# EC COMPLIANCE REPORT
# &
# ENVIRONMENTAL STATUS REPORT
# (July 2015 – December 2015)

**Of**

# Hindadih Coal Washery
## (Capacity - 2.4 MTPA)

**Located At**
**Village - Hindadih, Tehsil - Masturi,**
**District - Bilaspur, State - Chhattisgarh**

***Project Proponent:***

## Hind Energy
## &
## Coal Beneficiation (India) Pvt. Ltd.
**Hindadih Village, Masturi Tehsil,**
**Bilaspur District, Chhattisgarh, India**

***Environment Consultant***


***ANACON LABORATORIES PVT. LTD., NAGPUR***
**Recognized by MoEF (GOI) as per EPA and valid upto Jan'2019**
**Accredited by NABL for Chemical & Biological), valid up to 03.10.2016**
**Accredited under the QCI-NABET Scheme for EIA Consultant**
**Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007**
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**FEBRUARY 2016**

# Foreword

The protection of environment plays a crucial role in maintaining the local environment quality for any Industrial and mining activity. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding of mining areas. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of **Hind Energy & Coal Beneficiation (India) Pvt. Ltd.** has adopted a corporate responsibility of environment protection.

In order to comply with the Environment protection act, to fulfill statutory requirements and to be in tune with Environmental Preservation and Sustainable Development, **Hind Energy & Coal Beneficiation (India) Pvt. Ltd.,** has retained **Anacon Laboratories Pvt. Ltd., Nagpur** as Environment Consultants and for various Environmental issues related to their Coal Washery.

This document presents the EC Compliance and Environmental Status Report for the period **July 2015 - December 2015** (six months) as part of the statutory requirements.

The co-operation extended by the Staff and Management of **Hind Energy & Coal Beneficiation (India) Pvt. Ltd.** during the work execution period is gratefully acknowledged.

For **ANACON LABORATORIES PVT. LTD.**

**Place:** NAGPUR
**Date :** 23.02.2016

***Dr. D. G. Garway***
**Authorized Signatory**
**Anacon Laboratories Pvt. Ltd.**

ANACON LABORATORIES PVT. LTD. NAGPUR

## INDEX

## INTRODUCTION:

**M/s Hind Energy & Coal Beneficiation (I) Pvt. Ltd, (HECBIPL)** has been established in the year 2005 when a Coal beneficiation plant with capacity of 2.4 MTPA was set up at Village Hindadih, Tehsil Masturi, District Bilaspur (C.G.). The raw coal is received generally from SECL Dipka mine which is about 70 km from HECBIPL.

Coal beneficiation is the process for cleaning & reducing ash content in the coal, thus improving the quality of coal. This is a dry type of Coal Washery, obtained environmental clearance vide letter No J-11015/190/2007-IA. II (M) dated 24/06/2008.

**EC Conditions compliance** with monitoring reports for the period of **July 2015 to December 2015** is given below.

**EC Conditions compliance**
**Specific Conditions:**

| S. No. | Specific Conditions | Action Taken |
|---|---|---|
| 01 | The raw coal, washed coal & coal wastes (rejects) shall be stacked properly at earmarked sites(s) within stockyards with wind breakers / shields. The storage time capacity of the stockyard shall be to store for not more than one day. Adequate measures shall be taken to ensure that the stored materials do not catch fire. | Raw Coal, Washed coal & coal waste (rejects) are stacked properly at earmarked sites(s) covered with boundary walls. Water Sprinklers are provided on the coal stock to reduce dispersion of coal particulate matter in ambient air. This also helps minimizing risk of coal storages fire. (**Refer Annexure I**) |
| 02 | Hoppers of the coal crushing unit and washery unit shall be fitted with high efficiency bag filters/dust extractors and mist spray water sprinkling system shall be installed and operated effectively at all times of operation to check fugitive emissions from crushing operations, transfer points of belt conveyor systems which shall be closed and from transportation roads. | Coal crusher and coal pulverizer of the plant are facilitated with Bag filters of adequate capacity and efficiency so as to comply with particulate emission norms. Mist spray water sprinkling system is provided. Closed conveyor system is provided to prevent fugitive dust emissions. (**Refer Annexure II**) |
| 03 | All internal roads shall be concretized. The roads shall be regularly cleaned with mechanical sweepers. Avenue plantation developed along the roads. | All internal roads are concrete & plantation has also been done along the road side wherever possible. (**Refer Annexure III**) |

| | | |
|---|---|---|
| 04 | The company shall prepare the plan for transportation for raw coal & Coal rejects by rail integrating it with the plan of M/s. South Eastern Coalfields. | Complied |
| 05 | The company shall obtain prior approval of SGWB/CGWB Regional office for Use of groundwater for the Washery operations. | Necessary permission from CGWA Ministry of Water Resources, GOI is already obtained and copy is enclosed. (**Annexure IV** Letter No. 21-4(102/CGWA/NCCR/2011-174 dt.15.02.2011) |
| 06 | Industrial wastewater (workshop and wastewater from the washery) shall be properly collected, treated so as to confirm to the standard prescribed under GSR 422 (E) dated 19th May' 1993 and 31st December' 1993 or as amended from time before discharge. Oil and grease trap shall be installed for workshop effluents | Effluent treatment plant has been constructed and the treated effluent is confirming with CECB standards. |
| 07 | The unit shall be a zero-discharge facility and no water shall be discharged from the washery into the drains / natural water sources. Recycled water shall be used for development & maintenance of green belt and in the plant operations. | Zero discharge is strictly followed and all the treated water is being utilized for green belt within the premises. No waste water is discharged into drains / water resources. |
| 08 | Green belt shall be developed along the area such as the washery unit, crushing unit & stockyard. | A total of 6380 saplings at washery, crushing plant, storage yard and along the roads have been planted (**Refer Annexure V**) |
| 09 | Railway siding shall be established at Gatora Railway station and at Hathbandh. Railway siding at a distance of 10km & 30km respectively, thereafter coal (raw and washed coal) would be transported by rail from these siding within 3 years. | Railway siding at Gatora Railway station has been constructed, commissioned and operational. (**Refer Annexure VI**) |
| 10 | Solid wastes and stones shall be backfilled into the murrum mine leases as part of its Mining Plan. | Filling of Solid wastes and stones in murrum mine lease area is being done. |

**General Conditions:**

| S. No. | General Conditions | Action Taken |
|---|---|---|
| 01. | No change in technology and scope of working shall be made without prior approval of MOEF | Noted and being complied. |

| | | |
|---|---|---|
| 02 | No change in the calendar plan for washing the quantum of mineral coal & waste produced shall be made. | No change in the calendar plan |
| 03. | Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for SPM, RSPM, $SO_2$&$NO_x$ monitoring. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally & ecologically sensitive targets in consultation with the State Pollution Control Board. | Four nos. of ambient air quality monitoring stations have been established & are operational for monitoring ambient air data. The data for July 2015 to December 2015 is enclosed along with EC compliance. |
| 04. | Fugitive dust emissions (SPM and RSPM) from all the sources shall be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, and dump trucks (loading and unloading,) points shall be provided and properly maintained. | Fugitive dust emissions are restricted, Water spray arrangement has been provided on the roads, loading & unloading points. |
| 05 | Periodic monitoring report with data on ambient air quality (SPM, RSPM, $SO_2$ and $NO_x$) shall be regularly submitted to the ministry including its regional office at Bhopal and to the state pollution control board and the central pollution control board once in six months. | Being Complied on regular basis |
| 06 | Adequate measures shall be taken for control of noise levels below 85 dB(A) in the work environment workers engaged in blasting and drilling operations of HEMM, etc. shall be provided with ear plugs/muffs | Machines & equipment's producing noise are covered with sound absorbing material & ear plugs/muffs are being provided to the workers in noisy environment |
| 07 | Vehicular emissions shall be kept under control & regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded. | All the vehicles engaged in transportation are covered with tarpaulins and are maintained so as to follow emission norms. |
| 08. | Environmental quality shall be regularly monitored and got analyzed through an Environment Laboratory established under the Environment (Protection) Act, 1986. | Field Environmental Laboratory has been established and is headed by Mr. R. K. Singh.<br>The environmental quality is being regularly monitored and analyzed through M/s Anacon Laboratory Pvt. Ltd., Nagpur, a MoEF recognized and NABET & NABL accredited Laboratory. |
| 09. | Personnel working in dusty areas shall wear protective respiratory devices and they shall | Protective Respiratory Devices are provided & safety appliances are being |

| | | |
|---|---|---|
| | also be provided with adequate training and information on safety and health aspects. Programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed. | used by the workers. Shoes, mask helmet safety belt & ear plug, have been provided & adequate training has been given to workers. |
| 10. | An environmental management cell with suitable qualified personnel shall be set up under the control of a senior executive who will report directly to the Head of the company. | Environmental cell has been framed. GM (Washery) is the Head of the Environment Cell. |
| 11. | The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this ministry and it's Regional Office at Bhopal. | Company has opened a separate bank account number 31214727669 in SBI Bank for the purpose of Environmental protection only. |
| 12. | The Regional Office of this Ministry located at Bhopal shall monitor compliance stipulated conditions. The Project authorities shall extend full cooperation to the office of the Regional Office by furnishing the requisite data / information / monitoring reports. | Full co-operation will be given to the official of the Hon'ble Ministry and all data/document/reports as sought by them will be submitted. |
| 13. | A copy of the EC will be marked to concerned Panchayat/Local NGO, if any; suggestion/representation has been received while processing the proposal. | Circulated and displayed in Gram Panchayat. |
| 14 | State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office /Tehsildar's Office for 30days. | Complied |
| 15. | The project authorities shall advertise at local newspapers widely circulated around the project, one of which shall bein the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at website of the ministry of Environment& Forests at http://envfor.nic.in. | Notice regarding award of environmental clearance was published in newspapers in Central Chronicle (English) on 5$^{th}$July 2008 & Dainik Jagran (Hindi) on 6$^{th}$July 2008. **(Refer Annexure VII)** |

## Annexure I
## Boundary Walls and Sprinklers


## Annexure II
## Bag Filters

## Annexure III
## Plantation along road side

## Annexure IV
## CGWA Letter

# Central Ground Water Authority
Ministry of Water Resources
Government of India

(13)

**No. 21-4(102)/CGWA/NCCR/2011-** 174 **Dated-** 15 FEB 2011

To,

M/s Hind Energy & Coal Beneficiation (India) Pvt. Ltd.
1st Floor, Shree Sai Parisar Commercial Complex,
Shri Srikant Verma Marg
Bilaspur, Chhattisgarh 495001

**Sub: Request for Ground Water clearance in respect of M/s Hind Energy & Coal Beneficiation (India) Pvt. Ltd. for the proposed expansion of coal washery unit at village Hindadih, Block &Tehsil Masturi, District Bilaspur, Chhattisgarh-reg.**

Sir,

The area where the project falls comes under safe category as per the ground water assessment carried out by Central Ground Water Board. Since the total requirement of ground water is **610 $m^3$/day**, NOC is not required for ground water withdrawal from Central Ground Water Authority. However, to neutralize the adverse impact of ground water withdrawal that may arise on a long term basis, the industry/ project is advised to undertake the following measures:

1. Ground water withdrawal shall not exceed the proposed quantity of **610 $m^3$/day**.
2. The abstraction structures should be fitted with water meter by the industry and monitoring of ground water abstraction to be undertaken accordingly on regular basis, at least once in a month. The data may be submitted on a yearly basis to the Regional Director, Central Ground Water Board, North Central Chhattisgarh Region, Raipur for perusal and records.
3. The industry should adopt and implement artificial recharge measures/rain water harvesting measures for augmenting the ground water resources of the area as per the hydrogeological investigation.
4. The industry shall ensure proper conservation measures, recycling and reuse of waste water after adequate treatment.
5. The industry shall monitor the ambient ground water regime of the area through piezometers and submit the data on a yearly basis to the Regional Director, Central Ground Water Board, North Central Chhattisgarh Region, Raipur for perusal and records.

Yours faithfully,

**(S. Bhattacharya)**
**Scientist 'D'**
**for Member Secretary**

**Copy to:**

1. Member Secretary, Chhattisgarh Environment Conservation Board, 1-Tilak Nagar, Shiv Mandir Chowk, Main Road, Awanti Vihar, Raipur-492006, Chhattisgarh, with a request to ensure that Rain Water Harvesting and Artificial Recharge methods are being implemented by the firm and the total quantity of ground water withdrawal is not exceeding **610 $m^3$/day**.
2. The Regional Director, Central Ground Water Board, North Central Chhattisgarh Region, Reena apartments, IInd Floor, Panchpedi naka, Raipur 492001, Chhattisgarh. This has reference to your letter No. 35.1/NCCR/Vol-VI-103 dated 19.01.2011.
3. The TS to Chairman, Central Ground Water Board, NH-IV, Faridabad.

**(S. Bhattacharya)**
**Scientist 'D'**
**for Member Secretary**

16/11, Jamnagar House, Mansingh Road, New Delhi- 110011
Tel: (011) 23381089, 23384973: Fax (011) 23386743 e-mail: tsmsml-cgwb@nic.in web site: http://cgwb.gov.in

## Annexure V
## Plantation Programmed Carried out by HECBIL


## Annexure VI
## Railway Siding at Gatora

## Annexure VII
## Paper Advisement of Environmental Clearance by MOEF

Environmental clearance vide letter No J-11015/190/2007-IA AS PER General Condition PT. NO. 15

CENTRAL CHRONICLE
RAIPUR SATURDAY, JULY 05, 2008

**Notice**

It is hereby informed to all concerned that Ministry of Environment & Forests, New Delhi vide its letter no J-11015/190/2007-IA.II (M) dated 24th June, 2008 has accorded environmental clearance to M/s Hind Energy and Coal Beneficiation (India) Pvt Ltd, Vill Hindadih, Teh-Masturi, Dist- Bilaspur for capacity expansion of its Coal Washery from 1.2 MTPA to 2.4 MTPA. Copy of clearance letter is available with State Pollution Control Board and can also be seen at website of Ministry of Environment and Forests at http://envfor.nic.in

Director,
Hind Energy and
Coal Beneficiation
(India) Pvt Ltd

दैनिक भास्कर रायपुर दिनांक 06 जुलाई 08

**"सर्व सम्बन्धितों को सूचना"**

सर्व सम्बन्धितों को सूचित किया जाता है कि पर्यावरण एवं वन मन्त्रालय नई दिल्ली के पत्र क्रमांक J-11015/190/2007-IA II (M) दिनांक 24 जून 2008 के माध्यम से मेसर्स हिन्द एनर्जी एण्ड कोल बेनीफिसियेशन (इण्डिया) प्रा लिमिटेड ग्राम हिण्डादीह तहसील मस्तूरी जिला बिलासपुर (छत्तीसगढ़) को क्षमता के [illegible] 12 मिलियन टन [illegible] 24 मिलियन टन [illegible] स्वीकृति [illegible]

मेसर्स हिन्द एनर्जी एण्ड कोल बेनीफिसियेशन (इण्डिया) प्रा लिमिटेड

## 1.1 Introduction

**M/s Hind Energy & Coal Beneficiation (I) Pvt. Ltd, (HECBIPL)** has been established in the year 2005 when a Coal benefication plant with capacity of 2.4 MTPA was set up. M/s Hind Energy & Coal Beneficiation (I) Pvt. Ltd is situated in village Hindadih, Tehsil Masturi, District Bilaspur (C.G.)

Coal beneficiation is the process for cleaning & reducing ash content in the coal, thus improving the quality of coal. This is a dry type of coal Washery, having obtained environmental clearance vide letter No J-11015/190/2007-IA. II (M) dated 24/06/2008.

**M/s Hind Energy & Coal Beneficiation (I) Pvt. Ltd, (HECBIPL)**, awarded the work to M/s Anacon Laboratories Pvt. Ltd. Nagpur (ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels as per the requirement of State Pollution Control Board (SPCB) and Ministry of Environment and Forest (MoEF).

## 1.2 Meteorological Data Recorded at IMD, Champa

Secondary information for the meteorological conditions was collected from the nearest IMD station at Champa. Pressure, temperature, relative humidity, rainfall, wind speed and direction are measured twice a day viz., at 0830 and 1730 hr. The meteorological data, rainfall data, climatological data and surface meteorology for the study area collected from IMD Champa for a 30 year period from 1971 to 2000 is presented in Table-1, Table-2 and Table-3 respectively.

**Analysis of IMD Data Champa**

The Indian Meteorological Department records the data twice a day viz. 0830 hr and 1730 hr.

- **Temperature & Relative Humidity**

The winter seasons sets in towards end of November and continues till mid of February. The last week of December to first week of January is the coolest period of the year, with lowest minimum temperature falling as low as 9.3 $^0$C or lower. Temperature gradually rises after February. March to June is the summer season. This is also referred to as Pre-monsoon season. During this time the highest maximum temperature may rise to 46.0 $^0$C. From the post monsoon of October, the mean temperature falls gradually marking the onset of the winter season. The average humidity, during the monsoon season is about 48% – 89%. The humidity in Pre-monsoon (March- May) is about 19-46%. Generally the weather during the other seasons is more or less dry and in the comfortable zone.

- **Rainfall**

Annual rainfall of an average is 1236.8 mm. The monsoon starts in end of June and continues till September. The maximum amount of rainfall and maximum rainy days generally occur in July, August and September months (**Table 2**). The rainfall is the highest in the southern parts and decreases gradually towards the northern part of the Barakar catchment.

## TABLE- 1
## CLIMATOLOGICAL DATA FROM IMD, CHAMPA

| Month | Pressure (hPa) | | Temperature (°C) | | Relative Humidity (%) | |
|---|---|---|---|---|---|---|
| | | | Mean | | | |
| | 08.30 | 17.30 | Max | Min | 08.30 | 17.30 |
| January | 988.6 | 985.0 | 30.6 | 9.3 | 70 | 42 |
| February | 986.7 | 982.9 | 34.8 | 10.8 | 61 | 34 |
| March | 984.5 | 980.0 | 40.1 | 14.8 | 46 | 22 |
| April | 980.5 | 975.4 | 44.2 | 20.3 | 41 | 19 |
| May | 976.9 | 972.0 | 46.0 | 23.3 | 41 | 22 |
| June | 973.2 | 969.2 | 44.7 | 22.9 | 64 | 48 |
| July | 973.7 | 970.6 | 35.9 | 22.5 | 87 | 76 |
| August | 974.2 | 971.1 | 34.2 | 22.8 | 89 | 78 |
| September | 978.6 | 975.1 | 34.6 | 22.3 | 87 | 73 |
| October | 983.7 | 980.1 | 34.6 | 17.6 | 80 | 60 |
| November | 987.2 | 983.6 | 32.3 | 13.1 | 73 | 47 |
| December | 989.4 | 985.7 | 30.2 | 10.0 | 72 | 46 |
| **Range** | | | **9.3-46.0** | | | |

## TABLE - 2
## CLOUD & RAINFALL DATA FROM IMD, CHAMPA

| Month | Cloud Cover (oktas) | | | | Rainfall (mm) |
|---|---|---|---|---|---|
| | All Clouds | | Low Clouds | | Monthly Average |
| | 08.30 | 17.30 | 08.30 | 17.30 | |
| January | 1.7 | 2.0 | 0.5 | 0.4 | 11.6 |
| February | 1.8 | 2.4 | 0.7 | 0.8 | 17.5 |
| March | 1.6 | 2.5 | 0.4 | 0.6 | 17.2 |
| April | 1.8 | 2.9 | 0.4 | 0.8 | 9.6 |
| May | 2.2 | 3.7 | 0.2 | 1.4 | 14.0 |
| June | 5.4 | 6.2 | 2.8 | 4.1 | 153.9 |
| July | 7.1 | 7.2 | 5.9 | 6.0 | 363.9 |
| August | 7.0 | 7.2 | 6.0 | 5.8 | 363.2 |
| September | 5.4 | 6.3 | 4.0 | 4.5 | 212.1 |
| October | 2.7 | 3.7 | 1.1 | 1.8 | 57.9 |
| November | 1.9 | 2.2 | 0.5 | 0.7 | 9.0 |
| December | 1.8 | 2.2 | 0.4 | 0.5 | 7.0 |
| **Average** | | | | | **1236.8** |

- **Cloud Cover**

During winter and summer seasons, it was observed that the sky was very clear. In the summer season, light clouds were observed in the evenings, with no clouds in the mornings. During monsoon season, both in the mornings and evenings the sky was observed to be generally cloudy.

- **Wind Speed / Direction**

Winter & Pre-monsoon (Summer) season Wind Rose diagrams (IMD, Champa) are shown in **Figure-1** and **2.**

**TABLE - 3**
**SUMMARY OF WIND PATTERN – IMD CHAMPA**

| Season | First Predominant Winds | | Second Predominant Winds | | Calm Condition | |
|---|---|---|---|---|---|---|
| | 0830 | 1730 | 0830 | 1730 | 0830 | 1730 |
| Pre-Monsoon | N 22% | W 27% | E 12% | NW 20% | 25% | 15% |
| Monsoon | W 34% | W 25% | SW 17% | SW 21% | 18% | 17% |
| Post-Monsoon | N 42% | N 32% | NW 11% | NW 9% | 32% | 37% |
| Winter | N 56% | N 29% | NW 10% | W 14% | 24% | 33% |
| Annual | N 29% | N 20% | W 14% | W 19% | 24% | 24% |

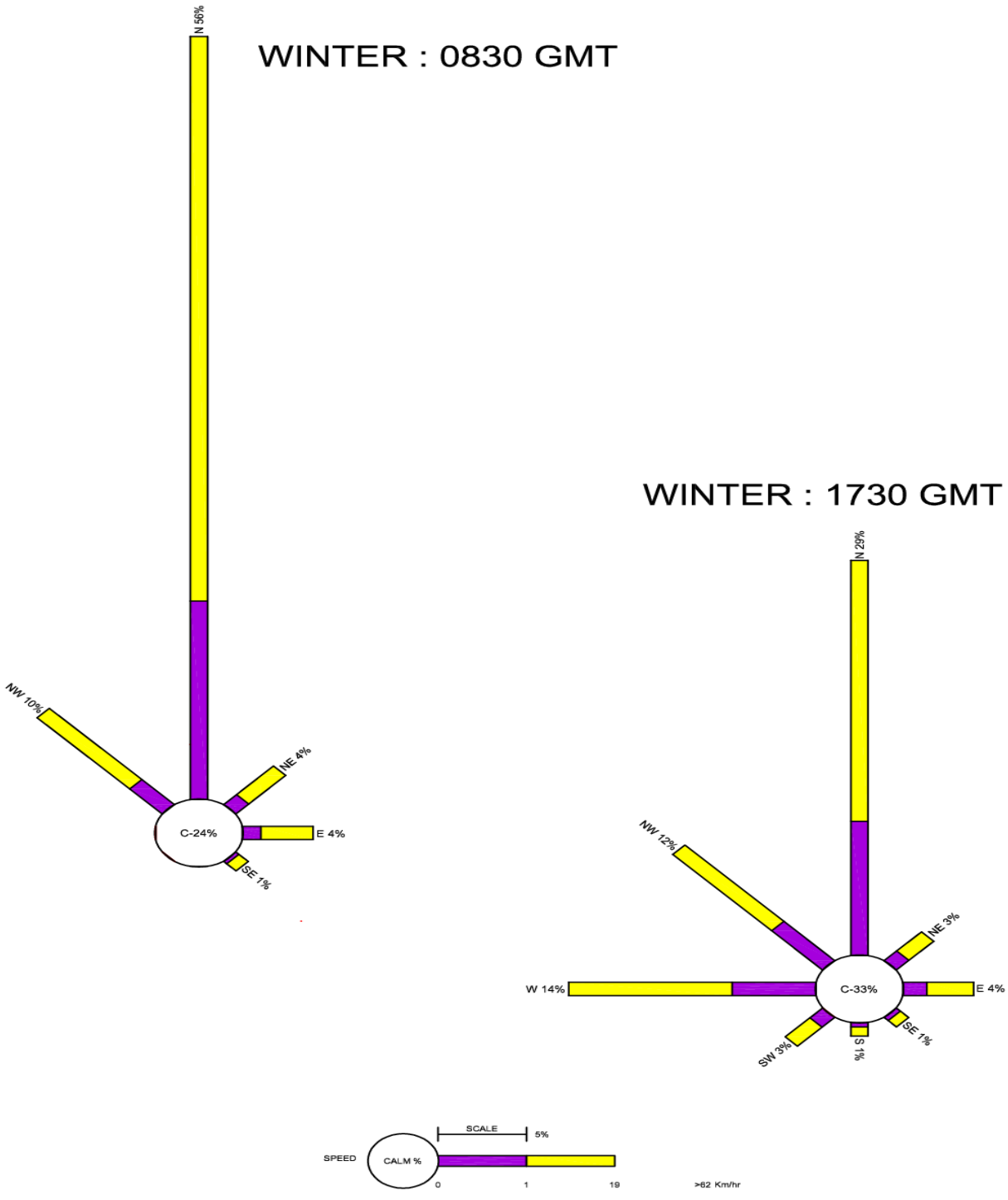


**FIGURE - 1**

**WINDROSE FOR WINTER SEASON IMD CHAMPA (8.30 Hrs and 17.30 Hrs)**

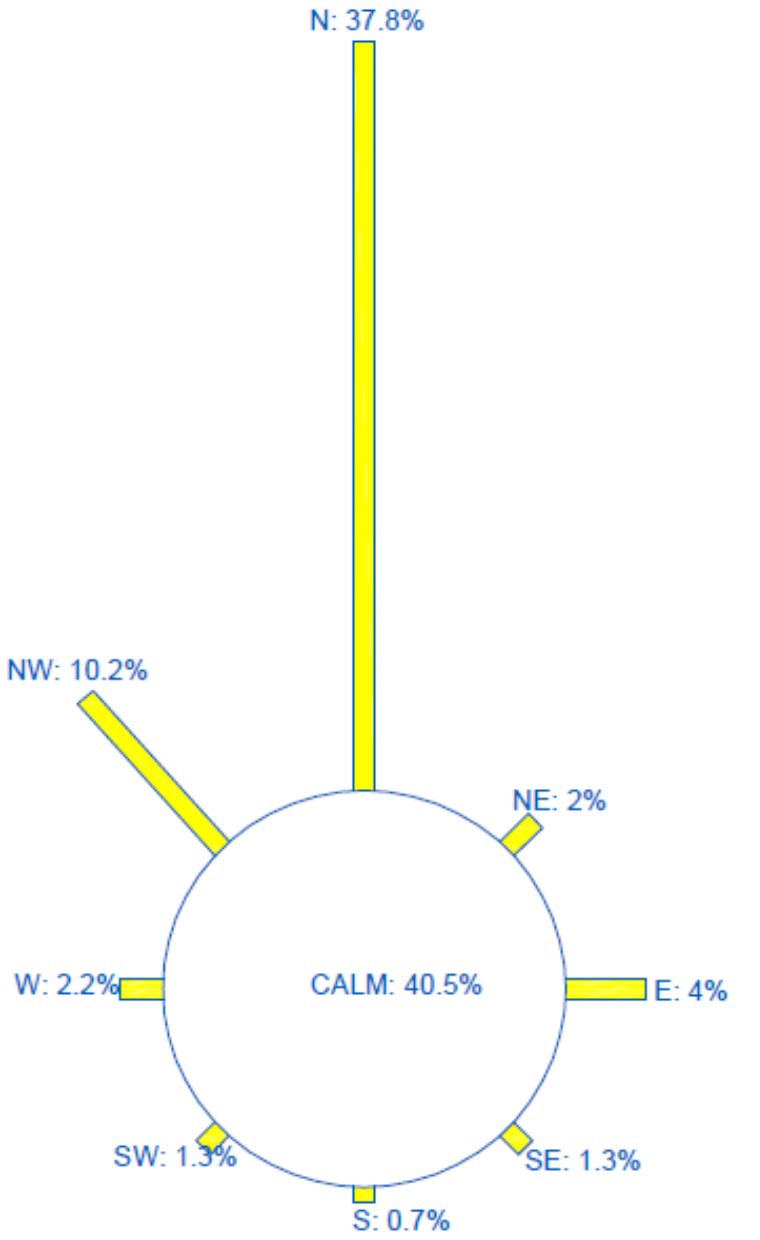


**FIGURE- 2**
**WINDROSE FOR POSTMONSOON IMD CHAMPA (8.30 Hrs and 17.30 Hrs)**

## 1.3 Air Quality Monitoring

Regular monitoring of environmental parameters is of immense importance to assess the status of environment. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to mining operation. Suitable mitigation steps will be taken in time to safeguard the environment, based on monitoring reports. Monitoring is important in the control of pollution since the efficiency of control measures can only be determined by monitoring.

In order to find out the impact of plant activity on sensitive receptors, it is necessary to monitor Environmental Quality to know the level of concentrations of pollutants within and around the plant area. Accordingly hind energy & coal beneficiation (India) Pvt. Ltd.monitoring air, quality on monthly basis.

### 1.3.1 Ambient Air Quality Monitoring

Ambient Air Quality was monitored at four locations within plant premises and four locations in nearby villages. Fugitive emissions were monitored at two locations in the plant premises.

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the Industry. ALPL is carrying out regular monitoring for, SPM, RPM, $SO_2$ and $NO_x$ at above Ambient Air Quality Monitoring (AAQM) locations. Monitoring of fugitive emissions include parameters SPM, PM10, SO2 & NOx.

**Frequency of Sampling**

Ambient air quality monitoring was carried out on 24 hourly on quarterly basis (once in a quarter) for the period of July 2015- Dec 2015.

**Duration of Sampling**

The duration of sampling for PM10, PM2.5, $SO_2$ and $NO_x$ was for twenty-four hourly. Data is compared with the standards mentioned in the Gazette Notification of the Central Pollution Control Board (CPCB) Notification 16$^{th}$ Nov. 2009.

**Methods and Instruments used for Sampling**

The air samples were analyzed as per methods specified by Central Pollution Control Board (CPCB).

The levels of Suspended Particulate Matter, Respirable Particulate Matter, Sulphur Dioxide ($SO_2$), and Oxides of Nitrogen ($NO_X$) were monitored for identifying the impact on surrounding area. $PM_{10}$ and $PM_{2.5}$ were collected with the help of Respirable particulate sampler and Fine particulate sampler operating 24 hours and is computed by gravimetric method. Due to the high flow rate of air, the vacuum is formed into the hopper region of sampler which is tapped by providing a nozzle in the hopper which sucks the ambient air for sampling $SO_2$ and $NO_X$. The gases were measured by wet chemical method and were analyzed by colorimetrical. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

**TABLE-4**
**MEASUREMENT TECHNIQUES FOR VARIOUS POLLUTANTS**

| S. No. | Parameter | Technique | Technical Protocol | Minimum Detection limit (µg/m$^3$) |
|---|---|---|---|---|
| 1. | Suspended Particulate Matter, SPM | Respirable Dust Sampler (Gravimetric Method) | IS-5182 (Part – IV) | 5 |
| 2. | Respirable Particulate Matter, PM10 | Respirable Dust Sampler (Gravimetric Method) | IS-5182 (Part – IV) | 5 |
| 3. | Fine Particulate Matter, PM2.5 | Fine Particulate Sampler (Gravimetric Method) | IS-5182 (Part-IV) | - |
| 4. | Sulphur Dioxide | Improved West and Geake Method | IS-5182 (Part – II) | 4 |
| 5 | Oxide of Nitrogen | Jacob & Hochheiser Modified Method | IS-5182 (Part – VI) | 4 |

### 1.3.2 Ambient Air Quality

The ambient air quality monitoring was carried out at 4 locations in the Plant premises and 4 locations in the nearby villages in upwind, downwind and crosswind directions of the coal washery project. The air quality monitoring was conducted for $PM_{10}$, $PM_{2.5}$, $SO_2$ and $NO_x$ during July 2015 & Dec. 2015.

Fugitive emission monitoring was carried out at two locations within the washery premises during Sept. 2015 & Dec. 2015. The parameters monitored include SPM, $PM_{10}$, $SO_2$ & NOx.

The results of ambient air quality monitoring during Sept. 2015 & Dec. 2015 are given in **Table 5** and the results of fugitive emission monitoring are given in **Table 6** below:

Overall the ambient air concentrations of $PM_{10}$, $PM_{2.5}$, $SO_2$ and $NO_x$ were observed to be well within the limits of concentrations promulgated by CPCB, New Delhi.
National Ambient Air Quality Standard:

- $PM_{10}$ (RPM): 100 µg/m$^3$,
- PM2.5: 60 µg/m$^3$
- $SO_2$ : 80 µg/m$^3$ and
- $NO_x$ : 80 µg/m$^3$

**TABLE -5**
**AMBIENT AIR QUALITY MONITORING RESULT**
**Period – July 2015- Dec 2015**

**(24 Hrs sampling)**

| SL No. | Sampling Location | Sampling Date | $PM_{10}$ µg /$m^3$ | $PM_{2.5}$ µg /$m^3$ | $SO_2$ µg /$m^3$ | $NO_x$ µg /$m^3$ |
|---|---|---|---|---|---|---|
| **Core Zone (Sept. 2015)** | | | | | | |
| 1. | Near Steel Yard | 18.09.2015 | 67.2 | 26.1 | 8.4 | 26.3 |
| 2. | Near Rotary Breaker | 18.09.2015 | 56.4 | 18.3 | 6.8 | 19.7 |
| 3. | Near Dispatch | 19.09.2015 | 62.8 | 24.9 | 8.1 | 24.6 |
| 4. | Near Barrack | 19.09.2015 | 73.1 | 28.4 | 6.4 | 21.3 |
| **Buffer Zone (Sept. 2015)** | | | | | | |
| 1. | Bhandrapara Village | 20. 09.2015 | 54.1 | 15.3 | 5.2 | 16.9 |
| 2. | Kalichhapar Village | 20. 09.2015 | 54.3 | 15.8 | 5.5 | 17.8 |
| 3. | Dhaniya Village | 21. 09.2015 | 61.5 | 21.3 | 6.1 | 20.0 |
| 4. | Hindadih Village | 21. 09.2015 | 48.1 | 15.2 | 4.9 | 15.3 |
| **Core Zone (Dec. 2015)** | | | | | | |
| 1. | Near Steel Yard | 28.12.2015 | 63.9 | 23.8 | 7.6 | 24.7 |
| 2. | Near Rotary Breaker | 28.12.2015 | 58.2 | 17.3 | 6.8 | 18.6 |
| 3. | Near Dispatch | 29.12.2015 | 61.7 | 22.6 | 7.9 | 23.1 |
| 4. | Near Barrack | 29.12.2015 | 67.3 | 26.4 | 7.6 | 23.9 |
| **Buffer Zone (Dec. 2015)** | | | | | | |
| 1. | Bhandrapara Village | 30.12.2015 | 47.9 | 13.5 | 6.3 | 16.0 |
| 2. | Kalichhapar Village | 30.12.2015 | 52.8 | 16.9 | 7.1 | 17.6 |
| 3. | Dhaniya Village | 31.12.2015 | 56.9 | 21.3 | 6.6 | 19.2 |
| 4. | Hindadih Village | 31.12.2015 | 44.8 | 15.5 | 6.4 | 18.0 |
| NAAQ Standards | | | 100 | 60 | 80 | 80 |

**TABLE 6**
**FUGITIVE DUST EMISSION MONITORING RESULT**
**Period – July 2015- Dec 2015**

**(24 Hrs sampling)**

| SL NO. | Sampling Location | Sampling Date | SPM µg /$m^3$ | RSPM µg /$m^3$ | $SO_2$ µg /$m^3$ | $NO_x$ µg /$m^3$ |
|---|---|---|---|---|---|---|
| | **(Sept. 2015)** | | | | | |
| 1 | Near Weight Bridge | 18.09.2015 | 326 | 105 | 9.2 | 26.1 |
| 2 | Near Environment Lab | 19.09.2015 | 238 | 76 | 7.3 | 19.4 |
| | **(Dec. 2015)** | | | | | |
| 1 | Near Weight Bridge | 28.12.2015 | 307 | 106 | 11.6 | 32.8 |
| 2 | Near Environment Lab | 29.12.2015 | 219 | 76 | 8.1 | 17.3 |
| CPCB Standards | | | - | 100 | 80 | 80 |