

Ref: UPCL/P-I/ENV/EC/MoEF/33/11/2021

Date: 24.11.2021

To,
Additional Principal Chief Conservator of Forest (APCCF)
Ministry of Environment, Forest & Climate Change,
Regional Office (Southern Zone)
Kendriya Sadan, Koramangala,
Bangalore – 560 034

Subject: Submission of Six Monthly EC compliance report & CRZ compliance report for the period of April 2021 to September 2021 for 2x600 MW Thermal Power Plant of Udupi Power Corporation Limited (UPCL)

Reference: Environmental Clearance No: J-13011/23/1996-IA.II (T) Dated: 01.09.2011.
CRZ Clearance No: 11-14/2010-IA-III dated: 18.05.2010

Dear Sir,

With reference to the above subject, please find enclosed herewith the six monthly compliance report for the period of **April 2021 to September 2021** against the conditions of Consolidated Environmental Clearance for **2x600 MW Udupi Thermal Power Plant** and CRZ Clearance of sea water pipe line granted to UPCL through e-mail.

Thanking you,
Yours sincerely,
For **Udupi Power Corporation Limited**



(Santosh Kumar Singh)
Authorized Signatory

Encl: as above

CC:

The Member Secretary
Central Pollution Control Board
Parivesh Bhavan, East Arjun Nagar,
Kendriya Paryavaran Bhavan,
New Delhi – 110 032

Regional Office
Karnataka State Pollution Control Board
Plot no-36-C, Shivalli industrial Area,
Manipal, Udupi – 576 104

The Member Secretary
Karnataka State Pollution Control Board
Parisara Bhavan, #49, 4th & 5th Floor,
Church Street, Bangalore – 560 010

Zonal Office
Central Pollution Control Board
1st and 2nd Floor, Nisarga Bhavan, A-Block,
Thimmaiah Main Road, 7th Cross,
Shivanagar, Bengaluru – 560 010

**SIX MONTHLY COMPLIANCE REPORT
(April 2021 to September 2021)**

Of

**Environmental Clearance for 2x600 MW Thermal Power
Plant and CRZ Clearance of Sea Water Pipeline of
Udupi Power Corporation Limited**

Submitted to

**Regional Office Ministry of Environment, Forest &
Climate Change (MoEF&CC),**

Zonal Office Central Pollution Control Board,

Karnataka State Pollution Control Board

Submitted By



Udupi Power Corporation Limited

Yelluru Village, Pilar Post, Padubidri,

Udupi District, Karnataka

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SIX MONTHLY COMPLIANCE REPORT FROM APRIL 2021 TO SEPTEMBER 2021 FOR ENVIRONMENT CLEARANCE NO J-13011/23/1996-IA.II (T) FOR 2x600 MW UDUPI POWER CORPORATION LIMITED

UDUPI POWER CORPORATION LIMITED (UPCL):

Udupi Power Corporation Limited is a 2X600 MW imported coal based power project in the Udupi District of Karnataka. Situated in the western coastal region of India, the plant is situated in the village of Yellur, between Mangalore and Udupi.

UPCL is the first independent power project (IPP) using 100% imported coal as fuel in the country. The Udupi Power Project supplies 90% of the power it generates to the State of Karnataka.

LOCATION OF THE PROJECT

State	Karnataka
District	Udupi
Village	Yelluru (in Padubidri Industrial Area)
Geographical Coordinates	13°09'00" N 74°47'00" E 13°10'30" N 74°48'40" E

Both units of 600 MW at UPCL has sub critical coal fired steam generator each connected to a reheat type condensing steam turbine and generator with water cooled condenser and all other required auxiliaries. Each steam generator of 600MW is rated to generate about 2028 tons/hour of superheated steam at a pressure of about 175 kg/cm² and superheat temperature of 540°C. The steam generators are equipped with facilities for HFO/LDO firing for startup and flame stabilization at low loads. Each steam turbine is 3000 rpm rated speed, tandem compound, single re-heat, condensing type machine with extractions for regenerative feed water heating. The turbine is designed for main stream pressure of 170 kg/cm² (a) and inlet temperature of 537°C.

Being coastal area with perennial availability of seawater, usage of seawater is envisaged for condenser cooling and fresh water requirement. Re-circulating type of circulating water (CW) system with natural draft cooling towers is installed. Due to availability of Fresh water in this area is seasonal and limited; desalination of seawater is installed for meeting the freshwater requirement for the plant. About 10000 m³/hr of makeup sea water is required for both the Unit-1 & Unit-2.

The plant has all latest Pollution Control Equipment like, High Efficiency ESP's, Flue gas desulphurization plant, Low NO_x burners and 275 m height chimney.

UPCL has obtained Environmental Clearances from Ministry of Environment & Forest (MoEF&CC), Consent to Establish and Consent for Operation (CFO) from Karnataka State Pollution Control Board (KSPCB). UPCL has also obtained all necessary statutory/mandatory clearances.

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Ambient Air quality Monitoring Stations were established in 4 locations inside the plant area for continuous monitoring of Ambient Air Quality. One meteorological station has also been installed for monitoring of meteorological data. UPCL is monitoring the environmental parameters in and around the plant area through NABL accredited Laboratory.

Environmental clearance was accorded to the project for 2x500 MW fully imported coal based units on 20 March 1997. This EC was amended on 25 Jan 1999 and 09 Sept 2009 permitting enhancement of capacity to 2x507.5 MW and subsequently to 2x600 MW. These amendments in EC were consolidated on 01 Sept 2011 by MoEF&CC.

Detailed compliance status of Consolidated Environment Clearance from MoEF&CC for 2X600 MW Coal based Subcritical Thermal Power plant and CRZ clearance from State Coastal Zone Management Authority for Sea Water Pipeline is being furnished herewith.

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S.NO	Conditions	Compliance
A	Specific Conditions	
(I)	All the conditions stipulated by the Karnataka State Pollution Control Board issued from time to time should be strictly implemented including the installation of Flue Gas Desulphurization (FGD) Plant. The status of implementation of FGD shall be submitted to the Regional Office of the Ministry at Bangalore.	Complied. All the conditions stipulated by KSPCB are implemented. FGD units are commissioned and are in operation from the inception of Unit-1 & Unit-2 boilers. Unit-I :11 th November 2010 Unit-II :19 th August 2012
(II)	Sulphur and ash contents in the coal to be used in the project shall not exceed 0.8% and 12 % (average) respectively at any given time. In case of variation of coal quality at any point of time, fresh reference shall be made to the Ministry	Complied for both Sulphur and Ash contents. Average Sulphur and Ash content in coal used for the period of April 2021 to September 2021 is as below: 1. Sulphur Content : 0.48 % 2. Ash Content : 7.33 %
(III)	A single bi-flue stack of 275 m height shall be provided with continuous online monitoring equipment's of SO _x , NO _x and Particulate Matter (PM _{2.5} & PM ₁₀). Exit velocity of flue gases shall not be less than 22 m/sec. Mercury emissions from stack shall also be monitored on periodic basis.	A Single bi-flue stack of 275 m height is provided with continuous online monitoring for SO ₂ , NO _x , Particulate matter and Mercury. Exit velocity of the flue gases from the stack for the period of April 2021 to September 2021 was 22.4 to 25.2 m/s .
(IV)	An instrumented meteorological tower shall be set up for collecting on-site meteorological data.	Complied with. An instrumented meteorological tower is established for online meteorological data. Meteorological data for the period of April 2021 to September 2021 is enclosed as Annexure-I for reference.
(V)	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission from the proposed plant does not exceed	Complied with. High Efficiency Electrostatic Precipitators and low NO _x Burners are installed.

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	50 mg / NM ³ . Low NO _x Burners shall be installed.	Particulate emissions from the plant are well within the limits. Monitoring values for the period of April 2021 to September 2021 is enclosed as Annexure-II for reference.
(VI)	Adequate dust extraction system such as cyclones / bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided.	Complied with. Water Sprinklers are provided in coal yard, coal unloading and coal conveyor systems. Dust Extraction system has been provided at Junction towers. Dry Fog dust suppression system is provided in track hopper and bunkers. Wind Shield has been provided, photograph enclosed in Annexure-III for reference.
(VII)	Transportation of coal from Mangalore Port to the project site shall be undertaken by rail with adequate provisions to prevent fugitive emissions	Complied with. Coal is transported from Mangalore port to plant site is only through rail by BORBN wagons. Wagons are covered with tarpaulin sheets to avoid fugitive emission during transportation.
(VIII)	Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry. Mercury and other heavy metals (As, Hg, Cr, Pb etc.) will be monitored in the bottom ash as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area. To prevent ground water contamination, the ash pond area should be lined with impervious layer.	Complied with. Fly ash is collected in dry form and stored in ash silos. All the generated fly ash is issued to the end users like Cement, RMC, Brick manufactures etc. Fly Ash Utilization details enclosed as Annexure-IV . Ash pond is lined with LDPE film as impervious layer to avoid ground water contamination. Mercury and other heavy metals are monitored in the bottom ash through NABL accredited laboratory. No effluent is emanated from ash pond. No ash is disposed in the low lying areas. Test wells are constructed around the ash pond area for water monitoring and monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-V for reference.
(IX)	The transportation of dry fly ash to the ash disposal area	Complied with.

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	<p>through closed bulkers shall be allowed till 30.03.2012 till the Cement Grinding unit of M/s ACC Ltd. is set up. Monitoring of particulate emissions along the route of transportation shall be carried out</p>	<p>Cement blending unit has installed within the UPCL plant near to Ash silos and ash is transferred from silos to blending unit through closed conduit only.</p> <p>Monitoring is carried out in transportation route.</p> <p>Four numbers of online ambient air quality monitoring stations are established for ambient air quality (AAQ) monitoring. AAQ monitoring is also done in transportation route and buffer zone through MoEF and NABL accredited laboratory. Air monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-VI for reference.</p>
(X)	<p>Extensive monitoring of air quality in and around the power plant and extending up to Western Ghat should be carried out and records should be scientifically maintained. The monitoring Programme should cover the key stone species for any potential acid deposition effects.</p>	<p>Complied with.</p> <p>Air quality monitoring is carried through MoEF and NABL accredited laboratory at 8 locations (extending up to Western Ghats) which is finalized in consultation with KSPCB and the monitoring reports are submitted to the KSPCB office monthly.</p> <p>The Monitoring programme covers till western Ghats and measure Sulphur dioxide and Nitrogen dioxide, as main precursors for acid rain.</p> <p>Key Stone Species Monitoring is carried once in six months. There is no change noticed.</p> <p>Air quality monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-VI for reference.</p>
(XI)	<p>No leachate shall take place at any point of time from the Coal storage area and Ash Pond and adequate safety measures such as lining with impermeable membrane / liner shall be adopted. Precautionary measure shall be taken to protect the ash dyke from getting breached and in-built monitoring mechanism shall be formulated.</p>	<p>Complied with.</p> <p>LDPE film is used as impervious layer to avoid ground water contamination from Coal storage and Ash Pond area.</p> <p>Test wells are constructed around the ash pond area for water monitoring and monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-V for reference.</p>

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(XII)	Fugitive emission of fly ash (dry or wet) shall be controlled so that no agricultural or non-agricultural land is affected. Damage to any land shall be mitigated and suitable compensation provided in consultation with the local Panchayat.	Complied with. Disposal of fly ash is handled through closed conduit within plant. No damage has happened to any land.
(XIII)	COC of at least 1.25 shall be adopted	Complied with.
(XIV)	Closed Circuit Cooling Tower shall be installed and sea water shall be used for cooling purpose. The sweet water requirement shall be met from the desalination plant.	Complied with. Closed circuit cooling tower is provided and sea water is used for cooling purpose. Desalination plant is provided for sweet water requirement.
(XV)	No effluent will be discharged into the Mulki River. The treated effluents shall be discharged through a pipeline in the Arabian Sea ensuring that the differential temperature is maintained at 5° C. The area and location of the intake and discharge point shall be finalized in consultation with the National Institute of Oceanography (NIO), Goa/Central Water and Power Research Station, Pune.	Complied with. No effluent is discharged into the Mulki River and there is no connection of UPCL with Mulki River. All the cooling tower blow down and water outlets are discharged back to the sea from Guard Pond through Coro-coated MS-Pipe line at designated place which is finalized in consultation with NIO. The differential temperature is maintained within 5° C. All the intake and outfall sea water points are finalized as per recommendations of NIO, Goa.
(XVI)	Brine management from desalination plant, its disposal mechanism and status of implementation shall be submitted to the Regional Office of the Ministry from time to time.	Complied with. Guard pond has been established to collect all the water outlets. Brine from desalination plant is sent to Guard pond and discharged to Sea. Continuous online monitoring system implemented in Guard pond, in addition to that water sample is being collected and analyzed once a week by MoEF&CC and NABL accredited laboratory.

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		Guard pond effluent monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-VII for your reference.
(XVII)	Possibility for setting up transit storage within plant site for temperature control of effluent before discharging to the sea shall be examined and details submitted to the Ministry within six months.	Complied with. Guard pond has been established to collect all the water outlets. Treated effluents, including blow down from the cooling towers are sent back to sea via Guard pond. Effluent temperature maintained within 5 ^o C before discharge.
(XVIII)	Monitoring of ground and surface water quality nearby shall be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and or advised by the State Pollution Control Board and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	Complied with. Ground water and Surface water monitoring is carried regularly in the locations finalized in consultation with KSPCB and records are maintained. Monitoring reports are sent to KSPCB once in every month. Monitoring of heavy metals in ground water is carried out monthly. Water monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-VIII for reference.
(XIX)	A well designed rain water harvesting system shall be put in place which shall comprise of rain water collection from the built up and open area in the plant premises. Action plan and road map for implementation shall be submitted to the Regional Office of Ministry.	Three Numbers of Rain water harvesting ponds are constructed to harvest rain water. (Annexure - IX - Photos Attached)
(XX)	The project proponent shall not hamper the vocation of the fishing community in the area (if any) and it shall be ensured that local fishing community shall be allowed to carry out their vocation. Clearance from the Department of Fisheries in	Complied with. Fishing activity is not hampered. Monitoring of sea water around the intake and outfall points is carried regularly through College of Fisheries, Mangalore. NOC obtained from department of Fisheries, State government of Karnataka.

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	the State Govt. shall be obtained.	Clearance letter from department of Fisheries Karnataka state government is enclosed as Annexure-X for reference.		
(XXI)	Acquisition of land should be restricted to 550 ha as per the following breakup:	Complied with. Following is the current status:		
	Plant area	180 Ha	Plant area	170 Ha
	Ash Disposal Area	150 Ha	Ash Disposal Area	46 Ha
	Colony Area	45 Ha	Colony Area	-
	In take pipe route	25 Ha	In take pipe route	15 Ha
	Other requirements	50 Ha	Other requirements	8 Ha
	Rehabilitation, Green belts, Ash utilizations etc.	100 Ha	Rehabilitation, Green belts, Ash utilizations etc.,	82 Ha
(XXII)	Green belt of adequate width and density with suitably selected native species should be developed all around the plant area and the ash disposal site. Density of trees shall not be less than 2000 per ha and survival rate not less than 80%. It shall be ensured that at least 1/3 rd of the total area is utilized for creation of green belt. Adequate financial provision should be made for this purpose.	Complied with. Green belt of about 369405 saplings in 195 acres have been planted. Survival rate of the plantation is ensured more than 80% by taking appropriate after care methods like Watering, apply manure etc. Snapshots of Plantation are enclosed as Annexure-XI for reference. Adequate financial provision for the plantation under Environment budget is made separately. The amount spent for various activities under Environment for the period of April 2021 to September 2021.		
		Description	Amount (Rs.)	
		Afforestation	49,68,526.67	
		Environment Monitoring	37,05,090.50	
		General Environment Management	3,24,97,243.02	
		Total	4,11,70,860.19	
(XXIII)	Local employable youth from Project Affected Family shall be trained in skills relevant to the project for eventual	Complied with. As per the recommendations from KIADB, project affected families are taken on		

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	employment in the project itself. The action taken report and details thereof to this effect shall be submitted to the Regional Office of the Ministry and the State Govt. Dept. concerned from time to time.	employment and provided required trainings and skill developments. The copy of the letter submitted to KIADB is enclosed as Annexure-XII for your reference.
(XXIV)	The project affected people should be rehabilitated and resettled in consultation with the State Govt. of Karnataka. A Rehabilitation Committee should be constituted with representatives from the state of Govt. of Karnataka, affected people, local recognized NGOs, technical institutions, experts etc.	Complied with. Rehabilitation and Resettlement is already provided to the project affected people as per R&R policy of Government of Karnataka.
(XXV)	Status of implementation of R&R including its financial component spent and action pending shall be submitted to the regional Office of the Ministry from time to time.	Complied with.
(XXVI)	Financial requirements for implementations of the environmental mitigative measures should be earmarked and shall not be diverted for the other purposes. Adequate provision should be ensured for enhancement of funds required, if any, in future.	Complied with Financial requirement for Environmental mitigative measures was earmarked at the time of project as per EIA report and measures have been implemented. Operating expenses are earmarked in operation budget on yearly basis. In case of any future requirement funds will be provided as when required.
(XXVII)	The project proponent shall also adequately contribute in the development of the neighboring villages. Special package with implementation schedule for free potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	Complied with. Potable drinking water supply through RO plant is done. The company is also providing assistance in Medical, Education and Infrastructural facilities etc., to the neighboring villages. Scholarships, green nurturing and school grants are also providing to nearby villages.

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(XXVIII)	The project proponent shall formulate sustainable livelihood scheme for landless and marginalized section of society (such as landless farmers) in the area who are directly or indirectly affected due to power project.	Complied with. The Company has engaged local people for various activities like Green belt Development, Area development and other service works like catering etc.,
(XXIX)	At least three nearest village shall be examined for possible adoption and basic amenities like development of roads; drinking water supply, primary health centre, primary school etc shall be developed in co-ordination with the district administration	Complied with. UPCL along with the District Administration has identified various schools in the neighboring villages for adoption and for providing basic amenities like toilet facilities, drinking water, green nurturing, etc.
(XXX)	An amount of Rs. 5.0 Crores shall be earmarked as one time capital cost for CSR programme. Subsequently a recurring expenditure of Rs. 1.0 Crores per annum till the life the plant shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation.	Complied with. Rs.5 crore was earmarked onetime cost for CSR during the project phase stage of 2x600 MW plant. Over Rs.1 crore is earmarked and used for all CSR activities every year.
(XXXI)	CSR scheme shall be identified based on need based assessment in and around the villages within 5.0 km of the site and in constant consultation with the village Panchayat and the District Administration. As part of CSR prior identification of local employable youth and eventual employment in the project as required after imparting relevant training shall be also undertaken as necessary.	Complied with. CSR schemes are identified based on need assessment and constant consultation with village Panchayat and the District Administration. CSR team is engaged for assessment and consultation with local villages for CSR activities on a continuous basis. For local youth, scholarships and various other schemes including trainings are provided so as to get them proper education and getting eventual employment opportunities.

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		Snapshots of CSR activities are enclosed as Annexure-XIII for reference.
(XXXII)	It shall be ensured that in-built monitoring mechanism for the schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time.	Complied with. Socio Economic study was carried at the project time as a part of EIA study. Impact assessment of CSR interventions is periodically done internally.
(XXXIII)	A Monitoring Committee should be constituted for reviewing the compliance to various safeguard measures by involving recognized local NGOs. Pollution Control Board, Institutions, Experts etc.	Monitoring Committee is framed comprises of NGO, College Experts and Institution Experts to review Safeguard measures implemented by UPCL.
B	General Conditions:	
(I)	A Corporate Environmental Policy shall be formulated and after due approval of the Board of Directors of the Company shall be submitted to the Ministry with six months . The policy shall specifically address issues of adherence to environmental policy so formulated and environmental clearance conditions stipulated for the power project and also others including matters related to violations of stipulated conditions (if any) to the Board.	Complied with.
(II)	The treated effluents confirming to the prescribed standards only shall be re-circulated and reused within the plant. Arrangements shall be made that effluents and storm water do not get mixed.	Complied with. All the Effluents are treated through ETP (Effluent Treatment Plant) to meet the effluent standards and the treated water is used for Green belt development/dust suppression.

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(III)	A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt / plantation.	Complied. Modular STP has been installed treating sewage water and discharging for green belt development.
(IV)	A well designed rainwater harvesting shall be constructed. Central Groundwater Authority / Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of issue of clearance and details shall be furnished to the Regional Office of the Ministry.	Three numbers of Rain water harvesting ponds are constructed to harvest rain water. (Annexure IX - Photos Attached)
(V)	Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	Complied with. Adequate safety measures like fire hydrant, fire extinguishers, smoke detectors, hose reel, hose house, water monitor, D.V system, Fire water pump house, fire tenders are available to prevent from spontaneous fires.
(VI)	Storage facilities for auxiliary liquid fuel such as LDO and HFO/LSHS shall be made in the plant area in consultation with Department of Explosives, Nagpur. Sulphur content in the liquid fuel will not exceed 0.5%. Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil.	Storage facilities in the plant for auxiliary liquid fuel are provided and the facilities are approved by Department of Explosives, Nagpur. Liquid fuel is procured from Oil Companies (GOI Undertakings) and Sulphur content condition is complied with. Environment and disaster preparedness plan is in place and approved by Inspector of Factories and Boilers.
(VII)	Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy	Complied with. Regular monitoring is being carried in existing wells and test wells constructed around ash pond area and reports are submitted monthly to KSPCB office and the same is submitted to RO-MoEF&CC once in six months.

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	metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely affected due to the project.	Monitoring reports are enclosed as Annexure-V and Annexure-VIII for reference. The compared baseline data for the period of April 2021 to September 2021 is enclosed as Annexure-XIV
(VIII)	Monitoring surface water quantity and quality shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.	Complied with, Surface water monitoring is carried regularly in the monitoring points finalized in consultation with KSPCB. Monitoring reports are submitted regularly to RO-KSPCB and same is submitted to RO-MoEF&CC once in six months. Monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-VIII for reference. However, surface water Quantity measurement is not applicable.
(IX)	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase	Complied with. All the arrangements are made during the construction phase.
(X)	Noise levels emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 75 dBA. For people working in the high noise area, requisite personal protective equipment like earplugs / ear muffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non-noisy / noise less areas.	Complied with. Enclosures are provided for turbines to control the noise. The persons working in the high noise area are provided with ear plugs/ear muffs All the employees working in the area are examined periodically for audiometric and records are maintained.

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(XI)	Regular monitoring of ground level concentration of SO ₂ , NO _x , PM _{2.5} & PM ₁₀ and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company.	Complied with. Regular monitoring is carried as per NAAQ standards in all the locations finalized by KSPCB. Ambient Air Quality Monitoring stations are established in the plant for continuous monitoring of pollution levels. Monitoring reports are regularly submitted to KSPCB and RO-MoEF&CC and copy of the report along with the data is being kept on company website in six monthly compliance reports http://www.adanipower.com/downloads
(XII)	Provision shall be made for the housing of construction labor (as applicable) within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project	Complied with. All the arrangements are made during the construction phase
(XIII)	The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter	Complied with
(XIV)	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad / Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions / representations, if	Complied with Clearance letter is displayed in company website as part of the Six monthly compliance report of EC conditions. http://www.adanipower.com/downloads

SIX MONTHLY COMPLIANCE REPORT FROM APRIL 2021 TO SEPTEMBER 2021 FOR ENVIRONMENT CLEARANCE NO J-13011/23/1996-IA.II (T) FOR 2x600 MW UDUPI POWER CORPORATION LIMITED

	any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the project proponent.	
(XV)	An Environmental Cell shall be created at the project site itself and shall be headed by an officer of appropriate seniority and qualification. It shall be ensured that the head of the Cell shall directly report to the Head of the Organization. The status report on the functioning of the Cell shall be submitted to the regional office of the Ministry periodically. The Cell shall comprise of an expert in Marine Biology, Fishery and Mangroves preservation.	<p>Complied with.</p> <p>A well-qualified Environment cell is established. Head of the Environment department is directly reporting to station head.</p> <p>Director & Research Karnataka Veterinary, Animal & Fisheries Sciences University Bidar, is a member of Environmental Monitoring committee is providing necessary technical assistance in Marine Biology, Fishery and Mangroves preservation issues.</p>
(XVI)	The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM (PM _{2.5} & PM ₁₀), SO ₂ , NO _x (ambient levels as well as stack emissions) shall be displayed at a convenient location near the main gate of the company in the public domain.	<p>Complied with.</p> <p>Status of compliance of the stipulated environmental clearance conditions including results of monitored data is kept website and shall update on Six monthly bases.</p> <p>http://www.adanipower.com/downloads</p> <p>Monitoring parameters are displayed near main gate.</p> <p>Online Continuous emission monitoring (CEMS) data is supplied to CPCB and displayed in the public domain through the below said website.</p> <p>URL: http://cpcbtdms.nic.in/</p> <p>Regularly monitoring data is submitted to Regional Office of MoEF&CC, Regional Office of KSPCB and Zonal Office of CPCB.</p>
(XVII)	The environment statement for each financial year ending 31 st March in Form – V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as	<p>Complied with.</p> <p>Copy of Environmental statement for the Financial Year 2020-21 is submitted to RO-MoEF&CC and RO-KSPCB. Copy is enclosed as Annexure-XV for reference.</p>

SIX MONTHLY COMPLIANCE REPORT FROM APRIL 2021 TO SEPTEMBER 2021 FOR ENVIRONMENT CLEARANCE NO J-13011/23/1996-IA.II (T) FOR 2x600 MW UDUPI POWER CORPORATION LIMITED

	<p>prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.</p>	<p>The copy of Environmental statement is kept in six monthly EC compliance report to MoEF&CC. Six monthly report is displayed through company website. http://www.adanipower.com/downloads</p>
(XVIII)	<p>The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests</p>	<p>Complied with.</p> <p>Six monthly compliance reports are regularly submitted to Regional Office of MoEF&CC, Regional Office of KSPCB and Zonal Office of CPCB.</p> <p>The same is displayed in the company website. http://www.adanipower.com/downloads</p>
(XIX)	<p>Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions.</p> <p>A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring.</p> <p>Project proponent will up-load the compliance status in their</p>	<p>Point is noted.</p> <p>Complied with. Complete set of document including EIA/EMP report was submitted to MoEF&CC and KSPCB for project approval.</p> <p>Status of compliance of the stipulated environmental clearance conditions including results of monitored data is kept</p>

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	<p>website and up-date the same from time to time at least six monthly basis.</p> <p>Criteria pollutants levels including NOx (from stack & ambient air) shall be displayed at the main gate of the power plant.</p>	<p>on website and shall be updated on Six monthly basis.</p> <p>http://www.adanipower.com/downloads</p> <p>Environmental Monitoring parameters are displayed near the main gate.</p>															
(XX)	<p>Separate funds shall be allocated for implantation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.</p>	<p>Complied with.</p> <p>Funds for Environmental protection measures were earmarked at the time of project as per EIA report and measures have been implemented.</p> <p>Yearly environmental budget is part of the yearly operating cost of the project.</p> <p>The total Environment Expenditure for the period of April 2021 to September 2021 included the following:</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Detail Description</th> <th>Amount (Rs)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Afforestation</td> <td>49,68,526.67</td> </tr> <tr> <td>2</td> <td>Environment Monitoring</td> <td>37,05,090.50</td> </tr> <tr> <td>3</td> <td>General Environment Management</td> <td>3,24,97,243.02</td> </tr> <tr> <td></td> <td>Total</td> <td>4,11,70,860.19</td> </tr> </tbody> </table>	S.No	Detail Description	Amount (Rs)	1	Afforestation	49,68,526.67	2	Environment Monitoring	37,05,090.50	3	General Environment Management	3,24,97,243.02		Total	4,11,70,860.19
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(XXI)	<p>The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant</p>	<p>Complied with</p>															
(XXII)	<p>Full cooperation shall be extended to the Scientists/ Officers from the Ministry/ Regional Office of the Ministry at Bangalore/ CPCB/ SPCB who would be monitoring the</p>	<p>Condition is Noted for compliance.</p>															

SIX MONTHLY COMPLIANCE REPORT FROM APRIL 2021 TO SEPTEMBER 2021 FOR ENVIRONMENT CLEARANCE NO J-13011/23/1996-IA.II (T) FOR 2x600 MW UDUPI POWER CORPORATION LIMITED

	compliance of environmental status	
(5)	The Ministry of Environment and Forests reserves the right to revoke the clearance if conditions stipulated are not implemented to the satisfaction of the Ministry. The Ministry may also impose additional environmental conditions or modify the existing ones, if necessary.	Condition is Noted
(6)	Concealing factual data or submission of false / fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986	Condition is Noted
(7)	In case of any deviation or alteration in the project a fresh reference should be made to the Ministry to assess the adequacy of the condition(s) imposed and to add additional environmental protection measures required	Condition is Noted
(8)	The above stipulations would be enforced among others under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and rules there under, Hazardous Wastes (Management and Handling) Rules, 2008 and its amendments, the Public Liability Insurance Act, 1991 and its amendments.	Condition is Noted & complied.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

S.NO	Conditions	Compliance
5	Specific Conditions	
I	Construction phase:	
(I)	All the conditions stipulated by the Karnataka State Coastal Zone Management Authority vide letter No. FEE 25 CRZ 2009, dated 16.02.2010 and the commitments/details submitted to KSCZMA shall be strictly complied with.	Condition is noted & complied.
(II)	Regular monitoring shall be carried out before discharging into sea.	All the used water is directed to Guard pond and regular monitoring is done and reports are submitted on monthly basis to KSPCB also.
(III)	A joint meeting of both the monitoring groups every year shall be carried out and send the report to MoEF.	Complied with. Regular joint meeting of UPCL monitoring team and third party MoEF&CC and NABL approved lab is conducted and monitoring reports are submitted to MoEF&CC on six monthly basis.
(IV)	It should be ensured that there shall not be any disturbance to fishing activity.	Condition is noted & complied.
(V)	All safety precautionary measures viz. stability of the pipe line, signal for fishing boats etc. shall be installed.	Sea water Pipe line is in fenced area and Emergency contact number is displayed in critical areas like Road Crossing, Village areas. 3 No's of Safety buoys are provided in the underwater pipeline area for safety of fishing boats.
(VI)	There shall be display boards at critical locations along the pipe line giving emergency instructions. Emergency information board shall contain emergency instructions in additions to contact details	Sea water Pipe line is in fenced area and caution boards provided with Emergency contact number is displayed in critical areas like Road Crossing, Village areas. Photos of display boards are enclosed as Annexure-XVI
(VII)	The project shall be implemented in such a manner that there is no damage to the mangroves/other sensitive coastal ecosystems	The pipeline area does not include any mangroves/other sensitive coastal eco systems.
(VIII)	A continuous and comprehensive post-project marine quality monitoring programme shall be taken up. This shall include	Monitoring is carried for sea water quality at intake and outfall points by Fisheries college, Mangalore. Reports are regularly submitted.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	monitoring of water quality, sediment quality and biological characteristics and the report shall be submitted every six month to Ministry's Regional Office at Bangalore.	Monitoring Reports for the period of April 2021 to September 2021 is enclosed as Annexure-XVII for reference.
(IX)	It shall be ensured that there is no displacement of people and the houses as a result of the project.	Condition is noted & complied.
(X)	There shall be no withdrawal of ground water in CRZ area, for the project.	Condition is noted & complied.
(XI)	Provision shall be made for the housing of construction labor within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	All the arrangements were made during the construction phase.
(XII)	A First Aid Room will be provided in the project both during construction and operation of the project	Complied with. All the arrangements are made during the construction phase.
(XIII)	Soil and ground water samples will be tested to ascertain that there is no threat to ground water quality	Complied with. All the construction activities are completed.
(XIV)	Any hazardous waste generated during construction phase, should be disposed off as per applicable rules and norms with necessary approvals of the KSPCB.	Complied with. No hazardous waste was generated during construction phase.
(XV)	The diesel generator sets to be used during construction phase should be low Sulphur diesel type and should confirm to Environment (Protection) Rules prescribed for air and noise emission standards.	Construction work involves only excavation and pipe laying work, so DG sets were not used.
(XVI)	The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from Chief	Construction work involves only excavation and pipe laying work, so DG sets were not used.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	Controller of Explosives shall be taken.	
(XVII)	Vehicles hired for bringing construction material to the site should be in good condition and should have a pollution check certificate and should confirm to applicable air and noise emission standards and should be operated only during non-peak hours.	Complied with condition.
(XVIII)	Ambient noise levels should confirm to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to confirm to the stipulated standards by CPCB/KSPCB	Condition is noted & complied.
(XIX)	Storm water control and its re-use as per CGWB and BIS standards for various applications.	Work involved only in lying of pipeline underground and back filling.
(XX)	Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surroundings	Condition is noted & complied.
(II)	OPERATION PHASE	
(I)	Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured shall be restricted to the permissible levels to comply with the prevalent regulations	Not applicable in the area because no structure is available in the area.
(II)	The green belt of the adequate width and density preferably with local species along the periphery of the power plant shall be raised so as to provide protection against particulates and noise as suggested by KSCZMA.	Green belt is developed in the power plant area in accordance with environmental clearance.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

(III)	Project proponent shall support afforestation activities by way of raising and supply of required seedling by the locals within 5KM radius of the plant as suggested by KSCZMA	Condition is noted & complied.															
(IV)	The ground water level and its quality should be monitored regularly	The work involves only laying of pipeline and no other industrial activities are involved. However regular water monitoring is being carried in the test wells constructed in the pipeline area. Monitoring reports for the period of April 2021 to September 2021 is enclosed as Annexure-XVIII for reference															
(V)	The mangroves, if any, on the site should not be disturbed in anyway	Complied with at the time of pipe line construction.															
(VI)	The environmental safeguards contained in the application should be implemented in letter and spirit	Complied with.															
(VII)	A separate Environment management Cell with suitably qualified staff to carry out various environment related functions shall be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the Company.	Well qualified environment cell is established which is headed by HOD-Environment who is directly reporting to station head.															
(VIII)	The funds earmarked for environment protection measures shall be maintained in a separate account and there shall be no diversion of these funds for any purpose. A year wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bangalore.	Noted and Complied. Funds for Environmental protection measures were earmarked at the time of project as per EIA report and measures have been implemented. Yearly environmental budget is part of the yearly operating cost of the project. The Environment Expenditure for the period of April 2021 to September 2021 included the following:															
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SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

(IX)	In case of deviation or alteration in the project including the implementing agency, a fresh reference shall be made to this Ministry for modification in the clearance conditions or imposition of new one for ensuring environmental protection. The project proponents shall be responsible for implementing the suggested safeguard measures.	Condition is noted & compliance.
(X)	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry	Condition is noted & compliance.
(6)	GENERAL CONDITIONS	
(I)	Adequate provision for infrastructure facilities including water supply, fuel and sanitation must be ensured for construction workers during the construction phase of the project to avoid any damage to the environment.	Complied with. All the arrangements are made during the construction phase.
(II)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Condition is noted & complied.
(III)	Borrow sites for each quarry sites for road construction material and dump sites must be identified keeping in view the following	Not Applicable since no road construction work involved in the CRZ area.
(a)	No excavation or dumping on private property is carried out without written consent of the owner	Condition is noted & complied.
(b)	No excavation or dumping shall be allowed on wetlands, forest areas or other ecologically valuable or sensitive locations.	Condition is noted & complied.
(c)	Excavation work shall be done in close consultation with the Soil Conservation and Watershed Development Agencies working in the area, and	Condition is noted & complied.
(d)	Construction spoils including	Condition is noted & complied.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	bituminous material and other hazardous materials must not be allowed to contaminate water courses and the dump sites for such materials and the dump sites for such materials must be secured so that they shall not leach into the ground water	
(IV)	Adequate precautions shall be taken during transportation of the construction material so that it does not affect the environment adversely	Complied with. All the precautionary measures are taken during construction time.
(V)	Borrow pits and other scars created during the laying of cable shall be properly leveled and treated	Complied with. Was not applicable.
(VI)	Adequate financial provision must be made in the project to implement the aforesaid safeguards.	Complied with.
(VII)	The project proponent will set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Well qualified Environment cell is established which is headed by HOD-Environment who is directly reporting to Station Head.
(VIII)	Full support shall be extended to the officers of this Ministry/Regional Office at Bangalore by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted for compliance.
(IX)	MoEF or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted for compliance.
(X)	The Ministry reserves the right to	Noted for compliance.

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry	
(XI)	In the event of a change in the project profile or change in the implementation agency, a fresh reference shall be made to the MoEF	Noted for compliance.
(XII)	The project proponents shall inform the Regional office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work	The pipeline activity is a part of the total power project. The date of financial closure for the total project was 13.06.2007. The MOEF clearance was originally received on 20.03.1997 and the clearance for augmented capacity (from 2 x 507.5 to 2 x 600 MW) was received on 09.09.2009. Consolidated Environmental clearance received on 01.09.2011. The land development work for the pipeline activity was commenced in March 2009.
(XIII)	KSPCB shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's office/Tahsildar's office for 30 days.	Noted as related to KSPCB.
7	These stipulations would be enforced among others under the provisions of Water Act, 1974, Air Act, 1981, Environment Act, 1986, Public Liability Act, 1991 and EIA Notification 2006, including the amendments and rules made thereafter.	Noted for compliance.
8	All other statutory clearances such as the approvals for storage of diesel from CCE, Fire Department, Civil Aviation Dept, Forest Conservation Act, 1980 and Wild life Act, 1972, etc shall be obtained, as applicable by project proponents from the respective competent authorities	Noted. These clearances were not applicable for sea water pipe line work.
9	The project proponent shall advertise in at least two local newspapers widely circulated in the region, one of which shall be	Complied with. A copy of advertisement in local newspaper is submitted to RO-MoEF vide ref letter No: UPCL/B04/2010/1990

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	in the vernacular language informing that the project has been accorded EC and copies of clearance letters are available with the KSPCB and may also be seen on the website of MoEF at http://www.envfor.nic.in . The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bangalore.	dated: 29.05.2010.
10	EC is subject to final order of the Honorable Supreme Court of India in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Noted for compliance.
11	Any appeal against this EC shall lie with National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Act, 1997.	Noted for compliance.
12	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	This is to clarify that the pipeline activity is a part of the main plant for which there was no need for public hearing as mentioned in MOEF letter.113011/23/96-IA-II (T) Part dated 31.01.2005. Hence no representations were received and therefore this clause is not applicable.
13	The proponent shall upload the status of compliance of stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF at Bangalore, the respective Zonal	Compliance status of the stipulated conditions uploaded on the website. However, results of monitoring data is not applicable since the activity involved is only laying of the water pipeline and no industrial activity involved in the area under discussion (CRZ). The monitoring data of the main plant is uploaded on the website and displayed near the main

SIX MONTHLY COMPLIANCE STATUS FOR THE PERIOD APRIL 2021 to SEPTEMBER 2021 OF CONDITIONS IN CRZ CLEARANCE NO. 11-14/2010-IA-III dated 18.05.2010 FOR SEA WATER PIPELINE OF 2x600 MW UDUPI POWER CORPORATION LIMITED

	Office of CPCB and the KSPCB. The criteria pollutant levels namely; SPM, RSPM, SO ₂ , NO _x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	gate of the project. Reports are displayed in company website. http://www.adanipower.com/downloads
14	The project proponent shall also submit six monthly reports on the status of compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the respective Zonal Office of CPCB and SPCB	Complied with. Six Monthly reports are regularly submitted to RO-MoEF&CC, RO-KSPCB and ZO-CPCB.
15	The Environmental Statement for each financial year ending 31 st March in Form-V as is mandated to be submitted by the project proponent to the concerned KSPCB as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Office of MoEF at Bangalore by email.	Complied with. Copy of Environmental statement for the Financial Year 2020-21 is submitted to RO-MoEF&CC and RO-KSPCB is enclosed as Annexure-XV for reference. The copy of the same is displayed through company website as part of the six monthly EC compliance report. http://www.adanipower.com/downloads

Annexure-I

METEOROLOGICAL DATA**Annexure-I**

UPCL is having own Continuous Meteorological Observatory Station at site to observe below parameters:

- Temperature
- Humidity
- Wind Speed
- Wind Direction
- Rain fall

Table-1: AVERAGE DAILY METEOROLOGICAL DATA OF APRIL 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Apr/2021	28.3	34.8	46.48	80.58	0
2/Apr/2021	28.2	33.9	50.19	81.54	0
3/Apr/2021	28.0	33.9	49.88	83.73	0
4/Apr/2021	28.1	34.0	45.83	78.10	0
5/Apr/2021	29.4	34.7	47.96	75.36	0
6/Apr/2021	29.8	35.6	52.59	83.48	0
7/Apr/2021	30.0	35.3	52.71	89.06	0
8/Apr/2021	29.7	34.7	60.15	85.49	0
9/Apr/2021	29.4	35	56.04	84.29	0
10/Apr/2021	29.1	34.8	51.01	84.11	0
11/Apr/2021	25.9	34.2	53.46	86.59	13.1
12/Apr/2021	26.5	33.7	61.11	87.50	14.6
13/Apr/2021	24.0	32.7	58.86	90.88	10.3
14/Apr/2021	25.9	33.8	57.52	87.23	9.8
15/Apr/2021	25.6	32.8	58.04	89.24	0
16/Apr/2021	29.1	34.5	49.85	84.28	0
17/Apr/2021	27.5	34.7	51.73	82.09	0
18/Apr/2021	26.8	33.9	56.83	86.81	0
19/Apr/2021	26.9	33.9	51.28	81.49	0
20/Apr/2021	25.5	34.6	58.99	90.84	15.6
21/Apr/2021	28.8	34.0	59.10	88.11	0
22/Apr/2021	26.1	35.2	53.41	84.90	0
23/Apr/2021	25.3	33.6	55.23	84.52	0
24/Apr/2021	26.5	34.3	52.39	87.50	0
25/Apr/2021	29.0	33.7	53.47	81.12	0
26/Apr/2021	29.0	33.5	51.18	88.58	0
27/Apr/2021	28.3	34.3	53.88	81.74	0
28/Apr/2021	28.4	33.5	56.57	79.86	0
29/Apr/2021	27.9	34.6	50.97	82.47	0
30/Apr/2021	25.6	34.0	42.32	76.45	0
Min	24.0	32.7	42.3	75.4	63.40
Max	30.0	35.6	61.1	90.9	
Average	27.6	34.2	53.3	84.3	

Periodic Wind Rose Met Station 4/1/2021 01:00-4/30/2021 24:00

Station:Met Station

AVG:1 Hour

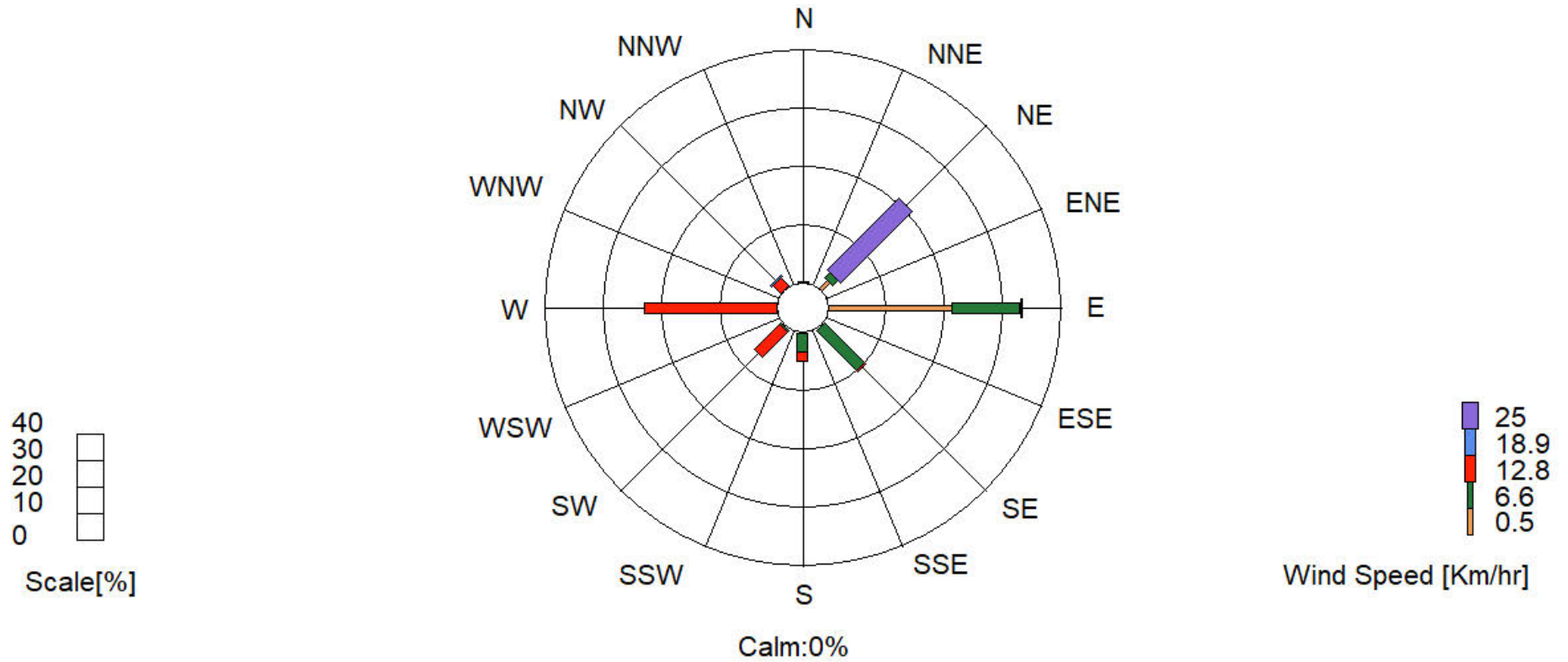


Table-2: AVERAGE DAILY METEOROLOGICAL DATA OF MAY 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/May/2021	26.9	34.3	51.27	75.48	0
2/May/2021	26.2	34.5	47.06	82.96	0
3/May/2021	26.9	35.1	45.39	83.15	0
4/May/2021	27.1	32.7	55.39	81.97	0
5/May/2021	26.6	33.6	60.17	88.61	0
6/May/2021	26.4	33.7	58.19	87.95	3.4
7/May/2021	26.0	33.2	55.27	90.24	0
8/May/2021	26.4	33.6	54.65	88.20	14.7
9/May/2021	27.5	32.9	61.27	87.38	0
10/May/2021	28.5	33.4	54.82	89.19	0
11/May/2021	27.5	32.0	60.89	89.43	23.2
12/May/2021	24.6	32.8	59.2	90.36	0
13/May/2021	24.9	31.7	52.62	88.26	0
14/May/2021	25.7	32.1	50.8	84.40	42.8
15/May/2021	23.1	26.3	78.05	95.61	96.3
16/May/2021	23.3	30.3	65.08	93.45	13.8
17/May/2021	25.1	27.7	65.89	90.31	17.8
18/May/2021	24.5	28.8	67.21	92.51	4.5
19/May/2021	24.9	28.5	71.44	91.78	6.1
20/May/2021	24.5	28.9	67.97	92.83	5.1
21/May/2021	26.2	28.9	65.4	88.86	0
22/May/2021	25.5	29.6	58.05	88.47	0
23/May/2021	26.1	31.1	49.02	85.53	0
24/May/2021	26.7	30.7	59.48	89.22	7.7
25/May/2021	25.0	29.8	61.17	91.70	9.9
26/May/2021	24.5	30.4	64.07	94.54	83.9
27/May/2021	24.1	30.3	60.86	96.78	0
28/May/2021	25.5	30.1	57.40	90.33	17.8
29/May/2021	24.4	28.8	71.63	92.71	6.2
30/May/2021	24.6	29.1	63.46	92.21	7.3
31/May/2021	24.1	29.3	57.08	92.12	4.7
Min	23.1	26.3	45.4	75.5	365.20
Max	28.5	35.1	78.1	96.8	
Average	25.6	31.1	59.7	89.2	

Periodic Wind Rose Met Station 5/1/2021 01:00-5/31/2021 24:00

Station:Met Station

AVG:1 Hour

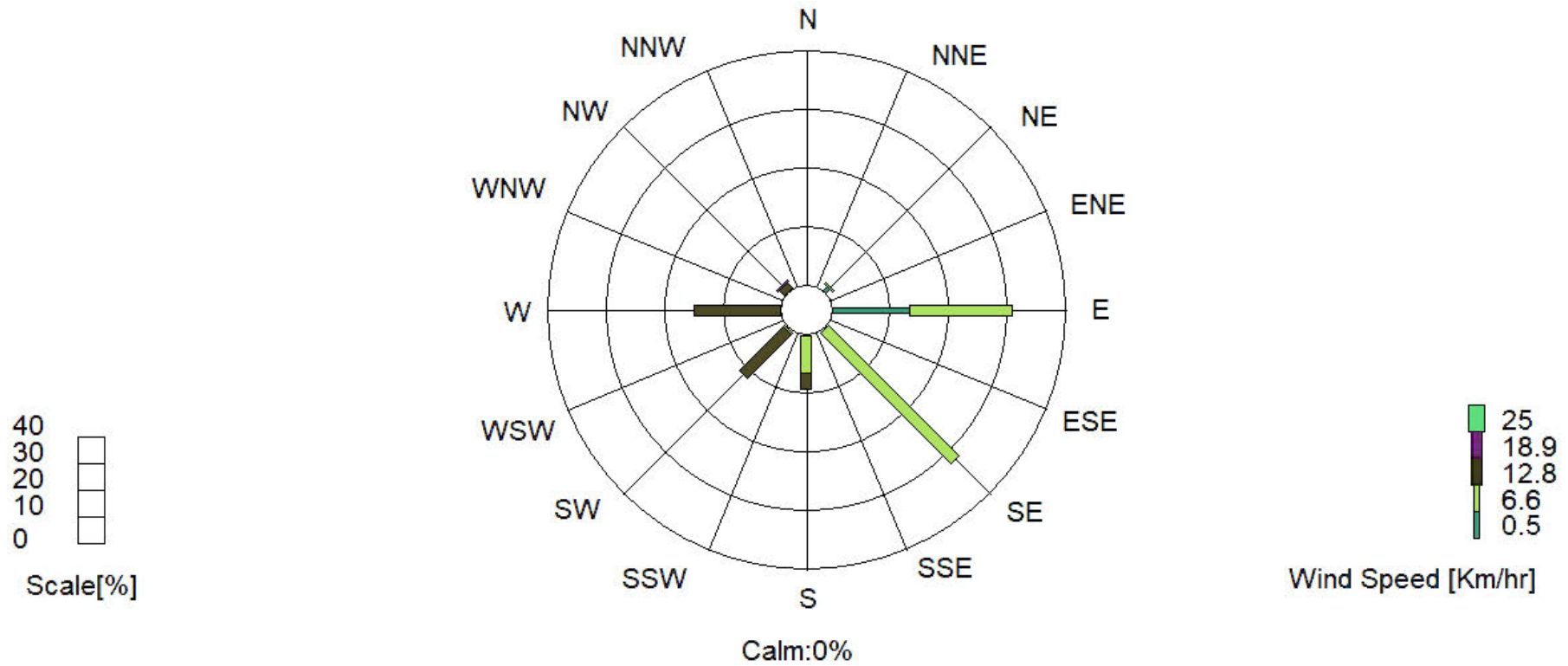


Table-3: AVERAGE DAILY METEOROLOGICAL DATA OF JUNE 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Jun/2021	24.5	29.8	57.7	93.6	6.8
2/Jun/2021	25.5	30.0	52.5	89.3	0.0
3/Jun/2021	26.6	31.2	52.9	90.8	124.4
4/Jun/2021	24.4	28.7	71.3	97.3	42.7
5/Jun/2021	22.8	28.1	69.5	94.5	23.4
6/Jun/2021	22.9	29.3	64.3	95.1	8.3
7/Jun/2021	24.4	28.7	71.3	97.3	0.0
8/Jun/2021	26.0	29.8	57.4	88.7	10.6
9/Jun/2021	23.5	28.9	63.1	92.4	22.2
10/Jun/2021	23.7	27.6	80.5	92.2	26.1
11/Jun/2021	24.6	29.4	66.4	92.7	11.6
12/Jun/2021	24.0	27.2	76.4	92.2	57.9
13/Jun/2021	22.7	25.3	82.6	95.4	81.6
14/Jun/2021	23.2	26.2	88.8	95.6	106.4
15/Jun/2021	23.6	27.5	77.5	95.3	46.4
16/Jun/2021	24.5	28.8	71.3	91.2	22.7
17/Jun/2021	25.0	28.4	73.4	89.2	8.2
18/Jun/2021	25.5	29.0	68.0	88.4	10.5
19/Jun/2021	24.5	28.2	75.1	92.9	91.7
20/Jun/2021	23.3	27.9	76.7	95.5	37.6
21/Jun/2021	23.9	28.7	68.2	95.1	1.4
22/Jun/2021	24.5	30.4	62.9	92.7	3.4
23/Jun/2021	25.4	30.0	65.1	92.8	13.9
24/Jun/2021	27.3	30.8	65.9	90.9	0.0
25/Jun/2021	28.7	31.1	62.5	90.7	27.6
26/Jun/2021	23.6	28.8	75.5	93.9	43.5
27/Jun/2021	25.2	30.5	62.2	93.7	28.5
28/Jun/2021	28.7	32.3	62.2	90.8	7.8
29/Jun/2021	29.1	32.6	51.9	91.9	1.8
30/Jun/2021	29.7	33.5	57.5	90.9	0.0
Min	22.7	25.3	51.9	88.4	867.00
Max	29.7	33.5	88.8	97.3	
Average	25.0	29.3	67.7	92.8	

Periodic Wind Rose Met Station 6/1/2021 01:00-6/30/2021 24:00

Station:Met Station

AVG:1 Hour

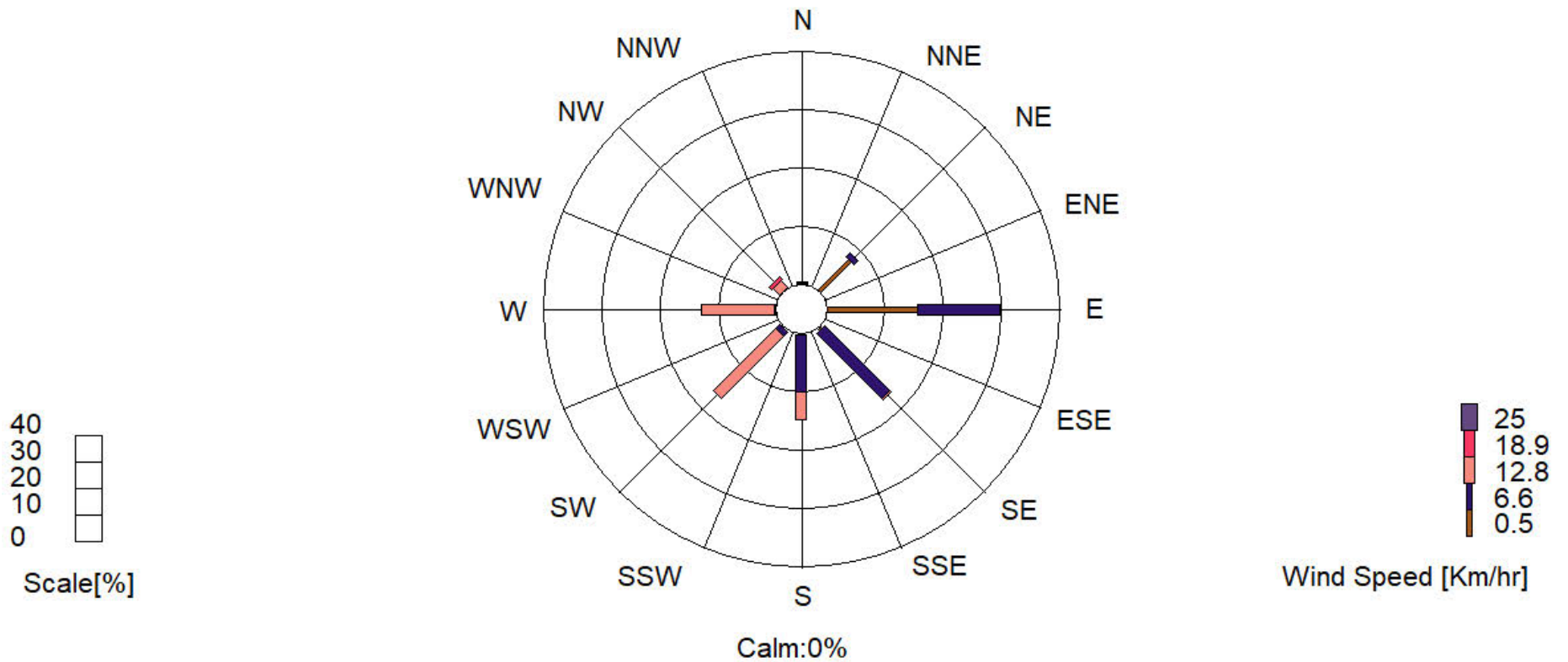


Table-4: AVERAGE DAILY METEOROLOGICAL DATA OF JULY 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Jul/2021	27.3	33.5	62.05	90.70	20.2
2/Jul/2021	27.8	32.6	65.16	93.57	0
3/Jul/2021	24.9	30.9	67.60	92.90	2.7
4/Jul/2021	25.7	31.9	56.34	93.00	0
5/Jul/2021	26.8	29.7	38.32	68.32	22.7
6/Jul/2021	26.0	32.2	64.62	93.41	22.9
7/Jul/2021	27.7	32.6	78.10	93.19	47.4
8/Jul/2021	25.5	31.9	73.50	95.17	64.9
9/Jul/2021	24.6	30.8	76.36	95.77	72.2
10/Jul/2021	24.2	30.3	66.30	94.82	58.6
11/Jul/2021	23.3	28.1	80.99	94.78	64.2
12/Jul/2021	24.9	29.0	76.72	93.90	57.5
13/Jul/2021	24.1	28.8	85.52	95.24	82.6
14/Jul/2021	27.2	31.0	80.13	93.70	95.8
15/Jul/2021	23.8	29.4	89.81	95.05	109.8
16/Jul/2021	25.7	29.8	82.19	95.30	36.8
17/Jul/2021	24.1	31.0	72.55	95.38	131.3
18/Jul/2021	23.7	26.9	92.39	96.33	61.6
19/Jul/2021	25.3	30.3	73.42	95.26	18.2
20/Jul/2021	26.2	31.3	65.11	95.26	26.1
21/Jul/2021	29.0	31.0	79.63	93.46	24.2
22/Jul/2021	28.7	30.9	82.39	93.77	29.9
23/Jul/2021	28.3	30.8	76.98	94.71	7.7
24/Jul/2021	26.60	29.80	74.61	92.46	43.8
25/Jul/2021	25.70	29.50	67.61	95.66	25.3
26/Jul/2021	24.30	28.70	78.05	95.91	12
27/Jul/2021	24.20	28.20	67.17	95.57	19.6
28/Jul/2021	24.60	28.60	67.74	94.15	5.2
29/Jul/2021	25.90	28.60	65.06	93.57	9.1
30/Jul/2021	26.40	28.70	60.04	93.71	8.4
31/Jul/2021	26.10	29.00	65.30	88.75	18.5
Min	23.3	26.9	38.3	68.3	1199.20
Max	29.0	33.5	92.4	96.3	
Average	25.8	30.2	72.0	93.3	

Periodic Wind Rose Met Station 7/1/2021 01:00-7/31/2021 24:00

Station:Met Station

AVG:1 Hour

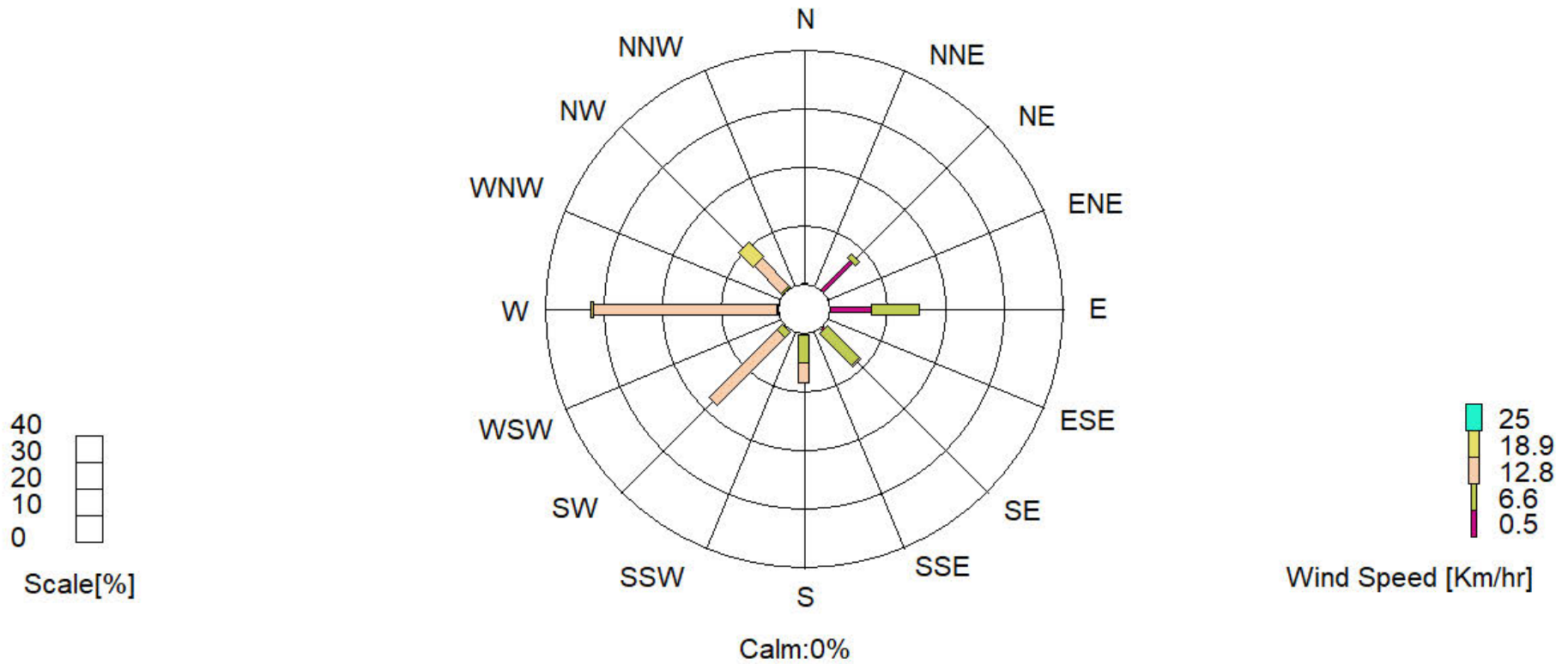


Table-5: AVERAGE DAILY METEOROLOGICAL DATA OF AUG 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Aug/2021	26.5	28.9	56.72	91.47	4.4
2/Aug/2021	26.4	28.7	61.27	92.01	24.8
3/Aug/2021	24.2	28.4	66.94	93.10	35.9
4/Aug/2021	23.7	28.0	75.77	94.97	15.5
5/Aug/2021	24.8	27.7	72.87	93.12	18.5
6/Aug/2021	25.1	28.7	68.09	92.24	32.5
7/Aug/2021	24.7	27.7	79.19	94.70	12.9
8/Aug/2021	24.0	29.2	62.00	95.24	2.8
9/Aug/2021	24.2	27.7	65.18	93.89	12.7
10/Aug/2021	24.8	29.9	65.68	94.89	4.2
11/Aug/2021	24.6	30.0	59.97	94.31	11.8
12/Aug/2021	23.4	28.8	70.35	94.70	5.5
13/Aug/2021	23.3	29.3	66.98	94.90	39.4
14/Aug/2021	24.2	29.7	72.76	93.25	13.5
15/Aug/2021	25.5	30.5	67.17	94.96	11.3
16/Aug/2021	25.3	31.0	65.18	95.18	5.8
17/Aug/2021	26.9	30.2	69.54	94.79	0
18/Aug/2021	23.3	28.4	64.46	94.77	32.5
19/Aug/2021	23.8	30.6	71.04	94.34	0
20/Aug/2021	25.4	30.3	75.17	94.33	1.9
21/Aug/2021	27.4	31.2	59.50	94.73	0
22/Aug/2021	26.3	31.0	62.62	91.74	0
23/Aug/2021	26.1	30.7	58.81	92.58	1.3
24/Aug/2021	24.9	28.5	63.59	91.81	3.6
25/Aug/2021	23.5	29.1	61.87	92.80	24.2
26/Aug/2021	24.7	29.8	64.17	94.01	13.3
27/Aug/2021	27.2	32.6	73.10	94.75	82.2
28/Aug/2021	24.4	27.9	79.40	95.26	83.6
29/Aug/2021	22.1	26.3	80.02	95.92	34.7
30/Aug/2021	22.4	27.5	72.47	95.72	29.2
31/Aug/2021	23.8	28.7	58.28	94.56	4.1
Min	22.1	26.3	56.7	91.5	562.10
Max	27.4	31.4	80.0	95.9	
Average	24.7	31.4	67.4	94.0	

Periodic Wind Rose Met Station 8/1/2021 01:00-8/31/2021 24:00

Station:Met Station

AVG:1 Hour

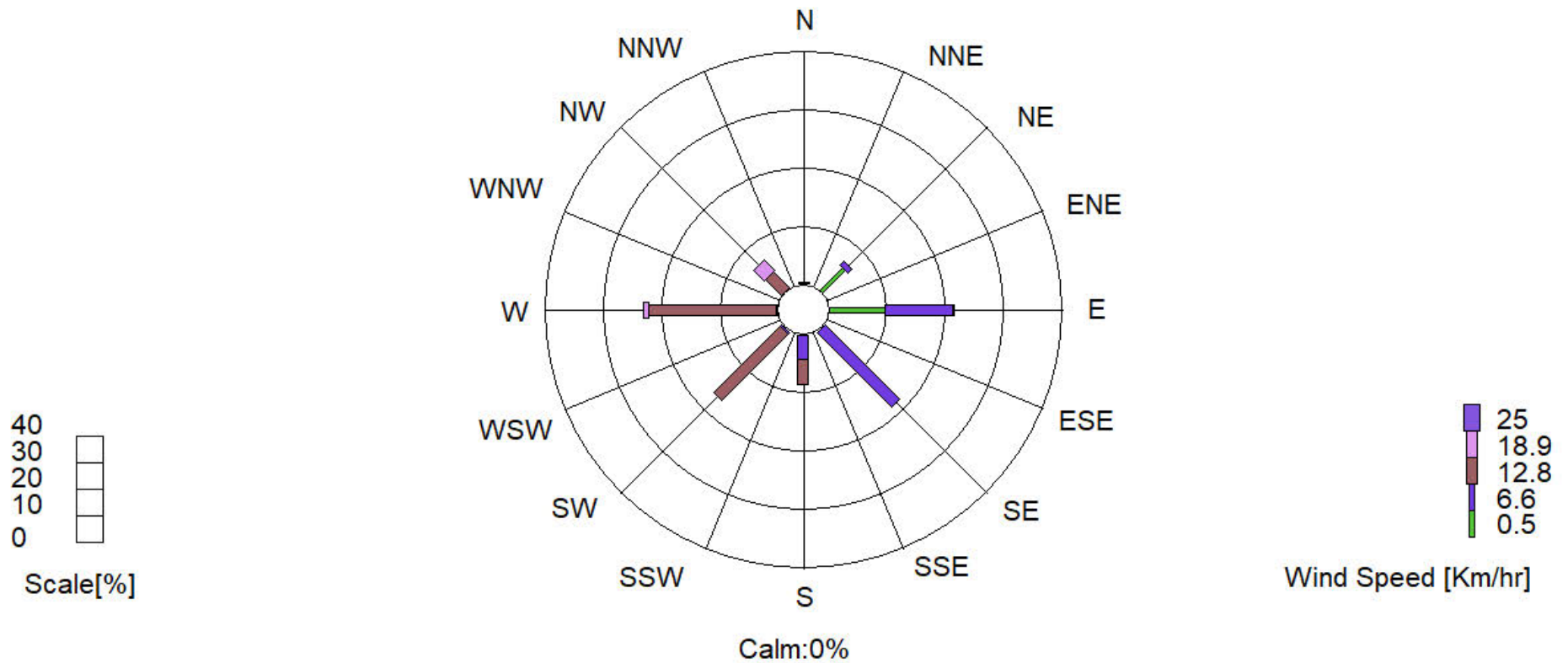


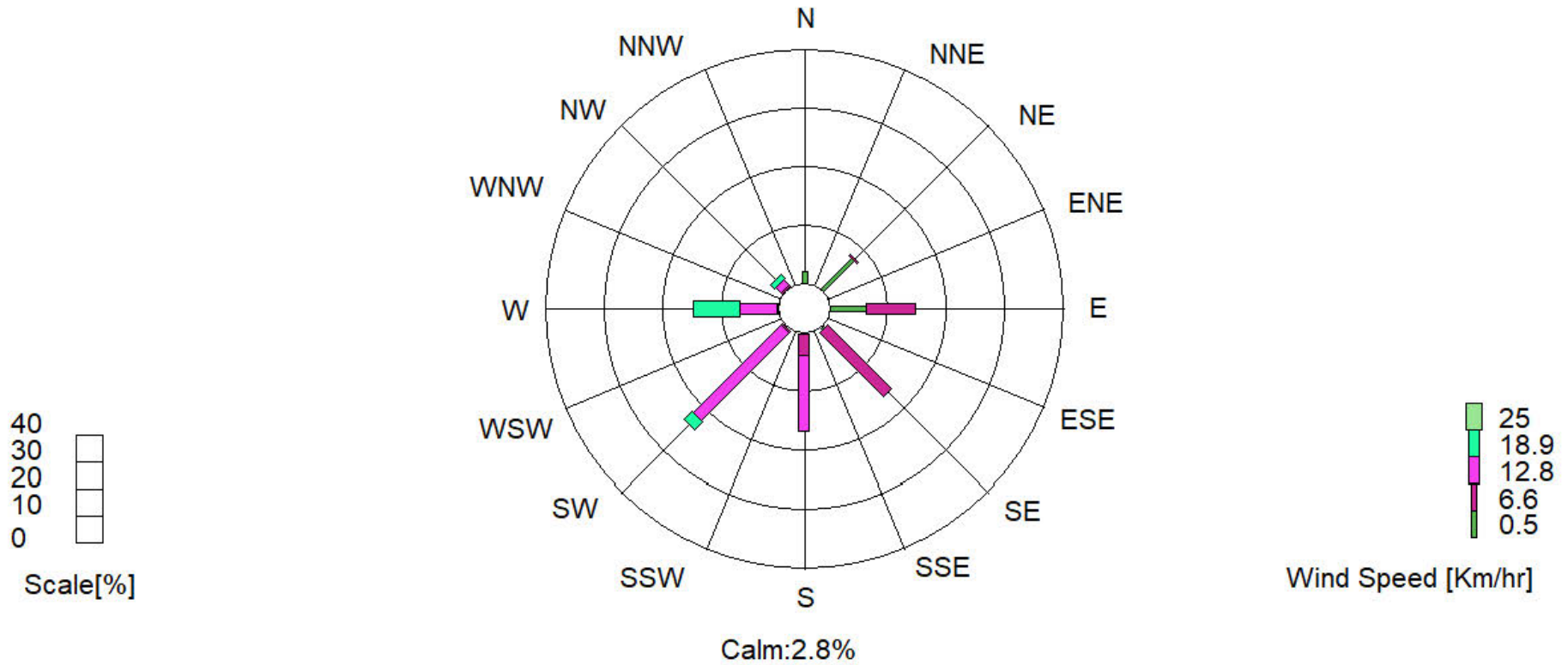
Table-6: AVERAGE DAILY METEOROLOGICAL DATA OF SEP 2021

Date	Temperature (°C)		Relative Humidity (%)		Rain Fall (mm)
	Min	Max	Min	Max	
1/Sep/2021	24.2	29.0	66.10	94.32	38.7
2/Sep/2021	23.2	29.1	69.53	94.78	4.4
3/Sep/2021	24.2	29.2	67.27	94.59	68.2
4/Sep/2021	23.5	26.6	78.11	95.70	11.2
5/Sep/2021	23.5	27.8	75.04	95.97	33.3
6/Sep/2021	22.8	28.0	74.33	95.25	44.5
7/Sep/2021	22.9	25.9	81.53	95.76	34.4
8/Sep/2021	23.5	27.9	66.82	95.99	17.8
9/Sep/2021	23.9	28.8	52.04	95.49	7.4
10/Sep/2021	25.6	29.1	60.04	94.92	4.2
11/Sep/2021	25.6	28.5	69.45	94.12	21.3
12/Sep/2021	25.4	28.2	68.46	93.93	31.1
13/Sep/2021	25.6	28.2	77.64	94.58	25.5
14/Sep/2021	25.9	28.5	70.42	95.23	15.3
15/Sep/2021	24.4	29.0	61.67	94.63	1.6
16/Sep/2021	25.7	30.0	66.82	94.56	10.5
17/Sep/2021	24.5	31.3	51.72	94.15	0
18/Sep/2021	26.4	31.9	48.16	91.76	0
19/Sep/2021	26.6	31.9	47.85	88.87	0
20/Sep/2021	26.2	32.0	48.11	87.61	1.8
21/Sep/2021	25.4	31.2	50.15	93.29	1.7
22/Sep/2021	24.7	29.7	63.93	92.82	2.9
23/Sep/2021	24.9	30.5	66.12	92.03	23.8
24/Sep/2021	22.9	31.0	45.90	94.00	0
25/Sep/2021	24.7	31.8	52.94	92.48	2.6
26/Sep/2021	25.4	30.9	53.67	92.40	7.6
27/Sep/2021	24.3	29.4	67.0	94.2	20.8
28/Sep/2021	24.5	28.3	68.80	94.09	22.7
29/Sep/2021	23.8	28.8	58.36	95.34	6.9
30/Sep/2021	24.9	29.7	57.50	93.19	0
Min	22.8	25.9	45.9	87.6	460.20
Max	26.6	32.0	81.5	96.0	
Average	24.6	29.4	62.8	93.9	

Periodic Wind Rose Met Station 9/1/2021 01:00-9/30/2021 24:00

Station:Met Station

AVG:1 Hour



Annexure-III

STACK MONITORING

Annexure-II

Stack Monitoring has been carried out by NABL accredited laboratory in the frequency of once in fifteen days per month. The monitoring reports for both the units during the period of April 2021 to Sep 2021 are as Table-1 below.

Table-1: Stack monitoring report for the period of April 2021 to Sep 2021

Stack	Parameter	April-2021		May-2021		June-2021		July-2021			Aug-2021		Sep-2021		Average
		05.04.2021	23.04.2021				25.06.2021	06.07.2021	20.07.2021	17.08.2021	27.08.2021				
Boiler -I	Particulate Matter (mg/Nm ³)	20.87	29.0	SD	SD	SD	3.1	18.9	47.3	28.7	28.8	SD	SD	25.2	
	SO ₂ (mg/Nm ³)	1045.1	1055.2	SD	SD	SD	926	626	749.5	599.3	739.2	SD	SD	820.0	
	NO _x (mg/Nm ³)	212.6	237.5	SD	SD	SD	164	178	141.9	191.2	140.2	SD	SD	180.8	
	Mercury (mg/Nm ³)	BDL	BDL	SD	SD	SD	BDL	BDL	BDL	BDL	BDL	SD	SD	0.0	
	Flue Gas Velocity (m/s)	24.1	25.0	SD	SD	SD	25.2	25.1	24.8	24.8	22.4	SD	SD	24.5	
	Flow Rate (Nm ³ /hr)	2323583	2373178	SD	SD	SD	2359810	2336945	2366359	2340494	2104629	SD	SD	2315000	
							29.06.2021								
Boiler -II	Particulate Matter (mg/Nm ³)	14.2	22.6	SD	SD	SD	19.3	38.7	43.4	SD	29.3	SD	SD	27.9	
	SO ₂ (mg/Nm ³)	986.29	986.3	SD	SD	SD	952.7	824	818.3	SD	803.5	SD	SD	895.2	
	NO _x (mg/Nm ³)	170.5	171.4	SD	SD	SD	1283.7	235	197.8	SD	197.7	SD	SD	376.0	
	Mercury (mg/Nm ³)	BDL	BDL	SD	SD	SD	BDL	BDL	BDL	SD	BDL	SD	SD	0.0	
	Flue Gas Velocity (m/s)	24.3	24.5	SD	SD	SD	24.2	23.9	23.6	SD	22.5	SD	SD	23.8	
	Flow Rate (Nm ³ /hr)	2361362	2380797	SD	SD	SD	2285485	2254889	2305473	SD	2107264.2	SD	SD	2282545	

Note: SD = Shut down

Annexure-III

CHP Wind Shield

Annexure - III



Annexure-IV

Fly Ash Generation & Utilization for the period of April 2021 to Sep 2021

Month	Ash Generation			Ash Utilization		
	Fly Ash (MT)	Bottom Ash (MT)	Total Ash Generation (MT)	Fly Ash (MT)	Bottom Ash (MT)	Total Ash Utilization (MT)
April 2021	15219	1862	17081	10,576	2,252	12,828
May 2021	2554	241	2795	3,954	1,825	5,779
June 2021	2637	383	3020	2,317	1,313	3,630
July 2021	12212	1547	13759	8,946	1,865	10,811
Aug 2021	3000	248	3248	5,754	782	6,536
Sep 2021	0	0	0	356	528	884
Total	35,622	4,281	39,903	31,903	8,565	40,468

Annexure-V

TEST WELLS MONITORING AROUND ASH POND

Annexure-V

Ash pond is lined with LDPE film of 500 μ thickness as an impervious layer to avoid ground water leachate contamination.

Water samples from Test wells (4 No's) around the ash pond area are analyzed for Ground water monitoring. Monitoring reports for the period of April 2021 to Sep 2021 is presented in the Table-1 to Table-4 as shown in below:

The nomenclature for test wells are as below:

1. Test well constructed on North Side of the Ash Pond
2. Test well constructed on South side of the Ash Pond
3. Test well constructed on East Side of the Ash Pond
4. Test well constructed on West Side of the Ash Pond

Table-1: Results of Water Sample from Test Well constructed in North side of Ash Pond sampling period of April 2021 to Sep 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	2.5	2.5	3	2	1	3	1	3	2.33
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.86	6.82	6.98	6.84	6.82	6.82	6.98	6.86
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	3.3	3.8	3.6	3.5	3.1	3.9	3.1	3.9	3.53
6	TDS	mg/l	500	2000	76.8	74.8	82.8	67.2	280.8	66.8	66.8	280.8	108.20
7	Alkalinity as CaCO ₃	mg/l	200	600	49.4	42.9	43.6	45.4	9.08	41	9.08	49.4	38.56
8	Total Hardness	mg/l	200	600	27.6	33.5	29.3	34.2	140.6	40.3	27.6	140.6	50.92
9	Calcium as Ca	mg/l	75	200	6.3	6.7	11.7	6.8	34.1	10.1	6.3	34.1	12.62
10	Magnesium as Mg	mg/l	30	100	2.8	4	BDL	4.1	13.4	3.6	2.8	13.4	5.58
11	Iron as Fe	mg/l	0.3	No relaxation	0.16	0.09	0.24	0.2	0.23	0.24	0.09	0.24	0.19
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	BDL	121.3	6.8	6.8	121.3	64.05
13	Chloride as Cl	mg/l	250	1000	16.3	19.0	14.9	17.1	36.4	17.3	14.9	36.4	20.17
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	0.27	BDL	0.27	0.27	0.27
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	0.63	2.4	BDL	BDL	BDL	0.31	0.31	2.4	1.11
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-2: Results of Water Sample from Test Well constructed in South side of Ash Pond sampling period of April 2021 to Sep 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	3.5	2.5	3	2	1	2	1	3.5	2.50
2	pH	-	6.5 - 8.5	No Relaxation	6.94	6.87	6.91	6.79	6.9	6.97	6.79	6.94	6.88
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	2.4	3.7	3.5	3.5	3.5	0.6	2.4	4	3.43
6	TDS	mg/l	500	2000	74.8	70.4	72	71.2	280.8	150	64.8	280.8	105.67
7	Alkalinity as CaCO ₃	mg/l	200	600	57.03	47.2	43.6	40.8	9	85.46	9	57.03	39.14
8	Total Hardness	mg/l	200	600	27.6	37.7	37.7	34.2	136.3	111.44	27.6	136.3	53.13
9	Calcium as Ca	mg/l	75	200	6.3	10	8.4	8.5	35.8	31.9	6.3	35.8	13.85
10	Magnesium as Mg	mg/l	30	100	2.8	3	4	3.1	11.3	7.73	2.4	11.3	4.43
11	Iron as Fe	mg/l	0.3	No relaxation	0.21	0.12	0.22	0.19	0.14	0.2	0.12	0.22	0.18
12	Sulphate as SO ₄	mg/l	200	400	5.2	BDL	BDL	BDL	121.3	14.36	5.2	121.3	63.25
13	Chloride as Cl	mg/l	250	1000	16.3	16.9	17.1	15	36.4	17.34	15	36.4	19.47
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	0.29	BDL	0.29	0.29	0.29
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	0.33	4.2	BDL	BDL	BDL	BDL	0.22	4.2	1.58
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	1.29	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-3: Results of Water Sample from Test Well constructed in East side of Ash Pond sampling period of April 2021 to Sep 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	3	2.5	3	3	3	3	2.5	3	2.92
2	pH	-	6.5 - 8.5	No Relaxation	6.87	6.85	6.99	6.83	6.89	6.83	6.83	6.99	6.88
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	1.7	3.6	3.2	3.7	3.3	3.8	1.7	3.8	3.22
6	TDS	mg/l	500	2000	82	64	83.6	67.6	66	65.6	64	83.6	71.47
7	Alkalinity as CaCO ₃	mg/l	200	600	53.2	42.9	53.3	45.4	45.4	41	41	53.3	46.87
8	Total Hardness	mg/l	200	600	31.5	29.3	41.9	29.9	29.8	35.2	29.3	41.9	32.93
9	Calcium as Ca	mg/l	75	200	6.3	6.7	10	6.8	6.8	10.1	6.3	10.1	7.78
10	Magnesium as Mg	mg/l	30	100	3.8	3	4	3.1	3.1	2.4	2.4	4	3.23
11	Iron as Fe	mg/l	0.3	No relaxation	0.2	0.2	0.17	0.23	0.22	0.23	0.17	0.23	0.21
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	BDL	13.5	BDL	13.5	13.5	13.5
13	Chloride as Cl	mg/l	250	1000	30.8	19	17.1	15	12.1	15.1	12.1	30.8	18.18
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	1.9	0.2	0.22	BDL	1.02	0.2	1.9	0.84
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-4: Results of Water Sample from Test Well constructed in West side of Ash Pond sampling period of April 2021 to Sep 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	3	2.5	3.2	2.5	3	2	2	3.2	2.70
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.91	6.87	6.94	6.9	6.85	6.82	6.94	6.88
3	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1	5	2.4	3.7	3.5	3.8	3.5	3.9	2.4	3.9	3.47
6	TDS	mg/l	500	2000	77.2	73.2	74	66.8	70.8	64.8	64.8	77.2	71.13
7	Alkalinity as CaCO ₃	mg/l	200	600	49.4	42.9	53.3	36.3	40.8	41	36.3	53.3	43.95
8	Total Hardness	mg/l	200	600	31.5	33.5	29.3	34.2	34	35.2	29.3	35.2	32.95
9	Calcium as Ca	mg/l	75	200	7.9	8.4	10.0	6.8	8.5	10.1	6.8	10.1	8.62
10	Magnesium as Mg	mg/l	30	100	2.8	3	BDL	4.1	3.1	2.4	2.4	4.1	3.08
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.11	0.15	0.24	0.21	0.2	0.11	0.24	0.19
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	5	BDL	BDL	5	5	5.00
13	Chloride as Cl	mg/l	250	1000	16.3	20.8	21.4	19.3	14.1	15.1	14.1	21.4	17.83
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	0.29	2.3	0.43	0.37	BDL	2.25	0.29	2.3	1.13
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Annexure-VI

AMBIENT AIR QUALITY MONITORING

Annexure-VI

The Ambient Air Quality samples were collected by representative from NABL accredited laboratory.

Method of Analysis

Pollutants	Method of Measurement
Particulate Matter (PM ₁₀), µg/m ³	Gravimetric
Particulate Matter (PM _{2.5}), µg/m ³	Gravimetric
Sulphur dioxide (SO ₂), µg/m ³	Improved west and Geake method
Nitrogen Dioxide (NO ₂), µg/m ³	Modified Jacob & Hochheiser
Carbon Monoxide (CO), mg/m ³	Non Dispersive Infra-Red

AMBIENT AIR QUALITY MONITORING LOCATIONS

Ambient Air Quality Monitoring (PM₁₀, PM_{2.5}, SO₂, NO_x & CO) was done twice a week at following locations:

1. Near DM Plant (Inside Plant)
2. Near Admar Village
3. Near Inna Village
4. Near Hejmady Village
5. Near Baikampady Village
6. Near Paradka Village
7. Near Mudarangadi Village
8. Near Adani Pump House
9. Near Ash Pond

The Monitoring values for the period from April 2021 to Sep 2021 in the above said locations are presented in Table-1 to Table-9 as below.

Table-1: Ambient Air Quality Monitoring in Plant Site (Near DM Plant) for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near DM Plant (A1)	April 2021	41.9	44.6	43.1	26.3	28.2	27	8.9	9.8	9.3	11.1	12.2	11.5	BDL	BDL	BDL
	May 2021	43.8	45.9	45.1	26.5	28.8	27.9	9.1	10.6	10.1	11.6	13.1	12.4	BDL	BDL	BDL
	June 2021	41.5	43.8	42.5	23.4	25.9	24.8	8.8	10.1	9.5	11.1	12.9	11.8	BDL	BDL	BDL
	July 2021	39.5	40.6	40	22.6	24.2	23.5	8.4	9.7	9.3	10.8	12.4	11.6	BDL	BDL	BDL
	Aug 2021	36.4	38.4	37.4	20.4	22.4	21.7	8.2	9.4	9	10.5	12.1	11.3	BDL	BDL	BDL
	Sep 2021	38.6	39.9	39.2	21.8	23.8	23.1	8.4	9.7	9.4	10.8	12.4	11.6	BDL	BDL	BDL
	Avg	40.3	42.2	41.2	23.5	25.6	24.7	8.6	9.9	9.4	11.0	12.5	11.7	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-2: Ambient Air Quality Monitoring at Admar village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Admar Village (A2)	April 2021	44.8	47.8	46.2	28.4	31.2	29.8	8.9	9.9	9.4	11.3	12.1	11.8	BDL	BDL	BDL
	May 2021	46.5	49.8	48	29.7	32.9	31.2	9.1	11.1	10.4	11.5	13.2	12.5	BDL	BDL	BDL
	June 2021	43.4	47.2	45.6	27.1	29.5	28.3	9.3	10.2	9.7	10.9	11.9	11.5	BDL	BDL	BDL
	July 2021	42.3	44.7	43.3	25.2	27.3	26.3	9.1	9.9	9.5	10.4	11.4	11.1	BDL	BDL	BDL
	Aug 2021	40.1	41.8	40.9	23.4	24.7	24.1	8.8	9.5	9.2	10.1	11.1	10.7	BDL	BDL	BDL
	Sep 2021	41.4	42.9	42	24.5	25.9	25.1	9.2	9.8	9.5	10.6	11.5	11.1	BDL	BDL	BDL
	Avg	43.1	45.7	44.3	26.4	28.6	27.5	9.1	10.1	9.6	10.8	11.9	11.5	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-3: Ambient Air Quality Monitoring at Inna village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Inna Village (A3)	April 2021	39.8	43.8	42.1	25.6	27.9	26.7	10.2	11.3	10.8	12.1	12.8	12.5	BDL	BDL	BDL
	May 2021	41.8	46.1	44.5	26	28.6	27.7	11.4	13.1	12.4	12.7	14	13.5	BDL	BDL	BDL
	June 2021	39.4	43.8	41.9	25.2	26.9	26.1	11.1	12.1	11.6	11.1	12.8	11.9	BDL	BDL	BDL
	July 2021	38.4	39.7	39.1	24.2	25.6	24.9	10.6	11.6	11	11.1	12.4	11.5	BDL	BDL	BDL
	Aug 2021	36.2	37.5	36.9	22.1	23.5	22.9	10.2	11.3	10.7	10.7	12	11.2	BDL	BDL	BDL
	Sep 2021	37.4	38.8	38.1	23.2	24.7	23.9	10.5	11.6	11	11	12.3	11.4	BDL	BDL	BDL
	Avg	38.8	41.6	40.4	24.4	26.2	25.4	10.7	11.8	11.3	11.5	12.7	12.0	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-4: Ambient Air Quality Monitoring at Hejmady Village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Hejmady Village (A4)	April 2021	43.6	45.7	44.3	24.1	26.8	25.7	9.1	9.9	9.6	14.5	15.4	14.9	BDL	BDL	BDL
	May 2021	44.9	47.1	46.2	25.7	27.8	26.9	10	11.1	10.6	14.9	16.4	15.6	BDL	BDL	BDL
	June 2021	42.3	44.2	43.4	23.2	25.1	24.2	8.9	9.8	9.4	13.2	14.9	14.2	BDL	BDL	BDL
	July 2021	40.5	42.3	41.3	21.4	22.9	22.3	8.8	9.4	9.2	13.3	14.3	13.9	BDL	BDL	BDL
	Aug 2021	38.2	39.6	39	19.3	20.5	20.1	8.4	9.1	8.8	13	14	13.6	BDL	BDL	BDL
	Sep 2021	39.5	41.1	40.3	20.5	21.7	21.2	8.7	9.5	9.1	13.3	14.3	13.9	BDL	BDL	BDL
	Avg	41.5	43.3	42.4	22.4	24.1	23.4	9.0	9.8	9.5	13.7	14.9	14.4	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-5: Ambient Air Quality Monitoring at Baikampady Village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Baikampady Village (A5)	April 2021	52.4	54.8	53.5	29.4	32.4	30.8	15.3	16.5	15.8	19.8	21.5	20.5	BDL	BDL	BDL
	May 2021	54.1	56.3	55.5	29.6	33.6	32	16.1	17.8	17	21.1	22.5	21.9	BDL	BDL	BDL
	June 2021	52.3	53.7	52.9	27.6	29.5	28.7	15.2	16.5	15.8	20.2	21.7	21	BDL	BDL	BDL
	July 2021	48.3	49.7	49.1	26.2	27.8	27.1	14.8	15.9	15.4	19.8	20.9	20.3	BDL	BDL	BDL
	Aug 2021	46.2	47.6	46.9	23.6	25.7	24.8	14.5	15.5	15	19.5	20.6	20	BDL	BDL	BDL
	Sep 2021	47.4	48.9	48.1	24.8	26.9	26.1	14.7	15.8	15.2	19.8	20.9	20.3	BDL	BDL	BDL
	Avg	50.1	51.8	51.0	26.9	29.3	28.3	15.1	16.3	15.7	20.0	21.4	20.7	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-6: Ambient Air Quality Monitoring at Paradka Village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Paradka Village (A6)	April 2021	28.6	31.4	30.2	18.4	20.2	19.5	8.9	9.9	9.5	10.5	11.2	10.8	BDL	BDL	BDL
	May 2021	30.1	33.4	31.9	19.5	21.2	20.5	9.4	11	10.5	10.6	12.1	11.3	BDL	BDL	BDL
	June 2021	27.7	30.1	28.8	18.5	19.6	19	9.1	9.9	9.5	10.1	10.9	10.5	BDL	BDL	BDL
	July 2021	26.4	28.4	27.1	17.3	18.8	17.9	8.7	9.5	9.1	9.6	10.3	10	BDL	BDL	BDL
	Aug 2021	24.1	26.3	25	15.4	16.7	16	8.4	9.2	8.8	9.2	9.9	9.6	BDL	BDL	BDL
	Sep 2021	25.3	27.5	26.4	16.5	17.8	17.1	8.7	9.5	9.2	9.6	10.3	10	BDL	BDL	BDL
	Avg	27.0	29.5	28.2	17.6	19.1	18.3	8.9	9.8	9.4	9.9	10.8	10.4	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-7: Ambient Air Quality Monitoring at Mudarangadi Village for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Mudarangadi Village (A7)	April 2021	39.5	41.9	40.7	20.5	22.3	21.5	10.3	10.8	10.6	11.2	11.8	11.5	BDL	BDL	BDL
	May 2021	41.1	43.1	42	20.4	23.4	22.3	10.7	11.9	11.3	12.1	13.2	12.6	BDL	BDL	BDL
	June 2021	38.1	39.8	39.1	18.1	19.9	19.2	10.1	11.1	10.5	11.4	12.5	11.9	BDL	BDL	BDL
	July 2021	36.5	38.8	37.4	17.1	18.8	18.2	9.7	10.2	9.9	10.9	12.1	11.4	BDL	BDL	BDL
	Aug 2021	34.2	36.2	35.1	15.4	16.4	16.1	9.4	9.8	9.6	10.5	11.8	11.1	BDL	BDL	BDL
	Sep 2021	35.3	37.3	36.4	16.6	17.5	17.1	9.7	10.4	9.9	10.6	12.1	11.2	BDL	BDL	BDL
	Avg	37.5	39.5	38.5	18.0	19.7	19.1	10.0	10.7	10.3	11.1	12.3	11.6	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-8: Ambient Air Quality Monitoring at Adani Pump House for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Adani Pump House (A8)	April 2021	34.8	36.7	35.6	26.2	27.9	27.1	9.2	9.9	9.7	11.3	12.2	11.7	BDL	BDL	BDL
	May 2021	36.1	37.9	37.1	27.2	28.7	28	10.1	11.3	10.7	12.1	13.1	12.7	BDL	BDL	BDL
	June 2021	32.8	35.1	33.9	24.1	25.8	24.9	8.5	10.2	9.5	10.5	12.1	11.5	BDL	BDL	BDL
	July 2021	32.1	33.9	32.8	22.3	23.7	23.1	8.9	9.7	9.2	10.9	11.7	11.3	BDL	BDL	BDL
	Aug 2021	30.1	31.3	30.7	20.1	21.5	20.9	8.6	9.4	8.9	10.5	11.4	10.9	BDL	BDL	BDL
	Sep 2021	30.9	32.6	31.8	20.9	22.6	21.9	8.8	9.7	9.2	11.4	12.5	11.9	BDL	BDL	BDL
	Avg	32.8	34.6	33.7	23.5	25.0	24.3	9.0	10.0	9.5	11.1	12.2	11.7	BDL	BDL	BDL

[BDL-Below Detection Limit]

Table-9: Ambient Air Quality Monitoring at Near Ash Pond for the period of April 2021 to Sep 2021

Location	Month	PM ₁₀ (100 µg/m ³)			PM _{2.5} (60 µg/m ³)			SO ₂ (80 µg/m ³)			NO _x (80 µg/m ³)			CO (2.0 mg/m ³)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Near Ash Pond (A9)	April 2021	43.2	46.3	44.9	28.9	32.4	30.5	10.3	11.4	10.8	11.5	13.2	12.4	BDL	BDL	BDL
	May 2021	44.5	47.5	46.2	29.8	32.8	31.7	10.9	12.7	11.9	12.1	14.8	13.4	BDL	BDL	BDL
	June 2021	41.2	44.8	43.1	26.3	29.8	28.6	10.1	11.8	11	11.2	13.9	12.5	BDL	BDL	BDL
	July 2021	37.9	40.3	39.2	25.2	28.6	27.3	9.6	11.2	10.4	10.7	13.3	12	BDL	BDL	BDL
	Aug 2021	35.2	38.4	37.1	23.1	26.6	25.4	9.3	10.9	10.2	10.3	13	11.7	BDL	BDL	BDL
	Sep 2021	36.3	39.4	38.3	24.3	27.8	26.7	9.6	11.3	10.5	10.6	13.2	12	BDL	BDL	BDL
	Avg	39.7	42.8	41.5	26.3	29.7	28.4	10.0	11.6	10.8	11.1	13.6	12.3	BDL	BDL	BDL

[BDL-Below Detection Limit]

Annexure-VIII

GUARD POND EFFLUENT WATER MONITORING

Annexure-VII

All the effluents like condenser cooling water, cooling tower blow down and brine discharge from desalination plant is directly discharged to Guard pond, from where the water is going back to the Sea through Coro-coated MS Pipeline. Final discharge point is through guard pond.

Boiler Blowdown, Coal Settling Pond water and Floor washings are treated in ETP and reused in the areas including greenbelt development/ dust suppression.

Continuous Online Monitoring setup is installed in the Guard pond & ETP discharge line to monitor Temp, pH, DO and TSS.

Ash Pond is covered with green belt and the runoff due to rain is collected in the adjacent pond and used for dust suppression within ash pond area. There is no provision of any outlet from Ash pond, Hence there is no effluent generated from the Ash Pond.

Samples are collected weekly and the monitoring values for the period of April 2021 to Sep 2021 are presented in Table-1 to Table-3 as below:

Table-1: Guard Pond Effluent sample monitoring for the period of April 2021 to Sep 2021

S.No	Parameters	Limits	Units	April-21	May-21	June-21	July-21	Aug-21	Sep-21	Average
1	Temperature	Not more than 5°C higher than intake sea water	°C	31.00	29.75	29.60	29.50	28.00	28.00	29.31
2	pH (at 25 °C)	5.5 – 9.0	-	7.88	7.65	7.12	7.62	7.28	7.33	7.48
3	Colour	-	-	1.00	1.00	2.00	1.00	1.50	1.00	1.25
4	Odour	-	-	A	A	A	A	A	A	BDL
5	Total Suspended Solids	Not more than 10% higher than intake sea water	mg/l	BDL	BDL	5.60	7.55	5.40	6.63	6.30
6	Oil and Grease	20	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	Total Residual Chlorine	1	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
8	BOD	100	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
9	COD	250	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10	Total Chromium	2	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11	Hexavalent Chromium	1	mg/l	0.02	0.04	0.04	0.02	0.01	0.026	0.025
12	Phenolic Compounds	5	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Mercury as Hg	0.01	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14	Lead as Pb	2	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Arsenic as As	0.2	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Iron	3	mg/l	0.45	0.28	0.85	0.42	0.20	0.96	0.52

Note: A- Agreeable, BDL- Below Detectable Level

Table-2: Cooling Tower Blow down Effluent monitoring for the period of April 2021 to Sep 2021

S.No	Parameters	Limits	Units	April-21	May-21	June-21	July-21	Aug-21	Sep-21	Average
1	Available Free Chlorine	0.5	mg/l	BDL	BDL	BDL	BDL	BDL	SD	BDL
2	Zinc	1	mg/l	0.25	0.24	0.39	0.33	0.26		0.29
3	Chromium	0.2	mg/l	0.03	0.02	0.04	0.03	0.07		0.04
4	Phosphate	5	mg/l	BDL	BDL	BDL	BDL	BDL		BDL

Note: BDL- Below Detectable Level, SD- Unit under Shut down

Table-3: Boiler Blow down Effluent sample monitoring for the period of April 2021 to Sep 2021

S.No	Parameters	Limits	Units	April-21	May-21	June-21	July-21	Aug-21	Sep-21	Average
1	Oil & Grease	20	mg/l	BDL	BDL	BDL	BDL	BDL	SD	BDL
2	Copper	1	mg/l	BDL	BDL	BDL	BDL	BDL		BDL
3	Suspended Solids	100	mg/l	BDL	0.14	BDL	BDL	BDL		0.14
4	Iron	1	mg/l	0.19	BDL	0.13	0.08	0.11		0.13

Note: BDL- Below Detectable Level, SD- Unit under Shut down

Annexure-VIII

WATER QUALITY MONITORING

Annexure-VIII

Water quality monitoring is carried in the eleven locations which are finalized in consultation with KSPCB and monitoring carried for the period of April 2021 to September 2021 is presented in the Table-1 to Table-11 as below:

Water Quality Sampling Location- Ground/Surface:

S.No	Name of the Location	Code	Source
1	Karnire River near Palimar village	SW-1	River
2	Pangala River Water	SW-2	River
3	Santhoor village	GW-1	Open well
4	Nandikur Village	GW-2	Open well
5	Palimar Village	GW-3	Open well
6	Simanthoor Village	GW-4	Open well
7	Admar Village	GW-5	Open well
8	Bappanadu Village	GW-6	Open well
9	Hejamady Village	GW-7	Open well
10	North Side of the UPCL Plant	GW-8	Open well
11	South Side of the UPCL plant	GW-9	Open well

Water Sample Analysis Parameters:

S.No	Parameters	S.No	Parameters
1	Color	16	Fluoride
2	pH	17	Phenolic Compounds
4	Taste	18	manganese
5	Turbidity	19	zinc
6	TDs	20	Arsenic
7	Alkalinity	21	cyanide
8	Total Hardness as CaCO ₃	22	cadmium
9	Calcium as Ca	23	chromium
10	Magnesium	24	Aluminium
11	Iron	25	Selenium
12	Sulphate as SO ₄	26	Lead
13	Chloride	27	Mercury
14	Boron	28	Nitrate nitrogen
15	Residual Free Chlorine	29	Ecoli

The Water Quality test results for the period of April 2021 to September 2021 is presented in the Table-1 to Table-11 as below.

Table-1: Water Quality Monitoring carried out in Karnire River (Back Water) (SW-1) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.87	6.91	6.82	6.8	6.83	6.84	6.8	6.91	6.85
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.5	0.7	0.7	1.2	0.8	3.4	0.5	3.4	1.22
6	TDS	mg/l	500	2000	295	304	91.6	94.8	38.8	32.8	32.8	304	142.83
7	Alkalinity as CaCO ₃	mg/l	200	600	45.3	42.4	24.2	22.7	18.1	7.4	7.4	45.3	26.68
8	Total Hardness	mg/l	200	600	58.7	51.5	29.3	25.6	17	20.1	17	58.7	33.70
9	Calcium as Ca	mg/l	75	200	45.1	40.7	6.7	5.1	3.4	6	3.4	45.1	17.83
10	Magnesium as Mg	mg/l	30	100	23.4	22.5	3	3.1	2.07	BDL	2.07	23.4	10.81
11	Iron as Fe	mg/l	0.3	No relaxation	0.17	0.18	0.14	0.2	0.18	0.22	0.14	0.22	0.18
12	Sulphate as SO ₄	mg/l	200	400	102.5	96.4	6	7.4	5.7	BDL	5.7	102.5	43.60
13	Chloride as Cl	mg/l	250	1000	115.2	103.1	40.6	45.1	12.1	13	12.1	115.2	54.85
14	Boron as B	mg/l	0.5	1	0.24	0.22	BDL	BDL	BDL	BDL	0.22	0.24	0.23
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	0.85	0.7	BDL	BDL	BDL	BDL	0.7	0.85	0.775
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	0.45	0.34	0.2	0.27	BDL	BDL	0.2	0.45	0.32
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	0.014	BDL	BDL	BDL	0.014	0.014	0.014
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	1.04	1.2	BDL	BDL	BDL	BDL	1.04	1.2	1.12
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-2: Water Quality Monitoring carried out in Pangala River (SW-2) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	1	1	1	1	1	1	1	1	1
2	pH	-	6.5 - 8.5	No Relaxation	7.15	7.02	6.93	6.76	6.86	6.8	6.76	7.15	6.92
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.4	0.8	3.6	1.4	0.8	3.7	0.4	3.7	1.78
6	TDS	mg/l	500	2000	235	240	190.4	96	34.8	29.2	29.2	240	137.57
7	Alkalinity as CaCO ₃	mg/l	200	600	76.5	74.2	9.7	18.1	13.6	7.4	7.4	76.5	33.25
8	Total Hardness	mg/l	200	600	60.2	58.6	41.9	25.6	17.04	20.1	17.04	60.2	37.24
9	Calcium as Ca	mg/l	75	200	39.4	40.1	8.4	5.1	3.4	4	3.4	40.1	16.73
10	Magnesium as Mg	mg/l	30	100	24.5	27.3	5	3.1	2.07	2.4	2.07	27.3	10.73
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.2	0.19	0.17	0.14	0.22	0.14	0.22	0.19
12	Sulphate as SO ₄	mg/l	200	400	85.3	92.5	9.6	7.9	BDL	BDL	7.9	92.5	48.83
13	Chloride as Cl	mg/l	250	1000	107.9	103.5	85.6	42.9	14.1	10.8	10.8	107.9	60.80
14	Boron as B	mg/l	0.5	1	0.14	0.17	BDL	BDL	BDL	BDL	0.14	0.17	0.155
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	0.89	0.63	BDL	BDL	BDL	BDL	0.63	0.89	0.76
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	1.02	1.41	BDL	BDL	BDL	BDL	1.02	1.41	1.215
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-3: Water Quality Monitoring Carried out at Open well in Santhoor Village (GW-1) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.89	6.85	6.76	6.8	6.85	6.81	6.76	6.89	6.82
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.2	BDL	0.2	BDL	BDL	1.4	0.2	1.4	0.6
6	TDS	mg/l	500	2000	46.8	53.6	34.8	28.8	45.2	36.4	28.8	53.6	40.93
7	Alkalinity as CaCO ₃	mg/l	200	600	26.6	21.4	14.5	9.08	22.7	11.1	9.08	26.6	17.56
8	Total Hardness	mg/l	200	600	27.6	16.7	8.3	12.8	21.3	25.2	8.3	27.6	18.65
9	Calcium as Ca	mg/l	75	200	7.9	6.7	3.3	3.4	6.8	6	3.3	7.9	5.68
10	Magnesium as Mg	mg/l	30	100	BDL	BDL	BDL	BDL	BDL	2.4	2.4	2.4	2.4
11	Iron as Fe	mg/l	0.3	No relaxation	0.21	0.13	0.19	0.15	0.04	0.22	0.04	0.22	0.15
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Chloride as Cl	mg/l	250	1000	16.3	BDL	12.8	10.7	21.3	13	10.7	21.3	14.82
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	1.02	BDL	BDL	BDL	BDL	1.02	1.02	1.02
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-4: Water Quality Monitoring Carried out at Open well in Nandikur Village (GW-2) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	7.02	7	6.70	6.75	7.35	7.28	6.7	7.35	7.02
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.4	1.3	0.3	3.0	BDL	2.2	0.3	3	1.44
6	TDS	mg/l	500	2000	99.6	100.8	96.4	90	95.6	96.8	90	100.8	96.53
7	Alkalinity as CaCO ₃	mg/l	200	600	64.6	68.6	63.1	59	63.5	52.1	52.1	68.6	61.81
8	Total Hardness	mg/l	200	600	59.1	67.1	71.2	72.7	72.4	80.6	59.1	80.6	70.51
9	Calcium as Ca	mg/l	75	200	14.2	13.4	15.1	17.1	13.6	16.1	13.4	17.1	14.91
10	Magnesium as Mg	mg/l	30	100	5.7	8.1	8.1	7.2	9.3	9.7	5.7	9.7	8.02
11	Iron as Fe	mg/l	0.3	No relaxation	0.18	0.09	0.16	0.17	0.12	0.19	0.09	0.19	0.15
12	Sulphate as SO ₄	mg/l	200	400	BDL	5.5	BDL	BDL	BDL	10.2	5.5	10.2	7.85
13	Chloride as Cl	mg/l	250	1000	16.3	14.8	12.8	12.8	14.1	15.1	12.8	16.3	14.31
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	0.80	0.15	0.15	BDL	BDL	0.15	0.8	0.36
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-5: Water Quality Monitoring carried out at Open well in Palimar Village (GW-3) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.96	6.82	6.8	6.76	6.93	6.84	6.76	6.96	6.85
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.4	1.1	BDL	BDL	BDL	BDL	0.4	1.1	0.75
6	TDS	mg/l	500	2000	102	99.6	81.2	140.8	140.8	140.8	81.2	140.8	117.53
7	Alkalinity as CaCO ₃	mg/l	200	600	45.6	51.5	33.9	49.9	54.4	48.4	33.9	54.4	47.28
8	Total Hardness	mg/l	200	600	63.1	67.1	54.5	85.5	102.2	120.9	54.5	120.9	82.22
9	Calcium as Ca	mg/l	75	200	20.5	26.8	151	30.8	30.7	36.3	20.5	151	49.35
10	Magnesium as Mg	mg/l	30	100	2.8	BDL	4	2	6.1	7.3	2	7.3	4.44
11	Iron as Fe	mg/l	0.3	No relaxation	0.14	0.08	0.13	0.11	0.095	0.2	0.08	0.2	0.13
12	Sulphate as SO ₄	mg/l	200	400	6.02	6.7	BDL	9.8	10.1	10.2	6.02	10.2	8.56
13	Chloride as Cl	mg/l	250	1000	27.2	23.2	23.5	38.6	38.5	43.3	23.2	43.3	32.38
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	1.12	1.12	BDL	BDL	1.12	1.12	1.12
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-6: Water Quality Monitoring carried out at Open well in Simanthoor Village (GW-4) for the period of April 2021 to Sept 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.84	6.92	6.85	7.24	6.84	6.93	6.84	7.24	6.94
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.1	BDL	BDL	BDL	BDL	2.9	0.1	2.9	1.5
6	TDS	mg/l	500	2000	78	120.8	54.8	150.8	108.4	81.6	54.8	150.8	99.07
7	Alkalinity as CaCO ₃	mg/l	200	600	38	12.8	19.4	86.2	63.5	33.5	12.8	86.2	42.23
8	Total Hardness	mg/l	200	600	39.4	12.5	29.3	98.3	80.9	65.5	12.5	98.3	54.32
9	Calcium as Ca	mg/l	75	200	14.2	2	6.7	37.7	25.6	22.2	2	37.7	18.07
10	Magnesium as Mg	mg/l	30	100	BDL	BDL	3	BDL	4.1	2.4	2.4	4.1	3.17
11	Iron as Fe	mg/l	0.3	No relaxation	0.15	0.1	0.18	0.2	0.14	0.21	0.1	0.21	0.16
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	11.6	BDL	8	8	11.6	9.8
13	Chloride as Cl	mg/l	250	1000	23.5	23.2	25.69	23.6	16.2	15.1	15.1	25.69	21.22
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	0.21	BDL	BDL	0.21	0.21	0.21
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	1.49	1.2	1.13	1.13	1.49	1.27
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-7: Water Quality Monitoring carried out at Open well in Admar Village (GW-5) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.89	6.97	6.71	6.91	6.82	6.71	6.97	6.85
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.4	BDL	BDL	0.4	BDL	2.7	0.4	2.7	1.17
6	TDS	mg/l	500	2000	18	43.6	79.6	26.8	27.6	26.8	18	79.6	37.07
7	Alkalinity as CaCO ₃	mg/l	200	600	7.6	25.7	29.1	4.5	9	7.4	4.5	29.1	13.88
8	Total Hardness	mg/l	200	600	15.7	20.9	50.3	8.5	8.5	10	8.5	50.3	18.98
9	Calcium as Ca	mg/l	75	200	4.7	8.4	16.8	3.4	3.4	4.04	3.4	16.8	6.79
10	Magnesium as Mg	mg/l	30	100	BDL	BDL	2.03	BDL	BDL	BDL	2.03	2.03	2.03
11	Iron as Fe	mg/l	0.3	No relaxation	0.18	0.11	0.2	0.08	0.21	0.17	0.08	0.21	0.16
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13	Chloride as Cl	mg/l	250	1000	7.2	14.8	23.5	12.8	12.1	13	7.2	23.5	13.9
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-8: Water Quality Monitoring carried out at Open well in Bappanadu Village (GW-6) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	7.33	6.93	6.79	7.12	6.88	7.07	6.79	7.33	7.02
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.2	BDL	BDL	1.2	BDL	2.8	0.2	2.8	1.4
6	TDS	mg/l	500	2000	240.4	130.4	96.8	95.3	108	78	78	240.4	124.82
7	Alkalinity as CaCO ₃	mg/l	200	600	87.4	17.1	14.5	102.6	86.2	37.2	14.5	102.6	57.5
8	Total Hardness	mg/l	200	600	138.1	41.9	33.5	37.7	80.9	65.5	33.5	138.1	66.27
9	Calcium as Ca	mg/l	75	200	34.7	10	6.7	2.08	27.3	24.2	2.08	34.7	17.50
10	Magnesium as Mg	mg/l	30	100	12.4	4	4	0.11	3.1	BDL	0.11	12.4	4.72
11	Iron as Fe	mg/l	0.3	No relaxation	0.1	0.11	0.17	0.16	0.19	0.2	0.1	0.2	0.16
12	Sulphate as SO ₄	mg/l	200	400	49.1	BDL	BDL	27.9	BDL	11.5	11.5	49.1	29.5
13	Chloride as Cl	mg/l	250	1000	45.3	50.7	36.4	BDL	16.2	13	13	50.7	32.32
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	0.22	BDL	BDL	BDL	BDL	BDL	0.22	0.22	0.22
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	1.05	4.81	4.16	1.22	1.05	1.17	1.05	4.81	2.24
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-9: Water Quality Monitoring carried out at Open well in Hejmady Village (GW-7) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.75	6.87	6.91	7.33	6.86	6.87	6.75	7.33	6.93
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.1	BDL	BDL	BDL	BDL	3.5	0.1	3.5	1.8
6	TDS	mg/l	500	2000	190.8	130.8	96.8	152	108.8	76	76	190.8	125.87
7	Alkalinity as CaCO ₃	mg/l	200	600	83.64	12.8	BDL	104.4	59.02	29.8	12.8	104.4	57.93
8	Total Hardness	mg/l	200	600	110.4	37.7	29.35	102.6	80.9	65.5	29.35	110.4	71.08
9	Calcium as Ca	mg/l	75	200	28.4	10	10	34.2	25.6	22.2	10	34.2	21.73
10	Magnesium as Mg	mg/l	30	100	9.5	3	BDL	4.1	4.1	2.4	2.4	9.5	4.62
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.12	0.22	0.12	0.2	0.15	0.12	0.22	0.17
12	Sulphate as SO ₄	mg/l	200	400	15.7	BDL	BDL	10.2	BDL	11.7	10.2	15.7	12.53
13	Chloride as Cl	mg/l	250	1000	47.1	50.7	32.1	30	18.2	15.1	15.1	50.7	32.20
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	4.79	3.7	1.09	1.09	1.15	1.09	4.79	2.36
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-10: Water Quality Monitoring carried out at North Side of UPCL Plant site (GW-8) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.85	6.85	6.84	6.81	6.82	6.82	6.81	6.85	6.83
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.1	BDL	BDL	BDL	BDL	1	0.1	1	0.55
6	TDS	mg/l	500	2000	45.6	53.6	36.8	22.8	96	150.4	22.8	150.4	67.53
7	Alkalinity as CaCO ₃	mg/l	200	600	26.6	17.4	9.7	4.5	63.5	44.7	4.5	63.5	27.73
8	Total Hardness	mg/l	200	600	23.6	25.1	16.7	8.55	72.4	110.8	8.55	110.8	42.86
9	Calcium as Ca	mg/l	75	200	7.9	5	3.3	3.4	15.3	34.3	3.3	34.3	11.53
10	Magnesium as Mg	mg/l	30	100	BDL	3	2	BDL	8.2	6.1	2	8.2	4.83
11	Iron as Fe	mg/l	0.3	No relaxation	0.15	0.09	0.22	0.08	0.22	0.2	0.08	0.22	0.16
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	BDL	BDL	10.1	10.1	10.1	10.1
13	Chloride as Cl	mg/l	250	1000	16.3	21.1	19.2	12.8	16.2	43.3	12.8	43.3	21.48
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Table-11: Water Quality Monitoring carried out at South Side of UPCL plant site (GW-9) for the period of April 2021 to September 2021

S.No	Parameters	Unit	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	pH	-	6.5 - 8.5	No Relaxation	6.79	6.82	7.06	6.95	6.87	7.09	6.79	7.09	6.93
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.2	1	3.8	0.5	BDL	0.8	0.2	3.8	1.26
6	TDS	mg/l	500	2000	98.8	480	430.8	210.4	28.8	120.8	28.8	480	228.27
7	Alkalinity as CaCO ₃	mg/l	200	600	64.6	8.5	4.85	9.08	9.08	14.9	4.85	64.6	18.50
8	Total Hardness	mg/l	200	600	63.1	109.0	92.2	47	12.7	40.3	12.7	109	60.72
9	Calcium as Ca	mg/l	75	200	12.6	23.5	16.8	11.9	3.4	8	3.4	23.5	12.70
10	Magnesium as Mg	mg/l	30	100	7.6	12.2	12.2	4.1	BDL	4.8	4.1	12.2	8.18
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.1	0.18	0.14	0.21	0.17	0.1	0.22	0.17
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	5	BDL	BDL	5	5	5
13	Chloride as Cl	mg/l	250	1000	18.1	272.9	233.3	111.7	14.1	67.2	14.1	272.9	119.55
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	0.34	BDL	0.23	BDL	BDL	0.23	0.34	0.285
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	0.2	0.23	BDL	BDL	0.2	0.23	0.215
20	Arsenic as As	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note: A- Agreeable, BDL- Below Detectable Level, NIL- Zero

Annexure-IX

Rain Water Harvesting Ponds

Annexure - IX



Three Numbers of Rain Water Harvesting Ponds constructed to conserve Rain Water
Six Monthly Environmental Compliance Report for the Period from April 2021 to Sep 2021 for UPCL

Annexure-X

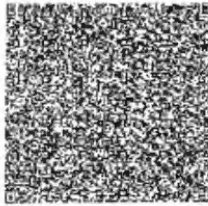


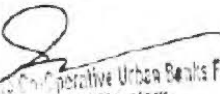
सत्यमेव जयते

**INDIA NON JUDICIAL
Government of Karnataka**

e-Stamp

Certificate No.	: IN-KA18483757771281M
Certificate Issued Date	: 14-Aug-2014 01:01 PM
Account Reference	: NONACC (BK) kakscub08/ BANGALORE4/ KA-BA
Unique Doc. Reference	: SUBIN-KAKAKSCUB0890564982776431M
Purchased by	: UDUPI POWER CORPORATION LIMITED
Description of Document	: Article 12 Bond
Description	: AGREEMENT
Consideration Price (Rs.)	: 0 (Zero)
First Party	: GOVERNMENT OF KARNATAKA DEPARTMENT OF FISHERIES
Second Party	: UDUPI POWER CORPORATION LIMITED
Stamp Duty Paid By	: UDUPI POWER CORPORATION LIMITED
Stamp Duty Amount (Rs.)	: 200 (Two Hundred only)




 For Karnataka State Co-Operative Urban Banks Federation Ltd.
 Authorized Signatory

Please write or type below this line

AMENDMENT TO AGREEMENT

This Amendment to the Agreement dated 9th March 2000 is made on 14th August 2014 by and between:

Government of Karnataka, Department of Fisheries, represented by the Deputy Director of Fisheries, Mangalore, hereinafter referred to as "Grantor" of the one part,



1



(SECOND COPY OF THE AGREEMENT)

Statutory Alert

1. The authenticity of the Stamp Certificate should be verified at www.ahelabnms.com. Any discrepancy in the details on this Certificate should be available on the website renders it void.

2. The issue of duplicate/stale/duplicate is on the users of the Certificate.

AND

Udupi Power Corporation Limited (formerly known as Nagarjuna Power Corporation Limited), a Company incorporated under the Companies Act, 1956 and having its Registered Office at 2nd Floor, 'Le-Parc Richmond', No. 51, Richmond Road, Bangalore – 560 025, hereinafter referred to as "Grantee" of the other part,

The terms "Grantor and Grantee", individually referred to as Party and collectively as Parties, which includes their successors and assignees

WHEREAS:

- (A) The Grantee was initially establishing 2 x 507.5MW coal fired thermal power station in Udupi District, Karnataka. Subsequently the capacity of the power project of the Grantee was augmented from 2 x 507.5MW to 2 x 600 MW with necessary approvals from Government of Karnataka, Ministry of Environment and Forests (Government of India) and Karnataka State Pollution Control Board.
- (B) The parties have entered into an Agreement dated 9th March 2000 (hereinafter referred to as **Agreement**)
- (C) Subsequent to entering of the Agreement, the Grantee had sought certain amendments to conditions imposed in the Agreement, for which, the Grantor, after examining the amendments sought, has approved the amendments vide its letter bearing No. ಪಸಂಮೀ.24.ವಿಜ್ಞ 2010 dated 19.06.2014.
- (D) The parties have agreed to amend the Agreement to incorporate the amendments approved by the Grantor.



2

(SECOND COPY OF THE AGREEMENT)

NOW THEREFORE IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS:

Item No.4, page 2 of the Agreement be read as follows:

"4. Sea water intake point shall be located at a depth of not less than 6.97 m and at a distance of 1400 m inside the sea from the coast."


Item No.5, page 2 of the Agreement be read as follows:

"5. The effluent from the power station shall be discharged at depth of minimum 4.89 m and 670 m inside the Sea from the coast."


All other terms and conditions in the Agreement that are not hereby amended are to remain in full force and effect.


IN WITNESS WHEREOF the parties herein have signed this Agreement on the day, month and year first above written, in the presence of:


Deputy Director of Fisheries
Mangalore
Deputy Director of Fisheries, Mangalore
On behalf of Governor of Karnataka


M. CHANDRASEKHAR REDDY
Director & COO
Director & Chief Operating Officer for and on behalf of Udupi Power Corporation Ltd

Witnesses:

1 
Sumit L Naik
504, 10th A Main
4th Block 3rd Stage
Baramahivanagar, B.10th-59

2 
SUSHMITHA RAO,
ASST DIR OF FISHERIES,
o/o DY. DIR. OF FISHERIES,
MANGALORE

(SECOND COPY OF THE AGREEMENT)

Annexure-XI

Green Belt development:

Plantation was carried in and around plant premises with local species. Total plantation carried so far is around 369405 No's in 195 acres.

Plantation Details	Area (Acres)
369405	195
2750 Saplings were planted inside the plant in lieu of World Environment Day 2021 celebrations	

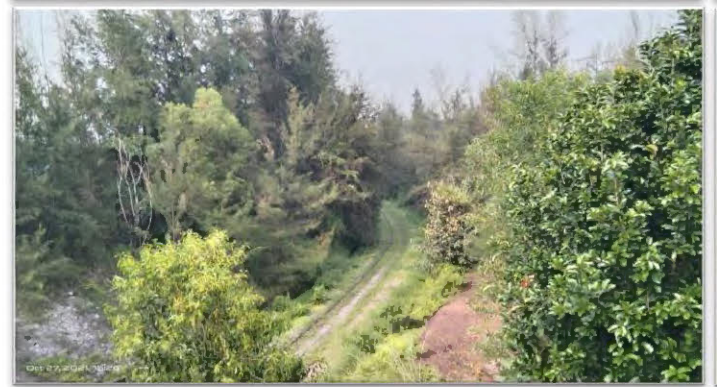
List of the Plant Species planted in and around the UPCL plant premises

S.No	Species
1	Honge
2	Neem
3	Mahagani
4	T. Rosea
5	Melengia
6	Seetha Ashoka
7	Alstonia
8	T. Arjuna
9	Honne
10	Kadu Badami
11	Lebeka
12	Legestonia
13	Nerale
14	Peltaform
15	Rain Tree
16	Gulmava
17	Beete
18	Cassurina
19	Holenandi
20	May Flower
21	Palaksha
22	Garige
23	Budubende
24	Surage
25	Dhupa
26	Basavanapada
27	Jack Fruit
28	Ramatre
29	Coconut Plant

Road Side Plantation



Thick plantation near Coal Handling Plant on both sides of the Road



Plantation developed all along the Outside boundary



Plantation developed all along the Inside boundary



Gardening Plantation developed



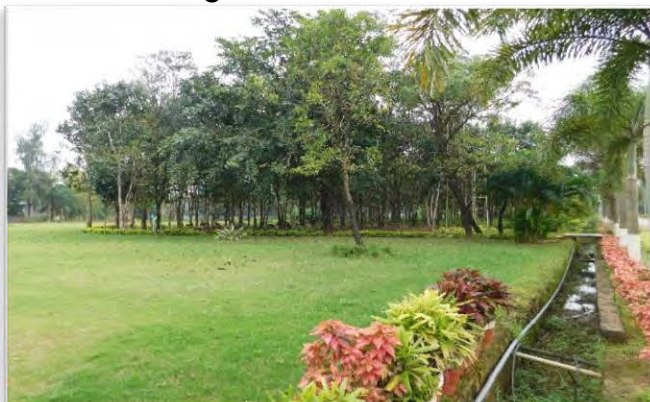
Vegetable & Fruit Plantation developed



Plantation near Fly Ash silo



Plantation developed Surrounding Guest House



Annexure XIII

Udupi Power Corporation Limited
(Formerly Nagarpur Power Corporation Limited)



Ref: UPCL/HR/R&R/2011/3278

dated 26th March, 2011

The Special Land Acquisition Officer
Karnataka Industrial Area Development Board
Baikampady Industrial Area
MANGALORE.

Dear Sir,

Subject: Udupi Power Corporation Limited – 1200 MW Thermal Power Project-
Providing of employment under Rehabilitation and Resettlement Policy
of Government of Karnataka.

References: (i) Your Office Letter No. LAQ/SR/1/92-93/1157, dated 18.02.2008
(ii) Your Office Letter No. LAQ/SR/1/2007-08/1294, dated 29.03.2008
(iii) Your Office Letter No. LAQ/SR/1/08-09, dated 08.01.2010
(iv) Your Office Letter No. LAQ/SR/1/2008-09/189, dated 27.04.2010
(v) Your Office Letter No. LAQ/SR/1/2008-09/399, dated 17.06.2010

.....

This is with regard to above subject and with reference to your letters under references. Please note that, in terms of the Government of Karnataka Order bearing No. RD 118 REN 91 dated 30.04.1997 read with Government of Karnataka Order No. RD 118 REN 91, dated 18.12.1992 and as per the letters issued by you, action taken by Udupi Power Corporation Limited on the 36 applications cleared by your office is furnished in the list enclosed herewith as 'Annexure – A'. It may please be noted that since the nominees mentioned as against the Sl. Nos. 6 and 14 are pursuing Diploma and Engineering course respectively, they may take-up employment with us on completion of their studies i.e., by July, 2011. The issue of employment letters to the nominees mentioned against the Sl. Nos. 12, 15 and 34 are under process.

Contd...2

Registered Office : II Floor, Le-Parc Richmond, No.51, Richmond Road, Bangalore - 560 025
T +91-080-40254025, F +91-080-40254000

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Further it may please be noted that among the applications cleared by your office for providing employment under R&R policy, we found some discrepancies in four applications. The details of the discrepancies and also our observations are given in the 'Annexure-B', which is enclosed herewith. We, therefore, are returning these 4 applications to you along with this letter with a request to provide us necessary clarifications / confirmations so as to consider these applications for employment at the earliest.

We would also request you to inform us of any further applications pending with you for providing employment under R&R Policy and if there are any, the same may be please be forwarded to us with necessary supporting documents.

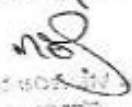
Thanking you

Yours faithfully
for **UDUPI POWER CORPORATION LIMITED**


M.V. Ramana Rao
Sr. General Manager – H.R

Encl:

1. Annexure – A
2. Annexure – B

ದ್ರ. ಪುಟ್ಟಣ್ಣ
ಮಾನ್ಯ ಸಿ.ಇ.ಒ.

ನಿರ್ದೇಶಕರು, ವಿದ್ಯುತ್ ಸಂಪನ್ಮೂಲ ಇಲಾಖೆ
6, 8, 9, 10, 11, 12
ಬೆಂಗಳೂರು, ಕರ್ನಾಟಕ - 573 011

Annexure-XIII

UPCL is executing CSR activities in the following villages:

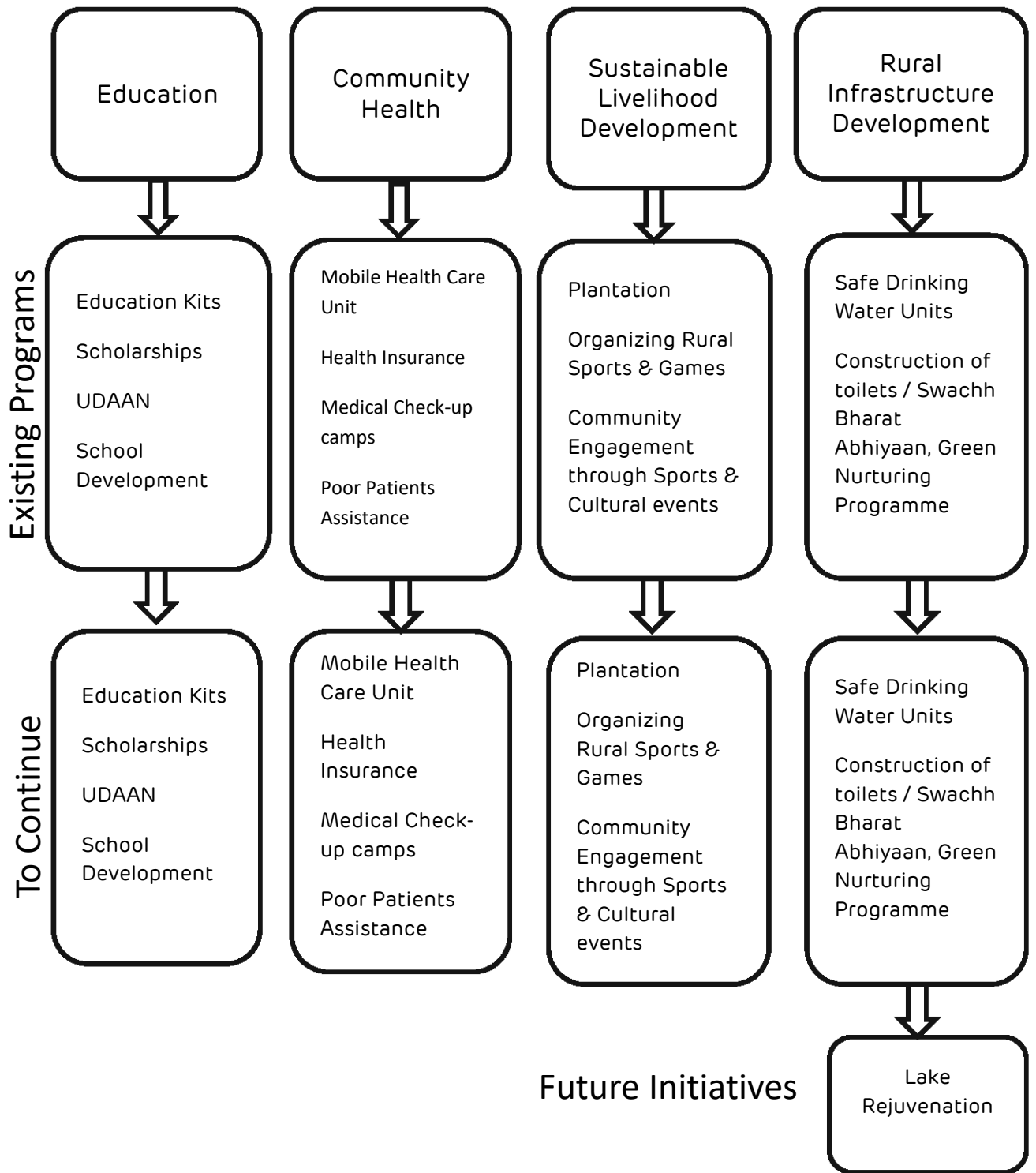
Annexure - XIII

Sl.No	Name of the Grama Panchayat	District	No. Of Households	Population	Villages
1.	Yellur	Udupi	1483	6404	Yellur, Ullur, Saje, Kemmendelu
2.	Mudarangadi	Udupi	1489	7476	Santhoor & Pilar
3.	Uchila/Bada	Udupi	2201	8770	Yermal, Bada, Bhaskara Nagara, Polya, Mullagudde, Kattinagara, Bada Guthu
4.	Tenka	Udupi	1109	3701	Tenka, Admar
5.	Padubidri	Udupi	5200	12694	Kanchinadka, Nadsal, Nadsal Budu, Nadipatna, Kadipatna, Padebettu
6.	Palimar	Udupi	1600	6761	Mudupalimar, Nandikoor, Avaralumattu.
7.	Belapu	Udupi	1211	4965	Belapu & Paniyuru
8.	Inna	Udupi	632	3864	Kanjarakatte, Inna
9.	Kutyar	Udupi	1376	5231	Kutyar
10.	Hejamadi	Udupi	1578	6630	Hejamadi


CSR FOCUS AREAS




Programs to be continued and new initiatives



Programme – Mobile Health Care Unit:

Purpose	Activity	
<p>To deliver the quality medical services at free of cost to the doorsteps of the villagers.</p> <p>To improve the health condition of the villagers.</p>	<p>The Mobile Health Service ply to 2 villages every day and provides free medical treatment to the villages. As on date it is plying to 13 villages. 66496 villagers cumulative.</p> <p>7952 villagers for Apr-Sep'2021.</p>	


Programme – Covid-19 Relief Care:

Purpose	Activity	
<p>To extend support for improving the medical infrastructure facilities in District Hospital, Udupi and Government Hospital.</p>	<p>To set-up a Pediatric ICU Ventilator beds in Government Hospital, support confirmation letter of Rs. 40 lakhs was handed over to Shri. G. Jagadeesha, Hon'ble Deputy Commissioner and District Magistrate, Udupi.</p>	

Programme – Community Infrastructure Development:

Purpose	Activity	
<p>Rejuvenation of Lakes</p>	<p>Rejuvenation of Twin Mainda Lake, spread across 5.6 acres in Santuru Village at Mudaragandi Grama Panchayat.</p>	

Programme – Community Infrastructure Development:

Purpose	Activity	
<p>To support the Scouts and Guides Training Centre</p>	<p>Construction of Compound Wall for the Training Centre of Bharat Scouts and Guides, Karnataka, spread across 26 acres in Pragati Nagar, Udupi District.</p>	



Programme – Safe Drinking Water Unit

Purpose	Activity	
To ensure potable drinking water to all the surrounding villagers.	Set-up Safe Drinking Water Units of RO based technology in 5 villages, i.e., Yellur, Belapu, Mudarangadi, Tenka and Bada.	
To overcome drinking water problem during summer	No of Beneficiaries is 6,465.	

Media Coverage

ಅದಾನಿ ಫೌಂಡೇಶನ್ ಉಡುಪಿ ಜಿಲ್ಲಾಡಳಿತಕ್ಕೆ 40 ಲಕ್ಷ ರೂ. ದೇಣಿಗೆ

ಹೂಂ ವರ್ಗಾವಣೆ ಪತ್ರವನ್ನು ಕಿಶೋರ್ ಅಳು ಅವರು ದಿ.21 ಗೆ ಪಸ್ತಾಂತರಿಸಿದರು. ಪುಡುಬದ್ದಿ, ಅ. 22: ಅದಾನಿ ಫೌಂಡೇಶನ್ ಮೂಲಕ ಉಡುಪಿ ಜಿಲ್ಲಾಡಳಿತಕ್ಕೆ 40 ಲಕ್ಷ ರೂ.ಗಳನ್ನು ಹಸ್ತಾಂತರಿಸಿದೆ. ಕೊರೋನಾ ಮೂರನೇ ಅಲೆಯನ್ನು ಎದುರಿಸುವ ನಿಟ್ಟಿನಲ್ಲಿ ಜಿಲ್ಲಾಡಳಿತ ಹಾಗೂ ಆರೋಗ್ಯ ಇಲಾಖೆಯು ತೆಗೆ ಕಿಶೋರ್ ಅಳು ತಿಳಿಸಿದ್ದಾರೆ.

CSR initiative: ₹40L donated for paediatric ventilators

TIMES NEWS NETWORK

Udupi: UPCL, a subsidiary of Adani Power Limited, through Adani Foundation, a CSR wing of Adani Group, has donated Rs 40 lakh to the Udupi district administration for establishing paediatric ICU ventilators in the government hospital, as preparation for the third wave of Covid-19. Adani Foundation has transferred Rs 40 lakh to the CSR account of deputy commissioner, Udupi.

ವೆಂಟಿಲೇಟರ್ ಸ್ಥಾಪನೆಗೆ ನೆರವು

ಜಿಲ್ಲಾಧಿಕಾರಿ ಜಿ.ಜಗದೀಶ್ ಅವರಿಗೆ ಹಣ ವರ್ಗಾವಣೆ ಪತ್ರವನ್ನು ಕಿಶೋರ್ ಅಳು ಹಸ್ತಾಂತರಿಸಿದರು.

ಪುಡುಬದ್ದಿ: ರೋವಿಡ್ ಮೂರನೇ ಅಲೆ ಎದುರಿಸುವ ನಿಟ್ಟಿನಲ್ಲಿ ಉಡುಪಿ ಜಿಲ್ಲಾ ಆಸ್ಪತ್ರೆಗೆ ಮಕ್ಕಳ ವಸಿಯ ವೆಂಟಿಲೇಟರ್ ಸ್ಥಾಪನೆಗಾಗಿ ಸಿಎಸ್‌ಆರ್ ಯೋಜನೆಯಡಿ 40 ಲಕ್ಷ ರೂ.ವನ್ನು ಎಲ್ಲೂರಿನಲ್ಲಿ ಕಾರ್ಯನಿರ್ವಹಿಸುತ್ತಿರುವ ಯುಪಿಎಲ್ ಸಂಸ್ಥೆಯ ಸಿಎಸ್‌ಆರ್ ಯೋಜನೆಯನ್ನು ನಿರ್ವಹಿಸುತ್ತಿರುವ ಅದಾನಿ ಫೌಂಡೇಶನ್ ಒದಗಿಸಿದೆ. ಉಡುಪಿ ಜಿಲ್ಲಾಡಳಿತ ಹಾಗೂ ಆರೋಗ್ಯ ಇಲಾಖೆ ಮನವಿಗೆ ಸ್ವಂದಿಸಿದ ಅದಾನಿ ಫೌಂಡೇಶನ್ ಈ ಮೊತ್ತವನ್ನು ಜಿಲ್ಲಾಧಿಕಾರಿ ಖಾತೆಗೆ ವರ್ಗಾಯಿಸಿದ್ದು, ಸಂಬಂಧಿಸಿದ ಪತ್ರವನ್ನು ಜಿಲ್ಲಾಧಿಕಾರಿ ಜಿ. ಜಗದೀಶ್ ಅವರಿಗೆ ಜಿಲ್ಲಾಧಿಕಾರಿ ಕಚೇರಿಯಲ್ಲಿ ಅದಾನಿ ಸಂಸ್ಥೆ ಕಾರ್ಯನಿರ್ವಾಹಕ ನಿರ್ದೇಶಕ ಕಿಶೋರ್ ಅಳು ಹಸ್ತಾಂತರಿಸಿದರು.

Annexure-XIV

Comparison of Base Line Data with the analysis report of Sep 2021:

Annexure-XIV

S.No	Parameters	Karnire (Surface water)		Nandikur Village		Santhoor Village		UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012
		As Per EIA-507.5 MU	Sep 2021	As Per EIA-507.5 MU	Sep 2021	As Per EIA-507.5 MU	Sep 2021			
1	Color	Colorless	BDL	Colorless	BDL	Colorless	BDL	Hz	5	15
2	Odour		A		A		A	-	Agreeable	Agreeable
3	Taste		A		A		A	-	Agreeable	Agreeable
4	Turbidity		3.4		2.2		1.4	NTU	1	5
5	TDS	17222	32.8	8	96.8	16	36.4	mg/l	500	2000
6	pH	7.1	6.84	6.2	7.28	6.8	6.81	-	6.5 - 8.5	No relaxation
7	Alkalinity		7.4		52.1		11.1	mg/l	200	600
8	Total Hardness as CaCO3		20.1		80.6		25.2	mg/l	200	600
9	Calcium as Ca		6.0		16.1		6.0	mg/l	75	200
10	Magnesium as Mg		BDL		9.7		2.4	mg/l	30	100
11	Iron as Fe	0.1	0.22	0.3	0.19	1.5	0.22	mg/l	0.3	No relaxation
12	Sulphate as SO4	1096	BDL	1.9	10.2	2.1	BDL	mg/l	200	400
13	Chloride as Cl	9264	13	8.6	15.1	9.6	13	mg/l	250	1000
14	Fluoride as F	0.5	BDL	0.05	BDL	0.1	BDL	mg/l	1	1.5
15	Phenolic Compounds	0.04	BDL	0.01	BDL	0.02	BDL	mg/l	0.001	0.002
16	Manganese as Mn		BDL		BDL		BDL	mg/l	0.1	0.3
17	Zinc as Zn	0.02	BDL	0.02	BDL	0.03	BDL	mg/l	5	15
18	Arsenic as As	ND	BDL	ND	BDL	ND	BDL	mg/l	0.05	No relaxation
19	Cyanide as CN		BDL	ND	BDL		BDL	mg/l	0.05	No relaxation
20	Cadmium as Cd	ND	BDL	ND	BDL	ND	BDL	mg/l	0.003	No relaxation
21	Chromium as Cr6+	ND	BDL	ND	BDL	ND	BDL	mg/l	0.05	No relaxation
22	Aluminium as Al		BDL	ND	BDL		BDL	mg/l	0.03	0.2
23	Selenium as Se	ND	BDL	ND	BDL	ND	BDL	mg/l	0.01	No relaxation
24	Lead as Pb	ND	BDL	ND	BDL	ND	BDL	mg/l	0.01	No relaxation
25	Mercury as Hg	ND	BDL	ND	BDL	ND	BDL	mg/l	0.001	No relaxation
26	Boron as B	ND	BDL	ND	BDL	ND	BDL	mg/l	0.5	1
27	Residual Free Chlorine	NT	BDL	ND	BDL	NT	BDL	mg/l	0.2	1
28	Nitrate as NO3-N		BDL	ND	BDL		BDL	mg/l	45	No relaxation
29	E.Coli	280	Nil	350	Nil	1800	Nil	MPN/100 ml	Shall not be detectable in any 100 ml sample	

Note: A- Agreeable, BDL- Below Detectable Level, Nil- Zero

Annexure-XV

9/c

adani

Power

REF: UPCL/PLANT/08/M/ENV/2021-22/490

24.09.2021

To,
The Environment Officer,
Karnataka State pollution Control Board,
Regional Office,
Plot No-36-C, Shivalli Industrial Area,
Manipal, Udupi-576104

Sub: Submission of Environment statement for Financial Year 2020-21 in Form-V for 2 X 600 MW coal based Subcritical Thermal Power Plant of Udupi Power Corporation Limited, reg...

Ref: 1) Consent for Operation No: - AWH - 301645 dated: 15/12/2016.
2) Environmental Clearance No: - J-13011/23/1996-IA.II (T) dated: 01.09.2011

Dear Sir,

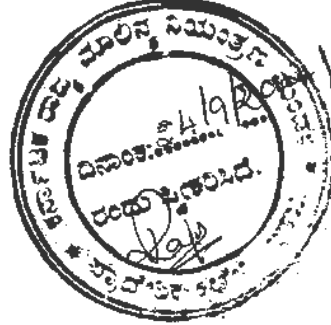
With reference to the above cited subject, please find the enclosed Environment Statement in Form-V for the financial year 2020-21 for 2X600 MW coal based Subcritical Thermal Power Plant of Udupi Power Corporation Limited.

Thanking you,

Yours faithfully



**Authorized Signatory
Udupi Power Corporation Limited.**



Enclosure: Environment Statement in Form-V

Copy to:

Member Secretary, Karnataka State Pollution Control Board, "Parisara Bhavana", 1st to 5th Floor,
#49 church street, Bengaluru-560001.

Udupi Power Corporation Limited
Yelluru Village
Pilar Post, Padubidri
Udupi 574113
Karnataka, India
CIN: U31909GJ1996PLC125650

Tel +820 270 3500
Fax +91 820 255 0854 / 270 3345
info@adani.com
www.adanipower.com

Registered Office: Adani Corporate House, Shantigram, Near Vaishno Devi Circle, S. G. Highway, Khodiyar, Ahmedabad - 382421

ANNEXURE

ENVIRONMENTAL STATEMENT FORM-V

(See rule 14)

Environmental Statement for the financial year ending with 31st March 2021

PART-A

i	Name and address of the owner/occupier of the industry	Pravat Kishore Sundaray Station Head Udupi Power Corporation Limited Yelluru Village, Pillar Post Padubidri, Udupi District Karnataka-574113
ii	Industry category Primary-(STC code) Secondary- (STC Code)	Large scale Industry- Red Category
iii	Production category -Units	2X600 MW Imported Coal based Thermal Power Plant
iv	Year of establishment	Unit-I: 11 th Nov 2010 Unit-II: 19 th Aug 2012
v	Date of the last environmental statement submitted	Letter No: UPCL/PLANT/08M/ENV/2020-21/346 Dated: 23.09.2020

PART-B

Water and Raw Material Consumption:

i. Water consumption in m ³ /d	
Process	: 19706.54
Cooling	: 136103.70
Domestic	: 73.54
Total	: 155883.78
Sea Water returned back to Sea	: 81119.18

Name of Products	Process water consumption per unit of products	
	During the previous financial year (2019-20)	During the current financial year (2020-21)
Power Generation (2350.12 MU)	0.00769 kl/kwh	0.00779 kl/kwh

ii. Raw material consumption

Name of raw materials	Name of Products	Consumption of raw material per unit of output	
		During the previous financial year (2019-20)	During the current financial year (2020-21)
Coal	Power Generation	0.430 kg/kWh	0.420 kg/kWh
Heavy Fuel Oil (HFO)	Flame Stabilization during power	Nil	Nil
Light Diesel oil (LDO)	generation and start-up	0.000476 ml/kWh	0.000740 ml/kWh

*Industry may use codes if disclosing details of raw material 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)*

Pollutants	Quantity of Pollutants discharged (mass/day) i.e., (Kg/day)		Concentration of Pollutants discharged (Mass/Volume)		Percentage of variation from prescribed standards with reasons		
	Parameter	Results	Parameter	Results			
a) Water	Color & Odor	Agreeable	Color & Odor	Agreeable	No deviation		
	pH	Not Applicable	pH	7.75			
	TSS	1335.2	TSS, mg/l	16.46			
	BOD	269.9	BOD, mg/l	3.66			
	COD	BDL	COD, mg/l	BDL			
	Oil & grease	BDL	Oil & grease	BDL			
	Arsenic	BDL	Arsenic	BDL			
	Lead	BDL	Lead	BDL			
	Mercury	BDL	Mercury	BDL			
	Total Cr	3.2	Total Cr	0.04			
	Hexavalent Cr	5.6	Hexavalent Cr	0.07			
	Phenolic Compounds	BDL	Phenolic Compounds	BDL			
	b) Air	Unit-I (kg/day)	Unit-II (kg/day)	Unit-I (mg/Nm ³)		Unit-II (mg/Nm ³)	No deviation
PM		684.61	907.13	PM	18.51	22.07	
SO _x		25412.18	32216.98	SO _x	687.11	783.74	
NO _x		4472.17	5687.30	NO _x	120.92	138.35	

PART-D**HAZARDOUS WASTE**

(As specified under the Hazardous and Other wastes (Management and Transboundary Movement) Rules, 2016)

Hazardous Wastes	Total Quantity (MT)			
	During the previous financial year (2019-20)		During the current financial year (2020-21)	
1) From Process	Used Oil	20.52 MT	Used Oil	14.59 MT
	Oil Soaked Cotton waste	3.17 MT	Oil Soaked Cotton waste	2.42 MT
	Discarded Containers	14.36 MT	Discarded Containers	11.14 MT
	Spent Ion exchange resins containing toxic metals	Nil	Spent Ion exchange resins containing toxic metals	7.22 MT
	Paint Residue	Nil	Paint Residue	1.5 MT
2) From Pollution Control Facilities	Not Applicable		Not Applicable	

PART-E**SOLID WASTES***

Solid Wastes	Total Quantity (MT)			
	During the previous financial year (2019-20)		During the current financial year (2020-21)	
a) From Process	Bottom Ash	10748.87	Bottom Ash	7369.00
b) From Pollution Control Facility	Fly Ash	76637.11	Fly Ash	61957.00
	Gypsum	1678.23	Gypsum	1041.73
c) Quantity recycled or reutilized	Fly Ash	73919.95	Fly Ash	53589.00
	Bottom Ash	14209.56	Bottom Ash	15915.00
	Gypsum	1533.55	Gypsum	1244.59



PART-F

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

- a) Hazardous waste: As per Hazardous and Other Wastes (Management & Transboundary Movement) Rules 2016, hazardous wastes generated in the industry are of five categories i.e., 5.1 Used Oil, 5.2 Oil soaked Cotton Waste, 21.1 Paint Sludge, 33.1 Discarded Containers and 35.2 Spent Ion Exchange resin. All these generated wastes are stored on the concrete platform in designated location and disposed to KSPCB/CPCB authorized vendors.
- b) Solid Waste: Solid waste in the industry is generated from process and pollution control facilities.
 - i. Bottom Ash is generated from the process of burning coal and is collected in the water impounding basin and the same is disposed to brick manufacturers & disposal to ash pond which is 3 km away from the plant.
 - ii. Fly Ash is generated from the process is trapped in the electro static precipitators (ESPs) in dry form and stored in silos. Fly ash is disposed to various end users like cement manufacturers, brick manufacturers and Ready Mix Concrete works.
 - iii. Gypsum is generated from the FGD (flue gas desulphurization) units when flue gas is passed through wet lime to remove Sulphur Di-oxides. Generated gypsum is disposed to end users like cement manufacturers, fertilizers industries and plasterboard manufacturers.
 - iv. Sludge generated from the STP was utilized as manure after drying and composting along with garden waste.

PART-G

Impact of the pollution control measures taken on conservation of natural resources and consequently on the cost of production

- a) The Ambient Air Quality surrounding the coal handling facility is monitored through Online Continuous Ambient Air Quality Monitoring Stations and the Ambient Air Quality is within the prescribed limits throughout the year.
- b) The coal conveyor belts are fully covered and installed with Dust Suppression system at transfer points for arresting the fugitive emissions.
- c) The Units are equipped with Pollution Control Equipment such as Low NOx Burner, ESP & FGD (flue gas desulphurization) for controlling the Stack Emission.
- d) Fly Ash generated is conveyed in dry form through conduits and stored in silos. Fly Ash is utilized by cement manufacturers, brick manufacturers and RMC works.
- e) Gypsum generated is stored in closed yard and disposed to end users like cement manufacturers, fertilizers industries and plasterboard manufacturers.
- f) ETP of 7200 KLD is in operation and treated water is reused for green belt development/ gardening.
- g) Water Sprinkling is undertaken in the Ash Pond for suppression of dust.

PART-H

Additional measures/investment proposal for environmental protection including abatement of pollution

- a) Wind shield installed in the coal handling plant for controlling fugitive emissions.
- b) Rain Harvesting Ponds of capacities 70000 m³ and 72000 m³ are constructed for harvesting rain water during rainy season and utilization in Cooling Tower and other purposes.
- c) Organic Waste Converter is installed for converting food and green waste into compost and used in green belt/ gardening.
- d) Deployment of Road Sweeping machine to reduce fugitive dust emissions.



PART-I

Any other particulars in respect of environmental protection and abatement of pollution

- a) UPCL is certified with ISO 9001, ISO 14001 & ISO 45001
- b) UPCL is certified with ISO 50001
- c) World Environment Day celebration to create Environmental awareness among employees and community by conducting various environmental competitions, workshops & presentations.
- d) Nearly 2000 saplings were planted inside and outside the plant on the occasion of world Environment Day -2021.
- e) As a CSR activity for COVID-19 vaccination Rs. 40 Lakhs been handed over to Udupi District Commissioner.
- f) Certified as SuP (Single Use Plastic) free plant by CII (Confederation of Indian Industry) as a initiative to mitigate the problems caused by single use of Plastic to environment.



Annexure-XVI

SNAP SHOTS OF CAUTION BOARDS

Annexure-XVI

Caution Boards are installed at every 500 meters length throughout the 6 km pipe line corridor. Snapshots of the caution boards are placed below:



Annexure-XVIII

**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
UDUPI DISTRICT, KARNATAKA**

Submitted to:

**M/S UDUPI POWER CORPORATION LIMITED
Kolachure, Yelluru village,
Pilar post, Udupi district - 574113**



Prepared by:

**DEPARTMENT OF AQUATIC ENVIRONMENT MANAGEMENT
KARNATAKA VETERINARY, ANIMAL AND FISHERIES SCIENCES
UNIVERSITY
COLLEGE OF FISHERIES, MANGALORE – 575 002.**

APRIL, 2021

CONTENTS

SL. NO.	Description	Page No.
1	Seawater Quality – Hydrographical parameters	1
2	Plankton i. Phytoplankton ii. Zooplankton	2 - 4 5 - 6
3	Macrobenthos	6 - 7
4	Bioassay teast – Lethal toxicity	8
5	Inference	9-10

Table 1. Data on water quality parameters off Padubidri during April 2021.

Sl. No.	Parameters		Stations							
			1	2	3	4	5	6	7	8
1	Water Temperature (°C)	S	31.9	32.0	32.0	32.1	32.20	32.0	31.90	32.1
		SS	32.0	32.20	31.8	31.4	31.50	31.8	31.30	31.3
2	pH	S	8.07	8.12	8.14	8.16	8.13	8.17	8.17	8.16
		SS	8.17	8.17	8.20	8.18	8.10	8.16	8.10	8.12
3	Salinity (psu)	S	32.06	32.38	32.81	32.88	30.63	31.25	31.44	31.81
		SS	31.44	31.81	32.00	32.13	31.56	31.63	32.19	32.31
4	Dissolved Oxygen (mg/l)	S	6.80	6.60	6.39	6.62	6.91	6.71	6.80	6.76
		SS	6.60	6.21	6.80	6.08	6.30	6.99	7.11	7.13
5	BOD ₃ at 27°C	S	-	1.58	-	-	2.01	-	1.94	-
		SS	-	1.39	-	-	1.73	-	1.85	-
6	COD (mg/l)	S	-	20	-	-	19	-	20	-
		SS	-	18	-	-	18	-	19	-
7	Transparency (m)		1.64	1.19	1.54	2.20	2.11	1.99	2.03	1.68
8	Total Suspended Solids (mg/l)		-	118	-	-	140	-	145	-
9	Total Dissolved Solids (mg/l)		-	2162	-	-	2294	-	2158	-
10	Ammonia (µg-at/l)	S	6.60	6.48	7.27	4.25	7.11	6.83	7.21	6.95
		SS	6.31	6.80	7.68	4.37	7.88	6.24	7.14	6.77
11	Nitrite (µg-at/l)	S	0.95	0.61	0.19	0.46	0.91	0.28	0.32	0.18
		SS	0.57	0.32	0.14	0.28	0.74	0.39	0.11	0.13
12	Nitrate (µg-at/l)	S	1.67	1.56	1.10	1.05	0.92	1.34	0.75	1.21
		SS	1.24	1.99	1.89	1.24	0.86	1.37	0.67	1.43
13	Phosphate (µg-at/l)	S	0.50	0.45	0.45	0.55	0.55	0.60	0.50	0.30
		SS	0.85	0.90	0.65	1.05	0.70	1.03	0.85	1.25
14	Silicate (µg-at/l)	S	15.00	13.43	10.77	12.22	15.97	13.31	15.61	16.58
		SS	16.39	14.20	11.18	13.35	18.88	13.88	17.47	18.73
15	Oil and Grease (mg/l)	S	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and Biomass (mg/m³) in the coastal waters off Padubidri during April 2021.

Sl. No.	Flora	Depth (m)		
		4	8	12
I	Diatoms			
1	<i>Asterionella</i>			
	a. <i>A. japonica</i>	500	-	600
	b. Others	-	-	-
2	<i>Bacteriastrum</i>			
	a. <i>B. varians</i>	1500	800	-
	b. Others	-	700	200
3	<i>Biddulphia</i>			
	a. <i>Biddulphia regia</i>	8000	6000	2000
	b. <i>B. sinensis</i>	2000	100	1000
	c. <i>Biddulphia mobiliensis</i>	7000	1000	500
	d. Others	300	400	500
4	<i>Cerataulina</i>			
	a. <i>C. perlagica</i>	-	400	100
	b. Others	-	-	-
5	<i>Chaetoceros</i>			
	a. <i>C. lorenzianus</i>	-	9000	2000
	b. <i>C. decipiens</i>	1900	2000	-
	c. <i>C. compressus</i>	-	200	400
	d. <i>C. curvisetus</i>	600	-	900
	e. Others	200	100	100
6	<i>Coscinodiscus</i>			
	a. <i>C. oculus iridis</i>	5000	1000	1000
	b. <i>C. lineatus</i>	1000	1000	700
	c. <i>C. excentricus</i>	1500	-	600
	d. Others	300	500	100
7	<i>Cyclotella</i>			
	a. <i>C. stelligera</i>	100	-	-
	b. Others	-	-	-
8	<i>Dynobryon setularia</i>	-	-	-
9	<i>Ditylum</i>			
	a. <i>D. brightwelli</i>	9000	2000	1000
	b. Others	500	-	1100
10	<i>Eucampia</i>			
	a. <i>E. zodiacus</i>	-	-	-
	b. Others	-	-	-

11	<i>Fragillaria</i>			
	a. <i>F. oceanica</i>	-	500	-
	b. Others	-	-	-
12	<i>Gyrosigma</i>			
	a. <i>G. balticum</i>	100	400	300
	b. Others	-	400	100
13	<i>Lauderia</i>			
	a. <i>L. borealis</i>	-	11000	10000
	b. Others	-	5000	900
14	<i>Leptocylindricus</i>			
	a. <i>L. danicus</i>	4000	-	200
	b. Others	300	200	-
15	<i>Melosira</i>			
	a. <i>M. moniliformas</i>	-	200	200
	b. Others	-	-	-
16	<i>Navicula</i>			
	a. <i>N. longa</i>	-	-	-
	b. Others	-	-	-
17	<i>Nitzschia</i>			
	a. <i>N. closterium</i>	-	-	-
	b. <i>N. striata</i>	-	-	-
	c. <i>N. longissima</i>	-	-	-
	d. Others	-	-	-
18	<i>Planktoniella</i>			
	a. <i>P. sol</i>	-	-	-
	b. Others	-	-	-
19	<i>Pleurosigma</i>			
	a. <i>P. normanii</i>	10000	-	3000
	b. <i>P. elongatum</i>	6000	1800	-
	c. Others	400	300	200
20	<i>Rhizosolenia</i>			
	a. <i>R. stolterfothii</i>	8000	6000	600
	b. <i>R. shrubsolei</i>	4000	1000	400
	c. <i>R. stliformis</i>	2000	-	900
	d. Others	200	-	400
21	<i>Skeletonema</i>			
	a. <i>S. costatum</i>	-	-	-
	b. Others	-	-	-
22	<i>Staurastrum</i> sp.	-	-	-
23	<i>Streptothecca</i>			
	a. <i>S. thamensis</i>	4000	2800	1600
	b. Others	200	-	300
24	<i>Thalassiothrix</i>			
	a. <i>T. decipiens</i>	600	700	-
	b. <i>T. longissima</i>	100	500	100

	c. Others	-	-	-
25	<i>Triceratium</i>			
	a. <i>T. reticulata</i>	-	150	400
	b. <i>T. favus</i>	100	-	200
	c. Others	-	-	-
26	<i>Diatoma</i>			
	a. <i>Diatoma vulgare</i>	-	-	-
27	Other diatoms	1100	800	200
II	Dinoflagellates			
1	<i>Ceratium</i>			
	a. <i>C. macroceros</i>	900	1400	2500
	b. <i>C. fusus</i>	12000	8000	1000
	c. <i>C. longipes</i>	9000	7000	1000
	d. others	2000	-	1100
2	<i>Dinophysis</i>			
	a. <i>D. acuta</i>	-	-	-
	b. Others	-	-	-
3	<i>Gymnodinium</i>			
	a. <i>G. splendens</i>	-	-	-
	b. <i>G. rhombodes</i>	-	-	-
	c. Others	-	-	-
4	<i>Ornithoceros magnificus</i>	-	-	-
5	<i>Peridinium</i>			
	a. <i>P. depressum</i>	4000	2500	-
	b. <i>P. divergens</i>	1500	-	2000
	c. <i>P. granii</i>	3000	1200	200
	d. <i>P. excentricum</i>	-	-	-
	e. Others	900	200	300
6	<i>Preperidinium</i>	10000	2000	2000
7	<i>Noctiluca</i>			
	a. <i>N. Scintillans</i>	11000	3000	-
	b. Others	600	200	1000
III	Blue green algae	-	-	-
1	Blue Green Algae	-	-	-
	Biomass [wet weight - mg/m³]	210.00	200.76	186.48

-: Absent

Table 3. Zooplankton diversity (no/m³) and Biomass (mg/m³) in the coastal waters off Padubidri during April 2021.

Sl. No.	Fauna	Depth (m)		
		4	8	12
1	Tintinids			
	a. <i>Tintinopsis</i> sp.	1500	1800	1100
	b. <i>Rabdonella</i> sp.	1300	1500	-
	c. <i>Favella</i> sp.	900	400	100
2	Radiolarians	400	300	-
3	Medusae			
	a. <i>Obelia</i> sp.	200	500	300
	b. <i>Octocostatum</i> sp.	300	200	-
	c. <i>Quadrata</i> sp.	200	100	100
4	Siphonophores			
	a. <i>Lensia</i> sp.	-	-	-
	b. <i>Diphyysis</i> sp.	-	-	-
5	Ctenophores			
	a. <i>Plurobranchia</i> sp.	-	-	-
6	Chaetognaths			
	a. <i>Sagitta enflata</i>	-	-	-
	b. <i>Pterosagitta draco</i>	-	-	-
	c. <i>Krohnitta subtilis</i>	-	-	-
7	Polychaetes	-	200	-
8	Cladocerans			
	a. <i>Penilia avirostris</i>	2000	2400	600
	b. <i>Evadnae nordmanni</i>	1000	400	600
9	Copepods			
	a. <i>Calanus finmarchicus</i>	2000	1500	2400
	b. <i>Tamora longicornis</i>	1000	1100	900
	c. <i>Parapontella brevicornis</i>	3000	500	500
	d. <i>Oithona helgolandica</i>	1100	700	800
10	Copepod nauplius	2000	400	1900
11	Lucifer	-	-	-
12	Planktonic Urochordates			
	a. <i>Frillillaria</i> sp.	-	-	-
	b. <i>Oikopleura</i> sp.	1500	3600	2000
	c. <i>Doliolom</i> sp.	-	-	-
13	Fish Eggs	1000	3000	2000
14	Copepod egg	1000	500	2000
15	Echinoderm Larvae	-	-	1800
16	Decapod Larvae	3000	1000	1100
17	Bivalve Larvae	700	200	-
18	Fish Larvae	50	-	-
19	Polychaete Larvae	-	-	-

20	Chaetognath Larvae	100	400	300
21	Others	100	100	-
Biomass [wet weight - mg/m³]		208.00	195.60	180.40

-: Absent

Table 4. Macrobenthos diversity (no/m²) in the coastal waters off Padubidri during April 2021.

Sl. No.	Fauna	Depth (m)		
		4	8	12
I	Molluscs			
A	Bivalves			
1	<i>Arca</i> sp.	30	30	40
2	<i>Anadora</i> sp.	-	-	-
3	Bivalve Spats	90	100	60
4	<i>Cardium</i> sp.	30	10	30
5	<i>Donax</i> sp.	50	40	-
6	<i>Katalysia</i> sp.	-	-	-
7	<i>Meritrix</i> sp.	40	40	70
8	<i>Perna</i> sp.	40	50	10
9	<i>Modiolus</i> sp.	-	-	-
10	<i>Pecten</i> sp.	-	-	-
B	Gastropods			
1	<i>Babylonia</i> sp.	-	60	30
2	<i>Cavolinia</i> sp.	-	-	-
3	<i>Cerithedia</i> sp.	50	40	90
4	<i>Conus</i> sp.	-	-	-
5	<i>Oliva</i> sp.	-	-	-
6	<i>Patella</i> sp.	30	30	-
7	<i>Surcula</i> sp.	-	-	30
8	<i>Telescopium</i> sp.	-	-	-

Table 5. Results of Bioassay experiment for the coastal waters off Padubidri during April 2021

1.	Organism Used for the Test	: <i>Perna viridis</i> (Green mussel)
2.	Length of the Test Organism	: 4.24 cms (Average)
3.	Weight of the Test Organism	: 1.40 gms (Average)
4.	Test Medium	: Sea water collected from the vicinity of effluent fallout from UPCL, Padubidri
5.	Control	: Filtered sea water
6.	Container	: Glass aquarium of 20 ltr. capacity
7.	Number of Organisms	: 10 in each container
8.	Number of Experiments	: Two
9.	Duration of the Test	: 96 hrs.
10.	Methodology	: Static bioassay

EXPERIMENT

MEDIUM	HOUR / MORTALITY (%)			
	24	48	72	96
CONTROL	Nil	Nil	Nil	Nil
TEST MEDIUM	Nil	Nil	Nil	Nil

Result: No mortality

Macrobenthos:

The qualitative analyses revealed the presence of 20 different groups of macrobenthos. Bivalve spats dominated the macrobenthos, followed by Coelenterates and *Meritrix*. The density ranged from 730.00 no/m² to 810.00 no/m².

Bioassay:

The bioassay studies indicated no mortality of mussels in the seawater samples collected from effluent discharge location in the Padubidri region.



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**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
UDUPI DISTRICT, KARNATAKA**

Submitted to:

**M/S UDUPI POWER CORPORATION LIMITED
Kolachure, Yelluru village,
Pilar post, Udupi district - 574113**



Prepared by:

**DEPARTMENT OF AQUATIC ENVIRONMENT MANAGEMENT
KARNATAKA VETERINARY, ANIMAL AND FISHERIES SCIENCES
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COLLEGE OF FISHERIES, MANGALORE – 575 002.**

MAY, 2021

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Table 1. Data on water quality parameters in the beach waters of Padubidri during May 2021.

Sl. No.	Parameters	Stations		
		1	2	3
1.	Temperature (°C)	28.60	28.60	28.80
2.	pH	7.8	7.7	7.6
3.	Salinity (ppt)	28.65	28.88	28.26
4.	Dissolved Oxygen (mg/l)	6.12	6.74	6.99
5.	BOD ₃ (mg/l)	1.42	1.11	1.08
6.	COD (mg/l)	19.22	17.54	19.00
7.	Turbidity (NTU)	52.10	48.55	50.32
8.	Total Suspended Solids (mg/l)	196.34	187.65	189.63
9.	Total Dissolved Solids (mg/l)	26324	24589	24871
10.	Ammonia (µg-at/l)	20.14	18.65	20.84
11.	Nitrite (µg-at/l)	0.48	0.61	0.42
12.	Nitrate (µg-at/l)	4.52	3.98	4.11
13.	Phosphate (µg-at/l)	0.95	0.87	0.80
14.	Silicate (µg-at/l)	92.65	85.26	84.97
15.	Oil and Grease (mg/l)	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during May 2021.

Sl. No.	Flora	Stations		
		1	2	3
I	DIATOMS			
1.	<i>Asterionella</i>	12400	10800	9800
2.	<i>Bacteriastrum</i>	-	-	-
3.	<i>Biddulphia</i>	9500	11200	8600
4.	<i>Cerataulina</i>	-	-	-
5.	<i>Chaetoceros</i>	13000	8500	10000
6.	<i>Coscinodiscus</i>	21800	18500	20300
7.	<i>Cyclotella</i>	-	-	-
8.	<i>Ditylum</i>	900	-	200
9.	<i>Dynobryon</i>	-	-	-
10.	<i>Eucamphia</i>	-	-	-
11.	<i>Fragillaria</i>	-	-	-
12.	<i>Gyrosigma</i>	-	-	-
13.	<i>Lauderia</i>	-	-	-
14.	<i>Leptocylindricus</i>	-	-	-
15.	<i>Melosira</i>	-	-	-
16.	<i>Navicula</i>	-	-	-
17.	<i>Nitzschia</i>	-	-	-
18.	<i>Pediastrum</i>	-	-	-
19.	<i>Planktoniella</i>	-	1800	-
20.	<i>Pleurosigma</i>	1200	800	1000
21.	<i>Rhizosolenia</i>	600	400	400
22.	<i>Skeletonema</i>	-	-	-
23.	<i>Staurastrum</i>	-	-	-
24.	<i>Streptothecca</i>	-	-	-
25.	<i>Thalassiothrix</i>	-	-	-
26.	<i>Triceratium</i>	1700	2200	1400
27.	Other diatoms	-	5000	-
II	DINOFLAGELLATES			
1.	<i>Ceratium</i>	16500	18000	13500
2.	<i>Dinophysis</i>	500	200	700
3.	<i>Gymnodinium</i>	-	-	-
4.	<i>Ornithoceros</i>	-	-	-
5.	<i>Peridinium</i>	-	100	-
6.	<i>Preperidinium</i>	-	-	-
7.	<i>Noctiluca</i>	-	-	-
III	BLUE GREEN ALGAE			
1.	Blue Green Algae	20000	18500	21300
Biomass (mg/m³)		122.74	118.62	120.34

Table 3. Zooplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during May 2021.

Sl. No.	Fauna	Stations		
		1	2	3
1.	Tintinids	1000	800	1600
2.	Medusae	-	-	-
3.	Ctenophore	-	-	-
4.	Chaetognath	-	-	-
5.	Chaetognath Larvae	-	-	-
6.	Polychaete	-	-	-
7.	Polychaete Larvae	2100	1400	-
8.	Cladocera	3200	2600	3000
9.	Ostracoda	-	-	-
10.	Rotifera	-	-	-
11.	Copepod	21600	20400	2200
12.	Copepod nauplius	23000	18000	20000
13.	Copepod egg	-	-	-
14.	Lucifer	10	80	20
15.	Decapod Larvae	3600	2500	1800
16.	Gastropod Larvae	-	-	-
17.	Barnacle Larvae	-	-	-
18.	Bivalve Larvae	1000	1800	1200
19.	Echinoderm Larvae	-	-	-
20.	<i>Oikopleura</i>	-	1200	1800
21.	Doliolids	-	-	-
22.	<i>Lensia</i>	-	-	-
23.	<i>Creseis</i>	-	-	-
24.	<i>Cavolinia</i>	-	-	-
25.	Fish Eggs	50	10	10
26.	Fish Larvae	-	-	-
Biomass (mg/m³)		165.24	171.44	169.32

‘-’: Absent

Table 4. Macrobenthos diversity (no/m²) and density (no/m²) in the beach waters of Padubidri during May 2021.

Sl. No.	Fauna	Stations		
		1	2	3
I	Echiuroids	-	-	-
II	Sipunculids	-	-	-
III	Mud tubes	-	-	-
IV	Sand tubes	-	-	-
V	Polychaetes	-	-	-
VI	Coelenterates	-	-	-
VII	Molluscs			
1.	<i>Arca</i>	50	30	60
2.	<i>Anadora</i>	-	-	-
3.	<i>Auger</i>	-	-	-
4.	<i>Babylon</i>	-	-	-
5.	Bivalve Spats	-	-	-
6.	<i>Cardium</i>	-	-	-
7.	<i>Cavolinia</i>	-	-	-
8.	<i>Cerithedia</i>	-	-	-
9.	<i>Conus</i>	10	40	-
10.	<i>Dentalium</i>	-	-	20
11.	<i>Donax</i>	20	60	40
12.	<i>Drupa</i>	-	-	-
13.	<i>Katalysia</i>	-	-	-
14.	<i>Littorina</i>	-	-	-
15.	<i>Meritrix</i>	20	20	10
16.	<i>Modiolus</i>	-	-	-
17.	<i>Oliva</i>	-	-	-
18.	<i>Patella</i>	-	-	-
19.	Scallop	-	-	-
20.	<i>Surcula</i>	-	-	-
21.	<i>Telescopium</i>	-	-	-
22.	<i>Trochus</i>	-	-	-
23.	<i>Turritella</i>	10	30	60
24.	<i>Umbonium</i>	-	-	-
25.	Other Molluscs	20	-	10
VIII	Echinodermata			
1.	<i>Astropecten</i>	-	-	-
2.	<i>Ophiocoma</i>	-	-	-
3.	Egg Cases	20	10	-
IX	Miscellaneous			
1.	Crab	30	10	20
2.	Shrimp	-	20	10
3.	Fish	10	10	-
Density (Individuals/m²)		190	230	230

Table 5. Results of Bioassay experiment in the beach waters of Padubidri during May 2021.

- 1 Test Organism : Green Mussel (*Perna viridis*)
- 2 Number of Test Organisms : 10 per replicate
- 3 Number of Replicates : 3 for each treatment
- 4 Size (Average) : 3.88 – 4.00 cm

EXPERIMENT

Medium	Mortality			
	24h	48h	72h	96h
Control (aged seawater)	Nil	Nil	Nil	Nil
50% seawater from station 2 + 50% aged seawater	Nil	Nil	Nil	Nil
100% seawater from station 2	Nil	Nil	Nil	Nil

Inference:

The inferences drawn on the various physical, chemical and biological parameters in the shore waters of Padubidri for the month of May 2021 are given below.

The water temperature varied from 28.60⁰C to 28.80⁰C. The pH values ranged between 7.60 and 7.80. The salinity varied from 28.26 psu to 28.88 psu. The dissolved oxygen (DO) varied between 6.12 mg/l and 6.99 mg/l. The biochemical oxygen demand (BOD₃) is an empirical biological test in which the water conditions such as temperature, dissolved oxygen and microbial flora play a decisive role. The BOD₃ values ranged from 1.08 mg/l to 1.42 mg/l in the study region indicate that these values are within the primary water quality criteria and do not pose any threat to the environment under the present condition. The COD values ranged between 17.54 mg/l to 19.22 mg/l, the total suspended solids (TSS) ranged between 187.65 mg/l to 196.34 mg/l and the total dissolved solids (TDS) ranged between 24589 mg/l to 26324 mg/l. The turbidity values were in the range of 48.55 NTU to 52.10 NTU.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO₂-N) in beach waters varied from 0.42 µg-at/l to 0.61 µg-at/l, while nitrate (NO₃-N) varied between 3.98 µg-at/l and 4.52 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH₃-N) varied between 18.65 µg-at/l and 20.84 µg-at/l. Inorganic phosphate (PO₄-P) was in the range of 0.80 µg-at/l and 0.95 µg-at/l. Silicate – Silicon (SiO₃-Si), one of the major nutrients for phytoplankton growth ranged between 84.97 and 92.65 µg-at/l in the beach waters.

The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted in Table 2. Phytoplankton study showed the presence of 24 different genera with the abundance of *Biddulphia*, *Guinardia* and *Asterionella*. The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 118.62 mg/m³ to 122.74 mg/m³.

Zooplankton:

The qualitative analyses revealed the presence of 8 different groups of zooplankton. Among zooplankton, Copepods remained the most dominant group, followed by Copepod nauplius and Tintinids. The biomass ranged between 165.24 mg/m³ to 171.44 mg/m³.

Macrobenthos:

The qualitative analyses revealed the presence of 11 different groups of macrobenthos. Bivalv spats dominated the macrobenthos followed by *Donax*, Crabs and *Dentalium*. Macrofaunal density ranged from 190 no/m² to 230 no/m².

Bioassay:

The bio assay studies indicated no mortality of mussels in the beach waters of Padubidri. The results indicated no environmental stress on aquatic life.



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**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
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JUNE, 2021

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Table 1. Data on water quality parameters in the beach waters of Padubidri during June 2021.

Sl. No.	Parameters	Stations		
		1	2	3
1.	Temperature (°C)	27.20	27.06	27.90
2.	pH	7.21	7.10	7.01
3.	Salinity (ppt)	29.04	29.53	29.64
4.	Dissolved Oxygen (mg/l)	6.34	5.98	6.29
5.	BOD ₃ (mg/l)	1.76	1.59	1.46
6.	COD (mg/l)	18.02	17.41	18.31
7.	Turbidity (NTU)	54.57	50.84	51.21
8.	Total Suspended Solids (mg/l)	172.14	168.50	170.31
9.	Total Dissolved Solids (mg/l)	2012	2573	2197
10.	Ammonia (µg-at/l)	2.74	1.75	2.01
11.	Nitrite (µg-at/l)	0.58	0.71	0.37
12.	Nitrate (µg-at/l)	1.46	1.07	1.08
13.	Phosphate (µg-at/l)	0.74	0.69	0.72
14.	Silicate (µg-at/l)	20.15	18.53	14.76
15.	Oil and Grease (mg/l)	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during June 2021.

Sl. No.	Flora	Stations		
		1	2	3
I	DIATOMS			
1.	<i>Asterionella</i>	1300	1000	900
2.	<i>Bacteriastrum</i>	-	-	-
3.	<i>Biddulphia</i>	600	800	1100
4.	<i>Cerataulina</i>	-	-	-
5.	<i>Chaetoceros</i>	700	600	1000
6.	<i>Coscinodiscus</i>	1600	800	900
7.	<i>Cyclotella</i>	-	-	-
8.	<i>Ditylum</i>	600	100	100
9.	<i>Dynobryon</i>	-	-	-
10.	<i>Eucampia</i>	-	-	-
11.	<i>Fragillaria</i>	-	300	-
12.	<i>Gyrosigma</i>	-	-	-
13.	<i>Lauderia</i>	-	-	-
14.	<i>Leptocylindricus</i>	-	-	-
15.	<i>Melosira</i>	-	-	-
16.	<i>Navicula</i>	-	-	-
17.	<i>Nitzschia</i>	100	-	50
18.	<i>Pediastrum</i>	-	-	-
19.	<i>Planktoniella</i>	100	700	-
20.	<i>Pleurosigma</i>	600	500	900
21.	<i>Rhizosolenia</i>	700	200	300
22.	<i>Skeletonema</i>	-	100	-
23.	<i>Staurastrum</i>	-	-	-
24.	<i>Streptothecca</i>	-	-	-
25.	<i>Thalassiothrix</i>	-	-	-
26.	<i>Triceratium</i>	1000	1100	800
27.	Other diatoms	-	300	-
II	DINOFLAGELLATES			
1.	<i>Ceratium</i>	1500	600	700
2.	<i>Dinophysis</i>	400	200	900
3.	<i>Gymnodinium</i>	-	-	-
4.	<i>Ornithoceros</i>	-	-	-
5.	<i>Peridinium</i>	100	50	-
6.	<i>Preperidinium</i>	-	-	-
7.	<i>Noctiluca</i>	-	-	-
III	BLUE GREEN ALGAE			
1.	Blue Green Algae	1000	800	600
Biomass (mg/m³)		134.48	109.73	121.67

Table 3. Zooplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during June 2021.

Sl. No.	Fauna	Stations		
		1	2	3
1.	Tintinids	500	400	100
2.	Medusae	-	-	-
3.	Ctenophore	-	-	-
4.	Chaetognath	-	100	-
5.	Chaetognath Larvae	-	-	-
6.	Polychaete	-	-	-
7.	Polychaete Larvae	200	400	100
8.	Cladocera	200	600	200
9.	Ostracoda	-	-	-
10.	Rotifera	-	-	-
11.	Copepod	600	400	800
12.	Copepod nauplius	500	800	300
13.	Copepod egg	-	-	-
14.	Lucifer	-	-	-
15.	Decapod Larvae	300	500	800
16.	Gastropod Larvae	-	-	-
17.	Barnacle Larvae	-	-	-
18.	Bivalve Larvae	700	600	500
19.	Echinoderm Larvae	-	-	-
20.	<i>Oikopleura</i>	600	300	100
21.	Doliolids	-	-	-
22.	<i>Lensia</i>	-	-	-
23.	<i>Creseis</i>	-	-	-
24.	<i>Cavolinia</i>	-	-	-
25.	Fish Eggs	30	20	10
26.	Fish Larvae	-	-	-
Biomass (mg/m³)		158.19	149.73	162.49

'-': Absent

Table 4. Macrobenthos diversity (no/m²) and density (no/m²) in the beach waters of Padubidri during June 2021.

Sl. No.	Fauna	Stations		
		1	2	3
I	Echiuroids	-	-	-
II	Sipunculids	-	-	-
III	Mud tubes	-	-	-
IV	Sand tubes	-	-	-
V	Polychaetes	-	-	-
VI	Coelenterates	-	-	-
VII	Molluscs			
1.	<i>Arca</i>	20	10	30
2.	<i>Anadora</i>	-	-	-
3.	<i>Auger</i>	-	-	-
4.	<i>Babylon</i>	-	-	-
5.	Bivalve Spats	-	-	-
6.	<i>Cardium</i>	-	-	-
7.	<i>Cavolinia</i>	-	-	-
8.	<i>Cerithedia</i>	-	-	-
9.	<i>Conus</i>	-	10	-
10.	<i>Dentalium</i>	-	-	20
11.	<i>Donax</i>	10	30	20
12.	<i>Drupa</i>	-	-	-
13.	<i>Katalysia</i>	-	-	-
14.	<i>Littorina</i>	-	-	-
15.	<i>Meritrix</i>	-	-	-
16.	<i>Modiolus</i>	-	-	-
17.	<i>Oliva</i>	-	-	-
18.	<i>Patella</i>	-	-	-
19.	Scallop	-	-	-
20.	<i>Surcula</i>	-	-	-
21.	<i>Telescopium</i>	-	-	-
22.	<i>Trochus</i>	-	-	-
23.	<i>Turitella</i>	10	10	20
24.	<i>Umbonium</i>	-	-	-
25.	Other Molluscs	20	10	10
VIII	Echinodermata			
1.	<i>Astropecten</i>	-	-	-
2.	<i>Ophiocoma</i>	-	-	-
3.	Egg Cases	10	10	-
IX	Miscellaneous			
1.	Crab	-	-	-
2.	Shrimp	-	-	-
3.	Fish	-	5	-

Table 5. Results of Bioassay experiment in the beach waters of Padubidri during June 2021.

- 1 Test Organism : Green Mussel (*Perna viridis*)
- 2 Number of Test Organisms : 10 per replicate
- 3 Number of Replicates : 3 for each treatment
- 4 Size (Average) : 3.50 – 4.00 cm

EXPERIMENT

Medium	Mortality			
	24h	48h	72h	96h
Control (aged seawater)	Nil	Nil	Nil	Nil
50% seawater from station 2 + 50% aged seawater	Nil	Nil	Nil	Nil
100% seawater from station 2	Nil	Nil	Nil	Nil

Inference:

The inferences drawn on the various physical, chemical and biological parameters in the shore waters of Padubidri for the month of June 2021 are given below.

The water temperature varied from 27.20⁰C to 27.90⁰C. The pH values ranged between 7.01 and 7.21. The salinity varied from 29.04 psu to 29.64 psu. The dissolved oxygen (DO) varied between 5.98 mg/l and 6.34 mg/l. The biochemical oxygen demand (BOD₃) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD₃ values ranged from 1.46 mg/l to 1.76 mg/l in the study region indicate that these values are within the primary water quality criteria and do not pose any threat to the environment under the present condition. The COD values ranged between 17.41 mg/l to 18.03 mg/l, the total suspended solids (TSS) ranged between 168.50 mg/l to 172.14 mg/l and the total dissolved solids (TDS) ranged between 2012 mg/l to 2573 mg/l. The turbidity values were in the range of 50.84 NTU to 54.57 NTU.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO₂-N) in beach waters varied from 0.37 µg-at/l to 0.71 µg-at/l, while nitrate (NO₃-N) varied between 1.07 µg-at/l and 1.46 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH₃-N) varied between 1.75 µg-at/l to 2.74 µg-at/l. Inorganic phosphate (PO₄-P) was in the range of 0.69 µg-at/l and 0.74 µg-at/l. Silicate – Silicon (SiO₃-Si), one of the major nutrients for phytoplankton growth ranged between 14.76 and 20.15 µg-at/l in the beach waters.

The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted in Table 2. Phytoplankton study showed the presence of 24 different genera with the abundance of *Biddulphia*, *Guinardia* and *Asterionella*. The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 109.73 mg/m³ to 134.48 mg/m³.

Zooplankton:

The qualitative analyses revealed the presence of 8 different groups of zooplankton. Among zooplankton, Copepods remained the most dominant group, followed by Copepod nauplius and Tintinids. The biomass ranged between 149.73 mg/m³ to 162.49 mg/m³.

Macrobenthos:

The qualitative analyses revealed the presence of 11 different groups of macrobenthos. Bivalv spats dominated the macrobenthos followed by *Donax*, Crabs and *Dentalium*.

Bioassay:

The bio assay studies indicated no mortality of mussels in the beach waters of Padubidri. The results indicated no environmental stress on aquatic life.


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**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
UDUPI DISTRICT, KARNATAKA**

Submitted to:

**M/S UDUPI POWER CORPORATION LIMITED
Kolachure, Yelluru village,
Pilar post, Udupi district - 574113**



Prepared by:

**DEPARTMENT OF AQUATIC ENVIRONMENT MANAGEMENT
KARNATAKA VETERINARY, ANIMAL AND FISHERIES SCIENCES
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July, 2021

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Table 1. Data on water quality parameters in the beach waters of Padubidri during July 2021.

Sl. No.	Parameters	Stations		
		1	2	3
1.	Temperature (^o C)	27.50	27.80	27.10
2.	pH	7.80	7.98	7.52
3.	Salinity (ppt)	28.43	28.97	28.88
4.	Dissolved Oxygen (mg/l)	4.23	4.51	4.56
5.	BOD ₃ (mg/l)	2.00	2.20	2.08
6.	COD (mg/l)	12.51	11.24	13.78
7.	Turbidity (NTU)	69.22	50.84	43.67
8.	Total Suspended Solids (mg/l)	102.82	98.22	92.14
9.	Total Dissolved Solids (mg/l)	2500	2872	2654
10.	Ammonia (μg-at/l)	2.78	2.60	1.28
11.	Nitrite (μg-at/l)	4.65	4.27	5.28
12.	Nitrate (μg-at/l)	13.12	13.20	14.02
13.	Phosphate (μg-at/l)	1.08	4.34	2.64
14.	Silicate (μg-at/l)	14.28	14.58	14.84
15.	Oil and Grease (mg/l)	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and biomass (mg/m³) in the Beach waters of Padubidri during July, 2021.

Sl. No.	Flora	Stations		
		1	2	3
I	DIATOMS			
1.	<i>Asterionella</i>	500	1000	1300
2.	<i>Bacteriastrum</i>	-	-	-
3.	<i>Biddulphia</i>	500	800	1000
4.	<i>Cerataulina</i>	500	250	650
5.	<i>Chaetoceros</i>	-	-	-
6.	<i>Coscinodiscus</i>	1300	1200	900
7.	<i>Cyclotella</i>	500	300	100
8.	<i>Ditylum</i>	-	-	-
9.	<i>Dynobryon</i>	-	-	-
10.	<i>Eucampia</i>	-	-	-
11.	<i>Fragillaria</i>	-	-	-
12.	<i>Gyrosigma</i>	-	-	-
13.	<i>Lauderia</i>	-	-	-
14.	<i>Leptocylindricus</i>	-	-	-
15.	<i>Melosira</i>	-	-	-
16.	<i>Navicula</i>	-	-	-
17.	<i>Nitzschia</i>	1500	1200	1100
18.	<i>Pediastrum</i>	-	-	-
19.	<i>Planktoniella</i>	200	500	200
20.	<i>Pleurosigma</i>	800	500	900
21.	<i>Rhizosolenia</i>	1200	400	1400
22.	<i>Skeletonema</i>	-	-	-
23.	<i>Staurastrum</i>	-	-	-
24.	<i>Streptotheca</i>	-	-	-
25.	<i>Thalassiothrix</i>	-	-	-
26.	<i>Triceratium</i>	900	1200	1600
27.	Other diatoms	-	300	-
II	DINOFLAGELLATES			
1.	<i>Ceratium</i>	1100	700	700
2.	<i>Dinophysis</i>	400	200	900
3.	<i>Gymnodinium</i>	200	250	100
4.	<i>Ornithoceros</i>	-	-	-
5.	<i>Peridinium</i>	100	50	-
6.	<i>Preperidinium</i>	-	-	-
7.	<i>Noctiluca</i>	800	500	900
III	BLUE GREEN ALGAE			
1.	Blue Green Algae	1000	800	600
Biomass (mg/m³)		158.34	119.32	136.78

Table 3. Zooplankton diversity (no/m³) and biomass (mg/m³) in the Beach waters of Padubidri during July 2021.

Sl. No.	Fauna	Stations		
		1	2	3
1.	Tintinids	400	200	300
2.	Medusae	-	-	-
3.	Ctenophore	-	-	-
4.	Chaetognath	50	80	200
5.	Chaetognath Larvae	-	-	-
6.	Polychaete	-	-	-
7.	Polychaete Larvae	500	400	200
8.	Cladocera	100	400	450
9.	Ostracoda	-	-	-
10.	Rotifera	-	-	-
11.	Copepod	800	600	250
12.	Copepod nauplius	1000	1500	1300
13.	Copepod egg	2000	1500	2000
14.	Lucifer	-	-	-
15.	Decapod Larvae	200	1200	800
16.	Gastropod Larvae	20	40	20
17.	Barnacle Larvae	-	-	-
18.	Bivalve Larvae	100	400	500
19.	Echinoderm Larvae	-	-	-
20.	<i>Oikopleura</i>	500	300	100
21.	Doliolids	-	-	-
22.	<i>Lensia</i>	200	300	350
23.	<i>Creseis</i>	-	-	-
24.	<i>Cavolinia</i>	-	-	-
25.	Fish Eggs	100	120	120
26.	Fish Larvae	-	-	-
Biomass (mg/m³)		168.29	171.77	152.29

-: Absent

Table 4. Macrobenthos diversity (no/m²) and density (no/m²) in the Beach waters of Padubidri during July 2021.

Sl. No.	Fauna	Stations		
		1	2	3
I	Echiuroids	-	-	-
II	Sipunculids	-	-	-
III	Mud tubes	10	10	-
IV	Sand tubes	-	-	-
V	Polychaetes	15	20	10
VI	Coelenterates	-	-	-
VII	Molluscs			
1.	<i>Arca</i>	20	20	30
2.	<i>Anadora</i>	-	-	-
3.	<i>Auger</i>	-	-	-
4.	<i>Babylon</i>	-	-	-
5.	Bivalve Spats	-	-	-
6.	<i>Cardium</i>	10	30	20
7.	<i>Cavolinia</i>	-	-	-
8.	<i>Cerithedia</i>	-	-	-
9.	<i>Conus</i>	-	10	-
10.	<i>Dentalium</i>	10	10	20
11.	<i>Donax</i>	40	40	20
12.	<i>Drupa</i>	-	-	-
13.	<i>Katalysia</i>	-	-	-
14.	<i>Littorina</i>	-	-	-
15.	<i>Meritrix</i>	-	-	-
16.	<i>Modiolus</i>	-	-	-
17.	<i>Oliva</i>	-	-	-
18.	<i>Patella</i>	-	-	-
19.	Scallop	-	-	-
20.	<i>Surcula</i>	-	-	-
21.	<i>Telescopium</i>	-	-	-
22.	<i>Trochus</i>	-	-	-
23.	<i>Turitella</i>	15	12	30
24.	<i>Umbonium</i>	-	-	-
25.	Other Molluscs	25	15	25
VIII	Echinodermata			
1.	<i>Astropecten</i>	-	-	-
2.	<i>Ophiocoma</i>	-	-	-
3.	Egg Cases	45	50	30
IX	Miscellaneous			
1.	Crab	-	-	-
2.	Shrimp	-	-	-
3.	Fish	-	-	-

Table 5. Results of Bioassay experiment in the beach waters of Padubidri during July 2021.

- 1 Test Organism : Green Mussel (*Perna viridis*)
- 2 Number of Test Organisms : 10 per replicate
- 3 Number of Replicates : 3 for each treatment
- 4 Size (Average) : 3.40 – 4.00 cm

EXPERIMENT

Medium	Mortality			
	24h	48h	72h	96h
Control (aged seawater)	Nil	Nil	Nil	Nil
50% seawater from station 2 + 50% aged seawater	Nil	Nil	Nil	Nil
100% seawater from station 2	Nil	Nil	Nil	Nil

Inference:

The inferences drawn on the various physical, chemical and biological parameters in the shore waters of Padubidri for the month of July 2021 are given below.

The water temperature varied from 27.10⁰C to 27.80⁰C. The pH values ranged between 7.52 and 7.80. The salinity varied from 28.43 psu to 28.97 psu. The dissolved oxygen (DO) varied between 4.26 mg/l and 4.56 mg/l. The biochemical oxygen demand (BOD₃) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD₃ values ranged from 2.00 mg/l to 2.20 mg/l in the study region indicate that these values are within the primary water quality criteria and do not pose any threat to the environment under the present condition. The COD values ranged between 11.24 mg/l to 13.78 mg/l, the total suspended solids (TSS) ranged between 92.14 mg/l to 102.82 mg/l and the total dissolved solids (TDS) ranged between 2500 mg/l to 2872 mg/l. The turbidity values were in the range of 43.67 NTU to 69.22 NTU.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO₂-N) in beach waters varied from 4.27 µg-at/l to 5.28 µg-at/l. while nitrate (NO₃-N) varied between 13.12 µg-at/l and 14.02 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH₃-N) varied between 1.28 µg-at/l to 2.78 µg-at/l. Inorganic (PO₄-P) was in the range of 1.08 µg-at/l and 4.34 µg-at/l. Silicate – Silicon (SiO₃-Si), one of the major nutrients for phytoplankton growth ranged between 14.28 and 14.84 µg-at/l in the beach waters.

The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted in Table 2. Phytoplankton study showed the presence of 25 different genera with the abundance of *Biddulphia*, *Guinardia* and *Asterionella*. The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 119.32 mg/m³ to 158.34 mg/m³.

Zooplankton:

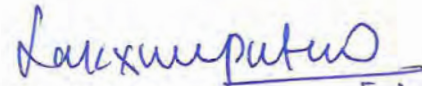
The qualitative analyses revealed the presence of 8 different groups of zooplankton. Among zooplankton, Copepods remained the most dominant group, followed by Copepod nauplius and Tintinids. The biomass ranged between 152.29 mg/m³ to 169.29 mg/m³.

Macrobenthos:

The qualitative analyses revealed the presence of 12 different groups of macrobenthos. Bivalv spats dominated the macrobenthos followed by *Donax*, *Crabs* and *Dentalium*.

Bioassay:

The bio assay studies indicated no mortality of mussels in the beach waters of Padubidri. The results indicated no environmental stress on aquatic life.



(LAKSHMIPATHI M. T)

Principal Investigator

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**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
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Submitted to:

**M/S UDUPI POWER CORPORATION LIMITED
Kolachure, Yelluru village,
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Prepared by:

**DEPARTMENT OF AQUATIC ENVIRONMENT MANAGEMENT
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August, 2021

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Table 1. Data on water quality parameters in the beach waters of Padubidri during August 2021.

Sl. No.	Parameters	Stations		
		1	2	3
1.	Temperature ($^{\circ}$ C)	28.60	28.80	28.10
2.	pH	8.05	7.98	8.02
3.	Salinity (ppt)	29.06	29.06	29.61
4.	Dissolved Oxygen (mg/l)	5.41	5.52	5.82
5.	BOD ₃ (mg/l)	2.10	2.15	2.08
6.	COD (mg/l)	20.22	16.12	15.32
7.	Turbidity (NTU)	48.28	41.21	46.32
8.	Total Suspended Solids (mg/l)	174.22	156.21	171.26
9.	Total Dissolved Solids (mg/l)	25340	22330	22450
10.	Ammonia (μ g-at/l)	3.58	2.09	3.45
11.	Nitrite (μ g-at/l)	5.65	4.87	4.58
12.	Nitrate (μ g-at/l)	15.61	12.21	12.84
13.	Phosphate (μ g-at/l)	0.21	0.34	0.64
14.	Silicate (μ g-at/l)	12.32	12.58	12.95
15.	Oil and Grease (mg/l)	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and biomass (mg/m³) in the Beach waters of Padubidri during August 2021.

Sl. No.	Flora	Stations		
		1	2	3
I	DIATOMS			
1.	<i>Asterionella</i>	1540	1550	1590
2.	<i>Bacteriastrum</i>	1100	1250	1300
3.	<i>Biddulphia</i>	9500	11200	8600
4.	<i>Cerataulina</i>	-	-	-
5.	<i>Chaetoceros</i>	1300	1200	1000
6.	<i>Coscinodiscus</i>	2500	2520	3650
7.	<i>Cyclotella</i>	2400	3950	1450
8.	<i>Ditylum</i>	1300	1200	1000
9.	<i>Dynobryon</i>	-	-	-
10.	<i>Eucamphia</i>	-	-	-
11.	<i>Fragillaria</i>	-	-	-
12.	<i>Gyrosigma</i>	-	-	-
13.	<i>Lauderia</i>	-	-	-
14.	<i>Leptocylindricus</i>	-	-	-
15.	<i>Melosira</i>	-	-	-
16.	<i>Navicula</i>	-	-	-
17.	<i>Nitzschia</i>	-	-	-
18.	<i>Pediastrum</i>	-	-	-
19.	<i>Planktoniella</i>	-	1800	-
20.	<i>Pleurosigma</i>	1350	1250	1300
21.	<i>Rhizosolenia</i>	3400	1750	3500
22.	<i>Skeletonema</i>	-	-	-
23.	<i>Staurastrum</i>	-	-	-
24.	<i>Streptotheca</i>	-	-	-
25.	<i>Thalassiothrix</i>	-	-	-
26.	<i>Triceratium</i>	1700	2200	1400
27.	Other diatoms	-	5000	-
II	DINOFLAGELLATES			
1.	<i>Ceratium</i>	18500	15000	16000
2.	<i>Dinophysis</i>	5000	1200	7000
3.	<i>Gymnodinium</i>	-	-	-
4.	<i>Ornithoceros</i>	-	-	-
5.	<i>Peridinium</i>	100	100	100
6.	<i>Preperidinium</i>	-	-	-
7.	<i>Noctiluca</i>	-	-	-
III	BLUE GREEN ALGAE			
1.	Blue Green Algae	2000	8500	1300
	Biomass (mg/m³)	132.66	145.12	130.21

Table 3. Zooplankton diversity (no/m³) and biomass (mg/m³) in the Beach waters of Padubidri during August 2021.

Sl. No.	Fauna	Stations		
		1	2	3
1.	Tintinids	1000	1500	1800
2.	Medusae	-	-	-
3.	Ctenophore	-	-	-
4.	Chaetognath	-	-	-
5.	Chaetognath Larvae	-	-	-
6.	Polychaete	-	-	-
7.	Polychaete Larvae	200	400	100
8.	Cladocera	3200	2600	3000
9.	Ostracoda	-	-	-
10.	Rotifera	-	-	-
11.	Copepod	1200	1400	2000
12.	Copepod nauplius	23000	18000	20000
13.	Copepod egg	-	-	-
14.	Lucifer	10	80	20
15.	Decapod Larvae	3600	2500	1800
16.	Gastropod Larvae	-	-	-
17.	Barnacle Larvae	-	-	-
18.	Bivalve Larvae	1340	1200	1500
19.	Echinoderm Larvae	1200	2150	1450
20.	<i>Oikopleura</i>	20	40	50
21.	Doliolids	-	-	-
22.	<i>Leptocera</i>	-	-	-
23.	<i>Creseis</i>	-	-	-
24.	<i>Cavolinia</i>	-	-	-
25.	Fish Eggs	20	10	10
26.	Fish Larvae	-	-	-
Biomass (mg/m³)		155.23	168.14	151.89

'-': Absent

Table 4. Macrobenthos diversity (no/m²) and density (no/m²) in the Beach waters of Padubidri during August 2021.

Sl. No.	Fauna	Stations		
		1	2	3
I	Echiuroids	-	-	-
II	Sipunculids	-	-	-
III	Mud tubes	-	-	-
IV	Sand tubes	-	-	-
V	Polychaetes	-	-	-
VI	Coelenterates	-	-	-
VII	Molluscs			
1.	<i>Arca</i>	50	30	60
2.	<i>Anadora</i>	-	-	-
3.	<i>Auger</i>	-	-	-
4.	<i>Babylon</i>	-	-	-
5.	Bivalve Spats	-	-	-
6.	<i>Cardium</i>	-	-	-
7.	<i>Cavolinia</i>	-	-	-
8.	<i>Cerithedia</i>	-	-	-
9.	<i>Conus</i>	120	110	130
10.	<i>Dentalium</i>	-	-	-
11.	<i>Donax</i>	130	120	170
12.	<i>Drupa</i>	400	440	450
13.	<i>Katalysia</i>	-	-	-
14.	<i>Littorina</i>	220	250	120
15.	<i>Meritrix</i>	120	230	200
16.	<i>Modiolus</i>	-	-	-
17.	<i>Oliva</i>	-	-	-
18.	<i>Patella</i>	-	-	-
19.	Scallop	-	-	-
20.	<i>Surcula</i>	-	-	-
21.	<i>Telescopium</i>	-	-	-
22.	<i>Trochus</i>	-	-	-
23.	<i>Turitella</i>	10	30	60
24.	<i>Umbonium</i>	-	-	-
25.	Other Molluscs	20	-	10
VIII	Echinodermata			
1.	<i>Astropecten</i>	-	-	-
2.	<i>Ophiocoma</i>	-	-	-
3.	Egg Cases	20	10	-
IX	Miscellaneous			
1.	Crab	02	10	20
2.	Shrimp	32	15	24
3.	Fish	220	150	200
Density (Individuals/m²)		550	730	480

Table 5. Results of Bioassay experiment in the beach waters of Padubidri during August 2021.

- 1 Test Organism : Green Mussel (*Perna viridis*)
- 2 Number of Test Organisms : 10 per replicate
- 3 Number of Replicates : 3 for each treatment
- 4 Size (Average) : 3.05 – 4.00 cm

EXPERIMENT

Medium	Mortality			
	24h	48h	72h	96h
Control (aged seawater)	Nil	Nil	Nil	Nil
50% seawater from station 2 + 50% aged seawater	Nil	Nil	Nil	Nil
100% seawater from station 2	Nil	Nil	Nil	Nil

Inference:

The inferences drawn on the various physical, chemical and biological parameters in the shore waters of Padubidri for the month of August 2021 are given below.

The water temperature varied from 28.60°C to 28.80°C. The pH values ranged between 7.98 and 8.05. The salinity varied from 29.06 psu to 29.98 psu. The dissolved oxygen (DO) varied between 5.41 mg/l and 5.82 mg/l. The biochemical oxygen demand (BOD₃) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD₃ values ranged from 2.08 mg/l to 2.15 mg/l in the study region indicate that these values are within the primary water quality criteria and do not pose any threat to the environment under the present condition. The COD values ranged between 15.32 mg/l to 20.22 mg/l, the total suspended solids (TSS) ranged between 156.21 mg/l to 174.22 mg/l and the total dissolved solids (TDS) ranged between 22330 mg/l to 25340 mg/l. The turbidity values were in the range of 48.55 NTU to 52.10 NTU.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO₂-N) in beach waters varied from 5.58 µg-at/l to 5.65 µg-at/l, while nitrate (NO₃-N) varied between 12.21 µg-at/l and 15.61 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH₃-N) varied between 2.09 µg-at/l and 3.58 µg-at/l. Inorganic phosphate (PO₄-P) was in the range of 0.21 µg-at/l and 0.64 µg-at/l. Silicate – Silicon (SiO₃-Si), one of the major nutrients for phytoplankton growth ranged between 12.32 and 12.95 µg-at/l in the beach waters.

The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted in Table 2. Phytoplankton study showed the presence of 25 different genera with the abundance of *Biddulphia*, *Guinardia* and *Asterionella*. The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 130.21 mg/m³ to 145.12 mg/m³.

Zooplankton:

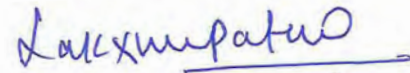
The qualitative analyses revealed the presence of 8 different groups of zooplankton. Among zooplankton, Copepods remained the most dominant group, followed by Copepod nauplius and Tintinids. The biomass ranged between 151.81 mg/m³ to 168.14 mg/m³.

Macrobenthos:

The qualitative analyses revealed the presence of 11 different groups of macrobenthos. Bivalv spats dominated the macrobenthos followed by *Donax*, *Crabs* and *Dentalium*. Macrofaunal density ranged from 480 no/m² to 730 no/m².

Bioassay:

The bio assay studies indicated no mortality of mussels in the beach waters of Padubidri. The results indicated no environmental stress on aquatic life.



(LAKSHMIPATHI M. T)

Principal Investigator

Dept. of Aquatic Environment Management
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**COASTAL WATER QUALITY MONITORING
NEAR THE M/S UPCL SEA WATER INTAKE AND
EFFLUENT DISCHARGE POINT OFF PADUBIDRI,
UDUPI DISTRICT, KARNATAKA**

Submitted to:

**M/S UDUPI POWER CORPORATION LIMITED
Kolachure, Yelluru village,
Pilar post, Udupi district - 574113**



Prepared by:

**DEPARTMENT OF AQUATIC ENVIRONMENT MANAGEMENT
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September, 2021

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Table 1. Data on water quality parameters in the beach waters of Padubidri during September 2021.

Sl. No.	Parameters	Stations		
		1	2	3
1.	Temperature (⁰ C)	28.60	28.50	28.90
2.	pH	7.75	7.64	7.72
3.	Salinity (ppt)	29.74	29.81	29.80
4.	Dissolved Oxygen (mg/l)	6.08	6.45	6.84
5.	BOD ₃ (mg/l)	1.05	0.94	1.01
6.	COD (mg/l)	20.92	17.65	19.66
7.	Turbidity (NTU)	61.25	60.88	63.74
8.	Total Suspended Solids (mg/l)	146.32	163.08	125.64
9.	Total Dissolved Solids (mg/l)	1862	2048	1845
10.	Ammonia (μg-at/l)	3.54	3.08	2.97
11.	Nitrite (μg-at/l)	0.87	0.65	0.77
12.	Nitrate (μg-at/l)	1.74	2.08	1.98
13.	Phosphate (μg-at/l)	0.95	0.85	0.87
14.	Silicate (μg-at/l)	19.87	17.65	19.89
15.	Oil and Grease (mg/l)	BDL	BDL	BDL

BDL: Below Detectable Level

Table 2. Phytoplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during September 2021.

Sl. No.	Flora	Stations		
		1	2	3
I DIATOMS				
1.	<i>Asterionella</i>	800	1200	1000
2.	<i>Bacteriastrum</i>	-	-	-
3.	<i>Biddulphia</i>	400	300	700
4.	<i>Cerataulina</i>	-	-	-
5.	<i>Chaetoceros</i>	1200	400	800
6.	<i>Coscinodiscus</i>	900	1000	600
7.	<i>Cyclotella</i>	-	-	-
8.	<i>Ditylum</i>	200	200	500
9.	<i>Dynobryon</i>	-	-	-
10.	<i>Eucamphia</i>	-	-	-
11.	<i>Fragillaria</i>	-	-	100
12.	<i>Gyrosigma</i>	50	-	-
13.	<i>Lauderia</i>	-	-	-
14.	<i>Leptocylindricus</i>	-	-	-
15.	<i>Melosira</i>	-	-	-
16.	<i>Navicula</i>	-	-	-
17.	<i>Nitzschia</i>	200	100	200
18.	<i>Pediastrum</i>	-	-	-
19.	<i>Planktoniella</i>	500	200	400
20.	<i>Pleurosigma</i>	800	1000	600
21.	<i>Rhizosolenia</i>	400	800	600
22.	<i>Skeletonema</i>	50	50	-
23.	<i>Staurastrum</i>	-	-	-
24.	<i>Streptotheca</i>	-	-	-
25.	<i>Thalassiothrix</i>	-	-	-
26.	<i>Triceratium</i>	400	800	1000
27.	Other diatoms	-	-	-
II DINOFLAGELLATES				
1.	<i>Ceratium</i>	1000	1400	800
2.	<i>Dinophysis</i>	200	200	50
3.	<i>Gymnodinium</i>	-	100	-
4.	<i>Ornithoceros</i>	-	-	-
5.	<i>Peridinium</i>	400	200	200
6.	<i>Preperidinium</i>	-	-	-
7.	<i>Noctiluca</i>	-	-	-
III BLUE GREEN ALGAE				
1.	Blue Green Algae	1200	1000	1400
Biomass (mg/m³)		135.26	116.84	149.62

Table 3. Zooplankton diversity (no/m³) and biomass (mg/m³) in the beach waters of Padubidri during September 2021.

Sl. No.	Fauna	Stations		
		1	2	3
1.	Tintinids	400	300	700
2.	Medusae	-	-	-
3.	Ctenophore	-	-	-
4.	Chaetognath	50	200	100
5.	Chaetognath Larvae	-	-	-
6.	Polychaete	-	-	-
7.	Polychaete Larvae	100	200	200
8.	Cladocera	800	500	100
9.	Ostracoda	-	-	-
10.	Rotifera	-	-	-
11.	Copepod	700	900	400
12.	Copepod nauplius	500	300	100
13.	Copepod egg	-	-	-
14.	Lucifer	-	-	-
15.	Decapod Larvae	400	200	200
16.	Gastropod Larvae	-	-	-
17.	Barnacle Larvae	-	-	-
18.	Bivalve Larvae	700	900	500
19.	Echinoderm Larvae	-	-	-
20.	<i>Oikopleura</i>	100	-	400
21.	Doliolids	-	-	-
22.	<i>Lensia</i>	-	-	-
23.	<i>Creseis</i>	-	-	-
24.	<i>Cavolinia</i>	-	-	-
25.	Fish Eggs	50	20	-
26.	Fish Larvae	-	2	-
Biomass (mg/m³)		148.65	168.20	149.24

'-': Absent

Table 4. Macrobenthos diversity (no/m²) and density (no/m²) in the beach waters of Padubidri during September 2021.

Sl. No.	Fauna	Stations		
		1	2	3
I	Echiuroids	-	-	-
II	Sipunculids	-	-	-
III	Mud tubes	-	10	-
IV	Sand tubes	-	-	-
V	Polychaetes	-	-	-
VI	Coelenterates	-	-	-
VII	Molluscs			
1.	<i>Arca</i>	30	10	50
2.	<i>Anadora</i>	-	-	-
3.	<i>Auger</i>	-	-	-
4.	<i>Babylon</i>	-	-	-
5.	Bivalve Spats	20	10	10
6.	<i>Cardium</i>	-	-	-
7.	<i>Cavolinia</i>	-	-	-
8.	<i>Cerithedia</i>	-	-	-
9.	<i>Conus</i>	10	30	-
10.	<i>Dentalium</i>	50	20	40
11.	<i>Donax</i>	20	10	20
12.	<i>Drupa</i>	-	-	-
13.	<i>Katalysia</i>	-	-	-
14.	<i>Littorina</i>	-	-	-
15.	<i>Meritrix</i>	60	70	40
16.	<i>Modiolus</i>	-	-	-
17.	<i>Oliva</i>	-	-	-
18.	<i>Patella</i>	-	-	-
19.	Scallop	-	-	-
20.	<i>Surcula</i>	-	-	-
21.	<i>Telescopium</i>	-	-	-
22.	<i>Trochus</i>	-	-	-
23.	<i>Turitella</i>	20	40	10
24.	<i>Umbonium</i>	10	-	-
25.	Other Molluscs	-	10	-
VIII	Echinodermata			
1.	<i>Astropecten</i>	-	-	-
2.	<i>Ophiocoma</i>	-	-	-
3.	Egg Cases	80	100	140
IX	Miscellaneous			
1.	Crab	-	20	-
2.	Shrimp	-	-	-
3.	Fish	10	-	-

Inference:

The inferences drawn on the various physical, chemical and biological parameters in the shore waters of Padubidri for the month of September 2021 are given below.

The water temperature varied from 28.50⁰C to 28.90⁰C. The pH values ranged between 7.64 and 7.75. The salinity varied from 29.74 psu to 29.81 psu. The dissolved oxygen (DO) varied between 6.08 mg/l and 6.84 mg/l. The biochemical oxygen demand (BOD₃) is an empirical biological test in which the water conditions such as temperature; dissolved oxygen and microbial flora play a decisive role. The BOD₃ values ranged from 0.94 mg/l to 1.05 mg/l in the study region indicate that these values are within the primary water quality criteria and do not pose any threat to the environment under the present condition. The COD values ranged between 17.65 mg/l to 20.92 mg/l, the total suspended solids (TSS) ranged between 125.64 mg/l to 163.08 mg/l and the total dissolved solids (TDS) ranged between 1845 mg/l to 2048 mg/l. The turbidity values were in the range of 60.88 NTU to 63.74 NTU.

Nutrients play a vital role in the biogeochemical cycles in the marine environment. The concentrations of nitrite (NO₂-N) in beach waters varied from 0.65 µg-at/l to 0.87 µg-at/l, while nitrate (NO₃-N) varied between 1.74 µg-at/l and 2.08 µg-at/l, which are within the acceptable limits of coastal environment. Ammonia content (NH₃-N) varied between 2.97 µg-at/l to 3.54 µg-at/l. Inorganic phosphate (PO₄-P) was in the range of 0.85 µg-at/l and 0.95 µg-at/l. Silicate – Silicon (SiO₃-Si), one of the major nutrients for phytoplankton growth ranged between 17.65 and 19.89 µg-at/l in the beach waters.

The oil and grease content was below detectable limits.

Phytoplankton:

The relative abundance of various forms of phytoplankton is depicted in Table 2. Phytoplankton study showed the presence of 24 different genera with the abundance of *Biddulphia*, *Guinardia* and *Asterionella*. The phytoplankton species recorded in this area are common types occurring along the west coast of India. The biomass varied from 116.84 mg/m³ to 149.62 mg/m³.

Zooplankton:

The qualitative analyses revealed the presence of 8 different groups of zooplankton. Among zooplankton, Copepods remained the most dominant group, followed by Copepod nauplius and Tintinids. The biomass ranged between 148.65 mg/m³ to 168.20 mg/m³.

Macrobenthos:

The qualitative analyses revealed the presence of 12 different groups of macrobenthos. Bivalv spats dominated the macrobenthos followed by *Donax*, Crabs and *Dentalium*.

Bioassay:

The bio assay studies indicated no mortality of mussels in the beach waters of Padubidri. The results indicated no environmental stress on aquatic life.


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Annexure-XVIII

TEST WELL MONITORING:*Annexure-XVIII*

Test Wells are installed in the Sea Water Pipe line fenced area and the monitoring is carried for the period from April 2021 to September 2021 is presented in the Table-1 to Table-6 as below:

The locations of test wells are:

S.NO	Name of the Location	Code	Source
1	Pipe line Corridor test well	PC-1	Test Well
2	Pipe line Corridor test well	PC-2	Test Well
3	Pipe line Corridor test well	PC-3	Test Well
4	Pipe line Corridor test well	PC-4	Test Well
5	Pipe line Corridor test well	PC-5	Test Well
6	Pipe line Corridor test well	PC-6	Test Well

Water Sample Analysis Parameters:

S.No	Parameters	S.No	Parameters
1	Color	16	Fluoride
2	pH	17	Phenolic Compounds
3	Odor	18	manganese
4	Taste	19	zinc
5	Turbidity	20	Arsenic
6	TDs	21	cyanide
7	Alkalinity	22	cadmium
8	Total Hardness as CaCO ₃	23	chromium
9	Calcium as Ca	24	Aluminium
10	Magnesium	25	Selenium
11	Iron	26	Lead
12	Sulphate as SO ₄	27	Mercury
13	Chloride	28	Nitrate nitrogen
14	Boron	29	E.coli
15	Residual Free Chlorine		

Table-1: Pipe line corridor test well (PC-1) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	1	1	1	1	1	1	1
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.87	6.76	6.74	6.87	6.98	6.74	6.98	6.84
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.2	3.1	2.6	1.7	BDL	2.7	1.7	3.1	2.46
6	TDS	mg/l	500	2000	220.8	190.4	130.4	34	60.4	95.2	34	220.8	121.87
7	Alkalinity as CaCO ₃	mg/l	200	600	15.2	30	BDL	13.6	BDL	7.4	7.4	30	16.55
8	Total Hardness	mg/l	200	600	43.4	41.9	41.9	4.2	12.7	25.2	4.2	43.4	28.22
9	Calcium as Ca	mg/l	75	200	7.9	8.4	20.9	BDL	3.4	4	3.4	20.9	8.92
10	Magnesium as Mg	mg/l	30	100	5.7	5	5	BDL	BDL	3.6	3.6	5.7	4.83
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.11	0.24	0.14	0.22	0.2	0.11	0.24	0.19
12	Sulphate as SO ₄	mg/l	200	400	16.1	11.8	41.2	5	12.4	26.9	5	41.2	18.90
13	Chloride as Cl	mg/l	250	1000	88.8	97.3	36.4	15	12.1	39	12.1	97.3	48.10
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	0.21	BDL	BDL	BDL	BDL	0.21	0.21	0.21
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ .N	mg/l	45	No relaxation	BDL	BDL	BDL	1.04	1.04	BDL	1.04	1.04	1.04
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero

Table-2: Pipe line corridor test well (PC-2) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	1	1	1	1	1	1	1
2	pH	-	6.5 - 8.5	No Relaxation	6.94	6.86	6.88	6.8	6.84	6.89	6.8	6.94	6.87
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.4	2.8	3.8	1.5	BDL	3.1	1.5	3.8	2.72
6	TDS	mg/l	500	2000	221.2	190.4	130.8	37.6	32.4	94.4	32.4	221.2	117.80
7	Alkalinity as CaCO ₃	mg/l	200	600	22.8	30	BDL	13.6	4.5	7.4	4.5	30	15.66
8	Total Hardness	mg/l	200	600	35.5	41.9	41.9	8.5	8.5	35.2	8.5	41.9	28.58
9	Calcium as Ca	mg/l	75	200	7.9	8.4	8.4	BDL	3.4	6	3.4	8.4	6.82
10	Magnesium as Mg	mg/l	30	100	3.8	5	5	BDL	BDL	4.8	3.8	5	4.65
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.14	0.22	0.15	0.2	0.22	0.14	0.22	0.19
12	Sulphate as SO ₄	mg/l	200	400	14.8	12	42.5	5.3	BDL	27.7	5.3	42.5	20.46
13	Chloride as Cl	mg/l	250	1000	88.8	90.9	36.4	12.8	18.2	39	12.8	90.9	47.68
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	0.23	BDL	BDL	BDL	BDL	0.23	0.23	0.23
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ -N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	1.02	BDL	1.02	1.02	1.02
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero

Table-3: Pipe line corridor test well (PC-3) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	1	1	1	1	1	1	1
2	pH	-	6.5 - 8.5	No Relaxation	6.93	6.93	6.99	6.79	6.83	6.85	6.79	6.99	6.89
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.6	2.7	3.3	2.8	BDL	3.2	2.6	3.3	2.92
6	TDS	mg/l	500	2000	210.8	202.4	140.4	42.8	32.8	93.6	32.8	210.8	120.47
7	Alkalinity as CaCO ₃	mg/l	200	600	19	17.5	4.8	22.7	4.5	7.4	4.5	22.7	12.65
8	Total Hardness	mg/l	200	600	35.5	32.6	37.7	4.2	12.7	35.2	4.2	37.7	26.32
9	Calcium as Ca	mg/l	75	200	6.3	6	8.4	BDL	3.4	6	3.4	8.4	6.02
10	Magnesium as Mg	mg/l	30	100	4.7	3.9	4	BDL	BDL	4.8	3.9	4.8	4.35
11	Iron as Fe	mg/l	0.3	No relaxation	0.24	0.21	0.24	0.21	0.23	0.21	0.21	0.24	0.22
12	Sulphate as SO ₄	mg/l	200	400	13.6	15.7	41.1	6.9	6	23.3	6	41.1	17.77
13	Chloride as Cl	mg/l	250	1000	90.6	84.2	38.5	12.8	16.2	39	12.8	90.6	46.88
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ :N	mg/l	45	No relaxation	BDL	BDL	BDL	1.05	1.06	BDL	1.05	1.06	1.055
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero

Table-4: Pipe line corridor test well (PC-4) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	BDL	1	1	1	1	1	1	1
2	pH	-	6.5 - 8.5	No Relaxation	6.84	6.84	6.75	6.89	6.83	6.79	6.75	6.89	6.82
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	2.1	2.3	2.7	2.5	BDL	3.4	2.1	3.4	2.60
6	TDS	mg/l	500	2000	42	52	67	39.6	32	96.8	32	96.8	54.90
7	Alkalinity as CaCO ₃	mg/l	200	600	16.45	17.9	22.1	13.6	9	3.7	3.7	22.1	13.79
8	Total Hardness	mg/l	200	600	13.5	15.2	18.4	17.1	8.5	36.2	8.5	36.2	18.15
9	Calcium as Ca	mg/l	75	200	5.78	6.47	9.5	5.1	BDL	8	5.1	9.5	6.97
10	Magnesium as Mg	mg/l	30	100	BDL	2.5	3.1	BDL	BDL	3.6	2.5	3.6	3.07
11	Iron as Fe	mg/l	0.3	No relaxation	0.17	0.18	0.14	0.15	0.24	0.21	0.14	0.24	0.18
12	Sulphate as SO ₄	mg/l	200	400	BDL	BDL	BDL	5.4	5.15	27.7	5.15	27.7	12.75
13	Chloride as Cl	mg/l	250	1000	17.58	17.58	22.4	12.8	12.1	36.8	12.1	36.8	19.88
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ :N	mg/l	45	No relaxation	BDL	BDL	BDL	1.07	1	BDL	1	1.07	1.035
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero

Table-5: Pipe line corridor test well (PC-5) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	2.5	2	BDL	BDL	BDL	2	2.5	2.25
2	pH	-	6.5 - 8.5	No Relaxation	6.86	6.87	6.98	6.84	6.84	6.98	6.84	6.98	6.89
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.2	3.5	3.6	BDL	BDL	1.5	0.2	3.6	2.2
6	TDS	mg/l	500	2000	211.2	450.4	190.8	84.4	84.4	70	70	450.4	181.86
7	Alkalinity as CaCO ₃	mg/l	200	600	19	42.9	19.4	13.6	13.6	11.1	11.1	42.9	19.93
8	Total Hardness	mg/l	200	600	39.4	272.6	88	34.2	34.2	35.2	34.2	272.6	83.93
9	Calcium as Ca	mg/l	75	200	7.9	45.9	15.1	6.8	6.8	6	6	45.9	14.75
10	Magnesium as Mg	mg/l	30	100	4.7	38.7	12.2	4.1	4.1	4.8	4.1	38.7	11.43
11	Iron as Fe	mg/l	0.3	No relaxation	0.23	0.24	0.2	0.16	0.16	0.21	0.16	0.24	0.2
12	Sulphate as SO ₄	mg/l	200	400	15.1	BDL	BDL	BDL	BDL	BDL	15.1	15.1	15.1
13	Chloride as Cl	mg/l	250	1000	88.8	230.6	100.6	42.9	42.9	39	39	230.6	88.84
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	0.35	BDL	BDL	BDL	BDL	0.35	0.35	0.35
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	0.29	BDL	BDL	BDL	0.29	0.29	0.29
19	Zinc as Zn	mg/l	5	15	BDL	BDL	BDL	0.28	BDL	0.17	0.17	0.28	0.225
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ .N	mg/l	45	No relaxation	BDL	BDL	BDL	1.09	BDL	BDL	1.09	1.09	1.09
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero

Table-6: Pipe line corridor test well (PC-6) for the period of April 2021 to Sep 2021

S.No	PARAMETERS	UNIT	Acceptable Limits as per IS:10500:2012	Permissible Limits as per IS:10500:2012	April 2021	May 2021	June 2021	July 2021	Aug 2021	Sep 2021	Min	Max	Average
1	Color	Hazen	5	15	BDL	2.5	1	1	1	1	1	2.5	1.3
2	pH	-	6.5 - 8.5	No Relaxation	6.82	6.91	6.79	6.91	6.88	6.84	6.79	6.91	6.86
3	Odour	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
4	Taste	-	Agreeable	Agreeable	A	A	A	A	A	A	A	A	A
5	Turbidity	NTU	1	5	0.6	3.4	2.7	2.4	BDL	1.7	0.6	3.4	2.16
6	TDS	mg/l	500	2000	220.8	450.8	180.8	85.6	85.2	91.6	85.2	450.8	185.80
7	Alkalinity as CaCO ₃	mg/l	200	600	22.8	47.2	14.5	9	54.4	7.4	7.4	54.4	25.88
8	Total Hardness	mg/l	200	600	39.4	468.4	41.9	38.5	34	50.4	34	468.4	112.10
9	Calcium as Ca	mg/l	75	200	7.9	48.7	11.7	8.5	6.8	8	6.8	48.7	15.27
10	Magnesium as Mg	mg/l	30	100	4.7	26.6	3	4.1	4.1	7.3	3	26.6	8.30
11	Iron as Fe	mg/l	0.3	No relaxation	0.22	0.14	0.22	0.21	0.22	0.19	0.14	0.22	0.20
12	Sulphate as SO ₄	mg/l	200	400	14.6	BDL	BDL	BDL	BDL	BDL	14.6	14.6	14.60
13	Chloride as Cl	mg/l	250	1000	90.6	232.7	102.7	42.9	32.4	49.8	32.4	232.7	91.85
14	Boron as B	mg/l	0.5	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15	Residual Free Chlorine	mg/l	0.2	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Fluoride as F	mg/l	1	1.5	BDL	0.37	BDL	BDL	BDL	BDL	0.37	0.37	0.37
17	Phenolic Compounds	mg/l	0.001	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Zinc as Zn	mg/l	5	15	BDL	3.5	BDL	BDL	BDL	0.14	0.14	3.5	1.82
20	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cyanide as CN	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium as Cd	mg/l	0.003	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr	mg/l	0.05	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Aluminium	mg/l	0.03	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Selenium as Se	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb	mg/l	0.01	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury as Hg	mg/l	0.001	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nitrate as NO ₃ .N	mg/l	45	No relaxation	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	E.Coli	MPN/100 ml	Should Not be Detectable		Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

A- Agreeable; BDL- Below Detectable Limit; Nil- Zero