



THE SINGARENI COLLIERIES COMPANY LIMITED
(A Government Company)

Venkateshkani - 507 103,
Bhadrachalam Road Rly. Station,
Khammam District - T.S.

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Ref.No.KGM/ENV/552/121

Date: 23-08-2023

To
The Member Secretary,
Telangana State Pollution Control Board,
Paryavaran Bhavan
A 3, Industrial Estate, Sanath Nagar
HYDERABAD - 500 018.

Dear Sir,

Subject : Environmental Statement of **Jalagam Vengal Rao Opencast Mine (I&II Expansion) of Kothagudem Area, SCCL** for the financial 2022 - 2023 in Form - V (Rule No. 14 of the Environment (Protection) Rules, 1986 - Reg.

CFO No.:Consent Order NO.220523417655 dt. 13.04.2022, valid upto 31.10.2026.

With reference to the above, please find enclosed the Environmental Statement of **Jalagam Vengal Rao Opencast Mine(I&II Expansion) of Kothagudem Area, SCCL** for the financial year 2022 - 2023 in Form - V (Rule No. 14 of the E (P) Rules, 1986), in compliance of the Special Condition No. 22 of Schedule - B of the consent order cited under reference.

This is for your information and further necessary action.

Yours sincerely,

General Manager
Kothagudem Area
General Manager
The S.C.Co.Ltd.,
KOTHAGUDEM AREA

Copy to:

1. Joint Chief Environmental Engineer,
T.S. Pollution Control Board, Zonal Office,
6-3-1219, Block-C, Ward-91,
Uma Nagar, Near-Country Club, Begumpet,
HYDERABAD - 500 001
2. Environmental Engineer,
T.S. Pollution Control Board
Besides MRO Office, A - Power House Basti
Head Office Area, KOTHAGUDEM - 507 101
3. General Manager (Env), Corporate

"Beat Plastic Pollution"



KOTHAGUDEM AREA

Form - V (Rule No. 14 of the Environment (Protection) Rules, 1986)

Environmental Statement of JVR OC Mine(I&II Expansion).

**The S C Co Limited.
Kothagudem Area**

1st April 2022 to 31st March' 2023

**CFO Order number: 220523417655
Date; 13.04.2022, Valid upto; 31.10.2026.**

Environmental Statement of Jalagam Vengalrao Opencast Mine (I&II Expansion) for the financial year ending the 31st March' 2023

1. Introduction :

The Singareni Collieries Company Limited (SCCL) is a joint undertaking of State and Central governments. SCCL is the only Coal producer in the entire South India. The coal mining activities are spread over 6 Districts of Telangana State in Godavari Valley Coalfield. The Company functions as 11 administrative areas in 3 Regions comprising of 24 UG mines and 19 Opencast mines. Production achieved in SCCL during 2022 -23 financial year is 67.14 Million Tonnes.

Jalagam Vengalrao Opencast Mine(I&II Expansion), Sathupalli falls in Kothagudem area of Kothagudem region in Khammam District of Telangana State. In addition, one underground mine namely PVK No.5 Incline and Two opencast coal mines Kistaram OCP and Gowtham Khani Opencast Project are in operation in Kothagudem area. Besides, supporting facilities such as Stores, Area workshop and Coal Handling Plant also exist. Coal mining activities started in sathupalli in 2005.

2. About Jalagam Vengalrao Opencast Mine(I&II Expansion):

2.1. Location:

Jalagam Vengalrao Opencast Mine (I&II Expansion) falls in south central part of Sathupalli - Chintalapudi coal belt in Khammam district of Telangana State. The project area falls between North Latitudes 17°09'54.59" to 17°13'01.70" N and East Longitudes 80°45'43.38" to 80°49'20.86" in Survey of India Topo Sheet No. 65 C/16

The project is located near Sattupalli town in Sathupalli Mandal of Khammam District in the state of Telangana.

2.2. Communication:

Sathupalli area is well connected by metal road to Kothagudem mining area and district headquarters Khammam which are at a distance of 63 Kms. and 70 Kms. respectively. It is also well connected by road to all important places within the Telangana State.

Topography:

The area is of gently sloping undulatory terrain dotted with hillocks and adjacent sandy patches that are imperfectly drained. The topographic elevation varies from 180 m (above MSL) in the NE to 120 m (above MSL) in WSW, with a slope of 4.16 m/km. Pulligutta, Inupraigutta and few other hillocks are the prominent land marks of the area. Most of the OCP block area falls under Lankapalli Reserve Forest.

2.3. Climate:

The area experiences a tropical climate with three distinct seasons, a hot dry summer from March to June, with occasional thunder showers, a good rainy season between mid June to September and pleasant winter between October and February.

2.4. Township:

SCCL management has constructed a Township at Ayyagaripeta, Sathupalli to the employees working in the project. At present, the employees are coming from the colonies of Rudrampur, Gowthampur and Kothagudem also.

2.5. Environmental Clearance & Consent for Operation.

The MoEF accorded environmental clearance vide its letter number J -11015/268/2007-IA.II (M) dated 28th March 2010 and also Environmental Public Hearing was held on 14.02.2020 to enhance the production capacity from 5.00 MTPA to 10.00 MTPA and E.C was awarded vide MoEF&CC, GoI Ltr No.J-11015/268/2007-IA.II(M), Dt.11.10.2021.

TSPCB accorded Consent for Operation (CFO) for a capacity of 10.00 MTPA vide its letter number Consent Order NO.220523417655 dt. 13.04.2022 and valid up to 31.10.2026.

3. A brief note on different processes involved in opencast mining operations and allied activities.

Unlike in other industries, No chemical process and burning of fuel are involved in coal extraction process. Dust is the only common pollutant generated in mines and allied activities.

Mining operations do not result into any point sources of gaseous emission. Dust emission sources are extensive and fugitive in nature like plying of vehicles, coal loading and unloading operation, coal screening and handling operation.

The coal from this project is transported to the pit head CHP and thereby to Rudrampur Coal Handling Plant (RCHP) from where it is loaded into trucks and railway wagons for transporting to the customers.

Brief flow charts of different mining process involved in opencast mining operation area as follows.

Opencast Mining

Opencast coal mine involves exposing of coal seam by removing the overlying strata, extraction of the exposed coal seam and filling up the voids created by the extraction of coal with the overburden material removed. Sequence of operations involved in opencast mining is as follows.

- Drilling of holes in overburden / coal benches
- Charging of holes with explosive material
- Blasting of overburden material / coal
- Lifting of broken overburden material, coal by using shovels and dumpers.
- Transportation of these overburden material up to the earmarked dump yards (External & Internal).
- Reclamation of overburden dumps, back filled areas by leveling, top soil spreading and finally by plantation / growing vegetation.
- Dumping of coal at a central place / CHP from where it is loaded into trucks by mechanical loaders.

* * * * *



A Government Company)

Kothagudem Area

Form - V (Rule No. 14 of the Environment (Protection) Rules, 1986)

Environmental Statement of Jalagam Vengalrao Opencast Mine(I&II Expansion) of Kothagudem Area for the financial year ending the 31st March' 2023

Part A

- I. Name and address of the owner / occupier : M.Shalem Raju.
of the industry, operation or process. General Manager, SCCL
Kothagudem Area, S.C.Co.Ltd
Venkateshkhani (P.O.),
Bhadradi Kothagudem (Dist.),
PIN - 507 103.
- II. Industry Category : Coal Mining (Red Non - Hazardous)
- III. Production Capacity - Units : 27,397 Tonnes/day (Average)
- IV. Year of establishment : 01.09.2017
- V. Environment Statement last sent : 18.08.2022

Part B

Water and Raw Material Consumption:

(1) Water Consumption m³/day: **Furnished in Table No. 1**

Name of the products	Process water consumption per unit of product output	
	During the previous financial year	During the current financial year
	(1)	(2)
(1) Washings	60 KLD	60 KLD
(2) Greenbelt	100 KLD	100 KLD
(3) Domestic	90 KLD	90 KLD
(4) Dust suppression and others	2350 KLD	2350 KLD

(2) Raw material consumption: **Enclosed as Annexure - I**

* Name of raw materials	Name of products	Consumption of raw material per unit	
		During the previous financial year	During the current financial year
	Coal	--	--

** Industry may use codes if disclosing details of raw materials would violate contractual obligations, otherwise all industries have to name the raw materials used*

Part C

Pollution discharged to environment / unit of output

(Parameter as specified in the consent issued)

(1) Pollution	Quantity of pollutants discharged (mass/day)	Concentration of pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Air	Enclosed as Annexure - II		
(b) Water	Enclosed as Annexure - II		

Part D

Hazardous Waste

(as specified under Hazardous Wastes (Management and Handling), Rules, 1989)

Hazardous Waste	Total Quantity (Kg)	
	During the previous financial year	During the current financial year
(a) From Process	Not applicable	
(b) From pollution control facility	Not applicable	

Part E

Solid Waste

Solid Waste	Total Quantity	
	During the previous financial year (2021 - 22)	During the current financial year (2022 - 23)
(a) From Process	38.200	43.60 M.Cum
(b) From pollution control facility		
(c)(1) Quantity recycled or re-utilized within the unit		
(2) Sold		
(3) Disposed		

Note: In opencast mining, no chemical or manufacturing process is involved, the rock / soil lying above the coal seams is removed and dumped in external dump area or de-coaled area to facilitate extraction of coal.

Part F

Please specify the characterization (in terms of composition and quantum) of hazardous as well as solid waste and indicate disposal practice adopted for both these categories of wastes.

Characterization of Solid Wastes and Disposal Practice:

The Solid waste (Overburden) / soil / rock lying over the coal seam is to be removed to extract the coal. The overburden so removed is transported and dumped in the earmarked sites or dump sites / de-coaled area as per the reclamation and solid waste management plan.

The characteristics of overburden is top soil or blasted rock material mainly consists of quartz. The overburden dumps after attaining planned height, the top soil is spread on the top and slopes of the dumps for taking up plantation with native species as per the reclamation plan. (Solid waste details enclosed as **Annexure III.**)

Part G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production.

Post project monitoring for air and water quality is being carried out as per the MoEF guidelines for coal mines vide GSR 742 (E) dated 25.09.2000. The post project monitoring data of air and water quality data are enclosed as **Annexure II A and II B.** Expenditure towards the environmental protection for the year 2022 - 23 is furnished in **Annexure - IV.**

Part H

Additional measures / investment proposal for environment protection, abatement of pollution, prevention of pollution.

1. Free supply of one LPG cylinder per employee or re-imbursement of cost of one LPG Cylinder (at IOC rates) per month to the employees using LPG so as to discourage use of coal for domestic purpose.
2. Afforestation in vacant land and on over burden dumps in a phased manner in the area.

Part I

Any other particulars for improving the quality of the environment.

Other Particulars for Improving the Quality of Environment:

1. "World Environment Day" and "World Environment Protection Day" were observed on 5th June and 30th June 2022 respectively.
2. Environment Awareness Week (ENVAW) was observed from 30th June 2022 in the area. During ENVAW, quiz competitions were held at mines and departments and for the local school children etc. to inculcate environmental awareness.
3. Health awareness camps and regular medical camps are being held in the surrounding villages also.
4. Environmental management is included in the curriculum of training for supervisors.
5. Steps are being taken to conserve water by taking suitable water conservation measures.
6. Rain water harvesting pits have been constructed in mine premises.
7. Awareness is being brought among workmen through posters, pamphlets slogans and by conducting quiz competitions.


Project Officer
JVROC-I&II Mines
Project Officer
JVR OC-I & OC-II,
STPL, Kgm Area

Raw Material Consumption Details

In coal mines, the material required for extracting coal and other purposes are supplied from stores and workshops. Generally, consumption of raw material (except HEMM spares and others) at stores and workshops is negligible as they are the service units. The following raw materials have been supplied to JVR OC Mine (I&II Expansion) for using in the process of coal extraction, transportation, handling, running and maintenance of various plant and machinery used in the mines.

SL. No.	Description of the item	Quantity
1.	Cement in Bags	--
2.	HSD oil in liters (SCCL)	55,62,633
	HSD oil in liters (Outsourcing)	3,39,96,139
3.	Detonators	
	Instantaneous in No's(ED's).	6,649
	Delay in No's.	--
	Nonels in Mtrs	80,89,375
4.	Explosives in Kgs	
	P1 Explosive in Kgs	--
	P5 Explosive in Kgs	--
	Slurry explosive in Tonnes	25,238.220
	LD Explosives in Tonnes	915.100
	Boosters in Kgs	57.3588
5.	Paint in liters	--
6.	Red oxide in liters	--
7.	Transformer Oil in Ltrs	1000
8.	MS flat 35x6 mm in Metric Tons.	--
9.	Timber non teak (Stemming Rods, Shovel Handle)	--
10.	Coal Drill Rods in No's.	--
11.	Coal Drill Bits in No's.	--
12.	Wooden Chocks in No's.	--
13.	Cement Capsules in No's.	--
14.	Wooden Sprags in No's.	--
15.	Wooden Wedges in No's.	--

Pollution discharged to environment / unit of output

(a) Air Pollution:

At JVR OC Base workshop premises, no air pollution takes place as there are no activities like loading, unloading, crushing and transport of coal and OB etc to cause air pollution.

A statement of the ambient air quality data during the period is enclosed as **Annexure - II A**

(b) Water

Water Pollution Sources:

The only source of water pollution at base workshop premises is the water coming out from HEMM washing platform.

Control Measures:

The water coming out from the HEMM washing platform is being treated in Effluent Treatment Plant (ETP) for separating oil & grease before discharging in to natural drainage system.

The quality of outlet waster of ETP is enclosed as **Annexure - II B.**

ANNEXURE – II A**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
JVR OC-I & II PO Office (Code: CA6)	07.04.2022	95	36.2	12.2	18.4
	22.04.2022	92	38.7	13.0	19.8
	07.05.2022	92	35.2	13.3	20.1
	22.05.2022	88	37.0	12.5	18.9
	08.06.2022	85	32.4	12.1	18.2
	24.06.2022	79	34.8	11.1	16.4
	06.07.2022	72	30.3	14.4	21.9
	21.07.2022	65	28.7	13.4	20.2
	06.08.2022	75	31.7	11.6	16.5
	22.08.2022	73	32.2	12.9	19.5
	08.09.2022	81	34.1	12.6	18.9
	24.09.2022	83	36.6	13.0	19.5
	13.10.2022	98	41.3	13.8	20.8
	29.10.2022	105	46.3	13.8	20.8
	13.11.2022	92	38.6	14.4	22
	29.11.2022	94	41.5	13.9	21.1
	13.12.2022	107	45	15.5	23.8
	29.12.2022	110	48.4	13.4	20.1
	07.01.2023	105	44.2	16.9	26.3
	28.01.2023	108	47.5	16.2	25
	07.02.2023	119	50	15.5	23.8
	22.02.2023	122	53.7	16.5	25.6
	06.03.2023	110	46.2	14.1	21.5
	18.03.2023	113	50	15.2	23.3
Min		65	28.7	11.1	16.4
Max		122	53.7	16.9	26.3
Average		94.3	40.0	13.8	20.9
98% percentile		120.6	52.0	16.7	26.0
Coal mine standards (commenced after 25.9.2000), GSR 742(E), Dated 25.09.2000		250	-	120	120

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
JVR OC-I &II BWS (Code:CA8)	07.04.2022	135	47.1	12.6	18.2
	22.04.2022	139	48.4	13.4	19.4
	07.05.2022	139	48.4	13.8	19.9
	22.05.2022	130	45.4	13.0	18.8
	08.06.2022	133	46.4	12.6	18.2
	24.06.2022	98	34.2	11.5	16.2
	06.07.2022	95	33.2	14.7	21.3
	21.07.2022	106	37.0	13.7	19.7
	06.08.2022	108	37.7	12.0	17.2
	22.08.2022	112	39.1	13.3	19.3
	09.09.2022	118	41.2	13.4	20.4
	25.09.2022	121	42.3	13.8	21.0
	13.10.2022	132	46.1	14.5	22.4
	29.10.2022	136	47.4	14.5	22.4
	13.11.2022	127	44.2	15.7	24.5
	29.11.2022	130	45.5	14.9	23.1
	13.12.2022	135	47.1	16.9	26.6
	29.12.2022	139	48.4	14.3	22
	09.01.2023	128	44.7	18.4	29.3
	28.01.2023	132	45.9	17.8	28
	08.02.2023	136	47.5	16.8	26.4
	23.02.2023	140	48.7	18.2	28.9
	06.03.2023	130	45.4	15.3	23.7
	18.03.2023	134	46.7	16.5	26
Min		95	33.2	11.5	16.2
Max		140	48.7	18.4	29.3
Average		126.4	44.1	14.7	22.2
98% percentile		139.5	48.6	18.3	29.1
Coal mine standards (commenced after 25.9.2000),GSR 742(E), Dated 25.09.2000		250	-	120	120

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
JVR OC-I & II Pit head CHP (Code: CA7)	11.04.2022	194	74.9	13.1	19.2
	26.04.2022	192	68.8	13.9	20.4
	07.05.2022	196	75.6	14.3	21.0
	22.05.2022	195	69.8	13.5	19.8
	11.06.2022	212	81.8	13.1	19.2
	28.06.2022	166	59.4	12.0	17.2
	14.07.2022	135	52.1	15.4	22.7
	25.07.2022	142	50.8	14.4	21.1
	10.08.2022	164	63.2	13.1	19.1
	27.08.2022	181	64.8	13.8	20.3
	08.09.2022	185	71.4	14.1	21.6
	24.09.2022	190	68.0	14.5	22.3
	13.10.2022	192	74.1	15.3	23.6
	29.10.2022	197	70.6	15.3	23.6
	13.11.2022	208	80.3	16.5	25.8
	29.11.2022	214	76.5	15.8	24.5
	13.12.2022	219	84.5	17.9	28.2
	29.12.2022	225	80.5	15	23.1
	07.01.2023	201	77.6	19.4	30.9
	28.01.2023	194	69.3	18.7	29.5
	07.02.2023	199	76.7	17.7	27.8
	22.02.2023	192	68.7	19.2	30.5
	06.03.2023	197	75.8	16.2	25.2
	22.03.2023	190	67.9	17.4	27.4
minimum		135	50.8	12.0	17.2
max		225	84.5	19.4	30.9
average		190.8	71.0	15.4	23.5
98% percentile		222.2	83.3	19.3	30.7
Coal mine standards, GSR 742(E), Dated 25.09.2000		250	-	120	120

Station Name	Date of Sampling	Parameters			
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
JVR OC-I&II New CHP-Site Office (Code:CA9)	08.09.2022	197	74.1	14.0	20.6
	24.09.2022	191	71.8	14.3	21.0
	13.10.2022	190	71.4	15.2	22.5
	29.10.2022	205	77.1	15	22.2
	13.11.2022	201	75.6	16.4	24.5
	29.11.2022	195	73.3	15.5	23.1
	13.12.2022	221	83.1	17.8	26.9
	29.12.2022	219	80.2	14.8	21.8
	07.01.2023	208	78.2	19.3	29.4
	28.01.2023	198	72.5	18.6	28.2
	07.02.2023	190	67.5	17.6	26.4
	22.02.2023	195	71.2	19.1	29
	06.03.2023	191	67.9	16	23.9
	22.03.2023	184	67.5	17.4	26.2
Min		184	67.5	14.0	20.6
Max		221	83.1	19.3	29.4
Average		198.9	73.7	16.5	24.7
98 Percentile		220.5	82.3	19.2	29.3
Coal mine standards, GSR 742(E), Dated 25.09.2000		250	-	120	120

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Kistaram Village (Code No. BA9)	11.04.2022	61	24.9	11.9	17.1
	26.04.2022	64	26.9	12.3	17.9
	14.05.2022	62	25.3	12.7	18.6
	24.05.2022	58	24.3	11.8	17.0
	11.06.2022	55	22.5	11.9	16.8
	28.06.2022	52	21.8	10.8	15.3
	14.07.2022	55	22.5	13.0	18.8
	25.07.2022	52	21.9	12.2	17.6
	10.08.2022	54	21.9	11.9	16.9
	27.08.2022	59	24.7	12.7	18.4
	12.09.2022	65	26.6	12.6	18.7
	27.09.2022	61	25.7	13.4	20.0
	10.10.2022	64	26.2	12.9	17.7
	25.10.2022	59	25.9	13	17.9
	10.11.2022	62	25.5	14	21.1
	25.11.2022	60	26.3	13.3	19.8
	10.12.2022	60	25.6	14.8	22.5
	25.12.2022	70	28.6	13.9	20.5
	11.01.2023	63	26.3	15.9	24.3
	30.01.2023	66	26.8	15.2	23
	10.02.2023	63	26.2	14.5	21.9
	25.02.2023	59	24.2	13.9	20.8
	08.03.2023	58	25	13.4	20
	20.03.2023	55	22.5	12.8	18.9
Min		52	21.8	10.8	15.3
Max		70	28.6	15.9	24.3
Average		59.9	24.9	13.1	19.2
98% percentile		68.2	27.8	15.6	23.7
Standards as per NAAQ		100	60	80	80

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Sathupalli Town (Code No. BA10)	08.04.2022	55	23.7	10.8	15.3
	23.04.2022	57	24.2	11.2	15.7
	08.05.2022	55	23.6	11.5	16.3
	23.05.2022	56	24.0	10.7	15.1
	09.06.2022	51	21.9	10.5	14.7
	25.06.2022	55	23.6	9.7	14.2
	12.07.2022	54	23.2	11.9	16.7
	22.07.2022	51	22.0	11.3	15.8
	08.08.2022	53	22.7	11.4	15.8
	25.08.2022	55	23.8	11.6	16.4
	09.09.2022	52	22.3	11.7	17.3
	25.09.2022	53	22.9	12.4	18.3
	14.10.2022	56	24	12.6	18.8
	30.10.2022	58	24.8	13	19.4
	14.11.2022	55	23.5	13.6	20.6
	30.11.2022	56	24.2	12.9	19.3
	14.12.2022	59	25.4	14.5	22.5
	30.12.2022	61	26.1	12.4	18.3
	09.01.2023	56	24	15.8	24.3
	28.01.2023	57	24.7	15.2	23.2
	08.02.2023	54	20.8	14.6	22.2
	23.02.2023	56	24.2	14.3	21.6
	07.03.2023	51	22.1	13.1	19.6
	20.03.2023	52	22.5	13	19.4
Minimum		51	20.8	9.7	14.2
Max		61	26.1	15.8	24.3
Average		54.9	23.5	12.5	18.4
98% percentile		60.1	25.8	15.5	23.8
Standards as per NAAQ		100	60	80	80

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Rejarla Village (Code BA -11)	09.04.2022	64	27.5	11.8	16.2
	25.04.2022	58	26.3	11.4	16.5
	08.05.2022	60	25.8	12.5	18.4
	23.05.2022	57	25.8	11.7	17.1
	10.06.2022	47	20.4	11.5	17.1
	27.06.2022	46	20.8	10.6	15.1
	13.07.2022	50	21.7	12.1	17.5
	23.07.2022	48	21.5	11.5	15.6
	09.08.2022	48	20.6	11.0	15.2
	26.08.2022	52	23.7	11.8	17.1
	12.09.2022	61	26.4	12.0	17.6
	27.09.2022	63	28.4	12.6	18.6
	14.10.2022	60	26	12.9	19.1
	30.10.2022	61	27.8	13.4	19.9
	14.11.2022	59	25.5	13.9	20.8
	30.11.2022	61	27.5	13.1	19.6
	14.12.2022	64	27.7	15	22.8
	30.12.2022	66	29.8	12.6	18.6
	11.01.2023	61	26.5	15.7	23.9
	29.01.2023	63	28.5	14.9	22.6
	10.02.2023	60	25.8	14.3	21.7
	25.02.2023	61	27.9	14	21
	08.03.2023	56	24.2	13	19.3
	18.03.2023	58	26.2	12.9	19.1
Minimum		46	20.4	10.6	15.1
Max		66	29.8	15.7	23.9
Average		57.7	25.5	12.8	18.8
98% percentile		65.1	29.2	15.4	23.4
Standards as per NAAQ		100	60	80	80

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Chaudavaram Village (Code No. BA - 10)	09.04.2022	54	23.5	11.2	15.8
	25.04.2022	53	22.0	11.8	17.2
	08.05.2022	53	23.3	12.0	17.6
	24.05.2022	50	21.0	11.3	16.5
	10.06.2022	45	19.8	11.1	16.1
	27.06.2022	43	18.0	10.2	14.5
	13.07.2022	46	20.2	12.3	18.0
	23.07.2022	44	18.3	11.5	16.3
	09.08.2022	44	19.5	10.4	15.0
	26.08.2022	47	19.5	12.0	17.5
Minimum		43	18	10.2	14.5
Max		54	23.5	12.3	18
Average		47.9	20.5	11.4	16.5
98% percentile		53.8	23.5	12.2	17.9
Standards as per NAAQ		100	60	80	80

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Venkatapuram Village (Code No. BA7)	08.04.2022	51	20.9	10.3	14.7
	23.04.2022	54	22.4	10.7	15.1
	07.05.2022	53	21.8	11.0	15.6
	23.05.2022	51	21.1	10.5	14.7
	09.06.2022	53	21.7	10.2	14.1
	25.06.2022	54	22.3	9.4	14.2
	12.07.2022	53	21.6	11.6	16.4
	22.07.2022	50	20.7	11.1	15.5
	08.08.2022	52	21.5	11.5	16.1
	25.08.2022	55	22.7	11.4	16.1
Min		50	20.7	9.4	14.1
Max		55	22.7	11.6	16.4
Average		52.6	21.7	10.8	15.3
98 Percentile		54.8	22.6	11.6	16.3
Standards as per NAAQ		100	60	80	80

**AAQ MONITORING DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters (µg/m ³)			
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
Pallewada Village (Code No. BA12)	09.04.2022	53	22.5	11.0	15.4
	25.04.2022	51	22.0	11.6	16.8
	08.05.2022	51	21.8	11.7	17.0
	24.05.2022	48	20.6	11.2	16.1
	10.06.2022	42	17.9	10.9	15.7
	27.06.2022	45	19.3	10.1	14.1
	13.07.2022	45	19.1	12.4	17.9
	23.07.2022	43	18.3	11.8	16.4
	09.08.2022	44	18.6	10.3	15.5
	26.08.2022	46	19.7	12.1	17.5
	12.09.2022	52	22.1	10.9	15.3
	27.09.2022	54	23.0	11.4	16.1
	14.10.2022	50	21.3	11.7	16.8
	30.10.2022	51	21.9	11.9	17
	14.11.2022	53	22.5	12.6	18.2
	30.11.2022	55	23.4	12	17.2
	14.12.2022	57	24.4	13.6	19.9
	30.12.2022	59	25.4	11.6	16.6
	11.01.2023	52	22.2	14.8	21.8
	30.01.2023	54	23.1	14.3	21
	10.02.2023	51	21.8	13.6	19.9
	25.02.2023	53	23	13.6	19.9
	08.03.2023	52	21.2	12.4	17.8
	18.03.2023	54	22.5	12.2	17.6
Min		42	17.9	10.1	14.1
Max		59	25.4	14.8	21.8
Average		50.6	21.6	12.1	17.4
98 Percentile		58.1	24.9	14.6	21.4
Standards as per NAAQ		100	60	80	80

Station Name	Date of Sampling	Parameters			
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
NTR Nagar (Code No. BA16)	10.09.2022	51	20.7	11.7	16.9
	26.09.2022	54	21.9	12.4	17.9
	14.10.2022	50	20.3	12.6	18.3
	30.10.2022	52	21.1	13	18.9
	14.11.2022	54	22.4	13.6	20.1
	30.11.2022	50	20.3	12.9	18.8
	14.12.2022	53	21.8	14.8	22
	30.12.2022	55	22.4	12.5	18.1
	10.01.2023	52	21.8	14.8	22
	29.01.2023	55	22.3	14.3	21.1
	09.02.2023	52	21.7	13.5	19.9
	24.02.2023	57	23.1	13.5	19.7
	07.03.2023	53	22.1	12.4	17.9
	22.03.2023	50	20.4	12	17.3
Min		50	20.3	11.7	16.9
Max		57	23.1	14.8	22.0
Average		52.7	21.6	13.1	19.2
98 Percentile		56.5	22.9	14.8	22.0
Standards as per NAAQ		100	60	80	80

Station Name	Date of Sampling	Parameters			
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)
Siddaram Village (Code No. BA17)	10.09.2022	55	22.8	11.9	17.4
	26.09.2022	57	23.7	12.5	18.6
	14.10.2022	54	22.4	12.8	19
	30.10.2022	59	24.5	13.1	19.6
	14.11.2022	56	23.3	13.8	20.7
	30.11.2022	53	22	13	19.4
	14.12.2022	56	23.1	14.5	22.8
	30.12.2022	59	24.3	12.5	18.6
	10.01.2023	57	23.6	15.4	23.6
	29.01.2023	60	24.8	14.8	22.5
	09.02.2023	57	23.3	13.2	19.6
	24.02.2023	55	23	13.7	20.5
	08.03.2023	50	20.8	11.9	17.4
	18.03.2023	53	22.1	12.2	18.1
Min		50	20.8	11.9	17.4
Max		60	24.8	15.4	23.6
Average		55.8	23.1	13.2	19.8
98 Percentile		59.7	24.7	15.2	23.4
Standards as per NAAQ		100	60	80	80

(a) Air Pollution:

Dust is the only common pollutant generated in the mine and allied activities. The main sources of air pollution are

- Loading, unloading and transport of coal and overburden.
- Crushing of coal.
- Transportation of coal and overburden to the loading / dumping points.
- Generation of dust at conveyor transfer points etc.

All these sources are fugitive in nature.

Control Measures:

- Wet drilling arrangements are provided for controlling dust while drilling.
- Water spraying is being done on haul roads; dump yards and at coal loading and unloading points to reduce the dust arising due to movement of vehicles and wind.
- Four mobile water sprinklers of 28 KL, 5 No's of 20 KL, 2 No's of 15 KL and three mobile water sprinklers of 12 KL capacities are deployed for water spraying purpose.
- As far as practicable, coal produced is dispatched to the central CHP.
- Automatic sprinkling system under the control of operator is provided at the crushers.
- Periodical maintenance of all diesel / petrol operated machinery vehicles is being done to control SO₂, NO_x & CO in the exhaust emissions.
- No burning of coal or wood or cotton waste impregnated with oil and grease is done in the mine premises.
- Employees are being provided with free LPG gas cylinders instead of coal to discourage coal burning for domestic use. All employees are using LPG gas in place of coal.
- Ambient air quality is being monitored every fortnight in and around the project area.
- Cabins of heavy earth moving machines are provided with A.C.
- Emissions from heavy earth moving machinery are being monitored.
- Extensive plantation is being taken up on overburden dumps and in the vacant areas.

A statement of the ambient air quality data during the period is enclosed as

(b) Water**Water Pollution Sources:**

The main sources of water pollution at mines are the seepage water pumped from the sumps and the waste water let out from workshops.

In case of opencast mines, the ground water which seeps into the workings gets accumulated in the sump. This water is pumped out and let out through drains and settling ponds.

This water does not contain any harmful substances. Small quantity of waste water is discharged from offices, canteen and workshops. The waste water discharged from the above units does not reach any water body. It gets dried within the premises of the above establishments.

Control Measures:

The mine discharge water mainly contains suspended solids and dissolved solids. The seepage water belowground is collected in sumps by gravity and pumped out to the surface. The water is subjected to sedimentation, filtration and disinfection also, if required for drinking. Excess water particularly, in Monsoon season is let out on the surface land which will be by the local people for cultivation.

The water quality data during the period is enclosed as Annexure-IIB.

ANNEXURE – II B

**EFFLUENT WATER DATA OF JVROC MINE(I&II EXPANSION)) FOR THE PERIOD
APRIL 2022 TO MARCH 2023**

Station Name	Date of Sampling	Parameters Concentration in mg/Liter (Except pH)					
		pH	TSS	TDS	COD	BOD	Oil & Grease
		(at 25 ⁰ C)	At 105 ⁰ C	at 180 ⁰ C			
JVR OC – I&II Mine Discharge (EW-6)	15.04.2022	7.8	16	1076	27	2.9	<1
	30.04.2022	7.8	16	1076	27	2.9	<1
	14.05.2022	7.8	20	1109	24	2.7	<1
	30.05.2022	7.5	14	1079	22	2.4	<1
	15.06.2022	7.7	19	998	20	2.0	<1
	30.06.2022	7.3	16	929	22	2.4	<1
	15.07.2022	7.5	17	944	18	2.1	<1
	30.07.2022	7.7	15	986	23	2.5	<1
	14.08.2022	7.6	14	895	21	2.0	<1
	30.08.2022	7.1	17	852	16	2.0	<1
	14.09.2022	7.2	10	718	21	2.6	<1
	30.09.2022	7.7	9	649	22	2.2	<1
	15.10.2022	7.7	12	619	16	2.3	<1
	31.10.2022	7.8	22	617	19	3.0	<1
	15.11.2022	6.8	20	643	18	3.2	<1
	30.11.2022	7.5	13	669	16	2.0	<1
	15.12.2022	7.7	10	627	15	2.0	<1
	30.12.2022	7.2	14	608	19	23.0	<1
	13.01.2023	7.3	12	682	17	2.2	<1
	30.01.2023	7.6	10	679	19	2.8	<1
	15.02.2023	7.7	15	682	22	3.2	<1
	28.02.2023	7.4	18	709	18	2.6	<1
	15.03.2023	7.9	18	746	20	3.0	<1
	31.03.2023	7.4	15	736	21	3.0	<1
Standards as per GSR 742 (E) & GSR 801 (E)		5.5 to 9.0	100	--	250	30	10

Station Name	Date of Sampling	Parameters Concentration in mg/Liter (Except pH)					
		pH	TSS	TDS	COD	BOD	Oil & Grease
		(at 25 ⁰ C)	At 105 ⁰ C	at 180 ⁰ C			
JVR OC -I &II OB Dump Runoff / Settling Pond Outlet (EW-08)	15.04.2022	7.4	18	1148	30	3.1	<1
	30.04.2022	7.4	18	1148	30	3.1	<1
	14.05.2022	7.9	16	1678	31	3.4	<1
	30.05.2022	7.6	17	1436	27	2.9	<1
	15.06.2022	7.5	15	1246	25	2.7	<1
	30.06.2022	7.6	23	1021	21	2.0	<1
	15.07.2022	7.8	15	918	16	2.0	<1
	30.07.2022	7.3	20	929	18	2.0	<1
	14.08.2022	7.5	10	876	16	2.0	<1
	30.08.2022	7.7	13	847	25	2.8	<1
	14.09.2022	7.2	11	645	22	2.4	<1
	30.09.2022	7.1	12	672	23	2.4	<1
	15.10.2022	7.5	18	639	20	3.2	<1
	31.10.2022	7.7	15	679	21	3.2	<1
	15.11.2022	7.9	13	701	18	2.8	<1
	30.11.2022	7.2	17	769	14	2.0	<1
	15.12.2022	7.1	12	732	16	2.2	<1
	30.12.2022	7.6	11	713	24	2.2	<1
	13.01.2023	7.8	10	689	21	3.0	<1
	30.01.2023	7.9	16	709	22	3.2	<1
	15.02.2023	7.9	10	744	24	3.4	<1
	28.02.2023	7.5	21	762	23	3.2	<1
	15.03.2023	7.4	16	782	19	2.8	<1
	31.03.2023	7.5	10	743	22	3.0	<1
Standards as per GSR 742 (E) & GSR 801 (E)		5.5 to 9.0	100	--	250	30	10

Station Name	Date of Sampling	Parameters Concentration in mg/Liter (Except pH)					
		pH	TSS	TDS	COD	BOD	Oil & Grease
		(at 25 ⁰ C)	At 105 ⁰ C	at 180 ⁰ C			
JVR OC -I &II Base Workshop ETP Outlet (EW7)	15.04.2022	7.5	15	1089	31	3.4	3.9
	30.04.2022	7.5	24	1082	29	3.0	4.7
	14.05.2022	7.8	21	1147	33	3.6	5.3
	30.05.2022	7.6	18	1122	26	2.8	4.9
	15.06.2022	8.2	14	976	22	2.2	4.1
	30.06.2022	7.7	12	939	15	2.0	4.6
	15.07.2022	7.8	16	946	16	2.0	3.5
	30.07.2022	7.7	14	942	15	2.0	4.1
	14.08.2022	7.5	11	874	22	2.4	3.6
	30.08.2022	7.9	19	825	19	2.0	4.4
	14.09.2022	6.9	17	726	18	2.0	3.1
	30.09.2022	7.1	15	624	21	2.0	3.4
	15.10.2022	7.8	21	646	24	3.9	4.5
	31.10.2022	7.7	18	715	22	3.5	4.1
	15.11.2022	6.6	24	843	23	3.6	3.9
	30.11.2022	6.9	18	871	21	3.4	3.1
	15.12.2022	7.5	13	815	18	2.8	2.9
	30.12.2022	7.3	9	764	22	3.2	2.6
	13.01.2023	7.5	16	779	23	3.4	3.3
	30.01.2023	7.4	19	723	26	3.8	3.4
	15.02.2023	7.5	17	731	23	3.2	3.0
	28.02.2023	7.3	11	782	16	2.0	2.4
	15.03.2023	7.9	21	763	23	3.2	3.3
	31.03.2023	7.5	13	727	25	3.4	3.1
Standards as per GSR 742 (E) & GSR 801 (E)		5.5 to 9.0	100	--	250	30	10

Physico-Chemical and Biological characteristics of Effluent samples collected at Kothagudem area

S.No	Test Parameter (s)	Unit	Test Method	Standards Part –A: Effluents (GSR 801) (E)			Result		
				Inland surface water	Public sewers	Land for irrigation	JVR OC -I &II Base Workshop ETP Outlet (EW7)	JVR OC – I&II Mine Discharge (EW-6)	JVR OC -I &II OB Dump Runoff / Settling Pond Outlet (EW-08)
				(a)	(b)	(c)	EW-07	EW-06	EW-08
1	Colour	CU	2120. B	*	--	*	10	5	10
2	Odour	TON	2150. B	*	--	*	No odour observed	No odour observed	No odour observed
3	Total Suspended Solids	mg/L	2540. D	100	600	200	28	23	37
4	Particle size of suspended solids	mg/L		Shall pass 850 Micron IS sieve	--	--	Pass	Pass	Pass
5	pH	--	4500-H ⁺ B	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	7.4	7.4	7.7
6	Temperature	°C	2550. B	Shall not exceed 5°C above the receiving water temperature	--	--	25.3	25.4	25.1
7	Oil & Grease	mg/L	5520. B	10	20	10	<1	<1	<1
8	Ammonical Nitrogen	mg/L	4500-NH ₃ -C	50	50	--	BDL	BDL	BDL
9	Total Kjeldahl Nitrogen	mg/L	4500-N _{org} .C	100	--	--	BDL	BDL	BDL
10	Free Ammonia	mg/L	4500-NH ₃ -D	5.0	--	--	BDL	BDL	BDL
11	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS:3025	30	350	100	9	11	7
12	Chemical Oxygen Demand	mg/L	5220. D	250	--	--	30	40	24
13	Arsenic as As	mg/L	3120.B	0.2	0.2	0.2	BDL	BDL	BDL
14	Mercury as Hg	µg/L	3500-Hg.B	0.01	0.01	--	BDL	BDL	BDL
15	Lead as Pb	mg/L	3120.B	0.1	1.0	--	BDL	BDL	BDL
16	Cadmium as Cd	mg/L	3120.B	2.0	1.0	--	BDL	BDL	BDL
17	Hexavalent Chromium as Cr ⁺⁶	mg/L	3500-Cr ⁺⁶ .B	0.1	2.0	--	BDL	BDL	BDL
18	Total Chromium as Cr	mg/L	3120.B	2.0	2.0	--	BDL	BDL	BDL

S.No	Test Parameter (s)	Unit	Test Method	Standards Part –A: Effluents (GSR 801) (E)			Result		
				Inland surface water	Public sewers	Land for irrigation	JVR OC -I &II Base Workshop ETP Outlet (EW7)	JVR OC – I&II Mine Discharge (EW-6)	JVR OC -I &II OB Dump Runoff / Settling Pond Outlet (EW-08)
				(a)	(b)	(c)	EW-07	EW-06	EW-08
19	Copper as Cu	mg/L	3120.B	3.0	3.0	--	BDL	0.06	BDL
20	Zinc as Zn	mg/L	3120.B	5.0	15	--	0.05	0.28	0.27
21	Selenium as Se	mg/L	3120.B	0.05	0.05	--	BDL	BDL	BDL
22	Nickel as Ni	mg/L	3120.B	3.0	3.0	--	BDL	BDL	BDL
23	Fluoride as F ⁻	mg/L	4500-F.C	2.0	15	--	0.48	0.48	0.19
24	Dissolved Phosphates	mg/L	4500-P.D	5.0	--	--	BDL	BDL	BDL
25	Sulphide	mg/L	4500-S ²⁻ .G	2.0	--	--	BDL	BDL	BDL
26	Phenolic Compounds as C ₆ H ₅ OH	mg/L	5530-D	1.0	5.0	--	BDL	BDL	BDL
27	Bio-assay test	% survival	8010 F,G & H	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90 % survival of fish after 96 hours in 100 % effluent	100 % survival of fish after 96 hours in 100 % effluent	90 % survival of fish after 96 hours in 100 % effluent
28	Manganese as Mn	mg/L	3120.B	2	2	--	BDL	BDL	BDL
29	Iron as Fe	mg/L	3120.B	3	3	--	0.64	0.31	0.28
30	Vanadium as V	mg/L	3120.B	0.2	0.2	--	BDL	BDL	BDL
31	Nitrate Nitrogen	mg/L	PDA	10	--	--	3.1	3.6	3.0
32	Total residual chlorine	mg/L	4500-Cl -B	1.0	--	--	BDL	BDL	BDL

BDL: Below Detection Limit. Minimum detection limit: Ammonical Nitrogen – 5 mg/L; Free Ammonia – 0.03mg/L; Arsenic – 0.02 mg /L ; Mercury – 20 µg/L; Lead - 0.04 mg/L; Cadmium – 0.01 mg/L; Hex. Chromium – 0.05 mg/L; Total Chromium – 0.02 mg/L; Copper – 0.02 mg/L; Selenium – 0.04mg /L ; Nickel – 0.03 mg/L; Dissolved Phosphates – 0.02 mg/L; Sulphide – 1 mg/L; Phenols 0.1 mg/L; Manganese – 0.01 mg/L; Iron – 0.02 mg/L; Vanadium- 0.01mg/L; TKN-5 mg/L; Residual free chlorine-1mg/L.

SURFACE WATER DATA FOR THE PERIOD April 2022 to March 2023**Surface Water Sampling Locations**

Sl. No.	Sampling code	Date of Sampling		Sampling Location	Latitude	Longitude
		1 st Quarter	2 nd Quarter			
1.	SW4	01.11.2022	15.02.2023	Kistaram Tank	17°12'35.92"N	80°46'56.30"E
2.	SW5	01.11.2022	15.02.2023	Pedda Cheruvu (Kistaram Village)	17°13'13.812"N	80°46'57.348"E
3.	SW6	01.11.2022	15.02.2023	Chilla Vagu	17°11'46.11"N	80°46'17.79"E
4.	SW7	01.11.2022	15.02.2023	Rajarla Tank	17°10'11.95"N	80°49'15.41"E
5.	SW8	01.11.2022	15.02.2023	Veshyakanthala Cheruvu - Sathupalli	17°12'22.45"N	80°50'48.85"E
6.	SW9	01.11.2022	15.02.2023	Tamara Cheruvu	17°13'21.28"N	80°49'24.81"E
7.	SW10	01.11.2022	15.02.2023	Cherukupalli Tank	17°15'30.85"N	80°47'8.68"E
8.	SW11	01.11.2022	15.02.2023	Yedutla Cheruvu	17°12'34.92"N	80°44'36.64"E
9.	SW12	01.11.2022	15.02.2023	Guruvai Cheruvu	17°13'18.42"N	80°44'30.26"E
10.	SW-13*	--	15.02.2023	Pedda Cheruvu (Choudavaram)	17°10'23.89"N	80°46'8.31"E

**New location collected in February 2023*

Physico-Chemical and Bacteriological Characteristics of Surface Water
Physico-Chemical and Bacteriological Characteristics of Surface Water as per CPCB Water Quality Criteria

S. No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT					
				Class A	Class B	Class C	Class D	Class E	SW-4 Kistaram Tank		SW-5 Pedda Cheruvu (Kistaram)		SW-6 Chilla Vagu	
									1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
1	pH	-	4500-H ⁺ B	6.5-8.5	6.5-8.5	6.0–9.0	6.5-8.5	6.0-8.5	8.1	7.5	8.1	7.6	6.6	6.8
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	685	1054	386	610	1520	1348
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	6.0	5.2	6.3	5.7	5.8	5.6
4	Bio chemical Oxygen Demand (3 days 27° C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	3.0	3.0	2.6	2.8	3.0	3.4
5	Total Coliforms	MPN/100mL	9221B	50 or less	500 or less	5000 or less	-	-	280	280	170	220	340	540
6	Free Ammonia (as N)	mg/L	4500-NH ₃ -F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	BDL	0.26	0.16	0.32	0.27	0.13
8	SAR	-	-	-	-	-	-	Less than 26	1.48	1.85	0.93	1.34	2.32	0.86

S. No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT					
				Class A	Class B	Class C	Class D	Class E	SW-7 Rajarla Tank		SW-8 Veshyakanthala Cheruvu		SW-9 Tamara Cheruvu	
									1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
1	pH	-	4500-H ⁺ B	6.5-8.5	6.5-8.5	6.0–9.0	6.5-8.5	6.0-8.5	8.0	8.2	8.2	8.2	8.3	8.0
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	336	490	420	604	392	542
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	6.1	5.9	6.0	5.9	6.3	5.2
4	Bio chemical Oxygen Demand (3 days 27° C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	2.4	1.7	3.0	2.4	3.0	2.8
5	Total Coliforms	MPN/100mL	9221B	50 or less	500 or less	5000 or less	-	-	220	110	220	170	130	220
6	Free Ammonia (as N)	mg/L	4500-NH ₃ -F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.31	0.19	0.05	0.23	BDL	0.18
8	SAR	-	-	-	-	-	-	Less than 26	3.15	1.34	1.36	1.41	1.05	1.38

S. No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT							
				Class A	Class B	Class C	Class D	Class E	SW-10 Cherukupalli		SW-11 Yedutla Cheruvu		SW-12 Guruvai Cheruvu		SW-13 Pedda Cheruvu (Choudavaam)	
									1.11.2 2	15.02.2 3	1.11.2 2	15.02. 23	1.11.2 2	15.02.2 3	1.11 .22	15.02 .23
1	pH	-	4500-H ⁺ B	6.5-8.5	6.5-8.5	6.0-9.0	6.5-8.5	6.0-8.5	7.7	7.8	8.3	7.8	8.5	7.9	--	7.7
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	415	437	659	917	275	464	--	705
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	5.9	5.9	5.6	5.6	6.0	6.1	--	6.1
4	Bio chemical Oxygen Demand (3 days 27° C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	2.2	2.1	2.2	3.4	2.6	1.5	--	1.7
5	Total Coliforms	MPN/ 100mL	9221B	50 or less	500 or less	5000 or less	-	-	140	130	140	280	170	70	--	130
6	Free Ammonia (as N)	mg/L	4500-NH ₃ -F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.07	0.11	0.06	0.09	BDL	0.21	--	0.13
8	SAR	-	-	-	-	-	-	Less than 26	0.94	1.16	2.11	2.72	0.68	1.18	--	1.79

Physico-Chemical Characteristics of Surface Water at Selected Locations in the Study Area

S. No	Parameters	Unit	Test Method	SW-4 Kistaram Tank		SW-5 Pedda Cheruvu(Kistaram)		SW-6 Chilla Vagu	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
1	Colour	Hazen	2120. B	5	10	10	10	5	10
2.	Odour	TON	2150. B	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed
3.	Temperature	°C	2550. B	25.3	25.0	25.3	25.1	25.0	25.2
4.	Turbidity	NTU	2130. B	1.3	2.1	1.7	1.8	2.1	2.4
5.	Total Dissolved Solids at 180° C	mg/L	2540.C	404	613	229	355	897	784
6.	Total Suspended Solids at 105° C	mg/L	2540. D	19	31	35	28	27	35
7.	Chemical Oxygen Demand	mg/L	5220. D	28	28	20	28	28	32
8.	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	79	129	52	77	186	84
9.	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	100	84	35	51	364	139
10.	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	0.46	0.62	0.27	0.34	0.69	0.82
11.	Calcium as Ca	mg/L	3500-Ca.B	36	76	26	40	37	150
12.	Magnesium as Mg	mg/L	3500-Mg.B	33	56	15	30	97	95
13.	Sodium as Na	mg/L	3500-Na.B	51	87	24	46	118	55
14.	Potassium as K	mg/L	3500-K.B	5.1	3.8	7.9	2.9	11.9	5.8
15.	Nitrites as NO ₂	mg/L	4500-NO ₂ ⁻ .B	2.5	BDL	BDL	BDL	BDL	BDL
16.	Nitrates as NO ₃	mg/L	4500-NO ₃ ⁻ .B	4.3	16.3	5.7	2.9	11.8	31
17.	Total Phosphates	mg/L	4500-P-D	BDL	0.13	BDL	0.11	BDL	0.14
18.	Ammonical Nitrogen as NH ₃ -N	mg/L	4500-NH ₃ -C	BDL	BDL	BDL	BDL	BDL	BDL
19.	Phenolic compounds as C ₆ H ₅ OH	mg/L	5530-D	BDL	BDL	BDL	BDL	BDL	BDL
20.	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1	<1	<1
21.	Carbonates as CO ₃	mg/L	2320. B	Nil	Nil	Nil	Nil	Nil	Nil
22.	Bi-carbonates as HCO ₃	mg/L	2320. B	128	255	90	165	85	360
23.	Fecal Coliforms	MPN/100mL	9221 E	33	17	17	11	23	70
24.	Zinc as Zn	mg/L	3120. B	0.22	0.11	0.25	0.22	0.15	0.15

S. No	Parameters	Unit	Test Method	SW-4 Kistaram Tank		SW-5 Pedda Cheruvu(Kistaram)		SW-6 Chilla Vagu	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
25.	Iron as Fe	mg/L	3120. B	0.70	0.55	0.45	0.48	0.38	0.38
26.	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
27.	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL		BDL
28.	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
29.	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
30.	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
31.	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL
32.	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL

S. No	Parameters	Unit	Test Method	SW-7 Rajarla Tank		SW-8 Veshyakanthala Cheruvu		SW-9 Tamara Cheruvu	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
1.	Colour	Hazen	2120. B	10	5	10	5	10	5
2.	Odour	TON	2150. B	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed
3.	Temperature	°C	2550. B	24.8	25.0	25.0	25.1	25.4	25.0
4.	Turbidity	NTU	2130. B	1.4	1.1	2.1	1.3	1.8	1.2
5.	Total Dissolved Solids at 180° C	mg/L	2540.C	192	285	245	351	230	315
6.	Total Suspended Solids at 105° C	mg/L	2540. D	19	19	27	22	36	20
7.	Chemical Oxygen Demand	mg/L	5220. D	20	20	32	24	24	28
8.	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	48	43	66	72	44	67
9.	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	12	17	9	28	22	36
10.	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	0.41	0.19	0.44	0.21	0.22	0.38
11.	Calcium as Ca	mg/L	3500-Ca.B	20	30	36	36	22	34
12.	Magnesium as Mg	mg/L	3500-Mg.B	9.7	21	8.5	27	15	26
13.	Sodium as Na	mg/L	3500-Na.B	24	39	35	46	26	44

S. No	Parameters	Unit	Test Method	SW-7 Rajarla Tank		SW-8 Veshyakanthala Cheruvu		SW-9 Tamara Cheruvu	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
14.	Potassium as K	mg/L	3500-K.B	5.4	1.6	4.9	2	7.8	2.4
15.	Nitrites as NO ₂	mg/L	4500-NO ₂ ⁻ .B	2.8	BDL	2.3	BDL	0.13	BDL
16.	Nitrates as NO ₃	mg/L	4500-NO ₃ ⁻ .B	4.1	5.7	4.5	4.6	5.6	6.2
17.	Total Phosphates	mg/L	4500-P-D	BDL	0.21	BDL	0.15	BDL	0.17
18.	Ammonical Nitrogen as NH ₃ -N	mg/L	4500-NH ₃ -C	BDL	BDL	BDL	BDL	BDL	BDL
19.	Phenolic compounds as C ₆ H ₅ OH	mg/L	5530-D	BDL	BDL	BDL	BDL	BDL	BDL
20.	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1	<1	<1
21.	Carbonates as CO ₃	mg/L	2320. B	Nil	Nil	Nil	Nil	Nil	Nil
22.	Bi-carbonates as HCO ₃	mg/L	2320. B	95	200	109	220	104	145
23.	Fecal Coliforms	MPN/100mL	9221 E	14	14	33	14	11	11
24.	Zinc as Zn	mg/L	3120. B	0.32	0.13	0.16	0.19	0.08	0.21
25.	Iron as Fe	mg/L	3120. B	0.56	0.53	0.85	0.35	0.20	0.66
26.	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
27.	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
28.	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
29.	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
30.	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL
31.	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL
32.	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL

S. No	Parameters	Unit	Test Method	SW-10 Cherukupalli		SW-11 Yedutla Cheruvu		SW-12 Guruvai Cheruvu		SW-13 Pedda Cheruvu (Choudavaam)	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
1.	Colour	Hazen	2120. B	10	5	10	5	10	5	--	5
2.	Odour	TON	2150. B	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	No odour observed	--	No odour observed
3.	Temperature	°C	2550. B	25.3	25.0	25.4	25.1	25.5	25.4	--	25.0
4.	Turbidity	NTU	2130. B	1.6	0.9	2.4	1.5	1.3	1.0	--	0.1
5.	Total Dissolved Solids at 180° C	mg/L	2540.C	241	254	388	533	162	270	--	410
6.	Total Suspended Solids at 105° C	mg/L	2540. D	30	25	18	20	27	20	--	25
7.	Chemical Oxygen Demand	mg/L	5220. D	24	24	20	30	24	20	--	24
8.	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	55	43	121	159	41	29	--	92
9.	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	3	28	11	49	1.8	23	--	42
10.	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	0.25	0.27	0.44	0.49	0.18	0.21	--	0.23
11.	Calcium as Ca	mg/L	3500-Ca.B	34	30	46	46	26	26	--	42
12.	Magnesium as Mg	mg/L	3500-Mg.B	17	21	24	33	10	18	--	30
13.	Sodium as Na	mg/L	3500-Na.B	27	34	71	99	16	32	--	62
14.	Potassium as K	mg/L	3500-K.B	2	1.8	2.1	3.8	1.7	1.4	--	3.5
15.	Nitrites as NO ₂ ⁻	mg/L	4500-NO ₂ ⁻ .B	0.09	BDL	0.31	BDL	0.75	BDL	--	BDL
16.	Nitrates as NO ₃ ⁻	mg/L	4500-NO ₃ ⁻ .B	6.6	4.6	3.5	11.6	5	3.9	--	7.2
17.	Total Phosphates	mg/L	4500-P-D	BDL	0.09	BDL	0.59	BDL	0.12	--	0.11
18.	Ammonical Nitrogen as NH ₃ -N	mg/L	4500-NH ₃ -C	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
19.	Phenolic compounds as C ₆ H ₅ OH	mg/L	5530-D	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
20.	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1	<1	<1	--	<1
21.	Carbonates as CO ₃	mg/L	2320. B	Nil	Nil	Nil	Nil	Nil	Nil	--	Nil
22.	Bi-carbonates as HCO ₃	mg/L	2320. B	147	140	176	195	90	215	--	205
23.	Fecal Coliforms	MPN/100mL	9221 E	22	6.8	21	33	22	4.5	--	11
24.	Zinc as Zn	mg/L	3120. B	0.04	0.18	BDL	0.25	0.18	0.11	--	0.19

S. No	Parameters	Unit	Test Method	SW-10 Cherukupalli		SW-11 Yedutla Cheruvu		SW-12 Guruvai Cheruvu		SW-13 Pedda Cheruvu (Choudavaam)	
				1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23	1.11.22	15.02.23
25.	Iron as Fe	mg/L	3120. B	0.44	0.42	0.33	0.37	0.92	0.54	--	0.48
26.	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
27.	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
28.	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
29.	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
30.	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
31.	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL
32.	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL	BDL	BDL	--	BDL

Physical-Chemical and Bacteriological Characteristics of Surface Water at Selected Locations in the Study Area

Sl.No	Parameters	Unit	Test Method	CPCB Water Quality Criteria					RESULT			
				Class A	Class B	Class C	Class D	Class E	SW-4 Yedutla Cheruvu		SW-2 (Kistaram Tank)	
									24.05.2022	23.08.2022	24.05.2022	23.08.2022
1	pH	-	4500-H ⁺ B	6.5-8.5	6.5-8.5	6.0 – 9.0	6.5-8.5	6.0-8.5	7.4	7.6	7.1	7.6
2	Electrical Conductivity	µmhos/cm	2510-B	-	-	-	-	2250 µmhos/cm	672	365	610	560
3	Dissolved Oxygen (DO)	mg/L	4500-O.C	6 mg/l or more	5 mg/l or more	4 mg/l or more	4 mg/l or more	-	5.9	6.4	5.9	6.1
4	Bio chemical Oxygen Demand (3 days 27 ^o C)	mg/L	IS: 3025	2 mg/l or less	3 mg/l or less	3 mg/l or less	-	-	3.8	3.2	3.0	2.8
5	Total Coliforms	MPN/100mL	9221A & B	50 or less	500 or less	5000 or less	-	-	350	280	220	170
6	Free Ammonia (as N)	mg/L	4500-NH ₃ -F	-	-	-	1.2 mg/L or less	-	BDL	BDL	BDL	BDL
7	Boron as B	mg/L	3120-B	-	-	-	-	Less than 2 mg/L	0.22	0.18	0.09	0.27
8	SAR	-	-	-	-	-	-	Less than 26	1.09	2.72	0.83	1.46

Physico-Chemical Characteristics of Surface Water at Selected Locations in the Study Area

Sl. No	Parameters	Unit	Test Method	RESULT			
				SW-4 (Yedutla Cheruvu)		SW-2 (Kistaram Tank)	
				24.05.2022	23.08.2022	24.05.2022	23.08.2022
1	Colour	Pt-co	2120. B	15	5	10	10
2	Odour	TON	2150. B	No odour Observed	No odour observed	No odour Observed	No odour observed
3	Temperature	°C	2550. B	25.3	25.1	25.8	25.1
4	Total Dissolved Solids at 180° C	mg/L	2540.C	392	224	364	342
5	Total Suspended Solids at 105° C	mg/L	2540. D	21	27	15	28
6	Chemical Oxygen Demand	mg/L	5220. D	26	22	20	14
7	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	85	55	92	55
8	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	18	9	17	13
9	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	0.84	0.36	0.99	0.21
10	Calcium as Ca	mg/L	3500-Ca.B	26	12	49	40
11	Magnesium as Mg	mg/L	3500-Mg.B	37	7	30	32
12	Sodium as Na	mg/L	3500-Na.B	37	48	30	51
13	Nitrites as NO ₂	mg/L	4500-NO ₂ ⁻ .B	BDL	BDL	BDL	BDL
14	Nitrates as NO ₃	mg/L	4500-NO ₃ ⁻ .B	7.9	6.8	3.4	10
15	Total Phosphates	mg/L	4500-P-D	BDL	BDL	BDL	BDL
16	Ammonical Nitrogen as NH ₃ -N	mg/L	4500-NH ₃ -C	BDL	BDL	BDL	BDL
17	Oil & Grease	mg/L	5520. B	<1	<1	<1	<1
18	Fecal Coliform	MPN/100mL	9221 E	110	46	70	21
19	Zinc as Zn	mg/L	3120. B	0.38	0.19	0.17	0.26
20	Iron as Fe	mg/L	3120. B	0.96	0.41	0.6	0.32
21	Arsenic as As	mg/L	3120. B	BDL	BDL	BDL	BDL
22	Lead as Pb	mg/L	3120. B	BDL	BDL	BDL	BDL
23	Cadmium as Cd	mg/L	3120. B	BDL	BDL	BDL	BDL
24	Total Chromium as Cr	mg/L	3120. B	BDL	BDL	BDL	BDL
25	Nickel as Ni	mg/L	3120. B	BDL	BDL	BDL	BDL
26	Copper as Cu	mg/L	3120-B	BDL	BDL	BDL	BDL
27	Selenium as Se	mg/L	3120-B	BDL	BDL	BDL	BDL

GROUND WATER DATA FOR THE PERIOD Apr '2022 – Sep'2022
Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area
Organoleptic and Physical Parameters

S.No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-3 (Vengalaraonagar)		GW-5 (Pallewada Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1.	Colour	Pt-co-	2120. B	5	15	<5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
3.	pH	-	4500-H ⁺ B	6.5 to 8.5	No relaxation	7.0	7.1	6.6	7.0
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
5.	Turbidity	NTU	2130. B	1	5	0.41	0.32	0.7	0.44
6.	Total Dissolved Solids at 180° C	mg/L	2540.C	500	2000	753	716	782	1480

S.No .	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-4 (Rejarla Village)		GW-6 (Kistaram Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1.	Colour	Pt-co-	2120. B	5	15	<5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
3.	pH	-	4500-H ⁺ B	6.5 to 8.5	No relaxation	7.2	7.8	7.0	7.5
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.
5.	Turbidity	NTU	2130. B	1	5	0.6	0.64	0.38	0.26
6.	Total Dissolved Solids at 180° C	mg/L	2540.C	500	2000	860	875	868	1184

General Parameters Concerning Substances Undesirable in Excessive Amounts

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-3 (Vengalraonagar)		GW-5 (Pallewada Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1.	Calcium as Ca	mg/L	3500-Ca.B	75	200	103	76	83	260
2.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	40	57	37	125
3.	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	250	1000	137	121	140	415
4.	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	200	400	22	28	42	64
5.	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	1.0	1.5	0.95	0.59	1.04	0.97
6.	Nitrates as NO ₃	mg/L	4500-NO ₃ ⁻ .B	45	No relaxation	27	46	32	54
7.	Residual free chlorine	mg/L	4500-Cl ⁻ .B	0.2	1.0	BDL	BDL	BDL	BDL
8.	Phenolic compounds as C ₆ H ₅ OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL
9.	Total Alkalinity as CaCO ₃	mg/L	2320. B	200	600	345	325	410	375
10.	Total Hardness as CaCO ₃	mg/L	2340. C	200	600	422	425	359	750
11.	Aluminium as Al	mg/L	3120-B	0.03	0.2	0.07	0.09	BDL	BDL
12.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.16	0.38	0.32	0.16
13.	Boron as B	mg/L	3120-B	0.5	2.4	0.32	0.24	0.24	0.09
14.	Iron as Fe	mg/L	3120-B	1.0	No relaxation	0.71	0.28	0.35	0.52
15.	Zinc as Zn	mg/L	3120-B	5	15	0.36	0.26	0.17	0.12
16.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL
17.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL
18.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
19.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-4 (Rejarla Village)		GW-6 (Kistaram Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1.	Calcium as Ca	mg/L	3500-Ca.B	75	200	150	84	67	146
2.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	46	63	42	110
3.	Chlorides as Cl ⁻	mg/L	4500-Cl ⁻ .B	250	1000	177	249	224	301
4.	Sulphates as SO ₄ ²⁻	mg/L	4500-SO ₄ ²⁻ .E	200	400	55	36	64	128
5.	Fluoride as F ⁻	mg/L	4500-F ⁻ .C	1.0	1.5	1.14	0.45	0.83	0.75
6.	Nitrates as NO ₃	mg/L	4500-NO ₃ ⁻ .B	45	No relaxation	36	11	39	30
7.	Residual free chlorine	mg/L	4500-Cl ⁻ .B	0.2	1.0	BDL	BDL	BDL	BDL
8.	Phenolic compounds as C ₆ H ₅ OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL
9.	Total Alkalinity as CaCO ₃	mg/L	2320. B	200	600	470	400	465	425
10.	Total Hardness as CaCO ₃	mg/L	2340. C	200	600	564	470	340	820
11.	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	0.06	0.06
12.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.2	0.31	0.2	0.22
13.	Boron as B	mg/L	3120-B	0.5	2.4	0.29	0.11	0.18	0.27
14.	Iron as Fe	mg/L	3120-B	1.0	No relaxation	0.63	0.36	0.66	0.47
15.	Zinc as Zn	mg/L	3120-B	5	15	0.18	0.22	0.26	0.27
16.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL
17.	Manganese as Mn	mg/L	3120-B	0.1	0.3	BDL	BDL	BDL	BDL
18.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
19.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL

Parameters Concerning Toxic Substances

S.No	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-3 (Vengalaraonagar)		GW-5 (Pallewada Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL
2	Cyanide as CN-	mg/L	4500-CN.F	0.05	No relaxation	BDL	BDL	BDL	BDL
3	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
4	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL
5	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL
6	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL
7	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL
8	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL
9	Pesticides: α-BHC, β-BHC, γ-BHC, δ-BHC, o, p-DDT, p, p'-DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND
	2,4-D, Carbaryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND
10	Polyaromatic Hydrocarbons (PAH's): Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenzo (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-4 (Rejarla Village)		GW-6 (Kistaram Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1.	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL
2.	Cyanide as CN-	mg/L	4500-CN.F	0.05	No relaxation	BDL	BDL	BDL	BDL
3.	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL
4.	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL
5.	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL
6.	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL
7.	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL
8.	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL
9.	Pesticides: α-BHC, β-BHC, γ-BHC, δ-BHC, o, p-DDT, p, p' -DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND
	2,4-D, Carbaryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative Analysis	6630. D	Absent	0.001	ND	ND	ND	ND
10.	Polyaromatic Hydrocarbons (PAH's): Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND

Bacteriological Quality of Drinking water

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-3 (Vengalraonagar)		GW-5 (Pallewada Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1	Total Coliforms	MPN/100 mL	9221 B	-	-	<1.8	<1.8	<1.8	<1.8
2	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT			
						GW-4 (Rejarla Village)		GW-6 (Kistaram Village)	
						24.05.2022	23.08.2022	24.05.2022	23.08.2022
1	Total Coliforms	MPN/100 mL	9221B	-	-	<1.8	<1.8	<1.8	<1.8
2	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8

GROUND WATER DATA FOR THE PERIOD Oct '2022 – Mar'2023
Groundwater Sampling Locations

Sl. No.	Sampling code	Date of Sampling		Sampling Location	Latitude	Longitude
		1 st Quarter	2 nd Quarter			
1	GW5	01.11.2022	15.02.2023	Rejarla Village	17°10'10.35"N	80°48'15.06"E
2	GW6	01.11.2022	15.02.2023	NTR Nagar	17°12'1.05"N	80°49'46.09"E
3	GW7	01.11.2022	15.02.2023	Kistaram Village	17°12'29.03"N	80°46'39.52"E

Physico-Chemical, Bacteriological Characteristics of Groundwater Collected within the Study Area
Organoleptic and Physical Parameters

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-5 Rejarla Village		GW-6 NTR Nagar		GW-7 Kistaram Village	
						01.11.2022	15.02.2023	01.11.2022	15.02.2023	01.11.2022	15.02.2023
1.	Colour	Hazen	2120. B	5	15	<5	<5	<5	<5	<5	<5
2.	Odour	TON	2150. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.
3.	pH	-	4500-H ⁺ B	6.5 to 8.5	No relaxation	7.3	6.9	6.5	6.6	7.2	7.0
4.	Taste	FTN	2160. B	Agreeable	Agreeable	Agree.	Agree.	Agree.	Agree.	Agree.	Agree.
5.	Turbidity	NTU	2130. B	1	5	0.39	0.2	0.62	0.35	0.38	0.28
6.	Total Dissolved Solids at 180° C	mg/L	2540.C	500	2000	626	795	680	652	986	715

General Parameters Concerning Substances Undesirable in Excessive Amounts

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-5		GW-6		GW-7	
						Rejarla Village		NTR Nagar		Kistaram Village	
						01.11.2022	15.02.2023	01.11.2022	15.02.2023	01.11.2022	15.02.2023
1.	Calcium as Ca	mg/L	3500-Ca.B	75	200	80	100	54	70	46	94
2.	Magnesium as Mg	mg/L	3500-Mg.B	30	100	56	74	39	68	91	68
3.	Chlorides as Cl-	mg/L	4500-Cl-.B	250	1000	124	129	152	139	254	86
4.	Sulphates as SO42-	mg/L	4500-SO42-.E	200	400	46	78	90	57	215	82
5.	Fluoride as F-	mg/L	4500-F-.C	1.0	1.5	0.91	0.61	0.67	0.38	0.49	0.87
6.	Nitrates as NO3	mg/L	4500-NO3-.B	45	No relaxation	13	41	50	41	50	40
7.	Total Alkalinity as CaCO3	mg/L	2320. B	200	600	389	425	311	300	313	445
8.	Total Hardness as CaCO3	mg/L	2340. C	200	600	430	554	295	455	490	515
9.	Sulphide as H2S	mg/L	4500-S2-F&D	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
10.	Total Ammonia-N	mg/L	IS 3025 (Part 34)	0.5	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
11.	Phenolic compounds as C6H5OH	mg/L	5530-D	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL
12.	Residual free chlorine	mg/L	4500-Cl-.B	0.2	1.0	BDL	BDL	BDL	BDL	BDL	BDL
13.	Mineral oil	mg/L	IS:3025 (part 39)	0.5	No relaxation	absent	absent	absent	Absent	absent	Absent
14.	Anionic Detergents (as MBAS)	mg/L	IS:13428:2005K	0.2	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
15.	Aluminium as Al	mg/L	3120-B	0.03	0.2	BDL	BDL	0.04	BDL	0.05	0.05
16.	Barium as Ba	mg/L	3120. B	0.7	No relaxation	0.27	0.21	0.28	0.16	0.14	0.28
17.	Boron as B	mg/L	3120-B	0.5	2.4	0.35	0.17	0.40	0.21	0.22	0.09
18.	Iron as Fe	mg/L	3120-B	1.0	No relaxation	0.55	0.45	0.44	0.56	0.26	0.68
19.	Zinc as Zn	mg/L	3120-B	5	15	0.15	0.15	0.29	0.09	0.50	0.15
20.	Copper as Cu	mg/L	3120-B	0.05	1.5	BDL	BDL	BDL	BDL	BDL	BDL
21.	Manganese as Mn	mg/L	3120-B	0.1	0.3	0.1	BDL	BDL	BDL	0.11	BDL
22.	Selenium as Se	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
23.	Silver as Ag	mg/L	3120. B	0.1	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL

Parameters Concerning Toxic Substances

S.No	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-5		GW-6		GW-7	
						Rejarla Village		NTR Nagar		Kistaram Village	
						01.11.2022	15.02.2023	01.11.2022	15.02.2023	01.11.2022	15.02.2023
1.	Cadmium as Cd	mg/L	3120-B	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
2.	Cyanide as CN-	mg/L	4500-CN-.F	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
3.	Lead as Pb	mg/L	3120-B	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
4.	Molybdenum as Mo	mg/L	3120. B	0.07	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
5.	Nickel as Ni	mg/L	3120-B	0.02	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
6.	Total Arsenic as As	mg/L	3120-B	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL
7.	Total Chromium as Cr	mg/L	3120-B	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
8.	Mercury as Hg	µg/L	3500-Hg.B	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL
9.	Pesticides: α-BHC, β-BHC, γ-BHC, δ-BHC, o, p-DDT, p, p' -DDT, Endosulfan, β- Endosulfan, Aldrin, Dieldrin	µg/L	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
	2,4-D, Carbaryl (Carbonate) Malathion Methyl Parathion Anilophos, Chloropyriphos	Qualitative analysis	6630. D	Absent	0.001	ND	ND	ND	ND	ND	ND
10.	Polyaromatic Hydrocarbons (PAH's): Acenaphthene, Acenaphthylene, Anthracene, B(a)A, B(a)P, B(b)F, B(k)F, Pyrene, Dibenz (a,h) anthracene, Fluoranthene, Fluorene, Indeno (1,2,3-(d) Pyrene, Naphthalene, Phenanthrene, Pyrene, Methyl Naphthalene	µg/L	6440.C	--	--	ND	ND	ND	ND	ND	ND

Bacteriological Quality of Drinking water

S. No.	Parameters	Unit	Test Method	IS: 10500 Requirement (Acceptable Limit)	IS: 10500 Permissible Limit in the absence of alternate source	RESULT					
						GW-5 Rejarla Village		GW-6 NTR Nagar		GW-7 Kistaram Village	
						01.11.2022	15.02.2023	01.11.2022	15.02.2023	01.11.2022	15.02.2023
1	Total Coliforms	MPN/100 mL	9221B	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
2	Fecal Coliforms	MPN/100 mL	9221 E	-	-	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8

ANNEXURE –III

LAND MANAGEMENT OF THE PROJECT FOR THE YEAR 2022-2023

1	Present status as on 31 st March 2022	The project was commenced on 01.09. 2017
2	Total area of excavation so far.	629.912 Ha.
3	The depth of present workings.	120 Mts
4	Total overburden removed so far	330.850 M.cu.m
5	Volume of OB in external dump	396.870 M.Cu.m.(insitu)
6	Area occupied by internal dump	Nil
7	Total area of external OB dump & height so far	444.35 Ha & 90 mtrs.
8	Top soil preserved for future use	1.887 M.Cu.m

Annexure - IV

Capital & Revenue Expenditure incurred on EMP control measures at JVROC Mine(I&II Expansion) during the year 2022 – 2023

Sl. No	Pollution Control measure	Revenue Expenditure in Rupees
1	Air pollution prevention control measures	211414846
2	Water pollution prevention control measures	69516821
3	Land Development	24003079
4	Plantation	3837931
5	Plant & Machinery for Env.Protection	7451415
6	Others(LPG to employees, CSR&SHAPE works, Env.management cell etc)	219365628
	TOTAL	535589720


 Project Officer
 JVR OC-I&II Mines
 Project Officer
 JVR OC-I & OC-II
 STPL, Kgm Area