# REQUEST FOR PROPOSAL (Amended)

## Project for remediation of groundwater contamination around M/s Godavari Bio-Refineries, Ahmed Nagar District, Maharashtra

**October, 2015**


**Central Pollution Control Board, Delhi**

(Ministry of Environment, Forest & Climate Change)

Government of India

# Letter of Invitation

B-344/PCI-III/2K-2K01 Dated: 01/10/2015

To

The list of consultants (enclosed)

Sir,

1. The Central Pollution Control Board (CPCB), an autonomous organization under Ministry of Environment & Forests (MoEF), Government of India has been directed by Hon'ble NGT, Pune Bench to implement a project for remediation of groundwater contaminated area around M/s Godavari Bio-refineries.

2. The scope of work has been envisaged in three Assignments i.e. (i.) Immediate relief to effected wells, (ii.) Detailed environmental site assessment and preparation of detailed project report for remediation (iii.) Implementation of comprehensive remediation plan. Assignment-1 and Assignment-2 shall be initiated in parallel to save time in implementing the project.

3. The Central Pollution Control Board, Delhi now invites proposals for following Assignments;

   **Assignment-I**: Measures to provide immediate relief to water quality of effected wells along the boundary of lagoons envisaging the following services;

   a) Design a system for installation of suitable facilities for extraction and treatment of contaminated groundwater from open-dug wells located along the boundary of lagoon area with an objective to provide treated water for irrigation purpose.
   b) Installation of suitable pumps, piping network, holding tanks (for treated and untreated water) and additional treatment systems, if required in integration with existing RO plant available with M/s Godavari Bio-refineries.
   c) Installation of requisite facilities for collection, storage and disposal of reject from RO plant.

   **Assignment-II**: Preparation of Detailed Project Report, including the following services;

   a) Detailed site investigations including installation of monitoring wells
   b) Proposals for different options for remediation
   c) preparation of Detailed project report for remediation of contaminated area near M/s Godavari Bo-Refineries, Wari, Ahmednagar

4. This Request for Proposal is addressed some of the shortlisted consultants who have participated in earlier projects of CPCB. However, other competent parties are also invited to participate.

5. This invitation is not transferable to any other firm. The selection of consultants will be based on under *Quality and Cost criteria* as per the procedures described in the enclosed request for the proposal

6. Payment for execution of the project will be made by M/s Godavari Bio-refineries, which will be facilitated through CPCB, as per the directives of Hon'ble National Green tribunal, who has been identified as the responsible party for contamination of groundwater bodies in adjoining areas.

7. On receipt of this letter, your willingness to submit the proposal should be communicated in writing immediately at the following address;

The In-charge
Hazardous Waste Management Division,
Central Pollution Control Board,
Parivesh Bhawan, East Arjun Nagar,
Shahdara, Delhi – 110032

Yours faithfully,

**(A.B. Akolkar)**
Member Secretary

Copy to;

M/s Godavari Bio-refineries,
Somiaiya Bhawan, 45/47 Mahatam Gandhi Marg
Fort, Mumbai
400 001

**REQUEST FOR PROPOSAL**

**Project for remediation of groundwater contamination around M/s Godavari Bio-Refineries, Ahmed Nagar District, Maharashtra:**

**Instructions to Consultants**

**DATA SHEET**

| **Paragraph Reference** | | |
|---|---|---|
| **1.1** | Method of selection: | Qualityand Cost Based Selection |
| **1.2** | Method ofbidding: | Sealed Envelopes each for Technical &financial bids/proposals should be put together in a larger envelop duly sealed for each Assignment and submit the same by the specified date. |
| | Name of the assignments: | Assignment-I<br>Measures to provide immediate containment and relief to water quality of effected wells along the boundary of lagoons<br><br>Assignment-II<br>Preparation of Detailed Project Report |
| | Location: | Contaminated areas in the vicinity of M/s. Godavari Bio-refineries, Sakarwadi, Kopargaon, Ahmednagar District, Maharashtra 413 708 |
| **1.3** | A pre-bid discussion **was** held at the following address:<br>Central Pollution Control Board,<br>PariveshBhawan<br>East Arjun Nagar,<br>Shahdara<br>Delhi – 1100032<br>On**: 20/10/2015 at 3.00 pm**<br><br>The CPCB's representatives:<br>Shri Gurnam Singh & Shri B. Vinod Babu,<br><br>Telephone: 011-43102441/316; Facsimile: 011-22307643<br>E-mail: gurnamsinghcpcb@gmail.com / bvbabu.cpcb@nic.in | |
| **1.4** | CPCB will provide the following inputs and facilities: | |

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|---|---|
| | 1. Relevant data and reports available with CPCB<br>2. Facilitate correspondence with relevant agencies; however, it will be sole responsibility of the consultancy firm to get the necessary data and reports. |
| **1.5** | Proposals are valid for **90** days from the closing date for submission of RFP. |
| **2.1** | Clarifications — Clarifications, either through e-mail/telephone, can be made on or before the scheduled pre-bid conference. |
| **3.1** | Language of Proposals: — Proposals shall be submitted in English |
| **3.2** | Association after RFP — The shortlisted consultants shall not associate with other shortlisted Consultants. |
| **3.3** | The estimated period for complete project is:<br><br>**Assignment-I : 5 months**<br>**Assignment–II : 9 months** |
| **3.4** | The format of the Proposal to be submitted is specified as: Detailed Technical Proposal (TP) |
| **3.5** | M/s Godavari Bio-refineries will reimburse the Consultant the project cost along with local taxes paid by the Consultant |
| **4.1** | Consultant must submit in original and six copies of the Technical Proposal, and the original of the Financial Proposal. |
| **4.2** | The Proposal submission address is:<br><br>Incharge, Hazardous Waste Management Division,<br>Central Pollution Control Board,<br>PariveshBhawan, East Arjun Nagar, Shahdara<br>Delhi – 1100032<br>Proposals must be submitted no later than the following date and time:<br>**10/11/2015 at 05.00 pm** |
| **5.1** | Criteria, sub-criteria, and point system for the evaluation of Technical Proposals are:<br><br>Points<br><br>(i) Specific experience of the Consultants relevant to this site specific contaminants and conditions. [**10**]<br><br>(ii) Adequacy of the proposed methodology, work plan and staffing in responding to the Terms of Reference:<br><br>a) Site specific Technical approach and methodology [30]<br>b) Work plan [15]<br>c) Organization and technical supporting staffing proposed for this project other than below mentioned key professional staff, [10] |

| | |
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| | Total points for criterion (ii): [**55**]<br>(iii) Key professional staff qualifications and competence for the assignment:<br>a) Team Leader [15]<br><br>Technical Specialists<br>b) Remediation Expert [10]<br>d) Engineering Design Specialist [10]<br><br>Total points for criterion (iii): [**35**]<br><br>The number of points to be assigned to each of the above positions or disciplines shall be determined considering the following three sub-criteria and relevant percentage weights:<br><br>1) Academic Qualifications [20%]<br>2) Field experience in hazardous waste contaminated site assessment and remediation projects actually executed<br>(based on no. of projects & years of experience) [70%]<br>3) Working experience with Government agencies [10%]<br>Total weight: 100% |
| **6.1** | 6.1 An authorized representative of the Consultants shall put initial on all pages of the original Technical and Financial Proposals.<br><br>6.2 The original and 1 copy of the Technical Proposal shall be placed in a sealed envelope clearly marked "TECHNICAL PROPOSAL" Similarly, the original Financial Proposal (as indicated in the Data Sheet) shall be placed in a sealed envelope clearly marked "FINANCIAL PROPOSAL" followed by the CPCB's letter reference number and the name of the assignment, and with a warning "**DO NOT OPEN WITH THE TECHNICAL PROPOSAL.**" The envelopes containing the Technical and Financial Proposals shall be placed into an outer envelope and sealed. This outer envelope shall bear the submitter address, referring CPCB's invitation letter and title of the project clearly marked "**TO BE OPENED ONLY IN PRESENCE OF CPCB'S AUTHORISED PERSON**". CPCB shall not be responsible for misplacement, losing or premature opening if the outer envelope is not sealed and/or marked as stipulated. This circumstance may be case for Proposal rejection. If the Financial Proposal is not submitted in a separate sealed envelope duly marked as indicated above, this will constitute grounds for declaring the Proposal non-responsive.<br><br>6.3 The Proposals must be sent to the address/addresses indicated in this Data Sheet and received by CPCB no later than the time and the date indicated in this Data Sheet. Any proposal received by CPCB after the deadline for submission shall be returned unopened.<br><br>6.4 Proposals will be ranked according to their combined technical (ST) and financial (SF) scores using the weights (65% to technical bids and 35% to financial bids). In case of financial quote for services, the lowest evaluated Financial Proposal will be given the maximum |

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| | financial score (SF) of 100 * 0.35 points. The financial scores (SF) of the other Financial Proposals will be multiplied by a fraction which the ratio of lowest quote to the quote. (i.e 100 * 0.35 * (lowest quote/quote)). In case of technical proposals, the score will be given as Technical Score (ST) x 0.65. The firm achieving the highest combined technical and financial score may be invited for negotiations in accordance with QCBS approach.<br><br>6.5 Technical negotiations may be held in the presence of the representative of M/s Godavari Bio-refineries [Failure in satisfying such requirements may result in the CPCB proceeding to negotiate with the next-ranked Consultant as the discretion of the competent authority in CPCB]. Representatives conducting negotiations on behalf of the Consultant must have written authority to negotiate and conclude a Contract. |

## Forms for Submission of Technical Proposal

Form TP-1: Technical Proposal Submission Form
(Separate forms for Assignment-I and Assignment-II)

Form TP-2: Consultant's Organization and Experience

Form TP-3 Description of Approach, Methodology and Work Plan for Performing the Assignments (Separate forms for Assignment-I and Assignment-II)

Form TP-4: Curriculum Vitae (CV) for Proposed Professional Staff

### Form TP-1: Technical Proposal Submission Form

[*Location, Date*]

To:
**The Member Secretary,**
**Central Pollution Control Board**
**PariveshBhawan**
**East Arjun Nagar**
**Shahdara, Delhi 110032**

Dear Sirs:

We, the undersigned, offer to provide the consultancy services for [*Name of assignment as specified at Data Sheet*] in accordance with your Request for Proposal dated [*Insert Date*]. We are hereby submitting our Proposal, which includes this Technical Proposal, and a Financial Proposal sealed under separate envelopes.

We hereby declare that all the information and statements made in this Proposal are true and accept that any misinterpretation contained in it may lead to our disqualification at any stage.

If negotiations are held during the period of validity of the Proposal, i.e., before the date indicated in Paragraph Reference 1.5 of the Data Sheet, we undertake to negotiate and our Proposal is binding upon us and subject to the modifications resulting from contract negotiations.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature [*In full and initials*]: _____
Name and Title of Signatory: _____
Name of Firm: _____
Address: _____

**Form TP-2: Consultant's Organization and Experience**

Part-A: Consultant's Organization

[*Provide here a brief (two pages) description of the background and organization of your firm/entity and each associate for this assignment.*]

Part-B: Consultant's Experience

[*Using the format below, provide information on each assignment for which your firm, and each associate for this assignment, was legally contracted either individually as a corporate entity or as one of the major companies within an association, for carrying out consulting/engineering services similar to the ones requested under this assignment. Not exceeding 5 relevant experiences*]

| | |
|---|---|
| Assignment name: | Approx. value of the contract (in current Rs. Or US$ ): |
| Country:<br>Location within country: | Duration of assignment (months): |
| Name of Client: | Total number of staff-months of the assignment: |
| Address: | Approx. value of the services provided by your firm under the contract (in Rupees Or current US$ or Euro): |
| Start date (month/year):<br>Completion date (month/year): | No. of professional staff-months provided by associated Consultants: |
| Name of associated Consultants, if any: | Name of senior professional staff of your firm |

| | |
|---|---|
| | involved and functions performed (indicate most significant profiles such as Project Director/Coordinator, Team Leader): |
| Narrative description of Project: | |
| Description of actual services provided by your staff within the assignment: | |

Firm's Name: _____

**Form TP-3: Description of Approach, Methodology and Work Plan for Performing the Assignments**

[*Technical approach, methodology and work plan are key components of the Technical Proposal. You are suggested to present your Technical Proposal (inclusive of flow charts and diagrams) divided into the following three chapters:*

*a) Technical Approach and Methodology,*
*b) Work Plan, and*
*c) Organization and Staffing,*
*d) Number of investigations/tests/sampling*

*a) <u>Technical Approach and Methodology (applicable to Assignment-I & II):</u> In this chapter you should explain briefly about your understanding of the objectives of the assignment, approach to the services, methodology for carrying out / execution of the activities and the degree of detail of such output. You should highlight the problems being addressed and their importance, and explain the technical approach you would adopt to address them. You should also explain the methodologies you propose to adopt and highlight the compatibility of those methodologies with the proposed approach.*

*b) <u>Work Plan with Time-line (applicable to Assignment-I & II):</u> In this chapter you should propose the main activities of the assignment, their content and duration, milestones (including interim reviews/approvals by the CPCB), and delivery dates of the reports. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the TOR and ability to translate them into a feasible working plan.*

c) *Minimum number of investigations/tests/sampling (applicable to Assignment-II): The number of investigation/samplings/tests varies largely from site to site depending on extent of contamination, type of contaminants, area and number of receptor indicators. However, based on preliminary information available about the site, the consultants shall undertake about 100 number of samples of different matrixes for relevant parameters they would propose to undertake surface & sub-soils, recipient water bodies, sediments, test wells, hydro geological investigations etc. Comprehensive analysis should be done in one sample of contaminated soil and 2 samples of groundwater*]

**Form TP-4: Curriculum Vitae (CV) for Proposed Professional Staff**

[*Provide here a brief CV of the proposed staff for this assignment.*]

**Financial Proposal**

Form for submission of financial proposal

Name of the Firm:

| **Item** | **Costs** |
|---|---|
| | In Indian Rupees |
| Costs of Financial Proposal Assignment-I<br>a. designing and installation for well at Loc #3 | |
| Assignment-I<br>b. additional cost for installation for well at Loc #4 | |
| Costs of Financial Proposal Assignment-II | |
| Total Cost of Financial Proposal (excluding taxes) | |
| Service tax & other applicable taxes | |
| Amount of financial Proposal including taxes | |

## Terms of Reference:

### For Assignment-I & Assignment -II
### Provision of immediate relief to the water quality of contaminated wells & Preparation of Detailed Project Report for Remediation of Contaminated site near M/s Godavari Bio-refineries

**Background:**

The Hon'ble National Green Tribunal, Pune Bench has directed the Central Pollution Control Board to prepare and execute a ground water remediation plan for the observed contamination of well waters, adjacent to the premises of M/s Godavari Bio-Refineries, a distillery and chemical industry located along the banks of river Godavari near village Wari, Ahmed Nagar District, Maharashtra. The project has been envisaged in there phases i.e (i.) Provide immediate relief to water quality of effected wells along the boundary of lagoons, (ii.) Preparation of detailed project report based on site investigations and (iii.) Execution of the comprehensive remediation plan.

**About the contaminated area:**

(i.) M/s Godavari Bio-refineries is operating since 1939 and involved in production of alcohol and alcohol based chemicals. The unit was earlier storing untreated/treated spent wash, effluent from the distillery in open unlined lagoons spread around 54 hectares area in its back yard, which is presently levelled and dismantled as per CPCB directions. However a reconnaissance study carried out by CPCB indicates that that groundwater around storage lagoons of the industry has been contaminated with colour and elevated values of COD, SO4, Chlorides and volatile fatty acids. Earlier studies by NEERI and MS University, Vadodara also indicates contamination of groundwater around the lagoon area.

(ii.) As per initial findings, colour was found only in the wells (north-west to lagoons) within a distance of 250 meter form the lagoon area, where concentrations were found in the range of 57-538 mg/l for COD, 810 – 1335 mg/l for Sulphates, 504-1393 mg/l for volatile fatty acids, 100 – 1200 Hazen units of colour and 902 - 2826 mg/l chlorides. However, in the wells located beyond 250 meters were not impacted with colour. The analysis results of major parameters are given as annexure-I.

(iii.) The area of impact has been seen upto a distance of 250 metre from the boundary of the plant and lagoon area. The total area of groundwater impact is observed to be in an area of about 1500m x 600m. The open dug wells around the periphery of the lagoon area including the wells in the bed of river Godavari found to have impacted with colour. A satellite picture showing the impacted area and locations of samples taken is given at Annexure-II.

(iv.) The geology of the area indicates that there is fractured bed rock at a depth of 2-4 meters beneath the clayey silt from the top. The groundwater flow in the hard rock zones does not necessarily follow surface water flow directions, in shallow unconsolidated/weathered bedrock zones; however, the sallow groundwater flow appears to flowing northwest towards river Godavari.

(v.) These open wells are dug on the rocky river bed to extract water for irrigation purposes. Some of these well adjacent to pond area are impacted with colour.

(vi.) The unit has stopped discharge of wastewater in lagoons; they have initiated the work of covering the entire old pond area with fresh soil from outside. The dried sludge at the bottom of ponds is not lifted, which is a potential source of groundwater contamination in future during monsoon period.surface water flow directions, in shallow unconsolidated/weathered bedrock zones, however, the sallow groundwater flow appears to flowing northwest towards river Godavari.

(vii.) There open wells are dug on the rocky river bed to extract water for irrigation purposes. Some of these well adjacent to pond area are impacted with colour.

**Location Map of Site:**


The unit has stopped discharge of wastewater in lagoons; they have initiated the work of covering the entire old pond area with fresh soil from outside. The dried sludge at the bottom of ponds is not lifted, which is a potential source of groundwater contamination in future during monsoon period.

**Scope of Work for Assignment-I:** (Provision of immediate relief to water quality of effected wells along the boundary of lagoons)

The following works are envisaged in **Assignment-1**;

a) Design a system for installation of suitable facilities for extraction and treatment of contaminated groundwater from open-dug wells located along the boundary of lagoon area with an objective to provide treated water for irrigation purpose.

b) Installation of suitable pumps, piping network, holding tanks (for treated and untreated water) and integration with existing RO pant available with M/s Godavari Bio-refineries.

c) Installation of requisite facilities for collection, storage and disposal of reject from RO plant.

It is expected that prior to bidding, the interested parties would visit the site, identify wells and inspect the facilities already installed at M/s. Godavari Bio refineries. In this regard the contact details are given below:

Representative of Industry (to facilitate visit of R.O plant and lagoon areas):
Mr. Jayesh Kamant / Mr Mohan
Mobile No: 08882375441 / 09225747910

Representative of affected wells (to obtain details about wells and other site requirements):
Mr. Ashok Kajale –
Mobile No:: 09921083729 / 08862018373

**Step-1 (Assignment-I)**
Design a system for extraction and treatment of contaminated groundwater from 2 wells (open dug wells, Loc-3 & Loc-4) along the boundary of old lagoon area. This include designing a system based on assessment of quality of well water, feasible rate of extraction, selection of suitable pumping systems, designing a layout of piping network, integration with existing ETP in the premises of M/s Godavari Bio-refineries. The capacity of extraction system shall be equivalent to the expected yield form the selected wells, which is estimated as 130 $m^3$/day. This will include designing additional systems that may require for integration with existing RO plant. The details of RO plant such as its make, designed capacity, input water quality criteria etc. are given at Annexure IV.

The system shall be designed to treat the extracted water meeting the quality of irrigation water for which the wells were installed. Provisions shall also be made for treatment or disposal of RO reject water using the existing facilities of M/s Godavari Bio-refineries, else design a separate systems. The irrigation water quality parameters are given at Annexure III.

**Step-2 (Assignment-I)**
Installation of the systems including costs for procurement, installation, commissioning and testing of the facilities.

**Step-3 (Assignment-I)**
Demonstration of operation of the installed system for a period of one month.

The bid should be submitted for designing and installation for one well, i.e, well at Loc #3 and similar installation for well at Loc #4, should be quoted as additional item as per the format for financial proposal

**Scope of Work for Assignment-II** (Preparation of Detailed Project Report)

Preparation of detailed project report includes identification &assessment of contaminants, delineating the contaminated areas, assessment of areas needing remediation, detailed site investigation, characterization, qualitative risk assessment, outlining remediation options, preparation of detailed technical document with specifications for the selected remediation option in consultation with CPCB or a monitoring committee constituted by CPCB. This assignment shall be carried out in following steps;

**Step 1. Detailed Site Assessment**

- Current sources of contamination contributing to the pollution of the site.

- Collection of history/background information of the contaminated site
- Basic features of the site i.e. collection of available information on the site like site maps (topographical, geological), hydro-geological information, information from local authorities, information on the type of polluting-sources, wastes stored / disposed at site.
- Study of previous site investigation reports
- Nature, location, type and characteristics of the site
- Site photographs
- Identification of previous and current land use pattern of the site
- Identification of parameters causing immediate threat to the ecology and environment.
- Selection of the available observation wells (Bore Well) in the watershed covering the site, for monitoring water level and quality monitoring at appropriate locations, & Inventory details like total depth of the well
- Description of area with respect to existing land use and potential areas of environmental/ecological risk
- Preparation of groundwater level contour maps w.r.t. msl; ascertaining groundwater flow direction.
- Collection of 2 samples of soil, sub-soil, surface water, ground water for comprehensive analysis of major ions and heavy metals, organic constituents, pesticides and other relevant parameters related to the contaminated site as per national / international accredited testing procedures.
- Develop a sampling protocol with about 100 samples of different matrixes aimed at assessing the contamination level of the site and to establish the baseline environmental status of the project area. Such sampling protocol shall include identified criteria pollutants (parameters) for analysis,
- Develop a conceptual site plan/model. The conceptual site plan comprise three elements (i) Potential sources of contamination, (ii) Potential receptors (farm lands) that may be harmed and (iii) Potential pathways linking the two
- Collect data on Geological, hydrogeological and hydrological features of the contaminated site - if required necessary studies shall be carried.
- Groundwater flow processes & contaminant transport processes to visualize the contaminant plume in groundwater.
- Clearly delineate the boundaries, longitudinal and cross section of the contaminated site through topographic and other engineering surveys and prepare a base map of the project site.
- Development of groundwater flow, surface water flow, and mass transport models.
- Estimate the quantity of contaminants and their concentrations including secondary pollutants.
- The expected approach for detailed site investigation shall be;

    i. The area of investigation should be identified considering the main pathways, air and water transport of contaminates.

    ii. Prior to any drilling or sampling work, a detailed map showing the site and its surroundings is required to document sampling points, findings and later the

concentrations of contaminants. If such a map is not available, it should be generated based on a survey of the area.

iii. All locations where waste was dumped shall be clearly identified. Available wells in the surroundings should be identified and tested for identified pollutant. The depth of the wells should be recorded and surveyed against mean seal level.

iv. Installation of 8 monitoring wells in and around the contaminated area.

v. The depth of the bore wells should depend on the geological and hydro-geological conditions. If these conditions are unknown, a test bore for geological logging needs to be installed. The filter sections of the wells should all be in same depth considering the geological conditions.

vi. Background samples should be taken from up gradient wells. The groundwater flow directions shall be determined based on the available information or any feasible studies.

vii. Surface water samples and sediment samples shall be collected from all identified surface water bodies. Composite samples are not recommended. Groundwater-monitoring along the down gradient should be carried out as per requirement.

viii. Intrusive investigation should include the soil underneath and surrounding the waste in order to identify the depth and extent of contamination. Additional waste samples or samples from obvious contaminated soil/materials are not necessary.

ix. If there is any potential source of contamination other than M/s Godvari Bio-refineries, the same shall be investigated.

x. Soil / contaminated soil collected should be tested for total concentration expressed in mg/Kg. 2-3 samples (in consultation with CPCB) should be tested for leachable concentration in mg/L in the leachate extracted as per Toxicity Characteristic Leaching Procedure (TCLP).

xi. Evaluation of the results should be carried out in order to identify potential sources pathways and receptors, and to identify the entire quantity of waste buried and contamination present.

**Step 2. Risk Assessment**

- A qualitative risk assessment shall be carried out. Quantitative risk assessment based on source-pathway-receptor models may not be necessary since no toxic constituents were observed during preliminary investigations. However, it is required to describe the risk qualitatively based on findings of the detailed investigations and source-pathway-receptor approach.

**Step 3. - Identification of remediation goals/objectives**

- Identification of remediation goals/objectives.
- List and evaluate best options for remediation of the contaminated site including (soil, surface water, groundwater, etc.) based on economic feasibility, complexity, technology, effectiveness, execution aspects, previous performance, safety, locally available skills, etc.
- Assess the environmental and social impacts of remediation options, based on detailed field surveys and investigations
- Recommend remedial options and appropriate implementation strategies, considering the future land use and target contaminant concentrations. The options should be recommended based on (i) environmental risks due to the contamination, (ii)

compliance with the standards based on techno-economic feasibility (iii) performance based approach that is based on verifiable success in similar situations.

- The implementation strategy should consider options such as conventional turnkey or Engineer-Procure-Construct (EPC) contracts. For the identified strategy (in consultation with CPCB or the committee constituted by CPCB), the consultant
- Finalization of the suitable site specific remediation technology strategy (in consultation with CPCB or the committee constituted by CPCB)

**Step 4. Design of remediation plan and submission of DPR along with technical document with detailed specification**

Submission of detailed project report for the approved remediation option, comprising detailed designs, engineering drawings, cost estimates and implementation schedule

[The execution of the remediation plan based on the prepared DPR shall be taken up by CPCB in the third phase, for which separate tendering process shall be initiated.]

**Final outputs (i.e. Reports, Drawing, etc.) that will be required of the consultant Delivery Schedules.**

**For Assignment-I:** Provision of immediate relief to water quality of effected wells along the boundary of lagoons:

| **Activities/Deliverables** | **Time in Months** | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Design a system for extraction and treatment of contaminated groundwater from 2 wells **(Step 1)** | | | | | |
| Installation of the systems including, commissioning and testing of the facilities **(Step 2)** | | | | | |
| Demonstration of installed system **(Step 3)** | | | | | |

**For Assignment-II:** Preparation of Detailed Project report:

| **Activities/Deliverables** | **Time in Months** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Detailed Site Assessment (Step-1) | | | | | | | | | |
| Risk Assessment | | | | | | | | | |
| Identification of remediation goals/objectives (Step-3) | | | | | | | | | |
| Design of remediation plan and submission of DPR along with technical document with detailed specification (Step-4) | | | | | | | | | |

- Consultant is required to plan his resources keeping in view the above time schedule.

- The consultant is required to present the findings of study to the Project Steering Committee members for their feedback on quarterly basis.

- The approved final DPR shall be provided by the consultant in colour hardcopy (6 copies) and in electronic form.

**Terms of payment:**

- An advance payment equivalent to 40% of the contract value shall be paid against a Bank Guarantee for equivalent amount, the validity of such bank guarantee shall be valid for a period till successful completion of project.

- Balance payment of 60% of the contract value shall be paid after successful completion of the work and as per the satisfaction of CPCB.

- The payment to the parties shall be made by CPCB.

**Liabilities**

(i) The Consultant will not be liable for any consequential Loss to a third party arising from the findings of the Consultants work.

(ii) The liability of Consultant is limited to 1.25 times the amount of the contract value in case he fails to execute the work and demonstrate desired water quality as per the ToR. The liability is however restricted to the systems installed by the consultant and not implied on performance RO plant.

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**Annexure I**

## Analysis Result of major parameters in Well water/ Hand pump at different locations:

| S.No | Parameters | Ground Water Samples | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Open well (Loc. 1) | Hand pump (Loc.2) | Open well (Loc.3) | Open well (Loc. 4) | Open well (Loc. 5) | Open well (Loc. 6) | Hand pump (Loc. 7) | Open well (Loc. 8) | Open well (Loc. 9) | Open well (Loc. 10) | Open well (Loc. 11) |
| 1. | pH | 7.87 | 6.80 | 6.94 | 7.31 | 7.41 | 6.66 | 6.91 | 7.14 | 6.83 | 7.80 | 7.31 |
| 2. | Conductivity (µmhos/cm) | 5876 | 4295 | 10693 | 4528 | 9406 | 5973 | 2211 | 6454 | 3347 | 2986 | 5587 |
| 3. | Colour (Hazen) | 5.0 | 5.0 | 1200 | 100 | 400 | 5.0 | 5.0 | 5.0 | 5.0 | 10 | 5.0 |
| 4. | TDS (mg/l) | 4212 | 3458 | 7778 | 3266 | 6836 | 3709 | 1652 | 4679 | 2555 | 2192 | 3823 |
| 5. | COD (mg/l) | 29.8 | 15.2 | 538 | 57.6 | 180 | 29.4 | 36.1 | 28.4 | 36.9 | 32.6 | 32.2 |
| 6. | BOD (mg/l) | 4.2 | 2.8 | 207 | 11.7 | 59 | 4.6 | 5.3 | 2.0 | 4.3 | 4.4 | 4.8 |
| 7. | NH3-N (mg/l) | 0.70 | BDL | 3.50 | 0.42 | 1.40 | BDL | 0.28 | 0.56 | 0.27 | 0.80 | 0.27 |
| 8. | PO4-P (mg/l) | 0.015 | BDL | 0.001 | BDL | BDL | BDL | BDL | BDL | BDL | BDL | 0.004 |
| 9. | $Cl^-$ (mg/l) | 931.1 | 608.0 | 2826.4 | 902.6 | 2232.6 | 1083.1 | 256.5 | 1472.6 | 546.3 | 370.5 | 864.6 |
| 10. | $SO_4^{-2}$ (mg/l) | 1393 | 1380 | 1335 | 810 | 1055 | 928 | 393 | 893 | 595 | 814 | 902 |
| 11. | SAR (milli-eq/l) | 9.71 | 7.04 | 16.3 | 11.6 | 8.03 | 9.18 | 1.67 | 3.46 | 2.07 | 3.05 | 15.9 |
| 12. | Volatile Acids | 34.2 | 179.2 | 1393.2 | 1162.4 | 504.3 | 307.7 | 162.4 | 25.6 | 42.7 | 265.0 | 17.1 |

**Annexure-II**

**Preliminary Assessment and Investigation of Contaminated areas around M/s Godavari Bio-Refineries**

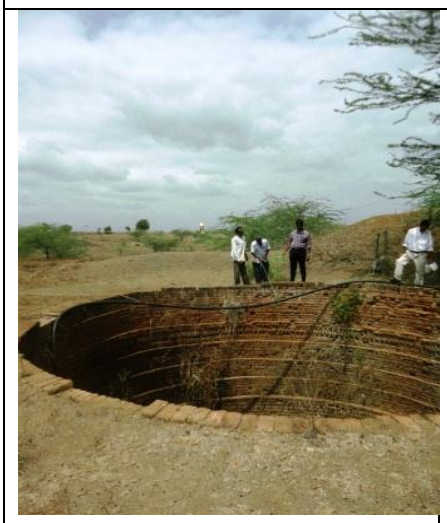
**AS ON 11TH MAY, 2013 [old image]**


AS ON 18TH MAY, 2015 [recent image]

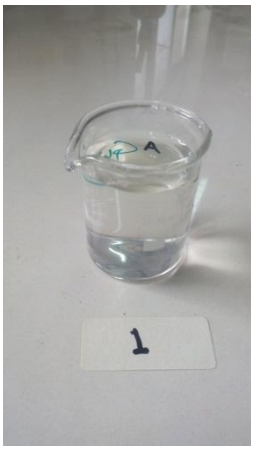
**LOCATION - 1**

**Open dug well of Shri MachhindrJayramKajale, Survey No. 130/6, Kanegaon @ N19°50.117' E074°33.819'**

**Date 09th July, 2015**



**Sample Appearance**



| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 7.87 | | Total Hardness | 1714.3 |
| Conductivity | 5876 | | $Ca^{+2}$ | 343.5 |
| Colour | 5.0 | | $Mg^{+2}$ | 208.3 |
| TDS | 4212 | | $NO_2$-N | 0.438 |
| COD | 29.8 | | $NO_3$-N | 10.33 |
| BOD | 4.2 | | $Na^{+}$ | 728.5 |
| $NH_3$-N | 0.70 | | $K^{+}$ | 7.2 |
| $PO_4$-P | 0.015 | | SAR | 9.71 |
| $Cl^{-}$ | 931.1 | | %Na | 59.60 |
| $SO_4^{-2}$ | 1393 | | Boron | 1.29 |
| $F^{-}$ | 1.23 | | Volatile Acids | 34.2 |
| Total Alkalinity | 286.3 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 2**

**Hand Pump, SangleVasti, Opp. House of Shri Sukhdev Ram Sangle, Survey No. 5 @ N19°50.567' E074°33.564' Elevation 504 m**

**Date 09th July, 2015**

**Sample Appearance**

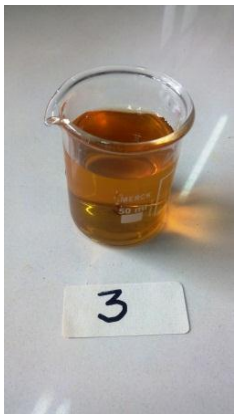

| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 6.80 | | Total Hardness | 1489.8 |
| Conductivity | 4295 | | $Ca^{+2}$ | 368.1 |
| Colour | 5.0 | | $Mg^{+2}$ | 138.9 |
| TDS | 3458 | | $NO_2$-N | 0.008 |
| COD | 15.2 | | $NO_3$-N | 16.27 |
| BOD | 2.8 | | $Na^{+}$ | 523.6 |
| $NH_3$-N | BDL | | $K^{+}$ | 4.5 |
| $PO_4$-P | BDL | | SAR | 7.04 |
| $Cl^{-}$ | 608 | | %Na | 51.89 |
| $SO_4^{-2}$ | 1380 | | Boron | 0.59 |
| $F^{-}$ | 1.46 | | Volatile Acids | 179.2 |
| Total Alkalinity | 270.6 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 3**

**Open dug well of Shri Ashok Kajale, Survey No. 139/1**
**@ N19°49.878' E074°33.921' Elevation 495 m**

**Sample Appearance**




**Date 09th July, 2015**

| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 6.94 | | Total Hardness | 2979.6 |
| Conductivity | 10693 | | $Ca^{+2}$ | 638.0 |
| Colour | 1200 | | $Mg^{+2}$ | 337.2 |
| TDS | 7778 | | $NO_2$-N | 0.086 |
| COD | 538 | | $NO_3$-N | 10.36 |
| BOD | 207 | | $Na^{+}$ | 1646.2 |
| $NH_3$-N | 3.50 | | $K^{+}$ | 5.9 |
| $PO_4$-P | 0.001 | | SAR | 16.3 |
| $Cl^{-}$ | 2826.4 | | %Na | 64.91 |
| $SO_4^{-2}$ | 1335 | | Boron | 0.66 |
| $F^{-}$ | NA | | Volatile Acids | 1393.2 |
| Total Alkalinity | 813.8 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 4**

**Another open dug well of Shri Ashok Kajale, Survey No. 131/--**
**@ N19°49.938' E074°33.959' Elevation 500 m**

**Sample Appearance**


**Date 09th July, 2015**

| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 7.31 | | Total Hardness | 1265.3 |
| Conductivity | 4528 | | $Ca^{+2}$ | 253.6 |
| Colour | 100 | | $Mg^{+2}$ | 153.7 |
| TDS | 3266 | | $NO_2$-N | 0.111 |
| COD | 57.6 | | $NO_3$-N | 11.0 |
| BOD | 11.7 | | $Na^{+}$ | 746.4 |
| $NH_3$-N | 0.42 | | $K^{+}$ | 5.9 |
| $PO_4$-P | BDL | | SAR | 11.6 |
| $Cl^{-}$ | 902.6 | | %Na | 67.17 |
| $SO_4^{-2}$ | 810 | | Boron | 0.76 |
| $F^{-}$ | 1.17 | | Volatile Acids | 1162.4 |
| Total Alkalinity | 447.1 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 5**

**Open dug well in Godavari River Bed**
**@ N19°49.92' E074°33.55' Elevation 486 m**

**Sample Appearance**


**Date 09th July, 2015**

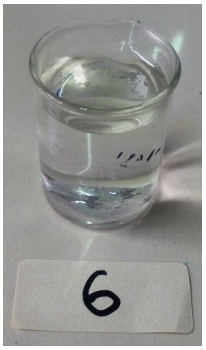
| **Parameters** | **Concentration** | | **Parameters** | **Concentration** |
|---|---|---|---|---|
| pH | 7.41 | | Total Hardness | 3326.5 |
| Conductivity | 9406 | | $Ca^{+2}$ | 793.4 |
| Colour | 400 | | $Mg^{+2}$ | 327.3 |
| TDS | 6836 | | $NO_2$-N | 0.054 |
| COD | 180 | | $NO_3$-N | 3.22 |
| BOD | 59 | | $Na^{+}$ | 887.0 |
| $NH_3$-N | 1.40 | | $K^{+}$ | 5.5 |
| $PO_4$-P | BDL | | SAR | 8.03 |
| $Cl^{-}$ | 2232.6 | | %Na | 45.48 |
| $SO_4^{-2}$ | 1055 | | Boron | 1.04 |
| $F^{-}$ | 1.57 | | Volatile Acids | 504.3 |
| Total Alkalinity | 519.7 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 6**

**Open dug well of Shri DattuLakre, Sadegaon [Across the river, opp. GBL) @ N19°49.019' E074°33.747' Elevation 490 m**

**Sample Appearance**




**Date 09th July, 2015**

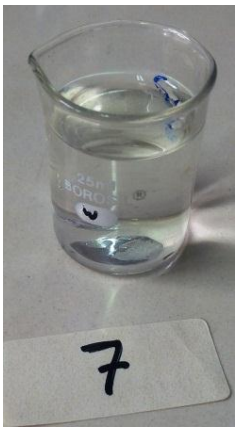
| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 6.66 | | Total Hardness | 1836.7 |
| Conductivity | 5973 | | $Ca^{+2}$ | 368.1 |
| Colour | 5.0 | | $Mg^{+2}$ | 223.2 |
| TDS | 3709 | | $NO_2$-N | 0.016 |
| COD | 29.4 | | $NO_3$-N | 6.99 |
| BOD | 4.6 | | $Na^{+}$ | 713.2 |
| $NH_3$-N | BDL | | $K^{+}$ | 4.7 |
| $PO_4$-P | BDL | | SAR | 9.18 |
| $Cl^{-}$ | 1083.1 | | %Na | 57.50 |
| $SO_4^{-2}$ | 928 | | Boron | 0.75 |
| $F^{-}$ | 0.96 | | Volatile Acids | 307.7 |
| Total Alkalinity | 533.4 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 7**

**Hand pump at SthawarWyawasthapakKaaryalay, Maharashtra Rajya ShetiMahamandal, Sakarwadi (Behind Kanegaon Railway Station) @ N19°49.113' E074°34.328' Elevation 506 m**

**Sample Appearance**




**Date 09th July, 2015**

| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 6.91 | | Total Hardness | 979.6 |
| Conductivity | 2211 | | $Ca^{+2}$ | 204.5 |
| Colour | 5.0 | | $Mg^{+2}$ | 114.1 |
| TDS | 1652 | | $NO_2$-N | 0.027 |
| COD | 36.1 | | $NO_3$-N | 9.85 |
| BOD | 5.3 | | $Na^{+}$ | 96.1 |
| $NH_3$-N | 0.28 | | $K^{+}$ | 3.4 |
| $PO_4$-P | BDL | | SAR | 1.67 |
| $Cl^{-}$ | 256.5 | | %Na | 24.97 |
| $SO_4^{-2}$ | 393 | | Boron | 0.71 |
| $F^{-}$ | 0.78 | | Volatile Acids | 162.4 |
| Total Alkalinity | 368.7 | | | |

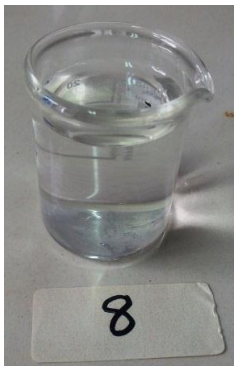
*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 8**

**Open dug well of Vari Gram Panchayat (Gavthan well), Near Police Door Kshetra, Gut No. 138-139**

**@ N19°48.950' E074°34.087' Elevation 499 m**

**Sample Appearance**




**Date 09th July, 2015**

| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 7.14 | | Total Hardness | 3000 |
| Conductivity | 6454 | | $Ca^{+2}$ | 621.6 |
| Colour | 5.0 | | $Mg^{+2}$ | 352.1 |
| TDS | 4679 | | $NO_2$-N | 0.04 |
| COD | 28.4 | | $NO_3$-N | 25.62 |
| BOD | 2.0 | | $Na^{+}$ | 346.6 |
| $NH_3$-N | 0.56 | | $K^{+}$ | 4.3 |
| $PO_4$-P | BDL | | SAR | 3.46 |
| $Cl^{-}$ | 1472.6 | | %Na | 28.33 |
| $SO_4^{-2}$ | 893 | | Boron | 0.82 |
| $F^{-}$ | 1.08 | | Volatile Acids | 25.6 |
| Total Alkalinity | 435.3 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 9**

**Open dug well of Kanhegaon Railway Station, Adjacent to Platform @ N19°49.065' E074°34.287' Elevation 506 m**

Photograph: NA
Located exactly adjacent to the railway platform.

**Sample Appearance**


| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 6.83 | | Total Hardness | 1387.7 |
| Conductivity | 3347 | | $Ca^{+2}$ | 208.3 |
| Colour | 5.0 | | $Mg^{+2}$ | 128.9 |
| TDS | 2555 | | $NO_2$-N | 0.093 |
| COD | 36.9 | | $NO_3$-N | 30.6 |
| BOD | 4.3 | | $Na^{+}$ | 149.3 |
| $NH_3$-N | 0.27 | | $K^{+}$ | 3.6 |
| $PO_4$-P | BDL | | SAR | 2.07 |
| $Cl^{-}$ | 546.3 | | %Na | 24.70 |
| $SO_4^{-2}$ | 595 | | Boron | 0.70 |
| $F^{-}$ | 0.86 | | Volatile Acids | 42.7 |
| Total Alkalinity | 384.4 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 10**

**Open dug well of Shri Ashok N. Teke, Gut No. 204, Vari village**
**@ N19°49.666' E074°34.448' Elevation 507m**

**Sample Appearance**


| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 7.80 | | Total Hardness | 1326.5 |
| Conductivity | 2986 | | $Ca^{+2}$ | 302.6 |
| Colour | 10 | | $Mg^{+2}$ | 138.9 |
| TDS | 2192 | | $NO_2$-N | 0.10 |
| COD | 32.6 | | $NO_3$-N | 10.54 |
| BOD | 4.4 | | $Na^{+}$ | 209.6 |
| $NH_3$-N | 0.80 | | $K^{+}$ | 4.4 |
| $PO_4$-P | BDL | | SAR | 3.05 |
| $Cl^{-}$ | 370.5 | | %Na | 33.65 |
| $SO_4^{-2}$ | 814 | | Boron | 0.42 |
| $F^{-}$ | 1.02 | | Volatile Acids | 265.0 |
| Total Alkalinity | 254.9 | | | |

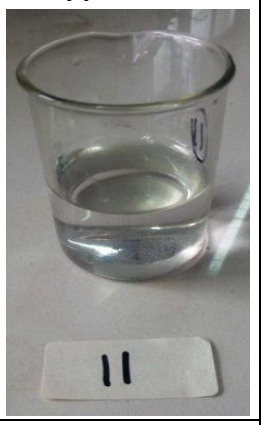
*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

**LOCATION - 11**

**One of the many open dug wells in Godavari River bed near Gram PanchayatVari well; Well located in middle of the river and has high parapet wall. Water was observed being lifted through pump for storage in nearby impoundment.**

**@ N19°48.479' E074°33.782'**

**Sample Appearance**




| Parameters | Concentration | | Parameters | Concentration |
|---|---|---|---|---|
| pH | 7.31 | | Total Hardness | 1142.9 |
| Conductivity | 5587 | | $Ca^{+2}$ | 253.6 |
| Colour | 5.0 | | $Mg^{+2}$ | 124.0 |
| TDS | 3823 | | $NO_2$-N | 0.012 |
| COD | 32.2 | | $NO_3$-N | 12.83 |
| BOD | 4.8 | | $Na^{+}$ | 1006.1 |
| $NH_3$-N | 0.27 | | $K^{+}$ | 7.1 |
| $PO_4$-P | 0.004 | | SAR | 15.9 |
| $Cl^{-}$ | 864.6 | | %Na | 74.09 |
| $SO_4^{-2}$ | 902 | | Boron | 0.77 |
| $F^{-}$ | 1.19 | | Volatile Acids | 17.1 |
| Total Alkalinity | 533.4 | | | |

*Note: Except pH, Conductivity & Colour, all results expressed in mg/l. Conductivity expressed in µmhos/cm. Colour expressed in Hazen units. * BDL – Below detectable limit. ** NA- Not analyzed due to interferences.*

CENTRAL POLLUTION CONTROL BOARD
ZONAL OFFICE, VADODARA

## ANALYSIS REPORT OF PHYSICO-CHEMICAL PARAMETERS

Reg. No.: W-11/15(40/15 to 50/15)
Date and type of sample collection: 09.07.2015, Grab.
**Name of the location:** Ground water quality nearby M/s Godavari Bio-refinery Ltd. Sakarwadi, Kopargaon (Maharashtra)
Sample collected by: Zonal Office, CPCB, Vadodara

| Location | Parameters | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pH | Cond | Colour | TDS | COD | BOD | $NH_3$-N | $PO_4$-P | $Cl^-$ | $SO_4^{-2}$ | $F^-$ | T.Alk |
| Open dug well of Sh. Machhindra Jayram Kajale, Survey No.130/6, Kanegaon, N19°50.117' E 074°33.819' | 7.87 | 5876 | 5.0 | 4212 | 29.8 | 4.2 | 0.70 | 0.015 | 931.1 | 1393 | 1.23 | 286.3 |
| Hand pump, Sangle Vasti, opp. House of Sh. Sukhdev Ram Sangle ,Survey No-5 N19°50.567' E 074°33.564' | 6.80 | 4295 | 5.0 | 3458 | 15.2 | 2.8 | BDL | BDL | 608.0 | 1380 | 1.46 | 270.6 |
| Open dug well of Sh. Ashok Kajale, Survey No.139/1, N19°49.878' E 074°33.921' | 6.94 | 10693 | 1200 | 7778 | 538 | 207 | 3.50 | 0.001 | 2826.4 | 1335 | NA | 813.8 |
| Another open dug well of Sh. Ashok Kajale, house, N19°49.938'E 074°33.959' | 7.31 | 4528 | 100 | 3266 | 57.6 | 11.7 | 0.42 | BDL | 902.6 | 810 | 1.17 | 447.1 |
| Open dug well in Godavari River bed, N19°49.92' E 074°33.55' | 7.41 | 9406 | 400 | 6836 | 180 | 59 | 1.40 | BDL | 2232.6 | 1055 | 1.57 | 519.7 |
| Open dug well of Sh. Dattu Lakare, Sadegaon(Across the river from GBL), N19°49.019' E 074°33.747' | 6.66 | 5973 | 5.0 | 3709 | 29.4 | 4.6 | BDL | BDL | 1083.1 | 928 | 0.96 | 533.4 |
| Hand Pump at Sthawar Vyawasthpak Karyalay, Maharashtra Rajya Sheti Mahamandal, Sakarwadi,N19°49.113'E 074°34.328' | 6.91 | 2211 | 5.0 | 1652 | 36.1 | 5.3 | 0.28 | BDL | 256.5 | 393 | 0.78 | 368.7 |
| Open dug well of Vari Gram Panchayat(Garthan) Near Police Door Kshetra, N19°48.950' E 074°34.087' | 7.14 | 6454 | 5.0 | 4679 | 28.4 | 2.0 | 0.56 | BDL | 1472.6 | 893 | 1.08 | 435.3 |
| Open dug well of Kanhegaon Railway Station, adjacent to platform, N19°49.065' E 074°34.287' | 6.83 | 3347 | 5.0 | 2555 | 36.9 | 4.3 | 0.27 | BDL | 546.3 | 595 | 0.86 | 384.4 |
| Open dug well of Sh.Ashok N.take, Gut No.204,Vari village.N19°49.666' E 074°34.448' | 7.80 | 2986 | 10 | 2192 | 32.6 | 4.4 | 0.80 | BDL | 370.5 | 814 | 1.02 | 254.9 |
| Open dug well in Godavari River bed(near Vari Gram Panchayat well) N19°48.479' E 074°33.782' | 7.31 | 5587 | 5.0 | 3823 | 32.2 | 4.8 | 0.27 | 0.004 | 864.6 | 902 | 1.19 | 533.4 |

Note: Except pH, Cond. & colour, all other results are expressed in mg/L. The conductivity & colour are expressed in µmhos/cm & Hazen unit respectively.
*BDL- Below detectable limit. **NA-Not analysed due to interferences.

Compiled by

(B.D.Pandey) 14/7/15
JSA

(D.Brahmaiah)
LAB.I/C

(B.R.Naidu)
ZONAL OFFICER

CENTRAL POLLUTION CONTROL BOARD
ZONAL OFFICE, VADODARA

## ANALYSIS REPORT OF PHYSICO-CHEMICAL PARAMETERS

Reg. No.: W-11/15(40/15 to 50/15)
Date and type of sample collection: 09.07.2015, Grab.
**Name of the location:** Ground water quality nearby M/s Godavari Bio-refinery Ltd. Sakarwadi, Kopargaon (Maharashtra)
Sample collected by: Zonal Office, CPCB, Vadodara

| Location | Parameters | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | T.Hard. | $Ca^{+2}$ | $Mg^{+2}$ | $NO_2$-N | $NO_3$-N | $Na^{+}$ | $K^{+}$ | SAR | %Na | Boron | Volatile Acids |
| Open dug well of Sh. Machhindra Jayram Kajale, Survey No.130/6, Kanegaon, N19°50.117' E 074°33.819' | 1714.3 | 343.5 | 208.3 | 0.438 | 10.33 | 728.5 | 7.2 | 9.71 | 59.60 | 1.29 | 34.2 |
| Hand pump, Sangle Vasti, opp. House of Sh. Sukhdev Ram Sangle ,Survey No-5 N19°50.567' E 074°33.564' | 1489.8 | 368.1 | 138.9 | 0.008 | 16.27 | 526.6 | 4.5 | 7.04 | 51.89 | 0.59 | 179.2 |
| Open dug well of Sh. Ashok Kajale, Survey No.139/1, N19°49.878' E 074°33.921' | 2979.6 | 638.0 | 337.2 | 0.086 | 10.36 | 1646.2 | 5.9 | 16.3 | 64.91 | 0.66 | 1393.2 |
| Another open dug well of Sh. Ashok Kajale, house, N19°49.938' E 074°33.959' | 1265.3 | 253.6 | 153.7 | 0.111 | 11.00 | 746.4 | 5.9 | 11.6 | 67.17 | 0.76 | 1162.4 |
| Open dug well in Godavari River bed, N19°49.92' E 074°33.55' | 3326.5 | 793.4 | 327.3 | 0.054 | 3.22 | 887.0 | 5.5 | 8.03 | 45.48 | 1.04 | 504.3 |
| Open dug well of Sh. Dattu Lakare, Sadegaon(Across the river from GBL), N19°49.019' E 074°33.747' | 1836.7 | 368.1 | 223.2 | 0.016 | 6.99 | 713.2 | 4.7 | 9.18 | 57.50 | 0.75 | 307.7 |
| Hand Pump at Sthawar Vyawasthpak Karyalay, Maharashtra Rajya Sheti Mahamandal, Sakarwadi, N19°49.113'E 074°34.328' | 979.6 | 204.5 | 114.1 | 0.027 | 9.85 | 96.1 | 3.4 | 1.67 | 24.97 | 0.71 | 162.4 |
| Open dug well of Vari Gram Panchayat(Garthan) Near Police Door Kshetra, N19°48.950' E 074°34.087' | 3000.0 | 621.6 | 352.1 | 0.04 | 25.62 | 346.6 | 4.3 | 3.46 | 28.33 | 0.82 | 25.6 |
| Open dug well of Kanhegaon Railway Station, adjacent to platform, N19°49.065' E 074°34.287' | 1387.7 | 208.3 | 128.9 | 0.093 | 30.60 | 149.3 | 3.6 | 2.07 | 24.70 | 0.70 | 42.7 |
| Open dug well of Sh.Ashok N.Take, Gut No.204,Vari village,N19°49.666' E 074°34.448' | 1326.5 | 302.6 | 138.9 | 0.10 | 10.54 | 209.6 | 4.4 | 3.05 | 33.65 | 0.42 | 265.0 |
| Open dug well in Godavari River bed(near Vari Gram Panchayat well) N19°48.479' E 074°33.782' | 1142.9 | 253.6 | 124.0 | 0.012 | 12.83 | 1006.1 | 7.1 | 15.9 | 74.09 | 0.77 | 17.1 |

Note: Except SAR & %Na, all other results are expressed in mg/L.

Compiled by

(B.D.Pandey) 17/7/15
JSA

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ZONAL OFFICER

CENTRAL POLLUTION CONTROL BOARD
ZONAL OFFICE, VADODARA

## ANALYSIS REPORT OF HEAVY METALS

Reg. No.: W-11/15(40/15 to 50/15)
Date and type of sample collection: 09.07.2015, Grab.
**Name of the location:** Ground water quality nearby M/s Godavari Bio-refinery Ltd. Sakarwadi, Kopargaon (Maharashtra)
Sample collected by: Zonal Office, CPCB, Vadodara

| Location | Parameters | | | | | |
|---|---|---|---|---|---|---|
| | Cu | Cd | Cr | Co | Pb | Zn |
| Open dug well of Sh. Machhindra Jayram Kajale, Survey No.130/6, Kanegaon, N19$^0$50.117' E 074$^0$33.819' | 0.023 | BDL | BDL | BDL | BDL | 0.183 |
| Hand pump, Sangle Vasti, opp. House of Sh. Sukhdev Ram Sangle ,Survey No-5 N19$^0$50.567' E 074$^0$33.564' | 0.0365 | BDL | BDL | BDL | BDL | 0.239 |
| Open dug well of Sh. Ashok Kajale, Survey No.139/1, N19$^0$49.878' E 074$^0$33.921' | 0.1025 | BDL | BDL | 0.07 | BDL | 0.082 |
| Another open dug well of Sh. Ashok Kajale, house, N19$^0$49.938' E 074$^0$33.959' | 0.0255 | BDL | BDL | BDL | BDL | 0.044 |
| Open dug well in Godavari River bed, N19$^0$49.92' E 074$^0$33.55' | 0.1535 | BDL | BDL | 0.05 | BDL | 0.0325 |
| Open dug well of Sh. Dattu Lakare, Sadegaon(Across the river from GBL), N19$^0$49.019' E 074$^0$33.747' | 0.0275 | BDL | BDL | 0.0435 | BDL | 0.2855 |
| Hand Pump at Sthawar Vyawasthpak Karyalay, Maharashtra Rajya Sheti Mahamandal, Sakarwadi, N19$^0$49.113'E 074$^0$34.328' | 0.029 | BDL | BDL | BDL | BDL | 0.2145 |
| Open dug well of Vari Gram Panchayat(Garthan) Near Police Door Kshetra, N19$^0$48.950' E 074$^0$34.087' | 0.0245 | BDL | BDL | 0.0595 | BDL | 0.187 |
| Open dug well of Kanhegaon Railway Station, adjacent to platform, N19$^0$49.065' E 074$^0$34.287' | BDL | BDL | BDL | BDL | BDL | 0.1545 |
| Open dug well of Sh.Ashok N.Take, Gut No.204,Vari village,N19$^0$49.666' E 074$^0$34.448' | BDL | BDL | BDL | BDL | BDL | 0.020 |
| Open dug well in Godavari River bed(near Vari Gram Panchayat well) N19$^0$48.479' E 074$^0$33.782' | BDL | BDL | BDL | 0.0415 | BDL | BDL |

Note: All results are expressed in mg/L. *__BDL__- Below detectable limit

Compiled by

20/7/15
(B.D.Pandey)
JSA

(D.Brahmaiah)
LAB.I/C

(B.R.Naidu)
ZONAL OFFICER

# GREEN CIRCLE, INC.

Integrated HSEQR Consulting Engineers, Scientists & Trainers
(Recognised By Ministry of Environment and Forests, New Delhi Under EPA 1986)
(No. Q - 1508 / 32 / 2007 - CPW)
(ISO 9001:2008, 14001:2004, OHSAS 18001:2007 & NABL/ISO/IEC 17025 : 2005 Certified Organisation)


Report No: - GCI/V/LAB/WA-CPCB/15-SP/2015-16/July -00/0353 Date: 16/07/2015

## ANALYSIS REPORT

| Client Details | | Sample Details | |
|---|---|---|---|
| Name | M/s. CPCB(Vadodara) | Sample Code | GCI/V/15/G3/CPCB/GW1-GW3 |
| Address | Parivesh Bhawan, Atmajyoti Ashram Rd, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara, Gujarat 390023 | Location | As per Table |
| | | Quantity | 5 L |
| Sampling Done By | CPCB,Vadodara | Date of Sampling | - |
| Date of Analysis | 11/07/2015 | Date of Sample Received | 10/07/2015 |
| Date of Completion | 16/07/2015 | Sampling Method | - |

## GROUND WATER ANALYSIS RESULTS

| Sr. No. | Parameters | Unit | Results | | | Reference Method |
|---|---|---|---|---|---|---|
| | | | GW9 | GW3 | GW5 | |
| 1. | Bioassay test | - | 90% Survival of Fish after 96 hour in 100% effluent | 50% Survival of Fish after 96 hour in 100% effluent | 75 % Survival of Fish after 96 hour in 100% effluent | IS 6582 :1971 |

GW3-Toxic(Fails in the Bioassay test)
GW5-Toxic but less than GW3(Fails in the Bioassay test)
GW9-Not Toxic(Passes the Bioassay test)
Conclusion: The sample GW3 is more toxic followed by sample GW5 and the sample GW9 is not toxic to the fishes.

Authorized Signatory

- Analysis is subject to the condition In Which the Sample Is received at our Laboratory.
- Reports can not be used as an evidence anywhere including judiciary purpose without our prior permission.
- Sample will be retained till one month from the date of sampling.

**Annexure III**

## Irrigation water standards to be achieved:

| S. No. | Parameter | Standard(Concentration not to exceed mg/lit except for pH, SAR and colour & odour) |
|---|---|---|
| 1. | pH | 6.5-8.5 |
| 2. | Colour and odour | Absent |
| 3. | Suspended solids | 100 |
| 4. | BOD (3 days at $27^0$C] | 100 |
| 5. | COD | 250 |
| 5. | TDS | 2100 |
| 6. | Oil & Grease | 10 |
| 7. | SAR (Sodium Absorption Ratio) | 26 |

**Annexure - IV**

**Technical Specifications of Reverse Osmosis Plant**

| | | | | |
|---|---|---|---|---|
| 1 Make | : | Rochem Seperation Systems Pvt. Ltd,. Mumbai | | |
| 2 Type | : | DTRO ( Disc & Tube Reverse Osmosis) - Old plant<br>PTRO ( Plate & Tube Reverse Osmosis) - New Plant | | |
| 3 Capacity | : | 400 m3 per day (400m3 each)<br>Reverse Osmosis followed by Nano Filtration | | |
| 4 Type of Membrane | : | TFC | | |
| 4 Nos. | : | 2 nos. | | |
| 5 Efficiency | : | 50 % RO Permeate<br>20% NF Permeate<br>30 % Reject Effluent | | |
| 6 Quantity of Effluent | : | Feed | 400 m3/day | each |
| | | RO Permeate | 200 m3/day | 50% of feed |
| | | NF Permeate | 80 m3/day | 20% of feed |
| | | Reject Effluent | 120 m3/day | 30% of feed |

7 **Quality Parameters**

**a) Raw Effluent ( Biomethanated Effluent)**

| | | | |
|---|---|---|---|
| pH | : | 6.0 - 7.0 | |
| TSS | | 3000 | mg/lit. |
| TDS | : | 22000 | mg/lit. |
| Conductivity | : | 35000 | ms |
| COD | : | 35000 | mg/lit. |
| BOD | : | 17000 | mg/lit. |

**b) RO Permeate Water**

| | | | |
|---|---|---|---|
| pH | : | 6.8 - 7.0 | |
| COD | : | 250 - 750 | mg/lit. |
| Conductivity | : | 1600 | ms |

**c) NF Permeate Water**

| | | | |
|---|---|---|---|
| pH | : | 6.5 - 7.0 | |
| COD | : | 1500 - 2000 | mg/lit. |
| Conductivity | : | 45000 | ms |

**d) Reject Effluent**

| | | | |
|---|---|---|---|
| pH | : | 6.0 - 7.2 | |
| COD | : | 40000 - 70000 | mg/lit. |
| TDS | : | 50000 - 80000 | mg/lit. |

Note: As per the information available from the industry, one of the R.O plant can be readily put into operation, while the other plant may require some maintenance works, before putting into operation