found to be higher in terms of arsenic, nickel, boron, copper and zinc. The arsenic concentrations in the particulate matter are exceeding the NAAQS at all locations except at Pattebada and nickel concentrations are found to be exceeding NAAQS at Dakshina Veedhi. Higher levels of these may be due to the vehicle transportation, waste incineration or burning, oil and coal combustion, sewage sludge incineration, and construction activities.
- The overall water quality for Surface and Ground water is satisfactory. In terms of heavy metals, Iron and Manganese were found to be slightly higher than BIS Standards for Drinking which may be due to geological Origin
- Presence of Mercury in Surface and Ground water is alarming and it needs deeper scientific study for ascertain the reasons for high levels of Mercury
- Organochlorine pesticides like Alpha-HCH, Beta-HCH, Gamma-HCH, Delta-HCH, Aldrin, Dicofol, Alpha-endosulfan, pp-DDE, pp'-DDD, Beta-Endosulfan, Endosulfan Sulfate, Heptachlor, Heptachlor epoxide were analysed in groundwater and surface water samples and the concentration of all compounds were observed to be below detectable level. Similarly, organophophate pesticides and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion, Chloropyrifos, Pendimethalin, Butachlor, Profenofos,

Quinalfos and Ethion were analysed and found below detectable levels in all samples except for chloropyrifos in groundwater.

- The texture of most of the soil sample collected is sandy clay loam with moderately fine texture ranging moderate to strong Alkaline pH. The Soils are having low CEC with Normal ESP
- The heavy metal concentrations in the study area are below Screening and response levels as per MoEF&CC Guidance Document for assessment and remediation of Contaminated sites in India.
- Organochlorine and organophosphate pesticides concentration in soil samples were observed to be below detectable level.

3.2 *Recommendations*

Occurrence of certain heavy metals in ambient air and presence of mercury in both groundwater and surface water emphasizes need of further investigation. Periodic Assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months.

References:

APHA (2012). Standard methods for analysis of the water and waste water analysis, 22nd editions.

BIS (2012). Indian standard specification for drinking water. IS: 10500.

Annexures

Annexure - I

National Ambient Air Quality Standards – 2009

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1.	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual *	50	20	-Improved west and Gaeke
		24 Hours **	80	80	-Ultraviolet fluorescence
2.	Nitrogen Dioxide (NO_X), $\mu g/m^3$	Annual *	40	30	-Modified Jacob & Hochheiser (Na-Arsenite)
		24 Hours **	80	80	-Chemiluminescence
3.	Particulate Matter (Size less than 10 µm) or PM_{10} $\mu g/m^3$	Annual *	60	60	-Gravimetric -TOEM -Beta attenuation
		24 Hours **	100	100	
4.	Particulate Matter (Size less than 2.5 µm) or $PM_{2.5}$ $\mu g/m^3$	Annual *	40	40	-Gravimetric -TOEM -Beta attenuation
		24 Hours **	60	60	
5.	Ozone (O_3) $\mu g/m^3$	8 hours **	100	100	-UV photometric
		1 hour**	180	180	-Chemiluminescence - Chemical method
6.	Lead (Pb) $\mu g/m^3$	Annual *	0.50	0.50	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
		24 Hours **	1.00	1.00	-ED-XRF using Teflon filter
7.	Carbon Monoxide (CO) mg/m^3	8 hours **	02	02	-Non Dispersive Infrared Spectroscopy
		1 hour *	04	04	
8.	Ammonia (NH_3) $\mu g/m^3$	Annual *	100	100	-Chemiluminescence
		24 Hours **	400	400	-Indophenol blue method
9.	Benzene (C_4H_4) $\mu g/m^3$	Annual *	05	05	-Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10.	Benzo Pyrene (BaP) - particulate phase only ng/m^3	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
11.	Arsenic(As) ng/m^3	Annual *	06	06	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12.	Nickel(Ni) ng/m^3	Annual *	20	20	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals

** 24 hourly or 8 hourly or 01 hourly monitored values as applicable shall be compiled with 98% of the time in a year. 2% of the time they may exceed the limits but not on two consecutive days of monitoring

Annexure-II

Specifications for Drinking Water - (IS 10500: 2012)

S. No.	Substance or characteristic	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Remarks
Essential Characteristics				
1.	Colour Hazen Units, max	5	15	Extended to 15 only if toxic substances are not suspected in absence of alternate sources
2.	Odour	Agreeable	Agreeable	a. test cold and when heated b. test after several dilutions
3.	Taste	Agreeable	Agreeable	Test to be conducted only after safety has been established
4.	Turbidity (NTU) Max	1	5	-
5.	pH value	6.5 to 8.5	No relaxation	-
6.	Total hardness (mg/L, $CaCO_3$) Max.	200	600	-
7.	Iron (mg/L, Fe) Max	0.3	No relaxation	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
8.	Chlorides (as Cl) mg/L Max	250	1000	-
9.	Free residual chlorine (mg/L), Min	0.2	1	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/L
Desirable Characteristics				
10.	Total dissolved solids, mg/l, max	500	2000	-
11.	Calcium (mg/L, Ca) Max.	75	200	-
12.	Magnesium (mg/L, Mg) Max.	30	100	-
13.	Copper (mg/L, Cu) Max.	0.05	1.5	-
14.	Manganese (mg/L, Mn)	0.1	0.3	Total concentration of

S. No.	Substance or characteristic	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Remarks
	Max.			manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
15.	Sulphate (mg/L, SO_4) Max.	200	400	May be extended upto 400 provided Magnesium (as Mg) does not exceed 30
16.	Nitrate (mg/L, NO_3) Max.	45	No relaxation	-
17.	Fluoride (mg/L, F) Max.	1.0	1.5	-
18.	Phenolic compounds (mg/L C_6H_5OH) Max.	0.001	0.002	-
19.	Mercury (mg/L, Hg) Max	0.001	No Relaxation	-
20.	Cadium (mg/L, Cd) Max.	0.003	No Relaxation	-
21.	Selenium (mg/L, Se) Max.	0.01	No Relaxation	-
22.	Total Arsenic (mg/L, As) Max.	0.01	0.05	-
23.	Cyanide (mg/L, CN) Max.	0.05	No Relaxation	-
24.	Lead (mg/L, Pb) Max.	0.01	No Relaxation	-
25.	Zinc (mg/L, Zn) Max.	5	15	-
26.	Anionic detergents (mg/L, MBAS) Max	0.2	1.0	-
27.	Total Chromium (mg/L), Max.	0.05	No relaxation	-
28.	Polynuclear aromatic hydrocarbons (mg/L, PAH) Max.	0.0001	No relaxation	-
29.	Mineral oil (mg/L) Max.	0.05	No relaxation	-
30.	Pesticides (mg/L) Max.	-	No relaxation	-
Radioactive materials				
31.	Alpha emitters Bq/L Max.	0.1	No relaxation	-

S. No.	Substance or characteristic	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	Remarks
32.	Beta emitters pci/L Max.	1.0	No relaxation	-
33.	Alkalinity (mg/L) Max.	200	600	-
34.	Aluminium (mg/L, Al) Max.	0.03	0.2	-
35.	Boron (mg/L) Max.	0.5	1.0	-

Annexure-III

Methods for Preservation and Analysis of Water Samples

S. No.	Parameter	Units of Expression	Preservative and Storage Condition	Reference : APHA 21st Edition Methods
Physical Parameters				
1.	Temperature	^{0}C	Analyze immediately	2550 – B: (Thermometer)
2.	pH	–	Analyze immediately	4500-H^+ - B: (Electrode)
3.	Conductivity	µs/ms	Refrigeration at 4^{O}C	2510 – B: (Conductivity meter)
4.	Total dissolved solids	mg /L	Refrigeration at 4^{O}C	2540 – C: (dried at 180^{0}C & gravimetric)
5.	Total suspended solids	mg /L	Refrigeration at 4^{O}C	2540 – D: (dried at 103^{0}C-105^{0}C & gravimetric)
6.	Turbidity	NTU	Refrigerate and Analyze immediately	2130 – B: (Nephelometric)
Inorganic Parameters				
7.	Total alkalinity	as $CaCO_3$ mg/L	Refrigerate and Analyze immediately	2320 – B: (Titration)
8.	Hardness	as $CaCO_3$ mg/L	Add HNO_3 to pH < 2 and refrigerate	2340 – C: (EDTA Titrimetric)
9.	Chloride	mg /L	Not Required	4500-Cl^- - B: (Argentometric)
10.	Sulphate	mg /L	Refrigeration at 4^{O}C	4500-SO_4^{--} - E: (Turbidimetric)
11.	Fluoride	mg /L	Not Required	4500-F^- - D: (SPADNS)
12.	Sodium and potassium	mg /L	Not Required	3500- K, Na-B: (Flame Photometric)
Nutrient and Demand Parameter				
13.	Nitrate	as NO_3^- - N mg /L	Refrigerate and analyze immediately	4500-NO_3^- B: (UV spectrophotometric)
14.	Total Phosphate	mg/L	Refrigeration at 4^{O}C	4500-P-D: (Stannous Chloride)
15.	Dissolved Oxygen [DO]	mg /L	Analyze immediately	4500-O-C: (Azide modification)
16.	COD	mg/L	Add H_2SO_4 at pH <2 refrigerate & analyze immediately	5220-B: (Open Reflux)
17.	BOD	mg /L	Refrigeration at 4^{O}C & analyze immediately	5210-B: (BOD Test at 27 ^{0}C)

S. No.	Parameter	Units of Expression	Preservative and Storage Condition	Reference : APHA 21st Edition Methods
18.	Total Kjeldhal Nitrogen	mg /L	Refrigerate and Add H_2SO_4 to pH<2	4500- N_{ORG}-B: (Macro-kjeldhal)
19.	Oil and grease	mg /L	Add H_2SO_4 at pH <2 refrigerate	5220 –B: (Liquid-Liquid Partition Gravimetric)
Heavy Metals				
20.	Heavy metals	mg /L	Add HNO_3 to pH <2	3030 –E, 3125 - B: (ICP- MS)

Annexure-IV

Soil Fertility Ratings

S.No.	Soil Nutrients	Soil Fertility Ratings		
		Low	Medium	High
1	Organic carbon as a measure of available Nitrogen (%)	<0.5	0.5-0.75	>0.75
2	Available N as per alkaline permanganate method (kg/ha)	<280	280-560	>560
3	Available P by Olsen's method (kg/ha) in Alkaline soil	<10	10-24.6	>24.6
4	Available K by Neutral N, ammonia acetate method (kg/ha)	<108	108-280	>280

pH Range	Soil Reaction Rating
<4.6	Extremely acid
4.6-5.5	Strongly acid
5.6-6.5	Moderately acid
6.6-6.9	Slightly acid
7.0	Neutral
7.1-8.5	Moderately alkaline
>8.5	Strongly alkaline

General interpretation of EC values

S. No.	Soil	EC (mS/cm)	Total salt content (%)	Crop reaction
1.	Salt free	0-2	<0.15	Salinity effect negligible, except for more sensitive crops
2.	Slightly saline	4-8	0.15-0.35	Yield of many crops restricted
3.	Moderately saline	8-15	0.35-0.65	Only tolerant crops yield satisfactorily
4.	Highly saline	>15	>0.65	Only very tolerant crops yield satisfactorily

(Source : Methods Manual, Soil Testing in India, Dept. of Agri. and Cooperation, Ministry of Agriculture, Govt. of India, 2011)

Annexure-V

Metals Concentrations Typically Found in Unpolluted Soil and Soil Clean Up Standards

Metal (Symbol)	Typical Concentrations in Natural Soils (mg/kg)	State Clean up Standard Residential Direct Exposure Criteria (RDEC) mg/kg
Aluminium (Al)	10000 - 300000*	Not established
Antimony (Sb)	< 1 - 8.8	27
Arsenic (As)	< 0.1 - 73	10
Barium (Ba)	10-1500	4700
Beryllium (Be)	<1 - 7	2
Cadmium (Cd)	<0.010 - 2	34
Chromium (Cr)	1-1000	100/3900 #
Cobalt (Co)	< 0.3 - 70	70
Copper (Cu)	< 0.6-495	2500
Iron (Fe)	7000 - >550000*	Not established
Lead (Pb)	2 - 200*	Not established
Magnesium (Mg)	50 - 50000	Not established
Manganese (Mn)	< 2 -7000	1400
Mercury (Hg)	3.40	20
Molybdenum (Mo)	0.2 - 5*	Not established
Nickel (Ni)	5 - 500*	Not established
Potassium (K)	50 - 37000	Not established
Selenium (Se)	< 0.1 - 3.9	340
Silver (Ag)	0.01 - 8	340
Strontium (Sr)	50 - 1000*	Not established
Thallium (Tl)	0.1 - 0.8	5.4
Tin (Sn)	2 - 200*	2000
Titanium (Ti)	1000 - 10000	Not established
Zinc (Zn)	< 3.0 - 264	20000
Zirconium (Zr)	60 - 2000 *	Not established

(Source : Frink, Charles R., 1996. "A Perspective of Metals in Soils", Journal of Soil Contamination, 5(4):329- 359. Table A8: Most Likely Concentrations of EPA Target Analytes in Uncontaminated Soils of the Northeast (mg/kg [ppm] dry weight. www.newhallinfo.org) * Lindsay, W. 1979. Chemical Equilibrium in Soils. New York: John Wiley and Sons. (in: US EPA, 1987. A Compendium of Superfund Field Operations Methods. Exhibit 16-2. "The Content of Various Elements in Soils." www.epa.gov,

 # Criteria are 100 mg/kg for hexavalent chromium and 3900 mg/kg for trivalent chromium

Soil (Screening and Response levels)							
S.No	Chemical Name	Chemical Group	Response levels	Screening Levels			
				Agricultural	Residential/-parkland	Commercial	Industrial
			mg/kg				
1.	Arsenic	Metal	50	12	12	12	12
2.	Boron	inorganic	-	2	-	-	-
3.	Cadmium	Metal	13	1.4	10	22	22
4.	Chromium	Metal	-	64	64	87	87
5.	Cobalt	Inorganic	190	40	50	300	300
6.	Copper	Metal	190	63	63	91	91
7.	Iron	Inorganic	-	-	-	-	-
8.	Mercury	Metal	36	6.6	6.6	24	50
9.	Manganese	Inorganic	-	-	-	-	-
10.	Nickle	Metal	-	-	-	-	-
11.	Lead	Metal	530	70	140	260	600
12.	Zinc	Metal	720	200	200	360	360

Guidance document for assessment and remediation of contaminated sites in India : volume II-2.1-b Screening and Response levels, 1st Edition, December 2015, by MoEF&CC, GoI https://cpcb.nic.in/uploads/hwmd/MoEFCC_

GOVERNMENT OF ANDHRA PRADESH
ABSTRACT

A.P. Medical & Health Services – Constitution of High Level Committee to monitor the implementation of the recommendations made by the Multi-Disciplinary Committee on sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari – Orders – Issued.

HEALTH, MEDICAL & FAMILY WELFARE (B2) DEPARTMENT

G.O.Rt.No.63 **Dated.09.02.2021**

Read the following: -

1.G.O.Rt.No.1946, GA(SC-I) Department, dt.10.12.2020.
2.Report of the Multi-Disciplinary Committee on the sudden convulsions of unknown origin in Eluru, West Godavari District, Andhra Pradesh, dated.01.02.2021.

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ORDER:

In the G.O. 1st read above, Government have constituted a Multi-Disciplinary Committee under the Chairmanship of Chief Secretary to Government along with other members of concerned Line Departments and also with subject experts for investigating the source of the infection, thoroughly examine various cause/s of the incident and suggest remedial measures to prevent any occurrence of such events in future in the State.

2. In the reference 2nd read above, the Multi- Disciplinary Committee has submitted a detailed report to Government and made recommendations which are broadly categorized as short term action strategies and long term preventive strategy.

3. Government after careful examination of the matter, hereby accept the report submitted by the Multi- Disciplinary Committee and accordingly, hereby constitute a High-Level Committee to monitor the implementation of the recommendations made by the said Multi-Disciplinary Committee on sudden convulsions of unknown origin in Eluru Municipal Corporation limits, West Godavari with the following members:

Sl	**Designation**	
1	Chief Secretary to the Government	**Chairperson**
2	Spl Chief Secretary to Government, Agriculture, and Cooperation Department	Member
3	Spl Chief Secretary to Government, Animal Husbandry, Dairy Development and Fisheries Department	Member
4	Principal Secretary to Government, Municipal Administration and Urban Development Department.	Member
5.	Principal Secretary to Govt., HM&FW Dept.,	Member
6.	Principal Secretary to Govt., PR&RD Dept.	Member
7.	Secretary to Government, Water Resources Department	Member
8.	Secretary to Government, Environment, Forest, Science and Technology Department	Member
9	Commissioner, Health and Family Welfare	**Member Convenor**

(P.T.O.)

4. The Committee constituted above, shall examine the action plans prepared by all the Line Departments for monitoring water, food, air, soil, Agriculture, Aquaculture residues etc. on regular basis. Further, the Committee shall monitor the implementation of the action planes prepared by the line Departments in this regard.

5. The High-Level Committee constituted above shall meet as frequently as necessary and atleast once a month.

6. The Commissioner of Health & Family Welfare, A.P., Vijayawada shall take further necessary action.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

ADITYA NATH DAS
CHIEF SECREATRY TO GOVERNMENT

To
All the members of the Committee.
The Commissioner of Health & Family Welfare, A.P., Vijayawada.
Copy to:
The P.S. to Chief Secretary to Government.
OSD to Dy.C.M.(H,FW&ME).
The P.S. to Principal Secretary to Government, HM&FW Department.
Sc/Sf.

//FORWARDED : : BY ORDER//

SECTION OFFICER



Report of the multi-disciplinary committee on the

Sudden Convulsions of Unknown Origin in Eluru, West Godavari, Andhra Pradesh

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1. INTRODUCTION
2. EMERGENCY RESPONSE AND PREPAREDNESS
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4. DEMOGRAPHIC ANALYSIS
5. SUMMARY OF BIOLOGICAL INVESTIGATION FINDINGS
6. SUMMARY OF WATER & AIR INVESTIGATION FINDINGS
7. RECOMMENDATIONS
8. CONCLUSION
9. SOURCE OF THE OUTBREAK
10. RECOMMENDATIONS
11. GALLERY
12. REPORTS

Members of the Committee as per the GO 1946 GA(SC.I) dept. 10.12.2020

Sl	Designation	Role	Signature
1	Chief Secretary to the government	Chairperson	
2	Spl Chief Secretary to Government, Agriculture, and Cooperation Department	Member	
3	Spl Chief Secretary to Government, Animal Husbandry, Dairy Development and Fisheries Department	Member	
4	Spl Chief Secretary to Government, Environment, Forest, Science and Technology Department	Member	
5	Spl Chief Secretary to Government, Water Resources Department	Member	
6	Secretary to Government, Municipal Administration and Urban Development Department.	Member	
7	Commissioner, Health & Family Welfare	Member	
8	District Magistrate, West Godavari, Eluru	Member	
9	Dr. Mukesh Tripathi, Director & CEO of AIIMS(Mangalagiri)	Member	
10	Dr.Ahmadullah Shariff, HOD Clinical ecotoxicology, AIIMS(Delhi)	Member	
11	Dr.Rakesh K Mishra, Director CCMB	Member	
12	Dr.Chandrasekar, Director IICT	Member	
13	Dr. J JBabu, Scientist NIN	Member	
14	Dr.Jamshed Nair, Associate Professor, Dept of Emergency Medicine, AIIMS (New Delhi)	Member	
15	Dr.Sanket Kulkarni, Deputy Director NCDC (Delhi)	Member	
16	Dr.Avinash, Scientist D, ICMR - NIV (Pune)	Member	
17	Dr.Asish K Satapathy, National Professional Officer, NPSP WHO, South Region, Bangalore	Member	
18	Dr. B Chandrasekhar Reddy, Neuro physician, Govt. of AP	Member	
19	Dr.Malathi, Neurophysician, Siddartha Medical College	Member	
20	Dr. Mohan, Medical Superintendent, DH Eluru	Member	
21	Principal Secretary to Govt., HM&FW Dept.,	Member-Convenor	

INTRODUCTION

On 5th December 2020 afternoon, number of cases were reported at District Hospital, Eluru with symptoms of convulsions and loss of consciousness who had no previous history of seizures or other neurological conditions, fever, headache, vomiting, diarrhoea, head injury or trauma. After 5pm large numbers of cases were reported with similar symptoms. The district medical and health department was alerted immediately after receiving the information from the district hospital.

Critical observations by the district medical and health experts by the end of first day

Convulsions of unknown etiology were reported with sudden onset affecting all age groups with no previous history of illness. The disease is mild in nature, non-communicable lasting for 15-30 minutes. Single episode of epileptic seizures were observed and only about 6-7 percent of cases were identified with recurrent episodes. It was identified that on 4th December few cases were reported at District Hospital with similar symptoms. Population effected were with-in Eluru Municipality. 1-2 members from the same family and few houses in the same locality were affected. Cases reported were not age-specific. Based on the distribution of reported cases within a short duration of time, the source of contamination was suspected to be common drinking water, milk of same packaging, cereals or pulses from a common distribution point, and vegetables of the same produce, i.e., distributed from the same market.

Patients generally did not remember anything since the onset of drowsiness. A few cases sustained injuries subsequent to falls and seizures like tongue bites, head and limb injuries. Clinical findings were consistent and had a similar pattern in majority of cases. In most of the subjects there was a sudden onset of drowsiness, followed by seizures of mostly generalized tonic - clonic type followed by fall and loss of consciousness for 3-30 minutes. Mental confusion was presented in most cases and very few cases had nausea and vomiting episodes during or after the seizures. Pupillary reactions were sluggish in a small proportion of patients. Characteristically recovery from the episode was quick and complete and no residual neurological symptoms were reported. No patient was comatose.

A sudden onset on 4th December with a steep raise and peaking was observed from 5th December to 7th December. Subsequent fall in number of cases was observed on 8th December and there was a gradual decline. From 13th December no further cases were reported. Therefore, it was indicative that the outbreak was a common source single exposure outbreak. In the absence of fever, the possibility of infectious origin was unlikely and toxicity of unknown origin was the primary suspected cause.

The Government involved various departments like Municipal Administration, Zilla Parishad, District Malaria Department, District Public Health Laboratory, and Animal Husbandry for Outbreak Emergency Response and Preparedness planning. All Outbreak Emergency Response and Preparedness activities were implemented with immediate effect on 05.12.2020 in the view of prevention and control for early identification and case management.

Day wise activities were planned and Active Surveillance system was established for ensuring quality and emergency care management. Paramedical teams were deployed to conduct house to house survey. Day wise super sanitation drive was planned. Ambulance services (108) were mapped to multiple areas covering Eluru constituency for shifting of patients in view of emergencies. Elaborate arrangements were made to ensure quality medical care in all village and ward secretariats, UPHCs and PHCs in Eluru, District Hospital-Eluru, ASRAM Hospital, Andhra Hospitals and Chaitra Hospital were all covered.

The Hon'ble Deputy Chief Minister and Hon'ble Minister of Health and Family Welfare A.P, Principal secretary Health, Commissioner of Health and Family Welfare A.P, District Collector and Magistrate; W.G Dist, Joint Collector VSWS & Development; W.G Dist, Director of Health and Family Welfare A.P and State Medical and Health team, State Surveillance Unit, District Medical and Health Officer and team, Medical Superintendent and District coordinator for Health Services and team, District Surveillance Unit, District Municipal and Mandal Administration and other district and state teams came into force for the prevention and control of the outbreak.

EMERGENCY RESPONSE AND PREPAREDNESS

In all 62 wards and 22 village secretariats in Eluru constituency, active surveillance was conducted.24/7 Paramedical teams were deployed to conduct house to house survey. Super sanitation activities like removal of old debris and stilt from drains, Fogging and Spraying, Chlorination tests, Leakage identification and correction, removal of old pipes passing through culverts, disconnection of hand bores which are connected to municipal supply head water works was done. Chlorination was done in all the affected and unaffected areas of the Municipal Corporation.

Specialists, duty doctors and other paramedical staff were deployed to strengthen the Medical and Health services at District Hospital Eluru and ASRAM hospital Eluru as below:

NAME OF THE HOSPITAL	NO. DOCTORS SPECIALITY WISE			GENERAL DUTY DOCTORS	MICROBIOLOGIST	NURSES	FNOs	MNOs
	GENERAL MEDICINE	PEDIATRICIAN	GYNAECOLOGIST					
GGH ELURU	6	6	0	27	1	62	62	62
ASRAM	3	3	0	6	1	18	12	12

Since, the etiology of the outbreak was not known; all major and renowned agencies in the country were reached out by the Government and were actively involved. The following agencies were involved:

LIST OF AGENCIES/LABORATORIES/INSTITUTIONS INVOLVED	
SL NO	NAME OF THE AGENCY
1	ALL INDIAN INSTITUTE OF MEDICAL SCIENCE, MANGALAGIRI
2	ALL INDIAN INSTITUTE OF MEDICAL SCIENCE, DELHI
3	INDIAN INSTITUTE OF CHEMICAL TECHNOLOGY, HYDERABAD
4	CENTER FOR CELLULAR & MOLECULAR BIOLOGY, HYDERABAD
5	NATIONAL INSTITUTE OF NUTRITION, HYDERABAD
6	NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE
7	A.P POLLUTION CONTROL BOARD
8	SIDDHARTHA MEDICAL COLLEGE, VIJAYAWADA
9	NATIONAL INSTITUTION FOR VIROLOGY, PUNE
10	FOOD TESTING LABORATORY, KAKINADA
11	NATIONAL VETERINARY LAB, BHOPAL
12	VENEREAL DISEASE RESEARCH LABORATORY, VIJAYAWADA
13	WHO- NATIONAL PUBLIC HEALTH SURVEILLANCE PROJECT

On 10.12.2020 as per the **G.O. RT. No. 1946**, the government constituted a **multi-disciplinary** committee with the following members to investigate the source of the infection, to rule-out various causes of the incident and to suggest remedial measures to prevent any occurrence of such events in future in the state.

1	Chief Secretary to the government	Chairperson
2	Spl Chief Secretary to Government, Agriculture, and Cooperation Department	Member
3	Spl Chief Secretary to Government, Animal Husbandry Dairy Development and Fisheries Department	Member
4	Spl Chief Secretary to Government, Environment, Forest, Science and Technology Department	Member
5	Spl Chief Secretary to Government, Water Resources Department	Member
6	Secretary to Government, Municipal Administration and Urban Development Department.	Member
7	Commissioner, Health & Family Welfare	Member
8	District Magistrate, West Godavari, Eluru	Member
9	Dr.Mukesh Tripathi, Director & CEO of AIIMS (Mangalagiri)	Member
10	Dr.Ahmadullah Shariff, HOD Clinical ecotoxicology, AIIMS(Delhi)	Member
11	Dr.Rakesh K Mishra, Director CCMB	Member
12	Dr.Chandrasekar, Director IICT	Member
13	Dr. J JBabu, Scientist NIN	Member
14	Dr.Jamshed Nair, Associate Professor, Dept of Emergency Medicine, AIIMS (New Delhi)	Member
15	Dr.SanketKulkarni, Deputy Director NCDC (Delhi)	Member
16	Dr.Avinash, Scientist D, ICMR - NIV (Pune)	Member
17	Dr.Asish K Satapathy, National Professional Officer, NPSP WHO, South Region, Bangalore	Member
18	Dr. B Chandrasekhar Reddy, Neurophysician, Govt. of AP	Member
19	Dr.Malathi, Neurophysician, Siddartha Medical College	Member
20	Dr. Mohan, Medical Superintendent, DH Eluru	Member
21	Principal Secretary to Govt., HM&FW Dept.,	Member-Convenor

The Committee had deliberated and exchanged information and the report is herewith submitted to Government

DAY-WISE ACTIVITIES

Day- 1: 05.12.2020

A 6 year old male child reported with seizures and gasping, was referred to GGH, Vijayawada for better intensive care. No further unstable or critical illness was reported on Day-1.Surveillance report said there are similar cases that were reported since 01.12.2020 in local private hospitals of Eluru and on 4th December few cases were reported at District Hospital. Triaging was done and patients were stabilized and shifted to the wards and were kept under observation. Vitals were recorded at the time of admission.

The following treatment protocol was given to the patients reported with convulsions

ADULT	CHILDREN
1) Nil per oral	1) Nil per oral
2) IV Fluids 1 RL I DNS	2) Inj. Eptoin 5mg / kg body weight
3) Inj. Eptoin 500mg start and bid	3) IV Fluids 1 RL (30 drops per minute)
4) Inj. Decadran iv bid	4) Inj.Pantop 1 cc once daily
5) Inj. Pantop 40 mg once daily	5) Inj.Paracetamol 1cc bid
6) Inj. Paracetamol 2cc IM 8 hourly	6) Inj. Decadran 1cc (sos)
7) Inj. Zofer 8mg bid	
8) Tab. Seratiopeptidase bid	

All the cases reported were within the Eluru municipality and majority of the cases were reported from Southern Street, Gollaigudem and Kothapeta. Sanitation activities were conducted rigorously in Eluru Municipality.52 blood and urine samples were collected and 45 CT scans were done. All reports were observed to be normal. District Medical and Health Officer in coordination with the District and State Surveillance Unit developed Outbreak Emergency Response and Preparedness plan and implemented with immediate effect.15 ambulance services (108) were arranged in Eluru municipal jurisdiction at various places for shifting of patients in view of emergencies.

Siddhartha Medical College- Virology lab, Vijayawada.

20 random blood and Cerebrospinal Fluid, 4 blood and 1 Cerebrospinal fluid samples were collected from patients and sent to Virology lab at Siddhartha medical college for Complete Blood Picture, HSV-2 IgM, CMV IgM, Chikungunya IgM, Dengue IgM, Japanese B Encephalitis, and Hepatitis B IgM, bacterial and fungal investigation. It was found that there are 4 Dengue positives, 2 Hepatitis E positives and 1 among the Dengue positives reported positive for Japanese Encephalitis. Culture reports were found negative for known Viruses and Bacteria

Day- 2: 06.12.2020

Siddhartha Medical College, Vijayawada

Expert team from Siddhartha Medical College, Dr. Siva Durga Prasad Nayak- Assistant Professor, Department of Social and Preventive Medicine, Dr. Murali Krishna- Assistant Professor, Department of Paediatrics and Dr.Krishnaveni- Assistant Professor, Department of Microbiology visited District hospital and observed the cases reported. They visited the water treatment plant at Pampulacheruvu, checked the records.

The expert team reported the following observations: More number of cases belongs to Dakshinapuveedi, Fish market area, Padamaraveedi, Sunkarivarithota, Thangellamudi and Vangaigudem. The team haven't concluded about any suspected cause/source for the outbreak.

All India Institute of Medical Sciences, Mangalagiri

Expert Team from All India Institute of Medical Sciences Mangalagiri, Dr. Rajesh Kakkar, Medical Superintendent, Professor & HOD, Department of Community & Family Medicine-Chairman, Dr.Mangayarkarasi, Additional Professor & Head, Department of Microbiology, Dr.Sathiyanarayanan.S, Assistant Professor, Department of Community & Family Medicine, Dr.Vamsidhar Chamala, Assistant Professor, Department of Anaesthesiology & Critical Care, Dr. K. Vamsi Krishna Reddy, Assistant Professor, Department of Hospital Administration & Administrative Officer (I/c) and Dr. M. Rajasekhar, Senior Resident, Department of Anaesthesiology& Critical Care visited the District Hospital, Eluru, West Godavari.

The expert team reported the following observations: patients reported with a single episode of seizure lasting for about 2-8 minutes with or without vomiting. About 10% of patients developed a second episode of seizures. Out of 20 patients interviewed by the team, around half of them reported change in colour/taste of drinking water in the recent past. Some of them reported that there was greenish/muddy discoloration of the household water supply.

Measure taken for control of the outbreak

62 medical camps were conducted in all 62 ward secretariats in Eluru municipality. Active surveillance was conducted and it was identified that, on 4th December few cases were reported at District Hospital with similar symptoms. 24/7 medical camps were established with Medical and Paramedical staff. Super Sanitation drive was continued in both affected and unaffected areas in Eluru constituency. 6 General Physicians and 6 Paediatricians, 15 Interns, 10 FNO and 10 MNO were deployed from ASRAM hospital to District Hospital to render health services round the clock. Three scan/diagnostic centres were arranged for CT scan and other essential investigations. (Andhra Diagnostics, Jayanthi Diagnostics, Vamsi scan centre). Further water, milk and serum samples were sent for heavy metal analysis to Centre for Cellular and Molecular Biology and Indian Institute of Chemical Technology, Hyderabad for analysis. A Letter addressed to the National Institute of Nutrition to investigate source of outbreak.

Door to Door Surveillance Report					
Secretariats covered	Total House Holds	Total Population	Survey Completed		Total cases referred
			House Holds	Population	
62	57863	156714	57863	156714	492

AP Pollution Control Board

Ambient air and water samples were tested by the AP Pollution Control Board. It was found that the quality of air was within the desirable limits and no heavy metal was found in water.

Centre for Cellular and Molecular Biology, Hyderabad

20 blood, 16 urine, 8 stool, 13 Vomitus, 40 water samples were collected and sent for heavy metal detection to Centre for Cellular and Molecular Biology, Hyderabad. It was found that **no organism which can cause the reported phenotype was identified.**

Centre for Cellular and Molecular Biology, Hyderabad

20 blood, 16 urine, 8 stool and 13 vomitus samples were collected and sent for detection of any possible infectious etiology to the Centre for Cellular and Molecular Biology, Hyderabad. It was found that **no organism which can cause the reported phenotype was identified.**

Day- 3: 07.12.2020

Measures taken by the government

Twenty five ambulance services were mapped to 84 secretariats in view of emergency in Eluru constituency. In 22 village and 62 ward secretariats of Eluru, a team of 1 Medical Officer, 1 Staff Nurse, 1 ASHA worker were deputed. Total 84 teams were deployed 24/7 in Eluru constituency for early identification and management of any symptomatic cases. For every 15 Medical officers, 1 Nodal officer was deployed for monitoring and surveillance purpose.27 Medical Officers were deputed to District Hospital, Eluru in view of case load management and quality healthcare services. All triaging management arrangements were made to ensure quality care. Mid Level Practitioners were trained on case investigation forms.

Super sanitation activities like removal of old debris and stilt from drains, Fogging and Spraying, Chlorination tests, Leakage identification and correction, removal of old pipes which are passing through culverts, disconnection of hand bores which are connected to municipal supply head water works, Chlorination were continued in all the affected and unaffected area.

Expert team from Siddhartha Medical College, Vijayawada.

Expert team from Siddhartha Medical College with a Pediatrician, Neuro-Physician, Professor of Social and Preventive Medicine, Psychiatrist and Microbiologist visited the District Hospital Eluru andinteracted with patients. The teamhad taken complete case history of the patients and stated that most of the patients presented with nausea, vomiting, giddiness and alter sensorium. Patients admitted and recovered with conservative management. Vitals were stable and no abnormality detected in all the systemic examinations.

Expert team from National Institute of Nutrition, Hyderabad.

Expert team from National Institute of Nutrition with Public Health Specialists, Epidemiologist, Bio-Chemist and Toxicologist conducted examinations and investigations with the inpatients at District Hospital, Eluru. They collected random blood and urine samples from 67 patients.

All India Institute of Medical Sciences, Mangalagiri

Four cerebrospinal fluid, one hundred and eight RTPCR, six urine, ten blood samples were sent to **AIIMS, Mangalgiri** for analysis. It was found that N-gene positive for 2 patients-suspected for SARS-CoV-2 and other 106 samples were negative. Remaining results were normal.

Indian Institute of Chemical Technology, Hyderabad

Twenty two sera and twenty one water samples were collected and sent to the Indian Institute of Chemical Technology, Hyderabad for biochemical analysis. It was found that **no Organo-chlorine, Organophosphorous**, Carbamate, Synthetic Pyrethroids, Pesticide residues and heavy metals were found in water. **Water was clean and potable** without organic or elemental contamination.

WHO- National Public Health Surveillance Project (NPSP)

Team of two surveillance Medical Officers from WHO NPSP reached Eluru District hospital, participated in the review meeting chaired by Hon'ble Health Minister and joined by all stake holders. Later the team interviewed few patients admitted to war to understand the clinical presentation, exposure history, previous illness etc. Data collection tools were designed to conduct active case search in the community to find out additional cases and share with Director Health Services. Team also supported IDSP team to formalize an outbreak response plan and streamline field investigations.

VIMTA lab, Hyderabad

Twenty one water samples were sent to VIMTA lab and the test results were observed to be within desirable limits.

Day 4: 08.12.2020

Measures taken by the government

Case investigation forms were filled by the deployed duty medical officer/MLPs in the wards from all the IN patients. Door- Door survey and follow-up of discharged patients was done by the teams deployed in 84 secretariats. Super sanitation activities like removal old debris and stilt from drains, Fogging and Spraying, Chlorination tests, Leakage identification and correction, removal of old pipes which are passing from culverts, disconnection of hand bores which are connected to municipal supply head water works, Chlorination were continued in all the affected and unaffected areas.

Expert team from National Institute Of Nutrition

On Day-2 of the NIN expert team visit, house to house survey was done in the top five affected areas and collected thirty seven random water, blood and urine samples. Groceries like rice, dal and oil that were available at home were collected. Forty two milk samples, forty four vegetable samples and water samples from both affected and non affected areas were also collected. All varieties of vegetables half a kilogram each from Pathebada Raitu Bazaar and Main bazaar 1 town area Eluru were collected. From Tangellamudi Gram Panchayat random blood, urine, water and all other samples were collected from five unaffected families. They visited Pampula Cheruvu and the water sample from the water treatment plant and Municipal Tap water from JP colony were collected. The team collected forty two random blood and urine samples from the IN patients at District Hospital. All samples were tested at NIN Hyderabad. It was found that, **Organophosphorous pesticide was detected in blood of 70 percent of the subjects. High mercury was detected in rice samples. High herbicides detected in tomatoes.**

Joint Central Expert Team

A joint team from National Institute of Virology –PUNE, National Centre for Disease Control (NCDC), AIIMS New Delhi and Central IDSP team visited and had a detailed review meeting with the District Medical and Health and State expert teams and learnt about the outbreak. They observed and interacted with patients, studied their case sheets and collected random blood and urine samples among the IN patients. Blood and Urine samples are sent for evaluation to AIIMS, Delhi.

All India Institute of Medical Sciences, Delhi

Seventy one blood, fifty six urine, fifty one water and forty milk samples were sent to AIIMS, New Delhi for further investigations. Seventeen sera samples from the affected persons and fourteen sera samples from the unaffected family members of the affected persons and one raw water sample from Gun bazaar was sent for further analysis.

WHO- National Public Health Surveillance Project (NPSP)

As part of the epidemiological investigation, a structured questionnaire (CIF forms) was developed to interview all cases. Medical officers were trained for systematic data collection through CIF filling and IDSP staff was trained to collect and analyse the data related to the outbreak. They also went to the field along with state officers and monitored active case search conducted in the field of Eluru town. After arrival of the NCDC team they were briefed on the progress in the field investigation and handed over all the tools and explained the progress in data collection, NPSP team participated in all future review meetings and provided inputs based on the analyzed data collection initially. Team also kept supporting IDSP.

Day 5: 09.12.2020

NCDC team visited Animal Husbandry office to understand if animals were also affected. After a detailed review the team collected animal samples. They continued house – house survey and interacted with affected and unaffected families. AIIMS, Mangalagiri team visited water treatment plant at Pampula Cheruvu. SRM expert team conducted house-house survey and collected water samples from the affected areas. District Medical and Health officer and District Surveillance Officer assisted the expert teams during the field visits. NIV team did house-house survey and visited discharged patients to monitor their current health condition.

Super sanitation activities like removal old debris and stilt from drains, Fogging and Spraying, Chlorination tests, Leakage identification and correction, removal of old pipes which are passing from culverts, disconnection of hand bores which are connected to municipal supply head water works, Chlorination were continued in all the affected and unaffected area.

National Veterinary Lab, Bhopal

Thirty three animal blood samples were sent to **National Veterinary Lab, Bhopal** to investigate if animals were affected by this outbreak. It was found that all the observations were normal.

All India Institute of Medical Sciences, Delhi

Repeat samples of ten blood, urine and water samples were collected from same subjects and sent for analysis. It was found that all parameters in blood urine and water are within normal ranges.

Day 6: 10.12.2020

NCDC team continued house-house survey and conducted case investigations for the discharged patients and analysed their current health status. District Medical and Health officer and District Surveillance Officer assisted the expert teams during the field visits. Medical camps and active surveillance activities were continued in all 84 secretariats in Eluru constituency for early case identification and management. Director of Public Health and Family Welfare and the State Surveillance Unit were involved in door-door survey and enquired about health status of discharged patients and did case investigations.

National Institute of Virology, Pune

Forty blood, five Cerebrospinal Fluid, thirty urine, seventeen stool, thirty Nasal swabs were collected and sent to National Institute of Virology, Pune for analysis. It was found that four Dengue, four Chikungunya, one Dengue and Chikungunya and one Influenza- A were detected and all other samples were normal.

National Environmental Engineering Research Institute (CSIR-NEERI), Hyderabad

Three ambient air, ten surface water, seven ground water, four soil samples were collected and sent to National Environmental Engineering Research Institute (CSIR-NEERI) for analysis. All parameters were found to be in permissible levels.

Venereal Biological Research Laboratory, Vijayawada

Five milk, five grass samples were collected and sent to VBRL Vijayawada. **It was found that all parameters are within the desirable limits.**

Food Testing Laboratory, Kakinada

Four fish samples were collected and sent for fish testing laboratory, Kakinada. **It was found that all parameters are within normal range.**

Day 7: 11.12.2020

NCDC team continued door-door survey and also evaluated IN patients medical records in view of the outbreak. Director of Public Health and Family Welfare and the state Public Health and Family Welfare department visited the pump house, verified the records of water treatment plant and inspected the medical camps to ensure quality of health care activities by the District Medical and Health department. District Medical and Health officer and District Surveillance Officer did thorough inspections and monitored the Surveillance activities. Super sanitation activities were continued rigorously and monitored by the District authorities on hourly basis.

Day 8: 12.12.2020

Epidemic Intelligence Service Officers Dr.Purvi Patel and Dr. Sahil from NCDC, Hyderabad were deployed to Eluru, West Godavari for outbreak epidemiological investigation. The EIS officers took detailed case history of random IN patients they studied case sheets, lab and scan reports and learnt the clinical status of the subjects. Detailed case investigations were done to the discharged patients with the support of field medical and paramedical staff. They also analysed and monitored health status of discharged patients. District Surveillance Officer and NCDC team visited top 10 affected areas in Eluru municipality and conducted house-house survey, inspected all the water treatment records, recent past municipal activity records and had a detailed review with Municipal Health Officer and District Malaria Officer. Data collection and data entry of vitals and lab reports was done.

Day 9: 13.12.2020

No further cases were reported since 13th December. The expert NCDC team re- visited pump house in coordination with District Surveillance Unit. They observed and monitored water treatment procedure to identify any cause or source of the outbreak. Ward wise water distribution was mapped to secretariats in coordination with Municipal Engineer. Spot maps prepared by the field staff of all 62 secretariats for the cases reported due to convulsions of unknown etiology for epidemiological analysis. Data entry was continued for the case investigation forms in Epicollect analysis mobile application.

DEMOGRAPHIC DISTRIBUTION

Eluru is a city and the district headquarters of West Godavari district in the state of Andhra Pradesh. It is one of the 10 municipal corporations in the state. The city is on the banks of Tammileru River. The city is well known for its wool-pile carpets and hand woven products. As of 2011 Census of India, the city had a population of 217,876. A brief about the town is as follows:

AREA	11.52 Sq. Kms
2011 CENSUS POPULATION	217876
NO. OF HOUSE HOLDS	55014
NO. OF ELECTION WARDS	50
NO. SLUMS	59
SLUM POPULATION	78634(36.1%)
NO. OF GOVERNAMNET HOSPITALS	1
VEGETABLE MARKETS	2
PROTECTED WATER SUPPLY RESERVOIRS	26Nos
NO. OF HOUSE SERVICE CONNECTIONS	23.694
STORM WATER DRAINS	6.80 Kms
LENGTH OF C.C DRAINS	221.64 Kms
KUTCH A DRAINS	185 Kms
GARBAGE GENERATION/ DAY	82 Mt. Tonnes

94 percent of the cases reported due to convulsions of unknown etiology are from the Eluru municipality region and remaining 6 percent reported from Eluru rural region, where the source of drinking water supply is not the same as Eluru urban region. However, these 6% cases also had a highly of recent visit to Eluru.

Out of 62 ward secretariats in Eluru Municipal Corporation, majority of the cases are reported from wards 12, 9, 21, 40 and 1 which are Southern Street, Philhouse peta-1, Gollaygudem 1, Sivagopalapuram and MRC colony 1.Of all the 621 cases reported, 1 death case reported from Ward 24- Vidhyanagar.

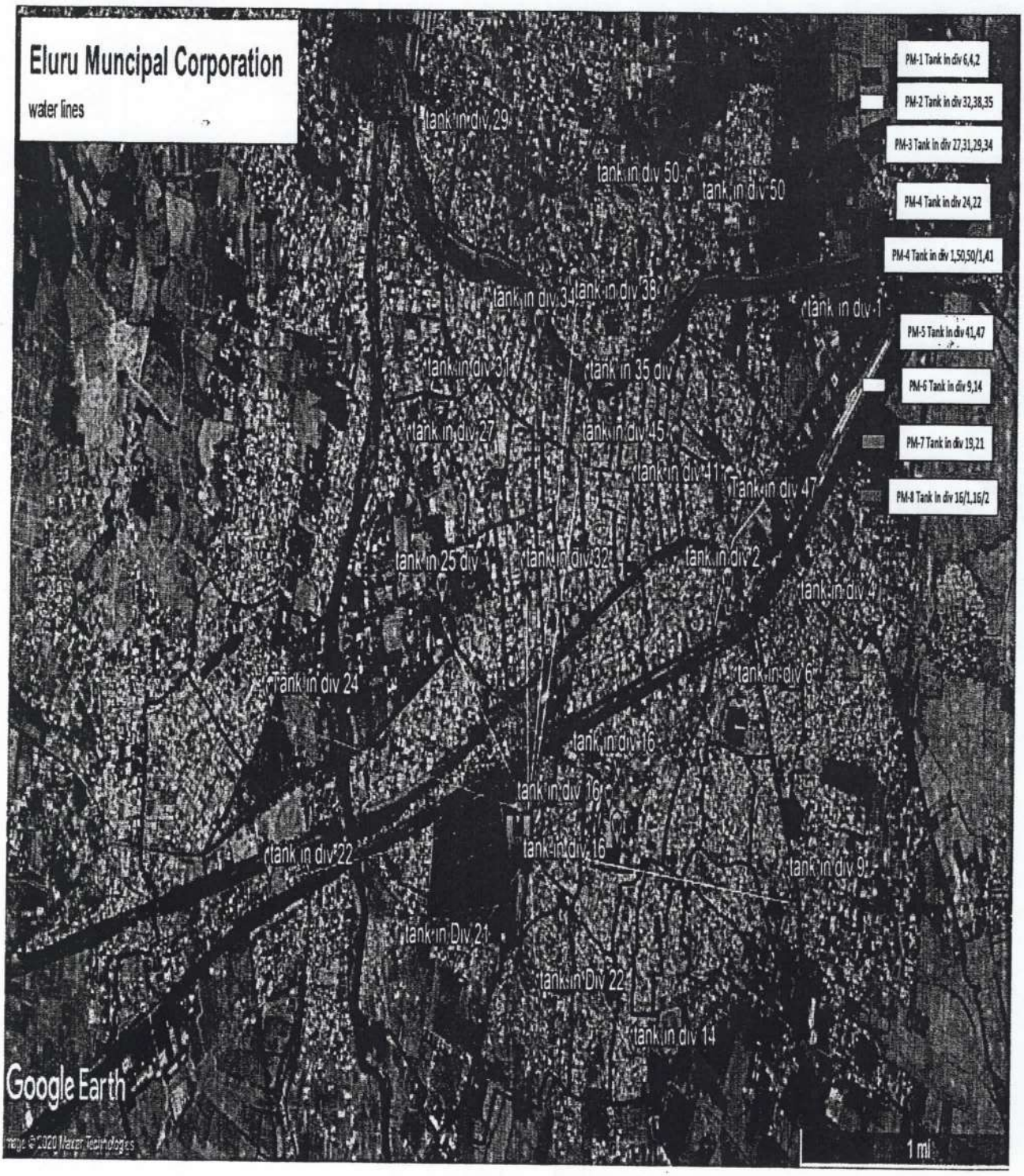
SL NO	WARD NUMBER	NAME OF THE SECRETARIAT	CASES REPORTED
1	12	SOUTHERN STREET	65
2	9	PHILHOUSE PETA 1	45
3	21	GOLLAY GUDEM – 1	28
4	40	SIVAGOPALAPURAM	23

5	1	MRC COLONY- 1	22
6	11	JP COLONY	21
7	45	CHODIDIBBA	20
8	14	ASHOKA CHEKRAM ROAD	19
9	15	WESTERN STREET	19
10	47	KOTHAPETA	17
11	41	PAMULADIBBA	16
12	2	IKP BHAVAN 3	15
13	18	AAS COLONY	15
14	6	THOTAKURA DODDLU-3	14
15	10	VENKANNA CHERUVU	14
GRAND TOTAL			**353**

No of Cases ward wise :

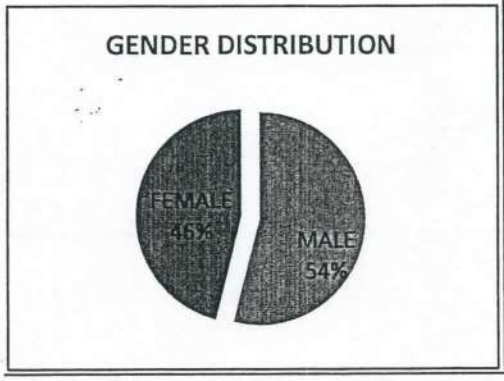


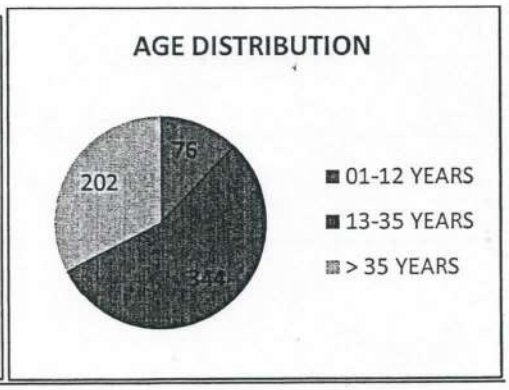
Water Distribution from PumpulaCheruvu:

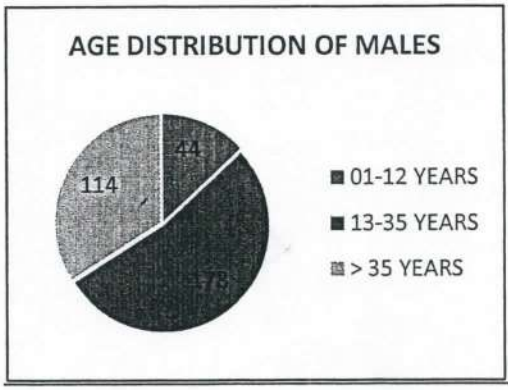


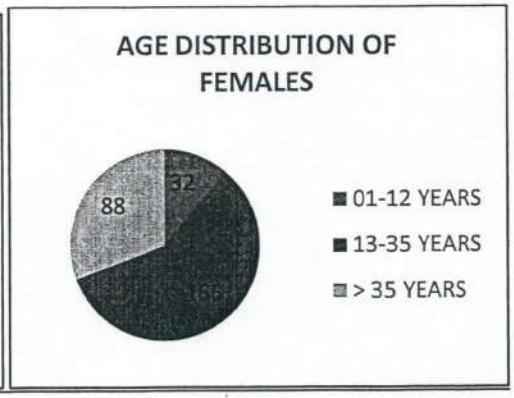
Out of 621 cases reported due to convulsions of unknown etiology, 336 were males and 285 were females. Males and females of 12 to 35 years were more affected than other age groups and males of 12 to 35 years are more affected than females of the same age group. Over all males were more affected than females.

AGE – GENDER WISE ANALYSIS			
AGE GROUP	MALES	FEMALES	TOTAL
01-12 YEARS	44	32	76
13-35 YEARS	178	166	344
> 35 YEARS	114	88	202
TOTAL	**336**	**286**	**622**

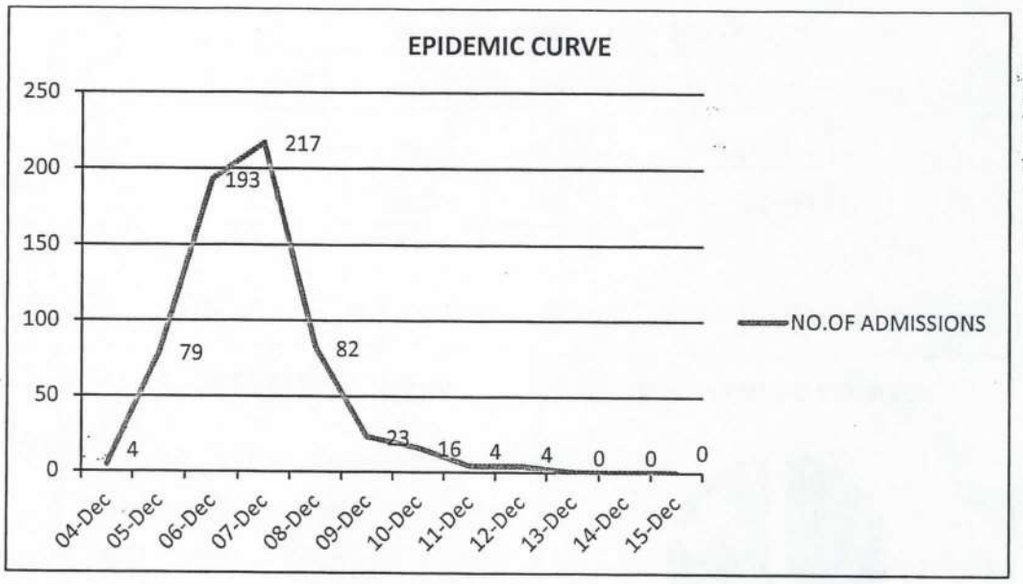








The epidemic curve shows a sudden onset on 4th December and steep raise and peaking was observed from 5th December to 7th December. Subsequent fall in number of cases is observed on 8th December. From 13th December no further cases were reported. It was indicative that the outbreak was a common source single exposure outbreak. In the absence of fever, the possibility of infectious origin was unlikely and toxicity of unknown origin was the primary suspected cause.



SUMMARY OF BIOLOGICAL INVESTIGATION FINDINGS

Siddhartha Medical College- Virology lab, Vijayawada.

20 random blood and Cerebrospinal Fluid, 4 blood and 1 Cerebrospinal fluid samples were collected and sent to Virology lab at Siddhartha medical college for Complete Blood Picture, HSV-2 IgM, CMV IgM, Chikungunya IgM, Dengue IgM, Japanese Encephalitis, Hepatitis B IgM, bacterial and fungal investigation. It was found that 4 Dengue positives, 2 Hepatitis E positives and 1 among the Dengue positives reported positive for Japanese Encephalitis. Culture reports were found negative for known Viruses and Bacteria.

Centre for Cellular and Molecular Biology, Hyderabad

Metagenomic analysis of 36 blood, 16 urine, 13 vomitus and 8 stool samples were conducted. DNA was extracted from all the samples and a total of 13 blood, stool and vomitus were selected for further processing. Next generation Sequencing (NGS) based on metagenome sequencing of the samples was conducted and it was found that **no organism which can cause the reported phenotype was identified.**

AIIMS, Mangalagiri

Microbiological, Pathological and Biochemical investigations were conducted. Direct microscopy of 4 CSF were tested with gram stain(No pus cells and bacteria were detected), acid fast stain (No acid fast organisms found), India ink stain (Negative) and Wet mount stain (No cells and bacteria found)and 6 urine samples were analysed with gram stain (No pus cells and bacteria were detected), acid fast stain (No acid fast organisms found) and wet mount stain (No cells and bacteria found). Oropharyngeal swabs were tested for SARS- CoV-2, it has N-gene positive for 2 patients were suspected for SARS-CoV-2 and all other samples (106) were negative. In biochemical investigations 4 CSF samples were investigated for glucose, proteins, chlorides and globulins, it was found that glucose and proteins were elevated and globulins were negative.

National Institute of Nutrition, Hyderabad.

The team examined cases (103); Active cases (77), Recovered cases (26) and Controls (9) and collected Biological samples (109), water samples (36) and other food samples were collected. The blood and urine samples were tested for 37 pesticides, out of which, **Triazophos (Organophosphorous)** was present in 74% of blood (67 out of 90 samples from affected area) and 8 out of 9 urine samples tested were positive for **Triazophos**, 1 out of 11 blood samples was positive for Triazophos in control area. Vegetables like Tomatoes and Brinjals were tested for 37 pesticides including herbicides, out of which **Metribuzin(herbicide)** was present in all samples of Tomato's and Brinjal's. In heavy metals analysis, 10 heavy metals were tested, out of which lead was present above the permissible limits in 2 blood samples and nickel was present above the permissible limits.

National Veterinary Lab, Bhopal

33 animal samples were sent to National Veterinary Lab, Bhopal for virological etiology. All samples were found to be negative for Rift Valley Fever, Psuedorabies, Porcine Teschovirus, Nipah virus, Japanese Encephalitis virus.

National institute of Virology, Pune

40 blood, 5 Cerebrospinal Fluid, 30 urine, 17stool, 30 nasal swabs were tested for JEV IgM, Dengue IgM, Chikungunya IgM, Scrub Typhus IgM, Dengue & Chikungunya RT-PCR and Influenza- A. Among which 4 Dengue, 4 Chikungunya, 1 Dengue & Chikungunya and 1 Influenza- A were detected.

Venereal Biological Research Laboratory, Vijayawada

5 milk,5 grass samples were analysed **for** toxicological parameters .No Lead, heavy metals and Phosphine were detected.

Food Testing Laboratory, Kakinada

Four fish samples were sent for different parameters like boron, Magnesium, Aluminium, Maganese, Iron, Nickle, Zinc, Arsenic, Selenium, Cadmium, Tin, Barium, Mercury and Lead. The samples of fresh fish were safe for human consumption.

SUMMARY OFWATER & AIR INVESTIGATION FINDINGS

AP Pollution Control Board

Ambient air and water samples were tested by the AP Pollution Control Board. Air samples were tested for particulate matter, arsenic, nickel, lead, ammonia, nitrogen dioxide and sulphur dioxde and water samples were tested for 17 compounds (Organochloro pesticides). It was found that the quality of air was within the desirable limits and no heavy metal was found in water.

Indian Institute of Chemical Technology, Hyderabad

21 water samples were collected from different locations of Eluru city were sent for biochemical analysis. The Samples were analyzed for Organochlorine, Organophosphorous, Carbamate, Synthetic Pyrethroid pesticide residues, heavy metals and water quality parameters. In **pesticide residue analysis**, the samples were tested by two different extraction procedures and analyzed by two different analytical techniques. The results showed the absence of the tested pesticide residues. In **Heavy metals** analysis, the samples were tested for the presence 29 heavy metals including Lead, Arsenic, and Nickel. The results showed contamination of the heavy metals was negligible. In **Volatile organic chemicals analysis,** the samples were tested using headspace GC-MS method. The results showed the absence of harmful volatile organic chemicals. In **Water Quality testing,** the water quality parameters such as pH, turbidity, and conductivity, total dissolved solids and arsenic content were tested. The parameters were within the acceptable limits. In **Microbial testing of water,** the water samples did not show any significant contamination of E-coli and other bacterial or fungal growth. The water samples are clean and potable without organic or elemental contamination.

National Institute of Nutrition, Hyderabad.

Water samples (26) were collected from households (20), reservoir (1), head pump (2) and stored samples (3).Head pump was free from pesticides. JP colony reservoir had traces of pesticide (Triazophos) and all water samples from cases had pesticides (triazophos). No mycotoxins were observed.

National Environmental Engineering Research Institute (CSIR-NEERI)

24 hour basis 3 ambient air, 10 surface water, 7 ground water, 4 soil samples were analysed. In ambient air analysis, concentrations of particulate matter are found to be high and exceeding the NAAQS largely in the study area due to due to vehicular traffic, re-suspended road dust, burning of solid waste, windblown dust, agricultural and construction activities. Heavy metals in the particulate matter were found to be higher in terms of Arsenic, Nickel, Boron, Copper and Zinc. Arsenic concentrations in the particulate matter were exceeding NAAQS at all locations except at Pattebada and nickel concentrations were found to be exceeding NAAQS at Dakshinapu Veedhi. Slightly higher levels of heavy metals like Arsenic, Nickel may be due to the vehicle transportation, waste incineration or burning, oil and coal combustion, and construction activities. In Water analysis Organochlorine, Synthetic Pyrethoids, Organophosphates and Herbicide were tested and were not found in ground water. **Mercury was high and ranged from 1.1 to 26 (permissible: 1 ppb) in**

ground water. High value of mercury of 26 ppb was found at RR peta. Mercury was high and ranged from 1.0 to 17.2 ppb in surface water.

ANMOOR LAB, VIJAYAWADA

9 milk and 21 water samples from the affected areas were tested for heavy metals. No heavy metals were detected.

VIMTA lab, Hyderabad

21 water samples were analysed for Aluminium, Boron, Calcium, Copper, Fluoride, Iron, Magnesium, Nitrate, Sulphate, Chromium, Bromide, Barium, Manganese, Selenium, Silver, Zinc, Cadmium, Lead and Mercury. Bromide was found to be out of WHO specifications remaining parameters were normal.

SUMMARY OF WATER & AIR INVESTIGATION FINDINGS			
S. No	**Name of the Institute**	**Type & No. of samples**	**Remarks**
1	AP Pollution Control Board	Air Ambient quality, water-12	No Organochlorine pesticide compounds and heavy metal were found in water.
2	Indian Institute of Chemical Technology	Water-21	No Organochlorine, Organophosphorus, carbamate, synthetic pyrethroid pesticide residues and heavy metals were found in water. Water is clean and potable without organic or elemental contamination
3	National Institute for Nutrition	Water-36	All water samples from cases had pesticides (triazophos). No mycotoxins were observed.
4	VIMTA lab	Water-21	Bromide was found to be out of WHO specifications Remaining parameters were normal.
5	NEERI	Ambient Air-24hrs basis -3,Surface water-10 , Ground water-7, Soil-4	**Mercury was high and detected in both ground and surface water**
6	ANMOOR	Water-21	No heavy metals were detected.

OTHER FINDINGS

Pathological investigations

Blood, Urine, Stool, Vomitus, CSF, Nasal Swab, **Water,** Milk, Air, Vegetables, Groceries, Soil, Grass, Oil, Fish, Meat, Ambient Air and Animal samples by various institutions are analysed

for Bacterial/Viral/Fungal pathogens. No suggestive findings were observed in the reports to confirm the etiology of the outbreak.

Neurological investigations

Blood, Urine, Stool, Vomitus, CSF, **Water**, Milk, Air, Vegetables, Groceries, Soil, Grass, Oil, Fish, Meat, Ambient Air And Animal samples by various institutions are analysed for the presence of any neuro-toxic chemicals, heavy metals, pesticides, elevated trace elements, Polychloro biphenyls, volatile organic chemicals, polyclinic aromatic hydrocarbons, synthetic Pyrithroids. Organo-phosphorous pesticide in blood samples and high levels of mercury in rice samples are detected. It was thought to be an accidental finding rather than suggestive finding. So far no suggestive findings were observed in the reports to confirm the aetiology of the outbreak.

Chronology of the Outbreak

DAYWISE/HOUR WISE REPORT				
SL NO	DATE	TIME (HRS)	NO. OF CASES REPORTED	CUMULATIVE
1	04.12.2020	23:59	4	4
2	05.12.2020	12:00	5	9
3	05.12.2020	23:59	74	83
4	06.12.2020	12:00	127	210
5	06.12.2020	23:59	66	276
6	07.12.2020	12:00	64	340
7	07.12.2020	23:59	153	493
8	08.12.2020	12:00	38	531
9	08.12.2020	23:59	44	575
10	09.12.2020	12:00	0	575
11	09.12.2020	23:59	23	598
12	10.12.2020	12:00	0	598
13	10.12.2020	23:59	16	614
14	11.12.2020	12:00	1	615
15	11.12.2020	23:59	3	618
16	12.12.2020	12:00	2	620
17	12.12.2020	23:59	2	622
18	13.12.2020		0	622
19	14.12.2020		0	622
20	15.12.2020		0	622
21	16.12.2020		0	622
TOTAL			622	

SUMMARY OF TESTS CONDUCTED BY DIFFERENT AGENCIES AND RESULTS

BIOLOGICAL INVESTIGATION FINDINGS				
S. No	Name of the Institute	Type & No. of samples	Test Result	Remarks
1	Health Department, Govt of AP	Blood-41 Urine-41, CT Scan-40 ECG 200	Normal	-
2	AIIMS New Delhi	Blood-88, Urine-56, and Milk-40		**Presence of lead and nickel found in blood.**
3	AIIMS Mangalgiri	RT-PCR-108, CSF-4,URINE-6	Normal	Negative for Bacteria and fungus. Negative for COVID-19.
4	Virology Lab, SMC Vijayawada	CSF-21 Blood-24	Cell count: Normal. Smear Test: Normal	Culture report found negative for known Viruses and Bacteria.
5	Centre for Cellular and Molecular Biology	Urine-16,Stool-8, Vomitis-13 and Blood-35		No organism which can cause the reported phenotype was detected.
6	National Institute for Nutrition	Blood-42, Urine-42, Milk-42 and Vegetables-44		Organo phosphorous pesticide was detected in 70% of blood samples, Mercury high in Rice Samples.
7	National Institute for Virology	40-blood,5-CSF,30-Urine,17-stool,30-Nasal swabs	Normal	4 Dengue, 4 Chikungunya, 1 Dengue & Chikungunya and 1 Influenza- A were detected. No suggestive findings detected.
8	National Veterinary Lab, Bhopal	Animal Samples -33	Normal	All samples were found to be negative for Rift Valley Fever, Psuedorabies, Porcine Teschovirus, Nipah virus, Japanese Encephalitis virus.
9	Food Testing Laboratory,Kakinada	Fish-4	Normal	Fresh fish were safe for human consumption.
10	VBRL Vijayawada	Milk-5,Grass-5	Normal	No Lead, heavy metals and Phosphine were detected.

DATE OF SAMPLE COLLECTION	SAMPLES											TOTAL SAMPLES	LAB SENT	RESULTS
	BLOOD	CSF	URINE	STOOL	VOMITUS	MILK	NASAL SWABS	VEGIES & GROCERIES	GRASS	FISH	ANIMAL SAMPLES			
05.12.20	11	11	0	0	0	0	0	0	0	0	0	22	SMC Vijayawada	No budding yeast cells seen and no fungal elements seen
06.12.20	13	10	0	0	0	0	0	0	0	0	0	23	SMC Vijayawada	No budding yeast cells seen and no fungal elements seen.
06.12.20	15	0	0	0	0	0	0	0	0	0	0	15	CCMB, Hyderabad	No organism which can cause the reported phenotype could be identified
07.12.20	0	4	6	0	0	0	108	0	0	0	0	118	AIIMS, Mangalagiri	High presence of Lead and Nickel found in blood
07.12.20	20	0	16	8	13	0	0	0	0	0	0	57	CCMB, Hyderabad	No organism which can cause the reported phenotype could be identified
08.12.20	40	0	40	0	0	0	0	0	0	0	0	80	AIIMS, Delhi	Normal
08.12.20	0	0	0	0	0	40	0	0	0	0	0	40	AIIMS, Delhi	Normal
08.12.20	42	0	42	0	0	42	0	44	0	0	0	86	NIN, Hyderabad	Organophosphorous pesticide was detected in blood samples, Mercury high in Rice.
09.12.20	10	0	10	0	0	0	0	0	0	0	0	20	AIIMS, Delhi	Normal
10.12.20	40	5	30	17	0	0	30	0	0	0	0	122	NIV, Pune	Normal
10.12.20	7	0	6	0	0	0	0	0	0	0	0	13	AIIMS, Delhi	Normal
10.12.20	0	0	0	0	0	0	0	0	0	0	33	33	National Lab, Bhopal	Normal
10.12.20	0	0	0	0	0	5	0	0	5	0	0	10	VBRL VIJAYAWADA	Normal
10.12.20	0	0	0	0	0	0	0	0	0	4	0	4	Food Testing Laboratory, Kkd	Normal
11.12.20	31	0	0	0	0	0	0	0	0	0	0	31	AIIMS, Delhi	**Presence of lead and nickel found in blood.**
TOTAL	**187**	**30**	**108**	**25**	**13**	**87**	**138**	**44**	**5**	**4**	**33**	**674**		

Summary of water samples results collected by various institutions						
Sl. no	Date of collection	Institution Name	No. Of samples collected	Source/point of collection	Ward/Area	Result
1	06.12.20	District Public Health Laboratory	9	Tap Water	Southern street, Ashok chakram road, kusthiladoddi, vadiragudem, Mpl.School near Jwalaparameswar temple	Bacteriologically satisfactory for drinking purpose as the MPN count is nill.
2	06.12.20	Anmoor	21	Household	Krishna canal, J.Pcolony, Godavari canal, Pension line area, Ramchandra rao peta, Gandhi colony, ZP colony, Kalpana road, Papasaheb road, venugopal swamy temple road, chappiti vari veedhi, tutavari street, suthernstreet, ashok chakra road, borepureddivari street, yerukala colony chowdidibba	No heavy metals were detected
3	07.12.20	IICT,Hyd	21	Household	Different locations of Eluru city like kothapeta, Thangellamudi, R.R peta, Gunbazar, Lakshmivarapupeta, Ameenapeta, powerpeta, chodidibha, Pathabadha, Ashok nagar, Arundhathipeta, Kummarirevu, N.R peta, Chaitanyapuricolony,Lankapeta,Ramakrishnapuram,Nukalammatemple,Raninagar,Tapimesthricolony,Vasavari Street	Water is clean and potable without organic or elemental contamination.
4	08.12.20	AIIMS,Delhi	32	Household	Lakshmivarapupeta, pathebad, thangellamudi, sanivarapeta, southernstreet, gubbalavariveedi, ramakrishnapuram, kathepuveedi, sainagar, chodidibba, ponangiroad, dasrivariveedi, kankanalavariveedi, medaraveedi, pensionline, kathepuveedi, western street kothapeta, gayathrinagar, sainagar, phiranguladibba, manchinellathota, chanukyapuricolony, pichugunta	Presence of Lead and Nickel found in blood.
5	08.12.20	NIN, Hyderabad	36	Households-20,Controls Households-10,Reservior-1,Head pump (Before filtration)-1,After filtration-1,Stored Water Supplied on 4th & 5th Dec(During outbreak)-3	Reservoir at JP colony, Eluru Pampulacheruvu	Traces of pesticide (Triazophos) were detected. No mycotoxins were observed.

6	08.12.20	AP Pollution control board	12	Elurucanal, Reservoir, Intake well of water treatment plant, before chlorination &after chlorination tank from treatment plant, Water tank, Household, Pond 1&2 of pampulacher uvu	Denduluru(V&M), Eluru Municipal corporation, Kotadibba, 5th Division, Near Postal colony-Eluru	No Organochlorine pesticide compounds and heavy metals found in water.
7	10.12.20	NEERI	17	Ground Water, Surface Water	**Ground water collected from** - Powerpet PCB office,Dakshinapaduveedhi,vangayagudem,ponangi,padamaraveedhi,thurupuveedhi,tangellamudi,kothapeta,lakshmivarapupeta,pathebada ,R.R peta. **Surface Water collected from**- Denduluru godavari canal & storage tank, krishna canal, pampulacheruvu pond-2, Inlet and outlet of treatment plant, J.P colony over head tank	High Mercury was detected in both ground and surface water

CAUSE OF THE OUTBREAK

After analysing the case sheets, reports from different labs and inputs from different expert agencies involved, It can be categorised as a point source outbreak which was non-propagative in nature. It was a case of acute exposure to a substance rather than being a chronic one.

Since the cause of the symptoms in the patients was not known and there is no parallel in the literature which points to similar outbreak, it was difficult for all the experts to pin-point the exact cause of the outbreak. Therefore, elimination mechanism was used to deduce the most probable cause.

All the three possible causes: infections, metabolic and neruo-toxic, were deeply analysed in a systematic way. It was opined that the cause could not have been infectious (either a bacteria or a virus) because none of the patients were presented with fever which is a basic character of an infectious source. Had the source been infectious, it should have taken more time to settle down and mortality should have been higher. The National Institute of Virology analysed the samples of Blood, CSF, Stool and Nasal Swabs and have cleared the samples for any known viruses or bacteria. The Centre for Cellular and Molecular Biology analysed the samples of urine, stool, vomitus, water and blood and stated that no organism which can cause the reported phenotype could be identified. Therefore, it can be inferred with high probability that the cause of outbreak was not infectious (either a bacteria or a virus).

The next cause could have been metabolic in nature. The likelihood of metabolic cause can be ruled out as the Arterial blood gas test and the blood sugar tests do not point to any abnormality.

The third source could have been toxins. There are large number of toxins which when present in the human body can produce the symptoms noticed. Relevant to the present situation, there are two sources namely heavy metals and pesticides which can cause such an activity. As regards the likelihood of the episode being caused by heavy metals, it is important to state that large number of blood samples showed presence of heavy metals (lead and nickel) in the patients. However, Dr Jagdeesh Nayyar, the expert from AIIMS New Delhi, has ruled out the possibility of heavy metals to be the likely cause. He has stated that the heavy metals cause encephalopathy at a very high dose. Also, if the cause would have been heavy metals, the patients could not have recovered in a span of 3-4 hours. The hospitalization would have been for a higher time and the patients could not have recovered with the medication carried out. The expert states that the presence of heavy metals in the blood is incidental in nature and the source of heavy metals entering into human body should be investigated and identified. The heavy metals have a serious impact on the body and cause chronic illness and issues.

The next set of probable cause could have been pesticides. The organo-chlorides and organo-phosphates present in the pesticides have the capacity to cause similar episode. National Institute of Nutrition (NIN) has found the presence of organo-phosphates in the blood of the patients and also in the water samples collected from the house of the patients. However, Dr Jagdeesh Nayyar has opined that the possibility of organo-phosphates as the source is unlikely, since the symptoms associated organo-phosphates like diarrhoea, miosis, bronchia were not seen in the patients. The NIN experts opined that organo-phosphates were the likely cause of the episode.

Coming to organo-chlorides, it needs to be stated that organo-chlorides were neither noticed in the blood samples of the patients nor in the water, vegetable or milk samples. However, Dr Jagdeesh Nayyar stated that the organo-chlorides are most likely to be the cause of this episode. The presence is not found in the samples because the half-life of organo-chlorides once mixed in water is less than 24 hours and it is most likely that the concentration reached below traceable limits till the time samples were collected. The hypothesis is also supported by the nature of the outbreak which quickly dissipated within a few days.

Thus, on the whole, it can be inferred that there is general unanimity amongst all that there was no bacterial/ viral cause of the episode. Overall the water and air samples tested subsequently have been found to be within prescribed norms and there might have been a one-time presence of organo-chloride which could have triggered the episode.

SOURCE OF THE OUTBREAK

According to the experts, toxins are likely to be the most probable cause of this outbreak. Among the toxins, the pesticides are most likely to present similar encephalopathy. Among pesticides also, organo-chlorides are most likely to be the cause of the outbreak.

From the epidemic curve with a sudden onset on 4th December and steep rise, peaking was observed between 5th and 7th December. Subsequently the cases started declining from 8th onwards. There was no case reported from 13th December onwards. After analysing the above epidemic curve, case sheets of the patients, reports from different labs and inputs from different expert agencies involved, it can be categorised as a point source outbreak which was non-propagative in nature. It was a case of acute exposure to a substance rather being a chronic one. It is indicative of a common single exposure source. Another important observation is that whatever was the source is no more there in the system as no case has been reported 13th December onwards.

The likely source of such kind of encephalopathy can be water, milk, vegetables and fruits. Nickel was found in Milk, but nickel cannot cause such encephalopathy and hence can be ruled out. The source cannot be meat or fish as 87% of the patients didn't consume non-vegetarian food in the last couple of days prior to the incident. Vegetables like tomato and brinjal have been found with Metribuzin (herbicide). But had it been the source, the geographical expanse would not have been confined to urban area alone. It would have spread to rural areas as well. So vegetables can be the source only if some contamination occurred after the arrival of the vegetables to the market in Eluru and the vegetables got contaminated after the stock arrived in the market.

Coming to the likelihood of water being the source of contamination. None of the agencies have reported the presence of organo-chlorines in the water samples taken from the source, reservoir and the storage tank. So the central water supply was clean. The water samples collected from the households had some presence of Triazophos (organo-phosphate compound) but the concentration was not too high and also the control samples also found the presence of Triazophos. Thus, contamination of water locally being the source cannot be substantiated or ruled out either. This requires a detailed study of the water supply system of Eluru municipal corporation over the next few months to arrive at a conclusion.

Thus there is a need of Involving reputed national Institutions like AIIMS, IICT, NEERI on a long term basis to find out the exact source and also to prevent the event from reoccurring. The teams will make a deep-dive to unearth the most likely source of the episode. It would require systematic sampling of all likely culprits from origin to human consumption.

Since water test results from all agencies indicated that there is no presence of heavy metals or pesticides beyond the allowed limits, it can be safely said that the present water supply is potable and safe for Human Consumption.

RECOMMENDATIONS

The Committee, after several rounds of in depth deliberations, arrived at several recommendations which can be broadly categorised as short term action strategies and long term preventive strategy.

The preventive strategy will involve following:

1. Involving reputed national Institutions like AIIMS, IICT, NEERI on a long-term basis by the District Administration. The teams will make a deep-dive to understand further the nature of the episode. It would require systematic sampling of all likely sources from origin to human consumption. Water food air and soil analysis on a long term basis need to be done with a proper research design and sample design. Data collected needs to be analysed to arrive at a long term strategy. The study must go beyond the Eluru city and shall include the west Godavari and East Godavari districts due to the similar nature of topography irrigation and agro climatic conditions. Teams from AIIMS, New Delhi, IICT Hyderabad, PHFI with its Indian Institute of Public Health, Hyderabad would conduct these studies which shall be assisted by the District Collectors.
2. A Multidisciplinary Health and Environment Monitoring Framework need to be developed for these studies. A Monitoring cell for this purpose will be opened under the aegis of EFS&T department with representation (not below the cadre of Joint Director) from department of Health, Agriculture, Environment, Animal Husbandry and Municipal administration. All line departments shall give necessary assistance to this multi-agency, multi-disciplinary team.
3. A high level committee under the Chairpersonship of Chief Secretary to the government may be set up with senior officers from department of Health, Agriculture, Environment, Animal Husbandry, Irrigation and Municipal administration.
4. This high level committee shall get action plans prepared by all the line departments for monitoring water, food, air , soil , Agriculture, Aquaculture residues etc. on regular basis. Further, the implementation of these action plans shall be monitored by the High level committee constituted.
5. Surveillance plan of action for identifying source of heavy metals in blood in Eluru Municipal Corporation area needs to be developed by the municipal department in co-ordination with the Andhra Pradesh Pollution Control Board. A statistical database with periodical updating needs to be developed for items like water supply including both surface and ground water at all possible tapping points. All food sources shall also be closely monitored for heavy metals. Further industrial sources including sewerage and solid waste management practises of the Eluru corporation shall be closely monitored for finding out and eradicating presence of heavy metal in the human beings in Eluru area. This activity shall be coordinated by the AP Pollution Control Board.

6. A broad study of the entire West Godavari district with regards to above parameters is required for a comparative study with Eluru Municipal Corporation area. If required both districts of East and West Godavari shall be included in these studies. The AP Pollution Control Board shall undertake this study in coordination with Municipal corporation, Eluru.
7. Since the pesticides are likely to contribute to such episodes, it is very crucial that the banned compounds like DDT, DDE Endosulfan should not reach up to the agricultural fields. Strict implementation by the regulatory authorities is required for this. Department of Agriculture is advised to submit a detailed action plan within one month to achieve this goal.
8. Promotion of organic and nature-based farming should find key place in the agricultural policy. ZBNF wing of agriculture department to identify all villages in and around Eluru Municipal Corporation area for promoting agriculture of vegetables following the organic farming methods. Dedicated outlets to be opened in Eluru Municipal Corporation area for marketing and sale of the organically grown products. Department of Agriculture should also submit a detailed action plan for this within one month.
9. Surveillance plan of action for monitoring the quality of milk needs to be developed by the Animal Husbandry department within one month.
10. Usage of Chemicals for Aqua farming in areas surrounding the Eluru city needs to be reduced in the long run by the fisheries department. Surveillance plan of action for monitoring the aquaculture in the west Godavari district to identify and stop usage of any banned products needs to be developed by the fisheries department within one month.
11. Setting up of state of art labs at Vizag, Guntur and Tirupati under the aegis of Health Department. These labs should have the capacity to detect all kinds of organo- chlorines and organo-phosphates in all mediums like water, food, blood, serum etc., They should also be able to detect all kinds of heavy metals especially lead, nickel, and mercury etc. in all mediums like blood, blood serum, water milk and vegetables etc. further each district also should have one lab for water and food analysis. Samples from different sources, establishments and locations in the entire state need to be randomly checked periodically in these labs. A scientific matrix of sampling needs to be evolved so that regular surveillance on food materials and water is maintained in the district labs. Regional labs should have advanced facilities at par with research institute labs for testing blood and serum.
12. Irrigation Department should take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal at the earliest.

The steps to be taken up in the short term for immediate action are detailed below

1. Irrigation Department should take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month.

2. The municipal water supply management forms the corner stone. Regular testing along with documentation needs to be ensured. While the water samples tested by the MA&UD indicated that the water supplied by Eluru Municipal Corporation is safe and as per standard, periodic checking must be ensured to rule out any contaminants. Similar system must be brought in place for all municipal water supply systems in the State.
3. The municipal water quality needs to be checked for more parameters like organo-chlorines and organo-phosphates on a periodical basis. Currently the water samples are checked for certain parameters like TDS etc., only.
4. Stand-alone RO units should also be checked for presence of heavy metals in water used by Institute for Preventive Medicine(IPM), AP Vijayawada.
5. Solid waste management in Eluru needs to be analysed for any likelihood of heavy metals leeching into the soil and then reaching to the human food chain through ground water. This task shall be taken up by the Municipal Administration and Urban Development (MA&UD) department.
6. Periodical inspections of prominent Rythu- bazaars and market places and sample collection for heavy metals and pesticides presence should be taken up by the Marketing department.
7. Entire distribution network including pumps, ESLR's and pipelines should be thoroughly checked for material integrity and the same should be done on a regular basis in future. Steps should be taken to keep the entire system under positive pressure at all times in future. This should be done by the Municipal Administration and Urban Development (MA&UD) department.
8. Testing of Pesticides / Weedicides / Fertilizers etc., being used in the district must be taken up by Agriculture department to ensure proper quality.

GALLERY







REPORTS

GOVERNMENT OF ANDHRA PRADESH
DEPARTMENT OF ANIMAL HUSBANDRY

Office of Joint Director (AH),
Veterinary Biological and Research Institute,
Labbipet, Vijayawada- 520010.

Lr. No. 02 / TOX / TFAL / VBRI / 2020 Date: 11/12/2020

Sub: Communication of toxicology analysis results –reg

Ref: 1. Lr. Roc. No.5 / ADDL / 2020; dated 10.12.2020 of O/o of AD (AH), ADDL, Eluru, W.G Dist.

The results of the toxicological analysis are here with Submitted.

S. No	TFAL No	ADDL Specimen No	Kind of Species	Kind of Specimen	Lead	Heavy Metals	Phosphine
1	106	1	S. Buffalo	Milk	Negative	Negative	—
2	107	2			Negative	Negative	—
3	108	3			Negative	Negative	—
4	109	4			Negative	Negative	—
5	110	5			Negative	Negative	—
6	111	6		Grass	—	—	Negative
7	112	7			—	—	Negative
8	113	8			—	—	Negative
9	114	9			—	—	Negative
10	115	10			—	—	Negative

Joint Director (AH)
VBRI, Vijayawada

To
The Assistant Director (AH),
Animal Disease Diagnostic Laboratory,
Eluru, West Godavari dist.

Mail to eddieluru@gmail.com

सीसीएमबी CSIR CCMB
कोशिकीय एवं आणविक जीवविज्ञान केन्द्र
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद)
उप्पल रोड, हैदराबाद - 500007, भारत
डॉ. राकेश कुमार मिश्र
निदेशक

CENTRE FOR CELLULAR AND MOLECULAR BIOLOGY
(Council of Scientific & Industrial Research)
Uppal Road, Hyderabad - 500007, India
Dr. Rakesh K. Mishra
Director

15-12-2020

The Commissioner
Department of Health and Family welfare
Govt. of Andhra Pradesh

Sub: Metagenomic analysis of samples collected from patients presenting with mystery illness Eluru, Andhra Pradesh

Respected Sir,

We had received 35 blood, 16 Urine, 13 vomitus and 8 stool samples from patients suffering with episodes of loss of consciousness/seizures followed by rapid recovery from District hospital, Eluru with a request to investigate for any possible microbial cause for the epidemic by utilizing latest technologies. DNA was extracted from all the samples and a total of 13 blood, stool and vomitus were selected for further processing. **No organisms which can cause the reported phenotype could be identified by Next Generation Sequencing (NGS) based metagenome sequencing** of the above samples. Taking into consideration the clinical features of the patients, nature of the epidemic and results of the investigations already done, it is unlikely to be caused by a microbial agent.

Thank you for providing us the opportunity to serve the people of our country and kindly let us know if you need any further information or assistance.

Detailed report would follow.

Yours sincerely,

[Rakesh Mishra]

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	Department: Analytical	Location: CMS	
	CSIR-IICT-Analytical Test Report		
	Form No: CSIR-IICT/FORM/TRF	Total Pages 21	

Date	:	11-12-2020
Sample Registration No.		2758
Customer Name & Address (with E-mail & Mobile Number of the Contact person)	:	The Director, Institute of Preventive Medicine, PH Labs and Food (H) Admin, Gollapudi, Vijayawada - 521225
Sample ID(s)/Code(s)	:	21 Water samples from different locations of Eluru city, as per the enclosed list
Nature of Samples		Water
Number of samples		21
Sampling plan, if any	:	Sampled by IPM, Vijayawada
Conditions at which sample received (sealed/unsealed/ice box etc.)		Room Temperature
Date of Sample Receipt	:	08-12-2020
Date of Analysis	:	08-12-2020
Test method(s) used for analysis	:	EPA Methods 622, 525, 531, 5021A, IS 3025
Deviations from test method/procedure, if any	:	NA
Additional information, if any	:	Quantitative Result

Results

SAMPLE DETAILS AND RESULTS AS ENCLOSED IN THE ATTACHED SHEETS

*Indicate the specific analyte as a parameter and if necessary indicate the type of analysis performed

Disclaimer:

i. The report pertains to the sample tested only
ii. The submitted samples were not collected by CSIR-IICT
iii. The report shall not be used or produced in fragments
iv. The report shall not be used for any other purpose than declared by the sponsor
v. CSIR-IICT is not a regulatory/certifying agency hence no part of this report should be used for legal purposes under any circumstances
vi. CSIR-IICT shall not be held financially liable for losses incurred by clients on account of inferences and interpretations made on the basis of the test results

Signature of TFM

Signature of
Chairperson
Analytical
Division

Department: Analytical	Location: CMS
CSIR-IICT-Analytical Test Report	
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ANALYTICAL REPORT FOR WATER SAMPLES (Pesticides and Volatiles)

S.NO	AREA NAME	DOOR No.	Organophosphorus pesticides EPA Method 622	Organochlorine Pesticides EPA Method 525	Synthetic Pyrethroids EPA Method 525	Carbamate Pesticides EPA Method 531	Volatile Organics EPA METHOD 5021A
1.	Kotha Peta	Janapareddy Vari Street	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
2.	Tangellamudi	Sivalayam Temple	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
3.	R.R. Peta	123/20	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
5.	Gun Bazar	18-1-1	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
6.	Lakshivarapu Peta	17-12-30	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
7.	Ameena Peta	26-6-20	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
8.	Chodi Dibbha	20F-12-27	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected

9.	Power Peta	SS-95/A2	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
10	Pathabadha	24B-1-26	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
11.	Ashok Nagar	Old Labour Office	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
12 (4)	Ameena Peta (Pension Line) Yeti gattu	711	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
13.	Arundhathi Peta	Near Marriyama Statue	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
14.	KummariRevu	498	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
16.	Charikaypuri Colony	24C-6-5/8	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
17.	N.R. Peta	KAHL Road	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
18	Rama Krishna Puram	V. Venkatesh House Road	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
19.	Lanka Peta	16B-9-10	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
20.	Nukalamma Temple	20A-1-19	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected

21	Rani Nagar	Ramalayam	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
22.	Tapimestri Colony	176	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected
23	Vasavari Street	23B-7-20/1	NOT DETECTED	NOT DETECTED	NOT DETECTED	NOT DETECTED	No harmful VOCs were detected

Signature of the Analyst

Signature of Scientist-in-Charge

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LIST OF PESTICIDES TESTED

S.No.	Organophosphate	Organochlorine	Carbamate	Synthetic Pyrethiod
1.	Ethion	δ- HCH	Thiophanate	Fenvalerate
2.	Anilofos	γ- HCH	Carbendazim	Deltamethrin
3.	Phenthoate	α- HCH	Carbosulfan	α- Cypermethrin
4.	Phosalone	β- HCH	Carbofuran	Allethrin
5.	Malaoxon	Endrin	Fenobucarb	β- Cyfluthrin
6.	Malathion	Methoxychlor	Iprovalicarb	
7.	Pirimiphos-methyl	Heptachlor-exo-epoxide	Benfuracarb	
8.	Edifenphos	Aldrin	Propoxur	
9.	Chlorfenvinphos	Dieldrin	Aldicarb	
10.	Profenofos	γ- Chlordane	Carbaryl	
11.	Chlorpyrifos	Heptachlor	Oxamyl	
12.	Parathion-methyl	4,4'-DDD	Methomyl	
13.	Monocrotophos	4,4'-DDT	Methiocarb	
14.	Dimethoate	4,4'-DDE		
15.	Diazinon	α- Endosulfan		
16.	Acephate	Endosulfan alcohol		
17.	Phorate	Endrin Aldehyde		
18.	Quinalphos			
19.	Dichlorvos			
20.	Fenitrothion			
21.	Imidan			

Department: Analytical	Location: CMS
CSIR-IICT-Analytical Test Report	
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WATER QUALITY TESTING PARAMETERS

Details of the sample			Parameters with Acceptable Limits					
Sample Code	Area Name	D. No	pH (6.5 – 8.5)	Total Dissolved Solids < 500 mg/L	Conductivity < 0.781 mS/cm	Turbidity < 5 NTU	Fluoride <1mg/L	Arsenic < 0.01 mg/L
1	Kotha Peta	JanapareddyVari Street	7.28	290	0.46	1.04	0.1	0.00
2	Thangellamudi	Sivalayam Temple	7.49	320	0.45	0.92	0.2	0.00
3	R. R. Peta	D. NO-123/20	7.34	250	0.44	0.81	< 0.1	0.00
5	Gun Bazar	D. NO-18-1-1	7.28	170	0.44	0.41	0.1	0.00
6	Lakshivarapu Peta	D. NO-17-12-30	7.40	220	0.45	0.77	0.1	0.00
7	Ameenapeta	D. NO-26-6-20	7.50	180	0.46	0.80	0.1	0.00
8	ChodiDibha	D. NO-20 F-12-27	9.20	244	0.45	0.83	0.1	0.010
9	Power Peta	E. P. No-SS-95/A2	7.41	270	0.46	0.99	0.2	0.00
10	Pathabadha	D. NO-24 B-1-26	7.50	272	0.46	0.83	0.1	0.00
11	Ashok Nagar	Old Labour Office	7.52	293	0.48	1.26	0.2	0.010
12	Ameenapeta (Pension line) YettiGatu	D. NO-711	7.26	492	0.47	0.94	0.1	0.00
13	Arundathi Peta	Near Marriyama Statue	7.02	294	0.49	0.58	0.2	0.00

	Department: Analytical	Location: CMS	
	CSIR-IICT-Analytical Test Report		
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14	Kummarirevu	D. NO-498	7.13	302	0.45	0.81	0.1	0.010
16	Chanikyapuri Colony	D. NO-24 C-6-5/8	7.41	320	0.45	0.92	0.2	0.010
17	N. R. Peta	KAHL Road	7.86	500	0.82	1.17	0.2	0.010
18	Ramakrishna Puram	V. Venkatesh House Road	7.11	299	0.42	0.72	0.2	0.00
19	Lankapeta	D. NO-16 B-9-10	7.49	301	0.47	0.82	0.1	0.010
20	Nukalamma Temple	D. NO-20 A-1-19	7.02	291	0.45	1.39	0.1	0.00
21	Raninagar	Ramalayam	7.41	299	0.45	0.87	0.1	0.010
22	Tapimestri Colony	D. NO-176	7.56	326	0.46	1.3	0.2	0.00
23	Vasavari Street	D. NO-23 B-7-20/1	7.32	337	0.48	0.88	0.1	0.00

J. Chandrashekar
Signature oftheAnalyst

Signature of Scientist-in-charge

Results of Elemental Analysis from Water Samples

S. no	Sample code	Name of the Element (µg/L)																	
		Al	Ba	B	Ca	Cu	Fe	Mg	Mn	Se	Ag	Zn	Pb	Cd	Hg	Mo	Ni	As	Cr
1	Acceptable Limit As per IS 10500:2012	30	700	500	75000	50	300	30000	100	10	100	5000	10	3	1	70	20	10	50
2	1	127	38.1	54.9	25630	BQL	35.13	8789	6.778	1.712	BQL	0.9946	BDL	0.239	BQL	BQL	BDL	BDL	BDL
3	2	141.9	35.31	53.03	25290	BQL	38.21	8537	6.342	1.168	BDL	9.663	BDL	0.1613	BQL	BQL	BDL	BDL	BQL
4	3	121.9	38.45	50.3	25580	BQL	43.35	8531	6.345	2.992	BDL	0.8734	BDL	BDL	BQL	BDL	BDL	BDL	BQL
5	4	125.3	39.12	55.33	25610	BDL	32.45	8679	6.865	BQL	BDL	BQL	BDL	0.1281	BDL	BDL	BDL	BDL	BQL
6	5	118.9	38.14	50.66	25630	BQL	41.91	8572	5.851	1.947	BDL	BDL	BDL	BQL	BQL	BDL	BDL	BDL	BQL
7	6	139.7	35.12	53.37	25210	BQL	33.31	8757	6.346	1.099	BDL	3.917	BDL	0.1862	BQL	BDL	BDL	BDL	BQL
8	7	131.7	38.14	53.12	25960	BQL	42.25	8648	7.415	3.352	BQL	1.182	BDL	0.3571	BQL	BQL	BDL	BDL	BDL
9	8	144.5	38.24	42.57	19890	6.013	37.52	8962	7.614	BQL	BDL	4.087	BDL	0.2397	BDL	BQL	BDL	BDL	BDL
10	9	148.6	35.8	58.31	25890	BQL	39.14	8759	8.238	1.782	BDL	5.593	BDL	0.1646	BQL	BQL	BDL	BDL	BQL
11	10	143.1	37.85	56.79	25800	BQL	36.13	8717	6.899	3.708	BDL	3.801	BDL	0.2312	BQL	BDL	BDL	BDL	BQL
12	11	161.5	43.8	47.44	21570	6.959	65.71	9455	13.86	BQL	BDL	6.327	BQL	0.1815	BDL	BQL	BDL	BDL	BQL
13	13	76.77	97.28	134.8	38230	5.403	20.3	13710	3.732	1.453	BDL	3.325	BDL	0.3967	BDL	1.028	BDL	BDL	2.789
14	14	138.1	37.26	55.49	26260	BQL	37.66	8711	7.94	2.069	BDL	1.728	BQL	0.1301	BQL	BQL	BDL	BDL	BQL
15	16	134	36.58	55.01	25920	1.183	38.12	8712	7.55	0.6492	BDL	4.044	BQL	0.1733	BQL	BQL	BDL	BDL	BQL
16	17	88.86	112.3	141	47530	0.7967	46.93	12790	7.746	7.341	BDL	18.02	BQL	0.2533	BQL	BQL	BDL	BDL	BQL
17	18	134.3	35.5	55.89	25690	0.1739	34.18	8523	6.558	1.857	BDL	8.451	BDL	BQL	BQL	BQL	BDL	BDL	BQL
18	19	135.6	35.37	55.85	25750	0.4523	34.26	8611	6.698	1.273	BDL	1.316	BQL	BQL	BQL	BDL	BDL	BDL	BQL
19	20	179.4	33.17	55.9	25710	0.5743	41.15	8578	6.972	1.731	BDL	1.472	BDL	BQL	BQL	BQL	BDL	BDL	BQL
20	21	148.6	35.57	53.6	25560	BDL	41.48	8562	6.712	1.69	BDL	4.101	BQL	0.1878	BQL	BQL	BDL	BDL	BQL

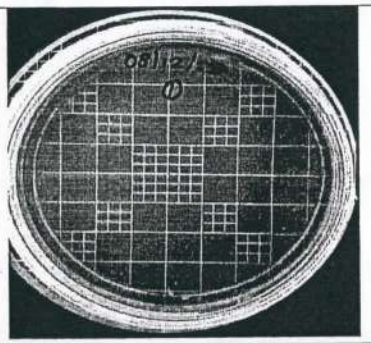
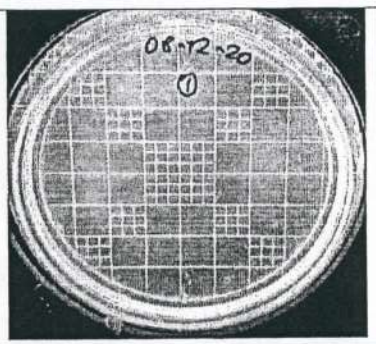
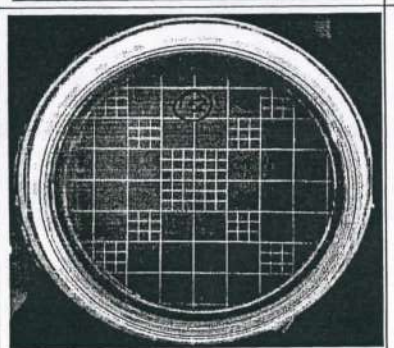
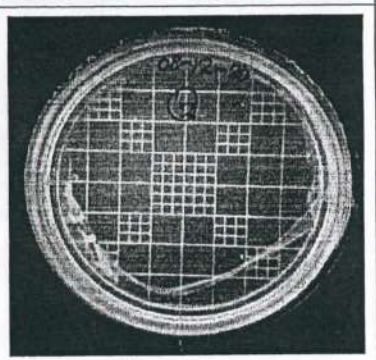
21	22	**187.9**	38.73	55.02	25680	0.5836	67.34	8764	12.37	1.111	BDL	12.31	BQL	0.2043	BQL	BQL	BDL	BDL	BQL
22	23	**141.2**	41.96	59.92	26850	0.3357	46.78	9018	6.869	1.703	BQL	3.024	BQL	0.2071	BQL	BQL	BDL	BDL	BQL
23	LOD(µg/L)	1.273	0.259	0.286	2.026	0.153	0.754	0.144	0.092	0.343	0.535	0.15	1.817	0.041	2.033	0.278	0.409	2.159	0.521
24	LOQ(µg/L)	3.819	0.778	0.859	6.08	0.461	2.262	0.432	0.279	1.029	1.510	0.45	5.452	0.124	6.099	0.834	1.228	6.477	1.565

Signature oftheanalyst

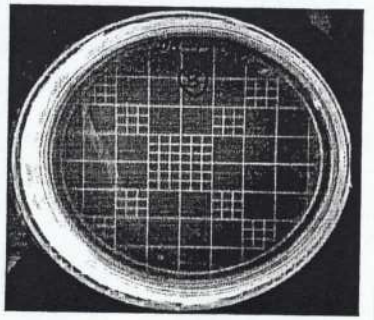
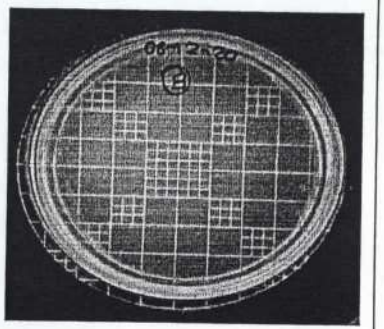
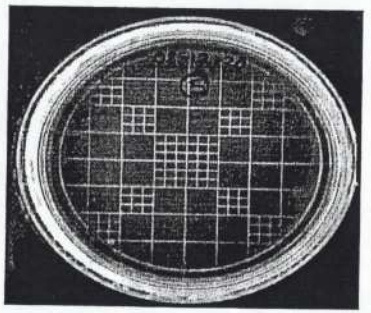
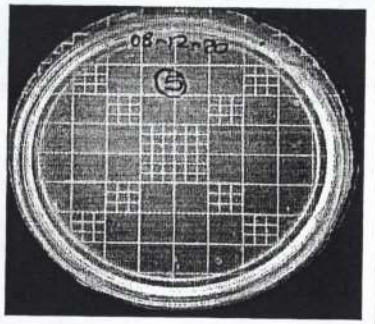
Signature of Scientist-in-Charge

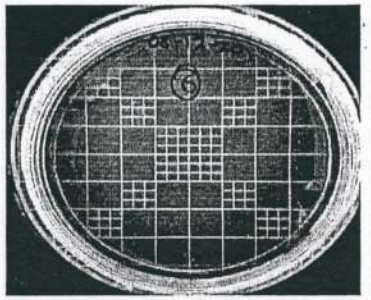
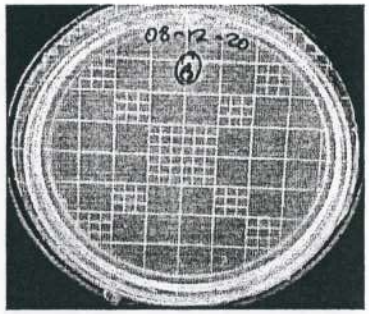
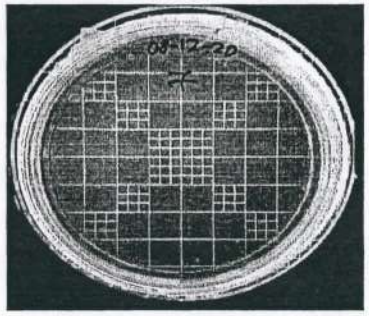
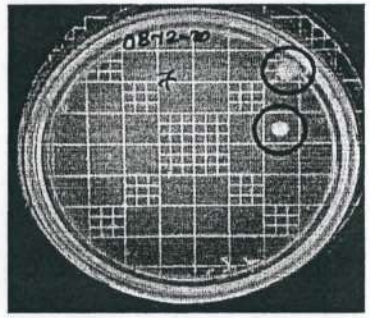
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	CSIR-IICT-Analytical Test Report		
	Form No: CSIR-IICT/FORM/TRF	Total Pages 21	

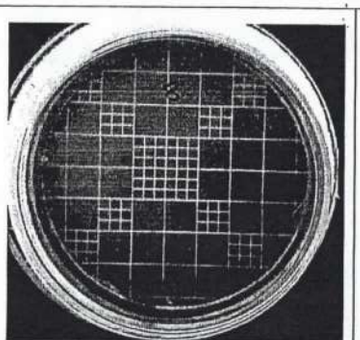
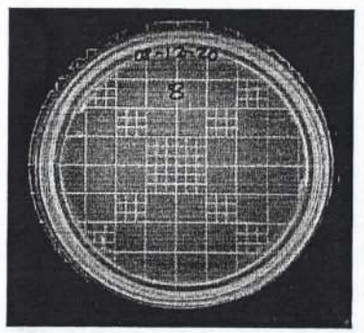
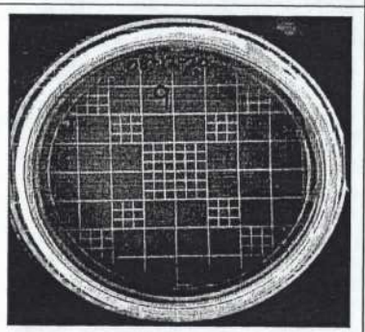
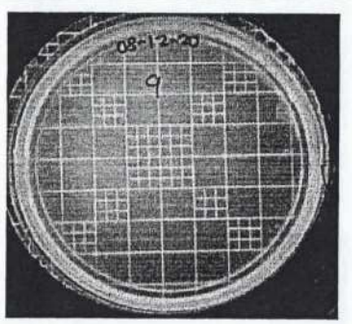
Analytical results of microbial testing of water samples

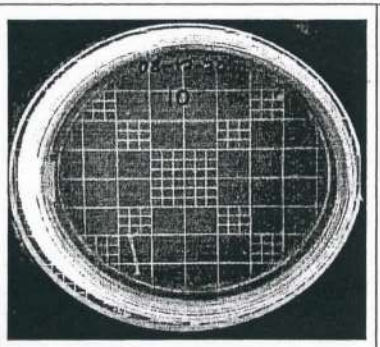
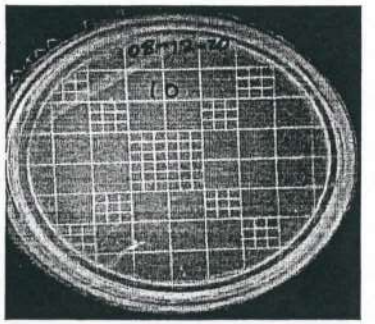
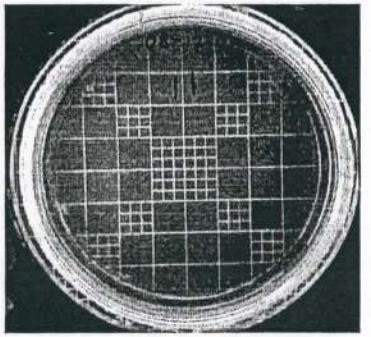
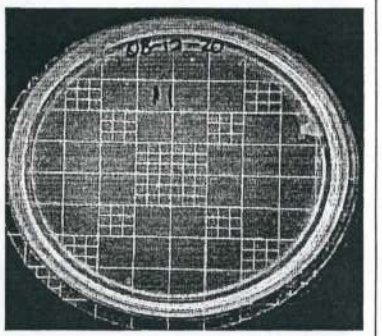
Division: PE&TT			Delivery Date of Report: 09/12/2020			
S. No	Details of the sample			Parameters with acceptable limits		Observations
	Sample Code	Area Name	D. No	E. Coli Test	Common bacterial test	
1.	1	Kotha Peta	JanapareddyVari Street			**E. Coli Test:** NIL **Common bacterial test: Nil**
2.	2	Thangellamudi	Sivalayam Temple			**E. Coli Test:** NIL **Common bacterial test:**NIL

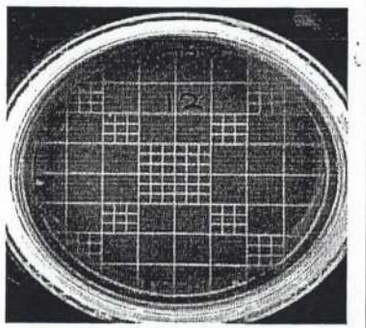
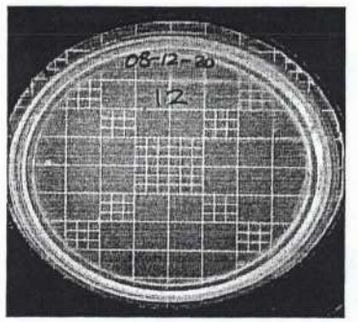
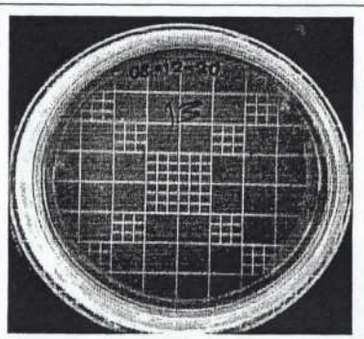
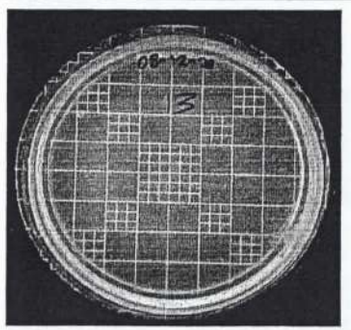
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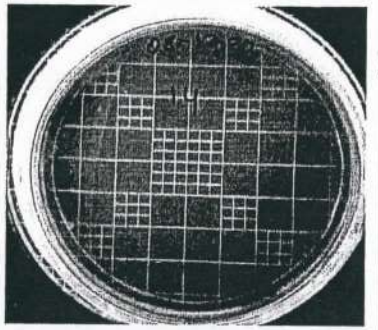
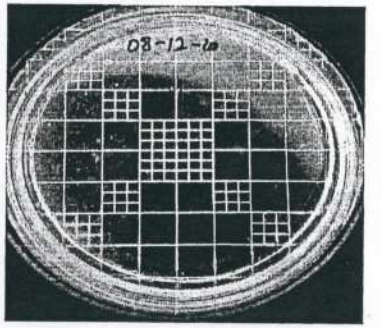
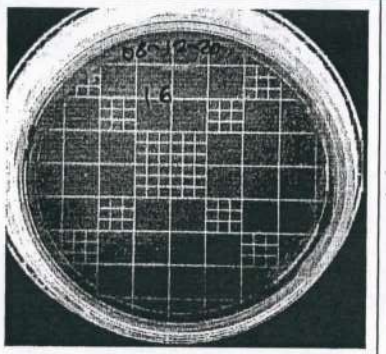
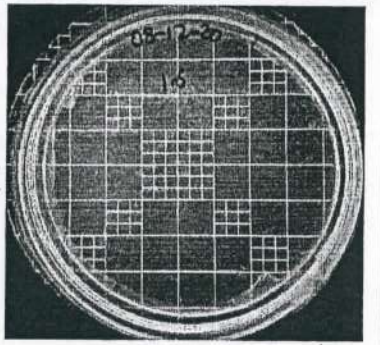
3.	3	R. R. Peta	D. NO-123/20			**E. Coli Test:** NIL **Common bacterial test:**NIL
4.	5	Gun Bazar	D. NO-18-1-1			**E. Coli Test:** NIL **Common bacterial test:**

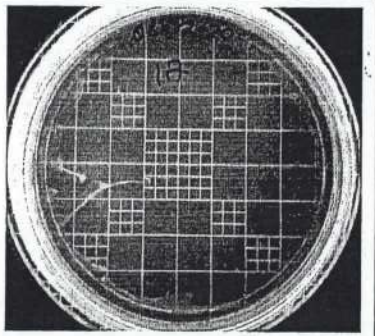
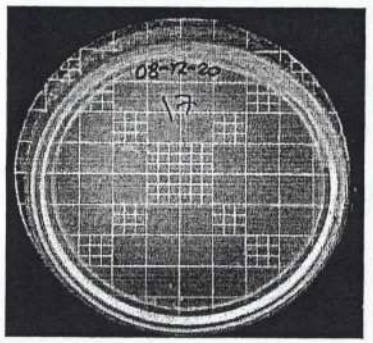
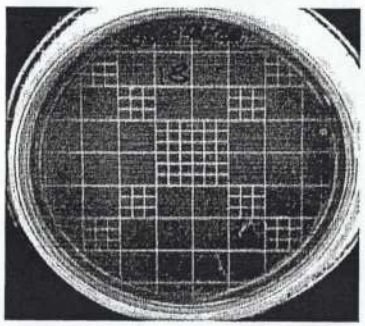
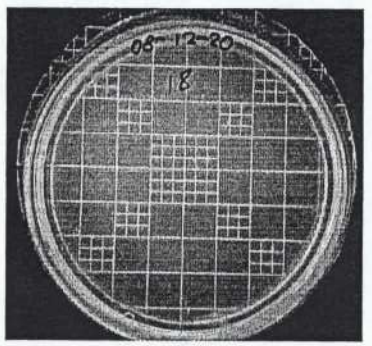
5.	6	Lakshivarapupeta	D. NO-17-12-30			**E. Coli Test:** NIL **Common bacterial test:**
6.	7	Ameenapeta	D. NO-26-6-20			**E. Coli Test:** NIL **Common bacterial test: Mild contaminant**

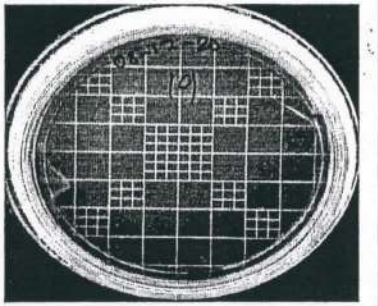
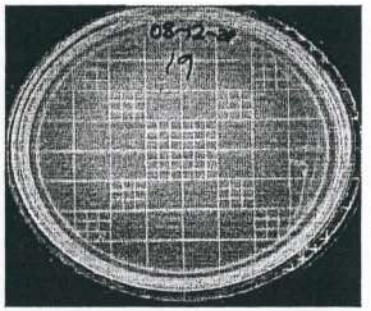
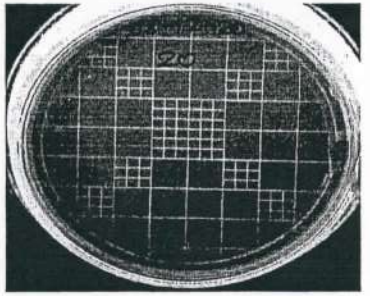
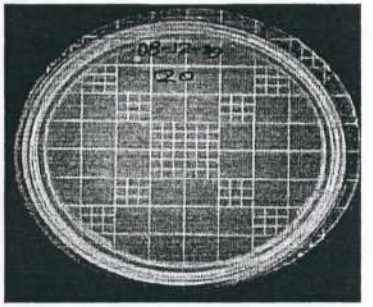
7.	8	Chodidibha	D. NO-20 F-12-27			**E. Coli Test:** NIL **Common bacterial test:**NIL
8.	9	Power peta	E. P. No-SS-95/A2			**E. Coli Test:** NIL **Common bacterial test:**NIL

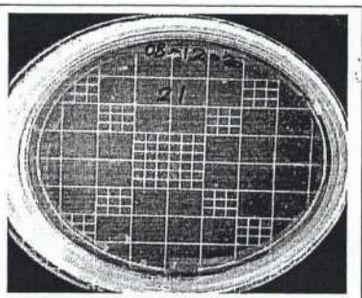
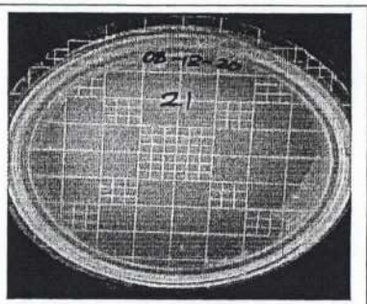
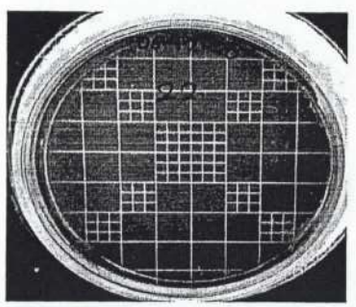
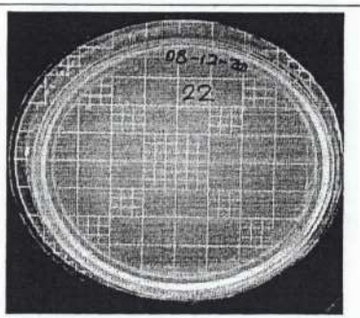
9.	10	Pathabadha	D. NO-24 B-1-26			**E. Coli Test:** NIL **Common bacterial test:** NIL
10.	11	Ashok Nagar	Old Labour Office			**E. Coli Test:** NIL **Common bacterial test:** NIL

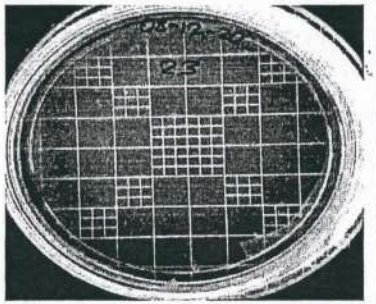
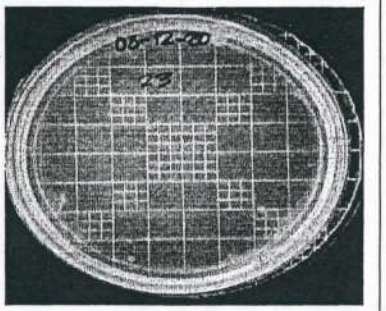
11.	12	Ameenapeta (Pension line) Yettigatu	D. NO-711			**E. Coli Test:** NIL **Common bacterial test:** NIL
12.	13	Arundathipeta	Near Marriyama Statyu			**E. Coli Test:** NIL **Common bacterial test:** NIL

13.	14	Kummarirevu	D. NO-498			**E. Coli Test:** NIL **Common bacterial test:**
14.	16	Chanikyapuri Colony	D. NO-24 C-6-5/8			**E. Coli Test:** NIL **Common bacterial test:** NIL

15.	17	N. R. Peta	KAHL Road			**E. Coli Test:** NIL **Common bacterial test:**NIL
16.	18	Ramakrishna Puram	V. Venkatesh house road			**E. Coli Test:** NIL **Common bacterial test:**NIL

17.	19	Lankapeta	D. NO-16 B-9-10			**E. Coli Test:** NIL **Common bacterial test:**NIL
18.	20	Nukalamma Temple	D. NO-20 A-1-19			**E. Coli Test:** NIL **Common bacterial test:**NIL

19.	21	Raninagar	Ramalayam			**E. Coli Test:** NIL **Common bacterial test:**NIL
20.	22	Tapimestri Colony	D. NO-176			**E. Coli Test:** NIL **Common bacterial test:**NIL

21.	23	Vasavari Street	D. NO-23 B-7-20/1			**E. Coli Test:** NIL **Common bacterial test:**NIL

J. Chandrasekhar

Signature of the Analyst

Signature of Scientist-in-charge

	Department: Analytical	Location: CMS	
	CSIR-IICT-Analytical Test Report		
	Form No: CSIR-IICT/FORM/TRF	Total Pages 21	

Summary of Test Report

- CSIR-IICT Received 21 water samples on 08-12-2020
- The Samples were analysed for Organo chlorine, Organophosphorus, Carbamate, Synthetic pyrethroid pesticide residues, heavy metals and water quality parameters
- Pesticide residue analysis: The samples were tested by two different extraction procedures and analysed by two different analytical techniques. The results showed the absence of the tested pesticide residues
- Heavy metals: The samples were tested for the presence 29 heavy metals including Lead, Arsenic, Nickel. The results also showed the heavy metal contamination is negligible
- Volatile organic chemicals: The samples were tested for the presence of volatile organic chemicals using headspace GC-MS method. The results showed the absence of harmful volatile organic chemicals.
- Water Quality testing: The water quality parameters such as pH, turbidity, conductivity, total dissolved solids and arsenic content were tested. The results are in the acceptable limits.
- Microbial testing of water: The water samples did not show any significant contamination of E-coli and other bacterial or fungal growth.

Conclusion: The water samples are clean and potable without organic or elemental contamination

Government of Andhra Pradesh

Directorate of IPM, PH Labs & Food (H) Administration, Amaravathi.

DISTRICT PUBLIC HEALTH LABORATORY

KOTADIBBA, ELURU, W.G.DIST

Sample From: Commissioner, Municipal Corporation, Eluru, West Godavari Dist.
Collected by: Mcnicipal staff.
Collected On: 06/12/2020 Received On: 06/12/2020 at 7.00 AM

REPORT OF BACTERIOLOGICAL ANALYSIS OF WATER

Lab Ref. No	Source	Exact Location	Residual Chlorine mg per liter	MPN of Coli form Bacteria per 100/ml.	Nature of Coli form Bacteria
1530	Muncipal Water	Tap water at D.No.6A-10-18/1, Kayyalavaari putta, southern street, Eluru	1.5	Nil	Nil
1532	Muncipal Water	Tap water at D.No.6A-10-16/1, Kayyalavaari putta, southern street, Eluru	1.5	Nil	Nil
1534	Muncipal Water	Tap water at D.No.6A-11-12, Ashok chakram road, Eluru	1.0	Nil	Nil
1536	Muncipal Water	Tap water at D.No.6B-11-20, Ashok chakram road, Eluru	1.0	Nil	Nil
1538	Muncipal Water	Tap water at D.No.6A-12-03, Ashok chakram road, Eluru	1.0	Nil	Nil
1540	Muncipal Water	Tap water at D.No.6B-11-23/10, Opp.Jwalapahareswara Mpl.School, Eluru	1.5	Nil	Nil
1542	Muncipal Water	Tap water at D.No.6A-11-6, Kusthila doddi, Eluru	1.5	Nil	Nil
1544	Muncipal Water	Tap water at D.No.6A-11-21, Vadira gudem, Eluru	1.5	Nil	Nil
1546	Muncipal Water	Tap water at D.No.6A-11-31, Vadira gudem, Eluru	1	Nil	Nil

Remarks :-

The above given water samples are Bacteriologically satisfactory for drinking purpose as the MPN count is Nil.

DISTRICT PUBLIC HEALTH LABORATORY * ELURU *

B. Srinivasa Rao
8/12/20

Senior Analyst
Dist. Public Health Laboratory
Eluru - 534 001

All India Institute of Medical Sciences
Clinical Ecotoxicology Diagnostic and Research Facility (CEF)
Ground Floor, Convergence Block,
Department of Anatomy, AIIMS, Ansari
Nagar, New Delhi-110029
Tel: 011-26549141, Internal No. 8061, Mob: 8527178343,
E-mail Id: clinicalecotox@aiims.edu

Elemental Analysis Report

Patient Name: Mr. Lova Raju	CEF Registration No: 1006/Ref/2020/UNOB
Sex: Male Age: Years	Ward/OPD/Clinic: Dr K Vamsi Krishna
Fathers/Husband Name:	Consultant-in-charge: C/o Administrative Officer AIIMS
UHID No/Hospital Registration No:	Mangalagiri
Phone/Mobile No.	Date: 07/12/2020

Sample	Test name	Results	Units	Reference range	Method
Blood	Cobalt	1.56	µg/L	0.5-3.90	Analyzed by ICP-MS
Blood	Nickel (Ni)	31.15	µg/L	0.14-0.65	Analyzed by ICP-MS
Blood	Arsenic (As)	0.66	µg/L	<62	Analyzed by ICP-MS
Blood	Selenium (Se)	89.75	µg/L	70-150	Analyzed by ICP-MS
Blood	Cadmium (Cd)	2.77	µg/L	<5	Analyzed by ICP-MS
Blood	Mercury (Hg)	0.00	µg/L	<10	Analyzed by ICP-MS
Blood	Lead (Pb)	83.4	µg/dL	<25	Analyzed by ICP-MS
Blood	Vanadium (V)	0.00	µg/L	0.05	Analyzed by ICP-MS
Blood	Thallium (Tl)	0.00	µg/L	<2	Analyzed by ICP-MS
Blood	Antimony (Sb)	0.00	µg/L	<3 (unexposed) 3-10 (exposed)	Analyzed by ICP-MS

Reported by
Dr. Javed A Quadri

07/12/2020

Verified by
Dr. A Shariff

07.12.2020

डा. ए. शरीफ/Dr. A. Shariff
आचार्य एवं अध्यक्ष/Professor & Head
शरीर रचना विभाग/Dept. of Anatomy
एम्स, नई दिल्ली/AIIMS, Ansari Nagar, New Delhi, India

All India Institute of Medical Sciences
Clinical Ecotoxicology Diagnostic and Research Facility (CEF)
Ground Floor, Convergence Block,
Department of Anatomy, AIIMS, Ansari Nagar, New Delhi-110029
Tel: 011-26549141, Internal No. 8061, Mob: 8527178343,
E-mail Id: clinicalecotox@aiims.edu

Elemental Analysis Report

Patient Name: Mr. M Rajasekhar	CEF Registration No:1001/Ref/2020/UN08
Sex: Male Age: Years	Ward/OPD/Clinic: Dr K Vamsi Krishna
Fathers/Husband Name:	Consultant-in-charge: C/o Administrative Officer AIIMS Mangalagiri
UHID No/Hospital Registration No:	Date: 07/12/2020
Phone/Mobile No.	

Sample	Test name	Results	Units	Reference range	Method
Blood	Cobalt	1.34	µg/L	0.5-3.90	Analyzed by ICP-MS
Blood	Nickel (Ni)	40.31	µg/L	0.14-0.65	Analyzed by ICP-MS
Blood	Arsenic (As)	0.71	µg/L	<62	Analyzed by ICP-MS
Blood	Selenium (Se)	92.37	µg/L	70-150	Analyzed by ICP-MS
Blood	Cadmium (Cd)	2.83	µg/L	<5	Analyzed by ICP-MS
Blood	Mercury (Hg)	0.00	µg/L	<10	Analyzed by ICP-MS
Blood	Lead (Pb)	96.87	µg/dL	<25	Analyzed by ICP-MS
Blood	Vanadium (V)	0.83	µg/L	0.05	Analyzed by ICP-MS
Blood	Thallium (Tl)	0.00	µg/L	<2	Analyzed by ICP-MS
Blood	Antimony (Sb)	0.00	µg/L	<3 (unexposed) 3-10 (exposed)	Analyzed by ICP-MS

Reported by
Dr. Javed A Quadri

07/12/2020

Verified by
Dr. A Shariff

07.12.2020

Clinical Ecotoxicology Diagnostic & Research Facility (CEF)
All India Institute of Medical Sciences, New Delhi-29

डा. ए. शरीफ/Dr. A. Shariff
आचार्य एवं अध्यक्ष/Professor & Head
शरीर रचना विभाग/Dept. of Anatomy
अंसारी नगर, नई दिल्ली-29/AIIMS, Ansari Nagar, New Delhi-29

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Tel: 011-26549141, Internal No. 8061, Mob: 8527178343,
E-mail Id: clinicalecotox@aiims.edu

Elemental Analysis Report

Patient Name: R Surya Prakash	CEF Registration No:1003/Ref/2020/UN08
Sex: Male Age: Years	Ward/OPD/Clinic: Dr K Vamsi Krishna
Fathers/Husband Name:	Consultant-in-charge: C/o Administrative Officer AIIMS Mangalagiri
UHID No/Hospital Registration No:	Date: 07/12/2020
Phone/Mobile No.	

Sample	Test name	Results	Units	Reference range	Method
Blood	Cobalt	1.3	µg/L	0.5-3.90	Analyzed by ICP-MS
Blood	Nickel (Ni)	20.07	µg/L	0.14-0.65	Analyzed by ICP-MS
Blood	Arsenic (As)	0.72	µg/L	<62	Analyzed by ICP-MS
Blood	Selenium (Se)	84.4	µg/L	70-150	Analyzed by ICP-MS
Blood	Cadmium (Cd)	1.66	µg/L	<5	Analyzed by ICP-MS
Blood	Mercury (Hg)	0.00	µg/L	<10	Analyzed by ICP-MS
Blood	Lead (Pb)	53.6	µg/dL	<25	Analyzed by ICP-MS
Blood	Vanadium (V)	0.12	µg/L	0.05	Analyzed by ICP-MS
Blood	Thallium (Tl)	0.00	µg/L	<2	Analyzed by ICP-MS
Blood	Antimony (Sb)	0.00	µg/L	<3 (unexposed) 3-10 (exposed)	Analyzed by ICP-MS

Reported by
Dr. Javed A Quadri

07/12/2020

Verified by
Dr. A Shariff

07.12.2020

Clinical Ecotoxicology Diagnostic & Research Facility (CEF)
All India Institute of Medical Sciences, New Delhi-29

Dr. A. Shariff/Professor & Head
Dept. of Anatomy

GOVERNMENT OF ANDHRA PRADESH
WATER RESOURCES DEPARTMENT

From,
Sri T.V.N.A.R Kumar,
Chief Engineer, Hydrology,
Water Resources Department,
Vijayawada.

To,
The Member Secretary,
A.P. Pollution Control Board,
Vijayawada,
Krishna District.

16 FEB 2022

Lr-No. CE/SE/EE/Hydrology/1645 10.2.2022

Sir,

Sub: NHP-APSW-Study of Inflow of Kolleru Lake and assessment of its water quality - requesting for sign in MoU as per the guidelines of NPMU (National Project Monitoring Unit) under National Hydrology Project-Submitted - Reg.

Ref: 1) TO Lr. Dated: 12/1/2022.
2) NPMU Mail Dt: 24/12/2021

****

It is to submit that Kolleru Lake is one of the Largest fresh water lakes in India located in state of Andhra Pradesh and forms the largest shallow fresh water lake in Asia with an area of 901 Sq.Kms which was declared as a wildlife sanctuary in November 1999 under India's Wildlife protection Act of 1972, and designated as a wetland of international importance in November 2002 under the Ramsar Convention.

It is located between the Krishna and the Godavari deltas, lying between the latitudes16°32′ and 16°47'N and longitudes 81°05′ and 81°21′ E. The lake is fed directly from the 67 major and minor drains including the seasonal streams of Budameru and Tammileru. The lake is the drinking water source for the people living in the vicinity and it is a bird sanctuary for indigenous and migrating birds. The ecological degradation of the lake was due to water diversion, extensive agriculture by use of pesticides and fertilisers in upper catchments and delta regions, bunding for pisiculture, draining of sewage and industrial pollutants through inflowing drains and channels.

The NPMU/MoWR has given some suggestions/recommendations "To collect and analyse secondary data and captured primary data for evaluating the impact of all physiochemical, bacteriological and heavy metal, industrial effluents, and agriculture residues of all notified/non notified major drains in close consultation and coordination with the A.P Pollution Control Board/CPCB, Agriculture, Fisheries, Municipal and Forest Departments to avoid duplication of efforts".

The Following shall be executed by the consultant in coordination and consultation with PCB to avoid duplication of efforts. If the consultant requires any necessary data, the same may be provided by the PCB to carry out this study.

1. The industrial/chemical parameters such as As, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Sc, Se, Ti, V and Zn etc., and the list of all contaminated outlets that are entering in to kolleru Lake.
2. The physical parameters like temperature, colour, odour, pH, electrical conductivity, dissolved oxygen (DO), total dissolved salts (TDS), COD, BOD,

heavy metals, Nitrates, Phosphates, sulphates, etc., of all in falling drains of Kolleru.

3. Any identified critical/ vulnerable reaches contributing to the highest concentration of pollutants/hotspots of pollution along the notified/non notified major drains of the Kolleru Lake.
4. If additional information under the scope of work needed by the PCB, the necessary relevant data may be provided by the consultant within the study.

In this connection, the National Project Monitoring Unit of MoWR has suggested to enter M.O.U with all stakeholders of Kolleru Lake for implementation of the measures suggested through this study.

Hence, it is requested to sign in M.O.U as one of the stake holder and also requested to agree for monitoring the quality of water assessment which is to be conducted by the consultant & suggest ratifications for remedial measures for any future clarifications.

A MoU Copy is herewith attached with this letter duly signed by the Chief Engineer, Hydrology, Water Resources Department as FIRST PART and it is requested the Chief Environmental Engineer, PCB(one of the stake holder) to sign in M.O.U as SECOND PART.

Yours faithfully

10/2/21

Chief Engineer,
Hydrology, Water Resources Department,
Vijayawada

MoU on "Assessment of Water Quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures" under National Hydrology Project as per the guidelines of National Project Monitoring Unit.

Memorandum of Understanding

Memorandum of Understanding (MoU) is drawn on the _____day of ____2022

between

CLIENT: **O/o Chief Engineer, Hydrology Water Resource Department, Govt. of Andhra Pradesh**, of the FIRST PART represented by
Chief Engineer Hydrology Water Resource Department

AND

Stake Holder is referred as SECOND PART

STAKE HOLDER : **Andhra Pradesh Pollution Control Board (PCB)** having its Office at Vijayawada, A. P represented by - Joint Chief Environmental Engineer.

O/o Chief Engineer Hydrology Water Resources Department Govt. of Andhra Pradesh and Stake holder individually referred as "Party" and collectively as "Parties".

WHERE AS:

1) O/o Chief Engineer Hydrology Water Resources Department, Govt. of Andhra Pradesh is the one of the Implementing Agency (IA) for "Assessment of Water Quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures" under National Hydrology Project as per the guidelines of National Project Monitoring Unit.

2) O/o Chief Engineer Hydrology Water Resources Department, Govt. of Andhra Pradesh & Stake holder (PCB) with mutual coordination and consultation to agree for implementation of study on "Assessment of Water Quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures" under National Hydrology Project as per the guidelines of National Project Monitoring Unit.

3) In pursuance of the aforesaid, the Parties here to wish to record under this Memorandum of Understanding (MoU), terms of their mutual understanding & "Terms of Reference" of this study is herewith enclosed with this MoU, in order to implement an integrated and comprehensive study on "Assessment of Water Quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures" under National Hydrology Project as per the guidelines of National Project Monitoring Unit.

NOW THEREFORE THE PARTIES HERETO AGREE AS UNDER:

A. SCOPE OF MoU

on

"STUDY OF KOLLERU LAKE AND ASSESSMENT OF WATER QUALITY"

- The Consultant will execute the assessment of the water quality parameters for all notified /non-notified Drains as per the guidelines of NPMU/MoWR under National Hydrology project.

- The Consultant will produce Complete GIS map for Kolleru Lake, infalling drains, streams, boundaries, vulnerable reaches, locations contributing for the highest concentration of pollutants, other water bodies along the Lake and Lake Morphology along with available peak discharges, annual rain fall details & its impact on water quality.

- The consultant will evaluate the impact of all physiochemical, bacteriological, heavy metal, industrial effluents, and agricultural residues in all notified/non-notified drains of Kolleru Lake and give final reports of the same.

- The consultant will suggest remedial measures based on the morphological and other environmental parameters as per their reports.

- The consultant will provide final report along with digital copy after the entire study on Kolleru Lake.

B) GOVERNANCE ON "STUDY OF KOLLERU LAKE AND ASSESSMENT OF WATER QUALITY"

✓ O/o Chief Engineer Hydrology Water Resources Department Govt. of Andhra Pradesh and PCB agree to study on above for guidance, supervision and management of the Consultant on "STUDY OF KOLLERULAKE AND ASSESSMENT OF WATER QUALITY" as per the guidance of National Project Monitoring Unit.

✓ The entire satellite data used in the study by the consultant, all analysis, results, maps, charts etc. and the subsequent report prepared shall be the exclusive property of client and the consultant has no right to disclose the information in any public domain.

C) RESPONSIBILITIES OF THE CLIENT

DATA, SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT

The available data on following features will be provided to the Consultant from the client side for this assignment. Collection of any additional primary and secondary data required for project preparation shall be the responsibility of consultant.

- All reports on drains list (notified and non notified), studies pertaining Kolleru Lake, collection of H.P's other than available data will be the client responsibility.
- Plan of catchments of Kolleru lake with the necessary available hydrological details

- Reports of various committees constituted earlier on the subject
- Recorded Annual Peak Discharges and Maximum recorded flood discharge available with this department.
- Any other relevant hydraulic data available with the client

D) RESPONSIBILITIES OF THE STAKEHOLDER

The following shall be executed by consultant in coordination and consultation with PCB to avoid duplication of efforts. If Consultant requires any necessary data, the same may be provided by the PCB to carry out this study.

i. The physical parameters that are of special importance and deserve frequent attention like temperature, color, odor, ph, electrical conductivity, dissolved oxygen (DO), total dissolved salts(TDS), COD,BOD etc., of all infalling drains and kolleru lake are to be analyzed to avoid duplicity.

ii. The effect of agricultural effluents entering into the all infalling drains (notified) has to be analyzed and the individual parameters are to be specified.

iii. The Study of industrial/chemical parameters such as As, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Sc, Se, Ti, V and Zn which are currently of environmental concern because of their toxic nature into the all infalling drains (notified) and Kolleru Lake have to be analyzed and the individual parameters are to be specified to avoid duplicity.

iv. If additional information under the scope of work needed by the PCB, the necessary relevant data may be provided by the consultant within the study.

MoU on "Assessment of Water Quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures"

The both parties hereto have carefully gone through the contents of Memorandum of Understanding (MoU) and signed and put their seals on the aforesaid MoU and agreed to abide by the terms and conditions as laid down therein totally have signed the MoU as of the day and year first above written.

The both parties hereby agree to monitoring the quality of water assessment to be conducted by the consultant and suggesting ratifications for remedial measures for any future clarifications.

SIGNATURES:

10/02/2022

Chief Engineer,Hydrology
Water Resources Department,
Vijayawada, A.P.

Chief Environmental Engineer
Pullution Control Board,
Govt. of Andhra Pardesh

Terms of Reference

Assessment of water quality of Kolleru Lake and Preparation of Feasibility Study Report on remedial measures

1. BACKGROUND

Kolleru Lakeis one of the largest fresh water lakes in India located in state of Andhra Pradesh and forms the largest shallow freshwater lake in Asia with an area of 901 Sq.Kms which was declared as a wildlife sanctuary in November 1999 under India's Wildlife Protection Act of 1972, and designated as a wetland of international importance in November 2002 under the Ramsar Convention.

It is located between the Krishna and the Godavari deltas, lying between the latitudes16°32′ and 16°47′N and longitudes 81°05′ and 81°21′ E. The lake is fed directly from the 67 major and minor drains including the seasonal streams Budameru and Tammileru. The Lake is the drinking water source for the people living in the vicinity and it is a bird sanctuary for indigenous and migrating birds. The ecological degradation of the lake has set in due to water diversion, extensive agriculture by use of pesticides & fertilizers in the upper catchment and delta regions, bunding for pisciculture, draining of sewage and industrial pollutants through in-flowing drains and channels.

Recently an inexplicable illness, called "Eluru disease" has hit the Eluru city in Andhra Pradesh and it had affected hundreds of people. The pesticide residues in drinking water was found to be the main reason for the recent outbreak of mysterious disease in the Eluru town of West Godavari district.

2. OBJECTIVES

The following are the main objectives of this study:

i. To collect and analyze secondary data and captured primary data for evaluating the impact of all physiochemical, bacteriological and heavy metal, industrial effluents, and agricultural residues of all notified major drains in close consultation with the A.P pollution control board, Agriculture/ Fisheries departments (to avoid duplication of efforts).

ii. To suggest a few alternative measures to mitigate the pollution levels in Kolleru Lake and its infalling drains depending on site conditions, and present the best results as a Feasibility Study Report containing short-term and long-term measures.

iii. To integrate the data as well as the results with state WRIS and India WRIS as a dynamic system, to be updated by the department after the expiry of the contract.

iv. To carry out capacity building of the department to enable undertaking of similar works in the future.

3. SCOPE OF WORK

i. To collect all available data and carry out data validation. This include collection and analysis of some limited amount of primary data. The main source for the assignment is considered to be secondary data available with:

- Urban Development Department for sewage treatment from towns and cities discharging in the recipient drains/ rivulets draining to lake Kolleru
- Department of Agriculture for promoting and creating awareness about restrictions in use of pesticides/ insecticides
- Department of Fisheries regulating Aquaculture
- Water Resources Department for augmenting flow of rivulets/ drains to Lake and
- Department of Environment-Pollution Control Board on the regulations in place for the sources of pollution.

ii. To carry out scrutiny and analysis of data as well as modeling. The tentative steps are:

- Prepare inventory of municipal, industrial, agricultural and other wastes draining into the lake, both in terms of quantity and quality (for both point and non-point sources)
- Prepare list of habitations/ industries that contribute, and likely pollution load in the present and in foreseeable future (considering a planning horizon of 30 years)
- Prepare inventory of the existing water treatment facilities
- Carry out field assessment including reconnaissance survey
- Assess the variation in water spread areas with varying water levels throughout the year from pre monsoon to post monsoon to capture the significant changes.
- Find out the all the trace elements in the Kolleru lake and also contributing drains (during summer and monsoon).
- Collect secondary and limited primary data to analyse the physical parameters that are of special importance and deserve frequent attention like temperature, colour, odour, pH, electrical conductivity, dissolved oxygen (DO), total dissolved salts (TDS), COD, BOD, heavy metals, Nitrates, Phosphates, sulphates, etc., of all infalling drains and Kolleru Lake. These are to be collected and analysed in close coordination with A.P /Central pollution control board to cover the gaps in available data and avoid duplication of efforts. It is to be presented with statistical model and trend analysis.
- The effect of agricultural effluents entering into the all infalling drains (notified) has to be analysed and the individual parameters are to be specified.
- The industrial/chemical parameters such as As, Be, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Sc, Se, Ti, V and Zn which are currently of environmental concern because of

their toxic nature into the all infalling drains (notified) and the Kolleru lake have to be analysed and the individual parameters are to be specified in consultation with A.P/Central pollution control board to avoid duplication of efforts.

- Carry out water quality modelling study with results for different scenarios (dry/ wet/ normal year, city expansion, population increase, industrialization, deforestation etc.)
- Carry out an analysis of impact of activities in the catchment areas on water quality
- Prepare details of mitigation measures and action plan including STPs (sewerage treatment plant) and ETPs (effluent treatment plant) including CEPTs (common effluent treatment plant, if required)

iii. To collect information about existing hydraulic structures (flood protection structures and water resources projects), major cities/ towns, river gauging sites (hydrological observation sites), airports, islands within the basins, and to integrate this information with the GIS based system for maintaining water quality of Koleru Lake (mentioned below).

iv. To carry out detailed analysis to

- Estimate the volumes of waste discharged into the river including industrial, agricultural, domestic/ municipal sewage and solid wastes draining into the lake
- Assess the seasonal water quality variation with varying availability of water both during lean period and during monsoon
- Identify 'Hot Spots' of pollution
- Assess the carrying capacity of the lake for sustainable future operations

v. To prepare maps using Geographical Information System (GIS) for Kolleru Lake, its infalling drains, streams and other water bodies of lake along with their hydraulic properties (viz., the cross sections and the longitudinal section, for which the available data will be provided by the department) and develop a dynamic system with all related spatial and temporal information.The GIS Based Koleru Lake Information System dealing primarily with the water quality is to be integrated with the State WRIS and India WRIS as a dynamic system that allows query-based retrieval of data and, finally results of the analysis. Preferably, it should also include provisions for scenario analysis for a limited number of simpler cases like doubling the load of a pollutant or reducing the water inflow to half. The department will continue updating of the data in future, after the expiry of the contract period.

vi. To study the shifting of boundaries of Kolleru Lake and its plan form, if any, during the last five decades (1970-2020) with the help of satellite images and the Survey of India

(SoI) topographic maps.

vii. To compile the temporal changes in land use/ land cover considering the available data at the various sources, and to study the impact of land use/ land cover change on the lake morphology.

viii. To identify all the critical/ vulnerable reaches and locations contributing to the highest concentration of pollutants along the all notified major drains of the Kolleru Lake.

ix. To relate the morphological changes along the Kolleru Lake on the basis of available peak discharges for different years within the time domain considered in this study and its impact on water quality. Study will also be carried out to investigate the impact of changes in the annual rainfall of the Kolleru Lake and its catchment and its relation to water quality.

x. To carry out the analysis of physiochemical, bacteriological and heavy metal parameters in Kolleru Lake along the length of its infalling drains (notified and non-notified) and to suggest remedial measures based on the morphological, ecological and other environmental parameters.

xi. To carry out analysis about the source, extent and intensity of pollution in the lake, and suggest several alternative short-term and long-term measures (including policy instruments as well as structural measures) for its abatement, as part of feasibility level study and prepare a feasibility study report for the best option selected by the department. It should include assessment of environmental and social impacts of the intervention measures, both overall and during the construction period. The report should include feasibility levels designs and cost estimates as well. The report should focus on quantitative as well as qualitative factors of environmental degradation including

- Analysis on the extent and sources of pollution
- Map of ecologically sensitive areas near the lake up to 100 m from the lake boundary (or larger areas, as found suitable) into the land (using remote sensing and ground truthing)
- Map of the zones in the lakes and the inflowing rivers with different water quality standards, as defined by the CPCB surface water quality criteria for different uses, with seasonal variations
- Scenario analysis to establish sustainable standards of water quality that can ideally and reasonably be achieved and maintained
- List of different measures that needs to be undertaken to upgrade the water quality
- Policy and legal instruments necessary to ensure sustainability of the solutions
- Comparative analysis of different alternative short-term measures along with economic,

environmental, social and legal implications (feasibility level) to arrive at the optimal solution

- Recommendation of the preferred design option based on considerations that might include, among others, technical, social, economic, and environmental factors. It should ensure the compatibility of designs considering the natural, renewable and green energy and ensure preservation of historical heritage in project elements.
- Demonstrate, through analysis, that the recommended option is the least-cost option based on the conduct of a detailed whole life-cycle cost analysis. Low operational / maintenance cost over the design life of the preferred option is to be a key consideration. The department, along with PCB/ other stakeholder is to choose the best option for implementation, based on practical considerations.

xii. To develop a mobile application for collection of data through crowd sourcing. The application should allow direct transmission of entered data as well as geotagged and time-stamped photographs to the central server/ database management platform. In case of non-availability of mobile data network at the site, the transfer should take place immediately at the next place when and where it is available.

xiii. To prepare a preliminary Environmental and Social Impact Assessment Report covering the following: protection of affected areas, including endangered species, traffic management; waste disposal; management of construction materials (transport, storage, and waste disposal); mitigation against hazardous materials, chemicals and wastewater and construction waste disposal; mitigation of dust and noise nuisance; and community and worker health safety, concerns and relations, ensuring that the Project does not exacerbate the vulnerability of local communities to natural hazard impacts. The preparation of the report may, in turn, include the following steps:

- Collect Baseline environmental and socio-economic data
- Study the impact of proposed measures on physical, biological and socio-economic environment.
- The preliminary ESIA should involve stakeholder consultation disaggregated by sex, age and occupation.
- Provide specific feasible and cost-effective mitigation measures for all significant negative environmental and social / gender impacts identified for both the construction and operational phases of the project. The boundaries of the project area for the assessment, as well as any adjacent areas that should be considered with respect to the project is to be demarcated.

xiv. To facilitate and take part in capacity building

- Consultant will arrange technical sessions to train different levels of Officers and Staff of the Andhra Pradesh Water Resources Department, to enable them to continue monitoring of the rivers and analysing the results after the expiry of the project period
- It is envisaged to have four such training sessions with around twenty-five participants in each batch comprising officers from the department as well as other implementing agencies of the National Hydrology Project
- It is also envisaged to involve two designated officers of the Department in the entire assignment throughout the project duration, to enable them to carry out similar assignments on their own in the future.

4. *KEY DELIVERABLES& TIME LINES*

The following are the main deliverables envisaged

S. No	Milestone	Description	Time Line
1	Submission and Approval of the Inception Report	Describing the results of initial consultations and assessments, available existing studies and other information, gaps identified, and approaches proposed to be taken to prepare and deliver the scope of works outlined and fortnightly schedule of implementation work plan as a Gantt Chart	T + 2 months
2	Monthly progress report (brief)	Detailing the progress achieved vis-à-vis the original proposal, the bottlenecks and the approach planned to be followed for avoiding delay	Every month from T + 3 months
3	Submission and Approval of the Data collection report	Detailing the data collected, its validation and preliminary analysis	T + 4 months
4	Presentation of alternative mitigation measures before the department	Detailing alternative short term and long-term measures along with their economic, environmental, social and legal implications, time requirement for execution and the recommended option, with reasons for selection. The department and the PCB to jointly select the best option/ combination of options based on practical considerations	T + 7 months

5	Submission and Approval of the Feasibility study report and demonstration of the dynamic system that allows integration of data and results with state WRIS and IndiaWRIS with dashboard for custom queries	The report should document the alternatives and the selection procedure for the best option. The report should include the feasibility level design, drawings, specifications and cost estimations for the best option/ combination of short term and long-term options chosen by the department The information management system for water quality of Kolleru Lake should be fully operational during demonstration	T + 11 months
6	Submission and Approval of the Preliminary Environmental and social impact assessment report	Detailing the social and environmental impacts of the perceived project during and after construction, and proposed approaches to avert the negative impacts	T + 13 months
7	Submission and Approval of the Final Project Completion Report	The final report should cover all tasks described in the ToR and address all the observations of the client on draft final report, which is to be submitted one month before the submission of the Final Project Completion Report	T + 15 months

T denotes the date of signing of the contract

5. RESPONSIBILITIES OF THE CONSULTANT

The responsibilities of the Consultant will include but will not be limited to the following:

- Conduct and complete the consultancy as per the agreed ToR and scope of the consultancy. Major work under the consultancy is envisaged to be carried out from the Head Office of the Consultant Firm, with visits to the project sites for data collection or offices for meeting as per requirement. This would allow the personnel engaged in this project to contribute to other projects as well, significantly reducing the financial overburden. This is also perceived to allow more flexibility in participation of senior experts, as the need for relocation sometimes poses a limitation. The Team Leader is expected to be the key person in maintaining liaison with the Client for the current assignment.

- The water Quality parameters and the frequency / number of sets of observations to be mentioned, should be done in accordance with the guidelines of the Ministry of Jalasakthi/ MOWR.(As per the guide lines based on satellite images, the "monitoring" category might be base line, trend or flux stations)
- Collect data as needed for modeling from relevant agencies. The Consultant will have to acquire all the data which is not available with Client from different agencies if required for the modeling work. The Consultant has to bear all expenses related to data collection, while the actual cost of data will be reimbursed by the client. However, to be eligible for reimbursement, all the proposals must be approved by the Client in advance.
- Conduct field visits as required for data collection or to verify modeling results.
- Undertake digitization / data conversion of source data as needed for modeling.
- Work in the specified space provided by the Andhra Pradesh Water Resources Department during the visits, which will be designated as the project office.
- Use the appropriate modeling software for obtaining satisfactory results. The requirement of all input data for the model, the consistency of data, including primary or secondary validation should be analysed in the initial phase.
- Hand over all software, hardware, data, and source code of all applications to the Client after the end of the project period.

6. ENVISAGED DATA REQUIREMENT

It is felt that the following data are required

- Time series data on water quality parameters (As the monitoring of water quality is one of the activities of Andhra Pradesh Pollution Control Board and they have a repository of information available through the web link: https://pcb.ap.gov.in/UI/a_water_quality_monitoring.aspx, further plan of activities may be decided accordingly.). Additionally, limited data collection may be required to be carried out from field
- Data on inflow (time series of river discharges)

- Time series of water storage in the lake
- Satellite images depicting the change of the lake over the years of study and over the different months (deemed to be obtained from Indian and international sources, available in the public domain; for any specific requirement of high resolution images not available in the public domain that is essential for the analysis, the department, after prior approval, may choose to reimburse the actual cost of acquisition. Overhead or handling charge or cost of collection will not be admissible)
- Any other relevant data as required for completion of the study

7. DATA, SERVICES AND FACILITIES TO BE PROVIDED BY THE CLIENT

The available data on following features will be provided from the client side for this assignment. Collection of any additional primary and secondary data required for project preparation shall be the responsibility of consultant. The cost of data collection will be on the consultant. The department will provide:

- Office space and infrastructure (furniture, electric supply and water supply) to the consultant.
- Access to all the data/ information available with the client and needed for the study including data / information available on WIMS / India-WRIS, free of cost.
- All reports on drains list (notified and non-notified), studies pertaining to the Kolleru Lake, Hydraulic particulars of major infalling drains of Kolleru.
- Plan of the catchments of Kolleru Lake with the necessary available hydrological details
- Reports of various committees constituted earlier on the subject
- Recorded Annual Peak Discharges and Maximum recorded flood discharge available with the department.
- Any other relevant hydraulic data available with the client
- Support in data collection from different Central and State Government organisations through issue of authorisation letters.
- Support in organisation of capacity building trainings through designation of two officers to be continuously engaged throughout the assignment, nomination of officers for the training sessions and sending invitation to other implementing agencies of the National Hydrology Project for trainings

- Review outputs from the consultant aligned to the work schedule, and provide comments on deliverables within two weeks
- Call, participate in and chair in stakeholder meetings

8. HANDLING OF DATA:

i. The Consultant Firm as well as their individual employees/ consultants/ staff either shall not, during the term or even after the expiration of this contract, disclose any proprietary or confidential information related to the Project, the services, this contact, or the Client's business or operations without the prior written consent of the Client. The company and all the team members will have to sign an undertaking of secrecy in the stipulated format (to be shared by the Client to the successful bidder during signing of the contract), in order to maintain the data secrecy for the project

ii. The entire satellite data used in the study by the consultant, all analysis, results, maps, charts etc. and the subsequent report prepared shall be the exclusive property of client and the consultant has no right.

iii. In order to ensure the desired quality of the generated outputs as well as to ensure that the GIS layers are hydrologically, hydraulically and scientifically reasonable approximations. It was decided that the standards used for WRIS, as well as "Standards for Geo morphological Mapping Project" and "Standards for Land Degradation Mapping Project" given in manuals of NRSC may be referred.

iv. The compilation of Changes in Land Use/Land cover, and study of its impact on Lake Morphology is to be incorporated in the study report. The NRSC's published information about land use and land cover maps under NRSC Bhuvan thematic service on a scale of 1:50,000 as well as 1:2, 50,000 for all years can be used for this purpose, along with other data available in the public domain/ can be prepared from satellite image available in the public domain.

9. REGULAR COMMITTEE FOR CONTRACT MONITORING AND ADMINISTRATION

For the purposes of this assignment, the Consultant will report to a committee formed by the Project Coordinator, National Hydrology Project, Water Resources Department, Government of Andhra Pradesh and State Pollution Control Board

and/or any other representative as designated by him. The Consultant will work closely with the officers of the Water Resources Department and PCB as a Client throughout this assignment - specially to discuss interim results and methodology. This Committee will be responsible for overall management of the contract in all aspects. In order to ensure smooth functioning of the project, this Committee will meet once every month. On subjects related to technical matters that require a judgment, this Committee may refer to the Technical Advisory Committee.

10. LIST OF KEY PROFESSIONAL POSITIONS:

The Consultant shall setup their exclusive team for providing technical support so that the project is completed in a time bound manner

Qualification and Experience requirements:

S.No	Key Staff	Minimum Qualifications	Required Experience	Engagement in Person-months
K-1.	Team Leader cum Water Quality Expert (1 No., National)	M. Tech/ M.E Degree with specialization in Water Resources/ Environmental Engineering	- Minimum 10 years of professional experience. - Experience in managing projects related to river conservation and restoration, sanitation sector infrastructure development and management etc - Experience in the field of environmental protection, water quality monitoring and protection/ water sampling, testing, analyses and results assessments, health risk assessments, mapping of the contaminated sites, assessment of pollution distribution - Experience in the field of rejuvenation of water bodies/ pollution abatement - Experience as Team Leader/ Deputy Team Leader in at least one project	7

S.No	Key Staff	Minimum Qualifications	Required Experience	Engagement in Person-months
			- Minimum 5 years of professional experience - Experience in assessment of surface water resources - Experience in hydrological and water resources information systems	5
K-2.	Senior Hydrologist (1 No., National)	M. Tech/ M.E in Hydrology/ Water Resources	- Should be familiar with conventional and modern equipment and techniques for hydrological data collection, hydrological, hydraulic and water quality modeling and flow estimations - Experience in river rejuvenation works would be preferred	
K-3.	Waste Water/ Waste Treatment Technology Expert(1 No., National)	M. Tech/ M.E in Environmental Engineering	- Minimum 5 years of professional experience - Experience in development of technical design, costing etc of STPs and ETPs - Experience in Sustainable and clean wastewater treatment/ management technologies and sludge disposal	6
K-4.	Environmental and Social Expert(1 No., National)	M. Tech/ M.Sc in Environmental Science/ Engineering/ Social Science/ Community Development/ Sociology	- Minimum 5 years of professional experience - Experience in conducting Environmental and Social Impact Assessment studies/ undertaking social and community development projects - Extensive experience of working with communities and community-based organizations on community level projects	3

GOVERNMENT OF ANDHRA PRADESH
ENVIRONMENT, FORESTS, SCIENCE & TECHNOLOGY (SEC.I) DEPARTMENT

Letter No. EFS01-ENV/29/2020-SEC-I **Dated : 08.03.2022**
Computer No:1306660

From
The Special Secretary to Government
E.F.S & T Department,
A.P.Secretariat,
Velagapudi.

To
The Member Secretary
A.P.Pollution Control Board,
Vijayawada.(w.e).

Sir,

Sub :- **NGT case** - E.F.S & T Department – NGT, SZ, Chennai orders dated : 03.01.2022 in O.A.No.259 of 2020(SZ) & 02 of 2021(SZ) - Conducting Comprehensive Study to save the Kolleru WLS as well as the Kolleru Lake against the Pollution – Request to conduct comprehensive study by National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute - Report called for – Reg.

Ref :-
1. From the Registrar, National Green Tribunal, SZB, email, dated.18.12.2020 in OA NO.259/2020 (SZ).
2. Lr No. EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., dated : 22.12.2020.
3. From the Registrar, National Green Tribunal, SZB, email, dated.18.12.2020 in OA NO.259/2020 (SZ) & O.A.No.02 of 2021(SZ) dated.19.06.2021.
4. Lr No. EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., dated : 25.06.2021.
5. From Judicial Section through email :judicial-ngtsz@gov.in, email,dated.28.09.2021.
6. Lr.No. EFS01-ENV/29/2020-SEC-I, E.F.S & T(Sec.I) Dept., Dated : 04.10.2021.
7. From Judicial Section through email :judicial-ngtsz@gov.in, email, dated.29.11.2021.
8. Lr.No.EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., Dated : 10..12.2021
9. From the Prl.Chief Conservator of Forests, HoFF, A.P., Guntur, Rc.No.7251/2021/WL-1, dated : 10.02.2022.

&&&

In continuation to the letter 8th cited, I enclose herewith a copy of the reference 9th cited together with its enclosures wherein, the Prl.Chief Conservator of Forests (HoFF), Guntur in respect of orders of the Hon'ble National Green Tribunal in O.A.No.259 of 2020 and 02 of 2021(SZ), dated 03.01.2022 among other things, has stated as follows ;

Para No.	Direction	Action to be taken
6.	The State of Andhra Pradesh is directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.	**The State Government has to take a suitable decision in this regard to conduct a comprehensive scientific study to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention.**

9.	The Registry is directed to communicate this order **to the official respondents including the Principal Secretary for Agriculture, State of Andhra Pradesh and also the Chief Secretary, State of Andhra Pradesh by e-mail for their information and compliance of the direction in respect of the study to be conducted as suggested by the Principal Chief Conservator of Forest** to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a Wetland under the Ramsar Convention.	**The State Government has to take a suitable decision in this regard to conduct a study.**

2. He has therefore, requested to issue suitable instructions to the A.P.Pollution Control Board and to entrust the above study to National Environmental Engineering Research Insititute(NEERI), Nagpur or any other reputed Institute as suggested by the A.P.Pollution Control Board for conducting the comprehensive study to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention and report accordingly to the Hon'ble NGT(SZ).

3. I, therefore, request you to take further action to entrust the matter to National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute as suggested for conducting the comprehensive study to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention and report accordingly to the Hon'ble NGT (SZ).

Yours faithfully,

for Special Secretary to Government

Copy to :
The Principal Chief Conservator of Forests(HoFF),
A.P., Guntur.

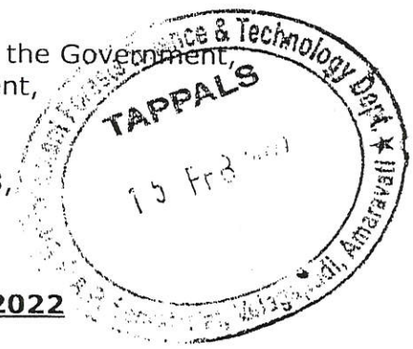
C326

2804/2022/SEC-I-EFS01

GOVERNMENT OF ANDHRA PRADESH
FOREST DEPARTMENT

From:
Sri N.Prateep Kumar, I.F.S.,
Prl. Chief Conservator of Forests &
Head of Forest Force,
Andhra Pradesh,
Aranya Bhavan,
Guntur-522004.

To:
The Secretary to the Government,
EFS&T Department,
A.P. Secretariat,
Velagapudi,
Guntur – 522503,



Rc.no.7251/2021/WL-1, Dt.10.02.2022

Sir,

Sub: Andhra Pradesh Forest Department – Wildlife – National Green Tribunal, Southern Zonal Bench at Chennai orders dated:03.01.2022 in O.A.no. 259 of 2020 (SZ) & O.A.no. 02 of 2021 (SZ) – Conducting Comprehensive Study to save the Kolleru WLS as well as the Kolleru Lake against the pollution – Report submitted - Regarding.

Ref:
1. Orders of the Hon'ble NGT, Southern Zone, Chennai Bench in O.A.no. 259 of 2020 (SZ) and 02 of 2021(SZ), dt.26.10.2021.
2. PCCF & HoFF, A.P., Guntur Rc.no.7251/2021/WL-1, dt:14.12.2021.
3. Orders of the Hon'ble NGT, Southern Zone, Chennai Bench in O.A.no. 259 of 2020 (SZ) and 02 of 2021(SZ), dt.03.01.2022.

****

Copies of the references cited are enclosed herewith.

It is submitted that, in pursuance of the orders of the Hon'ble National Green Tribunal, Southern Zone, Chennai in O.A.no. 259 of 2020 and 02 of 2021, Bench in the reference 1st cited, on the SUO MOTO cases registered by the Hon'ble National Green Tribunal (Southern Zone), Chennai, based on the Newspaper reports published in the Times of India, dated. 08.12.2020; Indian Express, dated. 09.12.2020 and in the Hindu, dt. 15.12,2020, under the captions "heavy metal content in water caused mysterious disease in Andhra Pradesh", "Andhra town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples" and "mystery illness raises concerns over Kolleru pollution" respectively and a news item telecasted in NDTV, dated. 09.12.2020 under the caption "Lead, Nickel found in Blood of people with a mystery illness in Andhra Pradesh", a report (reference 2nd cited) has been fled before the Hon'ble National Green Tribunal (SZ) in O.A.no.259 of 2020 (SZ) and O.A.no.02 of 2021 (SZ).

In this connection, it is submitted that, based on the said report, the Hon'ble NGT (SZ), Chennai has directed the Government in the reference 3rd cited as follows:

Para no.	Direction		Action to be taken
6.	The **State of Andhra Pradesh is directed to conduct a comprehensive scientific study** as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.	:	**The State Government has to take a suitable decision in this regard to conduct a comprehensive scientific study to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention.**

5532804/2022/SEC-I-EFS01

9.	The Registry is directed to communicate this order ***to the official respondents including the Principal Secretary for Agriculture, State of Andhra Pradesh and also the Chief Secretary, State of Andhra Pradesh by e-mail for their information and compliance*** of the direction **in respect of the study to be conducted as suggested by the Principal Chief Conservator of Forest** to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention.	:	**The State Government has to take a suitable decision in this regard to conduct a study.**

In view of the above, Government are requested to issue suitable instructions to the APPCB and may entrust the above study to National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute as suggested by the APPCB, for conducting the comprehensive study to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention and report accordingly to the Hon'ble NGT (SZ).

Encl: as Above

Yours faithfully,

Sd/-N.Prateep Kumar
Prl. Chief Conservator of Forests &
Head of Forest Force,
Andhra Pradesh.

//True Copy//

10/2/2022
Accounts Officer-I

10/02/2022

7321/2021/SEC-I-EFS01

GOVERNMENT OF ANDHRA PRADESH
ENVIRONMENT, FORESTS, SCIENCE & TECHNOLOGY (SEC.I) DEPARTMENT

Letter No. EFS01-ENV/29/2020-SEC-I **Dated :10.12.2021**
Computer No:1306660

From
The Secretary to Government
E.F.S. & T. Department,
A.P. Secretariat, Velagapudi.

To
The Member Secretary,
A.P.Pollution Control Board,
Vijayawada.

Sir,

Sub:- **NGT case** - E.F.S. & T. Department – Interim orders O.A.No.259 of 2020(SZ) & 02 of 2021 (SZ) - Suo Moto case - 'mystery' Illness, Traces of lead, nickel in blood samples," News item in the Times of India Newspaper, dt :09.12.2020, "Heavy Metal Content in water caused mysterious disease in Andhra Pradesh", & News item in NDTC, dt.09.12.2020, "Lead, Nickel found in Blood of people with mystery illness in Andhra"– Forwarded – Request to submit report before the Hon'ble National Green Tribunal(SZ) on or before 23.12.2021- Reg.

Ref :-
1. From the Registrar, National Green Tribunal, SZB, email, dated.18.12.2020 in OA NO.259/2020 (SZ).
2. Lr. No. EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., dated : 22.12.2020.
3. From the Registrar, National Green Tribunal, SZB, dated.18.12.2020 in OA NO.259/2020 (SZ) & O.A.No.02 of 2021(SZ), dated.19.06.2021.
4. Lr. No. EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., dated : 25.06.2021.
5. From the Judicial Section through email :judicial-ngtsz@gov.in, dated.28.09.2021.
6. Lr. No. EFS01-ENV/29/2020-SEC-I, E.F.S & T (Sec.I) Dept., Dated : 04.10.2021.
7. From Judicial Section through email :judicial-ngtsz@gov.in, dated.29.11.2021.

&&&

In continuation of the references 1st to 6th cited, I am to enclose herewith a copy of the reference 7th cited together with its enclosures and inform you that the above case has come up for hearing on 26.10.2021 and the Hon'ble National Green Tribunal has directed the respondents to submit report in the matter on or before 23.12.2021 and posted the case on 23.12.2021.

2. I, therefore request you to take immediate necessary action and submit report before the Hon'ble NGT in O.A.No.259 of 2020(SZ) & 02 of 2021(SZ) on or before 23.12.2021 to avoid further legal complications in the matter.

Yours faithfully,

for Secretary to Government

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

ORIGINAL APPLICATION No. 259 OF 2020 & 02 OF 2021 (SZ)
With
Original Application No.02 of 2021 (SZ)

In The Matter of:

Tribunal on its own motion Suo Motu based on the news item in The Indian Express, Newspaper dt. 09.12.2020, "Andhra town Eluru hit by „mystery" illness, Traces of lead, nickel in blood samples", News item in The Time of India, Newspaper Dt. 08.12.2020, "Heavy metal content in water Caused mysterious disease in Andhra Pradesh" & News item in NDTV, dt. 09.12.2020, "Lead, Nickel found in blood of people with Mystery illness in Andhra". .....Applicant (s)

Verses

The Chief Secretary of Govt. of Andhra Pradesh And Ors. ....Respondent (s)

With

Tribunal on its own motion Suo Motu based on the news item in The Hindu, edition dated 15.12.2020, "Kolleru (West Godavari Dt.) "Mystery illness raises Concerns over Kolleru Pollution". .....Applicant (s)

Verses

The Chief Secretary to Govt. of Andhra Pradesh, Andhra Pradesh and Ors. ....Respondent (s)

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K. Srinivas

K. Srinivas
Joint Chief Environmental Scientist (FAC)
Andhra Pradesh Pollution Control Board
Vijayawada.

REPORT OF ANDHRA PRADESH POLLUTION CONTROL BOARD ON THE POLLUTION OF KOLLERU LAKE IN THE MATTER OF O. A. No. 259 / 2020 (SZ) WITH O. A. No. 02 / 2021 (SZ) IN COMPLIANCE WITH THE HON'BLE NGT, CHENNAI ORDERS DATED 07.06.2021 & 03.01.2022:

1. Preamble:

The Hon'ble NGT, Chennai in its order dated 07.06.2021 in the case of O. A. No. 259 / 2020 (SZ) with O. A. No. 02 / 2021 (SZ) directed Andhra Pradesh Pollution Control Board (APPCB):

….. *"11. When this was pointed out, the learned counsel appearing for the State departments submitted that they will come with a further action taken report or any plan for the State Government to improve the water quality in that lake. The APPCB should also file a factual report on the pollution of Kolleru lake caused by Industries, Agricultural operations & sewage discharge. They are expected to carry out the analysis scientifically by collecting the samples at (1) inlets and outlets of the Industrial zones which are ultimately draining into the Kolleru Lake, (2) confluence points of major drains into the Kolleru Lake – surface water samples and sediment samples to be tested, (3) in case any settling ponds have been established prior to the joining of the drains into the lake, then samples of both surface water and the sediments in the settling ponds should be tested. The APPCB is expected to undertake the study comprehensively and not resort to filing a report based on cursory studies. The report has to be approved by the Chairman prior to submission.*

17. The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be taken for improving the water quality in that lake.

18. The respective departments are directed to submit a report to this Tribunal on or before 28.07.2021 by e-filing in the form of Searchable PDF/ OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules".

The copy of the Hon'ble NGT order dated 07.06.2021 is enclosed as *Annexure - 1.*

2. APPCB requests time for submission of report:

In this regard, APPCB has requested three months time for monitoring of water and sediment quality and various drains joining Kolleru lake and lake itself, vide letter dated 26.07.2021.

APPCB requested further three months time, vide letter dated 25.10.2021 to submit report on pollution of Kolleru lake as the three months period, August, September & October, being monsoon season with heavy rainfall in the catchment, the inlet drains and the lake with brimful water made it difficult the accessibility of the location for sampling of water and sediment.

Further, APPCB in its letter dated 21.12.2021, submitted that water quality monitoring of inlet drains and lake will be carried out post monsoon season upto January, 2022 and the comprehensive report on pollution of Kolleru lake will be submitted by 31.01.2022.

The Hon'ble NGT in its order, dated 03.01.2022 in the case of O. A. No. 259 / 2020 (SZ) with O. A. No. 02 / 2021 (SZ) directed Andhra Pradesh Pollution Control Board (APPCB):

….. *"8. They are directed to submit the respective reports to this Tribunal on or before 10.02.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules".*

The copy of the Hon'ble NGT order dated 03.01.2022 is enclosed as *Annexure - 2.*

3. Comprehensive report on pollution of Kolleru lake:

3.1 Introduction:

Kolleru lake is one of the largest fresh water Eco System (Wetland) in India of international importance recognized under Ramsar Convention (Iran 1971). The lake is located in between latitudes 16°13' and 16°45' North and longitudes 81°05' and 81°21' East and is about 35 kms away from the sea coast of Bay of Bengal. It is a naturally formed lake between the alluvial plains of river Godavari and river Krishna deltas and acts as a natural flood balancing reservoir. The lake with its variety of habitats supports rich biodiversity including some endangered species and supports livelihood of large population living in and around the wetland system.

The lake has been under tremendous pressure due to unsustainable developmental activities, particularly agriculture and aquaculture, which have led to concentration of

hydraulic structures, roads, bunds and other infrastructure within its basin. The area under cultivation within the lake increased since 1940, when British government granted pattas (title deeds) on payment of market value for land. In 1954, the government initiated cooperative farming in the region inducing formation of 93 farming societies on 850 sq km of the lake bed. The native paddy varieties were gradually replaced with shorter, high-yielding varieties that required application of high dosages of chemical fertilizers and pesticides. By 1969, almost entire lake was brought under cultivation and huge bunds were constructed to keep water out to protect the crops. As floods threatened cultivated areas almost every year, several control measures were also initiated during this period. However, the entire area was ravaged by a cyclone in 1969 which led to near complete destruction of agriculture. By the time flood control measures were completed, most of the people had become disillusioned with agriculture and had abandoned it. The roads and bridges that came up with agricultural development coupled with the increased demand for fish created a new livelihood opportunity and vast market for fish by 1978. Land use shifted to pisciculture which suddenly became profitable and by 1984, 5000 acres of government land within the lake bed was converted to fish tanks under the management of cooperative societies. Land was arbitrarily and haphazardly notified for pisciculture in total disregard to natural drainage Pattern. High profit margins subsequently induced contractors and private entrepreneurs into the Kolleru Lake area, who intensified aquaculture without adopting any environmental safeguards.

Realizing the rapid degradation of Kolleru Lake, Government of Andhra Pradesh constituted several committees to propose measures for its restoration. Most of these committees, however, suggested engineering solutions aimed at agriculture and fisheries development and flood control. The measures proposed aimed at diversion of water to the upstream reaches reducing flows to the lake. The report of the expert committee on floods of deltaic areas on Krishna, Godavari and Guntur districts by Mitra Committee in 1966 suggested construction of reservoirs at Budameru and Tammilaru for storage of flood waters (Mitra, 1966). Widening of Upputeru was proposed to drain the floodwaters with the lake levels controlled through construction of a regulator (Mitra, 1966; Sreeramakrishnaiah, 1987; Ramakrishnan, 1980). Pandurangam (1976) recommended construction of 71 tanks and necessary development to promote fisheries. Construction of roads, school buildings, hospitals,

electrification, and development of piggery, duckery and dairy farm for socioeconomic benefit were also recommended. Implementation of these recommendations have ultimately aggravated floods and led to overall degradation of wetland ecosystem.

3.2 Hydrology and drainage:

The lake spreads over an area of 2,25,250 acres up to +10' contour with rich biodiversity. Water spread area of Kolleru lake, contour-wise is as follows:

S. No.	Contour	Area in acres
1	Up to +10' contour MSL	2,25,250
2	Up to +7' Contour MSL	1,68,750
3	Up to +5' contour MSL	77,138
4	Up to +3' contour MSL	33,750

Source: *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021.*

3.3 Catchment Area:

The total catchment area of Kolleru lake is eleven lakhs ninety thousand seven hundred and fifty acres (11,90,750). Out of which, the upland catchment area is eight lakhs fifty thousand seven hundred and fifty acres (8,50,750) and the remaining three lakhs forty thousand acres (3,40,000) is in delta area. The lake receives inflows from nearly 67 medium & minor drains in West Godavari District and 14 drains from Krishna District. Major of them are, Budameru, Tammileru (east & west), Mondikodu, Bulusuvagu, Tokalapalli drain, Jodi Kaluva, Pandikodu drain, Kovvali drain, Chandraiah drain, Narasannapalem drain, Polaraj drain, etc. It receives an inflow of 1,10,000 cusecs of water and discharges @ 13,900 cusecs per day at +7' contour level capacity on the lake mouth through a single outlet called Upputeru drain into Bay of Bengal.

3.4 Declaration of Kolleru Sanctuary:

Government of Andhra Pradesh has issued notification declaring Kolleru as a Wildlife Sanctuary, vide G. O. Ms. No.120, EFS&T (For.III) Dept., dated 04.10.1999 (*Annexure – 3*). The Kolleru Wildlife Sanctuary spread over nine (9) Mandals, i.e., seven (7) Mandals in West Godavari and two (2) Mandals in Krishna District with an extent of

30,855.20 hectares or 77,138 acres up to +5' contour. Out of this 14,861.33 acres is privately owned patta lands.

The area details of sanctuary, District and Mandal wise are as follows:

S. No.	District	Name of the Mandal	Area in Acres
1	West Godavari	Eluru	23,900
2		Unguturu	134
3		Pedapadu	789
4		Denduluru	586
5		Akiveedu	6,914
6		Nidamarru	6,838
7		Bhimadolu	20,323
		West Godavari District total	**59,484**
8	Krishna	Kaikalur	10,295
9		Mandavalli	7,359
		Krishna District Total	**17,654**
		Total	**77,138**

Source: *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021.*

There are 122 villages inside the sanctuary area (46 bed villages and 76 belt villages) with a population of more than 3,00,000 people mostly dependent on the lake for their livelihood like capturing fish and traditional agriculture in the past upto 1980s.

3.5 Details of private patta lands owned by farmers:

Traditional agriculture in the privately owned lands is permitted as per G. O. Ms. No. 120, EFS & T (For.III) Dept., dated 04.10.1999. The details of patta lands owned by private owners having legal rights to practice traditional agriculture within the sanctuary area up to +5' contour is 14,861.33 acres out of the total sanctuary area of 77,138 acres. The details of patta lands, District and Mandal wise are as follows:

S. No.	District & Mandal	No. of villages	No. of Ryots	Extent of area in Acres involved
West Godavari District				
1	Eluru	7	399	823.61
2	Pedapadu	3	199	496.52
3	Denduluru	2	111	380.28
4	Bhimadolu	5	1,167	2,426.87
5	Nidamarru	11	4,126	6,150.63
6	Unguturu	1	30	146.46
7	Akiveedu	10	1,981	3,475.1
	Total	**39**	**8,013**	**13,899.47**

Krishna District				
1	Kaikaluru	10	125	571.45
2	Mandavalli	5	71	390.41
	Total	**15**	**196**	**961.86**
	Grand total	**54**	**8,209**	**14,861.33**

Source: *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021.*

As per G. O. Ms. No. 120, dated 04.10.1999, and the judgment of Hon'ble High Court, dated 30.07.2001 and also as per the Hon'ble Supreme Court of India's orders in April, 2006 the owners of the agriculture lands can practice traditional agriculture without using pesticides and chemicals.

But, the farmers are demanding to permit them to use chemical fertilizers to get more yields, which is illegal not permitted. Otherwise, they are requesting to pay adequate compensation to their own lands.

The District Collectors, West Godavari and Krishna have indicated an amount of Rs. 625.48 Crores and Rs. 30.00 Crores to acquire an extent of 13,899.47 acres and 961.86 acres, respectively.

As per the directions of the Hon'ble Supreme Court of India, totally, 1,776 tanks (1,140 in West Godavari and 636 in Krishna Districts) covering an area of about 43,724 acres (28,949 acres in West Godavari and 15,775 acres in Krishna) have been demolished in Kolleru Wildlife Sanctuary up to +5' contour and completed by 15.06.2006. The demolition was carried out by the Revenue Department under the supervision of District Collectors of respective Districts (***Source:*** *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021).*

3.6 Water quality monitoring of inlets, outlet & lake and status:

Andhra Pradesh Pollution Control Board (APPCB) has monitored water quality of Kolleru lake, its inlet streams / drains and the lone outlet, Upputeru during the period of six months from August, 2021 to January, 2022. Details of monitoring points along with GPS coordinates are as follows:

S. No.	Sampling Locations	Latitude	Longitude
I	**Lake Points:**		
1	Gudivakalanka, West Godavari District	16°39'21.84"N	81°12'03.18"E
2	Kokkirayalanka, West Godavari District	16°38'38.29"N	81°14'00.68"E
3	Chettunnapadu, West Godavari District	16°40'35.97"N	81°15'59.15"E
4	Pedaedlagadi, Krishna District	16°36'48.28"N	81°09'58.38"E

5	Chinaedlagadi, Krishna District	16°36'05.05"N	81°11'01.42"E
6	Kolleti kota, Krishna District	16°36'49.49"N	81°18'32.61"E
7	Circar canal, Krishna District	16°36'51.97"N	81°18'58.26"E
8	Srungavarappadu, Krishna District	16°39'03.25"N	81°17'57.29"E
9	Bird Life Sanctuary, Atapaka Village, Krishna District	16°34'15.51"N	81°13'52.35"E
II	**Inlets:**		
1	Mondikodu Grampachayat, West Godavari District	16°40'36.42"N	81°11'48.44"E
2	Jodi Kaluva, West Godavari District	16°38'24.85"N	81°15'56.04"E
3	Bulusuvagu, West Godavari District	16°47'51.96"N	81°14'02.66"E
4	Tokalapalli drain, West Godavari District	16°47'51.70"N	81°24'52.39"E
5	Pandikodu drain, West Godavari District	16°44'44.26"N	81°25'12.40"E
6	Kovvali drain, West Godavari District	16°43'47.92"N	81°09'43.25"E
7	East Tammileru, West Godavari District	16°43'20.42"N	81°07'30.58"E
8	West Tammileru, West Godavari District	16°41'40.65"N	81°05'27.29"E
9	Chandraiah drain, Krishna District	16°26'48.23"N	80°59'27.73"E
10	Budameru, Krishna District	16°30'38.27"N	80°57'31.55"E
11	Narasannapalem, Krishna District	16°33'45.55"N	80°57'23.53"E
12	Polaraj drain, Krishna District	16°33'49.64"N	81°11'28.40"E
13	Chandraiah drain at Polukonda Village, Krishna District	16°31'12.69"N	81°04'52.35"E
III	**Outlet:**		
1	Upputeru on road bridge Kaikaluru - Akivedu Highway	16°34'31.13"N	81°20'42.08"E
Maps showing the lake, inlet and outlet sampling points enclosed.			

Samples have been collected from the above mentioned lake points at nine (9) locations, inlet points at thirteen (13) locations and lone outlet, Upputeru for the period of six (6) months from August, 2021 to January, 2022 and analysed for important parameters in respect of organic, inorganic and bacteriological loads like, pH, Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Dissolved Oxygen (DO), Water Soluble Phosphates, Total Coli Form, Fecal Coli Form & toxic metals. Pesticide residues have been analyzed for the samples collected during August, 2021 & January, 2022.

Discussion on analysis results obtained during monitoring is as follows:

3.6.1 Lake water quality characteristics:

pH Values: pH value signifies whether water is acidic (<7.0) or alkaline (>7.0) or neutral (7.0) in nature. pH value of all the lake points collected during the six months period from August, 2021 to January, 2022 found to be neutral in nature in the range between 6.82 & 8.45, and are within the CPCB classification criteria for designated best use classes, A, B, C & D (Table – 1: pH values - Lake points). These neutral pH values at all the lake points shows that no effluents of acidic or alkaline nature are joining Kolleru lake.

Dissolved Oxygen (DO): Presence of **o**xygen in any water body in dissolved condition in optimum concentrations is very important for the survival of aquatic fauna. Contamination of any water body with domestic or industrial effluent will drastically affects the dissolved oxygen concentrations there by endangering the aquatic life.

The dissolved concentrations at various locations in the lake varies in the range between zero (nil) and 8.50 mg/lit (Table – 2: Dissolved Oxygen – Lake points). As per the CPCB classification criteria for designated best use, minimum 5.0 and 4.0 mg/lit of DO shall be present for the water to use as drinking water source (Class A & Class C) and 4.0 mg/lit of DO for propagation of wildlife and fisheries (Class D). DO values found to be < 4.0 mg/lit at Gudivakalanka during October, 2021; Kokkirayalanka during August, September & October, 2021; Chettunnapadu during August, 2021; Pedaedlagadi during August & October, 2021; Kolletikota, August, October & November, 2021 and Circar canal during November, 2021. Low concentrations of DO at these locations during the above said periods could be attributed to sudden gushing of domestic sewage contaminated inflow of storm water through various inlets into the lake thereby depleting the DO concentrations.

However, the DO concentration in the entire lake locations became saturated and stabilized to above 5.0 mg/lit during December, 2021 & January, 2022.

Total Dissolved Solids (TDS): Water soluble solids particularly salts in the form of anions and cations contributes to TDS in waters with high dissolved solids generally are of inferior palatability and may induce an unfavourable physiological reaction in the transient consumer.

TDS concentrations within the lake during the period of six months from August, 2021 to January, 2022 found to be in the range between 530 & 3880 mg/lit (Table – 3: Total Dissolved Solids – Lake points). On comparison with drinking water standards, the TDS concentrations at Gudivakalanka, September, 2021; Kokkirayalanka, Paedaedlagadi, Kolletikota, Circar canal & Srungavarappadu during January, 2022; Chinaedlagadi during August & September, 2021 & January, 2022 and Atapaka bird sanctuary during August, 2021 are exceeding the maximum permissible drinking water standard limit of 2000 mg/lit.

High concentrations of TDS in the lake could be attributed to the discharge of aqua culture pond effluents and domestic sewage with high TDS content into the lake through various inlets.

Chemical Oxygen Demand (COD): COD is used as a measurement of total organic pollution load, biodegradable & non-biodegradable in any wastewater or natural waters. COD concentrations in the lake found to be in the range between 4 to 156 mg/lit (Table – 4: Chemical Oxygen Demand – Lake points). No standards have been stipulated for the COD parameters either for drinking purpose or for other purposes like, propagation of wildlife & fisheries, irrigation, etc. However, high concentration of COD implies high concentration of organic pollution of that water body.

Higher concentrations of COD have been observed at various locations of the lake, which can be attributed to the joining of domestic sewage and aqua culture pond effluents in the lake through various inlets.

Bio-chemical Oxygen Demand (BOD): BOD parameter is a very important in respect of water pollution and indicates the concentration of organic load of a water or a wastewater, which is biodegradable in nature or amenable for bacteria for degradation.

BOD concentrations in the lake found to be in the range between 1.2 and 20.2 mg/lit (Table – 5: Bio-chemical Oxygen Demand (mg /l) – Lake points). As per the CPCB classification criteria for designated best use, BOD shall be < 2.0 and < 3.0 mg/lit in the water to use as drinking water source (Class A, B & Class C).

BOD values in the lake found to be > 3.0 mg/lit at Gudivakalanka during October, 2021 & January, 2022; Kokkirayalanka during January, 2022; Chettunnapadu & Chinaedlagadi during the entire six months period from August, 2021 to January, 2022; Pedaedlagadi during August, December, 2021 and January, 2022; Kolletikota during August, 2021 & January, 2022 and Circar canal & Srungavarappadu during January, 2022.

Further observed that the BOD concentrations are exceeding the standard limit of 3.0 mg/lit at all locations during January, 2022.

Phosphates (water soluble): Presence of phosphates in the water indicates that the water is contaminated with domestic sewage. Phosphate concentrations in the lake found to be in the range between 0.09 to 1.36 mg/lit (Table – 5: Phosphates (mg /l) – Lake points). No standards have been stipulated for the Phosphate parameter either for drinking purpose or for other purposes like, propagation of wildlife & fisheries, irrigation, etc.

Phosphate is present in almost all the locations of the lake in varying concentrations, which indicates that phosphate is finding its way in the lake through various inlets carrying domestic sewage. Phosphate is an ingredient in the detergents used in the households for washing cloths and utensils.

Total coliform & Fecal coliform: Total coliform bacteria in the lake found to be in the range between 7 and 460 MPN/100 ml. Fecal coliform bacteria in the lake found to be < 3 MPN / 100 ml.

Source of total and fecal form bacteria in the lake water is joining of domestic wastewater into the lake through various inlets.

Metals: Lake water has been tested for metals like, Iron, Manganese, Nickel, Total Chromium, Lead, Copper, Cadmium, Arsenic, Mercury and Zinc. These concentrations have been compared with that of the metal standards stipulated for drinking water (IS 10500:2012).

Iron concentration in the lake found to be in the range between 0.0015 and 1.41 mg/lit. All except at locations Chinaedlagadi during August, 2021 and Kolletikota &

Circar canal during January, 2022, the iron concentrations in the lake found to be within the stipulated acceptable standard limit of 0.3 mg/lit. for drinking water.

Manganese concentration in the lake found to be in the range between BDL and 0.33 mg/lit. All except at locations Chettunnapadu during August, 2021and Chinaedlagadi & Kolletikota during January, 2022, the manganese concentrations in the lake found to be within the stipulated acceptable standard limit of 0.1 mg/lit. for drinking water.

Nickel concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.02 mg/lit. for drinking water.

Total Chromium concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.05 mg/lit. for drinking water.

Lead concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.01 mg/lit. for drinking water.

Copper concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.05 mg/lit. for drinking water.

All except at locations Gudivakalanka, Kokkirayalanka & Chettunnapadu during September, 2021 and Chinaedlagadi, Kolletikota & Circar canal during October, 2021, 2022, the cadmium concentrations in the lake found to be within the stipulated acceptable standard limit of 0.003 mg/lit. for drinking water.

Arsenic concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.01 mg/lit. for drinking water.

Mercury concentrations in the entire lake found to be within the stipulated acceptable standard limit of 0.001 mg/lit. for drinking water.

Zinc concentrations in the entire lake found to be within the stipulated acceptable standard limit of 5.0 mg/lit. for drinking water.

Pesticides: Lake waters at these above said nine (9) lake points have been analyzed for Organochloro and organophosphorus pesticide residues like Alpha – BHC, Beta – BHC, Gamma – BHC, 4,4'- DDD, 4,4'- DDE, 4,4'- DDT, Aldrin, Dieldrin,

Endosulfan – I, Endosulfan Sulfate, Endrin, Heptachlor, Heptachlorapoxide, Methoxychlor, Endosulfan – II, Delta – BHC and Endrin Aldehyde for the samples collected during August, 2021, and found to be below detectable concentrations (0.05 mg / lit.). Lake waters and sediments have been analyzed for pesticide residues during January, 2022 through 3rd party reputed Environmental Laboratory, M/s. Vimta Labs Ltd., Hyderabad. Not found any pesticide residue in both water and sediments even in detectable concentrations (0.00002 mg / l).

3.6.2 Water quality characteristics of inlets:

3.6.2.1 Mondikodu drain – Lake inlet:

Water sample from this drain collected after confluence with East Tammileru river before joining the lake. Mondikodu drain carries domestic sewage from Denduluru and the villages along the drain. East Tammileru river carries domestic sewage of Eluru town and the villages along with the river. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 10.

pH value is found to be neutral in nature between 7.03 & 7.54; TDS found to be between 456 & 2639 mg / lit; Dissolved Oxygen found to be between 4.9 & 7.0 mg / lit; BOD found to be between 1.8 & 10 mg / lit; COD found to be between 12 & 68 mg / lit; Phosphates 0.02 & 0.76 mg / lit; Total coliform found to be between 15 & 440 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.2 Jodikaluva drain – Lake inlet:

This is a drain originates within the lake bed and carries domestic sewage and aquaculture pond effluents located at Gudivakalanka, Kokkirayalanka, Paidichintapadu, etc. villages and confluences with Kolleru lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 11.

pH value is found to be neutral in nature between 7.05 & 7.76; TDS found to be between 739 & 2432 mg / lit; Dissolved Oxygen found to be between 4.8 & 7.2 mg

/ lit; BOD found to be between 2.2 & 8.8 mg / lit; COD found to be between 24 & 60 mg / lit; Phosphates 0.70 & 1.74 mg / lit; Total coliform found to be between 15 & 470 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.3 Bulusuvagu drain – Lake inlet:

The objective of selection of the drain location is to verify discharges of effluents from M/s. Tirumala Milk Products Pvt. Ltd., M/s. Andhra Sugars Ltd., M/s. Naga Hanuman Solvent Oils Pvt. Ltd., etc. located upstream area. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 12.

pH value is found to be neutral in nature between 7.31 & 7.58; TDS found to be between 618 & 2673 mg / lit; Dissolved Oxygen found to be between 2.1 & 6.1 mg / lit; BOD found to be between 2.02 & 15 mg / lit; COD found to be between 20 & 104 mg / lit; Phosphates 0.02 & 1.16 mg / lit; Total coliform found to be between 11 & 460 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.4 Tokalapalli drain – Lake inlet:

The drain originates from the North side catchment of the lake and carries domestic sewage of villages located on its banks and aquaculture ponds. Tadepalligudem municipality is also located in the upstream catchment area to this drain. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 13.

pH value is found to be neutral in nature between 7.07 & 7.76; TDS found to be between 260 & 1302 mg / lit; Dissolved Oxygen found to be between 5.0 & 5.7 mg / lit; BOD found to be between 2.0 & 12.0 mg / lit; COD found to be between 10 & 84 mg / lit; Phosphates 0.03 & 0.41mg / lit; Total coliform found to be between 7 & 440 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.5 Pandikodu drain – Lake inlet:

The drain originates from North Eastern catchment of the lake and carries domestic sewage of various villages located in the vicinity and aquaculture pond effluents located upstream area of the lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 14.

pH value is found to be neutral in nature between 7.03 & 7.66; TDS found to be between 350 & 3054 mg / lit; Dissolved Oxygen found to be between 1.5 & 6.4 mg / lit; BOD found to be between 0.8 & 8.2 mg / lit; COD found to be between 16 & 56 mg / lit; Phosphates 0.03 & 0.80 mg / lit; Total coliform found to be between 11 & 380 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.6 Kovvali drain – Lake inlet:

The drain originates at Dendulru and carries domestic sewage & agriculture runoff from various villages located in the vicinity of the drain. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 15.

pH value is found to be neutral in nature between 7.12 & 7.96; TDS found to be between 350 & 912 mg / lit; Dissolved Oxygen found to be between 5.2 & 7.4 mg / lit; BOD found to be between 1.6 & 9.6 mg / lit; COD found to be between 12 & 68 mg / lit; Phosphates 0.02 & 0.89 mg / lit; Total coliform found to be between 15 & 440 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.7 East Tammileru River – Lake inlet:

Tammileru is a river originates in the upstream uplands of Eluru town and divides into East & West Tammileru rivulets and carries domestic sewage of Eluru town & villages and agriculture runoff and drains into Kolleru lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 16.

pH value is found to be neutral in nature between 7.17 & 7.75; TDS found to be between 368 & 789 mg / lit; Dissolved Oxygen found to be between 5.4 & 8.0 mg / lit; BOD found to be between 2.2 & 9.2 mg / lit; COD found to be between 16 & 60 mg / lit; Phosphates 0.05 & 0.70 mg / lit; Total coliform found to be between 20 & 380 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.8 West Tammileru River – Lake inlet:

West Tammileru is also carries domestic sewage of Eluru town & villages and agriculture runoff and drains into Kolleru lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 17.

pH value is found to be neutral in nature between 7.39 & 7.84; TDS found to be between 472 & 1008 mg / lit; Dissolved Oxygen found to be between 5.2 & 6.9 mg / lit; BOD found to be between 1.8 & 12 mg / lit; COD found to be between 16 & 88 mg / lit; Phosphates 0.03 & 0.8 mg / lit; Total coliform found to be between 15 & 460 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.9 Chandraiah drain – Lake inlet:

Chandraiah drain originates beyond Gudivada municipality and joins Kolleru lake from its South side. The drain carries domestic sewage of Gudivada town and villages located in the vicinity of the drain. The aquaculture pond effluents also join the drain before confluences with the lake. Water quality of the drain has been

monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 18.

pH value is found to be neutral in nature between 6.58 & 8.19; TDS found to be between 485 & 585 mg / lit; Dissolved Oxygen found to be between 3.5 & 6.8 mg / lit; BOD found to be between 0.8 & 4.0 mg / lit; COD found to be between 12 & 32 mg / lit; Phosphates 0.23 & 1.82 mg / lit; Total coliform found to be between 15 & 240 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.10 Budameru drain – Lake inlet:

Budameru is a rivulet originates from upstream catchment area of Vijayawada city and finally drained into Kolleru lake. Budameru rivulet carries domestic sewage generated from Vijayawada city and other villages located in its vicinity. It also carries aquaculture pond effluents located in its catchment before joining the lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 19.

pH value is found to be neutral in nature between 6.93 & 7.75; TDS found to be between 607 & 863 mg / lit; Dissolved Oxygen found to be between 3.0 & 5.6 mg / lit; BOD found to be between 1.4 & 8.6 mg / lit; COD found to be between 8 & 56 mg / lit; Phosphates 0.40 & 1.0 mg / lit; Total coliform found to be between 15 & 210 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.11 Narasannapalem (Arugolanu) drain – Lake inlet:

The drain mainly carries agriculture runoff, domestic sewage from various villages located within its vicinity and aquaculture pond effluents. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 20.

pH value is found to be neutral in nature between 7.17 & 7.74; TDS found to be between 553 & 675 mg / lit; Dissolved Oxygen found to be between 3.7 & 7.3 mg / lit; BOD found to be between 1.2 & 9.2 mg / lit; COD found to be between 8 & 60 mg / lit; Phosphates 0.37 & 0.92 mg / lit; Total coliform found to be between 15 & 460 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.12 Polaraju drain – Lake inlet:

The drain mainly carries agriculture runoff, domestic sewage from various villages located within its vicinity and aquaculture pond effluents and joins the lake at its Southern side. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 21.

pH value is found to be neutral in nature between 7.45 & 8.09; TDS found to be between 582 & 2710 mg / lit; Dissolved Oxygen found to be between 4.5 & 6.7 mg / lit; BOD found to be between 2.3 & 5.4 mg / lit; COD found to be between 28 & 40 mg / lit; Phosphates 0.53 & 1.13 mg / lit; Total coliform found to be between 7 & 240 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.13 Chandraiah drain at Polukonda Village – Lake inlet:

This is the second sampling point on this drain monitored for water quality. This point of sampling is located at Polukonda village just before confluence with lake. Water quality of the drain has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics have been depicted in the Table – 22.

pH value is found to be neutral in nature between 7.37 & 7.92; TDS found to be between 582 & 1016 mg / lit; Dissolved Oxygen found to be between 3.7 & 6.9 mg / lit; BOD found to be between 2.4 & 9.4 mg / lit; COD found to be between 27 &

64 mg / lit; Phosphates 0.40 & 0.99 mg / lit; Total coliform found to be between 11 & 120 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.2.14 Water quality characteristics of outlet:

Water quality of the lone outlet of Kolleru lake at Upputeru has been monitored for the period of six months from August, 2021 to January, 2022. The water characteristics of Upputeru are depicted at Table – 23.

pH value is found to be neutral in nature between 6.96 & 7.90; TDS found to be between 820 & 1860 mg / lit; Dissolved Oxygen found to be between 3.10 & 5.20 mg / lit; BOD found to be between 2.4 & 10.4 mg / lit; COD found to be between 28 & 76 mg / lit; Phosphates 0.54 & 1.0 mg / lit; Total coliform found to be between 11 & 210 MPN / 100 ml and Fecal coliform found to be < 3.0 MPN / 100 ml.

As far as metal concentrations are concerned, none of them have crossed the drinking water standard limits.

3.6.3 Water quality characteristics of Budameru:

As a part of monitoring of inlets of Kolleru lake, APPCB has carried out water quality monitoring of Budameru rivulet at eight (8) locations starting from Vijayawada city till its confluence with Kolleru lake during January, 2022. Water quality characteristics have been depicted at Table – 24.

pH value at all the locations is found to be neutral in nature between 6.93 & 7.34; TDS found to be between 627 to 903 mg / lit; Dissolved Oxygen found to be between zero (Nil) & 3.8 mg / lit; BOD found to be between 6.8 & 12.2 mg / lit; COD found to be between 56 & 88 mg / lit; Phosphates 0.09 & 1.18 mg / lit; Total coliform found to be between 1100 & > 2400 MPN / 100 ml and Fecal coliform found to be between 39 & 75 MPN / 100 ml.

Hence, the water following in the Budameru rivulet is not fit for drinking (Class ‘A’& ‘C’), bathing purpose (Class ‘B’), Propogation of wildlife & fisheries (Class ‘D’) as per the CPCB classification criteria for designated best use.

Analysis results of the Kolleru lake inlets, drains and lone outlet - *Annexure – 4* & Analysis reports – *Annexure - 5*. CPCB classification of water quality criteria for designated best use – *Annexure – 6* & drinking water standards – IS 10500:2012 – *Annexure - 7*.

3.7 Interpretation of results:

3.7.1 The neutral pH value of all the locations of lake, inlets and outlet suggests that acidic or alkaline effluents are not joining the lake.

3.7.2 The analysis results of lake points obtained during the period of six months from August, 2021 to January, 2022 suggest that there is no consistency in the values of DO, BOD & TDS in the same location and varying place to place within the lake. This could be because of varying amounts of rain fall in the catchments of various inlet drains and varying amounts of organic and inorganic contaminants joining the lake.

3.7.3 DO values in the lake observed to be between zero (nil) & 8.40 mg/lit and BOD values found to be between 0.8 & 20.2 mg/lit. The low values of DO (<4.0 mg/lit), high values of BOD (>3.0 mg/lit) at certain times at certain locations and presence of water soluble phosphates within the lake is attributed to the joining of untreated domestic sewage and aqua culture pond effluents into the lake through various inlet streams and drains. Domestic sewage is entering the lake mainly from Vijayawada city through Budameru rivulet, Eluru town through East & West Tammileru rivulets and Gudivada town through Chandrayya drain. Apart from these major Urban Local Bodies, Domestic sewage from various villages located in the vicinity of these inlet drains and effluents of thousands of aqua culture ponds located in the periphery and within the lake are also responsible for low DO and high BOD contents in the lake.

3.7.4 However, these domestic and aqua culture pond effluents are either getting diluted with rain water during monsoon season or getting self purified while flowing in the drains.

3.7.5 Low values of DO (<4.0 mg/lit) and high values of BOD (>3.0 mg/lit) at times and at certain locations as observed during the six months period monitoring rendering the lake water unfit for potable purpose (Class A & C), bathing purpose Class B and propagation of wildlife and fisheries (Class D).

3.7.6 Growth of water hyacinth within the lake portions indicate that the lake is enriched with plant nutrients like Nitrogen & Phosphorous. However, it is a good sign that lake water does not contain appreciable amount of toxic metal and the concentrations of metals are not exceeding the acceptable and permissible standard of drinking water (IS: 10500:2012).

3.7.7 Further, the lake water or the lake sediments does not contain the organocloro or organo phosphorous pesticide residues even in detectable concentrations. May be because of dilution affect and flushing out these contaminants through flooding during monsoon season.

4. Observations made during water quality monitoring of Kolleru lake and its inlets:

4.1 The three months August, September & October being monsoon season and continued the rainy season upto 1st week of December, 2021, the lake and all the inlets found to be with full of water to its brim.

4.2 Dumping of Municipal Solid Waste along and inside into the inlet drains of the lake was observed wherever the villages and towns are located.

4.3 Discharge of domestic sewage from towns & villages into the inlet drains of the lake was observed at several locations. Photographs pertaining to discharge of domestic sewage & dumping of Municipal Solid Waste into the Budameru rivulet, one of the main feeder channel for Kolleru lake at various locations staring from Vijayawada city till its confluence with Kolleru lake attached (**Photographs – 26 to 30**).

4.4 Discharge of untreated domestic sewage into the lake by almost all the bed villages and peripheral villages polluting the lake water (**Photograph – 4**). These villages have not been provided with sewage treatment systems of any kind.

4.5 Dumping of Municipal Solid Waste and Construction & Demolition Waste into the lake or all along the roads at village points were observed (**Photographs – 2, 3, 4, 5, 6, 7, 8 & 23**).

4.6 Some of the bed & peripheral villages have been provided with compost making sheds. But, they are found kept unused for the said purpose (**Photograph – 1**).

4.7 Heavy growth of water hyacinth on the lake water was observed at Chinayedlagadi, Pedayedlagadi, Gudivakalanka, Kokkirayalanka, Chettunnapadu and Kolleti kota, which indicates that the water at these locations is enriched with plant nutrients like

Nitrogen & Phosphorous through domestic sewage & aquaculture pond discharges into the lake various drains (**Photographs – 20 to 23**).

4.8 Traditional methods of fishing using mavus and nets of size which does not cause damage to seed but catches the fish of harvestable size was observed. Ordinary boats without motors for the movement of people within the lake were observed at certain locations.

4.9 It was observed that thousands of aquaculture ponds located on almost all sides of the lake and at villages located within the lake at Gudivakalanka, Kokkirayalanka, Chettunnapadu, Penchikalamarru, Kolleti kota, etc. It is also difficult to ascertain whether these aquaculture ponds within the bed and periphery of the lake are authorized ones.

4.10 None of these aquaculture ponds have systems for treatment of spent effluents before discharging into the various drains leading into Kolleru lake.

5. Sources of pollution identified:

During the monitoring of six months period from August, 2021 to January, 2022, it was observed that mainly:

5.1 The domestic sewage originating from Vijayawada city through Budameru rivulet which is one of the main feeder channel to Kolleru lake. Untreated domestic sewage is joining the Budameru at several locations starting from Vijayawada city till the confluence point with the lake (**photographs - 26 to 30**).

Vijayawada Municipal Corporation generates about 149 MLD of sewage and has treatment facilities to treat 130 MLD located at Ramalineshnagar, Ajithsingh nagar and Jakkampudi. Further, STP having a capacity of 20 MLD is under construction at Jakkampudi.

5.2 Eluru town, which is the district head quarter for West Godavari district generates about 26 MLD domestic sewage and all the domestic sewage is finding its way into the East & West Tammileru rivulets and finally joins Kolleru lake. Presently, the Eluru Urban Local Body is constructing one STP with a capacity to treat 5 MLD domestic sewage.

5.3 Gudivada town which generates about 10 MLD domestic sewage is also does not have treatment facilities at its disposal. The domestic sewage generated by this town is

finding its way into the Kolleru lake through the Chandrayya drain.

5.4 Thousands of aqua culture ponds are located in the periphery surrounding the lakes all sides and within the lake area does not have treatment systems for treatment of aqua culture pond effluents and all these untreated effluents are finding their way into the lake through various drains.

5.5 There are 122 villages inside the sanctuary area (46 bed villages and 76 belt villages) and none of the village is having treatment systems for treatment of domestic sewage and the same is finding its way into the Kolleru lake. Some of the villages are provided with compost making sheds, but, none of the sheds have been put into use (**Photograph - 1**).

5.6 Apart from Vijayawada, Eluru and Gudivada ULBs, there are several villages located in the vicinity of various inlet drains and the domestic sewage generated by this villages is also finding its way into the lake.

6. Industrial pollution – status:

No industrial effluents are joining either into the inlet drains of Kolleru lake or directly into the lake. APPCB is not issuing consents / permissions to any industry to discharge untreated / treated effluents outside the industry premises or into any drains / channels within the 10 kms radius from +5 contour of Kolleru wildlife sanctuary.

APPCB is also not permitting any new industry establishment to set up within the 10 km radius from +5 contour of Kolleru wildlife sanctuary.

7. Water quality management of Kolleru lake - Wetland International-South Asia (WISA), 2008 Plan:

The Integrated Management Plan for Kolleru Wildlife Sanctuary was prepared by Wetland International-South Asia (WISA), 2008 under an assignment from Forest Department, Government of Andhra Pradesh has made certain recommendations to improve the water quality of Kolleru lake:

7.1 Domestic sewage generated by the towns and villages is joining the lake directly or indirectly through various inlet channels resulting in near eutrophic conditions in the lake seriously jeopardizing its natural assimilation. Development of domestic sewage management system in these towns and villages including located in the lake bed and allowing only properly treated water to enter the lake to maintain the water quality to

its designated best use.

7.2 Management of municipal solid and construction & demolition wastes in and around urban local bodies and villages including located in the lake bed as per the relevant rules of the Environment (Protection) Act, 1986.

7.3 Providing low-cost sanitation systems for the public living in the peripheral and lake bed villages.

7.4 Control of diffused pollution through wetland technology for the removal of contaminants from the water in order to decrease the possibility of detrimental impacts on humans and aquatic ecosystem. Many contaminants, including a wide variety of organic compounds and metals, are toxic to humans and other organisms.

Source: *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021.*

8. Azeez Committee report on the proposal for downsizing the Kolleru Wildlife Sanctuary (+5 to +3 feet contour), 2011:

Ministry of Environment and Forest (MoEF), Government of India (GoI) constituted this committee to look into the issue of downsizing the Kolleru Wildlife Sanctuary (+5 to +3 feet contour). Recommendations of Azeez Committee on Pollution management of Kolleru Lake:

8.1 Identify area of major pollution sources (e.g., Rechacode, Budameru side – 'A' and make appropriate means for treatment of the effluents before they reach Kolleru lake. Also to consider diverting the effluents away from the Kolleru lake.

8.2 Appropriate treatment plants need to be established to clean up water flowing to all streams carrying pollutants from various sources. In case found necessary, the stream Budameru may be diverted from the lake to empty into the sea directly through another drain or Krishna river.

8.3 Industrial waste waters entering Chandraiah drain joining Kolleru Lake should be diverted to the sea through Mullapudi drain.

8.4 Industries should be enforced to install Effluent Treatment Plants (ETP). It is also to be ensured that the ETPs functions properly. Stringent action should be taken including closure of the polluting industries and penalization, if cleaning their effluents is not affected.

8.5 There should be continuous monitoring of water quality of the lake, preferably with cooperation from the locals.

8.6 The Municipalities also should be forced to manage their wastes, to build ETPs and to execute scientific means to dispose of their solid wastes. Appropriate measures should be taken to force the three municipalities to build and operate ETPs for treatment of sewerage entering the lake.

8.7 Local authorities of the towns and villages along the drains and channels should be compelled to provide collection and treatment systems for sewage by extending financial help.

8.8 Discharges from the fishponds above +5 contour should be stopped and the farms may be forced to build and operate ETPs for treating their water, at their own cost. In case of failure, action should be taken to demolish the fishponds.

Source: *Department of Forest, Govt. of Andhra Pradesh report dated 02.11.2021.*

9. Recommendations:

The following recommendations have been submitted to improve and maintain the water quality of Kolleru lake Class A category of CPCB specified criteria for designated best use with the characteristics, pH between 6.5 and 8.5; dissolved oxygen 6.0 mg/lit or more BOD; 2.0 mg/lit or less and Total Coliform 50 MPN/100 ml or less:

9.1 Municipal corporations, Vijayawada & Eluru and Municipality, Gudivada shall ensure that no domestic sewage or the municipal solid waste is discharged / dumped in the Budameru, East & West Tammileru rivulets and Chandrayya drain. These ULBs shall provide facilities for interception & diversion of entire domestic sewage and treatment. Only treated sewage shall either be disposed into the respective streams or shall be utilized for gardening or industrial purposes – Action to be initiated by the concerned ULBs and MA&UD Department.

9.2 Provision of treatment facilities for domestic sewage, domestic solid waste and construction & demolition waste in all the villages located in the vicinity of various inlet streams & drains and in the 122 bed & peripheral villages of Kolleru lake to ensure that only treated domestic sewage joins the lake – Action to be initiated by the district Panchayat offices and PR&RD Department.

9.3 Provision of treatment facilities for the aqua culture pond effluents to ensure that only

treated effluents only joins the Kolleru lake. Creation of awareness among the aquaculture formers on the use of feed and antibiotics to ensure prevention of excessive usage – Action to be initiated by the Fisheries Department.

9.4 To ensure no industrial effluent (treated or untreated) is discharged into the inlet streams & drains or into the lake – Action to be initiated by APPCB.

9.5 Continue to monitor water quality of all the inlet streams / drains, lake points and outlet for the characteristics including toxic metals and pesticide residues in future also – Action to be initiated by APPCB.

9.6 Creation of awareness among the farmers on the use of fertilizers and pesticides to ensure prevention of excessive use and usage of banned pesticides in the lake catchment. Inventorisation of pesticides (organo-chloro, organo-phosphorus, carbamates, etc.) and fertilizers used in the catchment of Kolleru lake – Action to be initiated by the Agriculture Department.

9.7 As there were allegations that the lake is subjected to encroachments, drawing of clear cut lake boundary on the field upto its +5 contour for identification of unauthorized encroachments of the Kolleru wildlife sanctuary and for identification of unauthorized establishments of aqua culture ponds and for their removal – Action to be initiated by Forest Department.

9.8 The subject of improvement of water quality of Kolleru lake involves various Stakeholder Departments like, MA&UD, PR&RD, EFS&T, Fisheries and Agriculture. Hence, it is suggested to constitute a team with the officials from the above Stakeholder Departments to formulate action plan for improvement of water quality of the lake to Class 'A' level.

Date: 15.02.2022,

Place: Vijayawada.

K Srinivas

K. Srinivas
Joint Chief Environmental Scientist (FAC)
Andhra Pradesh Pollution Control Board
Vijayawada.

Item No. 12 & 13:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Original Application No.259 of 2020 (SZ)
With
Original Application No.02 of 2021 (SZ)

(Through Video Conference)

IN THE MATTER OF

Tribunal on its own motion
Suo Motu based on the news item in
The Indian Express, Newspaper dt. 09.12.2020,
"Andhra town Eluru hit by 'mystery' illness,
Traces of lead, nickel in blood samples",
News item in The Time of India, Newspaper
Dt. 08.12.2020, "Heavy metal content in water
Caused mysterious disease in Andhra Pradesh" &
News item in NDTV, dt. 09.12.2020,
"Lead, Nickel found in blood of people with
Mystery illness in Andhra"

...Applicant(s)

Versus

The Chief Secretary of Govt. of Andhra Pradesh

And Ors.

…Respondent(s)

With

Tribunal on its own motion
Suo Motu based on the news item in
The Hindu, edition dated 15.12.2020,
"Kolleru (West Godavari Dt.) "Mystery illness raises
Concerns over Kolleru Pollution"

...Applicant(s)

Versus

The Chief Secretary to Govt. of Andhra Pradesh,

Andhra Pradesh and Ors.

…Respondent(s)

Date of hearing: 07.06.2021.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE MR. Dr. K. SATYAGOPAL, EXPERT MEMBER

O.A. No.259/2020:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R7.

O.A. No.02/2021:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R8.

ORDER

1. The above two cases have been Suo Motu registered by this Tribunal on the basis of the newspaper reports published in The Indian Express dated, 09.12.2020 and also in The Times of India dated, 08.12.2020 under the caption ***"Andhra Town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples"***, ***"Heavy metal content in water caused mysterious disease in Andhra Pradesh"*** respectively and a news item

published in NDTV dated 09.12.2020 under the caption ***"Lead, Nickel found in blood of people with mystery illness in Andhra Pradesh"*** and also in The Hindu dated 15.12.2020 under the caption ***"Mystery illness raises concerns over Kolleru Pollution"***.

2. Further, this Tribunal also considered the directions given by the Principal Bench of National Green Tribunal, New Delhi in ***O.A. No.176 of 2019 (A.P. Chandrashekar Vs. State of Andhra Pradesh & Ors.)*** dated, 05.01.2021 in respect of the alleged pollution in Kolleru Lake and on the basis of the report submitted by the District Magistrate, Machilipatnam of Krishna District, the Principal Bench had disposed of the matter and it is not known as to whether the recommendations made by the District Magistrate in that case has been implemented or not.

3. Since the learned counsel appearing for the State respondents in both the cases submitted that the State of Andhra Pradesh had already appointed a high level committee to go into the question and certain reports have been obtained and on that basis, steps will be taken to redress the issue, this Tribunal has not appointed any separate committee to go into the question.

4. When the matter came up for hearing today through Video Conference, Mrs. Madhuri Donti Reddy represented respondents 1 to 7 in O.A. No.259/2020 and respondents 1 to 8 in O.A. No.02/2021.

5. In O.A. No.259/2020, the Andhra Pradesh Pollution Control Board had submitted a status report dated 12.01.2021 which reads as follows:-

"Report submitted by Andhra Pradesh Pollution Control Board in pursuance to the order dated 16.12.2020 in O.A. No.259 of 2020 passed by the Hon'ble National Green Tribunal, Southern Bench, Chennai.

Introduction: The present report is submitted in pursuance to the order dt. 16.12.2020 of this Hon'ble Tribunal in O.A. No. 259 of 2020, whereby SUO - MOTU notice was issued to the Andhra Pradesh Pollution Control Board "APPCB" hereinafter and the Board was directed to file a report.

The Chairman, Andhra Pradesh Pollution Control Board (APPCB) is respondent No. 4.

The APPCB is primarily submitting the present report submitting the following:

Details of the incident:

An unusual incident occurred in Eluru town on the evening of 05.12.2020, leading to sudden hospitalization of people residing in the region, exhibiting symptoms of convulsions, vomiting, drowsiness etc.

II. Monitoring conducted by APPCB & its inferences:

1. APPCB officials carried out ambient air quality monitoring on 06.12.2020 at the following locations to assess the ambient air concentrations of PM_{10}, SO_2, NO_2, Ammonia and Heavy metals.

a) Sanivarapupeta, Eluru municipality

b) Dakshinapuveedhi, Eluru municipality

c) Vangayagudem, Eluru municipality

The analysis results are enclosed as Annexure - I. The following inferences were drawn from the results:

The ambient air concentrations of PM_{10}, SO_2, NO_2 & NH_3 were observed to be within the limits of NAAQ Standards.

Heavy metal concentrations of Lead, Nickel and Arsenic in particulate matter were also within the limit of NAAQS.

2. APPCB officials also carried out Surface Water

sampling on 06.12.2020 from the following locations, to assess the quality of the surface water, which are the primary sources of drinking water supply to Eluru town.

a) Reservoir (Godavari Water) (Water supply for Eluru Municipality) near Denduluru

b) Pampulacheruvu Outlet, Eluru Municipality

c) Kotadibba Water Tank, Eluru Municipality

d) J.P. Colony Water Tank, Eluru Municipality

e) Gandhi Colony Water Tank, Eluru Municipality

f) Panchyathi Water Tank, ZP High School, Sanivarapupeta, Eluru

g) Ashok Chakaram Road, 6B - 11-20, Eluru

h) Ashok Chakaram Road, 6A - 12 -20, Eluru

i) D.No.6A - 11-21, Vadiragudem, Eluru

j) D.No.6A - 11-31, Vadiragudem, Eluru

k) Krishna Canal, near Pampala Cheruvu

l) Pond - 1 of Pampala Cheruvu

m) Pond - 2 of Pampala Cheruvu

The analysis results are enclosed as Annexure - II. The following inferences were drawn from the results:

<u>Physicochemical analysis:</u>

The analysis results for physico - chemical parameters viz., pH, Dissolved oxygen, COD, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

<u>Heavy metal analysis:</u>

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc and Cadmium and the results are within norms except Iron reported to be 2.18 mg/lt at pond - 2 of Pampula cheruvu against the standard of 0.3 mg/lt.

3. As per the instructions of the Administration, West Godavari District and Commissioner, Health & Family Welfare, Govt. of AP, the officials of APPCB again collected surface water samples on 08.12.2020 from the following locations for the complete analysis of physicochemical parameters, heavy metals, Bacteriological and pesticides.

a) Eluru Canal (Godavari Water) near Denduluru (V & M)

b) Reservoir (Godavari Water- Water supply from Eluru Municipal Corporation), near Denduluru (V & M)

c) Intake well of water treatment plant (Godavari water) of Eluru Municipal Corporation

d) Treated water sample collected before chlorination

e) Treated water sample collected after chlorination

f) Treated water sample collected Kotadibba water tank

g) H/o Sri Vemula Gopiah, D.No: 6A-11-31, Vadiragudem, 5th Division

h) Krishna Canal, Near Postal Colony

i) Pond - 1 of Pampula Cheruvu, Eluru Municipal Corporation

j) Pond - 2 of Pampula Cheruvu, Eluru Municipal Corporation.

The analysis results are enclosed as Annexure - III. The following inferences were drawn from the results:

Physicochemical analysis:

The analysis results for physico - chemical parameters viz., pH, Turbidity, Dissolved oxygen, COD, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

Heavy metal analysis:

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc, Cadmium, Mercury, Barium, Aluminium, Manganese and Silver.

Concentration The concentration of Lead in Kotadibba water tank (overhead tanks) was observed to be 0.0174 mg / l which is slightly higher than the standard of 0.010 mg/l.

The concentration of Mercury in Eluru canal was observed to be 0.0011 mg/l which is slightly higher than the standard of 0.0010 mg / l.

Organo Chlorine Pesticides:

Analysis was carried out for residues of Organochlorine pesticide namely Alpha - BHC, Beta - BHC, Gamma - BHC, 4,4'

- DDD, 4,4'DDE, 4,4'DDT, Aldrin, Dieldrin, Endosulphan - 1, Endosulphan Sulphate, Endrin, Heptachlor, Heptachlor Epoxide, Methoxychlor, Endosulphon II, Delta - BHC and Endrin aldehyde.

No traces of organochlorine pesticides were detected in surface water samples.

Bacteriological Analysis:

Analysis was carried out for the presence of T-Coli & F - Coli bacteria.

In treated water samples, the T - Coli & F - Coli bacteria were absent.

4. APPCB officials carried out simultaneous sampling of Ground Water at the following locations during the visit of NEERI officials on 12.12.2020.

a) H/o D.No.6A-11-17, Dakshinapuveedhi.

b) Near Varasiddi Vinayaka Temple, Kothapeta.

c) H/o S. Nageswararao, Thurupuveedhi.

d) H/o D.No.38-5-7, Padmaraveedhi.

e) Near Graveyard, Tangellamudi, Thurupuveedhi.

f) H/o D.No.2-11-7 / 2, S. Satyanarayana house.

g) H/o D.No.17-3-4, Md. Saleem house, Vangayagudem.

h) At DFC Food Court, RR Peta.

i) Agri gold Apartment, Pathebadh.

j) H/o D.No.21-379, Ponangi.

The analysis results are enclosed as Annexure - IV. The following inferences were drawn from the results:

Physicochemical analysis:

The analysis results for physico - chemical parameters viz., pH, Turbidity, TDS, Chlorides, Hardness, Calcium, Magnesium, Alkalinity, Phosphates, Sulphates, Fluoride, Nitrates and Ammonia were observed to be normal.

Heavy metal analysis:

Heavy metal analysis was carried out for Nickel, Arsenic, Lead, Chromium, Iron, Copper, Zinc, Cadmium, Mercury Barium, Aluminium, Manganese and Silver.

The concentration of Manganese in Turupuveedhi was

observed to be 1.495 mg/l which is higher than the standard of 0.1 mg/1.

The concentration of Mercury in RR Peta was observed to be 0.0012 mg / l which is slightly higher than the standard of 0.0010 mg / 1.

Organochlorine Pesticides:

Analysis was carried out for residues of Organochlorine pesticide namely Alpha - BHC, Bela - BHC, Gamma - BHC, 4,4' - DDD, 4,4'DDE 4,4' DDT, Aldrin, Dieldrin, Endosulphan - 1 Endosulphan Sulphate, Endrin Heptachlor, Heptachlor Epoxide, Methoxychlor, Endosulphon - II, Delta - BHC and Endrin aldehyde.

No traces of organochlorine pesticides were detected in surface water samples.

III. Study conducted by CSIR - NEERI, Hyderabad and its inferences:

APPCB entrusted the study of air and water quality in and around the affected areas of Eluru to CSIR - NEERI, Hyderabad. The CSIR - NEERI carried out the studies during the period from 10.12.2020 to 12.12.2020. The CSIR - NEERI submitted the report on 21.12.2020, which is enclosed as Annexure - V.

The CSIR - NEERI in their report stated that:

Ambient Air Quality:

In the ambient air quality study it is found that the concentrations of particulate matter were found to be high and exceeding the NAAQS largely in the study area. Higher values of particulate matter may be due to vehicular traffic, re - suspended road dust, burning of solid waste, windblown dust and agricultural and construction activities. Gaseous pollutants are found to be very low and not significant.

The heavy metals in the particulate matter are found to be higher in terms of arsenic, boron, copper and zinc.

The arsenic concentrations in the particulate matter are exceeding the NAAQS at all locations except at Pattebada. Higher levels of these may be due to vehicle transportation, waste incineration or burning, oil and coal

combustion, sewage sludge incineration, and construction activities.

Ground and Surface water Quality:

The overall water quality for Surface and Ground water is satisfactory. In terms of heavy metals, Iron and Manganese were found to be slightly higher than BIS Standards for Drinking which may be due to geological Origin.

Presence of Mercury in Surface and Ground water is alarming and it needs deeper scientific study to ascertain the reasons for high levels of Mercury

Organochlorine pesticides like Alpha - HCH, Beta - HCH. Gamma - HCH, Delta - HCH, Aldrin, Dicofol, Alpha endosulfan, pp - DDE pp '- DDD Beta - Endosulfan, Endosulfan Sulfate, Heptachlor. Heptachlor epoxide were analyzed in groundwater and surface water samples and the concentration of all compounds were observed to be below detectable level. Similarly, organophophate pesticides and herbicides including Phorate, Dimethoate, Fluchloralin, Parathion Methyl, Alachlor, Malathion, Chloropyrifos, Pendimethalin, Butachlor, Profenofos, Quinalfos and Ethion were analyzed and found below detectable levels in all samples except for choloropyrifos in ground water.

Soil Quality:

The texture of most of the soil sample collected is sandy clay loam with moderately fine texture ranging moderate to strong Alkaline pH. The soils are having low CEC with Normal ESP.

The heavy metal concentrations in the study area are below Screening and response levels as per MoEF & CC Guidance Document for assessment and remediation of Contaminated sites in India.

Organochlorine and organophosphate pesticides concentration in soil samples were observed to be below detectable level.

Remarks:

1. As mentioned in the news papers the suspected cause for the incident reported by the All India Institute of Medical

Sciences (AIMS) is due to the presence of Lead and Nickel found in excess to the desirable limits in the blood samples of affected people. Further AIIMS indicated the symptoms of affected people may be due to Organochlorine pesticides.

2. From the studies conducted by CSIR - NEERI, it was observed that there was no contamination of surface and ground water of Eluru town due to Lead and Nickel. Even as per APPCB analysis reports there was no contamination of surface and ground water of Eluru town due to Lead and Nickel except at one location i.e. Kotadibba water tank (overhead tank) the concentration of lead is 0.0174mg / l, slightly higher than the standard of 0.010mg / 1.

3. In Surface water, high levels of Mercury ranging from 1.0 to 9.0 ppb were reported by CSIR - NEERI, the maximum found in location at Krishna Canal. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.1 ppb, the maximum value reported in Eluru canal, Near Denduluru which is marginally higher than the standard.

4. In Ground water high levels of Mercury ranging from 1.1 to 26 ppb were reported by CSIR - NEERI, the maximum found in location at RR Peta. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.2 ppb, the maximum value reported at the same location RR Peta which is marginally higher than the standard.

5. Other heavy metal concentrations in surface and ground water are observed to be within the norms except Iron and Manganese detection in few locations at slightly higher concentrations.

6. Organochlorine pesticide residues were not detected in the analysis carried out by both CSIR - NEERI and APPCB in ground and surface water. CSIR - NEERI reported presence of Chloropyriphos in excess of the standard in ground water samples at 1 location (Opposite to H.No: 21-379, Construction land, Ponangi).

7. As per Ambient air quality monitoring (conducted from 10.12.2020 to 12.12.2020) of CSIR - NEERI, higher concentrations of Particulate matter are reported. Ambient air

concentration of Lead and Nickel is found to be within the whereas slightly higher concentrations of Arsenic was reported which may be due to vehicle transportation, waste incineration or burning, Oil & Coal combustion and construction activities. APPCB carried out AAQM at 3 locations from 06.12.2020 to 07.12.2020. Concentrations of Particulate matter and Heavy metals (Lead, Arsenic and Nickel) are within the NAAQ standards.

8. CSIR - NEERI recommended that Periodic Assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months to ascertain the occurrence of certain heavy metals in ambient air and presence of mercury in both groundwater and surface water.

9. The Government of A.P. constituted a multi disciplinary committee headed by the Chief Secretary to the Government to investigate source of episode and suggest remedial measures to prevent any occurrence of such events in future. (Annexure - VI)

10. APPCB proposes to carry out Air and water quality monitoring on monthly basis for a period of six months to ascertain the presence of Mercury in Surface and Ground water samples and presence of heavy metal concentrations in Ambient air.

The above report is placed before the Hon'ble Tribunal for its kind consideration to pass appropriate directions."

6. It is seen from the remarks that high level mercury was found in certain areas as per the report submitted by the CSIR, NEERI and other heavy metal concentrations were also found in the surface and ground water.

7. The Andhra Pradesh Pollution Control Board also filed another status report dated Nil e-filed on 17.02.2021 and received on 19.02.2021, wherein, they have reported as follows:-

> ***"Status report on Hon'ble NGT order dated 06.01.2021 in O.A.No.2 of 2021 and in OA No. 259 of 2020***
>
> *It is to submit that the Hon'ble NGT has taken up Suo Motu in O.A.No.02 of 2021 the incident of* ***"Mystery illness raises concerns over Kolleru pollution"*** *based on news paper clipping published in Hindu Newspaper on 15.12.2020 status. It is alleged that large scale pollution is caused in Kolleru Lake and other water bodies in AP and people are suffering from Mysterious diseases on account of drinking of the polluted water in Kolleru Lake. The Hon'ble NGT vide order dated 06.01.2021 in OA No.2 has directed to post the matters along with matters of OA No. 259 of 2020.*
>
> *The Board submitted report in O.A.No.259 of 2020 to the Hon'ble Tribunal in December 2020 regarding deaths in Eluru on account of mysterious disease. It was submitted that:*
>
> *1. As mentioned in the news papers, the suspected cause for the incident reported by All India Institute of Medical Sciences (AIIMS) is due to the presence of Lead and Nickel found in excess to the desirable limits in the blood samples of affected people. Further, AIIMS indicated the symptoms of affected people may be due to Organochlorine pesticides.*
>
> *2. From the studies conducted by CSIR-NEERI, it was observed that there was no contamination of surface and ground water of Eluru town due to Lead and Nickel. Even as per APPCB analysis reports, there was no contamination of surface and ground water of Eluru town due to Lead and Nickel except at one location i.e. Kotadibba water tank (overhead tank) the concentration of*

lead is 0.0174mg/l, slightly higher than the standard of 0.010mg/l.

3. In Surface water, high levels of Mercury ranging from 1.0 to 9.0 ppb were reported by CSIR-NEERI, the maximum found in location at Krishna Canal. As per APPCB results, the concentration of Mercury is ranging from 0.0 to 1.1 ppb, the maximum value reported in Eluru canal, Near Denduluru which is marginally higher than the standard.

4. In Ground water, high levels of Mercury ranging from 1.1 to 26 ppb were reported by CSIR-NEERI, the maximum found in location at RR Peta. As per APPCB results, the concentration of Mercury is ranging from 0 to 1.2 ppb, the maximum value reported at the same location RR Peta which is marginally higher than the standard.

5. Other heavy metal concentrations in surface and ground water are observed to be within the norms except Iron and Manganese detection in few locations at slightly higher concentrations.

6. Organochlorine pesticide residues were not detected in the analysis carried out by both CSIR-NEERI and APPCB in ground and surface water. CSIR-NEERI reported presence of Chloropyriphos in excess of the standard in ground water samples at 1 location (Opposite to H.No: 21-379, Construction land, Ponangi).

7. As per Ambient air quality monitoring (conducted from 10.12.2020 to 12.12.2020) of CSIR-NEERI, higher concentrations of Particulate matter are reported. Ambient air concentration of Lead and Nickel is found to be within the norms whereas slightly higher concentrations of Arsenic was reported which may be due to vehicle transportation, waste incineration or burning, Oil & Coal combustion and construction activities. APPCB carried out AAQM at 3 locations from 06.12.2020 to 07.12.2020.

Concentrations of Particulate matter and Heavy metals (Lead, Arsenic and Nickel) are within the NAAQ standards.

8. CSIR-NEERI recommended that Periodic Assessment on monthly basis of all environmental components including critically identified pollutants need to be conducted for at least next 6 months to ascertain the occurrence of certain heavy metals in ambient air and presence of mercury in both groundwater and surface water.

9. The Government of A.P. constituted a multi disciplinary committee headed by the Chief Secretary to the Government to investigate source of episode and suggest remedial measures to prevent any occurrence of such events in future.

10.APPCB proposes to carry out Air and water quality monitoring on monthly basis for a period of six months to ascertain the presence of Mercury in Surface and Ground water samples and presence of heavy metal concentrations in Ambient air.

As regards to the apprehensions of the people that polluted water of Kolleru Lake might cause mysterious diseases as reported in Eluru and the surrounding areas, the following report is submitted on Kolleru lake pollution for kind perusal:

A. About Kolleru Lake:

1) Kolleru Lake is one of the largest fresh water Eco System (Wetland) in India of international importance recognized under Ramsar Convention (Iran 1971). The Kolleru lake is located in between Latitudes 16°13' & 16°45' North and Longitudes 81°05' & 81°21' East and is about 35 Km away from the coast i.e. Bay of Bengal. It is formed between the alluvial plains of Godavari and Krishna Rivers due to natural geological formation covering 7 mandals in West Godavari District and 3 mandals in Krishna District

of Andhra Pradesh with an extent of 30,855.20Ha (77,138 Acres) upto +5' contour of the Lake. Several drains from upstream are ending in Kolleru lake and outlet of Kolleru lake is through Upputeru to Bay of Bengal

2) Hydrology and drainage:

Kolleru Lake is spreading over an area of 2,25,000 acresupto +10' contour with rich biodiversity. Water spread area of Kolleru lake is as follows:

Upto +10' contour MSL	*2,25,250 Acres*
Upto +7' Contour MSL	*1,68,750 Acres*
Upto +5' contour MSL	*77,138 Acres*
Mean Sea Level (MSL)	

3) Catchment Area:

The total catchment area of Kolleru Lake is 11,90,750 Acres. Out of which, the catchment area in upland area is 8,50,750 Acres and 3,40,000 Acres in delta area. Four streams namely Budameru, Ramileru, Tammileru&Gunderu and drains in Krishna and West Godavari Districts join the lake and the Upputeru drain is the only outlet from Kolleru Lake to the sea i.e., Bay of Bengal.

4) Declared the Kolleru Lake as "KolleruWildlife Sanctuary" and also protected area under Wildlife Protection Act, 1972.

The Government of Andhra Pradesh vide G.O.Ms No.120, Environment, Forest, Science and Technology (Forest-III) Department Dt.04.10.1999 under Section 26-A of the Wild Life (Protection) Act, 1972, declared 308.55 Sq.Km (30,855.20 Ha) area as "The Kolleru Wild Life Sanctuary" covering 45 villages in West Godavari District and 29 villages in Krishna District for protection of birds and other wildlife.

B. Action taken by APPCB:

APPCB is not issuing consents/permissions to any industry to discharge treated/untreated effluents to outside the industry premises or to any drains/canals within the radius of 10 KM from +5 contour of Kolleru Wildlife Sanctuary. The Board is also not permitting any new industrial activities within the radius of 10 KM from +5 contour of Kolleru Wildlife Sanctuary. Hence, no pollution due to industrial discharges.

C. Monitoring of water quality of Kolleru Lake and the drains joining into Kolleru Lake by APPCB:

The APPCB has been monitoring the water quality of Kolleru Lake, the drains joining into the Lake and its outlet every month at the following locations in West Godavari District & in Krishna District.

Drain Sampling points:

West Godavari District:

1) West Thammileru.

2) East Thammileru.

3) Bulusuvagu drain.

4) Thokalapalli drain.

5) Pandikodu drain.

6) Kovvali drain.

7) Mondikodu drain.

Krishna District:

8) Chandraiah drain at Gudivada.

9) Budameru drain at Puttagunta.

10) Narasannapalem drain at Arugolanu.

11) Polraj drain at Pillipadu.

12) West Tammileru, Vangayagudem.

Lake sampling points:

West Godavari District:

1) Gudivakalanka bridge.

2) Kokkirayalanka bridge.

3) Chettunnapadu bridge.

Krishna District:

4) Pedaedlagadi

5) Chinaedlagadi

6) Kolletikota

7) Circarcanal

8) Srungavarappadu

Outlet of Kolleru Lake:

9) Upputeru at Alapadu bridge, Krishna District.

The samples are tested for physio-chemical and bacteriological parameters. The monitoring results for the period from 2010–2020 are enclosed as ***Annexure-I****.*

Inference on drain points data:

The average pH value in all the drains joining into the Kolleru lake are observed to be in the range of 7.03 to 8.20 over the period against the suggested range of 6.5 to 8.5. As per the 'CPCB Primary Water Quality Criteria' for designated best uses of water, water quality is suitable for the propagation of Wildlife and Fisheries.

The average Dissolved Oxygen (DO) values in the major drains joining into Kolleru lake are observed to be in the range of 3.0 mg/l to 7.0 mg/l over the period. As per the 'CPCB Primary Water Quality Criteria' for designated best uses of water, water quality is suitable for the propagation of Wildlife and Fisheries. The required DO value for propagation of Wildlife and Fisheries is 4.0 mg/l only.

Inference on Lake points data:

The average pH values in the lake over the period are observed to be in the range from 7.2 to 8.0 as against the suggested range of 6.5 to 8.5 vide 'CPCB Primary Water Quality Criteria' for designated best uses of water, indicating the water is suitable for propagation of Wildlife and Fisheries.

The average DO values, which were around 2 mg/l earlier (2010 to 2012), is observed to be improved to about 6.0 mg/l during the last 5 years (2015 to 2020) in the Kolleru Lake and its outlet Upputeru which indicates the water quality of the lake is improved. The required DO levels for the propagation of Wildlife and Fisheries in the lake is 4.0 mg/l only as per the 'CPCB Primary Water Quality Criteria' for designated best uses of water.

The analytical data is compared with CPCB Primary Water Quality Criteria of surface water for designated best use and observed that it falls into Class-D i.e. Propagation of Wildlife and Fisheries, which indicates the water is suitable for propagation of Wildlife and Fisheries.

Pesticides residues in the drains and lake:

In addition, samples are also tested for pesticide residues during the years 2019 and 2020 and observed that pesticide concentrations are below detectable limits except Heptachlor Epoxide which is also below drinking water standards. Copy of the analysis report is enclosed as ***Annexure-II****.*

D. STP construction by Eluru Municipal Corporation:

Eluru Municipal Corporation is constructing of 5 MLD STP and civil works were completed to 60%.

It is submitted that the Board has further taken the following actions after submitting the action taken report to Hon'ble NGT in OA No.259/2020 on 05.01.2021:

The Board collected drinking water samples of 9 Municipalities (Akiveedu, Bhimavaram, Palakole, Narsapuram, Tadepalligudem, Nidadavole, Jangareddygudem, Tanuku) and 1 Nos of Municipal Corporation (Eluru Municipal Corporation) on 09.01.2021 & 10.01.2021 and analyzed and observed that proper chlorination is required as coliforms are present in the treated water of these Urban Local Bodies (ULBs). Other parameters are meeting the drinking water standards. Analysis reports are enclosed as ***Annexure – III.***

As suggested by NEERI, Board conducted Ambient Air Quality Monitoring from 05.02.2021 to 06.02.2021 for Heavy Metals in Eluru city and also collected Surface and Ground water samples in the same locations to ascertain the presence of Mercury and analysis is under progress.

The Board collected the samples of drinking water supplied to the people of Pulla (V) located at a distance of about 25 km from Eluru city, wherein few mysterious disease cases were registered on 19.01.2021. As per the analysis, the samples were meeting the drinking water standards of ISI0500:2012. Analysis report enclosed as Annexure-IV.

The Government has constituted a Multi-Disciplinary Committee headed by the Chief Secretary to Government to Investigate the source of episode. The committee recommended continuing the services of AIIMS (All India Institution of Medical Sciences) and IICT (Indian Institute of Chennai Technology) to investigate the source of episode on long term basis and to suggest remedial measures to prevent reoccurrence of such incidents in future.

The board has been monitoring the Kolleru lake on regular basis. As per the findings of the analysis of water of drains as well as Lake water, no pesticides residues beyond standards was observed. Further, no industrial discharges are allowed in to Kolleru Lake. The Hon'ble NGT disposed O.A. No.176 of 2019 on Kolleru Lake pollution on 05.01.2021 with observation that no further orders appears to be necessary. The

Hon'ble NGT observed that there is an improvement in the water quality of Kolleru Lake waters in respect of pH and Dissolved Oxygen (DO) when compared to CPCB primary water quality criteria for designated best uses of water, indicating and suitability of water in the lake for the propagation of wildlife and fisheries, as per the regular monitoring carried out by the Andhra Pradesh Pollution Control Board.

No industrial effluents are joining into the Kolleru Lake and lake water is not the drinking water source to any village as it falls under Class -D as per CPCB Primary Water Quality criteria and is suitable for propagation of Wildlife & Fisheries only. Further, observed that the convulsion illness cases were registered in the month of December, 2020 in Eluru Town and its surrounding villages only and no cases were registered around the Kolleru lake area.

The above report is placed before the Hon'ble Tribunal for its kind consideration to pass appropriate directions."

8. It is very surprising to see from the report that no industrial effluents are joining in Kolleru Lake though large number of reports have alleged that industrial effluents are being discharged into the lake. It is also reported that the lake water is not the drinking water source to any of the villages, as it falls under Class - D as per CPCB Primary Water Quality criteria and it is suitable for propagation of wildlife and fisheries only. It is also mentioned in the report that no cases were registered around the Kolleru lake area.

9. It may be mentioned here that water bodies are intended for using it not only for the drinking purpose but also for irrigation purpose. It is understood that Kolleru Lake is one of the largest fresh water lake in

Andhra Pradesh. If that be the case, the authorities are expected to maintain the lake and improve the water quality into either Category - A or Category - B, instead of keeping in the Category - D.

10. Nothing is mentioned in the report regarding the steps taken by the authorities for improving the water quality, when it is the biggest fresh water body available in the Andhra Pradesh and it is also mentioned in the report itself that it is one of the largest fresh water ecosystem (wet land) in India of international importance recognized under the Ramsar Convention. If that be the case, there is a responsibility cast on the authorities to take steps to improve the water quality and make use of the same for drinking and irrigation purposes as well, so as to protect the water body and quality of the water.

11. When this was pointed out, the learned counsel appearing for the State departments submitted that they will come with a further action taken report or any plan for the State Government to improve the water quality in that lake. The APPCB should also file a factual report on the pollution of Kolleru lake caused by Industries, Agricultural operations & sewage discharge. They are expected to carry out the analysis scientifically by collecting the samples at (1) inlets and outlets of the Industrial zones which are ultimately draining into the Kolleru Lake, (2) confluence points of major drains into the Kolleru Lake – surface water samples and sediment

samples to be tested, (3) in case any settling ponds have been established prior to the joining of the drains into the lake, then samples of both surface water and the sediments in the settling ponds should be tested. The APPCB is expected to undertake the study comprehensively and not resort to filing a report based on cursory studies. The report has to be approved by the Chairman prior to submission.

12. As regards the report of the committee is concerned, the State of Andhra Pradesh has filed a report of the multi disciplinary committee dated Nil e-filed on 30.03.2021 and received on 31.03.2021 wherein, after making lot of discussion, source of the outbreak and recommendations have been made which reads as follows:-

> *"SOURCE OF THE OUTBREAK*
>
> *According to the experts, toxins are likely to be the most probable cause of this outbreak Among the toxins, the pesticides are most likely to present similar encephalopathy. Among pesticides also, organo - chlorides are most likely to be the cause of the outbreak.*
>
> *From the epidemic curve with a sudden onset on 4 December and steep rise, peaking was observed between 5th and 7th December. Subsequently the cases started declining from the 8th onwards. There was no case reported from 130 December onwards. After analyzing the above epidemic curve, case sheets of the patients, reports from different labs and inputs from different expert agencies involved, it can be categorized as a point source outbreak which was non-propagative in nature. It was a case of acute exposure to a substance rather being a chronic one. It is indicative of a common single exposure*

source. Another important observation is that whatever was the source is no more there in the system as no case has been reported 13th December onwards.

The likely source of such kind of encephalopathy can be water, milk, vegetables and fruits. Nickel was found in Milk, but nickel cannot cause such encephalopathy and hence can be ruled out. The source cannot be meat or fish as 87% of the patients did not consume non vegetarian food in the last couple of days prior to the incident. Vegetables like tomato and brinjal have been found with Metribuzin (herbicide). But had it been the source, the geographical expanse would not have been confined to urban area alone. It would have spread to rural areas as well. So vegetables can be the source only if some contamination occurred after the arrival of the vegetables to the market in Eluru and the vegetables got contaminated after the stock arrived in the market.

Coming to the likelihood of water being the source of contamination. None of the agencies have reported the presence of organo - chlorines in the water samples taken from the source, reservoir and the storage tank. So the central water supply was clean. The water samples collected from the households had some presence of Triazophos (organo phosphate compound) but the concentration was not too high and also the control samples also found the presence of Triazophos. Thus, contamination of water locally being the source cannot be substantiated or ruled out either. This requires a detailed study of the water supply system of Eluru municipal corporation over the next few months to arrive at a conclusion.

Thus there is a need of involving reputed national Institutions like AIIMS, IICT, NEERI on a long term basis to find out the exact source and also to prevent the event from reoccurring. The teams will make a deep - dive to unearth the most likely source of the episode. It would require systematic sampling of all likely culprits from origin to human consumption.

Since water test results from all agencies indicated that there is no presence of heavy metals or pesticides beyond the allowed limits, it can be safely said that the present water supply is potable and safe for Human Consumption.

RECOMMENDATIONS

The Committee, after several rounds of in depth deliberations, arrived at several recommendations which can be broadly categorized as short term action strategies and long term preventive strategy.

The preventive strategy will involve following:

1. Involving reputed national Institutions like AIIMS, IICT, NEERI on a long - term basis by the District Administration. The teams will make a deep - dive to understand further the nature of the episode. It would require systematic sampling of all likely sources from origin to human consumption. Water food air and sail analysis on a long term basis need to be done with a proper research design and sample design. Data collected needs to be analyzed to arrive at a long term strategy. The study must go beyond the Eluru city and shall include the west Godavari and East Godavari districts due to the similar nature of topography irrigation and agro climatic conditions. Teams from AIIMS, New Delhi, IICT Hyderabad, PHFI with its Indian Institute of Public Health, Hyderabad would conduct these studies which shall be assisted by the District Collectors.

2. A Multidisciplinary Health and Environment Monitoring Framework need to be developed for these studies. A Monitoring cell for this purpose will be opened under the aegis of EFS & T department with representation (not below the cadre of Joint Director) from department of Health, Agriculture, Environment, Animal Husbandry and Municipal administration. All line departments shall give necessary assistance to this multi-agency, multi-disciplinary team.

3. A high level committee under the Chairpersonship of Chief Secretary to the government may be set up with senior officers from department of Health, Agriculture, Environment, Animal Husbandry, Irrigation and Municipal administration.

4. This high level committee shall get action plans prepared by all the line departments for monitoring water, food, air, soil, Agriculture, Aquaculture residues etc. on a regular basis. Further, the implementation of these action plans shall be monitored by the High level committee constituted.

5. Surveillance plan of action for identifying source of heavy metals in blood in Eluru Municipal Corporation area needs to be developed by the municipal department in co - ordination with the Andhra Pradesh Pollution Control Board. A statistical database with periodical updating needs to be developed for items like water supply including both surface and ground water at all possible tapping points. All food sources shall also be closely monitored for heavy metals. Further industrial sources including sewerage and solid waste management practices of the Eluru corporation shall be closely monitored for finding out and eradicating presence of heavy metal in the human beings in Eluru area. This activity shall be coordinated by the AP Pollution Control Board.

6. A broad study of the entire West Godavari district with regards to above parameters is required for a comparative study with Eluru Municipal Corporation area. If required both districts of East and West Godavari shall be included in these studies. The AP Pollution Control Board shall undertake this study in coordination with Municipal corporation, Eluru.

7. Since the pesticides are likely to contribute to such episodes, it is very crucial that the banned compounds like DDT, DDE Endosulfan should not reach up to the agricultural fields. Strict implementation by the regulatory authorities is required for this. Department of Agriculture is advised to submit a detailed action plan within one month to achieve this goal.

8. Promotion of organic and nature - based farming should find key place in the agricultural policy. ZBNF wing of agriculture department to identify all villages in and around Eluru Municipal Corporation area for promoting agriculture of vegetables following the organic farming methods. Dedicated outlets to be opened in Eluru Municipal Corporation area for marketing and sale of the organically grown products. Department of Agriculture should also submit a detailed action plan for this within one month.

9. Surveillance plan of action for monitoring the quality of milk needs to be developed by the Animal Husbandry department within one month.

10. Usage of Chemicals for Aqua farming in areas surrounding the Eluru city needs to be reduced in the long run by the fisheries department. Surveillance plan of action for monitoring the aquaculture in the west Godavari district to identify and stop usage of any banned products needs to be developed by the fisheries department within one month.

11. Setting up of state of art labs at Vizag, Guntur and Tirupati under the aegis of Health Department. These labs should have the capacity to detect all kinds of organo - chlorines and organo - phosphates in all mediums like water, food, blood, serum etc. They should also be able to detect all kinds of heavy metals especially lead, nickel, and mercury etc. in all mediums like blood, blood serum, water milk and vegetables etc. Further each district also should have one lab for water and food analysis. Samples from different sources, establishments and locations in the entire state need to be randomly checked periodically in these labs. A scientific matrix of sampling needs to be evolved so that regular surveillance on food materials and water is maintained in the district labs. Regional labs should have advanced facilities at par with research institute labs for testing blood and serum.

12. Irrigation Department should take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal at the earliest.

The steps to be taken up in the short term for immediate action are detailed below

1. Irrigation Department should take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month.

2. The municipal water supply management forms the cornerstone. Regular testing along with documentation needs to be ensured. While the water samples tested by the MA & UD indicated that the water supplied by Eluru Municipal Corporation is safe and as per standard, periodic checking must be ensured to rule out any contaminants. Similar system must be brought in place for all municipal water supply systems in the State.

3. The municipal water quality needs to be checked for more parameters like organo - chlorines and organo - phosphates on a periodical basis. Currently the water samples are checked for certain parameters like TDS etc. only.

4. Stand - alone RO units should also be checked for presence of heavy metals in water used by Institute for Preventive Medicine (IPM), AP Vijayawada.

5. Solid Waste management in Eluru needs to be analyzed for any likelihood of heavy metals leeching into the soil and then reaching to the human food chain through ground water. This task shall be taken up by the Municipal Administration and Urban Development (MA & UD) department.

6. Periodical inspections of prominent Rythu-bazaars and market places and sample collection for heavy metals and

pesticides presence should be taken up by the Marketing department.

7. Entire distribution network including pumps, ESLR's and pipelines should be thoroughly checked for material integrity and the same should be done on a regular basis in future. Steps should be taken to keep the entire system under positive pressure at all times in the future. This should be done by the Municipal Administration and Urban Development (MA&UD) department.

8. Testing of pesticides/ weedicides/ fertilizers etc. being used in the district must be taken up by Agriculture Department to ensure proper quality."

13. Certain short term and long term measures were also provided to meet the situation and also identified the possible source of contaminants/pollutants in Eluru canal, as certain heavy organo-chlorines and organo-phosphates and other heavy metals like Mercury, Lead and Nickel. As the presence of heavy metals shows that either it should have been caused through food chain or through water, that is the reason why the irrigation department was directed to conduct a detailed study to identify the possible sources of contamination especially organo-chlorides and also to take up cleaning of the Eluru Canal immediately and also submit an action plan ensuring prevention of car wash and battery residues in the Eluru Canal within one month. Certain directions have been given to other departments as well, so as to restrict/prevent pollution either to the water or to the soil which has caused on account of mysterious disease found in that area.

14. It is also mentioned in the recommendation that the municipal water quality needs to be checked for more parameters like organo-chlorines and organo-phosphates on a periodical basis. Apart from that, they are also directed to monitor the level of heavy metals like Lead, Mercury and Nickel as well by conducting analysis and resort to the remedial measures to remove those metals from the water.

15. As regards the Solid Waste Management Rules, 2016 is concerned, they have not mentioned anything about the existing legacy waste and what are all the steps taken by them to dispose of the legacy waste, if any, in a scientific manner as provided under the Solid Waste Management Rules, 2016.

16. When this was pointed out, the learned counsel appearing for the State of Andhra Pradesh submitted that they will come with a detailed further report regarding the study, if any, done on the basis of the recommendations and also the remedial measures, if any, taken to mitigate the circumstances.

17. The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be

taken for improving the water quality in that lake.

18. The respective departments are directed to submit a report to this Tribunal on or before 28.07.2021 by e-filing in the form of Searchable PDF/ OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

19. The Registry is directed to communicate this order to the official respondents including the Principal Chief Conservator of Forest & Head of Forest Force, State of Andhra Pradesh and Chief Secretary, Principal Secretaries for Environment and Irrigation of State of Andhra Pradesh, Andhra Pradesh Pollution Control Board by e-mail immediately for their information and submission of report as directed.

20. For consideration of further reports, post on 28.07.2021.

Sd/-
.....J.M.
(Justice K. Ramakrishnan)

Sd/-
.....E.M.
(Dr. K. Satyagopal)

O.A. No. 259/2020,
O.A. No.02/2021,
07th June, 2021. Mn.

Item No. 13 & 14:

BEFORE THE NATIONAL GREEN TRIBUNAL
SOUTHERN ZONE, CHENNAI

Original Application No.259 of 2020 (SZ)
With
Original Application No.02 of 2021 (SZ)

(Through Video Conference)

IN THE MATTER OF

Tribunal on its own motion
Suo Motu based on the news item in
The Indian Express, Newspaper dt. 09.12.2020,
"Andhra town Eluru hit by 'mystery' illness,
Traces of lead, nickel in blood samples",
News item in The Time of India, Newspaper
Dt. 08.12.2020, "Heavy metal content in water
Caused mysterious disease in Andhra Pradesh" &
News item in NDTV, dt. 09.12.2020,
"Lead, Nickel found in blood of people with
Mystery illness in Andhra"

...Applicant(s)

Versus

The Chief Secretary of Govt. of Andhra Pradesh

And Ors.

…Respondent(s)

With

Tribunal on its own motion
Suo Motu based on the news item in
The Hindu, edition dated 15.12.2020,
"Kolleru (West Godavari Dt.) "Mystery illness raises
Concerns over Kolleru Pollution"

...Applicant(s)

Versus

The Chief Secretary to Govt. of Andhra Pradesh,

Andhra Pradesh and Ors.

…Respondent(s)

Date of hearing: 03.01.2022.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE Dr. SATYAGOPAL KORLAPATI, EXPERT MEMBER

O.A. No.259/2020:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R7.

O.A. No.02/2021:

For Applicant(s): Suo Motu by Court.

For Respondent(s): Mrs. Madhuri Donti Reddy for R1 to R8.

ORDER

1. As per order dated 26.10.2021, this Tribunal had considered the request made by the Andhra Pradesh Pollution Control Board, District Collector and other departments and also considered the latest newspaper report

published in Eenadu Daily dated 25.10.2021 regarding large scale encroachment into the Kolleru Lake and directed the authorities to file an independent report regarding the same. This Tribunal had also directed the Forest Department to file an independent report regarding these aspects and posted the case to 23.12.2021 for that purpose. On 23.12.2021, the case was adjourned to today by notification.

2. We have received the letter dated 21.12.2021 sent by the District Collector, West Godavari, Eluru addressed to the Registrar, National Green Tribunal, Southern Zone, Chennai supposed to be the report which was sought for from him. This Tribunal, in several occasions directed the parties to file a proper report, instead of sending in the letter form through their counsel. When this was pointed out, the learned counsel appearing for the State of Andhra Pradesh submitted that they will rectify the same and file a proper report regarding the same.

3. We have also received the report submitted by the Principal Chief Conservator of Forests and Head of Forest Force signed on 14.12.2021, e-filed on 02.01.2022 which reads as follows:-

REPORT FILED BY THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS AND HEAD OF FOREST FORCE, ANDHRA PRADESH BEFORE THE NATIONAL GREEN TRIBUNAL, SOUTHERN ZONE, CHENNAI IN O.A. NO.259(SZ) OF 2020& 02/2021 (SZ)

1. SUO MOTO cases were registered by the Hon'ble National Green Tribunal (Southern Zone), Chennai, based on the Newspaper reports published in the Times of India, dated.08.12.2020; Indian Express, dated.09.12.2020 and in the Hindu, dt. 15.12.2020, under the captions "***heavy metal content in water caused mysterious disease in Andhra Pradesh***", "***Andhra town Eluru hit by 'mystery' illness, traces of Lead, Nickel in blood samples***", and "***mystery illness raises concerns over Kolleru pollution***" respectively and a news item telecasted in NDTV, dated.09.12.2020 under the caption "***Lead, Nickel found in Blood of people with a mystery illness in Andhra Pradesh***".

2. It is respectfully submitted that the Hon'ble NGT (SZ), Chennai in their order dt.26.10.2021, directed to implead the Prl. Chief Conservator of Forests & Head of Forest Force, Andhra Pradesh and also the District Forest Officer, West Godavari District as additional respondents 9 and 10 in O.A. No. 2 of 2021. Consequent to the notification of a part of Kolleru Lake as a Wildlife Sanctuary by the Government of Andhra Pradesh, the Kolleru Wildlife Sanctuary has been under the administrative control of the Andhra Pradesh Forest Department. Hence, the Prl. Chief Conservator of Forests & Head of Forest Force, Andhra Pradesh is impleaded as 9th respondent.

3. It is respectfully submitted that, Kolleru Lake is one of the largest freshwater ecosystems (Wetland) in India of International importance recognized under the Ramsar Convention (Iran 1971) in the year 2002. Out of the total area of the lake which is up to +10 feet MSL contour (Ac. 2,25,250), only up to +5 feet MSL contour (Ac.77,138) has been declared as Wildlife Sanctuary in the year 1999. Further, as per the direction of the Hon'ble Supreme Court of India in I.A. no. WP(C) no.202 of 1995, a total of 1776 no. of tanks (1140 in West Godavari district + 636 in Krishna district) covering an area of about 43,724 acres (28,949 acres in West Godavari + 15,775 acres in Krishna) have been demolished under "Operation Kolleru" within the notified area of Kolleru Wildlife Sanctuary, up to +5' contour. After operation Kolleru, the sanctuary lands were consolidated by the Revenue Department of West Godavari and Krishna Districts and handed over to the Forest Department.

4. There are mainly three categories of lands that exist inside the Sanctuary area *viz.*, Government, D-Patta, and Ziroyati lands. The area of the Ziroyati land i.e., Ac.14,861.33 is with individual farmers. The D-Pattas granted inside the Sanctuary area were cancelled at the time of notification. Traditionally, the villagers were practicing either agriculture or aquaculture activities in the area. After the "Operation Kolleru 2006", the Revenue Department from both the Districts i.e. West Godavari and Krishna has consolidated the area, village-wise and handed it over to

the Forest Department. But, the survey did not take place to demarcate the physical boundary of the Sanctuary, which runs along the +5 feet MSL contour as per the notification. During "Operation Kolleru-2006", the aquaculture tank bunds inside the Wildlife Sanctuary were partially demolished and the villagers again resorted to aquaculture activities by strengthening the partially demolished bunds. The encroachments are seasonal in nature. During monsoon season, the area within the +5 feet contour of MSL is generally flooded and once the water level recedes post-monsoon, the villagers try to repair the bunds of old tanks and start aquaculture activities. The Ziroyati lands are yet to be acquired by the Government from the farmers by paying suitable compensation. Though the D-Patta lands were cancelled at the time of notification, the farmers claim that they still have rights over those lands.

5. There is a lot of pressure from local villagers to carry out aquaculture activities and several complex issues involved from paying compensation to downsizing the Sanctuary boundary. Forest Department is making concerted efforts in protecting the sanctuary area despite all hurdles. So far, 544 cases have been registered related to encroachment, mainly for aquaculture in all the categories of the lands since 2006-07 and the cases are under trial in various courts. The details of cases registered from 2006-07 to 2021-22 (up to 31-10-2021) are given below;

ABSTRACT OF ENCROACHMENT CASES REGISTERED FROM 2006-07 TO 2021-22 (up to 31-10-2021) IN KOLLERU WLS

Year of Encroachment Case booked	No. of cases booked	The extent of Encroachment (Acres)		
		Govt.	Ziroyati	Total
2006-07	3	0	3.03	3.03
2007-08	1	0	0	0
2008-09	11	170.00	258.71	428.71
2009-10	23	307.95	471.31	779.26
2010-11	36	321.61	355.24	676.85
2011-12	11	182.21	40.88	223.09
2012-13	18	237.83	122.45	360.28
2013-14	5	28.62	22.53	51.15
2014-15	19	586.80	193.88	780.68
2015-16	33	361.37	33.48	394.85
2016-17	74	737.83	172.51	910.34
2017-18	95	2329.59	244.69	2574.28
2018-19	55	2428.97	25.71	2454.68
2019-20	46	1665.47	95.27	1760.74
2020-21	65	1305.45	1009.33	2314.78
2021-22	59	1204.12	825.24	2029.36
TOTAL::	**554**	**11867.82**	**3874.26**	**15742.08**

6. However, in some areas cases were registered multiple times since aquaculture activities were attempted in the same location every year. Accordingly, the area has been reconciled and arrived to an extent of 9522.10 Acres. (Govt. land: 6680.73 Acres. Zeroyati land: 2841.37 Acres.). District -wise particulars are given below and a map is enclosed depicting the encroachments based on the cases registered so far.

ABSTRACT OF AREA UNDER ENCROACHMENT BASED ON CASES REGISTERED FROM 2006-07 TO 2020-21 IN KOLLERU WLS

Sl. no.	District	Mandal	Area of the Mandal (Acres)	Extent of Encroachment (Acres)		
				Govt. Land	Zeroyati Land	Total
1	West Godavari	Eluru	23900	2052.24	303.51	**2355.75**
2		Denduluru	586	0	158.54	**158.54**
3		Pedapadu	789	0	179.20	**179.20**
4		Nidamarru	6838	0	495.08	**495.08**
5		Unguturu	134	0	30.81	**30.81**
6		Bhimadole	20323	1617.69	834.28	**2451.97**
7		Akiveedu	6914	580.150	517.37	**1097.520**
		Total	**59484**	**4250.08**	**2518.79**	**6768.87**
1	Krishna	Kaikaluru	10295	2539.63	308.66	**2848.29**
2		Mandavalli	7359	71.02	13.92	**84.94**
		Total	**17654**	**2430.65**	**322.58**	**2753.23**
	WLS TOTAL		**77138**	**6680.73**	**2841.37**	**9522.10**

Activities taken up by the Forest Department in the Sanctuary area:

7. The Sanctuary area is generally managed based on the prescriptions provided in the approved Management Plan. The previous Integrated Management Plan for Kolleru Wildlife Sanctuary was prepared by WISA (Wetlands International-South Asia):2008 for a period of 5 years under an assignment from the Forest Department, Government of Andhra Pradesh. The present Management Plan for Kolleru WLS is being prepared by involving Bombay Natural History Society (BNHS), Mumbai and it is under progress.

8. Forest Department is implementing various activities through State and Central schemes. The main activities implemented broadly in the Sanctuary area are Protection, Wildlife Habitat Improvement, Ecotourism, Development of bird congregation sites and infrastructure development etc., Overall, an amount of Rs.30 crore(approx.) has been spent in the sanctuary area from 2006-07 to 2020-21. Some of the important State and Central schemes being implemented currently in the sanctuary are CAMPA, BIOSAP, 04-Sanctuaries, 06-Development of National Parks & Sanctuaries, Centrally Sponsored Schemes - Conservation of Natural Resources & Aquatic Ecosystems etc., A brief note in this regard is annexed hereto.

9. The important activities being taken by Forest Department in the Sanctuary area are;

1. Protection: Establishment of base camps, strike force, check posts for regular patrolling, collecting intelligence, preventing encroachment activities, checking vehicle movement that carries fertilizers, chemicals, and fish feed into Sanctuary area etc. Presently 5 base camps, 1 strike force and 6 check posts are functioning from various locations in the Sanctuary area.

2. Habitat improvement: The activities like desilting of drains, demolition of old bunds, removal of water hyacinth and other weeds, formation of mounds, planting trees for bird nesting, installation of artificial perching stands, releasing fish fingerlings (food for aquatic birds) etc., are being taken up to create a favourable environment for the wildlife to survive.

3. Research & Monitoring: Regular censuses are being conducted to enumerate different bird species and their population. Research related to tagging of birds was conducted earlier by BNHS. Presently through M.S. Swaminathan Research Foundation (MSSRF), a study is being conducted on Socio-economic and livelihood assessment of communities living in and around Kolleru WLS.

4. Ecotourism: The ecotourism facility at Aatapaka and Madhavapuram in the sanctuary caters to visitors and acts as a Conservation Education Centre. Presently facilities like Environmental Education Centre, watchtower, boating are being maintained by the department. These facilities are being managed by local communities under the supervision of the Forest Department.

5. Awareness creation: Regular village level awareness programmes are being taken up and competitions for school and college students are being conducted during World Wetland Day, World Environment Day and Wildlife Week etc., mainly for gaining their support in the protection and conservation of this wetland.

10. Further, Forest Department is not only implementing various developmental activities but also constantly monitoring the sanctuary area and taking strict actions against the illegal activities despite all hurdles. The seasonal encroachments in the Sanctuary area mostly for aquaculture have been tackled by registering offence cases, demolishing the bunds, conducting village level programmes. The department is taking the best possible efforts to prevent and remove all kinds of encroachments in the sanctuary area.

11. It is respectfully submitted that, the Map of Kolleru Wildlife Sanctuary depicting encroachments along with a report in the form of Searchable PDF/OCR supportable PDF is enclosed herewith. Necessary hard copies are also enclosed herewith which are as follows;

- Note on schemes under implementation (ANNEXURE - I).
- A detailed note on Kolleru Wildlife Sanctuary is also enclosed herewith for kind perusal (ANNEXURE – II).
- Map of Kolleru Wild Life Sanctuary (ANNEXURE – III).

This is submitted for kind information.

14.12.21

Prl. Chief Conservator of Forests &
Head of Forest Force
Andhra Pradesh

ANNEXURE - I

Brief Note on schemes being implemented in Kolleru Wildlife Sanctuary

Andhra Pradesh Forest department is implementing various activities through State and Central schemes. The main activities implemented broadly in the sanctuary area are Protection, Wildlife Habitat Improvement, Ecotourism, Development of bird congregation sites and infrastructure development etc. Overall, an amount of Rs.30 crore (approx.) has been spent in the sanctuary area from 2006-07 to 2020-21.

The Scheme-wise activities being taken up by the Andhra Pradesh Forest Department in the sanctuary area are broadly as follows;

1. CAMPA:

a. Wildlife Habitat Improvement in protected areas

i. Boundary Demarcation by the erection of stone monoliths/cairns

b. Water Resource Management in Protected Areas

ii. Construction of water conservation structures

iii. Development and maintenance of Check dams

c. Forest & Wildlife Protection

iv. Construction of boundary pillars

2. BIOSAP

v. Habitat Improvement

3. 04-Sanctuaries:

d. Habitat Improvement and Protection

vi. Maintenance of existing bird roosting stands

4. Vanavihari (Eco-tourism):

vii. Maintenance of EECs

Centrally Sponsored Schemes

5. Conservation of Natural Resources & Aquatic Ecosystems

e. Sustainable resource development and livelihood improvement

viii. Release of fish seed (fingerlings) into Kolleru WLS at strategic points

14.12.21

Prl. Chief Conservator of Forests &
Head of Forest Force,
Andhra Pradesh

ANNEXURE –II

NOTE ON KOLLERU LAKE & KOLLERU WILDLIFE SANCTUARY

BACKGROUND:

1. Kolleru Lake is one of the largest freshwater ecosystems (Wetland) in India of international importance recognized under the Ramsar Convention (Iran 1971) in the year 2002. It is a naturally formed lake between the alluvial plains of river Godavari and Krishna deltas and acts as a natural flood balancing reservoir. The lake with its variety of habitats supports rich biodiversity including some endangered species and supports the livelihoods of a large population living in and around the wetland system.

History:

2. The lake has been under tremendous pressure due to unsustainable developmental activities, particularly agriculture and aquaculture, which have led to the construction of hydraulic structures, roads, bunds and other infrastructure within its basin. The area under cultivation within the lake increased since 1940 when the British government granted *pattas* (title deeds) on payment of market value for the land. In 1954, the government initiated cooperative farming in the region inducing the formation of 93 farming societies on 850 sq. km. of the lake bed. The native paddy varieties were gradually replaced with shorter, high-yielding varieties that required the application of high dosages of chemical fertilizers and pesticides. By 1969, almost the entire lake was brought under cultivation and huge bunds were constructed to keep water out to protect the crops. As floods threatened cultivated areas almost every year, several control measures were also initiated during this period. However, the entire area was ravaged by a cyclone in 1969 which led to the near-complete destruction of agriculture. By the time flood control measures were completed, most of the people had become disillusioned with agriculture and had abandoned it. The roads and bridges that came up with agricultural development coupled with the increased demand for fish created a new livelihood opportunity and vast market for fish by 1978. Land use shifted to pisciculture which suddenly became profitable and by 1984, 5000 acres of government land within the lake bed was converted to fish tanks under the management of cooperative societies. The land was arbitrarily and haphazardly notified for pisciculture in total disregard to natural drainage patterns. High-profit margins subsequently induced contractors and private entrepreneurs into the Kolleru Lake area, who intensified aquaculture without adopting any environmental safeguards.

3. Realizing the rapid degradation of Kolleru Lake, the Government of Andhra Pradesh constituted several committees to propose measures for its restoration. Most of these committees, however, suggested engineering solutions aimed at agriculture and fisheries development and flood control. The measures proposed were aimed at the diversion of water to the upstream reaches reducing flows to the lake. The report of the expert committee on floods of deltaic areas on Krishna, Godavari and Guntur Districts by the Mitra Committee in 1966 suggested the construction of reservoirs at Budameru and Tammileru for storage of floodwaters (Mitra, 1966). Widening of Upputeru was proposed to drain the floodwaters with the lake levels controlled through the construction of a regulator (Mitra, 1966; Sreeramakrishnaiah, 1987; Ramakrishnan, 1980). Pandurangam (1976) recommended the construction of 71 tanks and necessary development to promote fisheries. Construction of roads, school buildings, hospitals, electrification and development of piggery, duckery, and dairy farms for socio-economic benefit were also recommended.

Area:

4. The Kolleru lake spreads over an area of 2,25,250 acres up to +10 feet contour MSL with rich biodiversity. The water spread area of Kolleru lake is as follows:

Up to +10 feet contour MSL	2,25,250 acres
Up to +7 feet Contour MSL	1,68,750 acres
Up to +5 feet contour MSL	77,138 acres
Up to +3 feet contour MSL	33,750 acres

Declaration of Kolleru wildlife sanctuary:

5. Govt. have issued a draft preliminary notification declaring Kolleru lake as a Wildlife Sanctuary vide G.O.Ms.No.76, EFS&T (For.III) Dept, dated. 25-9-1995. Later, the Govt. have issued a final notification of the sanctuary vide G.O.Ms.No. 120, EFS&T (For.III) Dept., dated.4-10-1999. The Kolleru Wildlife Sanctuary spreads over 9 Mandals, i.e., 7 Mandals in West Godavari and 2 Mandals in Krishna District with an extent of 30,855.20 ha or 77,138 acres up to +5 feet contour MSL. Out of this, 14861.33 Acres are privately owned Patta lands.

The sanctuary area details are as follows:

Sl. no.	District	Name of the Mandal	Area in Acres
1	West Godavari	Eluru	23900
2		Unguturu	134
3		Pedapadu	789
4		Denduluru	586
5		Akiveedu	6914
6		Nidamarru	6838
7		Bhimadolu	20323
	West Godavari district total		**59484**
8	Krishna	Kaikaluru	10295
9		Mandavalli	7359
	Krishna District Total		**17654**
	Total		**77138**

Status of WPs filed in the Hon'ble High Court of Andhra Pradesh:

6. Aggrieved by the notification orders issued by Government, several hundreds of illegal fish tank owners and other groups have filed several writ-petitions in Hon'ble High Court challenging the notification issued in 1999. After hearing all the writ-petitions, the Hon'ble High Court has bunched all the writ-petitions and treated them as a single case proclaimed the judgment on 30-7-2001, declaring the final notification issued by the State Govt. vide G.O.Ms.No.120 as valid and issued the following directions to the Government of A.P.;

- The final notification issued is valid.
- The Govt. should take all the steps to bring back Kolleru to its pristine glory.
- No pisciculture/aqua-culture/shrimp culture should be permitted inside the sanctuary except traditional methods of fishing and traditional agriculture in their Patta lands, till such time their agriculture lands are acquired by Government.
- All encroachments within Kolleru sanctuary up to +5' contour should be removed.

- Government should take adequate steps in stoppage of effluents into Kolleru lake.

Steps taken by Govt. of A.P after the Hon'ble High Court orders, dt.30.7.2001:

7. In order to implement the Hon'ble High Court orders, the Government have taken several steps. Taskforce teams were formed to prevent illegal encroachments. The Forest Department has removed 54 illegal fish tanks and faced threats and very difficult situations. Motivation camps were conducted to educate the local people on the adverse effects of floods like crop damages, deterioration of water quality, dangerous effects of pollution due to excessive usage of chemical fertilizers, feed, and pesticides by the illegal fish tank owners, etc. A total of 731 cases were booked for habitat destruction etc., from 30-7-2001 to 17.11.2005. Pollution control measures were taken by monitoring the water quality in 19 stations.

PIL filed by NGO (Nallamalai Foundation) before the CEC:

8. As the matter stands at this stage, the Executive Director, Nallamalai Foundation (NGO) filed an IA No.381/2005 before the Central Empowered Committee (CEC), constituted by the Hon'ble Supreme Court of India in W.P. (C) No.202/95 and 171/96 praying for the direction to the State Govt. on;

1. Immediate eviction of all encroachments in the sanctuary.
2. To expedite the acquisition of private Patta lands.
3. Cancellation of D-Form pattas (2,882 acres). (These D-Form pattas were cancelled by the Collector, West Godavari District on 11.8.2005 and 20.10.2005, and by the District Collector, Krishna on 10.1.2002 and 21.2.2002).
4. To bring back the Kolleru Lake to its pristine glory.

9. Hon'ble CEC has called for objections and conducted several hearings at New Delhi and also in Hyderabad wherein all the people representatives, several illegal fish tank owners, a large number of advocates have presented their cases before the committee and filed their affidavits during January-March, 2006. After the final hearing, the CEC has submitted its report to the Hon'ble Supreme Court of India during the month of March 2006.

Directions of the CEC of Hon'ble Supreme Court of India:

10. While dealing with a petition in IA No.1486-1487, Dt.20.3.2006, the Central Empowered Committee appointed by the Hon'ble Supreme Court of India, vide Para No.54 of their report; issued the following directions;

a. Use or transportation of inputs for pisciculture such as chemical fertilizer, farmyard manure, poultry manure, DOB, oil cakes etc., shall not be allowed in Kolleru Wildlife Sanctuary.
b. All fish tanks constructed inside the sanctuary shall be demolished in a time-bound manner starting from the big to the smaller ones. The tanks of an area of more than 100 acres (cumulative) shall be demolished within a period of 15 days and the remaining tanks shall be demolished by 31st May 2006.

Judgment of Hon'ble Supreme Court of India and action taken by the Govt. of A.P:

11. Aggrieved by the order of the CEC, the Kolleru Food Industries have filed a Writ Petition No.1486-1487 before the Hon'ble Supreme Court of India and the Supreme Court in their judgment Dt:10.04.2006 have upheld the directions issued by the CEC. As per the direction of the Hon'ble Supreme Court of India, under "Operation Kolleru" totally, 1776 tanks (1140 in West Godavari + 636 in Krishna district) covering an area of about 43,724 acres (28,949 acres in West Godavari + 15,775 acres in Krishna) have been demolished in Kolleru wildlife sanctuary up to +5' contour. The demolition work has been taken up and completed by 15.6.2006 as per the orders of the Hon'ble Supreme Court and CEC. The demolition was carried out by the revenue department under the supervision of District Collectors.

Post "Operation Kolleru-2006"

12. After the completion of "Operation Kolleru" in 2006, the revenue department from both the districts consolidated the lands falling up to +5 feet contour MSL and handed them over to the forest department for management. The Kolleru Wildlife Sanctuary is under the administrative control of the Wildlife Management Division, Eluru. Unlike the regular reserve forest blocks, the boundary of the sanctuary is described in terms of +5 feet MSL contour line in the notification. Through G.O no.144, EFS&T (For.II) dept., dt.15.11.2006 staff were recruited on a contract basis under various categories to effectively manage the sanctuary area.

Details of private Patta lands owned by farmers:

13. Traditional agriculture in privately owned lands is permitted as per G.O. Ms.No.120, EFS & T (For.III) Dept., dt.4.10.1999. The Patta lands owned by private owners having legal rights to practice traditional agriculture within the sanctuary area up to +5' contour is 14,861.33 acres out of the total sanctuary area of 77,138 acres. The details are given below:

Sl. no.	Name of the Mandal	No. of villages	No. of Ryots	The Extent of area (Acres)
	West Godavari Dist.			
1.	Eluru	7	399	823.61
2.	Pedapadu	3	199	496.52
3.	Denduluru	2	111	380.28
4.	Bhimadolu	5	1167	2426.87
5.	Nidamarru	11	4126	6150.63
6.	Unguturu	1	30	146.46
7.	Akiveedu	10	1981	3475.1
	Total	**39**	**8013**	**13899.47**
	Krishna District			
1.	***Kaikaluru***	10	125	571.45
2.	***Mandavalli***	5	71	390.41
	Total	**15**	**196**	**961.86**
	Grand total	**54**	**8209**	**14861.33**

14. As per G.O.Ms.No.120, dated.4.10.1999 and the judgment of the Hon'ble High Court, dated.30.7.2001 and also as per the Hon'ble Supreme Court of India's orders in April 2006, the owners of the agriculture lands can practice traditional agriculture without using pesticides and chemicals. But the farmers are agitating to permit them to use chemical fertilizers to get more yields, which is illegal. Otherwise, they are requesting to pay adequate compensation to their lands.

15. The Dist. Collector, West Godavari indicated Rupees Six Hundred Twenty-Five Crore Forty-Eight lakh (Rs.625.48 crore) and the Dist. Collector, Krishna has indicated Rupees Thirty crore (Rs.30.00 crore) to acquire an extent of 13,899.47 acres and 961.86 acres respectively. Accordingly, the Govt. have proposed to pay the total compensation of rupees Six hundred fifty five crore and forty eight lakh (Rs.655.48 crore) for paying compensation to the agriculture landowners to an extent of 14,861.33 acres from accumulated Compensatory Afforestation Management & Planning Agency (CAMPA) and requested Hon'ble Minister for Environment, Forests & Climate Change to consider this proposal. But the Union Minister, MoEF & CC, GoI in National Board for Wildlife Meeting held by him on 22-12-2009 has decided and informed that CAMPA funds cannot be used for acquisition of private lands and the question of payment of compensation to the farmers from CAMPA funds cannot be considered.

A.P. State Legislative Assembly resolution on 04.09.2008:

16. The A.P Legislative Assembly on 4-9-2008 had adopted a resolution to request the National Board of Wildlife, GoI and the Central Empowered Committee for reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet contour to +3 feet contour to mitigate the problems of the farmers.

17. The Ministry of Environment, Forests & Climate Change, GoI has been addressed accordingly vide EFS&T Lr.No.5876/For.II (2) 2006, dated. 17.10.2008 to place the matter before the National Board for Wildlife. The issue was discussed in the 17th meeting of the Standing Committee of the National Board for Wildlife on 22.12.2009 and the Chairman decided to visit the site. Hon'ble Union Minister for Environment, Forests & CC visited the Kolleru WLS along with the public representatives on 27.2.2010 and announced that a committee will be formed to look into the problems of the people and environmental issues. The Government of India have constituted a 7-member committee vide GoI F.No.6-118/2008/WL-1, Dt: 29.4.2010 headed by Dr. P. A. Azeez, SACON. The Committee has visited the Kolleru lake from 20th to 25th September 2010 and the report was submitted to the Government of India in April 2011.

18. The committee was not in agreement with the proposed reduction of the area from +5 feet contour to +3 feet contour as this would seriously affect the conservation of wildlife especially the migratory birds. The committee felt that it is not advisable to reduce the sanctuary area as it would not be a viable solution for socio-economic and ecological issues confronting the stakeholders and local communities dependent on the lake. The committee has stressed the need for appropriate relocation and rehabilitation policy to be adopted in acquiring the private lands below the +5 feet MSL contour level. The GoI has accepted the committee report and directed the State Government to implement the recommendations of the Committee vide F.No.6-118/2008/WL-I, Dt: 6.6.2012.

19. While is so, the Government of India have formulated the Wetlands (Conservation & Management) Rules, 2010 under the Environment (Protection) Act, 1986 (the same are amended subsequently in 2017). According to these rules, the entire Kolleru Lake up to +10 feet contour MSL (901 sq.km) will be under the purview of the Wetlands (Conservation & Management) Rules, 2010. Consequent to this and because of severe public opposition, the Government of Andhra Pradesh in letter No.10295/For-II (2)/2010-2, dt: 29.01.2011, has requested the Government of India to drop the proposals of bringing the entire lake under the purview of Wetlands (Conservation & Management) Rules, 2010 and also requested that these rules may be applied to the areas in Kolleru lake which remain underwater for most of the period of the year (up to +3 contour level).

A.P State Legislative Assembly Resolution on 23.12.2014:

20. The Andhra Pradesh Legislative Assembly have adopted the following resolution on 23.12.2014. "Kolleru Lake has been declared as Wildlife Sanctuary up to +5 feet Contour vide G.O. Ms.No.120, EFST&T (For.III) Dept., dated 04.10.1999 over an area of 30,855.20 Hectares, which includes 14,861.33 acres of Ziroyathi lands of which 13,899.47 acres is in West Godavari District 961.86 acres in Krishna District.

21. That these farmers are not getting adequate income from traditional agriculture without utilizing chemical fertilizers as per GO.Ms.No.120 EFS&T (For-III) Dept., dt.04.10.1999. The compensation proposed to be paid for acquiring these lands will cause a heavy financial burden on the state exchequer.

22. This House resolved to request the National Board for Wildlife, Government of India and the "Central Empowered Committee" to recommend for reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet Contour to +3 feet Contour to mitigate the problems of the farmers.

23. The above-said resolution was placed before State Board for Wildlife Andhra Pradesh. The State Board for Wildlife in its meeting held on 13.08.2015 recommended the reduction of the boundary of Kolleru Wildlife Sanctuary from +5 feet Contour to +3 feet Contour to the National Board for Wildlife.

24. The Standing Committee of the National Board for Wildlife in its 35th meeting held on 18th Aug 2015 discussed the proposal for boundary alteration of Kolleru Wildlife Sanctuary. The Standing Committee decided to constitute a Working Group to study all aspects of the matter. The Working Group will include member Prof R.Sukumar, representative of Wildlife Institute of India, a nominee of Wildlife Division of the Ministry and a representative of the State Forest Department of Andhra Pradesh. The Group visited the Kolleru Wildlife Sanctuary area during the second week of December 2015 and brainstormed on all aspects of the proposal and to suggest viable options, including rationalization of boundaries of the Sanctuary, for conservation of the wetland and the Sanctuary while ensuring that no hardships are caused to the bonafide owners of the lands in the area.

25. Further, in the Standing Committee of National Board for Wildlife in its 37th Meeting held on 26-02-2016, Chairman requested Dr. Sukumar and the site inspection team to interact with the state Government of Andhra Pradesh and finalize the report with the recommendations for the part of the Sanctuary area, which is suitable for de-notification, which would cater to the needs of the local and owners while preserving the Kolleru Bird Sanctuary.

26. Further, in the 40th Meeting of Standing Committee of National Board for Wildlife held on 3rd January 2017, member Dr.Sukumar, described the recommendations made in the report,

- No compromise with the ecological balance by a drastic reduction in sanctuary area as per Andhra Pradesh State Assembly Resolution.
- Deletion of private Ziroyati lands from the sanctuary, i.e., approx. 5533.3 ha located inside the north-eastern boundary of Kolleru WLS except major rivers/streams flowing within this area retaining 10 m on either side of the stream/river by the government to ensure the environmental water flow into sanctuary.
- Based on the authentic information on the extent of lands assigned to Scheduled Castes and Backward Class communities, the genuine D-Patta

cooperative societies be accommodated adjoining the Ziroyati lands to be deleted. Their process of rehabilitation should be ensured that these lands do not fall into the hands of 'Benami' owners.

- The government should be prepared to invest resources in R&R to resolve the rehabilitation cost of remaining Ziroyati landowners.
- The above actions may be started after the compilation of reliable data on the actual boundary of Kolleru WLS and the preparation of an integrated management plan.
- Within the rationalized boundaries of sanctuary, the important areas of bird congregation should be declared as core zones free of human disturbances and the rest buffer areas can be used for traditional fishing without the construction of bunds.
- Ecologically Sensitive Zone (ESZ) should be declared up to the present boundary or may be extended to a distance recommended by experts on wetland ecology.

27. Further, the Standing Committee of the National Board for Wildlife in its 48th meeting held on 27.03.2018 recommended for deletion of Ac.19797.69 cents (Approx. Ac.20000 cents) of private Ziroyati lands and D-Patta lands as per the resolution passed by the Government of Andhra Pradesh. Hon'ble CEC addressed the Chief Secretary, A.P vide letter dated 25.07.2018 (F.No.2-77/CEC/SC/2018-Pt.VI) advised no further action may be taken to implement the decision of the Standing Committee of National Board for Wildlife taken at its meeting held on 27.03.2018.

Encroachment status within Kolleru WL Sanctuary (up to +5 feet contour):

28. There are mainly three categories of the lands that exist inside the sanctuary area (Government, D-Patta & Ziroyati). Traditionally the villagers are practicing either agriculture or aquaculture activities in the area. The D-Patta lands were cancelled at the time of notification. After the "Operation Kolleru-2006", the revenue department from both the districts consolidated the area village-wise and handed it over to the forest department. The survey did not take place to demarcate the sanctuary boundary and as per the notification, the boundary of the sanctuary runs along the +5 feet of contour MSL. During "Operation Kolleru-2006" the aquaculture tank bunds inside the Wildlife Sanctuary were only partially demolished and the villagers again resorted to aquaculture activities by strengthening the partially demolished bunds. The encroachments are seasonal in nature, during monsoon season the area within +5 feet of contour MSL generally flooded and once the water level recedes post-monsoon, the villagers will try to repair the bunds of old tanks and start aquaculture activities. The Ziroyati lands are yet to be acquired by Government from the farmers by paying compensation. Though the D-Patta lands were cancelled at the time of notification, the farmers feel that still they have rights over those lands.

29. There is a lot of pressure from local villagers to carry out aquaculture activities and several complex issues involved from paying compensation to downsizing the sanctuary boundary. The Forest Department is taking concerted efforts in protecting the sanctuary area despite all hurdles. So far 544 cases have been registered related to encroachment in all the categories of the land since 2006-07 and the cases are under trial in various courts. The details of cases booked from 2006-07 to 2021-22 (up to 31-10-2021) are given below.

ABSTRACT OF ENCROACHMENT CASES REGISTERED FROM 2006-07 TO 2021-22 (up to 31-10-2021) IN KOLLERU WLS

Year of Encroachment Case booked	No. Cases booked	The Extent of Encroachment (Acres)		
		Govt.	Ziroyati	Total
2006-07	3	0	3.03	3.03
2007-08	1	0	0	0
2008-09	11	170.00	258.71	428.71
2009-10	23	307.95	471.31	779.26
2010-11	36	321.61	355.24	676.85
2011-12	11	182.21	40.88	223.09
2012-13	18	237.83	122.45	360.28
2013-14	5	28.62	22.53	51.15
2014-15	19	586.80	193.88	780.68
2015-16	33	361.37	33.48	394.85
2016-17	74	737.83	172.51	910.34
2017-18	95	2329.59	244.69	2574.28
2018-19	55	2428.97	25.71	2454.68
2019-20	46	1665.47	95.27	1760.74
2020-21	65	1305.45	1009.33	2314.78
2021-22	59	1204.12	825.24	2029.36
TOTAL:	**554**	**11867.82**	**3874.26**	**15742.08**

30. However, in some areas cases were registered multiple times since aquaculture activities were attempted in the same location every year. Accordingly, the area has been reconciled and arrived to an extent of 9522.10 Acres. (Govt land: 6680.73 Acres. Ziroyati land: 2841.37 Acres.). District-wise particulars are given below and the map is enclosed depicting the encroachment based on the cases registered so far.

ABSTRACT OF AREA UNDER ENCROACHMENT BASED ON CASES REGISTERED FROM 2006-07 TO 2020-21 IN KOLLERU WLS

Sl. no.	District	Mandal	Area of the Mandal (Acres)	Extent of Encroachment (Acres)		
				Govt. Land	Ziroyati Land	Total
1	West Godavari	Eluru	23900	2052.24	303.51	**2355.75**
2		Denduluru	586	0	158.54	**158.54**
3		Pedapadu	789	0	179.20	**179.20**
4		Nidamarru	6838	0	495.08	**495.08**
5		Unguturu	134	0	30.81	**30.81**
6		Bhimadole	20323	1617.69	834.28	**2451.97**
7		Akiveedu	6914	580.150	517.37	**1097.520**
		Total	**59484**	**4250.08**	**2518.79**	**6768.87**

1	Krishna	Kaikaluru	10295	2539.63	308.66	**2848.29**
2		Mandavalli	7359	71.02	13.92	**84.94**
		Total	**17654**	**2430.65**	**322.58**	**2753.23**
	WLS TOTAL		**77138**	**6680.73**	**2841.37**	**9522.10**

Activities have been taken up by the Forest department in the sanctuary area:

31. Forest Department is implementing various activities through state and central schemes. The main activities implemented broadly in the sanctuary area are Protection, wildlife habitat improvement, ecotourism, development of bird congregation site, infrastructure development, etc. Overall, an amount of Rs.30 crore (approx.) has been spent in the sanctuary area from 2006-07 to 2020-21. Some of the important state and central schemes being implemented currently in the sanctuary are CAMPA, BIOSAP, 04-Sanctuaries, 06-Development of National Park & Sanctuaries, Centrally Sponsored Schemes - Conservation of Natural Resources & Aquatic Ecosystem etc.,

32. The important activities being taken by Forest Department in the sanctuary area are;

1. **Protection:** Establishment of base camps, strike force, check posts for regular patrolling, collecting intelligence, preventing encroachment activities, checking vehicle movement that carries fertilizers, chemicals, and fish feed into sanctuary area etc. Presently 5 base camps,1 strike force, and 6 check posts are functioning from various locations in the sanctuary area.
2. **Habitat improvement:** The activities like desilting drains, demolition of old bunds, removal of water hyacinth and other weeds, formation of mounds, planting of trees for bird nesting, installation of artificial perching stands, releasing fish fingerlings (food for aquatic birds) etc., are being taken up to create a favourable environment for the wildlife to survive.
3. **Research & Monitoring:** Regular census is being conducted to enumerate different bird species and their population. Research related to tagging of birds was conducted earlier by BNHS. Presently through MS Swaminathan Research Foundation (MSSRF), a study is being conducted on Socio-economic and livelihood assessment of communities living in and around Kolleru WLS.
4. **Ecotourism:** The ecotourism facility at Aatapaka and Madhavapuram in the sanctuary caters to the visitors and acts as a Conservation Education Centre. Presently facilities like Environmental Education Centre, watch tower, boating are being maintained by the department. These facilities are being managed by local communities under the supervision of the forest department.
5. **Awareness creation:** Regular village level awareness programmes are being taken up and competitions for school and college students are being conducted during world wetland day, world environment day, wildlife week etc., mainly for gaining their support in the protection and conservation of this wetland.

33. Forest Department is not only implementing various developmental activities but also constantly monitoring the sanctuary area and taking strict actions against the illegal activities. The department is taking the best possible efforts to prevent and remove all kinds of encroachments in the sanctuary area. The sanctuary area is generally managed based on the prescriptions provided in the approved Management Plan. The previous Integrated Management Plan for Kolleru Wildlife Sanctuary was prepared by WISA (Wetlands International-South Asia):2008 for a period of 5 years under an assignment from the Forest Department, Government of

Andhra Pradesh. The present management plan for Kolleru WLS is being prepared by involving Bombay Natural History Society (BNHS), Mumbai and it is under progress.

Conclusion:

34. It is submitted that Kolleru lake is an important wetland in Andhra Pradesh. Out of the total area of the lake which is up to +10 feet MSL contour (Ac. 225250) only up to +5 feet MSL contour (Ac.77138) has been declared as a wildlife sanctuary in the year 1999. After "Operation Kolleru -2006", the sanctuary lands were consolidated by the revenue department of both the districts and handed it over to the Forest Department. Since then, the forest department is managing the sanctuary effectively despite all hurdles. The seasonal encroachments in the area mostly for aquaculture have been tackled by registering offense cases, demolishing the bunds, conducting village level awareness programmes etc.

35. Further, only 34.24% of the lake has been declared as Kolleru WLS out of the total lake area of Ac.2,25,250. The water quality in the lake not only depends on the activities carried out inside the sanctuary area (up to +5 feet MSL contour) but also based on the activities happening in the lake basin area. **Hence, to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by involving all the stakeholders working in Kolleru lake basin to manage the Kolleru lake/wetland holistically.**

4. It is seen from the report that there are certain deficiencies noted stating that complete survey as required has not been conducted. It is also mentioned in the report that out of 2,25,50 Acres of total lake area, only 34.24% of lake has been declared as Kolleru Wildlife Sanctuary. It is also mentioned that to understand the dynamics of this wetland ecosystem and various factors responsible for the degradation of water quality of the lake, a comprehensive scientific study is essential, which needs to be conducted through subject experts in the field of wetland/lake management by

involving all the stakeholders working in Kolleru Lake Basin to manage the Kolleru Lake/wetland holistically.

5. It is also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department is also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They are also directed to file an independent report in this aspect before this Tribunal.
6. The State of Andhra Pradesh is directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free.
7. The learned counsel appearing for the District Collector – Krishna District as well as the Andhra Pradesh Pollution Control Board wanted some time to file their independent reports regarding these aspects.
8. They are directed to submit the respective reports to this Tribunal on or before 10.02.2022 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.

9. The Registry is directed to communicate this order to the official respondents including the Principal Secretary for Agriculture, State of Andhra Pradesh and also the Chief Secretary, State of Andhra Pradesh by e-mail for their information and compliance of the direction in respect of the study to be conducted as suggested by the Principal Chief Conservator of Forest to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar Convention.

10. For consideration of further reports, post on 10.02.2022.

Sd/-
.....J.M.
(Justice K. Ramakrishnan)

Sd/-
.....E.M.
(Dr. Satyagopal Korlapati)

O.A. No.259/2020 (SZ) &
O.A. No.02/2021 (SZ)
03rd January, 2022. Mn.

Registered No. HSE/49. [Price : 0-40 Paise.



ఆంధ్ర ప్రదేశ్ రాజ పత్రము

THE ANDHRA PRADESH GAZETTE

PART I-EXTRAORDINARY
PUBLISHED BY AUTHORITY

No. 407] HYDERABAD, TUESDAY, OCTOBER 5, 1999

NOTIFICATIONS BY GOVERNMENT

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ENVIRONMENT, FORESTS, SCIENCE AND TECHNOLOGY DEPARTMENT

(For.-III)

DECLARATION OF AREAS FOR KOLLERU WILDLIFE SANCTUARY

[G.O.Ms.No. 120, Environment, Forest, Science and Technology (For.-III), 4th October, 1999.]

In exercise of the powers conferred by Section 26-A of the Wildlife (Protection) Act, 1972 (Central Act No. 53 of 1972), the Governor of Andhra Pradesh hereby declares the areas specified in the schedule below delineated and marked in the map kept in the office of the Prl. Chief Conservator of Forests, Andhra Pradesh, Hyderabad to be a Wildlife Sanctuary, for the protection of birds and other wildlife in the area, which shall be called "KOLLERU WILDLIFE SANCTUARY".

2. This Notification shall come into force with effect from the date of Publication of this Notification in the Andhra Pradesh Gazette.

THE SCHEDULE

(1) Name of the Districts : West Godavari and Krishna

(2) Name of the Mandals :

A) West Godavari District

i) Eluru
ii) Unguturu
iii) Pedapadu
iv) Denduluru
v) Akiveedu
vi) Nidamarru
vii) Bhimadole

B) Krishna District

i) Kaikaluru
ii) Mandavalli

(3) Name of the Forest Divisions : 1. Eluru, 2. Krishna

(4) Name of the Forest Ranges : 1. Eluru, 2. Vijayawada

(5) Name of the Wildlife Division : Wildlife Management Division, Eluru

(6) Name of the Sanctuary : Kolleru Wildlife Sanctuary

(7) Area of the Sanctuary : 308.55 Sq. Kms or 30,855.20 Ha.

Sno.	Mandal	District	Area in Ha.
1	Eluru	West Godavari	9560.00
2	Unguturu	--do--	53.71
3	Pedapadu	--do--	315.72
4	Denduluru	--do--	234.23
5	Akiveedu	--do--	2765.62
6	Nidamarru	--do--	2735.30
7	Bhimadolu	--do--	8129.00
8	Kaikaluru	Krishna	4117.81
9	Mandavalli	--do--	2943.81
	Total		30855.20

BOUNDARY DESCRIPTION: The Boundary runs along the contour at +5' MSL as marked in the map kept in the O/o. Principal Chief Conservator of Forests, Andhra Pradesh, Hyderabad. The village wise details of area included in the Sanctuary including details of Survey Numbers is kept in the O/o. the Principal Chief Conservator of Forests, Andhra Pradesh, Hyderabad.

I) EAST : 'A' TO 'B': The Sanctuary starts at Station 'A' which is a trijunction of R.S.Nos.1050, 1061 and 1069 of Vaddegudem village H/o. Kaikaram Revenue village of Unguturu Mandal (West Godavari District) as shown on the map at +5' Contour. Then the line traverses generally in Southernly direction along +5' Contour till it reaches point 'B', a point on common village boundary in R.S.Nos. 207 of Mandavalli and 134 of Akiveedu village 500mts north of Kaikaluru- Bhimavaram Railway line as shown in the map. While the line traverses along the +5' contour of the lake it touches the villages Voddegudem H/o. Kaikaram, Tokalapalli, Binepally, D. Gopavaram, Pedanindrakolanu, Nidamarru, Venkatapuram, Timmaraogudem, Adavikolanu, Chanamilli, Bavayyapalem, Krovvidi (Nidamarru Mandal), Pedakapavaram, Chinakapavaram, Gummuluru, Kollaparru, Siddapuram (Akiveedu Mandal), Kottada (Kaikaluru Mandal) Dharamapuram, Akiveedu and Madivada (Akiveedu Mandal). This line cuts across Tokalapalli drain, Siddapuram drain and Chinakapavaram drain.

I) SOUTH 'B' TO 'C': Thence the line from point 'B' traverses generally in Westerly direction along the Southern boundary of the lake along +5' Contour till point 'C' which is south western corner of R.S.No.241 and South East corner of Rs.Nos 152 of Ingilipakalanka village of Mandavalli Mandal in Krishna District located at South West corner of the lake, as shown in the map. The line runs parallel to the road from Akiveedu to Kaikaluru touching the villages of Akiveedu ,Dumpagadapa (Akiveedu Mandal), Someswaram, Alapadu, Pallewada, Penchikalamarru (Intrusion as English alphabet Z shape) then to Pallewada, Bhujabalapatnam, Gonepadu, Atapaka, Kaikaluru (Kaikaluru Mandal), Dayyampadu, Chintapadu, Kovvadalanka, Chintapadu, Pulaparru, Pillipadu, Nutchimilli, Takkellapadu, Ingilipakalanka (Mandavalli Mandal). This line cuts across Upputeru river, Polaraju drain, Eluru-Kaikaluru road and Moturu Channel.

) WEST 'C' TO 'D': Thence the line from point 'C' traverses generally in North, Northerly and South Westerly directions along +5' Contour of the lake and reaches the point 'D', trijunction of R.S.Nos. 391, 392 and 402 of Satyavolu village of Pedapadu Mandal in West Godavari District where Ramuleru River crosses +5' contour of the lake which is the Eastern limit of Satyavolu village. While the line traverses from point 'C' to 'D', it touches the villages of Ingilipakalanka, Nandigamalanka, Penumakalanka, Manuguuru, Penumakalanka, Nandigamalanka (Mandavalli Mandal), Koniki, Satyavolu (Pedapadu Mandal). This line crosses Gudivada channel, Chandraiah drain, N.S. drain of Nellimali, Dosapadu channel, Budameru river right and left branches.

) NORTH 'D' TO 'A': Then the boundary line runs generally in North-easterly direction upto Sriparru village thence in Southernly direction through Manuru Village limits till it crosses Eluru to Kaikaluru road thence it travels in Northernly direction upto a point where it crosses Thammileru western branch. Thence it runs in North-easterly direction till it touches Gundugolanu-Agadalalanka road and then it runs generally in Southernly direction upto Komatilanka village. Thence it runs in Northernly

direction upto a point where it crosses Escape drain at the junction point of Bhimadolu and Ambarpeta villages. Thence it runs in Easterly direction to reach the starting point at 'A'. The Northern boundary line passes through the villages Satyavolu, Mupparru (Pedapadu Mandal), Manuru, Sriparru, Ponnangi, Kalakuru, Jalipudi, Chitaparru (Eluru Mandal), Kovvali, Dosapadu, Pothanuru (Dendulurru Mandal), Agadalalanka, Chettunnapadu, Mallavaram (Bhimadolu Mandal), Kokkirayi lanka, Gudivaka lanka, Komatilanka, Prattikollalanka, Paidichintapadu (Eluru Mandal) and again Mallavaram, Chettunnapadu, Agadallanka, Amberpeta and Poolla (Bhimadolu Mandal), Kaikaram village (Unguturu Mandal). This line crosses the Pedapadu drain, Vatluru drain, Tammileru western branch, Jalipudi drain, Tammileru eastern branch, Kovvali drain, Agadalalanka channel and No.3 Escape drain.

NAMES OF THE VILLAGES:

Krishna District

Kaikaluru Mandal :

1) Chinnakottada	2) Penchikalamarru	3) Vadlakutithippa	4) Kolletikota
5) Laxmipuram	6) Gummallapadu	7) Gokarnapuram	8) Srungavarappadu
9) Pandiripallegudem	10) Jangampadu	11) Kovvadada	12) Pallevada
13) Someswaram,	14) Bhujabalapatnam	15) Chatrai	16) Singapuram
17) Atapaka	18) Gonepadu	19) Kaikaluru	20) Pedakottada
21) Pandiripalli gudem			

Mandavalli Mandal:

1) Penumakalanka	2) Marugunuru	3) Kovvadalanka	4) Chintapadu
5) Devvampadu	6) Nutchumilli	7) Nandigamalanka	8) Pagidipakalanka

West Godavari District

Eluru Mandal:

1) Paidichintapadu	2) Manuru	3) Kalakuru	4) Gudivakalanka
5) Komatilanka	6) Kokkirailanka	7) Prattikollalanka	8) Chataparru
9) Jalipudi	10) Sriparru	11) Ponangi	

Nidamarru Mandal:

1) Nidamarru	2) Adivikolanu	3) Venkatapuram	4) Tokalapalli
5) Pedanindrakolanu	6) Chanamilli	7) Bavajipalem	8) Binepalli
9) Krovvidi	10) D.Gopavaram	11) Timmaragudem	

Akiveedu Mandal:

1) Akiveedu	2) Madivada	3) Dharmapuram	4) Dunnapagadapa
5) Siddapuram	6) Kolleru	7) Gummuluru	8) Chinakapavaram
9) Pedakapavaram	10) Kollapuru		

Dendulurru Mandal:

1) Pothunuru 2) Kovvali 3) Dosapadu

Pedapadu Mandal:

1) Mupparru 2) Satyavolu 3) Koniki

Bhimadole Mandal:

1) Bhimadole 2) Amberpeta 3) Puila 4) Mallavaram

5) Chettunnapadu 6) Agadalalanka

Unguturu Mandal:

1) Kaikaram

The existence, nature and extent of rights as determined by the District Collector, Krishna vide Proceedings No.E6/1236/97, Dated: 01-09-1998 and by the District Collector, West Godavari, Eluru in Rc.No.D6/11717/96, Dated:08-08-1999 are as follows:

1. Right to do fishing with traditional methods using mavus, nets of size (which does not cause damage to seed but catches only fish of harvestable size) which will be specified separately by the Chief Wildlife Warden of Andhra Pradesh.
2. No person shall form any tank for Aquaculture or for any other purposes.
3. Wherever Pisciculture was existing in private lands, as on the date of notification, fishing in traditional methods shall be permitted, without causing environmental hazard, till the Government acquires such private lands.
4. Right to do traditional Agriculture without using pesticides and chemicals.
5. Right to use the ordinary boats without motor for the movement of the people.
6. Right of way with existing Roads connecting main habitations and their maintenance by providing sufficient number of vents for the roads existing at the time of Notification of Kolleru Wildlife Sanctuary U/s. 18 of Wildlife (Protection) Act, 1972 without permitting new roads and culverts.
7. Right to maintain existing water courses and drains necessary to avert submersion of agricultural lands surrounding Kolleru Lake.
8. Other rights and conditions as specified U/s. 27 to 34 and other provisions of the Wildlife (Protection) Act, 1972.
9. Electricity connection shall be given for domestic use only and not for Aquaculture or any activity connected therewith.
10. The 'D' form pattas granted or lease of land allowed in the area in favour of any assignee or lessee as the case may be including three societies viz., Gangaraju Fishermen Cooperative Society, Srungavarappadu; Sringavarappadu Fishermen Cooperative Society; Sanjay Gandhi Fishermen Cooperative Society, Srungavarappadu of Krishna District will be cancelled. The claimants are not entitled to any compensation under Wildlife (Protection) Act, 1972 as they were assigned the lands by the Government on free of land value.

11. D-Farm pattas to the extent of Ac.2882.00cts issued to the individuals as per G.O.Ms. No. 118 Revenue (Q) Dept., Dated:24-01-1976 in West Godavari District wherein they were permitted to construct fish tanks on the said lands are liable to be cancelled and these lands will be resumed under the provisions of Wildlife (Protection) Act, 1972. These D-Farm patta holders are not entitled for any compensation except exgratia as provided by the Government.
12. The annual Licences which are being issued by the Fisheries Department for fishery purpose indicating the areas allotted are to be discontinued.
13. Encroachments in conditional patta lands of Siddapuram village of Akiveedu Mandal are to be evicted.
14. The village site Poramboke of Siddapuram village of Akiveedu Mandal measuring Ac.16.67cts is hereby excluded from the jurisdiction of the Sanctuary.
15. Any other encroachments/activities which are not permitted specifically are liable to be removed/ stopped forthwith.

V. P. JAUHARI
PRINCIPAL SECRETARY TO GOVERNMENT

Printed and Published by the Commissioner of Printing, Government of Andhra Pradesh at Government Central Press, Hyderabad.

Annexure - 4

Water quality monitoring data of Kolleru lake, inlet streams / drains and outlet

I. Kolleru Lake points:

Table – 1: pH Values - Lake points											
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
1	Gudivaka lanka	7.72	---	7.14	6.82	6.90	7.52	7.86	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Kokkiraya lanka	7.73	---	7.5	7.04	7.18	7.51	7.48				
3	Chettunnapadu	7.36	---	7.37	7.02	7.60	7.75	7.66				
4	Pedayedlagadi	7.90	7.52	---	7.9	7.56	7.77	7.27				
5	Chinayedlagadi	8.25	8.35	---	7.78	7.44	7.22	7.07				
6	Kolleti kota	8.07	7.73	---	7.86	7.84	7.93	7.16				
7	Circar canal	8.02	---	---	7.95	7.94	7.94	7.19				
8	Srungavarappadu	7.98	---	---	7.86	7.82	7.89	7.10				
9	Bird Sanctuary, Atapaka Village	---	8.45	---	7.65	7.86	7.85	7.01				
Table – 2: Dissolved Oxygen – Lake points												
1	Gudivaka lanka	6.00	---	6.60	3.70	7.10	6.20	6.00	>6.0	>5.0	>4.0	>4.0
2	Kokkiraya lanka	2.80	---	2.90	2.60	6.10	5.80	5.20				
3	Chettunnapadu	Nil	---	7.70	7.50	5.70	6.00	5.70				
4	Pedayedlagadi	2.70	0.60	---	2.30	4.80	6.10	6.30				
5	Chinayedlagadi	8.20	8.00	---	8.40	8.10	6.00	5.70				
6	Kolleti kota	4.80	3.70	---	3.40	3.10	5.50	5.60				
7	Circar canal	4.80	---	---	4.00	3.90	5.20	5.50				
8	Srungavarappadu	5.10	---	---	4.70	4.10	5.00	5.30				
9	Bird Sanctuary, Atapaka Village	---	7.80	---	4.70	8.50	7.00	6.80				
All values are expressed in mg/lit.												

Table – 3: Total Dissolved Solids – Lake points

S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards - IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	1740	---	3880	650	745	780	1582	500	2000
2	Kokkiraya lanka	1900	---	1707	629	962	1266	2724		
3	Chettunnapadu	1660	---	1087	910	725	1288	1259		
4	Pedayedlagadi	1455	840	---	718	1264	1810	2422		
5	Chinayedlagadi	2400	2180	---	723	1774	1704	3073		
6	Kolleti kota	1660	1080	---	899	1004	1204	2053		
7	Circar canal	1587	---	---	809	1006	1294	2080		
8	Srungavarappadu	1781	---	---	1427	1113	1200	2070		
9	Bird Sanctuary, Atapaka Village	---	2180	---	530	1530	1656	1890		

All values are expressed in mg/lit.

Table – 4: Chemical Oxygen Demand – Lake points

S. No.	Location	04.08.2021& 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022
1	Gudivaka lanka	16	---	40	36	32	28	64
2	Kokkiraya lanka	8	---	20	20	24	20	104
3	Chettunnapadu	36	---	45	40	36	36	52
4	Pedayedlagadi	12	26	---	20	24	36	88
5	Chinayedlagadi	46	35	---	44	40	30	156
6	Kolleti kota	28	26	---	24	24	20	100
7	Circar canal	16	---	---	28	28	24	80
8	Srungavarappadu	4	---	---	32	30	16	92
9	Bird Sanctuary, Atapaka Village	---	41	---	28	24	28	84

All values are expressed in mg/lit.

Table – 5: Bio-chemical Oxygen Demand – Lake points

S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
1	Gudivaka lanka	2.1	---	3.0	3.2	3.0	2.5	9.8	<2.0	<3.0	<3.0	-
2	Kokkiraya lanka	1.2	---	2.1	2.2	2.4	2.0	14.6				
3	Chettunnapadu	4.6	---	6.6	5.4	4.0	3.4	8.0				
4	Pedayedlagadi	1.6	4.2	---	2.2	2.9	3.4	13.0				
5	Chinayedlagadi	9.0	5.8	---	4.2	3.4	3.2	20.2				
6	Kolleti kota	2.7	5.2	---	2.6	2.2	2.0	14.0				
7	Circar canal	2.2	---	---	3.0	3.0	2.2	12.6				
8	Srungavarappadu	0.8	---	---	3.1	3.2	1.8	13.4				
9	Bird Sanctuary, Atapaka Village	---	6.4	---	3.0	2.8	2.4	11.6				

All values are expressed in mg/lit.

Table – 6: Phosphates – Lake points

S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022
1	Gudivaka lanka	0.83	---	0.29	0.31	0.30	0.09	0.12
2	Kokkiraya lanka	1.00	---	0.37	0.33	0.70	0.38	0.20
3	Chettunnapadu	1.00	---	0.36	0.35	0.79	0.98	0.24
4	Pedayedlagadi	0.78	0.62	---	0.38	1.12	0.54	0.41
5	Chinayedlagadi	1.16	1.32	---	1.04	1.05	0.84	0.63
6	Kolleti kota	0.82	0.93	---	0.46	1.00	0.61	0.55
7	Circar canal	0.87	---	---	0.65	1.21	0.68	0.76
8	Srungavarappadu	0.85	---	---	0.77	1.36	0.62	0.73
9	Bird Sanctuary, Atapaka Village	---	0.31	---	0.14	0.50	0.15	0.13

All values are expressed in mg/lit.

Table – 7: Total Coliform – Lake points

S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
1	Gudivaka lanka	380	---	93	93	93	15	120	<50	<500	<5000	-
2	Kokkiraya lanka	240	---	15	20	15	28	240				
3	Chettunnapadu	210	---	20	20	21	11	120				
4	Pedayedlagadi	380	15	---	28	20	28	75				
5	Chinayedlagadi	210	20	---	11	7	11	230				
6	Kolleti kota	210	28	---	20	28	21	93				
7	Circar canal	460	---	---	11	15	15	75				
8	Srungavarappadu	240	---	---	15	20	20	240				
9	Bird Sanctuary, Atapaka Village	---	23	---	28	21	15	380				

All values are expressed MPN / 100 ml.

Table – 8: Fecal Coli form – Lake points

S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022
1	Gudivaka lanka	<3	---	<3	<3	<3	<3	<3
2	Kokkiraya lanka	<3	---	<3	<3	<3	<3	<3
3	Chettunnapadu	<3	---	<3	<3	<3	<3	<3
4	Pedayedlagadi	<3	<3	---	<3	<3	<3	<3
5	Chinayedlagadi	<3	<3	---	<3	<3	<3	<3
6	Kolleti kota	<3	<3	---	<3	<3	<3	<3
7	Circar canal	<3	---	---	<3	<3	<3	<3
8	Srungavarappadu	<3	---	---	<3	<3	<3	<3
9	Bird Sanctuary, Atapaka Village	---	<3	---	<3	<3	<3	<3

All values are expressed MPN / 100 ml.

Table – 9 (a): Iron as Fe - Lake points										
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards - IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	0.1449	---	0.0079	0.0208	0.0370	0.0426	0.0330	0.3	No relaxation
2	Kokkiraya lanka	0.1638	---	0.0049	0.1601	0.0240	0.0309	0.0290		
3	Chettunnapadu	0.1899	---	0.0161	0.0175	0.0136	0.0314	0.0260		
4	Pedayedlagadi	0.1132	0.2673	---	0.0074	0.0172	0.0406	0.0299		
5	Chinayedlagadi	0.1278	0.3491	---	0.0118	0.0161	0.0502	0.0280		
6	Kolleti kota	0.1175	0.2757	---	0.0047	0.0178	0.0343	0.5500		
7	Circar canal	0.0987	---	---	0.0015	0.0149	0.0323	1.4100		
8	Srungavarappadu	0.1499	---	---	0.0151	0.0165	0.0376	0.1300		
9	Bird Sanctuary, Atapaka Village	---	0.7490	---	0.0087	0.0105	0.0317	0.0320		
All values are expressed in mg/lit.										

Table – 9 (b): Manganese as Mn - Lake points										
1	Gudivaka lanka	0.0064	---	0.0016	0.0005	0.0060	0.0074	0.0130	0.1	0.3
2	Kokkiraya lanka	0.0081	---	0.0047	0.0004	0.0015	0.0029	0.0120		
3	Chettunnapadu	0.3252	---	0.0010	0.0004	0.0014	0.0029	0.0110		
4	Pedayedlagadi	0.0033	0.0856	---	0.0013	0.0007	0.0029	0.0480		
5	Chinayedlagadi	0.0035	0.0370	---	0.0019	0.0005	0.0056	0.2300		
6	Kolleti kota	0.0077	0.0236	---	0.0014	BDL	0.0014	0.1250		
7	Circar canal	0.0029	---	---	0.0008	0.0017	0.0013	0.0700		
8	Srungavarappadu	0.0061	---	---	0.0028	0.0035	0.0059	0.0340		
9	Bird Sanctuary, Atapaka Village	---	0.0250	---	0.0005	0.0012	0.0034	0.0440		
All values are expressed in mg/lit.										

Table – 9 (c): Nickel as Ni - Lake points										
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	0.0043	---	0.0014	0.0001	0.0010	0.0008	0.0080		
2	Kokkiraya lanka	0.0049	---	0.0011	0.0007	0.0009	0.0008	0.0006		
3	Chettunnapadu	0.0058	---	0.0012	BDL	0.0003	0.0010	0.0006		
4	Pedayedlagadi	0.0042	0.0024	---	0.0015	0.0007	0.0008	0.0015		
5	Chinayedlagadi	0.0047	0.0024	---	0.0016	0.0009	0.0010	0.0005	0.02	No relaxation
6	Kolleti kota	0.0043	0.0025	---	0.0001	0.0009	0.0009	0.0012		
7	Circar canal	0.0037	---	---	0.0001	0.0006	0.0008	0.0016		
8	Srungavarappadu	0.0046	---	---	0.0001	0.0031	0.0010	0.0130		
9	Bird Sanctuary, Atapaka Village	---	0.0042	---	0.0001	0.0007	0.0013	0.0006		
All values are expressed in mg/lit.										

Table – 9 (d): Total Chromium as Cr - Lake points										
1	Gudivaka lanka	0.0098	---	0.0013	0.0006	0.0017	0.0005	BDL		
2	Kokkiraya lanka	0.0099	---	0.0002	0.0001	0.0004	0.0004	BDL		
3	Chettunnapadu	0.0038	---	0.0025	0.0001	0.0308	0.0004	BDL		
4	Pedayedlagadi	0.0088	0.0032	---	0.0002	0.0002	0.0003	0.0040		
5	Chinayedlagadi	0.0097	0.0033	---	0.0001	0.0001	0.0002	0.0001	0.05	No relaxation
6	Kolleti kota	0.0089	0.0050	---	0.0004	BDL	0.0003	0.0070		
7	Circar canal	0.0075	---	---	0.0001	0.0002	0.0003	0.0014		
8	Srungavarappadu	0.0077	---	---	0.0003	0.0001	0.0003	0.0018		
9	Bird Sanctuary, Atapaka Village	---	0.0199	---	0.0009	0.0031	0.0002	0.0055		
All values are expressed in mg/lit.										

Table – 9 (e): Lead as Pb - Lake points										
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	0.0029	---	0.0014	BDL	0.0014	0.0002	BDL	0.01	No relaxation
2	Kokkiraya lanka	0.0072	---	<0.0001	BDL	0.0006	0.0002	BDL		
3	Chettunnapadu	0.0024	---	<0.0001	BDL	0.0013	0.0003	BDL		
4	Pedayedlagadi	0.0010	0.0026	---	BDL	0.0003	0.0001	BDL		
5	Chinayedlagadi	0.0011	0.0027	---	BDL	0.0004	0.0002	BDL		
6	Kolleti kota	0.0011	0.0070	---	BDL	0.0002	0.0002	BDL		
7	Circar canal	0.0009	---	---	BDL	0.0003	0.0002	BDL		
8	Srungavarappadu	0.0029	---	---	BDL	0.0003	0.0003	BDL		
9	Bird Sanctuary, Atapaka Village	---	0.0039	---	BDL	0.0004	0.0002	BDL		
All values are expressed in mg/lit.										

Table – 9 (f): Copper as Cu - Lake points										
1	Gudivaka lanka	0.0097	---	0.0015	0.0015	0.0033	0.0031	0.0007	0.05	1.5
2	Kokkiraya lanka	0.0105	---	0.0013	0.0014	0.0025	0.0030	0.0005		
3	Chettunnapadu	0.0104	---	0.0013	0.0015	0.0037	0.0030	0.0007		
4	Pedayedlagadi	0.0062	0.0095	---	0.0015	0.0026	0.0020	0.0030		
5	Chinayedlagadi	0.0061	0.0078	---	0.0016	0.0015	0.0030	0.0020		
6	Kolleti kota	0.0072	0.0106	---	0.0001	0.0013	0.0030	0.0030		
7	Circar canal	0.0041	---	---	0.0001	0.0021	0.0030	0.0030		
8	Srungavarappadu	0.0112	---	---	0.0014	0.0014	0.0030	0.0029		
9	Bird Sanctuary, Atapaka Village	---	0.0080	---	0.0018	0.0037	0.0030	0.0026		
All values are expressed in mg/lit.										

Table – 9 (g): Cadmium as Cd - Lake points										
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	0.0001	---	0.0061	BDL	BDL	BDL	BDL	0.003	No relaxation
2	Kokkiraya lanka	0.0002	---	0.0050	BDL	BDL	BDL	BDL		
3	Chettunnapadu	0.0001	---	0.0064	BDL	BDL	BDL	BDL		
4	Pedayedlagadi	0.0001	0.0009	---	0.0028	BDL	BDL	BDL		
5	Chinayedlagadi	0.0001	0.0009	---	0.0046	BDL	BDL	BDL		
6	Kolleti kota	0.0001	0.0018	---	0.0037	BDL	BDL	BDL		
7	Circar canal	0.0001	---	---	0.0038	BDL	BDL	0.0010		
8	Srungavarappadu	0.0001	---	---	0.0044	BDL	BDL	BDL		
9	Bird Sanctuary, Atapaka Village	---	0.0003	---	0.0024	BDL	BDL	BDL		
All values are expressed in mg/lit.										

Table – 9 (h): Arsenic as As - Lake points										
1	Gudivaka lanka	0.0038	---	0.0031	0.0047	0.0022	0.0023	0.0020	0.01	0.05
2	Kokkiraya lanka	0.0033	---	0.0048	0.0026	0.0032	0.0022	0.0040		
3	Chettunnapadu	0.0030	---	0.0077	0.0023	0.0065	0.0037	0.0020		
4	Pedayedlagadi	0.0002	0.0016	---	0.0048	0.0022	0.0023	0.0022		
5	Chinayedlagadi	0.0004	0.0027	---	0.0041	0.0032	0.0034	0.0028		
6	Kolleti kota	0.0003	0.0020	---	0.0019	0.0046	0.0027	0.0047		
7	Circar canal	0.0002	---	---	0.0047	0.0023	0.0027	0.0017		
8	Srungavarappadu	0.0028	---	---	0.0061	0.0003	0.0027	0.0030		
9	Bird Sanctuary, Atapaka Village	---	0.0028	---	0.0024	0.0026	0.0030	0.0080		
All values are expressed in mg/lit.										

Table – 9 (i): Mercury as Hg - Lake points										
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	Drinking water Standards IS 10500:2012	
									Acceptable Limit	Permissible Limit
1	Gudivaka lanka	BDL	---	0.0001	BDL	BDL	BDL	BDL	0.001	No relaxation
2	Kokkiraya lanka	BDL	---	0.0001	BDL	BDL	BDL	BDL		
3	Chettunnapadu	BDL	---	0.0001	BDL	BDL	BDL	BDL		
4	Pedayedlagadi	BDL	BDL	---	BDL	BDL	BDL	BDL		
5	Chinayedlagadi	BDL	BDL	---	BDL	BDL	BDL	BDL		
6	Kolleti kota	BDL	0.0010	---	BDL	BDL	BDL	BDL		
7	Circar canal	BDL	---	---	BDL	BDL	BDL	BDL		
8	Srungavarappadu	BDL	---	---	BDL	BDL	BDL	BDL		
9	Bird Sanctuary, Atapaka Village	---	0.0010	---	BDL	BDL	BDL	BDL		
All values are expressed in mg/lit.										

Table – 9 (j): Zinc as Zn - Lake points										
1	Gudivaka lanka	BDL	---	0.0019	0.0008	0.0046	0.0040	0.0130	5.0	15
2	Kokkiraya lanka	BDL	---	0.0018	0.0017	0.0019	0.0064	0.0080		
3	Chettunnapadu	BDL	---	0.0024	0.0005	0.0269	0.0050	0.0120		
4	Pedayedlagadi	BDL	0.0033	---	0.0015	0.0206	0.0016	0.0080		
5	Chinayedlagadi	BDL	0.0007	---	0.0017	0.0069	0.0036	0.0042		
6	Kolleti kota	BDL	0.0039	---	0.0015	0.0010	0.0037	0.0069		
7	Circar canal	BDL	---	---	0.0014	0.0010	0.0054	0.1240		
8	Srungavarappadu	BDL	---	---	0.0019	0.0042	0.0038	0.0490		
9	Bird Sanctuary, Atapaka Village	---	0.0014	---	0.0019	0.0229	0.0042	0.0090		
All values are expressed in mg/lit.										

II. Kolleru Lake inlet streams / drains:

Table- 10: Mondikodu drain, Grampanchayat - Lake inlet											
S. No.	Parameters	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
General												
1	pH	7.54	---	7.24	7.03	7.06	7.39	7.4	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	5.4	---	7.0	6.0	4.9	5	5.7	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	12	---	30	28	20	32	68	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	1.8	---	3.2	2.6	2.0	3.9	10.0	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.76	---	0.13	0.51	0.29	0.11	0.02	-	-	-	-
6	Total Coliform (MPN / 100 ml)	440	---	28	15	20	21	230	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		Permissible Limit	
8	Total Dissolved Solids (mg/lit)	1722	---	2639	756	763	1208	1155	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1161	---	0.0110	0.0224	0.0193	0.0356	0.036	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0114	---	0.0015	0.0004	0.0027	0.0044	0.031	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0041	---	0.0001	0.0001	0.0008	0.0009	0.001	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0073	---	0.0001	0.0001	0.0004	0.0004	0.0002	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0051	---	0.0006	BDL	0.0005	0.0002	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0096	---	0.0013	0.0017	0.0032	0.003	0.002	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	0.0039	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0037	---	0.0062	0.0044	0.002	0.0023	0.01	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0020	0.2413	0.0017	0.0050	0.014	5		15	

Table - 11: Jodikaluva drain - Lake inlet											
S. No.	Parameters	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
General												
1	pH	7.76	---	7.32	7.05	7.23	7.46	7.64	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	7.2	---	4.8	4.9	6.1	5.6	5.4	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	52	---	32	30	28	24	60	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	7.2	---	3.5	2.8	2.6	2.2	8.8	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	1.28	---	1.01	1.74	1.71	0.96	0.70	-	-	-	-
6	Total Coliform (MPN / 100 ml)	470	---	28	28	28	15	93	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		Permissible Limit	
8	Total Dissolved Solids (mg/lit)	2432	---	1024	945	739	1382	1806	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1361	---	0.0090	0.0185	0.0213	0.0381	0.026	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0094	---	0.0017	0.0003	0.0024	0.0036	0.009	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0046	---	0.0010	0.0001	0.0006	0.0013	0.0005	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0082	---	0.0013	0.0007	0.0005	0.0006	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0014	---	BDL	BDL	0.0326	0.0003	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0083	---	0.0013	0.0016	0.0035	0.003	0.0004	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	0.0059	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0039	---	0.0063	0.0043	0.0015	0.0044	0.003	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0021	0.0516	0.0044	0.0034	0.009	5		15	

Table - 12: Bulusuvagu drain - Lake inlet												
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.31	---	7.44	7.18	7.50	7.58	7.45	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	2.1	---	2.4	2.6	6.1	5.5	5.5	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	32	---	24	20	20	20	104	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	4.1	---	2	2.4	2.1	2.4	15.0	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	1.16	---	0.18	0.64	0.22	0.21	0.02	-	-	-	-
6	Total Coliform (MPN / 100 ml)	460	---	11	28	20	15	120	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	2673	---	1396	1102	618	768	2538	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1022	---	0.0160	0.0240	0.0146	0.0454	0.049	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0060	---	0.0056	0.0007	0.001	0.0018	0.01	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0037	---	0.0012	0.0005	0.0006	0.0008	0.0009	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0061	---	0.0015	0.0003	0.0006	0.0004	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0023	---	BDL	BDL	0.0002	0.0001	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0087	---	0.0013	0.0011	0.0037	0.0025	0.0004	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	0.0033	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0009	---	0.0038	0.0016	0.0017	0.0013	0.0009	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0016	0.2266	0.0002	0.0051	0.01	5		15	

Table - 13: Tokalapalli drain - Lake inlet											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.76	---	7.40	7.07	7.63	7.43	7.23	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	5.5	---	5.2	5.4	5.1	5	5.7	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	20	---	20	24	16	10	84	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	2.4	---	2.2	2.2	2.0	2.0	12.0	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.10	---	0.12	0.41	0.25	0.03	0.05	-	-	-	-
6	Total Coliform (MPN / 100 ml)	440	---	7	11	15	39	240	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	260	---	549	406	382	359	1302	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1521	---	0.0050	0.0161	0.0127	0.0208	0.029	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0070	---	0.0020	0.0005	0.0008	0.0013	0.013	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0054	---	0.0006	0.0006	0.0005	0.0013	0.0004	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0094	---	0.0014	0.0017	0.0004	0.0007	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0023	---	BDL	BDL	0.0003	0.0002	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0120	---	0.0006	0.0017	0.0037	0.003	0.0008	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	0.0021	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0009	---	0.0030	0.0010	0.0069	0.001	0.0007	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0019	0.0894	0.0034	0.0066	0.013	5		15	

Table - 14: Pandikodu drain - Lake inlet											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.49	---	7.34	7.03	7.20	7.66	7.21	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	6.4	---	4.9	4.8	1.5	5.2	5.6	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	4	---	34	36	20	16	56	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	0.8	---	4.9	4.2	2.2	2.2	8.2	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.11	---	0.33	0.54	0.80	0.03	0.04	-	-	-	-
6	Total Coliform (MPN / 100 ml)	380	---	21	21	11	20	210	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	3054	---	1491	934	424	350	384	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1010	---	0.0380	0.0322	0.0089	0.02	0.022	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0050	---	0.0044	0.0005	0.0009	0.0031	0.01	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0032	---	0.0012	0.0001	0.0001	0.0004	0.0004	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0058	---	0.0015	0.0001	0.0209	0.0005	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0025	---	BDL	BDL	0.0007	0.0003	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0096	---	0.0011	0.0020	0.0025	0.003	0.001	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	0.0026	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0009	---	0.0004	0.0021	0.0005	0.0012	0.0008	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0018	0.0006	0.0185	0.0072	0.014	5		15	

Table - 15: Kovvali drain - Lake inlet											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.62	---	7.12	7.30	7.76	7.96	7.32	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	6.4	---	7.4	6.5	6.0	5.9	5.2	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	12	---	36	32	32	24	68	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	1.6	---	4.5	3.9	4.0	2.6	9.6	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.89	---	0.08	0.39	0.22	0.46	0.02	-	-	-	-
6	Total Coliform (MPN / 100 ml)	440	---	28	15	28	20	210	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	350	---	643	620	386	612	912	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1650	---	0.0050	0.0211	0.0131	0.0284	0.019	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0062	---	0.0027	0.0002	0.0013	0.001	0.008	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0058	---	0.0014	0.0001	0.0003	0.0007	0.0002	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0111	---	0.0010	0.0002	0.0018	0.0003	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0033	---	0.0013	BDL	0.0012	0.0002	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0120	---	0.0010	0.0015	0.0036	0.003	0.0006	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0002	---	0.0027	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0015	---	0.0039	0.0014	0.0066	0.0023	0.0005	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	0.0017	0.0004	0.0369	0.0049	0.011	5		15	

Table - 16: East Tammileru - Lake inlet											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.58	---	7.30	7.40	7.43	7.75	7.17	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	7.5	---	8.4	5.5	8.0	5.6	5.4	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	16	---	28	24	28	30	60	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	2.2	---	4.7	2.8	2.4	3.2	9.2	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.21	---	0.05	0.70	0.20	0.26	0.05	-	-	-	-
6	Total Coliform (MPN / 100 ml)	380	---	20	20	21	28	93	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	530	---	368	543	610	789	476	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1667	---	0.0016	0.0213	0.0161	0.038	0.019	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0156	---	0.0004	0.0008	0.0006	0.0026	0.008	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0058	---	0.0010	0.0068	0.0006	0.0007	0.0003	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0111	---	0.0011	0.0002	0.0002	0.0003	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0047	---	BDL	BDL	0.0004	0.0001	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0170	---	0.0007	0.0015	0.0011	0.002	0.0008	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0002	---	0.0016	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0028	---	0.0028	0.0014	0.0017	0.0012	0.0013	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	0.0023	---	0.0011	0.0101	0.0011	0.0024	0.012	5		15	

Table - 17: West Tammileru - Lake inlet												
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.69	---	7.39	7.42	7.47	7.84	7.64	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	5.2	---	6.3	6.0	6.9	5.7	5.3	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	24	---	32	30	32	16	88	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	2.8	---	2.2	3.6	3.2	1.8	12.0	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.17	---	0.09	0.29	0.69	0.03	0.80	-	-	-	-
6	Total Coliform (MPN / 100 ml)	460	---	28	28	15	15	120	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	<3	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	482	---	472	538	632	642	1008	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1520	---	BDL	0.0202	0.0189	0.0236	0.03	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0110	---	0.0004	0.0006	0.0016	0.0009	0.011	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0074	---	0.0010	0.0009	0.0009	0.0004	0.0008	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0097	---	0.0008	0.0003	0.0002	0.0002	BDL	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0062	---	BDL	BDL	0.0001	0.0003	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0150	---	0.0007	0.0020	0.0023	0.0029	0.0009	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0003	---	0.0029	BDL	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0044	---	0.0007	0.0070	0.0024	0.0012	0.0033	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	BDL	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	0.0036	---	0.0018	0.0014	0.0021	0.0037	0.01	5		15	

Table - 18: Chandrayya drain, Gudivada - Lake inlet												
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.24	---	---	7.01	6.58	7.79	8.19	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	3.5	---	---	4.0	6.8	6.2	5.5	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	32	---	---	20	16	12	20	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	3.2	---	---	2.4	2.7	0.8	4.0	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.23	---	---	0.22	1.82	0.27	0.30	-	-	-	-
6	Total Coliform (MPN / 100 ml)	150	---	---	21	15	21	240	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	550	---	---	547	585	493	485	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1660	---	---	0.0082	0.0208	0.0224	0.032	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0067	---	---	0.0015	0.0009	0.0013	0.032	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0055	---	---	0.0001	0.0019	0.0005	0.004	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0106	---	---	0.0002	0.0001	0.0002	0.006	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0023	---	---	BDL	BDL	0.0002	0.001	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0088	---	---	0.0010	0.0021	0.0037	0.0039	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0002	---	---	0.0023	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0004	---	---	0.0025	0.0034	0.0017	0.021	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	---	0.0001	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	---	0.0020	0.0043	0.0045	0.005	5		15	

Table - 19: Budameru drain - Lake inlet												
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.12	---	---	6.93	7.19	7.75	7.18	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	3.5	---	---	3.0	3.4	5.5	5.6	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	8	---	---	16	20	20	56	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	1.4	---	---	1.8	2.0	2.0	8.6	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.64	---	---	0.40	1.00	0.52	0.48	-	-	-	-
6	Total Coliform (MPN / 100 ml)	210	---	---	28	21	15	210	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	732	---	---	607	663	785	863	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1240	---	---	0.0057	0.0288	0.0343	0.046	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0040	---	---	0.0008	0.0008	0.0028	0.066	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0047	---	---	0.0001	0.001	0.0008	0.0007	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0092	---	---	0.0001	0.0001	0.0004	0.0006	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0015	---	---	BDL	BDL	0.0003	0.002	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0063	---	---	0.0012	0.0014	0.0036	0.0035	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	---	0.0033	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0003	---	---	0.0038	0.0023	0.0014	0.0017	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	---	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	---	0.0015	0.0025	0.0062	0.007	5		15	

Table - 20: Narasannapalem drain - Lake inlet												
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.36	---	---	7.74	7.50	7.28	7.17	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	7.0	---	---	7.3	3.7	6.8	6.5	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	8	---	---	28	24	24	60	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	1.2	---	---	2.9	2.8	2.2	9.2	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.57	---	---	0.75	0.37	0.92	0.89	-	-	-	-
6	Total Coliform (MPN / 100 ml)	460	---	---	15	28	28	150	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	---	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	675	---	---	589	553	668	673	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1300	---	---	0.0077	0.0194	0.0373	0.079	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0042	---	---	0.0005	0.0016	0.0011	0.034	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0047	---	---	0.0001	0.0006	0.001	0.0017	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0099	---	---	0.0002	0.0001	0.0002	0.0024	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0014	---	---	BDL	BDL	0.0004	0.0003	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0075	---	---	0.0002	0.0019	0.0035	0.0039	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	---	---	0.0038	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0003	---	---	0.0042	0.0018	0.0026	0.0033	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	---	---	0.0001	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	---	---	0.0015	0.0082	0.0063	0.05	5		15	

Table - 21: Polaraju drain - Lake inlet											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	7.99	8.09	---	7.45	7.52	7.99	7.85	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	4.5	6.3	---	5.0	6.7	6.3	6.0	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	36	30	---	40	28	32	36	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	5.0	5.3	---	4	2.3	3.0	5.4	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	0.94	0.80	---	0.91	1.13	0.83	0.53	-	-	-	-
6	Total Coliform (MPN / 100 ml)	240	28	---	7	11	39	210	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	<3	<3	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	2710	1520	---	1549	582	1520	2305	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1050	0.4300	---	0.0128	0.0286	0.0502	0.043	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0028	0.0460	---	0.0026	0.0096	0.0281	0.176	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0039	0.0027	---	0.0001	0.0007	0.0009	0.0004	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0085	0.0034	---	0.0003	0.0346	0.0004	0.0003	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0010	0.0026	---	BDL	0.0012	0.0002	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0055	0.0085	---	0.0011	0.0033	0.002	0.0022	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	0.0001	---	0.0031	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0003	0.0018	---	0.0042	0.0023	0.0024	0.0017	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	BDL	---	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	0.0005	---	0.0016	0.0033	0.0054	0.006	5		15	

Table - 22: Chandraiah drain, Polukonda village											
S. No.	**Parameters**	**04.08.2021 & 06.08.2021**	**25.08.2021**	**16.09.2021**	**11.10.2021 & 23.10.2021**	**11.11.2021 & 17.11.2021**	**13.12.2021 & 23.12.2021**	**04.01.2022 & 06.01.2022**	**CPCB Classification for designated best use**			
									Class 'A'	**Class 'B'**	**Class 'C'**	**Class 'D'**
General												
1	pH	---	7.62	---	7.84	7.64	7.92	7.37	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	---	6.0	---	3.7	4.0	6.9	5.2	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	---	27	---	36	32	28	64	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	---	4.6	---	3.8	3.2	2.4	9.4	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	---	0.72	---	0.53	0.40	0.99	0.58	-	-	-	-
6	Total Coliform (MPN / 100 ml)	---	23	---	20	15	11	120	<50	<500	<5000	-
7	Fecal Coliform (MPN / 100 ml)	---	<3	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		**Permissible Limit**	
8	Total Dissolved Solids (mg/lit)	---	700	---	1016	582	1002	608	500		2000	
Metals												
9	Iron as Fe (mg/lit)	---	0.0296	---	0.0025	0.0192	0.0292	0.057	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	---	0.0430	---	0.0002	0.0004	0.003	0.013	0.1		0.3	
11	Nickel as Ni (mg/lit)	---	0.0032	---	0.0001	0.0007	0.0007	0.0006	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	---	0.0038	---	0.0001	0.0013	0.0002	0.001	0.05		No relaxation	
13	Lead as Pb (mg/lit)	---	0.0035	---	BDL	BDL	0.0002	0.0002	0.01		No relaxation	
14	Copper as Cu (mg/lit)	---	0.0080	---	0.0013	0.0015	0.0035	0.0031	0.05		1.5	
15	Cadmium as Cd (mg/lit)	---	0.0002	---	0.0045	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	---	0.0022	---	0.0008	0.0019	0.0023	0.0017	0.01		0.05	
17	Mercury as Hg (mg/lit)	---	0.0020	---	BDL	BDL	BDL	BDL	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	---	0.0200	---	0.0016	0.0025	0.0024	0.004	5		15	

III. Outlet of Kolleru Lake - Upputeru:

Table - 23: Upputeru - Outlet											
S. No.	Location	04.08.2021 & 06.08.2021	25.08.2021	16.09.2021	11.10.2021 & 23.10.2021	11.11.2021 & 17.11.2021	13.12.2021 & 23.12.2021	04.01.2022 & 06.01.2022	CPCB Classification for designated best use			
									Class 'A'	Class 'B'	Class 'C'	Class 'D'
General												
1	pH	---	6.96	---	7.67	7.90	7.21	7.71	6.5 - 8.5		6.0 - 9.0	6.5 - 8.5
2	Dissolved Oxygen (mg/lit)	---	3.10	---	3.80	3.40	5.00	5.20	>6.0	>5.0	>4.0	>4.0
3	Chemical Oxygen Demand (mg/lit)	---	28	---	40	28	32	76	-	-	-	-
4	Bio-chemical Oxygen Demand (mg/lit)	---	5.4	---	3.8	2.4	3.4	10.4	<2.0	<3.0	<3.0	-
5	Phosphates (mg/lit)	---	0.83	---	0.60	0.91	1.00	0.54	-	-	-	-
6	Total Coli form (MPN / 100 ml)	---	20	---	15	15	11	210	<50	<500	<5000	-
7	Fecal Coli form (MPN / 100 ml)	---	<3	---	<3	<3	<3	<3	-	-	-	-
									Drinking water Standards IS 10500:2012			
									Acceptable Limit		Permissible Limit	
8	Total Dissolved Solids (mg/lit)	---	1220	---	820	1064	1662	1860	500		2000	
Metals												
9	Iron as Fe (mg/lit)	0.1227	0.2264	---	0.0074	0.0248	0.0350	0.0530	0.3		No relaxation	
10	Manganese as Mn (mg/lit)	0.0063	0.0373	---	0.0006	0.0004	0.0053	0.0120	0.1		0.3	
11	Nickel as Ni (mg/lit)	0.0049	0.0026	---	0.0001	0.0002	0.0008	0.0004	0.02		No relaxation	
12	Total Chromium as Cr (mg/lit)	0.0089	0.0057	---	0.0003	0.0002	0.0003	0.0040	0.05		No relaxation	
13	Lead as Pb (mg/lit)	0.0026	0.0046	---	BDL	BDL	0.0002	BDL	0.01		No relaxation	
14	Copper as Cu (mg/lit)	0.0104	0.0087	---	0.0015	0.0005	0.0030	0.0010	0.05		1.5	
15	Cadmium as Cd (mg/lit)	0.0001	0.0001	---	0.0030	BDL	BDL	BDL	0.003		No relaxation	
16	Arsenic as As (mg/lit)	0.0025	0.0018	---	0.0023	BDL	0.0027	0.0020	0.01		0.05	
17	Mercury as Hg (mg/lit)	BDL	BDL	---	BDL	BDL	BDL	0.0004	0.001		No relaxation	
18	Zinc as Zn (mg/lit)	BDL	0.0127	---	0.0016	BDL	0.0052	0.0070	5		15	

Table - 24: Water quality of Budameru joining Kolleru Lake -Between Vijayawada and Kolleru Lake - January, 2022											
S. No.	**Location**	**Latitude**	**Longitude**	**pH**	**TDS**	**DO**	**BOD**	**COD**	**Phosphates**	**Total Coliform**	**Fecal Coliform**
1	Inner ring road	16°33'03.02"	80°37'01.37"	6.94	796	Nil	11.2	76	0.09	>2400	75
2	Sri Rajeswarinagar / Ayodhya nagar Railway Bridge	16°31'56.16"	80°38'01.75"	6.93	732	Nil	8	64	1.12	>2400	71
3	Gandhi Colony	16°31'37.52"	80°40'32.57"	7.03	727	1.2	7.4	60	1.08	1100	43
4	Gudavalli (V)	16°30'52.28"	80°44'56.48"	7.11	788	2.2	6.8	56	1.14	1300	64
5	Tarigopula	16°29'29.38"	80°49'56.29"	7.14	627	3.0	11.7	72	1.18	1100	39
6	Talaprolu - Vuyyur road, near Lankapadi Agraharam Bridge	16°30'17.38"	81°53'37.23"	7.20	711	3.4	12.2	88	0.86	1100	43
7	Puttagunta - Machilipatnam - Nuziveedu - Kalluru road	16°30'38.17"	80°57'30.92"	7.19	903	3.8	11.1	80	0.54	1300	64
8	Before confluence with Kolleru lake	16°33'45.79"	80°01'59.94"	7.34	867	3.7	9.3	76	0.85	1100	39
Standards: CPCB Classification for designated best use.											
Class A:				6.5 - 8.5	---	> 6.0	< 2.0	---	---	< 50	---
Class B:					---	> 5.0	< 3.0	---	---	< 500	---
Class C:				6.0 - 9.0	---	> 4.0		---	---	< 5000	---
Class D:				6.5 - 8.5	---	> 4.0	---	---	---	---	---
Note: All values are expressed in mg/lit, except pH, Total Coliform & Fecal Coliform. Total Colifrom & Fecal Coliform values are expressed in MPN / 100 ml.											

Annexure - 5

ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Physico chemical analysis report of Kolleru lake samples (Metals) for the month August - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe)	Manganese (Mn)	Nickel (Ni)	Chromium (Cr)	Lead (Pb)	Copper (Cu)	Cadmium (Cd)	Arsenic (As)	Mercury (Hg)	Zinc (Zn)
KRISHNA DISTRICT														
Y2108185	Sample collected from Upputeru at Tadinada Village	Lake	25/08/2021	26/08/2021	0.2264	0.0373	0.0026	0.0057	0.0046	0.0087	0.10	0.0018	BDL	0.0127
Y2108186	Sample collected from Kolletikota at Pachikalanarru Village	Lake	25/08/2021	26/08/2021	0.2757	0.0236	0.0025	0.0050	0.0070	0.0106	0.0018	0.0020	0.001	0.0039
Y2108187	Sample collected from drain (Polraju/Nagaraju) at Atapaka Village	Drain	25/08/2021	26/08/2021	0.4668	0.0412	0.0047	0.0225	0.0088	0.0162	0.003	0.0020	0.002	0.0057
Y2108188	Sample collected from in the Lake - Bird Life Sanctuary at Atapaka Village	Lake	25/08/2021	26/08/2021	0.749	0.0250	0.0042	0.0199	0.0039	0.0080	0.0003	0.0028	0.001	0.0014
Y2108189	Sample collected from in the Polraju drain at Kikaluru - Eluru Road	Drain	25/08/2021	26/08/2021	0.4311	0.0457	0.0027	0.0034	0.0026	0.0085	0.0001	0.0018	BDL	0.0005
Y2108190	Sample collected from in the Chinayedlagadi Lake at Kikaluru - Eluru Road	Lake	25/08/2021	26/08/2021	0.3491	0.0370	0.0024	0.0033	0.0027	0.0078	0.0009	0.0027	BDL	0.0007
Y2108191	Sample collected from in the Peddaedlagadi Lake at Kikaluru - Eluru Road	Lake	25/08/2021	26/08/2021	0.2673	0.0856	0.0024	0.0032	0.0026	0.0095	0.0009	0.0016	BDL	0.0033
Y2108192	Sample collected from in the Chandanah drain at Pohakonda Village	Drain	25/08/2021	26/08/2021	0.2963	0.0434	0.0032	0.0038	0.0035	0.0080	0.0002	0.0022	0.002	0.0200

Note: All results are expressed in mg/L except pH.

K. Annapurna
ANALYST

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JSO

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Physico chemical analysis report of Kolleru lake samples (Metals) for the month August - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe)	Manganese (Mn)	Nickel (Ni)	Chromium (Cr)	Lead (Pb)	Copper (Cu)	Cadmium (Cd)	Arsenic (As)	Mercury (Hg)	Zinc (Zn)
WEST GODAVARI DISTRICT (ELURU)														
Y2108070	Madavapuram	Drain	06/08/2021	07/08/2021	0.1638	0.0089	0.0045	0.0337	0.0021	0.0099	0.0001	0.0016	BDL	BDL
:108071	Gudivakalanka	Lake	06/08/2021	07/08/2021	0.1449	0.0064	0.0043	0.0098	0.0029	0.0097	0.0001	0.0038	BDL	BDL
Y2108072	Mondikodu Gram Pachayat	Drain	06/08/2021	07/08/2021	0.1161	0.0114	0.0041	0.0073	0.0051	0.0096	0.0001	0.0037	BDL	BDL
Y2108073	Kokkirayalanka	Lake	06/08/2021	07/08/2021	0.1638	0.0081	0.0049	0.0099	0.0072	0.0105	0.0002	0.0033	0.002	BDL
Y2108074	Jodi Kaluva	Drain	06/08/2021	07/08/2021	0.1361	0.0094	0.0046	0.0082	0.0014	0.0083	0.0001	0.0039	BDL	BDL
Y2108075	Chettunnapadu	Lake	06/08/2021	07/08/2021	0.1899	0.3252	0.0058	0.0038	0.0024	0.0104	0.0001	0.0030	BDL	BDL
:108076	Bulusuvagu	Drain	06/08/2021	07/08/2021	0.1022	0.0058	0.0037	0.0061	0.0023	0.0087	0.0001	0.0009	BDL	BDL
Y2108077	Tokalapalli drain	Drain	06/08/2021	07/08/2021	0.1521	0.0068	0.0054	0.0094	0.0023	0.0119	0.0001	0.0009	BDL	BDL
Y2108078	Pandikodu drain	Drain	06/08/2021	07/08/2021	0.1009	0.0052	0.0032	0.0058	0.0025	0.0096	0.0001	0.0009	BDL	BDL
Y2108079	Bulusuvagu Panta Bodhi	Drain	06/08/2021	07/08/2021	0.1376	0.0059	0.0052	0.0093	0.0027	0.0108	0.0001	0.0015	BDL	BDL
Y2108080	Kovvali drain	Drain	06/08/2021	07/08/2021	0.1647	0.0062	0.0058	0.0111	0.0033	0.0121	0.0002	0.0015	BDL	BDL
Y2108081	Mondikodu	Drain	06/08/2021	07/08/2021	0.1517	0.0083	0.0056	0.0084	0.0027	0.0131	0.0002	0.0019	BDL	0.0025
:108082	East Tammileru	Drain	06/08/2021	07/08/2021	0.1667	0.0156	0.0058	0.0111	0.0047	0.0170	0.0002	0.0028	BDL	0.0023
Y2108083	West Thammileru	Drain	06/08/2021	07/08/2021	0.1515	0.0111	0.0074	0.0097	0.0062	0.0152	0.0003	0.0044	BDL	0.0036
KRISHNA DISTRICT														
Y2108052	Chandraiah drain	Drain	04/08/2021	05/08/2021	0.1664	0.0067	0.0055	0.0106	0.0023	0.0088	0.0002	0.0004	BDL	BDL
Y2108053	Budameru	Drain	04/08/2021	05/08/2021	0.1235	0.0040	0.0047	0.0092	0.0015	0.0063	0.0001	0.0003	BDL	BDL

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe)	Manganese (Mn)	Nickel (Ni)	Chromium (Cr)	Lead (Pb)	Copper (Cu)	Cadmium (Cd)	Arsenic (As)	Mercury (Hg)	Zinc (Zn)
Y2108054	Narasannapalem	Drain	04/08/2021	05/08/2021	0.1299	0.0042	0.0047	0.0099	0.0014	0.0075	0.0001	0.0003	BDL	BDL
Y2108055	Pedaedlagadi	Lake	04/08/2021	05/08/2021	0.1132	0.0033	0.0042	0.0088	0.0010	0.0062	0.0001	0.0002	BDL	BDL
Y2108056	Chinaedlagadi	Lake	04/08/2021	05/08/2021	0.1278	0.0035	0.0047	0.0097	0.0011	0.0061	0.0001	0.0004	BDL	BDL
Y2108057	Polaraj drain	Drain	04/08/2021	05/08/2021	0.1053	0.0028	0.0039	0.0085	0.0010	0.0055	0.0001	0.0003	BDL	BDL
Y2108058	Kolleti kota	Lake	04/08/2021	05/08/2021	0.1175	0.0077	0.0043	0.0089	0.0011	0.0072	0.0001	0.0003	BDL	BDL
Y2108059	Circar canal	Lake	04/08/2021	05/08/2021	0.0987	0.0029	0.0037	0.0075	0.0009	0.0041	0.0001	0.0002	BDL	BDL
Y2108060	Srungavarappadu	Lake	04/08/2021	05/08/2021	0.1499	0.0061	0.0046	0.0077	0.0029	0.0112	0.0001	0.0028	BDL	BDL
Y2108061	Upputeru	Lake	04/08/2021	05/08/2021	0.1227	0.0063	0.0049	0.0089	0.0026	0.0104	0.0002	0.0025	BDL	BDL

Note: All results are expressed in mg/L except pH.

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Metal analysis report of Kolleru lake samples for the month of September - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
WEST GODAVARI DISTRICT (ELURU)														
Y2109110	Gudivadalanka	Lake	16/09/2021	17/09/2021	0.0079	0.0016	0.0014	0.0013	0.0014	0.0015	0.0061	0.0031	0.0001	0.0019
Y2109111	Mandikodu drain confluence with Kolleru lake at Mandikodu Gram Pachayat of Gudivadalanka Village	Drain	16/09/2021	17/09/2021	0.0109	0.0015	0.0001	0.0001	0.0006	0.0013	0.0039	0.0062	0.0001	0.0020
Y2109112	Kokkiraylanka	Lake	16/09/2021	17/09/2021	0.0049	0.0047	0.0011	0.0002	<0.0001	0.0013	0.0050	0.0048	0.0001	0.0018
Y2109113	Jedi Enkuru	Drain	16/09/2021	17/09/2021	0.0090	0.0017	0.0010	0.0013	<0.0001	0.0013	0.0059	0.0063	0.0001	0.0021
Y2109114	Chettumanapadu	Lake	16/09/2021	17/09/2021	0.0161	0.0010	0.0012	0.0025	<0.0001	0.0013	0.0064	0.0077	0.0001	0.0024
Y2109115	Pandikodu drain	Drain	16/09/2021	17/09/2021	0.0377	0.0044	0.0012	0.0018	<0.0001	0.0011	0.0026	0.0004	0.0001	0.0018
Y2109116	Tokalapalli drain	Drain	16/09/2021	17/09/2021	0.0050	0.0020	0.0006	0.0014	<0.0001	0.0006	0.0021	0.0030	<0.0001	0.0019
Y2109117	Buttaiyagu	Drain	16/09/2021	17/09/2021	0.0155	0.0056	0.0012	0.0018	<0.0001	0.0013	0.0033	0.0038	<0.0001	0.0016
Y2109153	Kovvali drain	Drain	17/09/2021	18/09/2021	0.0051	0.0027	0.0014	0.0010	0.0013	0.0010	0.0027	0.0039	0.0001	0.0017
Y2109154	East Tammileru	Drain	17/09/2021	18/09/2021	0.0016	0.0004	0.0010	0.0011	<0.0001	0.0007	0.0016	0.0028	<0.0001	0.0011
Y2109155	West Thammileru	Drain	17/09/2021	18/09/2021	BDL	0.0004	0.0010	0.0008	<0.0001	0.0007	0.0029	0.0007	<0.0001	0.0018

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Metal analysis report of Kolleru lake samples for the month of October - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
WEST GODAVARI DISTRICT (ELURU)														
Y2110209	Gudivakalanka	Lake	23/10/2021	23/10/2021	0.0208	0.0008	0.0001	0.0006	0.00005	0.0015	BDL	0.0047	BDL	0.0008
Y2110210	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village	Drain	23/10/2021	23/10/2021	0.0224	0.0004	0.0001	0.0001	0.00005	0.0017	BDL	0.0044	BDL	0.2413
Y2110211	Kokkirayalanka	Lake	23/10/2021	23/10/2021	0.1601	0.0004	0.0007	0.0001	0.00008	0.0014	BDL	0.0026	BDL	0.0017
Y2110212	Jodi Kaluva	Drain	23/10/2021	23/10/2021	0.0185	0.0003	0.0001	0.0007	0.00001	0.0016	BDL	0.0043	BDL	0.0516
Y2110213	Chettunnagudu	Lake	23/10/2021	23/10/2021	0.0175	0.0004	0.00005	0.0001	0.00005	0.0015	BDL	0.0023	BDL	0.0008
Y2110214	Pamidikodu drain	Drain	23/10/2021	23/10/2021	0.0322	0.0005	0.0001	0.0001	0.00004	0.0020	BDL	0.0021	BDL	0.0006
Y2110215	Tokalapalli drain	Drain	23/10/2021	23/10/2021	0.0161	0.0005	0.0006	0.0017	0.00004	0.0017	BDL	0.0010	BDL	0.0894
Y2110216	Bulusuraga	Drain	23/10/2021	23/10/2021	0.0240	0.0007	0.0005	0.0003	0.00002	0.0011	BDL	0.0016	BDL	0.2266
Y2110217	Korvali drain	Drain	23/10/2021	23/10/2021	0.0211	0.0002	0.0001	0.0002	0.00002	0.0015	BDL	0.0014	BDL	0.0004
Y2110218	East Tammileru	Drain	23/10/2021	23/10/2021	0.0213	0.0008	0.0008	0.0002	0.00007	0.0015	BDL	0.0014	BDL	0.0101
Y2110219	West Thammileru	Drain	23/10/2021	23/10/2021	0.0262	0.0006	0.0009	0.0003	0.00001	0.0020	BDL	0.0070	BDL	0.0014
KRISHNA DISTRICT														
Y2110070	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	11/10/2021	11/10/2021	0.0082	0.0015	0.0001	0.0002	<0.0001	0.0010	0.0023	0.0025	0.0001	0.0020
Y2110071	Bodameru drain, Machilipatnam-Nuzid, Kaluru Road No.28, Near Puttagunta Village	Drain	11/10/2021	11/10/2021	0.0057	0.0008	0.0001	0.0001	<0.0001	0.0012	0.0033	0.0038	<0.0001	0.0015

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
Y2110072	Narasannapalem drain at Gudivada Road, Arugolanu Village	Drain	11/10/2021	11/10/2021	0.0077	0.0005	0.0001	0.0002	<0.0001	0.0002	0.0038	0.0042	0.0001	0.0015
Y2110073	Polaraj drain at Kaluru-Eluru Road	Drain	11/10/2021	11/10/2021	0.0128	0.0026	0.0001	0.0003	<0.0001	0.0011	0.0031	0.0042	<0.0001	0.0016
Y2110074	Chinayedlagadi lake at Kaluru-Eluru Road	Lake	11/10/2021	11/10/2021	0.0118	0.0019	0.0016	0.0001	0.0001	0.0016	0.0046	0.0041	0.0001	0.0017
Y2110075	Peddayedlagadi lake at Kaluru-Eluru Road	Lake	11/10/2021	11/10/2021	0.0074	0.0013	0.0015	0.0002	<0.0001	0.0015	0.0028	0.0048	0.0001	0.0015
Y2110076	Chandraiah drain at Polukonda Village	Drain	11/10/2021	11/10/2021	0.0025	0.0002	0.0001	0.0001	<0.0001	0.0013	0.0045	0.0008	<0.0001	0.0016
Y2110077	Burkumeru at Kudarawalli Village	Drain	11/10/2021	11/10/2021	0.0093	0.0013	0.0001	0.0003	0.0002	0.0013	0.0040	0.0075	<0.0001	0.0014
Y2110078	Holeti kota at Pichikalamaru Village	Lake	11/10/2021	11/10/2021	0.0047	0.0014	0.0001	0.0004	<0.0001	0.0001	0.0037	0.0019	<0.0001	0.0015
Y2110079	Circar canal at Pichikalamaru Village	Lake	11/10/2021	11/10/2021	0.0015	0.0008	0.0001	0.0001	<0.0001	0.0001	0.0038	0.0047	<0.0001	0.0014
Y2110080	Srungavarappadu drain at Srungavarappadu	Drain	11/10/2021	11/10/2021	0.0151	0.0028	0.0001	0.0003	<0.0001	0.0014	0.0044	0.0051	0.0001	0.0019
Y2110081	Polraju/Nagaraju) at Arapaka Village	Drain	11/10/2021	11/10/2021	0.0124	0.0018	0.0002	0.0001	<0.0001	0.0016	0.0056	0.0055	0.0001	0.0020
Y2110082	Lake - Bird Life Sanctuary at Arapaka Village	Lake	11/10/2021	11/10/2021	0.0087	0.0005	0.0001	0.0009	<0.0001	0.0018	0.0024	0.0024	0.0001	0.0019
Y2110083	Upparuru Tadinada Village	Lake	11/10/2021	11/10/2021	0.0074	0.0008	0.0001	0.0003	0.0001	0.0015	0.0030	0.0023	0.0001	0.0016

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Metal analysis report of Kolleru lake samples for the month of November - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
WEST GODAVARI DISTRICT (ELURU)														
Y2111114	Gudivalalanka	Lake	17/11/2021	18/11/2021	0.0370	0.0060	0.0010	0.0017	0.0014	0.0033	0.00004	0.0022	BDL	0.0046
Y2111115	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivalalanka Village	Drain	17/11/2021	18/11/2021	0.0193	0.0027	0.0008	0.0004	0.0006	0.0032	0.000002	0.0020	BDL	0.0017
Y2111116	Kokkirayalanka	Lake	17/11/2021	18/11/2021	0.0240	0.0015	0.0009	0.0004	0.0006	0.0025	BDL	0.0032	BDL	0.0019
Y2111117	Jodi Kaluva	Drain	17/11/2021	18/11/2021	0.0213	0.0024	0.0006	0.0005	0.0326	0.0035	0.00005	0.0015	BDL	0.0044
Y2111118	Chettinenipadu	Lake	17/11/2021	18/11/2021	0.0136	0.0014	0.0003	0.0308	0.0013	0.0037	0.00004	0.0068	BDL	0.0269
Y2111119	Pandikodu drain	Drain	17/11/2021	18/11/2021	0.0089	0.0009	0.0001	0.0209	0.0007	0.0025	0.00002	0.0005	BDL	0.0185
Y2111120	Tokalapalli drain	Drain	17/11/2021	18/11/2021	0.0127	0.0008	0.0005	0.0004	0.0003	0.0037	BDL	0.0069	BDL	0.0034
Y2111121	Buluvagu	Drain	17/11/2021	18/11/2021	0.0146	0.0010	0.0006	0.0006	0.0002	0.0037	BDL	0.0017	BDL	0.0002
Y2111122	Kovvali drain	Drain	17/11/2021	18/11/2021	0.0131	0.0013	0.0003	0.0018	0.0012	0.0036	0.00001	0.0066	BDL	0.0369
Y2111123	East Tammileru	Drain	17/11/2021	18/11/2021	0.0161	0.0006	0.0006	0.0002	0.0004	0.0011	BDL	0.0017	BDL	0.0011
Y2111124	West Thammileru	Drain	17/11/2021	18/11/2021	0.0189	0.0016	0.0009	0.0002	0.0001	0.0023	BDL	0.0024	BDL	0.0021
KRISHNA DISTRICT														
Y2111085	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	11/11/2021	12/11/2021	0.0308	0.0009	0.0019	0.0001	0.00004	0.0021	BDL	0.0034	BDL	0.0043
Y2111086	Budameru drain, Machilipatnam-Nuzid, Kaluru Road No.28, Near Puntagunta Village	Drain	11/11/2021	12/11/2021	0.0288	0.0008	0.0010	0.0001	0.00003	0.0014	BDL	0.0023	BDL	0.0025
Y2111087	Narasannapalem drain at Gudivada Road, Arugolanu Village	Drain	11/11/2021	12/11/2021	0.0194	0.0016	0.0006	0.0001	0.00004	0.0019	BDL	0.0018	BDL	0.0082
Y2111096	Polaraj drain at Kaluru-Eluru Road	Drain	16/11/2021	16/11/2021	0.0286	0.0096	0.0007	0.0346	0.0012	0.0033	BDL	0.0023	BDL	0.0033
Y2111097	Chinayedlagadi lake at Kaluru-Eluru Road	Lake	16/11/2021	16/11/2021	0.0161	0.0005	0.0009	0.0001	0.0004	0.0015	BDL	0.0032	BDL	0.0069

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T2111088	Peddacheguda lake at Ilkaluru-Eluru Road	Lake	10/11/2021	10/11/2021	0.0172	0.0007	0.0007	0.0002	0.0003	0.0026	BDL	0.0022	BDL	0.0206
T2111058	Chandraiah drain at Pokkonda Village	Drain	11/11/2021	12/11/2021	0.0192	0.0004	0.0007	0.0013	0.00007	0.0015	BDL	0.0019	BDL	0.0025
T2111089	Burlamma at Kadarvalli Village	Drain	11/11/2021	12/11/2021	0.0103	BDL	BDL	0.000007	BDL	0.00003	BDL	0.0009	BDL	BDL
T2111060	Kolleri lotta at Pichikalamarru Village	Lake	11/11/2021	12/11/2021	0.0178	0.00008	0.0009	0.00005	0.0002	0.0013	BDL	0.0046	BDL	0.0010
T2111061	Circar canal at Pichikalamarru Village	Lake	11/11/2021	12/11/2021	0.0149	0.0017	0.0006	0.0002	0.0003	0.0021	BDL	0.0023	BDL	0.0010
T2111062	Srungavarappadu drain at Srungavarappadu	Drain	11/11/2021	12/11/2021	0.0165	0.0035	0.0031	0.0001	0.0003	0.0014	BDL	0.0003	BDL	0.0042
T2111089	Pedraju (Nageraju) at Arupaka Village	Drain	10/11/2021	10/11/2021	0.0257	0.0008	0.0006	0.0022	0.0003	0.0016	BDL	0.0021	BDL	0.0006
T2111090	Lake - Bird Life Sanctuary at Arupaka Village	Lake	10/11/2021	10/11/2021	0.0105	0.0012	0.0007	0.0031	0.0004	0.0037	BDL	0.0026	BDL	0.0229
T2110063	Uppuleru Tadimada Village	Lake	11/11/2021	12/11/2021	0.0248	0.0004	0.0002	0.0002	BDL	0.0006	BDL	0.00006	BDL	BDL

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WEST GODAVARI DISTRICT (ELURU)														
Y2112088	Gudivakalanka	Lake	13/12/2021	14/12/2021	0.042609	0.007353	0.000829	0.000492	0.000232	0.003082	BDL	0.002261	BDL	0.004478
Y2112089	Mandikodu drain confluence with Kolleru lake at Mandikodu Gram Pachayat of Gudivakalanka Village	Drain	13/12/2021	14/12/2021	0.035801	0.004444	0.000886	0.000419	0.000224	0.002993	BDL	0.002268	BDL	0.005045
Y2112090	Kokkirapalanka	Lake	13/12/2021	14/12/2021	0.030867	0.002932	0.000779	0.000359	0.00023	0.002971	0.000001	0.00215	BDL	0.006390
Y2112091	Jedi Kalava	Drain	13/12/2021	14/12/2021	0.038065	0.003622	0.001258	0.000586	0.000251	0.003058	BDL	0.004398	BDL	0.003416
Y2112092	Chettumrapadu	Lake	13/12/2021	14/12/2021	0.031421	0.002892	0.000959	0.000358	0.000315	0.003072	BDL	0.003703	BDL	0.004998
Y2112093	Pandikodu drain	Drain	13/12/2021	14/12/2021	0.020939	0.003165	0.000362	0.000647	0.000313	0.003314	0.000008	0.001237	BDL	0.007188
Y2112094	Tokalapalli drain	Drain	13/12/2021	14/12/2021	0.020849	0.001396	0.00126	0.000732	0.000215	0.003388	BDL	0.001029	BDL	0.00668
Y2112095	Bulusuvagu	Drain	13/12/2021	14/12/2021	0.046397	0.001820	0.000789	0.00039	0.000155	0.002457	BDL	0.001333	BDL	0.005091
Y2112096	Kovuli drain	Drain	13/12/2021	14/12/2021	0.028411	0.001049	0.000739	0.000299	0.000179	0.002902	BDL	0.002280	BDL	0.004883
Y2112097	East Tammileru	Drain	13/12/2021	14/12/2021	0.037961	0.002673	0.000682	0.000327	0.000100	0.002107	BDL	0.001154	BDL	0.002386
Y2112098	West Thammileru	Drain	13/12/2021	14/12/2021	0.023569	0.000936	0.000347	0.000244	0.000326	0.002852	BDL	0.001201	BDL	0.003686
KRISHNA DISTRICT														
Y2112210	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	23/12/2021	24/12/2021	0.022429	0.001359	0.000491	0.000234	0.000183	0.003694	0.000001	0.001699	BDL	0.004516
Y2112211	Ruderuru drain, Machilipatnam-Nuzid, Kaluru Road No.28, Near Puttagunta Village	Drain	23/12/2021	24/12/2021	0.034333	0.002863	0.000773	0.000417	0.000302	0.003614	BDL	0.001448	BDL	0.006182
Y2112212	Narasamapalem drain at Gudivada Road, Angaluru Village	Drain	23/12/2021	24/12/2021	0.037318	0.001154	0.000959	0.000213	0.000405	0.003477	BDL	0.002584	BDL	0.006345
Y2112213	Polaraj drain at Kikaluru-Eluru Road	Drain	23/12/2021	24/12/2021	0.050234	0.028139	0.000805	0.000375	0.000178	0.001954	BDL	0.002444	BDL	0.005382
Y2112214	Chinayedlagadi lake at Kikaluru-Eluru Road	Lake	23/12/2021	24/12/2021	0.050275	0.005609	0.001068	0.000237	0.000189	0.002825	BDL	0.00343	BDL	0.003611
Y2112215	Peddaedlagadi lake at Kikaluru-Eluru Road	Lake	23/12/2021	24/12/2021	0.040637	0.002961	0.000795	0.000235	0.000143	0.00222	BDL	0.002269	BDL	0.001582

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Y2112216	Chandraiah drain at Polukonda Village	Drain	23/12/2021	24/12/2021	0.029157	0.003023	0.000747	0.00024	0.000198	0.00353	BDL	0.002331	BDL	0.00241
Y2112217	Budameru at Kadiravalli Village	Drain	23/12/2021	24/12/2021	0.025581	0.0022	0.000610	0.000281	0.000222	0.003937	0.000005	0.002153	BDL	0.007322
Y2112218	Kolleti kuta at Pichikalamarru Village	Lake	23/12/2021	24/12/2021	0.034308	0.001429	0.000900	0.000264	0.000159	0.002743	BDL	0.002744	BDL	0.003653
Y2112219	Cevar canal at Pichikalamarru Village	Lake	23/12/2021	24/12/2021	0.032313	0.001335	0.000785	0.000245	0.000185	0.002999	BDL	0.00269	BDL	0.005357
Y2112220	Srungavarappadu drain at Srungavarappadu	Drain	23/12/2021	24/12/2021	0.037623	0.005851	0.001008	0.000325	0.000324	0.00293	BDL	0.00269	BDL	0.003797
Y2112221	Pulugu/Nagaraju at Atapaka Village	Drain	23/12/2021	24/12/2021	0.03531	0.002445	0.000688	0.000356	0.000200	0.002961	0.000009	0.002448	BDL	0.001349
Y2112222	Lake - Bird life Sanctuary at Atapaka Village	Lake	23/12/2021	24/12/2021	0.031669	0.003347	0.001298	0.000227	0.000200	0.003142	0.000002	0.003073	BDL	0.004182
Y2112223	Upputeru Tadimada Village	Lake	23/12/2021	24/12/2021	0.035037	0.005269	0.000798	0.000245	0.000222	0.003283	BDL	0.002679	BDL	0.005177

K SRINIVAS

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SENIOR ENVIRONMENTAL SCIENTIST

ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Metal analysis report of Kolleru lake samples for the month of January - 2022

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
WEST GODAVARI DISTRICT (ELURU)														
Y2201057	Gudivakalanka	Lake	06/01/2022	07/01/2022	0.033014	0.012634	0.00796	BDL	BDL	0.000675	BDL	0.002033	BDL	0.013392
Y2201058	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village	Drain	06/01/2022	07/01/2022	0.036136	0.031122	0.00129	0.000239	BDL	0.001781	BDL	0.009499	BDL	0.013995
Y2201059	Kokkirayalanka	Lake	06/01/2022	07/01/2022	0.029227	0.012285	0.000577	BDL	BDL	0.000489	BDL	0.003755	BDL	0.00829
Y2201060	Jodi Kaluva	Drain	06/01/2022	07/01/2022	0.0259	0.00908	0.00052	BDL	BDL	0.00037	BDL	0.00329	BDL	0.0094
Y2201061	Cheitunnapadu	Lake	06/01/2022	07/01/2022	0.02555	0.01111	0.00059	BDL	BDL	0.00067	BDL	0.002	BDL	0.01246
Y2201062	Pandikodu drain	Drain	06/01/2022	07/01/2022	0.0222	0.01024	0.0004	BDL	BDL	0.00096	BDL	0.00080	BDL	0.01354
Y2201063	Tokalapalli drain	Drain	06/01/2022	07/01/2022	0.02879	0.01268	0.00039	BDL	BDL	0.00083	BDL	0.00071	BDL	0.01341
Y2201064	Bulusuvagu	Drain	06/01/2022	07/01/2022	0.048835	0.010359	0.000889	0.000029	BDL	0.000443	BDL	0.000924	BDL	0.009598
Y2201065	Kovvali drain	Drain	06/01/2022	07/01/2022	0.019222	0.007554	0.000183	BDL	BDL	0.000572	BDL	0.000479	BDL	0.011425
Y2201066	East Tammileru	Drain	06/01/2022	07/01/2022	0.018721	0.0083	0.000337	BDL	BDL	0.000842	BDL	0.001318	BDL	0.011529
Y2201067	West Thammileru	Drain	06/01/2022	07/01/2022	0.030263	0.010655	0.000833	BDL	BDL	0.000934	BDL	0.003296	BDL	0.010316
KRISHNA DISTRICT														
Y2201021	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	04/01/2022	05/01/2022	0.032215	0.031529	0.00412	0.00606	0.0014	0.003865	BDL	0.02047	0.000785	0.004776
Y2201022	Budameru drain, Machilipatnam-Nuzid, Kalluru Road No.28, Near Puttagunta Village	Drain	04/01/2022	05/01/2022	0.046475	0.065778	0.000707	0.000598	0.0024	0.003511	BDL	0.001653	0.00599	0.007413

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Iron (Fe) mg/L	Manganese (Mn) mg/L	Nickel (Ni) mg/L	Chromium (Cr) mg/L	Lead (Pb) mg/L	Copper (Cu) mg/L	Cadmium (Cd) mg/L	Arsenic (As) mg/L	Mercury (Hg) mg/L	Zinc (Zn) mg/L
Y2201023	Narasannapalem drain at Gudivada Road, Arugolanu Village	Drain	04/01/2022	05/01/2022	0.079591	0.034258	0.001658	0.002442	0.000301	0.003942	BDL	0.003297	0.000096	0.050023
Y2201024	Pularaj drain at Kikaluru-Eluru Road	Drain	04/01/2022	05/01/2022	0.042976	0.175984	0.000422	0.00026	BDL	0.002252	BDL	0.001677	BDL	0.005617
Y2201025	Chinayedlagadi lake at Kikaluru-Eluru Road	Lake	04/01/2022	05/01/2022	0.028419	0.022821	0.000475	0.000113	BDL	0.002048	BDL	0.002826	BDL	0.004244
Y2201026	Peddaedlagadi lake at Kikaluru-Eluru Road	Lake	04/01/2022	05/01/2022	0.29944	0.04801	0.00146	0.00433	0.00021	0.00325	BDL	0.00221	BDL	0.00773
Y2201027	Chandraiah drain at Polukonda Village	Drain	04/01/2022	05/01/2022	0.0571	0.01336	0.00056	0.00104	0.00016	0.00313	BDL	0.00172	BDL	0.00414
Y2201028	Budameru at Kudaravalli Village	Drain	04/01/2022	05/01/2022	0.42852	0.04788	0.00186	0.00611	0.00029	0.00411	0.00001	0.00288	BDL	0.01073
Y2201029	Kolleti kota at Pichikalamarru Village	Lake	04/01/2022	05/01/2022	0.54584	0.1247	0.00117	0.00722	0.00035	0.00341	0.000004	0.00465	BDL	0.00692
Y2201030	Circar canal at Pichikalamarru Village	Lake	04/01/2022	05/01/2022	1.41106	0.07032	0.00156	0.00135	0.00024	0.00318	0.00115	0.00165	BDL	0.12358
Y2201031	Srungavarappadu drain at Srungavarappadu	Drain	04/01/2022	05/01/2022	0.13218	0.033890	0.00128	0.00177	0.00008	0.00293	0.00001	0.00296	BDL	0.04885
Y2201032	Polraju/Nagaraju) at Atapaka Village	Drain	04/01/2022	05/01/2022	0.29716	0.085765	0.00825	0.003705	0.000138	0.002722	BDL	0.003136	BDL	0.008921
Y2201033	Lake - Bird Life Sanctuary at Atapaka Village	Lake	04/01/2022	05/01/2022	0.032306	0.044509	0.000627	0.005460	0.000027	0.002568	BDL	0.008290	BDL	0.00943
Y2201034	Upputeru Tadinada Village	Lake	04/01/2022	05/01/2022	0.05337	0.01171	0.000411	0.00385	BDL	0.00128	BDL	0.002154	0.00037	0.00649

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Physico chemical analysis report of Kolleru lake samples (Physico Chemicals) for the month August - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO	TDS	COD	BOD	Nitrate -N (NO_3-N)	Phosphates (PO_4-P)	Coliform (MPN/100ml)	
												Total	Fecal
WEST GODAVARI DISTRICT (ELURU)													
Y2108070	Madavapuram	Drain	06/08/2021	07/08/2021	7.53	1.8	3468	40	5.8	2.02	0.47	460	<3
Y2108071	Gudivakalanka	Lake	06/08/2021	07/08/2021	7.72	6.0	1740	16	2.1	2.31	0.83	380	<3
Y2108072	Mondikodu Gram Pachayat	Drain	06/08/2021	07/08/2021	7.54	5.4	1722	12	1.8	2.29	0.76	440	<3
Y2108073	Kokkirayalanka	Lake	06/08/2021	07/08/2021	7.73	2.8	1900	8	1.2	2.34	1.00	240	<3
Y2108074	Jodi Kaluva	Drain	06/08/2021	07/08/2021	7.76	7.2	2432	52	7.2	2.61	1.28	470	<3
Y2108075	Chettunnapadu	Lake	06/08/2021	07/08/2021	7.36	NIL	1660	36	4.6	3.65	1.00	210	<3
Y2108076	Bulusuvagu	Drain	06/08/2021	07/08/2021	7.31	2.1	2673	32	4.1	1.61	1.16	460	<3
Y2108077	Tokalapalli drain	Drain	06/08/2021	07/08/2021	7.76	5.5	260	20	2.4	1.84	0.10	440	<3
Y2108078	Pandikodu drain	Drain	06/08/2021	07/08/2021	7.49	6.4	3054	4	0.8	1.61	0.11	380	<3
Y2108079	Bulusuvagu Panta Bodhi	Drain	06/08/2021	07/08/2021	7.58	7.2	1890	40	5.2	1.47	0.22	460	<3
Y2108080	Kovvali drain	Drain	06/08/2021	07/08/2021	7.62	6.4	350	12	1.6	0.99	0.89	440	<3
Y2108081	Mondikodu	Drain	06/08/2021	07/08/2021	7.55	5.8	554	12	1.8	1.70	0.12	470	<3
Y2108082	East Tammileru	Drain	06/08/2021	07/08/2021	7.58	7.5	530	16	2.2	1.16	0.21	380	<3
Y2108083	West Thammileru	Drain	06/08/2021	07/08/2021	7.69	5.2	482	24	2.8	1.13	0.17	460	<3
KRISHNA DISTRICT													
Y2108052	Chandraiah drain	Drain	04/08/2021	05/08/2021	7.24	3.5	550	32	3.2	1.73	0.23	150	<3
Y2108053	Budameru	Drain	04/08/2021	05/08/2021	7.12	3.5	732	8	1.4	2.36	0.64	210	<3
Y2108054	Narasannapalem	Drain	04/08/2021	05/08/2021	7.36	7.0	675	8	1.2	2.08	0.57	460	<3

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO	TDS	COD	BOD	Nitrate -N (NO_3-N)	Phosphates (PO_4-P)	Coliform (MPN/100ml)	
												Total	Fecal
Y2108055	Pedaedlagadi	Lake	04/08/2021	05/08/2021	7.90	2.7	1455	12	1.6	1.74	0.78	380	<3
Y2108056	Chinaedlagadi	Lake	04/08/2021	05/08/2021	8.25	8.2	2400	46	9.0	1.77	1.16	210	<3
Y2108057	Polaraj drain	Drain	04/08/2021	05/08/2021	7.99	4.5	2710	36	5.0	2.52	0.94	240	<3
Y2108058	Kolleti kota	Lake	04/08/2021	05/08/2021	8.07	4.8	1660	28	2.7	1.62	0.82	210	<3
Y2108059	Circar canal	Lake	04/08/2021	05/08/2021	8.02	4.5	1587	16	2.2	1.57	0.87	460	<3
Y2108060	Srungavarappadu	Lake	04/08/2021	05/08/2021	7.98	5.1	1781	4	0.8	1.59	0.85	240	<3
Y2108061	Upputeru	Lake	04/08/2021	05/08/2021	7.92	4.1	1692	44	5.8	1.99	0.84	39	<3

Note: All results are expressed in mg/L except pH.

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Physico chemical analysis report of Kolleru lake samples (Physico Chemicals) for the month August - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	Electrical Conductivity	TSS	TDS	DO	COD	BOD	Nitrate -N (NO_3-N)	Phosphates (PO_4-P)	Free Ammonia	Coliform (MPN/100ml)	
															Total	Fecal
KRISHNA DISTRICT																
Y2108185	Sample collected from Upputeru at Tadimada Village	Lake	25/08/2021	26/08/2021	6.96	1935.00	13	1220	3.1	28	5.4	1.66	0.83	0.03	20	<3
Y2108186	Sample collected from Kolleruikota at Pachikalamarru Village	Lake	25/08/2021	26/08/2021	7.33	1815	8	1080	3.7	26	5.2	1.49	0.93	BDL	28	<3
Y2108187	Sample collected from drain (Polraju/Nagaraju) at Atapaka Village	Drain	25/08/2021	26/08/2021	7.29	2440	45	1580	4.5	29	5.4	1.89	0.98	BDL	15	<3
Y2108188	Sample collected from in the Lake - Bird Life Sanctuary at Atapaka Village	Lake	25/08/2021	26/08/2021	8.45	3300	49	2180	7.8	41	6.4	1.93	0.31	0.18	23	<3
Y2108189	Sample collected from in the Polraju drain at Kikaluru - Eluru Road	Drain	25/08/2021	26/08/2021	8.09	2340	25	1520	6.3	30	5.3	1.89	0.80	0.04	28	<3
Y2108190	Sample collected from in the Chinayedlagadi Lake at Kikaluru - Eluru Road	Lake	25/08/2021	26/08/2021	8.35	3270	18	2180	8	35	5.8	1.77	1.32	BDL	20	<3
Y2108191	Sample collected from in the Peddaedlagadi Lake at Kikaluru - Eluru Road	Lake	25/08/2021	26/08/2021	7.52	1471	9	940	0.6	26	4.2	1.59	0.62	0.11	15	<3
Y2108192	Sample collected from in the Chandraiah drain at Polukonda Village	Drain	25/08/2021	26/08/2021	7.62	1229	19	700	6.0	27	4.6	1.92	0.72	0.09	23	<3

Note: All results are expressed in mg/L except pH.

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Physico chemical analysis report of Kolleru lake samples (Physico Chemicals) for the month September - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO	TDS	COD	TOC	BOD	Nitrate -N (NO_3-N)	Phosphates (PO_4-P)	Coliform (MPN/100ml)	
													Total	Fecal
WEST GODAVARI DISTRICT (ELURU)														
Y2109110	Gudivakalanka	Lake	16/09/2021	17/09/2021	7.14	6.6	3880	40	12.02	3.0	1.46	0.29	93	<3
Y2109111	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village	Drain	16/09/2021	17/09/2021	7.24	7.0	2639	30	10.66	3.2	1.64	0.13	28	<3
Y2109112	Kokkirayalanka	Lake	16/09/2021	17/09/2021	7.50	2.9	1707	20	5.42	2.1	1.32	0.37	15	<3
Y2109113	Jodi Kaluva	Drain	16/09/2021	17/09/2021	7.32	4.8	1024	32	11.14	3.5	1.75	1.01	28	<3
Y2109114	Chettunnapadu	Lake	16/09/2021	17/09/2021	7.37	7.7	1087	45	15.25	6.6	2.18	0.36	20	<3
Y2109115	Pandikodu drain	Drain	16/09/2021	17/09/2021	7.34	4.9	1491	34	11.08	4.9	1.71	0.33	21	<3
Y2109116	Tokalapalli drain	Drain	16/09/2021	17/09/2021	7.40	5.2	549	20	5.31	2.2	1.55	0.12	7	<3
Y2109117	Bulusuvagu	Drain	16/09/2021	17/09/2021	7.44	2.4	1396	24	6.00	2.0	1.82	0.18	11	<3
Y2109153	Kovvali drain	Drain	17/09/2021	18/09/2021	7.12	7.4	643	36	8.82	4.5	2.47	0.08	28	<3
Y2109154	East Tammileru	Drain	17/09/2021	18/09/2021	7.30	8.4	368	28	6.73	4.7	1.15	0.05	20	<3
Y2109155	West Thammileru	Drain	17/09/2021	18/09/2021	7.39	6.3	472	32	7.72	2.2	1.40	0.09	28	<3

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO	TDS	COD	TOC	BOD	Nitrate -N (NO_3-N)	Phosphates (PO_4-P)	Coliform (MPN/100ml)	
													Total	Fecal
KRISHNA DISTRICT														
	Chandraiah drain	Drain	Not Submitted											
	Budameru	Drain												
	Narasannapalem	Drain												
	Pedaedlagadi	Lake												
	Chinaedlagadi	Lake												
	Polaraj drain	Drain												
	Kolleti kota	Lake												
	Circar canal	Lake												
	Srungavarappadu	Lake												
	Upputeru	Lake												

Note: All results are expressed in mg/L except pH.

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Physico chemical analysis report of Kollern lake samples for the month of October - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	TOC (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
													Total	Fecal
WEST GODAVARI DISTRICT (ELURU)														
Y2110209	Gudimalanka	Lake	23/10/2021	23/10/2021	6.82	3.7	650	36	16.2	3.2	1.15	0.31	93	<3
Y2110210	Mendikodu drain confluence with Kolleru lake at Mendikodu Gram Pachayat of Gudimalanka Village	Drain	23/10/2021	23/10/2021	7.03	6.0	756	28	13.6	2.6	1.54	0.51	15	<3
Y2110211	Kokkiregalanka	Lake	23/10/2021	23/10/2021	7.04	2.6	629	20	13.2	2.2	1.13	0.33	20	<3
Y2110212	Jodi Kaluva	Drain	23/10/2021	23/10/2021	7.05	4.9	945	30	14.9	2.8	1.65	1.74	28	<3
Y2110213	Chetmanagadu	Lake	23/10/2021	23/10/2021	7.02	7.5	910	40	11.7	5.4	1.18	0.35	20	<3
Y2110214	Pandikodu drain	Drain	23/10/2021	23/10/2021	7.03	4.8	934	36	12.5	4.2	1.45	0.54	21	<3
Y2110215	Tokalapalli drain	Drain	23/10/2021	23/10/2021	7.07	5.4	406	24	10.0	2.2	1.55	0.41	11	<3
Y2110216	Buluvayagu	Drain	23/10/2021	23/10/2021	7.18	2.6	1102	20	13.6	2.4	1.63	0.64	28	<3
Y2110217	Eovali drain	Drain	23/10/2021	23/10/2021	7.30	6.5	620	32	12.4	3.9	1.18	0.39	15	<3
Y2110218	East Tammileru	Drain	23/10/2021	23/10/2021	7.40	5.5	543	24	9.8	2.8	1.12	0.70	20	<3
Y2110219	West Thammileru	Drain	23/10/2021	23/10/2021	7.42	6.0	538	30	17.0	3.6	1.62	0.29	28	<3

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	TOC (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
													Total	Fecal
KRISHNA DISTRICT														
Y2110070	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	11/10/2021	11/10/2021	7.01	4.0	547	20	5.97	2.4	1.64	0.22	21	<3
Y2110071	Budameru drain, Machilipatnam-Nuzid, Kaluru Road No.28, Near Puttagunta Village	Drain	11/10/2021	11/10/2021	6.93	3.0	607	16	10.6	1.8	2.84	0.40	28	<3
Y2110072	Narasannapalem drain at Gudivada Road, Avagadam Village	Drain	11/10/2021	11/10/2021	7.74	7.3	589	28	9.4	2.9	2.49	0.75	15	<3
Y2110073	Polaraj drain at Kikuluru-Eluru Road	Drain	11/10/2021	11/10/2021	7.45	5.0	1549	40	13.0	4.0	2.06	0.91	7	<3
Y2110074	Chinayedlagadi lake at Kikuluru-Eluru Road	Lake	11/10/2021	11/10/2021	7.78	8.4	723	44	9.7	4.2	1.76	1.04	11	<3
Y2110075	Peddayedlagadi lake at Kikuluru-Eluru Road	Lake	11/10/2021	11/10/2021	7.90	2.3	718	20	12.5	2.2	1.29	0.38	28	<3
Y2110076	Chandraiah drain at Polukonda Village	Drain	11/10/2021	11/10/2021	7.84	3.7	1016	36	14.4	3.8	1.33	0.53	20	<3
Y2110077	Budameru at Kudavalli Village	Drain	11/10/2021	11/10/2021	7.80	4.5	1050	20	10.0	2.1	1.39	0.67	28	<3
Y2110078	Kolleti lake at Pichikadamarru Village	Lake	11/10/2021	11/10/2021	7.86	3.4	899	24	10.6	2.6	1.33	0.46	20	<3
Y2110079	Circar canal at Pichikadamarru Village	Lake	11/10/2021	11/10/2021	7.95	4.0	809	28	11.4	3.0	1.31	0.65	11	<3
Y2110080	Srungavarappadu drain at Srungavarappadu	Drain	11/10/2021	11/10/2021	7.86	4.7	1427	32	13.1	3.1	1.16	0.77	15	<3
Y2110081	Polraju/Naganjuj at Atapaka Village	Drain	11/10/2021	11/10/2021	7.88	6.2	1525	36	16.0	3.7	2.15	0.39	39	<3
Y2110082	Lake - Bird Life Sanctuary at Atapaka Village	Lake	11/10/2021	11/10/2021	7.65	4.7	530	28	10.9	3.0	1.80	0.14	28	<3
Y2110083	Upputeru Tadimada Village	Lake	11/10/2021	11/10/2021	7.67	3.8	820	40	10.4	3.8	2.37	0.60	15	<3

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Physico Chemical analysis report of Kolleru lake samples for the month of November - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	TOC (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
													Total	Fecal
WEST GODAVARI DISTRICT (ELURU)														
Y2111114	Gudivadalanka	Lake	17/11/2021	18/11/2021	6.90	7.1	745	32	17.4	3.0	1.83	0.30	93	<3
Y2111115	Mondikodu drain confluence with Kalleru lake at Mondikodu Gram Pachayat of Gudivadalanka Village	Drain	17/11/2021	18/11/2021	7.06	4.9	763	20	12.2	2.0	1.74	0.29	20	<3
Y2111116	Kokkirayalanka	Lake	17/11/2021	18/11/2021	7.18	6.1	962	24	14.2	2.4	1.69	0.70	15	<3
Y2111117	Jodi Kaluva	Drain	17/11/2021	18/11/2021	7.23	6.1	739	28	15.2	2.6	1.51	1.71	28	<3
Y2111118	Chettunnapadu	Lake	17/11/2021	18/11/2021	7.60	5.7	725	36	11.84	4.0	1.53	0.79	21	<3
Y2111119	Pandikodu drain	Drain	17/11/2021	18/11/2021	7.20	1.5	424	20	12.50	2.2	1.20	0.80	11	<3
Y2111120	Tokalapalli drain	Drain	17/11/2021	18/11/2021	7.63	5.1	382	16	15.2	2.0	1.25	0.25	15	<3
Y2111121	Bulusuvagu	Drain	17/11/2021	18/11/2021	7.50	6.1	618	20	14.8	2.1	1.29	0.22	20	<3
Y2111122	Kovvali drain	Drain	17/11/2021	18/11/2021	7.76	6.0	386	32	14.0	4.0	1.22	0.22	28	<3
Y2111123	East Tammileru	Drain	17/11/2021	18/11/2021	7.43	8.0	610	28	16.7	2.4	1.53	0.20	21	<3
Y2111124	West Thammileru	Drain	17/11/2021	18/11/2021	7.47	6.9	632	32	18.2	3.2	2.90	0.69	15	<3

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	TOC (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
													Total	Fecal
KRISHNA DISTRICT														
Y2111055	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	11/11/2021	12/11/2021	6.58	6.8	585	16	6.09	2.7	1.69	1.82	15	<3
Y2111056	Budameru drain, Machilipatnam-Nuzid, Kalluru Road No.28, Near Pattaguntа Village	Drain	11/11/2021	12/11/2021	7.19	3.4	663	20	17.27	2.0	3.17	1.00	21	<3
Y2111057	Narasannapalem drain at Gudivada Road, Arugolanu Village	Drain	11/11/2021	12/11/2021	7.50	3.7	553	24	9.4	2.8	2.37	0.37	28	<3
Y2111086	Polang drain at Kikuluru-Eluru Road	Drain	16/11/2021	16/11/2021	7.52	6.7	582	28	12.5	2.3	2.25	1.13	11	<3
Y2111087	Chinayedlagadi lake at Kikuluru-Eluru Road	Lake	16/11/2021	16/11/2021	7.44	8.1	1774	40	10.8	3.4	1.79	1.05	7	<3
Y2111088	Peddaedlagadi lake at Kikuluru-Eluru Road	Lake	16/11/2021	16/11/2021	7.56	4.8	1264	24	12.4	2.9	2.21	1.12	20	<3
Y2111058	Chandraiah drain at Polukonda Village	Drain	11/11/2021	12/11/2021	7.64	4.0	582	32	14.0	3.2	2.78	0.40	15	<3
Y2111059	Budameru at Rudravalli Village	Drain	11/11/2021	12/11/2021	7.82	6.1	1438	20	10.2	2.8	2.13	1.11	39	<3
Y2110060	Kolleti kota at Pichikalamarru Village	Lake	11/11/2021	12/11/2021	7.84	3.1	1004	24	10.6	2.2	1.60	1.00	28	<3
Y2110061	Circar canal at Pichikalamarru Village	Lake	11/11/2021	12/11/2021	7.94	3.9	1006	28	11.8	3.0	1.52	1.21	15	<3
Y2111062	Srungavarappadu drain at Srungavarappadu	Drain	11/11/2021	12/11/2021	7.82	4.1	1113	30	14.2	3.2	1.72	1.36	20	<3
Y2111089	Pairoju/Nagaraju at Atapaka Village	Drain	16/11/2021	16/11/2021	7.80	5.6	1203	32	15.0	3.5	2.12	1.60	11	<3
Y2111090	Lake - Bird Life Sanctuary at Atapaka Village	Lake	16/11/2021	16/11/2021	7.86	8.5	1530	24	10.4	2.8	2.17	0.5	21	<3
Y2111063	Upputeru Tadinada Village	Lake	11/11/2021	12/11/2021	7.90	3.4	1064	28	9.8	2.4	1.74	0.91	15	<3

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Physico Chemical analysis report of Kolleru lake samples for the month of December - 2021

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	BOD (mg/L)	Nitrate-N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
												Total	Fecal
WEST GODAVARI DISTRICT (ELURU)													
Y2112088	Gudivakalanka	Lake	13/12/2021	14/12/2021	7.52	6.2	780	28	2.5	1.49	0.09	15	<3
Y2112089	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Panchayat of Gudivakalanka Village	Drain	13/12/2021	14/12/2021	7.39	5.0	1208	32	3.9	1.45	0.11	21	<3
Y2112090	Kokinayalanka	Lake	13/12/2021	14/12/2021	7.51	5.8	1266	20	2.0	1.54	0.38	28	<3
Y2112091	Jodi Kaluva	Drain	13/12/2021	14/12/2021	7.46	5.6	1382	24	2.2	2.06	0.96	15	<3
Y2112092	Chatlanippaku	Lake	13/12/2021	14/12/2021	7.75	6.0	1288	36	3.4	2.10	0.98	11	<3
Y2112093	Pandikodu drain	Drain	13/12/2021	14/12/2021	7.66	5.2	350	16	2.2	0.83	0.03	20	<3
Y2112094	Tokalapalli drain	Drain	13/12/2021	14/12/2021	7.43	5.8	359	10	2.0	1.01	0.03	39	<3
Y2112095	Bulusuvagu	Drain	13/12/2021	14/12/2021	7.58	5.5	768	20	2.4	1.65	0.21	15	<3
Y2112096	Koravili drain	Drain	13/12/2021	14/12/2021	7.96	5.9	612	24	2.6	1.99	0.46	20	<3
Y2112097	East Tamarileru	Drain	13/12/2021	14/12/2021	7.75	5.6	789	30	3.2	1.78	0.26	28	<3
Y2112098	West Thammileru	Drain	13/12/2021	14/12/2021	7.84	5.7	642	16	1.8	1.28	0.03	15	<3
KRISHNA DISTRICT													
Y2112210	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	23/12.2021	24/12/2021	7.79	6.2	493	12	0.8	1.72	0.27	21	<3
Y2112211	Sadaneru drain, Machilipatnam-Nuzid, Kaikalu Road No.20, Near Pulligunta Village	Drain	23/12.2021	24/12/2021	7.75	5.6	785	2.0	2.0	1.28	0.52	15	<3
Y2112212	Narasannapalem drain at Gudivada Road, Anajaneru Village	Drain	23/12.2021	24/12/2021	7.28	5.8	668	24	2.2	2.0	0.92	28	<3

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
												Total	Fecal
Y2112213	Pulicaj drain at Kirlaluru-Eluru Road	Drain	23/12.2021	24/12/2021	7.99	6.3	1520	32	3.0	2.16	0.83	39	<3
Y2112214	Chinayedlagadi lake at Kirlaluru-Eluru Road	Lake	23/12.2021	24/12/2021	7.22	6.0	1704	30	3.2	2.13	0.84	11	<3
Y2112215	Peddacedlagadi lake at Kirlaluru-Eluru Road	Lake	23/12.2021	24/12/2021	7.77	6.1	1810	36	3.4	2.39	0.54	28	<3
Y2112216	Chandralahi drain at Polukonda Village	Drain	23/12.2021	24/12/2021	7.92	6.9	1002	28	2.4	2.07	0.39	11	<3
Y2112217	Budameru at Kudaravalli Village	Drain	23/12.2021	24/12/2021	7.81	5.2	524	16	2.0	1.91	0.20	28	<3
Y2112218	Kolleti kota at Pichikalamanru Village	Lake	23/12.2021	24/12/2021	7.53	5.5	1204	20	2.0	1.77	0.61	21	<3
Y2112219	Cinor canal at Pichikalamanru Village	Lake	23/12.2021	24/12/2021	7.94	5.2	1294	24	2.2	1.73	0.68	16	<3
Y2112220	Srungavarappadu drain at Srungavarappadu	Drain	23/12.2021	24/12/2021	7.89	5.0	1200	16	1.8	1.62	0.62	20	<3
Y2112221	Pedda Pagarajuru at Atapaka Village	Drain	23/12.2021	24/12/2021	7.72	6.0	1384	30	3.2	2.49	0.96	39	<3
Y2112222	Lake - Bird Life Sanctuary at Atapaka Village	Lake	23/12.2021	24/12/2021	7.85	7.0	1636	28	2.4	2.31	0.15	15	<3
Y2112223	Uppuleru Tadinada Village	Lake	23/12.2021	24/12/2021	7.21	6.0	1662	32	3.4	2.19	1.0	11	<3

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Physico Chemical analysis report of Kolleru lake samples for the month of January - 2022

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	BOD (mg/L)	Nitrate-N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
												Total	Fecal
WEST GODAVARI DISTRICT (ELURU)													
Y2201057	Gudivakalanka	Lake	06/01/2022	07/01/2022	7.85	6.0	1582	64	9.8	0.88	0.12	120	<3
Y2201058	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village	Drain	06/01/2022	07/01/2022	7.40	5.7	1155	68	10.0	0.67	0.02	230	1
Y2201059	Kokkireyalanka	Lake	06/01/2022	07/01/2022	7.48	5.2	2724	104	14.6	2.74	0.20	240	<3
Y2201060	Jodi Kaluva	Drain	06/01/2022	07/01/2022	7.64	5.4	1936	60	8.8	0.98	0.70	93	3
Y2201061	Chettunnapadu	Lake	06/01/2022	07/01/2022	7.66	5.7	1259	52	8.0	0.86	0.24	120	<3
Y2201062	Pandikodu drain	Drain	06/01/2022	07/01/2022	7.21	5.6	384	56	8.2	0.41	0.04	210	3
Y2201063	Tokalapelli drain	Drain	06/01/2022	07/01/2022	7.23	5.7	1302	84	12.0	0.44	0.05	240	3
Y2201064	Buluswagu	Drain	06/01/2022	07/01/2022	7.64	5.6	2638	104	15.0	1.19	0.02	120	2
Y2201065	Kowali drain	Drain	06/01/2022	07/01/2022	7.32	5.2	912	68	9.6	0.36	0.02	210	2
Y2201066	East Tammileru	Drain	06/01/2022	07/01/2022	7.17	5.4	476	60	9.2	0.42	0.05	93	1
Y2201067	West Thammileru	Drain	06/01/2022	07/01/2022	7.64	5.3	1008	88	12.0	6.32	0.80	120	1
KRISHNA DISTRICT													
Y2201021	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	04/01/2022	05/01/2022	8.19	5.5	485	20	4.0	0.80	0.30	240	3
Y2201022	Budameru drain, Machilipatnam-Nuzid, Kaikaru Road No.28, Near Puttagunta Village	Drain	04/01/2022	05/01/2022	7.18	5.6	853	56	8.6	6.70	0.48	210	1

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Sample code	Sample Particulars	From	Date of Collection	Date of Submission	pH	DO (mg/L)	TDS (mg/L)	COD (mg/L)	BOD (mg/L)	Nitrate -N (NO_3-N) (mg/L)	Phosphates (PO_4-P) (mg/L)	Coliform (MPN/100ml)	
												Total	Fecal
Y2201023	Narasannapalem drain at Gudivada Road, Angalanu Village	Drain	04/01/2022	05/01/2022	7.17	6.5	673	60	9.2	1.03	0.89	150	<3
Y2201024	Polaraj drain at Kilaluru-Eluru Road	Drain	04/01/2022	05/01/2022	7.85	6.0	2305	36	5.4	0.89	0.53	210	1
	Chinayedlagadi lake at Kilaluru-Eluru Road	Lake	04/01/2022	05/01/2022	7.07	5.7	3073	156	20.2	3.10	0.63	230	1
Y2201026	Peddaedlagadi lake at Kilaluru-Eluru Road	Lake	04/01/2022	05/01/2022	7.27	6.3	2422	88	13.0	1.03	0.41	75	<3
Y2201027	Chandralah drain at Polukonda Village	Drain	04/01/2022	05/01/2022	7.37	5.2	608	64	9.4	0.89	0.58	120	1
Y2201028	Buckaneru at Kudaravalli Village	Drain	04/01/2022	05/01/2022	7.56	5.4	548	68	9.8	1.07	0.18	150	1
Y2201029	Kolleti lota at Pichikalamarru Village	Lake	04/01/2022	05/01/2022	7.16	5.6	2063	100	14.0	0.74	0.55	93	1
Y2201030	Circar canal at Pichikalamarru Village	Lake	04/01/2022	05/01/2022	7.19	5.5	2080	80	12.6	0.65	0.76	75	1
Y2201031	Srungavarappadu drain at Srungavarappadu	Drain	04/01/2022	05/01/2022	7.10	5.3	2070	92	13.4	0.81	0.73	240	<3
Y2201032	Polraju/Nagaraju) at Atapaka Village	Drain	04/01/2022	05/01/2022	7.18	6.2	2265	108	14.8	1.55	0.76	210	1
Y2201033	Lake - Bird Life Sanctuary at Atapaka Village	Lake	04/01/2022	05/01/2022	7.01	6.8	1890	84	11.6	1.22	0.13	380	3
Y2201034	Upputeru Tadimada Village	Lake	04/01/2022	05/01/2022	7.71	5.2	1860	76	10.4	0.74	0.54	210	<3

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ANDHRA PRADESH POLLUTION CONTROL BOARD, ZONAL LABORATORY :: VIJAYAWADA

Metals Analysis reports of Kolleru lake Sludge samples for the month January - 2022

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Chromium (Cr) mg/kg	Mangenese (Mn) mg/kg	Iron (Fe) mg/kg	Nickel (Ni) mg/kg	Copper (Cu) mg/kg	Zinc (Zn) mg/kg	Arsenic (As) mg/kg	Cadmium (Cd) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg
KRISHNA DISTRICT														
Y2201SL001	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada	Drain	04.01.2022	05.01.2022	0.0216	0.742	2.5937	0.291	0.1302	0.9732	0.1293	BDL	0.0203	BDL
Y2201SL002	Budameru drain, Machilipatnam-Nuzid, Kalluru Road No.28, Near Puttagunta Village	Drain	04.01.2022	05.01.2022	0.0157	1.0955	2.4173	0.0046	0.0974	1.1188	0.1483	BDL	0.0124	0.0209
Y2201SL003	Narasannapalem drain at Gudivada Road, Arugulanu Village	Drain	04.01.2022	05.01.2022	0.2321	1.2491	2.7978	0.0014	0.1395	1.3047	0.1491	BDL	0.0275	0.013
Y2201SL004	Polaraj drain at Kikaluru-Eluru Road	Drain	04.01.2022	05.01.2022	0.0278	1.0032	3.1898	0.0241	0.222	1.1555	0.1965	BDL	0.0188	BDL
Y2201SL005	Chinayedlagadi lake at Kikaluru-Eluru Road	Lake	04.01.2022	05.01.2022	0.0230	0.0797	4.528	0.073	0.0187	1.090	0.0212	BDL	0.014	0.058
Y2201SL006	Peddaedlagadi lake at Kikaluru-Eluru Road	Lake	04.01.2022	05.01.2022	0.035	0.755	2.805	BDL	0.137	0.878	0.141	BDL	0.005	0.007
Y2201SL007	Chandraiah drain at Polukonda Village	Drain	04.01.2022	05.01.2022	0.031	0.949	5.619	0.025	0.328	0.951	0.202	BDL	0.009	BDL
Y2201SL008	Budameru at Kudaravalli Village	Drain	04.01.2022	05.01.2022	0.030	0.398	2.014	BDL	0.168	0.807	0.146	BDL	0.006	BDL
Y2201SL009	Kolleti kota at Pichikalamarru Village	Lake	04.01.2022	05.01.2022	0.0128	0.46048	3.6811	BDL	0.0582	0.8411	0.1245	BDL	0.0019	BDL
Y2201SL010	Circar canal at Pichikalamarru Village	Lake	04.01.2022	05.01.2022	0.052	0.4683	1.3091	BDL	0.0986	0.8336	0.2136	BDL	BDL	BDL
Y2201SL011	Srungavarappadu drain at Srungavarappadu	Drain	04.01.2022	05.01.2022	0.116	0.5743	1.7803	BDL	0.0868	0.8293	0.2336	BDL	0.0035	BDL
Y2201SL012	Polraju/Nagaraju) at Atapaka Village	Drain	04.01.2022	05.01.2022	0.0828	0.6915	2.2652	0.0133	0.1717	1.6088	0.3413	BDL	0.0061	BDL
Y2201SL013	Lake - Bird Life Sanctuary at Atapaka Village	Lake	04.01.2022	05.01.2022	0.0036	1.0338	2.4701	0.0124	0.208	1.1089	0.2222	BDL	0.0087	BDL
Y2201SL014	Upputeru Tadinada Village	Lake	04.01.2022	05.01.2022	0.1641	0.5098	1.8625	BDL	0.0146	0.8915	0.0782	BDL	0.0091	BDL

Sample code	Sample Particulars	From	Date of Collection	Date of Submission	Chromium (Cr) mg/kg	Mangenese (Mn) mg/kg	Iron (Fe) mg/kg	Nickel (Ni) mg/kg	Copper (Cu) mg/kg	Zinc (Zn) mg/kg	Arsenic (As) mg/kg	Cadmium (Cd) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg
WEST GODAVARI DISTRICT (ELURU)														
Y2201SL015	Gudivakalanka	Lake	06.01.2022	07.01.2022	0.0006	2.7611	2.9517	0.0603	0.0981	0.8609	0.0969	BDL	0.0112	0.0103
Y2201SL016	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village	Drain	06.01.2022	07.01.2022	0.0441	1.2027	3.9391	BDL	0.1158	1.1244	0.1466	BDL	0.0059	0.0788
Y2201SL017	Kokkirayalanka	Lake	06.01.2022	07.01.2022	0.0183	1.193	4.7727	0.0253	0.1058	0.9933	0.1929	BDL	0.004	BDL
Y2201SL018	Jodi Kaluva	Drain	06.01.2022	07.01.2022	0.0636	0.9872	4.1815	0.0108	0.0725	0.9178	0.1282	BDL	0.0036	BDL
Y2201SL019	Chettunnapadu	Lake	06.01.2022	07.01.2022	0.022	1.7844	0.2949	0.0485	0.209	1.0387	0.1619	BDL	0.0133	0.574
Y2201SL020	Pundikodu drain	Drain	06.01.2022	07.01.2022	BDL	1.0509	4.595	0.0232	0.1238	0.08359	0.1243	BDL	0.0323	BDL
Y2201SL021	Tokalapalli drain	Drain	06.01.2022	07.01.2022	BDL	0.7653	3.2335	BDL	0.0741	0.9089	0.1044	BDL	0.065	BDL
Y2201SL022	Buhusuvagu	Drain	06.01.2022	07.01.2022	BDL	1.0265	3.4356	0.0004	0.0721	0.8422	0.116	BDL	0.331	BDL
Y2201SL023	Kovvali drain	Drain	06.01.2022	07.01.2022	BDL	1.1474	4.6689	0.0244	0.1362	0.8446	0.1559	BDL	0.0345	0.0050
Y2201SL024	East Tammileru	Drain	06.01.2022	07.01.2022	BDL	0.5508	3.3346	BDL	0.0584	0.7293	0.1148	BDL	0.0236	BDL
Y2201SL025	West Thammileru	Drain	06.01.2022	07.01.2022	BDL	0.5803	2.8958	BDL	0.0548	0.008	0.0946	BDL	0.0302	BDL

K. Sreenivas 03.02.2022
SENIOR ENVIROMENTAL SCIENTIST

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL LABORATORY – VIJAYAWADA
Plot No.41, Sri Kanakadurga Officers' Colony,
Gurunanak Road, Vijayawada-520008

K.SRINIVAS, M.Sc., M.Tech.,
Senior Environmental Scientist

e.mail: zovjalab-ses1@appcb.gov.in
Tel No: 0866-2546218

Dt. 08.02.2022

Kolleru Lake Samples Pesticide analysis report Description for the month of August-2021.

	Sample Code	Sample Particulars	From
KRISHNA DISTRICT	**Y2108052**	Chandraiah drain	Drain
	Y2108053	Budameru	Drain
	Y2108054	Narasannapalem	Drain
	Y2108055	Pedaedlagadi	Lake
	Y2108056	Chinaedlagadi	Lake
	Y2108057	Polaraj drain	Drain
	Y2108058	Kolleti kota	Lake
	Y2108059	Circar canal	Lake
	Y2108060	Srungavarappadu	Lake
	Y2108061	Upputeru	Lake

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Tel No: 0866-2546218

	Sample Code	Sample Particulars	From
WEST GODAVARI DISTRICT (ELURU)	**Y2108070**	Madavapuram	Drain
	Y2108071	Gudivakalanka	Lake
	Y2108072	Mondikodu Gram Pachayat	Drain
	Y2108073	Kokkirayalanka	Lake
	Y2108074	Jodi Kaluva	Drain
	Y2108075	Chettunnapadu	Lake
	Y2108076	Bulusuvagu	Drain
	Y2108077	Tokalapalli drain	Drain
	Y2108078	Pandikodu drain	Drain
	Y2108079	Bulusuvagu Panta Bodhi	Drain
	Y2108080	Kovvali drain	Drain
	Y2108081	Mondikodu	Drain
	Y2108082	East Tammileru	Drain
	Y2108083	West Thammileru	Drain

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Tel No: 0866-2546218

	Sample Code	Sample Particulars	From
KRISHNA DISTRICT	**Y2108185**	Sample collected from Upputeru at Tadinada Village	Lake
	Y2108186	Sample collected from Kolletikota at Pachikalamarru Village	Lake
	Y2108187	Sample collected from drain (Polraju/Nagaraju) at Atapaka Village	Drain
	Y2108188	Sample collected from in the Lake - Bird Life Sanctuary at Atapaka Village	Lake
	Y2108189	Sample collected from in the Polraju drain at Kikaluru - Eluru Road	Drain
	Y2108190	Sample collected from in the Chinayedlagadi Lake at Kikaluru - Eluru Road	Lake
	Y2108191	Sample collected from in the Peddaedlagadi Lake at Kikaluru - Eluru Road	Lake
	Y2108192	Sample collected from in the Chandraiah drain at Polukonda Village	Drain

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

Sample No. Y2108052 to Y2108061, Y2108070 to Y2108075
Sample received on: 04.09.2021

S. No.	Parameter	Y2108052	Y2108053	Y2108054	Y2108055	Y2108056	Y2108057	Y2108058	Y2108059	Y2108060	Y2108061	Y2108070	Y2108071	Y2108072	Y2108073	Y2108074	Y2108075
1	Alpha – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	Beta– BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
3	Gamma – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
4	4,4' – DDD	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
5	4,4' – DDE	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
6	4,4' – DDT	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
7	Aldrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
8	Dieldrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
9	Endosulfan – I	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
10	Endosulfan Sulfate	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
11	Endrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
12	Heptachlor	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	Heptachlorapoxide	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
14	Methoxychlor	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Endosulfan – II	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Delta – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Endrin Aldehyde	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

BLQ: Below Limit of Quantitation (0.05 mg/l)

SENIOR ENVIRONMENTAL SCIENTIST

A.P. POLLUTION CONTROL BOARD, ZONAL LABORATORY, VISAKHAPATNAM

Sample No: Y2108076 to Y2108087, Y2108185 to Y2108192
Sample received on: 04.09.2021

S. No.	Parameter	Y2108076	Y2108077	Y2108078	Y2108079	Y2108080	Y2108081	Y2108082	Y2108083	Y2108185	Y2108186	Y2108187	Y2108188	Y2108189	Y2108190	Y2108191	Y2108192
1	Alpha – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
2	Beta– BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
3	Gamma – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
4	4,4' – DDD	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
5	4,4' – DDE	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
6	4,4' – DDT	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
7	Aldrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
8	Dieldrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
9	Endosulfan – I	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
10	Endosulfan Sulfate	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
11	Endrin	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
12	Heptachlor	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
13	Heptachlorapoxide	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
14	Methoxychlor	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
15	Endosulfan – II	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
16	Delta – BHC	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ
17	Endrin Aldehyde	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ	BLQ

BLQ: Below Limit of Quantitation (0.05 mg/l)

SENIOR ENVIRONMENTAL SCIENTIST

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL LABORATORY – VIJAYAWADA
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K.SRINIVAS, M.Sc., M.Tech.,
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e.mail: zovjalab-scs1@appcb.gov.in
Tel No: 0866-2546218

Kolleru lake Water Samples

S.No.	Sample Code	Sample Description
		KRISHNA DISTRICT
1.	Y2201021	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada
2.	Y2201022	Budameru drain, Machilipatnam-Nuzid, Kalluru Road No.28, Near Puttagunta Village
3.	Y2201023	Narasannapalem drain at Gudivada Road, Arugolanu Village
4.	Y2201024	Polaraj drain at Kikaluru-Eluru Road
5.		Chinayedlagadi lake at Kikaluru-Eluru Road
6.	Y2201026	Peddaedlagadi lake at Kikaluru-Eluru Road
7.	Y2201027	Chandraiah drain at Polukonda Village
8.	Y2201028	Budameru at Kudaravalli Village
9.	Y2201029	Kolleti kota at Pichikalamarru Village
10.	Y2201030	Circar canal at Pichikalamarru Village
11.	Y2201031	Srungavarappadu drain at Srungavarappadu
12.	Y2201032	(Polraju/Nagaraju) at Atapaka Village
13.	Y2201033	Lake - Bird Life Sanctuary at Atapaka Village
14.	Y2201034	Upputeru at Tadinada Village
		WEST GODAVARI DISTRICT (ELURU)
15.	Y2201057	Gudivakalanka
16.	Y2201058	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village
17.	Y2201059	Kokkirayalanka
18.	Y2201060	Jodi Kaluva
19.	Y2201061	Chettunnapadu
20.	Y2201062	Pandikodu drain
21.	Y2201063	Tokalapalli drain
22.	Y2201064	Bulusuvagu
23.	Y2201065	Kovvali drain
24.	Y2201066	East Tammileru
25.	Y2201067	West Thammileru

K Srinivas
SENIOR ENVIRONMENTAL SCIENTIST
A.P.POLLUTION CONTROL BOARD
ZONAL LABORATORY,VIJAYAWADA

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Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/001**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043662
LIMS Report No.: 331529

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samplea**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201021, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... Knowledge Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093143

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Test Report

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Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14259/001**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043662
LIMS Report No.:	331529

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... e Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093144

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/002**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043663
LIMS Report No.: 331530

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201022, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093145

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: VLL/VLS/21/14259/002
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043663
LIMS Report No.: 331530

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly A... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093146

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14259/003**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043664
LIMS Report No.:	331531

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201023, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093147

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: VLL/VLS/21/14259/003
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043664
LIMS Report No.: 331531

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093148

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/004**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043665
LIMS Report No.: 331532

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201024, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093149

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/004**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043665
LIMS Report No.: 331532

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093150

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/005**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043666
LIMS Report No.: 331533

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201025, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093151

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/005**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043666
LIMS Report No.: 331533

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093152

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546216 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14259/006**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043667
LIMS Report No.:	331534

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201026, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093153

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/006**
Issue Date: 2022-02-09
Your Ref: Letter
and Date 2022-02-02
Lab Ref No.: 1043667
LIMS Report No.: 331534

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093154

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/007**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043668
LIMS Report No.: 331535

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201027, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093155

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/007**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043668
LIMS Report No.: 331535

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093156

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/008**
Issue Date: 2022-02-09
Your Ref. and Date: Letter 2022-02-02
Lab Ref No.: 1043669
LIMS Report No.: 331536

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201028, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093157

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/008**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043669
LIMS Report No.: 331536

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly A... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093158

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Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14259/009**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043670
LIMS Report No.:	331537

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201029, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093159

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: VLL/VLS/21/14259/009
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043670
LIMS Report No.: 331537

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093160

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/010**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043671
LIMS Report No.: 331538

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201030, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093161

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/010**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043671
LIMS Report No.: 331538

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad. Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093162

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/011**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043672
LIMS Report No.: 331539

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201031, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/011**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043672
LIMS Report No.: 331539

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al[illegible] Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093164

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Test Report

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Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14259/012**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043673
LIMS Report No.:	331540

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201032, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093165

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/012**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043673
LIMS Report No.: 331540

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093166

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14259/013**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043674
LIMS Report No.:	331541

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201033, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/013**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043674
LIMS Report No.: 331541

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093168

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/014**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043675
LIMS Report No.: 331542

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201034, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al[illegible] Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093169

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/014**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043675
LIMS Report No.: 331542

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093170

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: VLL/VLS/21/14259/015
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043676
LIMS Report No.: 331543

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201057, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093171

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/015**
Issue Date: 2022-02-09
Your Ref. and Date: Letter 2022-02-02
Lab Ref No.: 1043676
LIMS Report No.: 331543

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkagiri - 500 101, Hyderabad, Telangana India. Phone: +91-40-6740 4040

NO: LSF-B 1093172

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/016**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043677
LIMS Report No.: 331544

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201058, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093173

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/016**
Issue Date: 2022-02-09
Your Ref. and Date: Letter 2022-02-02
Lab Ref No.: 1043677
LIMS Report No.: 331544

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-8740 4040

NO: LSF-B 1093174

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14259/017**
Issue Date:	2022-02-09
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043678
LIMS Report No.:	331545

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201059, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093175

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/017**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043678
LIMS Report No.: 331545

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/018**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043679
LIMS Report No.: 331546

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201060, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093177

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481473

Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/018**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043679
LIMS Report No.: 331546

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093178

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/019**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043680
LIMS Report No.: 331547

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201061, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093179

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/019**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043680
LIMS Report No.: 331547

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093180

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Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/020**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043681
LIMS Report No.: 331548

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201062, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093181

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/020**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043681
LIMS Report No.: 331548

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093182

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/021**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043682
LIMS Report No.: 331549

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201063, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/021**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043682
LIMS Report No.: 331549

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/022**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043683
LIMS Report No.: 331550

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201064, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/022**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043683
LIMS Report No.: 331550

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/023**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043684
LIMS Report No.: 331551

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201065, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093187

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/023**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043684
LIMS Report No.: 331551

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093188

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/024**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043665
LIMS Report No.: 331552

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201066, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1093189

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/024**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043685
LIMS Report No.: 331552

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093190

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Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14259/025**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043686
LIMS Report No.: 331553

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru Lake Water Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201067, Water samples Extracted with N-Hexane stored in 1ml vial submitted by customer		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	1 Vial		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
2	Beta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
3	Gamma HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ
4	Aldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
5	Dieldrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
6	Endosulfan	mg/L	SOP NO 15/31A & 15/31B	BLQ
7	Endosulfan I	mg/L	SOP NO 15/31A & 15/31B	BLQ
8	Endosulfan II	mg/L	SOP NO 15/31A & 15/31B	BLQ
9	Endosulfan sulfate	mg/L	SOP NO 15/31A & 15/31B	BLQ
10	Heptachlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
11	Heptachlor epoxide	mg/L	SOP NO 15/31A & 15/31B	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1093191

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14259/025**
Issue Date: 2022-02-09
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043686
LIMS Report No.: 331553

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/L	SOP NO 15/31A & 15/31B	BLQ
13	Endrin aldehyde	mg/L	SOP NO 15/31A & 15/31B	BLQ
14	Endrin ketone	mg/L	SOP NO 15/31A & 15/31B	BLQ
15	Methoxychlor	mg/L	SOP NO 15/31A & 15/31B	BLQ
16	4,4- DDE	mg/L	SOP NO 15/31A & 15/31B	BLQ
17	4,4- DDD	mg/L	SOP NO 15/31A & 15/31B	BLQ
18	4,4- DDT	mg/L	SOP NO 15/31A & 15/31B	BLQ
19	Delta HCH	mg/L	SOP NO 15/31A & 15/31B	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS ; BLQ: Below Limit of Quantification;
Limit of Quantification for Pesticide residues :0.00002 mg/L.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1093192

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL LABORATORY – VIJAYAWADA
Plot No.41, Sri Kanakadurga Officers' Colony,
Gurunanak Road, Vijayawada-520008

K.SRINIVAS, M.Sc., M.Tech.,
Senior Environmental Scientist

e.mail: zovjalab-ses1@appcb.gov.in
Tel No: 0866-2546218

Kolleru lake Sediment Samples

S.No.	Sample Code	Sample Description
		KRISHNA DISTRICT
1.	Y2201SL001	Chandraiah drain at Teacher Colony, Satyanarayana Puram, Gudivada
2.	Y2201SL002	Budameru drain, Machilipatnam-Nuzid, Kalluru Road No.28, Near Puttagunta Village
3.	Y2201SL003	Narasannapalem drain at Gudivada Road, Arugolanu Village
4.	Y2201SL004	Polaraj drain at Kikaluru-Eluru Road
5.	Y2201SL005	Chinayedlagadi lake at Kikaluru-Eluru Road
6.	Y2201SL006	Peddaedlagadi lake at Kikaluru-Eluru Road
7.	Y2201SL007	Chandraiah drain at Polukonda Village
8.	Y2201SL008	Budameru at Kudaravalli Village
9.	Y2201SL009	Kolleti kota at Pichikalamarru Village
10.	Y2201SL010	Circar canal at Pichikalamarru Village
11.	Y2201SL011	Srungavarappadu drain at Srungavarappadu
12.	Y2201SL012	(Polraju/Nagaraju) at Atapaka Village
13.	Y2201SL013	Lake - Bird Life Sanctuary at Atapaka Village
14.	Y2201SL014	Upputeru at Tadinada Village
		WEST GODAVARI DISTRICT (ELURU)
15.	Y2201SL015	Gudivakalanka
16.	Y2201SL016	Mondikodu drain confluence with Kolleru lake at Mondikodu Gram Pachayat of Gudivakalanka Village
17.	Y2201SL017	Kokkirayalanka
18.	Y2201SL018	Jodi Kaluva
19.	Y2201SL019	Chettunnapadu
20.	Y2201SL020	Pandikodu drain
21.	Y2201SL021	Tokalapalli drain
22.	Y2201SL022	Bulusuvagu
23.	Y2201SL023	Kovvali drain
24.	Y2201SL024	East Tammileru
25.	Y2201SL025	West Thammileru

SENIOR ENVIRONMENTAL SCIENTIST
A.P.POLLUTION CONTROL BOARD
ZONAL LABORATORY, VIJAYAWADA

K. Srinivas

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/001**
Issue Date: 2022-02-08
Your Ref. and Date: Letter 2022-02-02
Lab Ref No.: 1043700
LIMS Report No.: 331313

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL001		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092716

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/001**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043700
LIMS Report No.: 331313

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092717

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14260/002**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043701
LIMS Report No.:	331314

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL002		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092718

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/002**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043701
LIMS Report No.: 331314

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092719

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/003**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043702
LIMS Report No.: 331315

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL003		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092720

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/003**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043702
LIMS Report No.:	331315

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092721

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/004**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043703
LIMS Report No.: 331316

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL004		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly Al... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092722

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/004**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043703
LIMS Report No.: 331316

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092723

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/005**
Issue Date: 2022-02-08
Your Ref: and Date: Letter 2022-02-02
Lab Ref No.: 1043705
LIMS Report No.: 331317

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL005		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092724

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Test Report

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Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/005**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043705
LIMS Report No.: 331317

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092725

Vimta
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Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/006**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043706
LIMS Report No.: 331318

Kind Attn: Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL006		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly A... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092726

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: VLL/VLS/21/14260/006
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043706
LIMS Report No.: 331318

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

Issued To:
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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/007**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043707
LIMS Report No.: 331319

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL007		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092728

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/007**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043707
LIMS Report No.:	331319

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

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Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/008**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043708
LIMS Report No.: 331320

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL008		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092730

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/008**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043708
LIMS Report No.: 331320

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/009**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043709
LIMS Report No.: 331321

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL009		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana,India. Phone: +91-40-6740 4040

NO: LSF-B 1092732

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/009**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043709
LIMS Report No.: 331321

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092733

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/010**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043710
LIMS Report No.: 331322

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL010		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092734

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/010**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043710
LIMS Report No.: 331322

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092735

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/011**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043711
LIMS Report No.: 331323

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL011		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092736

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/011**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043711
LIMS Report No.: 331323

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092737

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/012**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043712
LIMS Report No.: 331324

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL012		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092738

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/012**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043712
LIMS Report No.:	331324

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092739

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Test Report

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/013**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043713
LIMS Report No.: 331325

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL013		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092740

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/013**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043713
LIMS Report No.: 331325

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092741

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/014**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043714
LIMS Report No.: 331326

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL014		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092742

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/014**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043714
LIMS Report No.: 331326

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092743

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14260/015**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043715
LIMS Report No.:	331327

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL015		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092744

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/015**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043715
LIMS Report No.: 331327

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092745

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14260/016**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043716
LIMS Report No.:	331328

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y22D1SL016		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092746

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/016**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043716
LIMS Report No.: 331328

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092747

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/017**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043717
LIMS Report No.: 331329

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL017		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

NO: LSF-B 1092748

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/017**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043717
LIMS Report No.: 331329

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Denduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092749

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/018**
Issue Date:	2022-02-08
Your Ref: and Date:	Letter 2022-02-02
Lab Ref No.:	1043718
LIMS Report No.:	331330

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL018		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092750

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/018**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043718
LIMS Report No.:	331330

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

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Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/019**
Issue Date: 2022-02-08
Your Ref: and Date: Letter 2022-02-02
Lab Ref No.: 1043719
LIMS Report No.: 331331

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL019		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092752

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/019**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043719
LIMS Report No.: 331331

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092753

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/020**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043720
LIMS Report No.:	331332

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL020		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092754

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/020**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043720
LIMS Report No.: 331332

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092755

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number:	**VLL/VLS/21/14260/021**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043721
LIMS Report No.:	331333

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL021		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092756

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/021**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043721
LIMS Report No : 331333

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092757

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Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/022**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043722
LIMS Report No.: 331334

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL022		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092758

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/022**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043722
LIMS Report No.: 331334

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory
Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092759

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/023**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043724
LIMS Report No.: 331335

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL023		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
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NO: LSF-B 1092760

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Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number:	**VLL/VLS/21/14260/023**
Issue Date:	2022-02-08
Your Ref:	Letter
and Date:	2022-02-02
Lab Ref No.:	1043724
LIMS Report No.:	331335

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Test Report

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Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/024**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043725
LIMS Report No.: 331336

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL024		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Life Sciences Campus, Plot No. 5, MN Park (Formerly A... Park),
Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana,India. Phone: +91-40-6740 4040

NO: LSF-B 1092762

Vimta
Driven by Quality. Inspired by Science.

Test Report

Issued To:
Andhra Pradesh Pollution Control Board - Zonal Laboratory - Vijayawada,
Plot no. 41, Sri Kanakadurga Officer's Colony,
Gurunanak Road,
Vijayawada-520008
Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Kind Attn:Mr. K. Srinivas

Registration/Report Number: **VLL/VLS/21/14260/024**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043725
LIMS Report No.: 331336

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
12	Endrin	mg/kg	AOAC_2007.01	BLQ
13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana, India. Phone: +91-40-6740 4040

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Test Report

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Andhra Pradesh,IND
Ph:2546218 Mob:9177303281

Registration/Report Number: **VLL/VLS/21/14260/025**
Issue Date: 2022-02-08
Your Ref: Letter
and Date: 2022-02-02
Lab Ref No.: 1043726
LIMS Report No.: 331337

Kind Attn:Mr. K. Srinivas

Customer Provided Details :			
Sample Name:	**Kolleru sediment Samples**		
Manufacturer:	NA		
Batch Number:	NA	A.R. Number/Sample Code:	NA
Mfg. Date:	NA	Exp. Date:	NA
Test Required:	Pesticides		
Other Details if Any:	Y2201SL025		
Lab Provided Details :			
Sample Received Date:	2022-02-02	Sample Registration Date:	2022-02-02
Analysis Starting Date:	2022-02-04	Analysis Completion Date:	2022-02-07
Quantity Received:	~25gms X 1No		
Sampling Details:	NA		
Other Details if Any:	NA		

TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
1	Alpha HCH	mg/kg	AOAC_2007.01	BLQ
2	Beta HCH	mg/kg	AOAC_2007.01	BLQ
3	Gamma HCH	mg/kg	AOAC_2007.01	BLQ
4	Aldrin	mg/kg	AOAC_2007.01	BLQ
5	Dieldrin	mg/kg	AOAC_2007.01	BLQ
6	Endosulfan	mg/kg	AOAC_2007.01	BLQ
7	Endosulfan I	mg/kg	AOAC_2007.01	BLQ
8	Endosulfan II	mg/kg	AOAC_2007.01	BLQ
9	Endosulfan sulfate	mg/kg	AOAC_2007.01	BLQ
10	Heptachlor	mg/kg	AOAC_2007.01	BLQ
11	Heptachlor epoxide	mg/kg	AOAC_2007.01	BLQ

Name and Designation of Authorized Signatory

Narasimha Rao Danduprolu
Deputy Manager

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NO: LSF-B 1092764

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Test Report

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TEST RESULTS

S. No.	Test Parameters	UOM	Method	Results
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13	Endrin aldehyde	mg/kg	AOAC_2007.01	BLQ
14	Endrin ketone	mg/kg	AOAC_2007.01	BLQ
15	Methoxychlor	mg/kg	AOAC_2007.01	BLQ
16	4,4- DDE	mg/kg	AOAC_2007.01	BLQ
17	4,4- DDD	mg/kg	AOAC_2007.01	BLQ
18	4,4- DDT	mg/kg	AOAC_2007.01	BLQ
19	Delta HCH	mg/kg	AOAC_2007.01	BLQ

Results relate only to the sample tested.

Remarks: Instrument used:GC-MS/MS; BLQ: Below Limit of Quantification;
Limit of Qunatification for Pesticide residues : 0.01 mg/kg.

- END OF THE TEST REPORT -

Name and Designation of Authorized Signatory

Narasimha Rao Dandupolu
Deputy Manager

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Genome Valley, Shamirpet, Medchal - Malkajgiri - 500 101, Hyderabad, Telangana,India, Phone: +91-40-6740 4040

NO: LSF-B 1092765

Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	**A**	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	**B**	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	**C**	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	**D**	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	**E**	pH betwwn 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

इंटरनेट

Annexure - 7

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 10500 (2012): Drinking water [FAD 25: Drinking Water]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"





"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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भारतीय मानक

पीने का पानी — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

DRINKING WATER — SPECIFICATION

(Second Revision)

ICS 13.060.20

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 2012 **Price Group 6**

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Drinking Water Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was originally published in 1983. A report prepared by the World Health Organization in cooperation with the World Bank showed that in 1975, some 1 230 million people were without safe water supplies. These appalling facts were central to the United Nations decision to declare an International Drinking Water Supply and Sanitation decade, beginning in 1981. Further, the VI Five-Year Plan of India had made a special provision for availability of safe drinking water for the masses. Therefore, the standard was formulated with the objective of assessing the quality of water resources, and to check the effectiveness of water treatment and supply by the concerned authorities.

The first revision was undertaken to take into account the up-to-date information available about the nature and effect of various contaminants as also the new techniques for identifying and determining their concentration. Based on experience gained additional requirements for alkalinity; aluminium and boron were incorporated and the permissible limits for dissolved solids, nitrate and pesticides residues modified.

As per the eleventh five year plan document of India (2007-12), there are about 2.17 lakh quality affected habitations in the country with more than half affected with excess iron, followed by fluoride, salinity, nitrate and arsenic in that order. Further, approximately, 10 million cases of diarrhoea, more than 7.2 lakh typhoid cases and 1.5 lakh viral hepatitis cases occur every year a majority of which are contributed by unclean water supply and poor sanitation. The eleventh five year plan document of India (2007-2012) recognizes dealing with the issue of water quality as a major challenge and aims at addressing water quality problems in all quality affected habitations with emphasis on community participation and awareness campaigns as well as on top most priority to water quality surveillance and monitoring by setting up of water quality testing laboratories strengthened with qualified manpower, equipments and chemicals.

The second revision was undertaken to upgrade the requirements of the standard and align with the internationally available specifications on drinking water. In this revision assistance has been derived from the following:

a) EU Directives relating to the quality of water intended for human consumption (80/778/EEC) and Council Directive 98/83/EC.

b) USEPA standard — National Primary Drinking Water Standard. EPA 816-F-02-013 dated July, 2002.

c) WHO Guidelines for Drinking Water Quality. 3rd Edition Vol. 1 Recommendations, 2008.

d) Manual on Water Supply and Treatment, third edition — revised and updated May 1999, Ministry of Urban Development, New Delhi.

This standard specifies the acceptable limits and the permissible limits in the absence of alternate source. It is recommended that the acceptable limit is to be implemented as values in excess of those mentioned under 'Acceptable' render the water not suitable. Such a value may, however, be tolerated in the absence of an alternative source. However, if the value exceeds the limits indicated under 'permissible limit in the absence of alternate source' in col 4 of Tables 1 to 4, the sources will have to be rejected.

Pesticide residues limits and test methods given in Table 5 are based on consumption pattern, persistence and available manufacturing data. The limits have been specified based on WHO guidelines, wherever available. In cases where WHO guidelines are not available, the standards available from other countries have been examined and incorporated, taking in view the Indian conditions.

In this revision, additional requirements for ammonia, chloramines, barium, molybdenum, silver, sulphide, nickel, polychlorinated biphenyls and trihalomethanes have been incorporated while the requirements for colour, turbidity, total hardness, free residual chlorine, iron, magnesium, mineral oil, boron, cadmium, total arsenic, lead, polynuclear aromatic hydrocarbons, pesticides and bacteriological requirements have been modified.

In this revision, requirement and test method for virological examination have been included. Further, requirements and test methods for cryptosporidium and giardia have also been specified.

Routine surveillance of drinking water supplies should be carried out by the relevant authorities to understand the risk of specific pathogens and to define proper control procedures. The WHO Guidelines for Drinking Water Quality, 3rd Edition, Vol. 1 may be referred for specific recommendations on using a water safety approach incorporating risk identification. Precautions/Care should be taken to prevent contamination of drinking water from chlorine resistant parasites such as cryptosporidium species and giardia.

Indian Standard

DRINKING WATER — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for drinking water.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard the following definition shall apply.

3.1 Drinking Water — Drinking water is water intended for human consumption for drinking and cooking purposes from any source. It includes water (treated or untreated) supplied by any means for human consumption.

4 REQUIREMENTS

Drinking water shall comply with the requirements given in Tables 1 to 4. The analysis of pesticide residues given in Table 3 shall be conducted by a recognized laboratory using internationally established test method meeting the residue limits as given in Table 5.

Drinking water shall also comply with bacteriological requirements (*see* **4.1**), virological requirements (*see* **4.2**) and biological requirements (*see* **4.3**).

4.1 Bacteriological Requirements

4.1.1 *Water in Distribution System*

Ideally, all samples taken from the distribution system including consumers' premises, should be free from coliform organisms and the following bacteriological quality of drinking water collected in the distribution system, as given in Table 6 is, therefore specified when tested in accordance with IS 1622.

4.2 Virological Requirements

4.2.1 Ideally, all samples taken from the distribution

Table 1 Organoleptic and Physical Parameters
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, *Max*	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	*p*H value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, *Max*	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, *Max*	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, *Max*	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, *Max*	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MBAS) mg/l, *Max*	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, *Max*	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, *Max*	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, *Max*	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl_2), mg/l, *Max*	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, *Max*	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, *Max*	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, *Max*	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, *Min*	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, *Max*	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, *Max*	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, *Max*	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, *Max*	0.5	No relaxation	Clause **6** of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO_3), mg/l, *Max*	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C_6H_5OH), mg/l, *Max*	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, *Max*	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, *Max*	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO_4) mg/l, *Max*	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H_2S), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, *Max*	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as $CaCO_3$), mg/l, *Max*	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, *Max*	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under ‘acceptable’ render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under ‘permissible limit in the absence of alternate source’ in col 4, above which the sources will have to be rejected.

Table 3 Parameters Concerning Toxic Substances
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Cadmium (as Cd), mg/l, *Max*	0.003	No relaxation	IS 3025 (Part 41)	—
ii)	Cyanide (as CN), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 27)	—
iii)	Lead (as Pb), mg/l, *Max*	0.01	No relaxation	IS 3025 (Part 47)	—
iv)	Mercury (as Hg), mg/l, *Max*	0.001	No relaxation	IS 3025 (Part 48)/ Mercury analyser	—
v)	Molybdenum (as Mo), mg/l, *Max*	0.07	No relaxation	IS 3025 (Part 2)	—
vi)	Nickel (as Ni), mg/l, *Max*	0.02	No relaxation	IS 3025 (Part 54)	—
vii)	Pesticides, µg/l, *Max*	See Table 5	No relaxation	See Table 5	—
viii)	Polychlorinated biphenyls, mg/l, *Max*	0.000 5	No relaxation	ASTM 5175*	— or APHA 6630
ix)	Polynuclear aromatic hydro-carbons (as PAH), mg/l, *Max*	0.000 1	No relaxation	APHA 6440	—
x)	Total arsenic (as As), mg/l, *Max*	0.01	0.05	IS 3025 (Part 37)	—
xi)	Total chromium (as Cr), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 52)	—
xii)	Trihalomethanes:				
	a) Bromoform, mg/l, *Max*	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
	b) Dibromochloromethane, mg/l, *Max*	0.1	No relaxation	ASTM D 3973-85* or APHA 6232	—
	c) Bromodichloromethane, mg/l, *Max*	0.06	No relaxation	ASTM D 3973-85* or APHA 6232	—
	d) Chloroform, mg/l, *Max*	0.2	No relaxation	ASTM D 3973-85* or APHA 6232	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under ‘acceptable’ render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source’ in col 4, above which the sources will have to be rejected.

Table 4 Parameters Concerning Radioactive Substances
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 14194	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Radioactive materials:				
	a) Alpha emitters Bq/l, *Max*	0.1	No relaxation	Part 2	—
	b) Beta emitters Bq/l, *Max*	1.0	No relaxation	Part 1	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under ‘acceptable’ render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under ‘permissible limit in the absence of alternate source’ in col 4, above which the sources will have to be rejected.

Table 5 Pesticide Residues Limits and Test Method
(*Foreword* and *Table* 3)

Sl No.	Pesticide	Limit µg/l	Method of Test, Ref to	
			USEPA	AOAC/ ISO
(1)	(2)	(3)	(4)	(5)
i)	Alachlor	20	525.2, 507	—
ii)	Atrazine	2	525.2, 8141 A	—
iii)	Aldrin/ Dieldrin	0.03	508	—
iv)	Alpha HCH	0.01	508	—
v)	Beta HCH	0.04	508	—
vi)	Butachlor	125	525.2, 8141 A	—
vii)	Chlorpyriphos	30	525.2, 8141 A	—
viii)	Delta HCH	0.04	508	—
ix)	2,4- Dichlorophenoxyacetic acid	30	515.1	—
x)	DDT (*o, p* and *p, p* – Isomers of DDT, DDE and DDD)	1	508	AOAC 990.06
xi)	Endosulfan (alpha, beta, and sulphate)	0.4	508	AOAC 990.06
xii)	Ethion	3	1657 A	—
xiii)	Gamma — HCH (Lindane)	2	508	AOAC 990.06
xiv)	Isoproturon	9	532	—
xv)	Malathion	190	8141 A	—
xvi)	Methyl parathion	0.3	8141 A	ISO 10695
xvii)	Monocrotophos	1	8141 A	—
xviii)	Phorate	2	8141 A	—

NOTE — Test methods are for guidance and reference for testing laboratory. In case of two methods, USEPA method shall be the reference method.

Table 6 Bacteriological Quality of Drinking Water[1)]
(*Clause* 4.1.1)

Sl No.	Organisms	Requirements
(1)	(2)	(3)
i)	*All water intended for drinking*:	
	a) *E. coli* or thermotolerant coliform bacteria[2), 3)]	Shall not be detectable in any 100 ml sample
ii)	*Treated water entering the distribution system*:	
	a) *E. coli* or thermotolerant coliform bacteria[2)]	Shall not be detectable in any 100 ml sample
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample
iii)	*Treated water in the distribution system*:	
	a) *E. coli* or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample

[1)]Immediate investigative action shall be taken if either *E.coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause shall be determined by immediate further investigation.

[2)]Although, *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests shall be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

[3)]It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for progressive improvement of water supplies.

system including consumers' premises, should be free from virus.

4.2.2 None of the generally accepted sewage treatment methods yield virus-free effluent. Although a number of investigators have found activated sludge treatment to be superior to trickling filters from this point of view, it seems possible that chemical precipitation methods will prove to be the most effective.

4.2.3 Virus can be isolated from raw water and from springs, enterovirus, reovirus, and adenovirus have been found in water, the first named being the most resistant to chlorination. If enterovirus are absent from chlorinated water, it can be assumed that the water is safe to drink. Some uncertainty still remains about the virus of infectious hepatitis, since it has not so far been isolated but in view of the morphology and resistance of enterovirus it is likely that, if they have been inactivated hepatitis virus will have been inactivated also.

4.2.4 An exponential relationship exists between the rate of virus inactivation and the redox potential. A redox potential of 650 mV (measured between platinum and calomel electrodes) will cause almost instantaneous inactivation of even high concentrations of virus. Such a potential can be obtained with even a low concentration of free chlorine, but only with an extremely high concentration of combined chlorine. This oxidative inactivation may be achieved with a number of other oxidants also, for example, iodine, ozone and potassium permanganate, but the effect of the oxidants will always be counteracted, if reducing components, which are mainly organic, are present. As a consequence, the sensitivity of virus towards disinfectants will depend on the *milieu* just as much as on the particular disinfectant used.

4.2.5 Viruses are generally resistant to disinfectants as well as get protected on account of presence of particulate and organic matter in water. Because the difference between the resistance of coliform organisms and of virus to disinfection by oxidants increases with increasing concentration of reducing components, for example, organic matter, it cannot be assumed that the absence of available coliform organisms implies freedom from active virus under circumstances where a free chlorine residual cannot be maintained. Sedimentation and slow sand filtration in themselves may contribute to the removal of virus from water.

4.2.6 In practice, >0.5 mg/l of free chlorine for 1 h is sufficient to inactivate virus, even in water that was originally polluted provided the water is free from particulates and organic matter.

4.2.7 MS2 phage are indicator of viral contamination in drinking water. MS2 phage shall be absent in 1 litre of water when tested in accordance with USEPA method 1602. If MS2 phage are detected in the drinking water, virological examination shall be done by the Polymerase Chain Reaction (PCR) method for virological examination as given in Annex B. USEPA method in Manual of Method for Virology Chapter 16, June 2001 shall be the alternate method. If viruses are detected, the cause shall be determined by immediate further investigation.

4.3 Biological Requirements

4.3.1 Ideally, all samples taken including consumers premises should be free from biological organisms. Biological examination is of value in determining the causes of objectionable tastes and odours in water and controlling remedial treatments, in helping to interpret the results of various chemical analysis, and in explaining the causes of clogging in distribution pipes and filters. In some instances, it may be of use in demonstrating that water from one source has been mixed with that from another.

4.3.2 The biological qualities of water are of greater importance when the supply has not undergone the conventional flocculation and filtration processes, since increased growth of methane-utilizing bacteria on biological slimes in pipes may then be expected, and the development of bryozoal growths such as *Plumatella* may cause operational difficulties.

4.3.3 Some of the animalcules found in water mains may be free-living in the water, but others such as *Dreissena* and *Asellus* are more or less firmly attached to the inside of the mains. Although these animalcules are not themselves pathogenic, they may harbour pathogenic organisms or virus in their intestines, thus protecting these pathogens from destruction by chlorine.

4.3.4 Chlorination, at the dosages normally employed in waterworks, is ineffective against certain parasites, including amoebic cysts; they can be excluded only by effective filtration or by higher chlorine doses than can be tolerated without subsequent dechlorination. *Amoebiasis* can be conveyed by water completely free from enteric bacteria; microscopic examination after concentration is, therefore, the only safe method of identification.

4.3.5 Strict precautions against back-syphonage and cross-connections are required, if amoebic cysts are found in a distribution system containing tested water.

4.3.6 The *cercariae of schistosomiasis* can be detected by similar microscopic examination, but there is, in

any case, no evidence to suggest that this disease is normally spread through piped water supplies.

4.3.7 The cyclops vector of the embryos of *Dracunculus medinensis* which causes dracontiasis or Guinea-worm disease can be found in open wells in a number of tropical areas. They are identifiable by microscopic examination. Such well supplies are frequently used untreated, but the parasite can be relatively easily excluded by simple physical improvements in the form of curbs, drainage, and apron surrounds and other measures which prevent physical contact with the water source.

4.3.8 Cryptosporidium shall be absent in 10 liter of water when tested in accordance with USEPA method 1622 or USEPA method 1623* or ISO 15553 : 2006.

4.3.9 Giardia shall be absent in 10 liter of water when tested in accordance with USEPA method 1623* or ISO 15553 : 2006.

4.3.10 The drinking water shall be free from microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms. An illustrative (and not exhaustive) list is given in Annex C for guidance.

NOTE — In case of dispute, the method indicated by '*' in **4.3.8** and **4.3.9** shall be referee method.

5 SAMPLING

Representative samples of water shall be drawn as prescribed in IS 1622 and IS 3025 (Part 1).

ANNEX A
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1622 : 1981	Methods of sampling and microbiological examination of water (*first revision*)
3025	Methods of sampling and test (physical and chemical) for water and waste water:
(Part 1) : 1987	Sampling (*first revision*)
(Part 2) : 2002	Determination of 33 elements by inductively coupled plasma atomic emission spectroscopy
(Part 4) : 1983	Colour (*first revision*)
(Part 5) : 1983	Odour (*first revision*)
(Part 7) : 1984	Taste threshold (*first revision*)
(Part 8) : 1984	Tasting rate (*first revision*)
(Part 10) : 1984	Turbidity (*first revision*)
(Part 11) : 1983	*p*H value (*first revision*)
(Part 16) : 1984	Filterable residue (total dissolved solids) (*first revision*)
(Part 21) : 1983	Total hardness (*first revision*)
(Part 23) : 1983	Alkalinity (*first revision*)
(Part 24) : 1986	Sulphates (*first revision*)
(Part 26) : 1986	Chlorine residual (*first revision*)
(Part 27) : 1986	Cyanide (*first revision*)
(Part 29) : 1986	Sulphide (*first revision*)
(Part 32) : 1988	Chloride (*first revision*)
(Part 34) : 1988	Nitrogen (*first revision*)
(Part 37) : 1988	Arsenic (*first revision*)
(Part 39) : 1989	Oil and grease
(Part 40) : 1991	Calcium
(Part 41) : 1992	Cadmium (*first revision*)
(Part 42) : 1992	Copper (*first revision*)
(Part 43) : 1992	Phenols (*first revision*)
(Part 46) : 1994	Magnesium
(Part 47) : 1994	Lead
(Part 48) : 1994	Mercury
(Part 49) : 1994	Zinc
(Part 52) : 2003	Chromium
(Part 53) : 2003	Iron
(Part 54) : 2003	Nickel
(Part 55) : 2003	Aluminium
(Part 56) : 2003	Selenium
(Part 57) : 2005	Boron
(Part 59) : 2006	Manganese
(Part 60) : 2008	Fluoride
13428 : 2003	Packaged natural mineral water — Specification (*first revision*)
14194	Radionuclides in environmental samples — Method of estimation:
(Part 1) : 1994	Gross beta activity measurement
(Part 2) : 1994	Gross alpha activity measurement
15302 : 2002	Determination of aluminium and barium in water by direct nitrous oxide-acetylene flame atomic absorption spectrometry
15303 : 2002	Determination of antimony, iron and selenium in water by electrothermal atomic absorption spectrometry

ANNEX B

(*Clause* 4.2.7)

POLYMERASE CHAIN REACTION (PCR) METHOD

B-1 GENERAL

The method involves the concentration of viruses from 100 litre of drinking water to 1 ml by membrane filter technique. The concentrate is subjected to amplification using polymerase chain reaction (PCR) and primers based on highly conserved regions of viral genomes. This method can detect as low as 10 genome copies. Stringent precautions are needed to avoid contamination with amplified DNA products leading to false positive reactions. Detection of hepatitis A virus (HAV) RNA and enterovirus (EV) RNA is considered as an indication of presence of viruses in water. Steps involved include concentration of water, RNA extraction, complementary DNA (cDNA) synthesis and PCR.

B-2 CONCENTRATION OF DRINKING WATER

B-2.1 Apparatus

B-2.1.1 *Pressure Pump*

B-2.1.2 *Membrane Filter Assembly with 144 mm Diameter with Tripod Stand*

B-2.1.3 *Pressure Vessel (50 litre capacity) with Pressure Gauge*

B-2.1.4 *Inter-connecting Pressure Tubes*

B-2.2 Reagents

Autoclaved double distilled water shall be used for the preparation of reagents/buffers in this study.

B-2.2.1 *Aluminium Chloride*

B-2.2.2 *HCl/NaOH Urea (Extra Pure)*

B-2.2.3 *Disodium Hydrogen Phosphate* ($Na_2HPO_4.2H_2O$) — 0.2 M, filter sterilized.

B-2.2.4 *Sodium Dihydrogen Phosphate* ($NaH_2PO_4.2H_2O$) — 0.2 M, filter sterilized.

B-2.2.5 *Citric Acid* — 0.1 M, filter sterilized.

B-2.2.6 *L-Arginine* — 0.5 M, filter sterilized.

B-2.2.7 *Urea-Arginine Phosphate Buffer* (*U-APB*) — Mix 4.5 g of urea with 2 ml of 0.2 M NaH_2PO_4 and 2 ml of 0.5 M L - Arginine and make up the volume to 50 ml with sterile distilled water. The *p*H of the eluent shall be 9.0.

B-2.2.8 *Magnesium Chloride* ($MgCl_2$) — 1 M.

B-2.2.9 *McII Vaines Buffer* (*p*H *5.0*) — Mix 9.7 ml of 0.1 M citric acid with 10.3 ml of 0.2 M $Na_2HPO_4.2H_2O$ under sterile conditions.

B-2.3 Procedure

Filter 100 litre of drinking water sample through membrane filter assembly using either positively charged membrane of 144 mm diameter or 0.22 micron diameter pore size nitrocellulose membrane. For positively charged membrane the test water *p*H need not be adjusted. But for the 0.22 micron nitrocellulose membrane adjust the *p*H to 3.5 after adding the aluminium chloride as a coagulant to a final concentration of 0.000 5 M.

At lower *p*H pass the water through the membrane. The flow rate shall be 40 litre/h approximately. After the completion of the filtration, elute the adsorbed particles using 100 ml of urea-arginine phosphate buffer (U-APB). Precipitate the suspended particles using 1 ml of magnesium chloride (1 M). Dissolve the resultant precipitate centrifuged out of the sample in 800-1.0 ml of McII vaines buffer. The processed sample can be stored at refrigerator until required.

B-3 RNA EXTRACTION

B-3.1 Apparatus

B-3.1.1 *Cooling Centrifuge*

B-3.1.2 *Deep Freezer (–20°C)*

B-3.1.3 *Vortex Mixer*

B-3.1.4 *Pipette Man*

B-3.2 Reagents

B-3.2.1 *Cetyl Trimethyl Ammonium Bromide (CTAB) Buffer*

CTAB	:	1 percent
Sodium Dodecyl Sulphate (SDS)	:	1 percent
EDTA	:	20 mM
Sodium Chloride	:	1 M

B-3.2.2 *Phenol, Chloroform and Isoamylalcohol in the ratio of 25:24:1 (PCI)*

B-3.2.3 *Ethanol*

B-3.2.4 *TE Buffer (p*H *8.0)*

Tris base	:	1 M
EDTA	:	0.5 M

B-3.2.5 *Sodium Acetate* — 3 M.

B-3.3 Procedure

Treat 300 µl of concentrated water sample with equal volume of CTAB and 1/10th volume of PCI. Vortex and centrifuge at 5 000 × g for 30 min at 4°C. Add 1/10th volume of 3 M sodium acetate and double the volume of cold ethanol to the aqueous layer. Keep the mixture at either at –20°C for overnight or in liquid nitrogen for 2-5 min. Centrifuge at 10 000 × g, for 30 min at 4°C. Discard the supernatant and air dry the pellet and dissolve it in 20 µl TE buffer.

B-4 COMPLEMENTARY DNA (c DNA) SYNTHESIS

B-4.1 Apparatus

B-4.1.1 *PCR Machine*

B-4.1.2 *Deep Freezer (–20°C)*

B-4.2 Reagents

B-4.2.1 *cDNA Synthesis Kit*

B-4.3 Procedure

Suspend the extracted RNA in 20 µl of cDNA reaction mixture, which consists of 4 µl of 5X reverse transcriptase reaction buffer [250 mM TRIS–HCl (*p*H 8.5), 40 mM KCl, 150 mM $MgCl_2$, 5 mM dithiothreitol (DTT)], 0.5 µl of 10 mM deoxynucleotide phosphate (dNTP), 2 µl of hexa nucleotide mixture, 1 µl of 25 U of Maloney Murine Leukaemia Virus (M-MuLV) reverse transcriptase, 0.5 µl of 20 U of human placental RNase inhibitor. Heat the reaction mixture to 95°C for 5 min and rapidly chill on ice, this is followed by the addition of 1 µl (25 U/µl) of M-MuLV reverse transcriptase. Incubate the reaction mixture as given by the manufacturer of the kit and quickly chill the reaction tube on ice.

B-5 PCR AMPLIFICATION

B-5.1 Apparatus

B-5.1.1 *PCR Machine*

B-5.1.2 *Deep Freezer (–20°C)*

B-5.1.3 *Micropippette*

B-5.2 Reagents

B-5.2.1 *Primers for EV and HAV*

EV sense primer, 5' — TCC TCC GGC CCC TGA ATG CG — 3'

antisense primer, 5' — ATT GTC ACC ATA AGC AGC CA — 3'

HAV sense primer, 5' — GTTTT GCTCC TCTTT ATCAT GCTAT G-3'

antisense primer, 5' — GGAAA TGTCT CAGGT ACTTT CTTTG-3'

B-5.2.2 *PCR Master Mix*

B-5.2.3 *Mineral Oil*

B-5.3 Procedure

B-5.3.1 *PCR Amplification for Hepatitis A Virus (HAV)*

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS–HCl (*p*H 8.3), 50 mM KCl, 2.5 mM $MgCl_2$, 0.01 percent gelatin (1× PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of HAV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min

Denaturation for	1.0 min	at 94°C	} 35 cycles
Annealing for	1.0 min	at 57°C	
Extension for	1.3 min	at 72°C	

Final extension at 72°C for 7 min.

B-5.3.2 *PCR Amplification for Enterovirus (EV)*

In 5 µl of cDNA, add 95 µl of a PCR Master Mix (10 mM TRIS–HCl (*p*H 8.3), 50 mM KCl, 2.5 mM $MgCl_2$, 0.01 percent gelatin (1X PCR buffer), 200 µM of each dNTP, 1.5 U of *Thermus aquaticus* polymerase). Add 25 pico moles of sense and antisense oligonucleotide primers of EV and overlay with mineral oil. Appropriate positive and negative controls shall be included with each run. Set the following reaction at thermo cycler:

Denaturation at 94°C for 2 min

Denaturation for	1.0 min	at 94°C	} 35 cycles
Annealing for	1.0 min	at 42°C	
Extension for	2.0 min	at 72°C	

Final extension at 72°C for 7 min.

B-6 AGAROSE GEL ELECTROPHORESIS

B-6.1 Apparatus

B-6.1.1 *Micropippette*

B-6.1.2 *Electrophoresis Apparatus*

B-6.1.3 *Gel Documentation System*

B-6.2 Reagents

B-6.2.1 *Running Buffer* — 50X TAE buffer

Tris base/Tris buffer : 121.00 g

Glacial acetic acid	:	28.55 ml
0.5 M EDTA	:	50 .00 ml
Distilled water (autoclaved)	:	300.45 ml

Make the final volume upto 1 000 ml with deionised distilled water, sterilize and store at 4°C. The final concentration for the preparation of agarose gel and to run the gel shall be 1X.

B-6.2.2 *Tracking Dye* — 6X bromophenol blue.

B-6.2.3 *Ethidium Bromide* — 0.5 µg/ml.

B-6.3 Procedure

Run the PCR amplified product of EV and HAV on 1.5 percent agarose gel using 1X TAE buffer. Load 10 µl of amplified product after mixing it with 1 µl 10X loading dye. Run the molecular weight marker along with the samples. Run the electrophoresis at 100 V for 30 min. Stain the gel with ethidium bromide (0.5 µl/ml) for 20 min. Wash it with distilled water and view under UV transilluminator and photograph the gel to analyse the band pattern. EV gives the band as 155 base pair and the HAV gives band as 225 base pair.

ANNEX C

(*Clause* 4.3.10)

ILLUSTRATIVE LIST OF MICROSCOPIC ORGANISMS PRESENT IN WATER

Sl No. (1)	*Classification of Microscopic Organism* (2)	*Group and Name of the Organism* (3)	*Habitat* (4)	*Effect of the Organisms and Significance* (5)
i)	Algae	a) Chlorophyceae:		
		1) *Species of* Coelastrum, Gomphospherium, Micractinium, Mougeotia, Oocystis, Euastrum, Scenedesmus, Actinastrum, Gonium, Eudorina Pandorina, Pediastrum, Zygnema, Chlamydomonas, Careteria, Chlorella, Chroococcus, Spirogyra, Tetraedron, Chlorogonium, Stigeoclonium	Polluted water, impounded sources	Impart colouration
		2) *Species of* Pandorina, Volvox, Gomphospherium, Staurastrum, Hydrodictyon, Nitella	Polluted waters	Produce taste and odour
		3) *Species of* Rhizoclonium, Cladothrix, Ankistrodesmus, Ulothrix, Micrasterias, Chromulina	Clean water	Indicate clean condition
		4) *Species of* Chlorella, Tribonema, Clostrium, Spirogyra, Palmella	Polluted waters, impounded sources	Clog filters and create impounded difficulties
		b) Cyanophyceae:		
		1) *Species of* Anacystis and Cylindrospermum	Polluted waters	Cause water bloom and impart colour
		2) *Species of* Anabena, Phormidium, Lyngbya, Arthrospira, Oscillatona	Polluted waters	Impart colour
		3) *Species of* Anabena, Anacystis, Aphanizomenon	Polluted waters, impounded sources	Produce taste and odour
		4) *Species of* Anacystis, Anabena, Coelospherium, Cleotrichina, Aphanizomenon	Polluted waters	Toxin producing
		5) *Species of* Anacystis, Rivularia, Oscillatoria, Anabena	Polluted waters	Clog filters

Sl No. (1)	*Classification of Microscopic Organism* (2)	*Group and Name of the Organism* (3)	*Habitat* (4)	*Effect of the Organisms and Significance* (5)
		6) *Species of* Rivularia	Calcareous waters and also rocks	Bores rocks and calcareous strata and causes matted growth
		7) *Species of* Agmenellum, Microcoleus, Lemanea	Clean waters	Indicators of purification
		c) Diatoms (Bacillareophyceae):		
		1) *Species of* Fragillaria, Stephanodiscus, Stauroneis	—	Cause discoloration
		2) *Species of* Asterionella, Tabellaria	Hill streams high altitude, torrential and temperate waters	Taste and odour producing clog filters
		3) *Species of* Synedra and Fragillavia	Polluted waters	Taste and odour producing
		4) *Species of* Nitzchia, Gomphonema	Moderately polluted waters	Cause discoloration
		5) *Species of* Cymbela, Synedra, Melosira, Navicula, Cyclotella, Fragillaria, Diatoma, Pleurogsigma	Rivers and streams impounded sources	Clog filters and cause operational difficulties
		6) *Species of* Pinmularia, Surinella, Cyclotella, Meridion, Cocconeis	Clean waters	Indicators of purification
		d) Xanthophyceae:		
		Species of Botryococcus	Hill streams, high altitude and temperate waters	Produces coloration
ii)	Zooplankton	a) Protozoa:		
		1) Amoeba, Giardia Lamblia Arcella, Difflugia, Actinophrys	Polluted waters	Pollution indicators
		2) Endamoeba, Histolytica	Sewage and activated sludge	Parasitic and pathogenic
		b) Ciliates:		
		Paramoecium, Vorticella, Carchesium, Stentor, Colpidium, Coleps, Euplotes, Colopoda, Bodo	Highly polluted waters, sewage and activated sludge	Bacteria eaters
		c) Crustacea:		
		1) Bosmina, Daphnia	Stagnant polluted waters	Indicators of pollution
		2) Cyclops	Step wells in tropical climate	Carrier host of guinea worm
iii)	Rotifers	a) Rotifers:		
		Anurea, Rotaria, Philodina	Polluted and Algae laden waters	Feed on algae
		b) Flagellates:		
		1) Ceratium, Glenodinium, Peridinium Dinobryon	Rocky strata, iron bearing and acidic waters	Impart colour and fishy taste
		2) Euglena, Phacus	Polluted waters	Impart colour

Sl No.	*Classification of Microscopic Organism*	*Group and Name of the Organism*	*Habitat*	*Effect of the Organisms and Significance*
(1)	(2)	(3)	(4)	(5)
iv)	Miscellaneous Organisms	a) Sponges, Hydra	Fresh water	Clog filters and affect purification systems
		b) Tubifex, Eristalls, Chironomids	Highly polluted waters, sewage and activated sludge and bottom deposits	Clog filters and render water unaesthetic
		c) Plumatella	Polluted waters	Produces biological slimes and causes filter operational difficulties
		c) Dreissena, Asellus	Polluted waters	Harbour pathogenic organisms

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Photographs – Kolleru lake

1. Unused compost making shed at Kokkirayalanka



2. Construction & Demolition waste dump - Gudivakalanka



3. Disposal of municicpal solid waste at Penchikalamarru on Gundugolanu Alapadu Road - Kolleru lake



4. Domestic sewage discharge and Municipal Solid Waste dumping into kolleru lake - Gudivakalanka



5. MSW dump on the banks of Kolleru lake on the road between Kokkirayalanka and Chettunnapadu



6. MSW dumping in the inlet drain, Pandikodu drain, Chinanindru kolanu Village, Nidamarru Mandal, West Godavari District.



7. Muncipal Solid Waste Dump - Gudivakalanka



8. Plastic waste dump on the banks of Kolleru lake at on the road between Kokkirayalanka and Chettunnapadu



9. View of Kolleru lake at Atapaka Bird Sanctuary



10. View of Kolleru lake at Chettunnapadu



11. View of Kolleru lake at China Yedlagadi



12. View of Kolleti kota



13. View of Kolleru lake at Kolleti kota



14. View of Kolleru lake at Kolleti kota



15. View of Kolleru lake at Komati lanka



16. View of Kolleru lake at Komati lanka



17. View of Kolleru lake at Pedayedlagadi village



18. View of Kolleru lake at Pedayedlagadi



19. View of the Kolleru lake at Komati lanka



20. Water hycinth growth in Kolleru lake - Gudivakalanka



21. Water hycinth growth on lake water at Pedayedlagadi village.



22. Water hycinth growth on lake water at Pedayedlagadi village



23. Municipal Solid Waste Dumping in the Mondikodu drain at Madhavapuram village.



24. View of Upputeru - Outlet of Kolleru lake on Kaikaluru- Akivedu Highway



25. View of Upputeru - Outlet of Kolleru lake



26. Budameru – Domestic sewage discharge at New Rajarajeshwari peta, Vijayawada.



27. Budameru – Domestic sewage discharge & Municipal Solid Waste dumping at Inner Ring Road, Ramavarpadu, Vijayawada



28. Budameru – Domestic sewage discharge at NH 16, Velpuru, Krishna District.

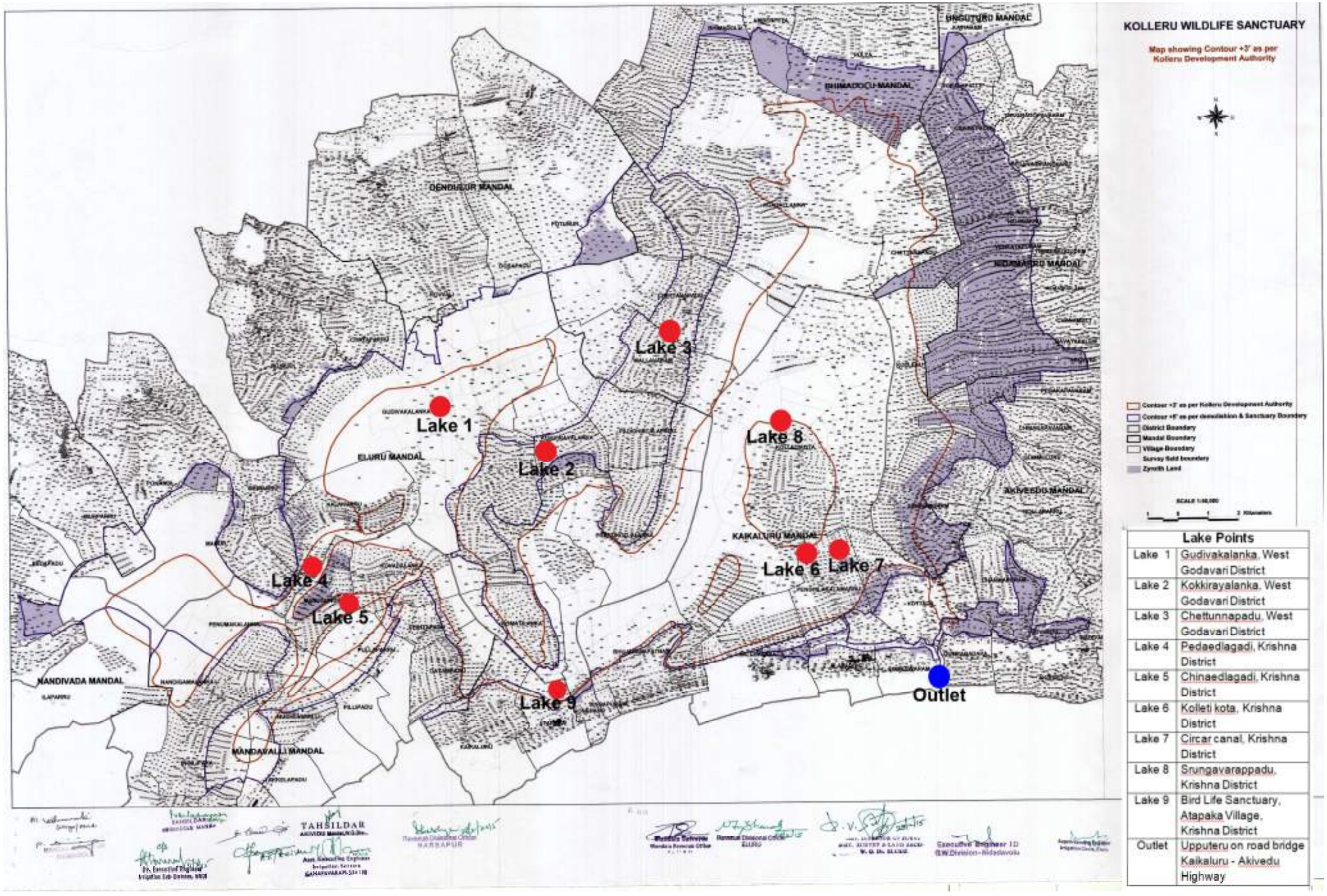


29. Budameru – Domestic sewage discharge at NH 16, Velpuru, Krishna District.



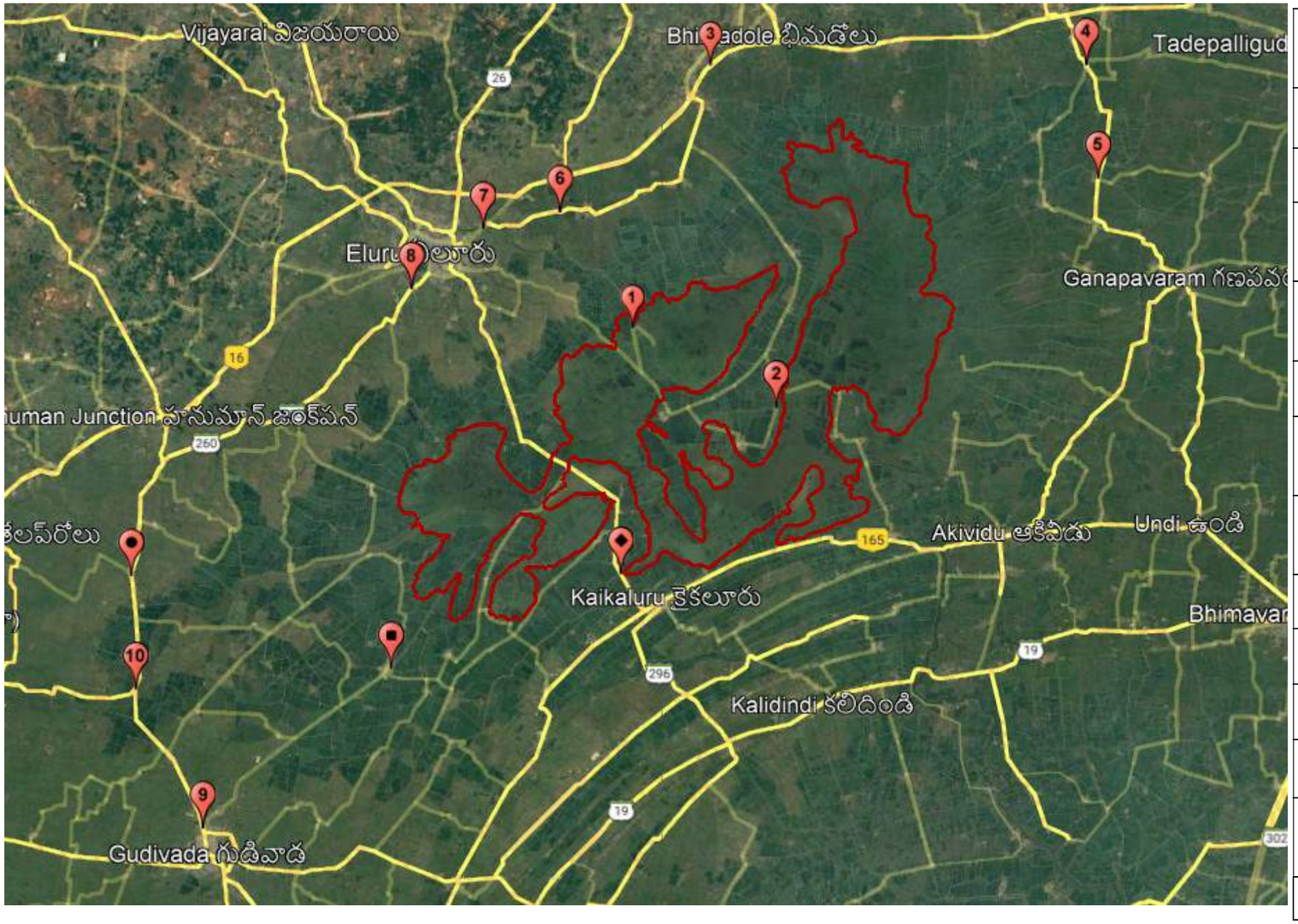
30. Budameru – Domestic sewage discharge on SH 28 – Gudivada to Hanuman Junction Road.





Lake Points	
Lake 1	Gudivakalanka, West Godavari District
Lake 2	Kokkirayalanka, West Godavari District
Lake 3	Chettunnapadu, West Godavari District
Lake 4	Pedaedlagadi, Krishna District
Lake 5	Chinaedlagadi, Krishna District
Lake 6	Kolleti kota, Krishna District
Lake 7	Circar canal, Krishna District
Lake 8	Srungavarappadu, Krishna District
Lake 9	Bird Life Sanctuary, Atapaka Village, Krishna District
Outlet	Upputeru on road bridge Kaikaluru - Akivedu Highway

Kolleru Lake – Map depicting inlet streams / drains



1	Mondikodu Grampachayat, West Godavari District
2	Jodi Kaluva, West Godavari District
3	Bulusuvagu, West Godavari District
4	Tokalapalli drain, West Godavari District
5	Pandikodu drain, West Godavari District
6	Kovvali drain, West Godavari District
7	East Tammileru, West Godavari District
8	West Tammileru, West Godavari District
9	Chandraiah drain, Krishna District
10	Budameru, Krishna District
	Narasannapalem, Krishna District
	Polaraj drain, Krishna District
	Chandraiah drain at Polukonda Village, Krishna District
	Kolleru lake boundary

GOVERNMENT OF ANDHRA PRADESH
FOREST DEPARTMENT

From:
Sri N.Prateep Kumar, I.F.S.,
Prl. Chief Conservator of Forests &
Head of Forest Force,
Andhra Pradesh,
Aranya Bhavan,
Guntur-522004.

To:
The Spl. Chief Secretary to the Government,
EFS&T Department,
A.P Secretariat,
Velagapudi,
Guntur – 522503.

Rc.no.7251/2021/WL-1(i), Dated:17/04/2022

Sir,

Sub: Andhra Pradesh Forest Department – Wildlife – National Green Tribunal, Southern Zone, Chennai orders dated:03.01.2022 in O.A.no. 259 of 2020 (SZ) with O.A no. 02 of 2021 (SZ) – Conducting Comprehensive Study to save the Kolleru Lake against pollution – Note containing the gist on NGT orders and responsibilities of different departments in the prescribed format - Report submitted - Regarding.

Ref:
1. Orders of the Hon'ble NGT, Southern Zone, Chennai in O.A no. 259 of 2020 (SZ) with O.A no. 02 of 2021(SZ), dt.26.10.2021.
2. PCCF & HoFF, A.P, Guntur Rc.no.7251/2021/WL-1, dt:14.12.2021.
3. Orders of the Hon'ble NGT, Southern Zone, Chennai in O.A no. 259 of 2020 (SZ) with O.A no. 02 of 2021(SZ), dt.03.01.2022.
4. PCCF & HoFF, A.P, Guntur Rc.no.7251/2021/WL-1, dt:10.02.2022.
5. Lr.no.EFS01-ENV/ 29/2020-SEC-I, EFS&T(Sec-I) Dept., dt: 08.03.2022.
6. Orders of the Hon'ble NGT, Southern Zone, Chennai in O.A.no. 259 of 2020 (SZ) with O.A no. 02 of 2021(SZ), dt.30.03.2022.
7. CCF, Rajahmundry, Rc.no.1814/2015/D-1, dt:03.04.2022.
8. Orders of the Hon'ble NGT, Southern Zone, Chennai in O.A.no. 259 of 2020 (SZ) with O.A no. 02 of 2021(SZ), dt.04.04.2022
9. Chief Secretary's office, Note no.78/CS-EA/2022, dt:12.04.2022.
10. Chief Secretary's office, Note no.78-1/CS-EA/2022, dt:13.04.2022.

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Attention is invited to the references cited.

It is submitted that, in the references 9th and 10th cited, while communicating the Minutes of the Meeting on Multi-Disciplinary Committee (Kolleru Pollution) held by the Chief Secretary on 06.04.2022, it was requested to furnish Action Taken Report on the MoM and action to be taken on gist of NGT orders by different departments.

Accordingly the following information on action taken / to be taken as per Orders of the Hon'ble NGT, Southern Zone, Chennai in O.A.no. 259 of 2020 (SZ) with O.A no. 02 of 2021(SZ) is submitted.

Sl. no.	Brief of the Order	Reference document	Responsible Department
1	**Para 17 of Hon'ble NGT order dated 07.06.2021:** The State of Andhra Pradesh is directed to give direction to the Irrigation Department to conduct studies as directed and submit a report to this Tribunal. As regards the Kolleru Lake is concerned, the Irrigation Department, Andhra Pradesh Pollution Control Board and the Forest Department are directed to submit a detailed report regarding the steps to be taken for improving the water quality in that lake.	Orders of the Hon'ble NGT, SZ, Chennai in O.A.No.259 of 2020 (SZ) with O.A.no.2 of 2021(SZ) dt:07.06.2021	1. Irrigation Dept., 2. APPCB 3. Forest Dept., Forest Department has not received these orders.
2	**Para 8 of Hon'ble NGT order dated 26.10.2021:** District Collector as well as the ***Forest Department through PCCF are directed to submit a report regarding the nature of encroachments, steps taken by them to remove the encroachments*** and protect the water body and if there is any scheme launched by the Government of Andhra Pradesh to protect this water body, then what is the stage of its implementation etc before the next hearing date apart from filing the report directed by this Tribunal in the previous orders by the Pollution Control Board. **Para 9 of Hon'ble NGT order dated 26.10.2021:** They are directed to ***file the report along with map of Kolleru Lake depicting***	Orders of the Hon'ble NGT, SZ, Chennai in O.A.No.259 of 2020 (SZ) with O.A.no. 2 of 2021(SZ) dt:26.10.2021	1. APPCB 2. District Collector, West Godavari 3. Forest Dept., **<u>Action taken by APFD:</u>** A report along with map has been filed before the Hon'ble NGT, SZ, Chennai in PCCF&HoFF, A.P Rc.no.7251/2021 /WL-1, dt:14.12.2021 through the Standing Counsel for GoAP, Hon'ble NGT, SZ, Chennai. **(copy enclosed)**

	encroachments on or before 23.12.2021 by e-filing in the form of Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.		
3	**Para 6 of Hon'ble NGT order dated 03.01.2022:** The State of Andhra Pradesh is directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free. **Para 9 of Hon'ble NGT order dated 03.01.2022:** The Registry is directed to communicate this order to the official respondents including the Principal Secretary for Agriculture, State of Andhra Pradesh and also the Chief Secretary, State of Andhra Pradesh by e- mail for their information and compliance of the direction in respect of the study to be conducted as suggested by the Principal Chief Conservator of Forest to save the wildlife sanctuary as well as the lake against pollution, in view of the international importance of Kolleru Lake which was already declared as a wetland under the Ramsar	Orders of the Hon'ble NGT(SZ), Chennai in O.A.No.259 of 2020 with O.A.no.2 of 2021(SZ) dt:03.01.2022.	1. Principal Secretary, Agriculture, GoAP 2. Chief Secretary, GoAP **Action taken by APFD:** Since the Hon'ble NGT SZ, Chennai issued directions to the Government for conducting a Comprehensive study on Kolleru Lake, a detailed report has been submitted to the Govt. in EFS&T Dept. by the PCCF&HoFF, A.P in Rc.no.7251/2021 /WL-1, dt:10.02.2022. **(copy enclosed)** Accordingly, the Govt., in Lr.no.EFS01-ENV/ 29/2020-SEC-I, EFS&T(SEC.I) department dt: 08.03.2022 **(Copy enclosed)** have instructed the APPCB, to take further action and entrust the matter to National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute for conducting the comprehensive study to save the wildlife sanctuary as well as the lake against pollution. **Further action in the matter is to be taken by the APPCB, Vijayawada.**

	Convention		
4	**Para 4 of Hon'ble NGT order dated 30.03.2022:** It was also seen from the report that due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department was also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area. They were also directed to file an independent report in this aspect before this Tribunal. **Para 5 of Hon'ble NGT order dated 30.03.2022:** The State of Andhra Pradesh was directed to conduct a comprehensive scientific study as suggested by the Principal Chief Conservator of Forest as well in order to protect the water body and remove the encroachments and hand over the entire area to the Forest Department, so as to maintain the lake area in the wildlife sanctuary in an effective manner and also pollution free. **Para 6 of Hon'ble NGT order dated 30.03.2022:** It is seen from the newspaper report that in spite of directions given by this Tribunal to conduct	Orders of the Hon'ble NGT, SZ, Chennai in O.A.No.259 of 2020 (SZ) with O.A.no.2 of 2021(SZ) dt:30.03.2022	1. Principal Secretary, Agriculture, GoAP 2. Chief Secretry, GoAP 3. APPCB 4.Forest Dept., **Action taken by APFD:** As per the directions at para no. 7 & 10, necessary report has been filed by the Chief Conservator of Forests, Rajahmundry Circle before the Hon'ble NGT, SZ, Chennai in Rc. no. 1814/2015-D1, Dt.03.04.2022 through the Standing Counsel for GoAP, Hon'ble NGT, SZ, Chennai. **(copy enclosed)**

	scientific study and for removal of encroachments and hand over the lake area to the Forest Department as part of the wildlife sanctuary, certain illegal activities of creating fish ponds in the wildlife sanctuary are being undertaken at Pedayaganamalli Village, Eluru Mandal. **Para 7 of Hon'ble NGT order dated 30.03.2022:** *The Chief Secretary, State of Andhra Pradesh is directed to conduct an enquiry through the respective District Collector and* ***the Conservator of Forests to look into the issue referred to in the newspaper report*** *mentioned above and submit a factual as well as action taken report by the respective departments in this regard.* **Para 8 of Hon'ble NGT order dated 30.03.2022:** We have not received any further report in continuation of the order passed by this Tribunal on 03.01.2022. This aspect also will have to be considered by the Chief Secretary while filing the report as directed by this Tribunal on the basis of the newspaper report. **Para 9 of Hon'ble NGT order dated 30.03.2022:** They are directed to submit the respective reports to this Tribunal on or before 04.04.2022 by e-filing in the form of		

	Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules. **Para 10 of Hon'ble NGT order dated 30.03.2022:** Even if they are not able to file the detailed report, ***they are directed to file an interim report to the allegations made in the newspaper report*** and action taken on that aspect, if any illegal activities are going on.		
5	**Para 8 of Hon'ble NGT order dated 04.04.2022:** Considering the fact that the present disaster due to unknown disease, itself could be due to some damage caused to environment especially water quality in Kolleru Lake, we feel that some more time can be granted to State of Andhra Pradesh to conduct the holistic study as suggested by the Principal Chief Conservator of Forests and come with a proper report before this Tribunal on or before 24.05.2022.	Orders of the Hon'ble NGT, SZ, Chennai in O.A.No.259 of 2020 (SZ) with O.A.no.2 of 2021(SZ) dt:04.04.2022	Based on the Hon'ble NGT, SZ, Chennai directions to the Government for conducting a comprehensive study. **A detailed report has been submitted to the Govt., in EFS&T Dept. by the PCCF&HoFF, A.P in Rc.no.7251/2021/ WL-1, dt:10.02.2022**. Accordingly the Govt., in Lr.no.EFS01-ENV/29/ 2020-SEC-I, EFS&T(SEC.I) department dt: 08.03.2022 have instructed the APPCB, to take further action and entrust the mater to National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute for conducting the comprehensive study. **Further action in the matter is to be taken by**

			the APPCB, Vijayawada

Responsibilities of different Departments

Sl. no.	Compliance Report	Authority
1	Action taken report on encroachments in Kolleru Lake	PCCF & HoFF and Spl.CS, Revenue Dept., **Action taken by the APFD:** The Hon'ble NGT, SZ, Chennai in orders dated:26.10.2021 in O.A.No.259 of 2020(SZ) with O.A.no.2 of 2021(SZ) directed the District Collector as well as the ***Forest Department through PCCF to submit a report regarding the nature of encroachments, steps taken by them to remove the encroachments along with map of Kolleru Lake depicting encroachments.*** In compliance with the NGT order, a report along with map has been filed before the Hon'ble NGT, SZ, Chennai by the PCCF&HoFF, A.P in Rc.no.7251/2021/WL-1, dt:14.12.2021 through the Standing Counsel for GoAP, Hon'ble NGT, SZ, Chennai. **(copy enclosed)** Further, a report has been filed before the Hon'ble NGT, SZ, Chennai by the Chief Conservator of Forests, Rajahmundry in Rc.no.1841/2015-D1, dt: 03.04.2022, in compliance with the orders of the Hon'ble NGT, SZ, Chennai dated:30.03.2022.
2	A comprehensive scientific study about Kolleru Lake to be conducted through subject experts in the field of wetland / lake management by involving all stakeholders working in Kolleru lake Basin to manage the Kolleru lake / wetland holistically	PCCF & HoFF Since the Hon'ble NGT, SZ, Chennai issued directions to the Government for conducting a **Comprehensive study, a detailed report has been submitted to the Govt. in EFS&T Dept. by the PCCF&HoFF, A.P in Rc.no.7251/2021 /WL-1, dt:10.02.2022**. Accordingly the Govt., in Lr.no.EFS01-ENV/ 29/2020-SEC-I, EFS&T (SEC.I) department dt: 08.03.2022 have instructed the APPCB, to take further action and entrust the mater to National Environmental Engineering Research Institute (NEERI), Nagpur or any other reputed Institute for conducting the comprehensive study to save the wildlife sanctuary as well as the lake against pollution.

		Further action in the matter is to be taken by the APPCB.
3	Due to usage of organophosphate chemical pesticides, some amount of organic chemicals were also found in the lake and the drinking water. The Agriculture Department was also expected to file a detailed report as to how this will have to be rectified by them by educating farmers and also restricting the use of such chemicals in agricultural activities in the area.	Spl. Chief Secretary, Agriculture Dept.
4	To take up detailed study to identify possible sources of contaminants / Pollutants in Eluru canal.	Prl. Secretary, Water Resources Department.
5	A detailed report regarding the steps to be taken for improving the water quality in the lake.	Prl. Secretary, Water Resources Department, PCCF & HoFF and APPCB. Agriculture Department and APPCB have to take stringent steps for restricting the use of organophosphate chemical pesticides and organic chemicals in agricultural activities in the area by educating the farmers as suggested by the Hon'ble NGT(SZ), Chennai. Similarly, the APPCB has to initiate stringent action against the industries located in and around the lake for release of industrial effluents in to the lake.

This is submitted for information and necessary action.

Yours faithfully,
N Prateep Kumar Ifs
Prl. Chief Conservator of Forests &
Head of Forest Force

Copy to the Chief Conservator of Forests, Rajahmundry circle for information.
Copy to the Divisional Forest Officer, WLM division, Eluru for information.

Signed by N Prateep Kumar
Ifs
Date: 17-04-2022 21:45:08
Reason: Approved

in:inbox K Venkateswara Rao
Mail Contacts Calendar Tasks Briefcase Preferences Video Tutorials Logout
Close Reply Reply to All Forward Archive Delete Spam Actions View

Fwd: APPCB - LAB - Proposals requested for conducting comprehensive scientific study to

Please arrange lodging/boarding and transportation facilities to the team.

Regards,

Basha

Begin forwarded message:

From: S BASHA <s_basha@neeri.res.in>
Subject: Re: APPCB - LAB - Proposals requested for conducting comprehensive scientific study to
Date: 6 May 2022 at 4:27:15 PM IST
To: K Venkateswara Rao <chiefengineer@appcb.gov.in>
Cc: BESTA VENKATESWARA PRASAD <bvprasad@appcb.gov.in>, Spl CS EFST <splcs_efst@ap.gov.in

Dear Sir,

With reference to telecon on May 04, 2022 regarding site visit, following CSIR-NEERI staff will visit the site during

Dr Shaik Basha, Scientist and Head, CSIR-NEERI HZC
Er Ramya Sanam, Principal Scientist
Dr Karthik Raghunathan, Senior Scientist

The above team will reach Eluru by road on May 12, 2022 at 1800 hrs. The site visit and discussions with concern

It is requested that concerned officials from Irrigation and Forest department may be asked to accompany our te

Kindly arrange lodging/boarding facilities (three rooms) for the above period and do the needful.

A line of confirmation from your side will be highly appreciated.

Regards,

Basha

On 04-May-2022, at 5:04 PM, S BASHA <s_basha@neeri.res.in> wrote:

Dear Dr Prasad.

O.A.NO.259 OF 2O2O (SZ) & O.A .NO.2 OF 2021 (SZ)

The site visit of NEERI team along with other officials of Sanctuary and various major drains like Tammileru, Ramileru, Budameru, Potaraju drain, Kolleru lake, Madhavapuram lake, and outlet of Kolleru (Upputeru).

		
Interaction of NEERI team with officials	Interaction of NEERI team with officials	Ramileru drain Kolleru
		
Ramileru drain Kolleru	Tammileru East Upputeru	West Tammileru of Koleru
		
Water treatment of plant of Eluru Municipal Corporation	Kolleru Bird Sanctuary	West Tammileru of Kolleru lake
		
Map showing Kolleru Wildlife Sanctuary		