JPL/Environment/2016 Dated: 09.08.2016

The Director (Thermal),
Ministry of Environment, Forests and Climate Change
Indira Paryavaran Bhawan,
Jor Bagh,
New Delhi-110003

Sub: Expansion Project of 4x600 MW of M/s Jindal Power Ltd. at Tamnar in Gharghoda Taluk, in Raigarh Distt., Chhattisgarh – Request for amendment in EC for change in location of ash dyke, change in source of coal for unit 3 & 4 etc.

Kind Attention: Dr. S. Kerketta

Dear Sir,

This has reference to the Environmental Clearance (EC) granted vide letter no. J-13012/117/2008-IA.II (T) dated 18.03.2011, granting EC for Units 1 & 2 of 4x600 MW Power Plant of Jindal Power Ltd. (JPL) at Tamnar and its amendment dated 04.11.2011 granting EC for Unit 3 and Unit 4, based upon imported coal, till domestic coal linkage is available.

Subsequently, vide letter dated 23.09.2015 and 07.07.2016, JPL requested MOEF & CC to consider its request for change in source of coal for Unit 3 and Unit 4 from imported to domestic and change in location of ash dyke. The aforesaid proposals of JPL were considered in the Expert Appraisal Committee (EAC) meetings held in January, 2016 and July, 2016. The decision of EAC and our para wise response to the clarification/information sought is as follows:

Change in location of ash dyke:

The proposal for change in location of ash dyke was considered in the meeting of EAC (Thermal) held in January, 2016, wherein EAC desired the following:

(i) Hydro-geological study of the proposed ash pond area for a minimum one month.

(ii) ....to make the public aware about the proposed new location of ash pond, public notices in the leading local newspapers, Gram Panchayats, Website of PP etc. should be published along with the intimation that the public can send its comments if any to the PP and also MoEF & CC within one month after publication of the public notice.

In line with the above, a Hydro-geological study has been completed through M/s Volcons Solutions, Odisha and the report on the same is attached herewith as **Annexure I**. The key findings and recommendations of the study are as follows:

- The proposed ash dyke and buzzer zone (5 km radius) is mainly on Barakar formation. The Barakars are represented by thick sequence of sandstone, shale, and clay stone and sand shale intercalation.

Jindal Power Limited
CIN No. - U04010CT1995PLC008985
Corporate Office Jindal Centre, 12 Bhikaiji Cama Place, New Delhi 110 066
T +91 11 4146 2000 F +91 11 2616 1271 W www.jindalpower.com
Registered Office Tamnar - 496 107, District Raigarh, Chhattisgarh

- The deepest water level (8 and above 8 mBGL) occurs in Central region of the buffer zone and the shallowest water level (below 3 mBGL) occurs in south western portion of the buffer zone.
- The regional flow of the Ground water is found to be towards South i.e. in the direction of the flow of the Pajhar Nadi that is running from North to South in line of the study area.
- The concentrations of heavy metals under study in the leachates were well below the permissible limit for discharge of effluents as per the Indian Standards
- The leachability tests were conducted at pH<5 and such situation is unlikely to occur. Although, as a precautionary measure, a suitable HDPE/LDPE liner over the bottom of the pond and on the upstream face of the ash dyke shall be provided during execution stage.

As recommended, we are committed to provide suitable HDPE/LDPE lining of the proposed ash area.

As directed by EAC, Public notices were issued in the local newspapers on 03.04.2016 (**Annexure-II**) and also uploaded on the Company's website on 12.04.2016 (**Annexure-III**) about the proposed new location of the ash dyke, inviting comments from the public, if any. No comments/suggestions were received from the public. Further, NOC was received by the State Govt. from the Gram Sabha on 22.08.2015 for initiating land acquisition proceedings, a copy of which is attached herewith as **Annexure-IV**.

Reply to para 2.6.4 of Minutes of Meeting (MOM) of EAC dated 15.07.2016:

As directed by EAC, point wise response to the issues raised in the representation dated 13.07.2016 received by MOEF is attached herewith as **Annexure-V**. As can be seen from our response, the proposed area is outside the Gare Palma Sector-I allocated to Gujarat State Electricity Corporation Limited. Further, the State Govt. has initiated land acquisition process only after ascertaining the same. All requisite steps as applicable under the *'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013'* are being followed by the State Govt. to complete the land acquisition process, including NOC from Gram Sabha. Therefore, the allegations in the representation are misleading and incorrect.

Reply to Para 2.6.5 of MOM of EAC dated 15.07.2016:

Status of land acquisition up to completion of Section -15 was included in our presentation to EAC in January, 2016, whereas NOC from Gram Sabha is a pre-requisite before completion of Section -11. Therefore, copy of the NOC dated 22.08.2015 from Gram Sabha was not placed before EAC in January, 2016. However, in the Minutes of the Meeting of EAC of January, 2016, it was recorded to make public aware about the proposed new location of ash pond through notices to the public, including Gram Panchayat. Therefore, to address the notice to Gram Panchayat, the NOC of Gram Sabha was submitted to MOEF on 07.07.2016.

As regards the land for the proposed ash pond, it is clarified that the required area is about 236 Ha, which was inadvertently mentioned as 239 Ha in our letter dated 23.09.2015. Out of 236 Ha of land required for the ash pond, 224.379 Ha is private land and remaining 11.653 is Government land. State Govt. has in-principle agreed for acquisition of entire 224 .379 Ha. of private land and in-principle approval for 11.653 Ha of Govt. land is at an advanced stage. Further, acquisition of 190.562 Ha. of land is at an advanced stage.

In view of the above, it is requested to approve the change in location of the proposed ash dyke.

Change in source of coal for unit 3 & 4:

Reply to para 2.6.8 of MOM dated 15.07.2016:

Road carrying capacity study and impact of coal transportation on ambient air quality has been undertaken through M/s Minmec Consultancy, New Delhi. The report is attached herewith as **Annexure VI**. The key findings and recommendations of the study are:

- All roads have adequate Maximum Capacity to cater to the additional traffic for coal transportation as well as natural growth of the existing traffic for the next 3 years.
- Continue to maintain plantation already done and replace damaged saplings for dust and noise control on either side of road in consultation with villagers where ever possible.
- The vehicles used for transportation should be covered with tarpaulin and should be spill-proof.
- The practice of road cleaning by JPL along various stretches of various roads shall be continued to minimize road dust generation.
- To ensure that road safety measures are rightly implemented, Road Safety Committee shall be constituted by JPL.

The recommendations of study as detailed in the report will be implemented.

Further, due measures will be taken as being recommended by EAC/MOEF & CC for usage of road before commencing Coal transportation by road.

Reply to para 2.6.9: of MOM dated 15.07.2016:

The status of implementation of Cross Country Pipe Conveyer (CCPC) is attached herewith as **Annexure-VII**. The perusal of status of CCPC reveals that due to change in route of CCPC and delay in obtaining further statutory clearances, its implementation got delayed. However, we are committed to implement the same latest by March, 2020.

In view of the above, it is requested to approve the change in source of coal from Imported to domestic.

Status of temporary permissions granted & Request for amendment:

MOEF vide letters dated 10.01.2014 and 27.03.2015 granted certain time bound permissions for 4x 600 MW expansion project. Current status on the same is as under:

Temporary Permissions Granted	Validity	Vide amendment dated	Status	Request
Use existing water reservoir and water allocation for 1000 MW	09.01.2017	10.01.2014	The Govt. of Chhattisgarh vide letter dated 21.01.2016 has allocated 17 MCM of water from Rabo dam for 1 unit (600 MW) of expansion project and have accordingly reduced 17 MCM from 70 MCM allocation from the Mahanadi River(**Annexure-VIII**). The pipeline to draw water from the Kalma Barrage on the river Mahanadi has been completed and water from the same will be available by end August, 2016. On commissioning of pipeline, water for 3 units of 600 MW will be utilized from the river Mahanadi. Further, existing water reservoir will meet the storage requirement for existing 1000 MW as well as expansion project of 2400. In view of the above, it is proposed to continue to use existing water reservoir of 1000 MW.	Permit to use existing water reservoir constructed for 1000 MW for expansion project in lieu of construction of new reservoir.
Use existing ash dyke of 1000 MW for 2400 MW expansion project.	09.01.2017	10.01.2014	Proposal to approve new ash dyke location is under consideration of MOEF. Obtaining prior approvals and further completion of land acquisition process and construction of ash dyke is expected to take about further 2 years.	Permit to continue use of existing ash dyke of 1000 MW to dispose un-utilized ash from expansion project till 09.01.2019.

Transport domestic coal from SECL/MCL mines for unit 1 and 2 and imported coal for unit 3 and 4 from Raigarh to site.	26.03.2017	27.03.2015	As implementation of CCPC may take about 3 years we need to continue transport of domestic coal for unit 1 and 2 by road for further period of 3 years. Further, as proposed we also need to transport special e-auction coal by road for unit 3 and 4, request for the same is under consideration of EAC/MOEF.	Permit to continue to transport domestic coal for unit 1 and 2 by road up to 26.03.2020 and transport special e-auction coal by road for unit 3 and 4 till 26.03.2020.
Install crusher at Kulda and transport coal through CCPC to plant site for entire project	26.03.2017	27.03.2015	Due to change in route of CCPC and delay in obtaining further statutory clearances, its implementation got delayed and will be completed by March, 2020.	Install CCPC by 26.03.2020.
Use coal crusher within expansion area of plant site	26.03.2017	27.03.2015	Due to delay in implementation of CCPC we need to transport raw coal to plant site by road and crush the same inside the plant. Therefore, coal crusher need to be used till CCPC is operational.	Permit to continue to use Coal Crusher installed at expansion site to crush raw coal transported by road to plant up to 26.03.2020.

In conclusion, following is requested so that all the 4 units of the expansion project can be operated on a continuous basis:

1. Change in source of coal for Unit 3 & 4 from Imported to Domestic.
2. Change in location of ash dyke from near Rodapali to near Dolesara village.
3. Permit to use existing water reservoir constructed for 1000 MW for expansion project in lieu of construction of new reservoir.
4. Grant extension/permissions for the following:

   - ✓ Use existing ash dyke of 1000 MW up to 09.01.2019 to dispose un-utilized ash.
   - ✓ Transport coal by road up to 26.03.2020.
   - ✓ Continue to use Coal Crusher installed at expansion site up to 26.03.2020 to crush raw coal transported by road to plant.

Thanking You,
Yours Faithfully,

For Jindal Power Limited

Dr. J.K. Soni
Group Executive Vice-President (Environment)

Encl: As above

Annexure I

Hydrogeological Study Report For Ash Dyke

client

Jindal Power Limited.

At: Tamnar,
District: Raigarh,
State: Chhattisgarh

prepared by

VOLCONS SOLUTIONS

OFFICE:PLT.NO.D/36,GROUND FLOOR,ROURKELA
DIST:SUNDARGRAH,ODISHA-769014
TELEFAX.NO.0661-2472641.MOB.NO.09437212363
MAIL ID:volcons.odisha@gmail.com

Hydrogeological Study Report
For Ash Dyke of
Jindal Power Limited.
Near Dolesara Village, Block: Tamnar,
District: Raigarh,
State: Chhattisgarh

Prepared by:

VOLCONS SOLUTIONS
OFFICE:PLT.NO.D/36,GROUND FLOOR,ROURKELA
DIST:SUNDARGRAH,ODISHA-769014
TELEFAX.NO.0661-2472641.MOB.NO.09437212363
MAIL ID:volcons.odisha@gmail.com

TABLE OF CONTENTS

CHAPTER 1:

INTRODUCTION

1.1 Background

Coal occupies an important position in the Indian energy sector. About 112 million tons of fly ash is generated annually in India by thermal power plants as a byproduct of coal combustion. Fly ash quality depends on coal type, coal particle fineness, percentage of ash in coal, combustion technique, air/fuel ratio, and boiler type. In India, studies have been carried out toward management of fly ash disposal and utilization. Fly ash is utilized in cement and construction. However, the rate of production is greater than consumption. The unused fly ash is disposed into holding ponds, lagoons, landfills and slag heaps. Disposal of large amounts of fly ash in landfills, and surface impoundments or its reuse in construction materials is of environmental concern. Fly ash contains trace amounts of toxic metals that may have negative effects on human health and on plants. The main aim of this study was to investigate the leaching behavior of fly ash to be disposed in the ash pond at Jindal Power Limited's Thermal Power Plant and to investigate the potential influence from the ash disposal on ground water quality.

This report presents the result of a Hydro geological assessment carried out for the construction of the ash pond for 2400 MW (4 X 600MW) Thermal Power Plant of M/s Jindal Power Ltd. The site is located east of Ambikapur Highway Marg near Dolesara village of Tamnar block in Raigarh district of Chhattisgarh state (herein after referred to as "site") (Figure -1).

The purpose of this report is to delineate subsurface geological features in and around the Ash pond locations, to assess the groundwater flow field conditions, the potential impacts on groundwater quality and possibility of soil contamination from the Ash Pond along with the surface and ground water monitoring program, and the leaching behavior due to ash pond operations in the core and the buffer zone of the site. In these studies, the leaching of heavy metals like Ba, Ca, Fe, Zn, Al, Mn, Mg, Sb, Be, Si, Cd, Cr, As, Hg, Se, CN, Ni, Co, Cu, Pb, Mo, and Sn from Fly ash was investigated in order to predict potential environmental pollution.

Hydro geological report involves collections of data on sub-surface geological features, potential for ground water contamination, lab test on leaching behavior of ash with respect to heavy metals etc. over an area of 5 KM radius surrounding the project site.

1.2 Project Area and Description

The proposed site covers an area of 236.032 hectare and is located in the Survey of India toposheet number 64 N/08 at latitude 22°08'48.12”N and longitude 83°25'39.45"E. The site area is situated near village Dolesara within the Tamnar block of Raigarh district in the state of Chhattisgarh.

Tamnar is a small town, situated in the Raigarh District of Chhattisgarh. It is located at a distance of 23.9 KM from the city of Raigarh. It lies at an elevation of 225 m above sea level and is also a passing point of the Kelo River.

The location map of the plant site has been provided in Figure - 1.

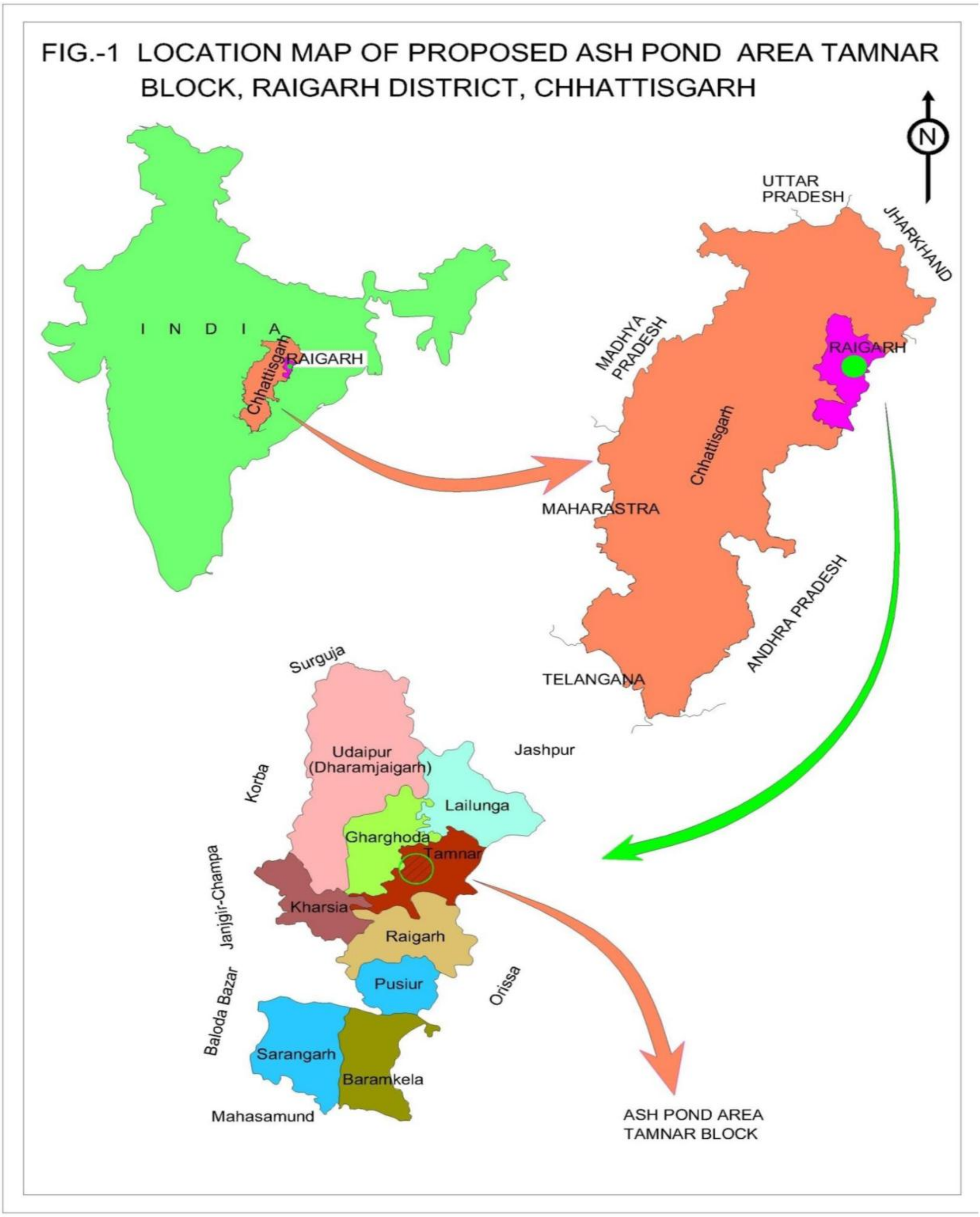


FIG.-1 LOCATION MAP OF PROPOSED ASH POND AREA TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
N
I N D I A
Chhattisgarh
RAIGARH
UTTAR PRADESH
JHARKHAND
MADHYA PRADESH
RAIGARH
Chhattisgarh
MAHARASTRA
ANDHRA PRADESH
TELANGANA
Surguja
Udaipur (Dharamjaigarh)
Jashpur
Korba
Lailunga
Gharghoda
Tamnar
Janjgir-Champa
Kharsia
Raigarh
Pusiur
Orissa
Baloda Bazar
Sarangarh
Baramkela
Mahasamund
ASH POND AREA TAMNAR BLOCK

About Power Plant

Jindal Power Ltd (JPL), has set up a 1000MW coal based Independent Power Plant (IPP) in India. It has expanded its existing 1000 MW Power Plant by constructing an additional 2400 MW (4x600 MW) of thermal generation near village Tamnar in Raigarh District in the State of Chhattisgarh.

1.3 Objectives and Scope of the work

The study was undertaken to generate hydro geological data through field investigations to prepare ground water assessment report for ash dyke near Dolesara village, Tamnar — M/s Jindal Power Limited (JPL). The principal objective of the study is to understand the hydrogeological features including ground water level and leaching behavior.

The scope of the work includes:

1. Delineating subsurface geological features in and around the Ash Pond area.
2. Potential for groundwater and soil contamination in and around the Ash pond.
3. Ground water table, groundwater and surface water quality and monitoring program.
4. Leaching behavior due to Ash pond operation.

5. Determine whether the discharge is to a usable aquifer, or unusable aquifer or ground water not in an aquifer.

6. Soil investigation through bore holes to know soil strata, permeability, soil bearing capacity etc.

1.4 Methods of Investigation

VOLCONS SOULTIONS has collected the hydro geological data of key wells through field survey, studying the present groundwater conditions. The water level data from 12 key wells was collected for May 2016. The fluctuation of water levels was interpreted in relation to the proposed industrial activity and its impact on quality of water in nearby area.

The ash generated at the plant will be disposed at the ash pond in the form of ash slurry. In this process, there is potential for groundwater quality and soil contamination in the area in and around the ash pond. The magnitude of impact shall depend upon the present hydro geological conditions of the area and leaching behavior of ash with respect to heavy metals.

To achieve these aims, studies were undertaken in the following order:

1. The geology of the area and the subsurface conditions have been studied and interpreted based on the ground water exploratory data and geological studies made by GSI, Dept. of Geology and Mines, Govt. of Jharkhand and different research papers.

2. Intensive well inventory of the area has been undertaken to evaluate the status of the ground water level of the buffer and core zones within 5 KM radius from the proposed plant site.

3. The seasonal fluctuations of water level in response to groundwater recharge due to rainfall have been estimated based on local information, field observations and secondary data from different sources.

4. The ground water flow regimes have been worked out using observed water levels and the spot heights of the measuring stations.

5. Water samples from varying ground water sources were collected for chemical analysis in order to establish the water quality.

6. Fly ash sample has been collected to undertake Leachate test for heavy metals. Interpretations and recommendations were made on the basis of the Ash report from Leachate test.

CHAPTER 2:

EXISTING ENVIRONMENT

2.1 Location

The proposed ash dyke covers an area of 236.032 hectare and is located in the Survey of India toposheet number 64 N/8 at latitude 22°08'48.12"N and longitude 83°25'39.45"E. The site area is situated near village Dolesara within the Tamnar block of Raigarh district in the state of Chhattisgarh.

2.2 Physiography and Drainage

The area is generally characterized by rolling topography. The highest elevation is at 302 meters AMSL in the North-East and the lowest elevation point is at 240 meters AMSL in the South Western region of the buffer zone. The general slope of the buffer zone is towards South-West. The average ground level elevation is around 225 meters AMSL. The area is occupied mostly, by softer horizons of Barakar Formation showing, in general, an undulating topography. Barakar sandstones on the North and North¬East also occur as ridges.

The drainage system of the district may be divided into two parts - Northern and Southern part. In Northern part, the streams and rivers originating in the hills of Chhotanagpur plateau have Southward slope and the Mand, Kelo, Kuruket and Ib are the important rivers that flows in this region. These rivers are perennial in nature. The Kelo and Kuruket rivers form the main drainage system of the Raigarh Coalfield. However, the drainage system originating in the Southern part of the district flows in North and in North-East direction before joining the Mahanadi River. These rivers are non-perennial in nature except the Lath nala.

In the area under study, the Southerly flowing Kuruket River is the main drainage with its numerous tributaries flowing either from West or from North-East. The buffer zone is drained by Pajhar Nala, one of the main tributary of Kelo River, flowing in North-South direction. The drainage system has moderate and steep valleys between hill ranges. The drainage pattern is dendritic to sub parallel. Kuruket nala joins Mand River which finally joins River Mahanadi at Chanderpur before draining the entire Northern and Central parts of the district. Kelo and Ib rivers also join Mahanadi.

The Topographical map of the Buffer zone (5KM) of the Proposed ash pond area of Jindal Power Ltd. has been provided in the Figure no – 2 and the Drainage map of the Buffer zone of the Proposed ash pond area of Jindal Power Ltd. has been provided in the Figure no - 3.

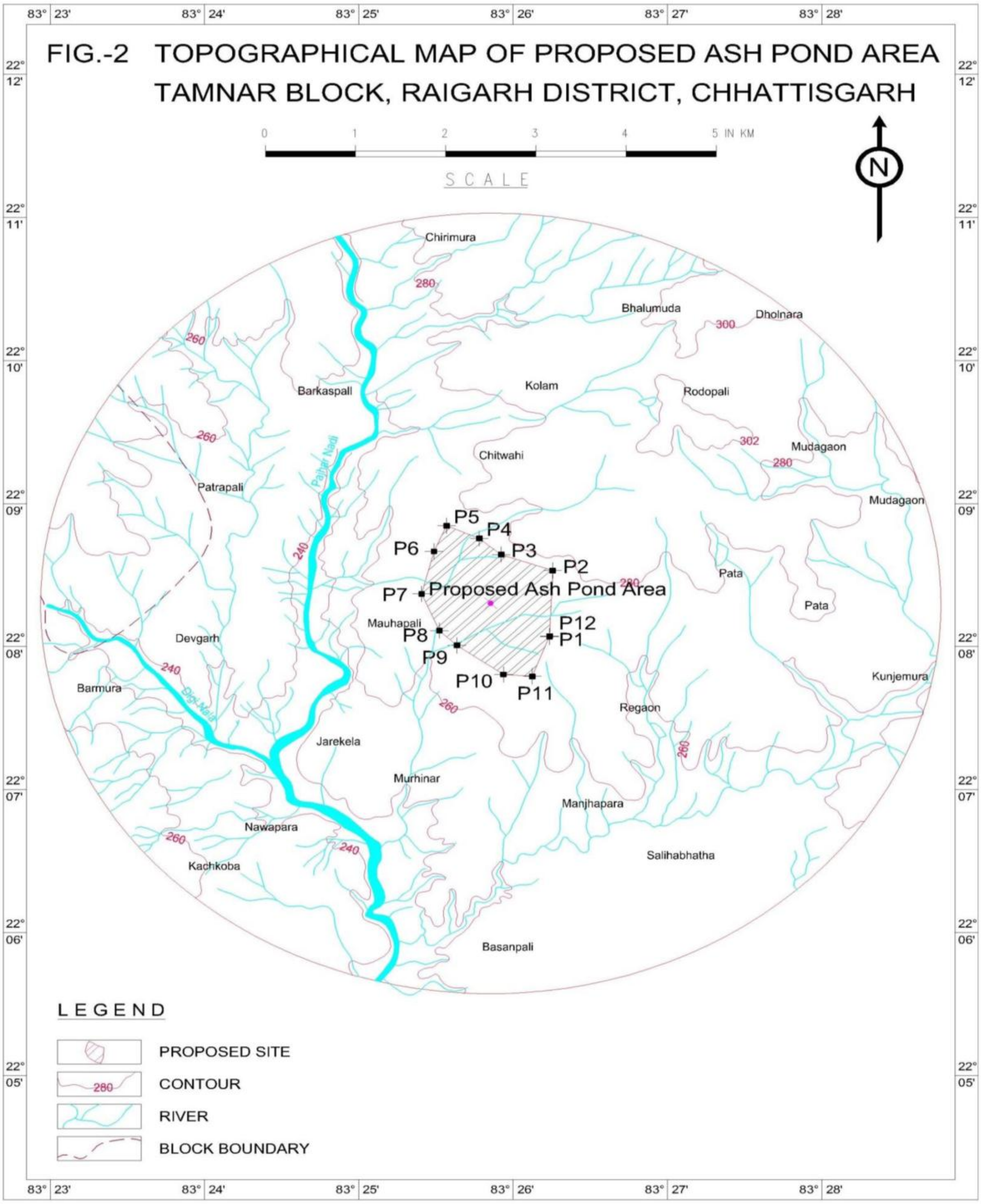


FIG.-2 TOPOGRAPHICAL MAP OF PROPOSED ASH POND AREA
TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
SCALE
5 IN KM
N
Chirimura
Bhalumuda
Dholnara
Kolam
Barkaspali
Rodopali
Chitwahi
Mudagaon
Patrapali
Mudagaon
P5
P4
P6
P3
P2
P7
Proposed Ash Pond Area
Pata
Pata
Mauhapali
P12
P8
P1
P9
Devgarh
P10
P11
Kunjemura
Barmura
Regaon
Jarekela
Murhinar
Manjhapara
Nawapara
Kachkoba
Salihabhatha
Basanpali
LEGEND
PROPOSED SITE
CONTOUR
RIVER
BLOCK BOUNDARY

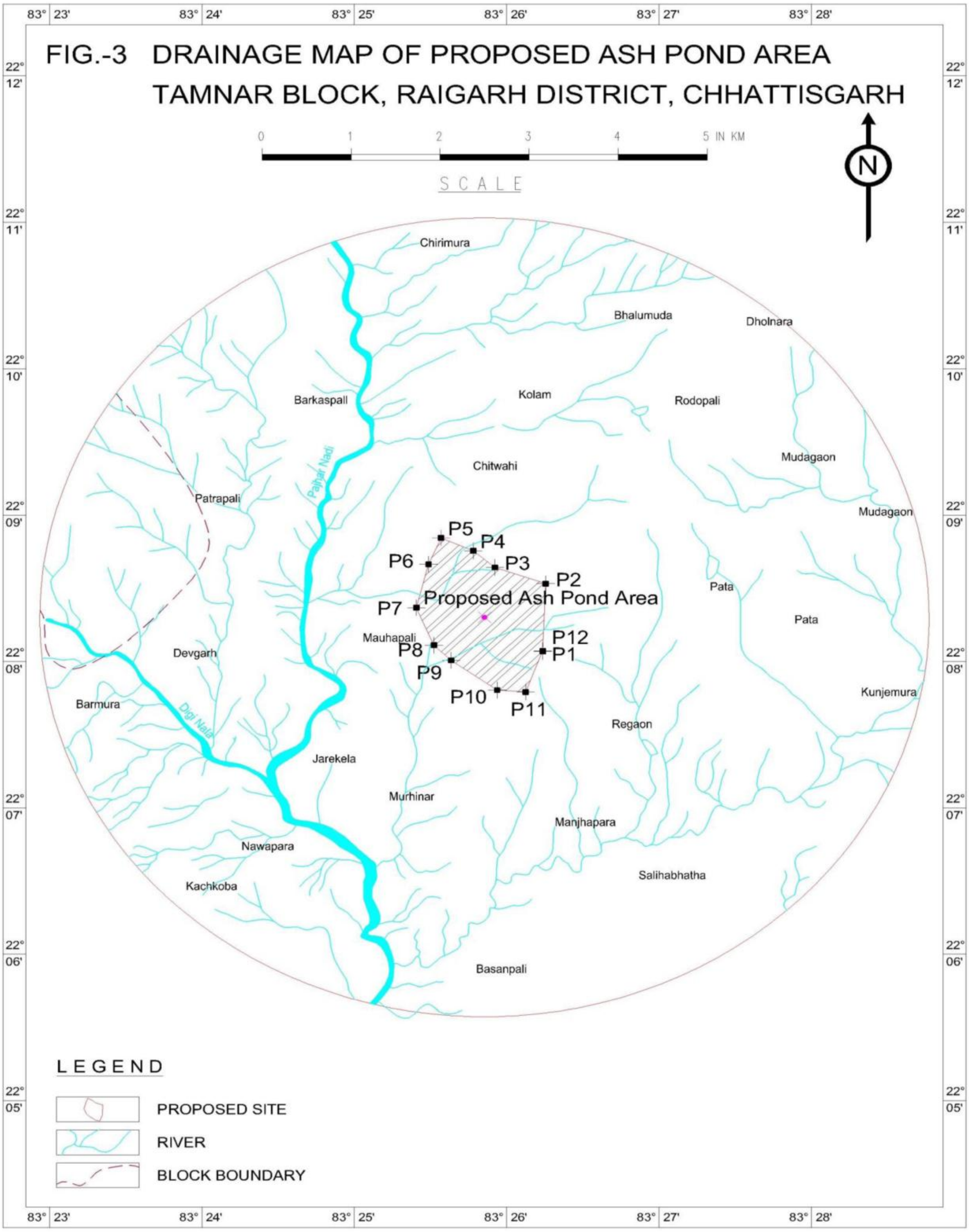


FIG.-3 DRAINAGE MAP OF PROPOSED ASH POND AREA
TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
0 1 2 3 4 5 IN KM
SCALE
N
Chirimura
Bhalumuda
Dholnara
Barkaspali
Kolam
Rodopali
Mudagaon
Chitwahi
Patrapali
Mudagaon
P5
P4
P6
P3
P2
P7
Proposed Ash Pond Area
Pata
Pata
Mauhapali
P12
P8
P1
P9
Devgarh
P10
P11
Kunjemura
Barmura
Regaon
Jarekela
Murhinar
Manjhapara
Nawapara
Kachkoba
Salihabhatha
Basanpali
LEGEND
PROPOSED SITE
RIVER
BLOCK BOUNDARY

2.3 Climate and Rainfall

2.3.1 Climate

The climate is warm and temperate. When compared with winter, the summers have more rainfall. The Koppen-Geiger climate classification is "Cwa" (Humid Subtropical Climate- with dry winters). The average annual temperature in Raigarh is 25.1 °C. About 980 mm of precipitation falls annually. The bulk of rainfall precipitates between June and September. The day temperature can rise to around 48 °C during the summer season and can drop to around 9 °C during the winter season. A Humid Subtropical Climate is a zone of climate characterized by hot, usually humid summers and mild to cool winters.

Three broad seasons can be recognized as:

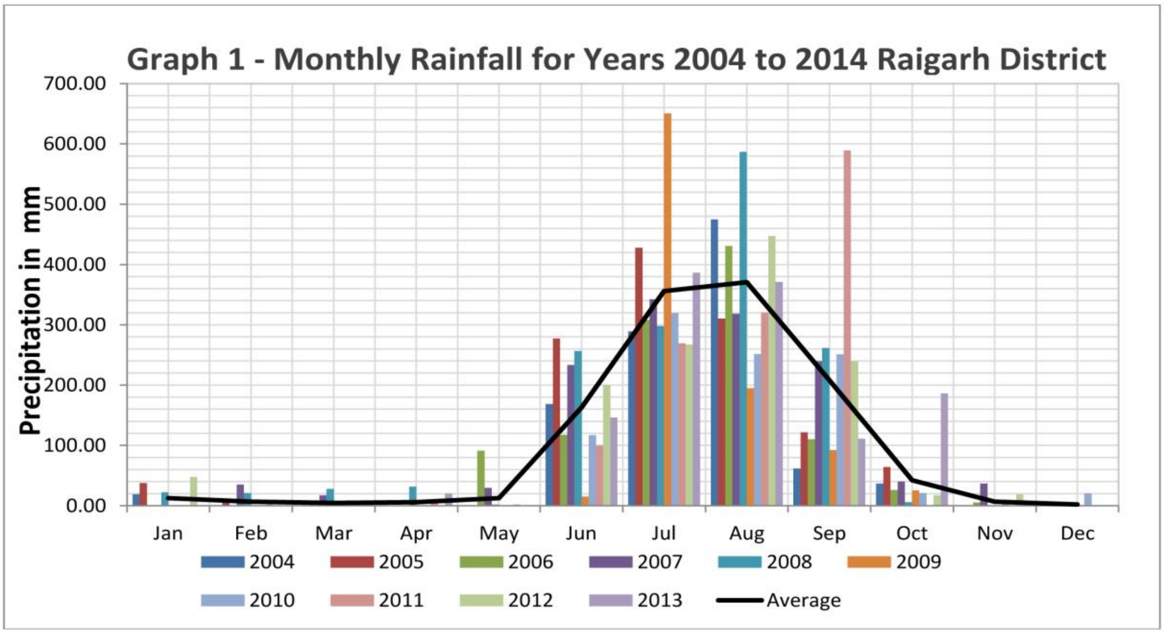
- The winter season from October to February
- The summer/ hot season from March to May
- The monsoon/ rainy season from June to September

The South-West monsoon is the predominant rainy season of the study area. It generally starts around mid-June and continues till September. There is significant spatial as well as temporal variability in the amount as well as the intensity of rainfall in different parts of the study area, due to topographic and altitude variations.

The metrological data for the district level has been collected from the nearest Meteorological observatory located at Raigarh town.

2.3.2 RAINFALL

The variation of monthly rainfall over Raigarh district shows that the intensity of rainfall gradually increases from May to July (see Graph-1). This is mostly due to the enhancement of Southwest monsoon activity over the region. This then reverses and decreases sharply till October. July is the highest rainfall recording month in the district with an average rainfall of around 355.75 mm. The actual spatial distribution of average rainfall during June to September months shows that the district recorded mm of rainfall of 1097.25 mm, which is more than 1000 mm of rainfall (Graph -1).



Source: Indian Meteorological Department

2.4 Geology

The district is mainly covered by rocks of Archaean to Cretaceous age, with some isolated pockets of recent to sub-recent alluvium. Based on the water bearing property, the rocks of the district can be divided into:

(i) Hard rocks: comprising crystalline and metamorphic and consolidated sedimentary rocks of Chhattisgarh Super group; and

(ii) Soft rocks: comprising semi consolidated rocks belonging to Gondwana Super group and younger alluvium.

The Gondwana sediments cover 40% area of the district. The Gondwana rocks of the area are divided into (1) Talchir Formation (2) Karharbari Formation (3) Barakar Formation and (4) Kamthi Formation. The Gondwana rocks are faulted and intrusive and are rarely present in the district.

The bulk of the complex comprising the buffer zone is of the Barakar formation. The Barakars are represented by thick sequence (>500 m) of sandstone, shale, clay stone, and sand shale intercalation. The Barakar sandstone/shale are semi -consolidated, horizontally to low dipping strata. The sandstone is sub-arkosic in composition, fine to coarse grained, poor to moderately sorted. The shales are generally black and carbonaceous.

Barakar Formation:

Talchir formation is, in general, conformably overlain by Barakar Formation. Barakar strata are mainly exposed along the Kuruket River and its tributaries. The total thickness of Barakar Formation, intersected in boreholes is approximately 650 m. The sediments are represented by multistoried sandstone, grey shale, carbonaceous shale and number of coal horizons which display repetitive fining upwards cycles. Burnt outcrops of coal also occur at different places. The sandstones are, in general, poorly sorted, white to greyish white in colour. Fine grained sandstones are frequently micaceous and cross-laminated while coarse-grained variety is mostly massive and is arkosic in nature. Reworked shale clasts and stringers of coal are occasionally dispersed within the sandstone horizon. Thin pebble beds also occur at times within the sandstone units.

On the basis of gross lithological attributes as evident from surface and sub-surface data, Barakar rocks of the area can be tentatively sub-divided into three broad litho-assemblages as (i) Lower (ii) Middle and (iii)Upper Members.

The Lower Member is characterized by relative predominance of coarser arenaceous facies than the other two members while the Middle Member is more argillaceous than the rest. The Upper Member on the other hand is represented by relative predominance of fine arenaceous facies than the Lower Member and less argillaceous than the Middle Member.

Alluvium:

Alluvium occurs in the area are mainly confined along stream, on either sides extending 0.1 to 0.5 KM at places. This comprises mainly sand, clay, silt and kanker. It attains a maximum thickness of 20 meters along the drainage.

The Geological map of the Buffer zone of the Proposed ash pond area of Jindal Power Ltd. has been provided in the Figure no - 4.

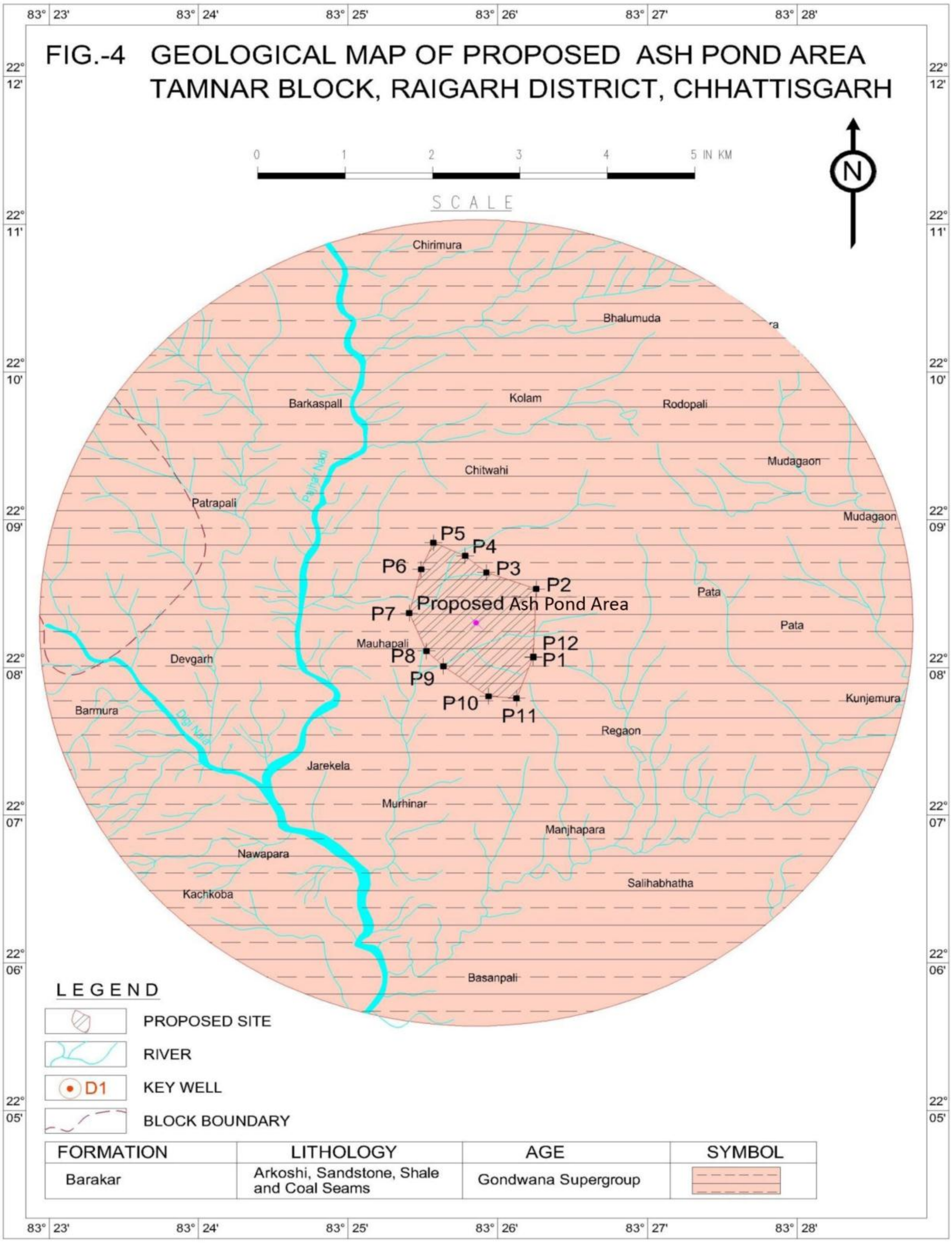


FIG.-4 GEOLOGICAL MAP OF PROPOSED ASH POND AREA
TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
0 1 2 3 4 5 IN KM
SCALE
N
Chirimura
Bhalumuda
Barkaspall
Kolam
Rodopali
Chitwahi
Mudagaon
Patrapali
Mudagaon
P5
P4
P6
P3
P2
Proposed Ash Pond Area
P7
Pata
Pata
Mauhapali
P8
P12
P1
P9
Devgarh
P10
P11
Kunjemura
Barmura
Regaon
Jarekela
Murhinar
Manjhapara
Nawapara
Kachkoba
Salihabhatha
Basanpali
LEGEND
PROPOSED SITE
RIVER
D1
KEY WELL
BLOCK BOUNDARY
FORMATION
LITHOLOGY
AGE
SYMBOL
Barakar
Arkoshi, Sandstone, Shale and Coal Seams
Gondwana Supergroup
83° 23'
83° 24'
83° 25'
83° 26'
83° 27'
83° 28'
22° 12'
22° 11'
22° 10'
22° 09'
22° 08'
22° 07'
22° 06'
22° 05'

2.5 Hydrogeology

2.5.1 General Hydrogeology:

The aquifer controlling ground water flow can be broadly divided into two major media:

(1) Fractured media and

(2) Porous media.

The shallow aquifers are wide spread and present both in hard and soft rocks in the district and in the buffer zone. The shallow aquifers are being tapped through dug wells, dug cum bore wells or shallow bore wells drilled to a depth of 60 m. The shallow aquifer is mainly constituted of weathered mantle and shallow fractures. The thickness of weathered mantle varies from 5 to 20 meters below ground level (BGL). The deeper aquifers have also been identified in both hard and soft rocks. The development of the deeper aquifer in hard rock area is localized in patches of Baramkela, Pusaur and Raigarh blocks occupied by Raigarh Formation. The deeper aquifer is being tapped by using power pumps. The depth of these bore wells varies between 60 to 120 m BGL. Barakars are the most promising formation present in the buffer zone. The deeper zone in Barakar Formation beyond 180 m in depth has more ground water potential. The ground water occurrence in hard rocks particularly in crystalline and metamorphic terrain is restricted to phreatic zone only, which extends down to 60 m. The distribution of ground water in these formation show that the morphological low areas have better ground water potential than the high areas. The area of the buffer zone is suitable for dug wells and shallow bore wells up to 60 m depth.

The ground water occurs in both phreatic and semi-confined to confined conditions. Tamnar is one of the two distinct perennial auto-flow zones that have been demarcated in the Kelo river sub basin. The deeper aquifer zones encountered between 150 to 400 m BGL has maximum of 6 m piezometric head above ground level. Oozing of springs is common in Barakar sandstone/shale area.

The Transmissivity and Storativity of Barakar Formation ranges between 3 to 143 m^2/ day and 1.72 x 10^{-2} to 7.86 x 10^{-4} respectively. Depth to water level in the phreatic aquifer during pre-monsoon period remains mostly between 3 to 14 m BGL and that in post-monsoon period lies between 2 to 6 m BGL. Similarly, the water level in the semi-confined to confined aquifers vary from 10 to 60 m BGL in pre-monsoon and 5 to 15 m BGL in post-monsoon period. The Hydro geological map of the Buffer zone of the proposed ash pond area of Jindal Power Ltd. has been provided in Figure - 5.

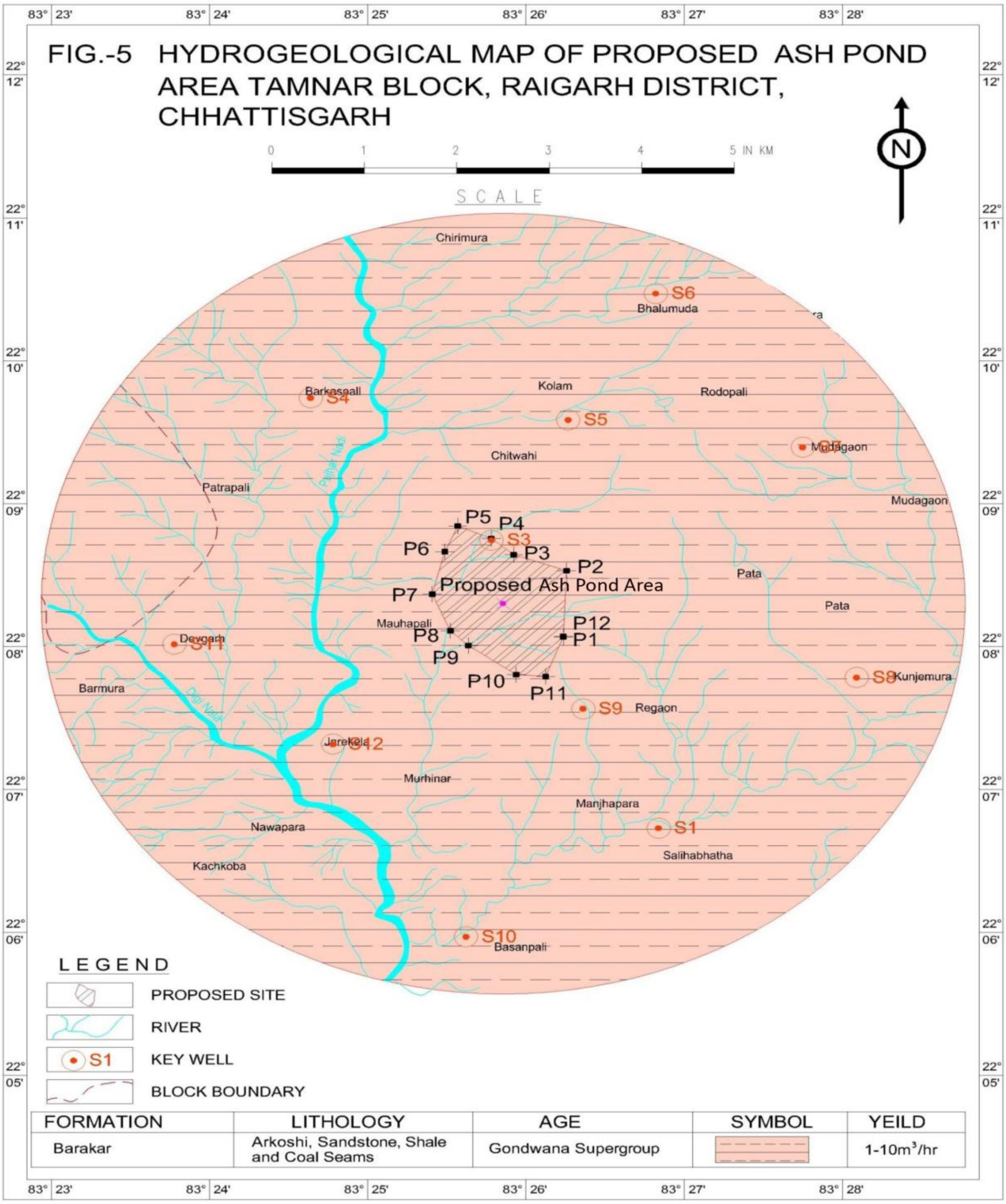


FIG.-5 HYDROGEOLOGICAL MAP OF PROPOSED ASH POND AREA TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
83° 23'
83° 24'
83° 25'
83° 26'
83° 27'
83° 28'
22° 12'
22° 11'
22° 10'
22° 09'
22° 08'
22° 07'
22° 06'
22° 05'
0
1
2
3
4
5 IN KM
SCALE
N
Chirimura
S6
Bhalumuda
Barkaspali
S4
Kolam
Rodopali
S5
Chitwahi
Mudagaon
Patrapali
Mudagaon
P5
P4
S3
P6
P3
P2
Proposed Ash Pond Area
P7
Pata
Pata
Mauhapali
P12
P8
P1
Devgarh
S11
P9
P10
P11
S8
Kunjemura
Barmura
S9
Regaon
Jarekela
S12
Murhinar
Manjhapara
S1
Nawapara
Salihabhatha
Kachkoba
S10
Basanpali
LEGEND
PROPOSED SITE
RIVER
S1
KEY WELL
BLOCK BOUNDARY
FORMATION
LITHOLOGY
AGE
SYMBOL
YEILD
Barakar
Arkoshi, Sandstone, Shale and Coal Seams
Gondwana Supergroup
1-10m³/hr

2.5.2 Depth to Water Table:

DEPTH TO WATER LEVEL MAP:

The depth to water level is observed through 12 observation wells (Table 2B) distributed throughout the buffer zone. The depth to water level map indicates the overall view of depth to water level of the buffer zone (Fig 6). The figure reveals that the deepest water level occurs in central region (8 and above 8 m BGL) and the shallowest water level occurs in south western portion of the buffer zone (below 3 m BGL).

The Depth to Water Level map in Buffer zone of the proposed ash pond area of Jindal Power Ltd. has been provided in Figure - 6.

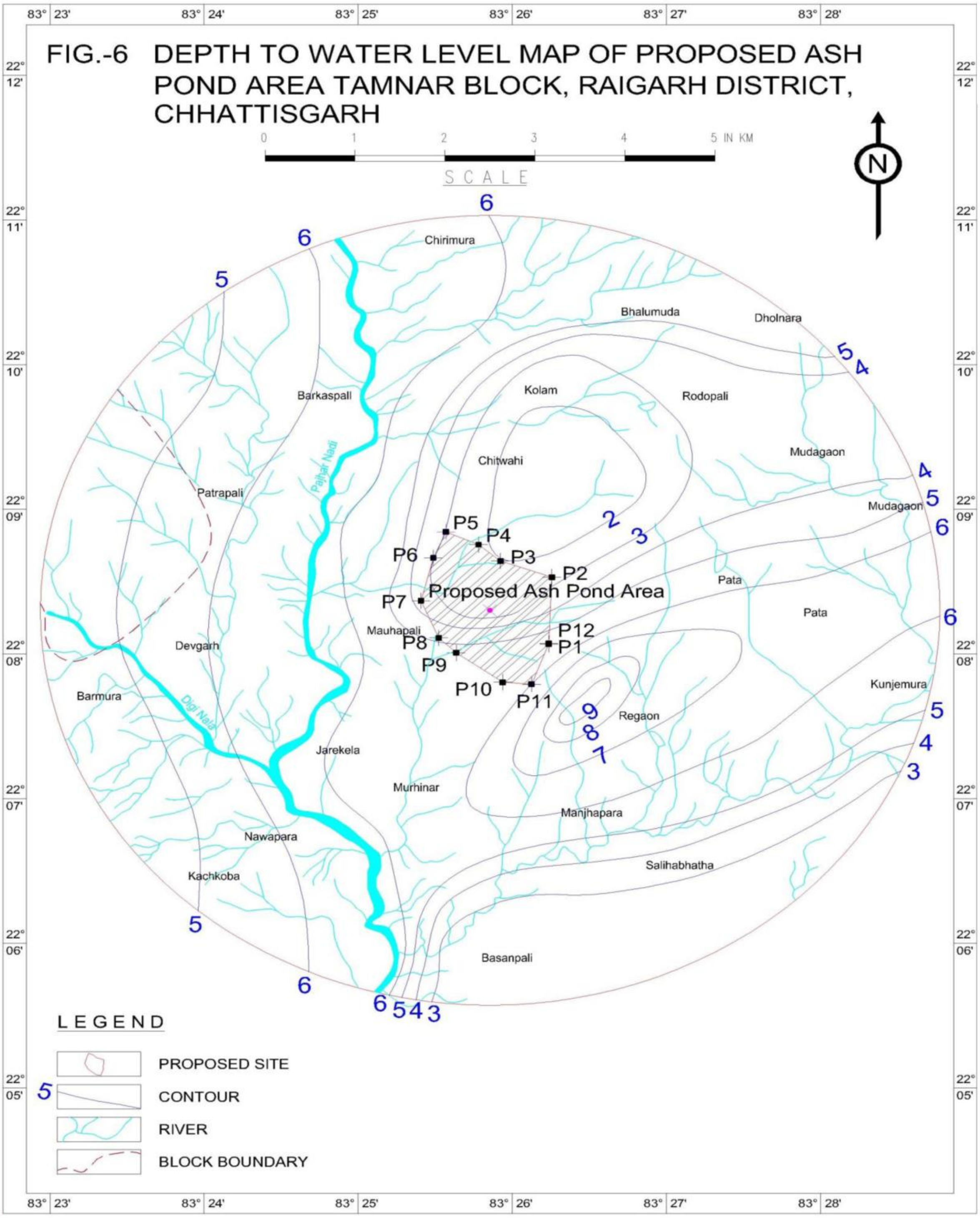


FIG.-6 DEPTH TO WATER LEVEL MAP OF PROPOSED ASH POND AREA TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH
0 1 2 3 4 5 IN KM
SCALE
N
Chirimura
Bhalumuda
Dholnara
Kolam
Rodopali
Barkaspall
Chitwahi
Mudagaon
Patrapali
Pajhar Nadi
Mudagaon
P5
P4
P6
P3
P2
Proposed Ash Pond Area
P7
Pata
Pata
Mauhapali
P12
P8
P1
Devgarh
P9
P10
P11
Kunjemura
Barmura
Regaon
Digi Nala
Jarekela
Murhinar
Manjhapara
Nawapara
Salihabhatha
Kachkoba
Basanpali
LEGEND
PROPOSED SITE
CONTOUR
RIVER
BLOCK BOUNDARY
83° 23'
83° 24'
83° 25'
83° 26'
83° 27'
83° 28'
22° 12'
22° 11'
22° 10'
22° 09'
22° 08'
22° 07'
22° 06'
22° 05'

2.5.3 Groundwater flow regime

Water Table Map: The altitude of water level is determined by the reduced level in all of the 12 observation wells (Table 2A). The water table contour map drawn indicates the flow direction of the ground water within the buffer zone. The water table elevation contour map has been drawn based on observed pre-monsoon levels and spot elevation estimated from topographic contour. As inferred from the water table contour map, the regional flow of ground water has been found to be towards South that is in the direction of the flow of the Pajhar Nadi from North to South in the of the study area.

Table - 2A

Details of wells inventoried in Buffer zone of the proposed ash pond of Jindal Power Ltd.

Sl. No.	Well no.	Location	Latitude North	Longitude East	Water level BGL (in m)	RL (in m)	Altitude (in m)
1	S1	Manjhapar	22°06'43.76"	83°26'50.29"	6.75	261.00	254.25
2	S2	Dolesara	22°08'44.73"	83°25'46.99"	1.70	265.00	270.23
3	S3	Dolesara	22°08'44.73"	83°25'46.99"	1.70	276.00	274.30
4	S4	Barkaspali	22°09'38.25"	83°24'33.23"	6.57	277.00	270.43
5	S5	Chitwahi	22°09'35.87"	83°26'05.81"	2.79	273.00	270.21
6	S6	Bhalumuda	22°10'28.40"	83°26'43.71"	6.72	301.00	294.28
7	S7	Mudagaon	22°08'58.58"	83°28'05.6"	4.60	276.00	271.40
8	S8	Kunjemura	22°07'45.4"	83°28'02.32"	6.25	269.00	262.75
9	S9	Regoan	22°07'32.24"	83°26'19.85"	10.20	266.00	255.80
10	S10	Basanpali	22°05'58.24"	83°25'31.35"	3.07	253.00	249.93
11	S11	Devgarh	22°08'2.81"	83°23'37.61"	5.96	256.00	250.04
12	S12	Jarikela	22°07'12.04"	83°24'37.91"	6.90	288.00	281.10

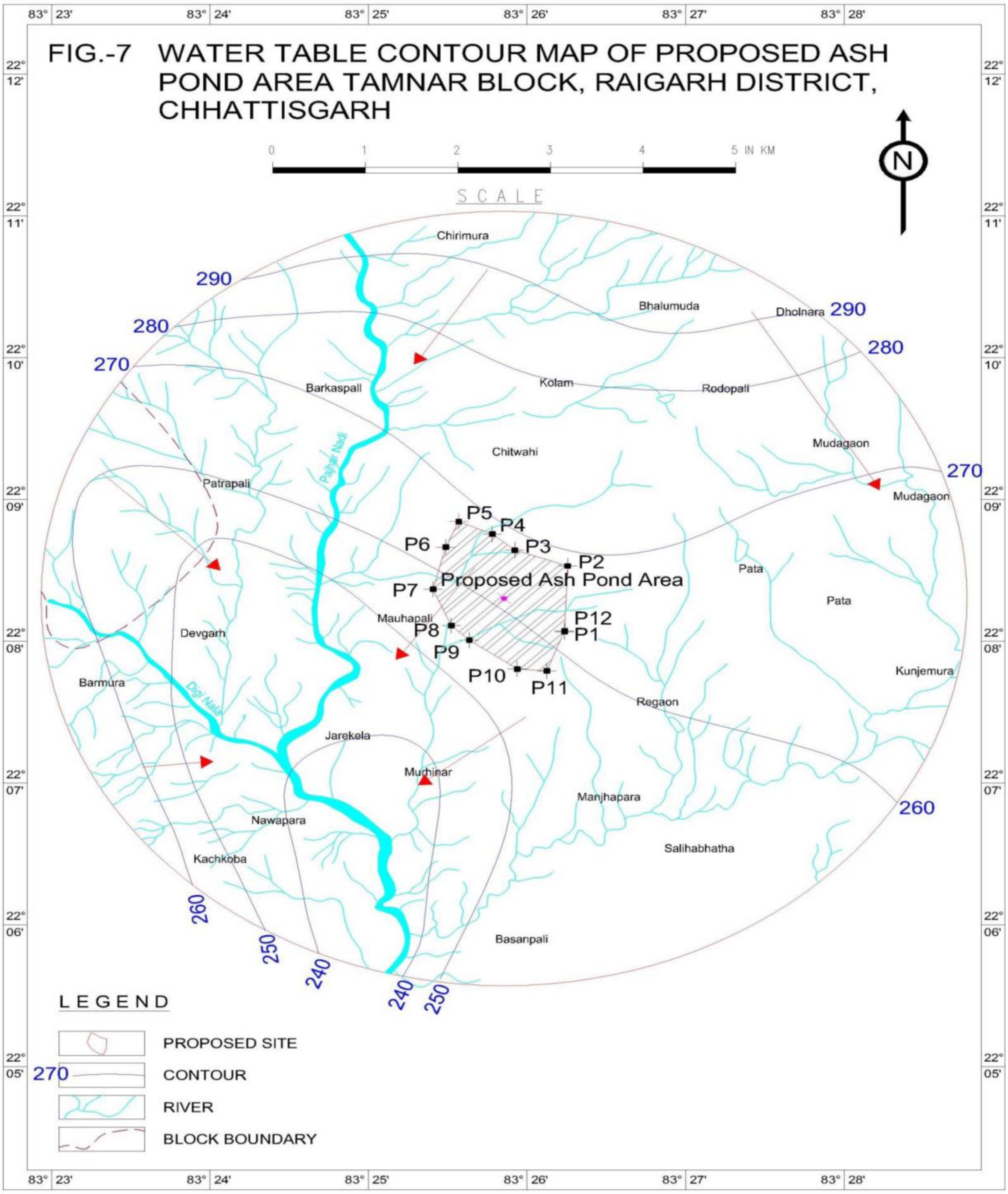


FIG.-7 WATER TABLE CONTOUR MAP OF PROPOSED ASH POND AREA TAMNAR BLOCK, RAIGARH DISTRICT, CHHATTISGARH

2.6 Soil

2.6.1Overall Profile: The soils of the district have a large aerial variation. The red colored residual soil is derived from the lateritization of shale and sandstones and the area covered by such type of soil is known as "Bhata". The black colored soils are locally known as "Kanhar". Similarly there are pale yellow sandy loamy soils which are locally known as "Matasi" and "Dorsa".

The area under Tamnar block has been covered by Ultisols and Alfisols. Alfisols are a red & sandy soil mainly consisting of sand, kanker and pieces of rock fragments (sandstone) and clay. Ultisols are a red & yellow soil mainly consisting of sand, silt and clay.

2.6.2 Field Bore log

BORE HOLE NO.	DESCRIPTION	TERMINATION DEPTH OF BORING	DATE OF BORING	TYPE OF SAMPLE	COEFFICIENT OF PERMEABILITY (CM/SEC)
1	Yellowish grey sandy clayey silt	0-0.7 MTR	06/05/2016	DS	
	Greyish brown sandy clayey silt with kankar mix highly decomposed to weathered rock	0.7 - 2.15 MTR		DS	
2	Yellowish grey sandy silt	0 - 0.6 MTR	06/05/2016	DS	
	Stiff to very stiff greyish brown sandy silty clay with kankar	0.6 - 2.3 MTR		DS	
	Greyish brown highly decomposed product of rock mix with soil	2.3 - 2.6 MTR		DS	
3	Yellowish sandy clayey silt	0 - 0.5 MTR	07/05/2016	DS	
	Reddish grey sandy decomposed product of rock with	0.5 - 2.15 MTR		DS	

	boulder				
4	Yellowish grey sandy silty clay with kankar	0 - 0.8 MTR	07/05/2016	DS	
	Greyish brown with white patches highly decomposed product of rock	0.8 - 1.2 MTR		DS	
	Dark grey silty clay with decomposed product of rock	1.2 - 3.15 MTR		DS	
5	Yellowish grey sandy silt with kankar	0 - 0.7 MTR	08/05/2016	DS	
	Brownish grey silty clay with decomposed product of rock	0.7 - 2.5 MTR		DS/UDS	3.73 x 10 −5
	Greyish highly decomposed product of rock mix with soil	2.5 - 3.09 MTR		DS	
6	Yellowish brown sandy clayey silty mix kankar	0 - 0.6 MTR	08/05/2016	DS	
	Reddish sandy silty clay with mooram	0.6 - 2.0 MTR		DS/UDS	4.09 x 10 −5
	Greyish brown highly decomposed to decomposed product of weathered rock mix with soil	2.0 - 3.0 MTR		DS	
7	Yellowish brown sandy clayey silty	0 - 0.8 MTR	08/05/2016	DS	
	Reddish grey silty clay with mooram	0.8 - 2.1 MTR		UDS/DS	3.66 x 10 −6
	Reddish grey decomposed to wethered rock	2.1 - 3.0 MTR		DS	
8	Yellowish grey sandy clayey silt	0 - 0.9 MTR	09/05/2016	DS	

	with Kankar				
	Blackish grey highly decomposed to weathered rock	0.9 - 2.0 MTR		DS	
9	Yellowish brwon sandy sitly clay mix with kankar	0 - 0.8 MTR	09/05/2016	DS	
	Brownish grey sandy decomposed product of rock	0.8 - 3.0 MTR		DS	
10	Yellowish brwon sandy clayey silt	0 - 0.7 MTR	09/05/2016	DS	
	Brownish grey sandy clay with mooram	0.7 - 1.5 MTR		DS	
	Greyish brown highly decomposed product of rock mix with soil	1.5 - 3.0 MTR		DS	

CHAPTER 3

WATER QUALITY OF GROUND WATER IN THE BUFFER ZONE

A suitable quality of water is whose characteristics make it acceptable for the needs of particular purpose, be it industrial, domestic or agriculture. The determination of the quality of water that will be utilized is a prerequisite to any establishment of industry as well as any domestic use by people within the area. During the field study, water samples were collected from dug well including bore well, to know the suitability of water for domestic and industrial use. The location and source of water samples collected have been given in Table - 3A.

Table - 3A

Location of water samples collected in and around Tamnar site for Chemical Analysis

Sl. No.	Water Sample code	Location/ Village name	**Water level (m)**			Parameters for chemical analysis
			B.G.L	**R.L.**	**Altitude**	pH, E.C., Ca, Mg, K, F, NO3, HCO3, Cl, SO4, CO3, As & TDS
1	S1	Manjhapara	6.75	261.00	254.25	----do----
2	S2	Dolesara	1.7	265.00	270.23	----do----
3	S3	Dolesara	1.7	276.00	274.30	----do----
4	S5	Chitwahi	2.79	273.00	270.21	----do----
5	S8	Kunjemura	6.25	269.00	262.75	----do----
6	S9	Regoan	10.2	266.00	255.80	----do----
7	S10	Basanpali	3.07	253.00	249.93	----do----
8	S12	Jarikela	6.9	288.00	281.10	----do----

Results of the chemical analysis

- pH of ground water is slightly alkaline in nature and varies between 6.8 to 7.65.
- Odour of the sample collected is unobjectionable and the taste is agreeable.
- Turbidity is in the range of 0.5 to 3.0.
- Electrical conductivity of ground water varies between 266 micro mhos/cm and 1503 micro mhos/cm at 250°c.
- Total Dissolved Solid (TDS) are within permissible limits prescribed by the Bureau of Indian Standards (BIS) and is in the range of 160 to 902 mg/l.
- Total Hardness of Calcium Carbonate of ground water varies between 88 to 332 mg/l.
- The low value of Iron (Fe) varies between 0.05 to 0.83 mg/l.
- The low value of Sulphate varies between 1.03 to 82.1 mg/l.
- The value of Fluoride varies between 0.45 to 0.60 mg/l.
- The low value of Chloride varies between 11.34 to 141.8 mg/l.
- The value of Nitrate for ground water varies between 4 to 14 mg/l.
- The value of Calcium varies between 14.43 to 44.8 mg/l.
- The value of Magnesium varies between 4.86 to 54.43 mg/l.
- The value of Arsenic is below 0.03 mg/l.
- Total Alkalinity due to Calcium Carbonate is in the range of 100 to 400 mg/l.
- The value of Mercury is below 0.0005 mg/l.
- The value of Lead is below 0.01 mg/l.
- The value of Chromium is below 0.05 mg/l.

The range of different chemical constituents have been given in Table - 3B

Table - 3B

Comparison of BIS standards with Chemical Analysis of ground water samples collected from Buffer Zone of the proposed ash dyke area of Jindal Power Ltd.

Sl no	Chemical constituent	Range (mg/l)	BIS Standards (mg/l)	Permissible Limits in absence of the alternate source
1	pH	6.8 - 7.65	6.5 - 8.5	No relaxation
2	Odour	Unobjectionable	Unobjectionable	-
3	Taste	Agreeable	Agreeable	-
4	Turbidity, NTU, Max	0.5 - 3	5	10
5	Electrical Conductivity, µmhos/cm, Max	266 - 1503	-	-
6	Total Hardness (as $CaCO_3$), mg/l, Max.	88 - 332	300	600
7	Iron (as Fe), mg/l, Max.	0.05 - 0.83	0.3	No relaxation
8	Chloride (as Cl), mg/l, Max.	11.34 - 141.8	250	1000
9	Fluoride (as F) mg/L, Max.	0.45 - 0.6	1.0	1.5
10	Arsenic (as As), mg/l, Max	<0.03	0.05	No relaxation
11	Dissolved Solids mg/l, Max.	160 - 902	500	2000
12	Calcium (as Ca), mg/l, Max.	14.43 - 44.8	75	200
13	Magnesium (as Mg), mg/L, Max.	4.86 - 54.43	30	100
14	Sulphate (as SO_4), mg/l, Max.	1.03 - 82.1	200	400
15	Nitrate (as NO_3), mg/l, Max.	4 - 14	45	100
16	Alkalinity (as $CaCO_3$) mg/l, Max.	100 - 460	200	600
17	Mercury (as Hg), mg/l, Max.	< 0.0005	0.001	No relaxation
18	Lead (as Pb), mg/l, Max.	< 0.01	0.01	No relaxation
19	Chromium (as Cr^{6+}), mg/l, Max.	< 0.05	0.05	No relaxation

Ground water of core zone and buffer zone has been found suitable for domestic as well as industrial use. The assessment of different samples collected is given in Table - 3C and summarized in Table - 3D.

Table - 3C

Remarks on Chemical Analysis of the collected water samples from the Buffer Zone of the proposed ash dyke area of Jindal Power Ltd. Near dolesara village, Tamnar Block, Raigarh District, Chhattisgarh

Sl. No.	Well No.	Buffer Zone	Location	Remarks
1	S1	Tamnar	Manjhapara	This water sample after chemical analysis found satisfactorily.
2	S2	Tamnar	Dolesara	This water sample after chemical analysis found satisfactorily.
3	S3	Tamnar	Dolesara	This water sample after chemical analysis found satisfactorily.
4	S5	Tamnar	Chitwahi	This water sample after chemical analysis found satisfactorily.
5	S8	Tamnar	Kunjemura	This water sample after chemical analysis found satisfactorily.
6	S9	Tamnar	Regoan	This water sample after chemical analysis found satisfactorily.
7	S10	Tamnar	Basanpali	This water sample after chemical analysis found satisfactorily.
8	S12	Tamnar	Jarikela	This water sample after chemical analysis found satisfactorily.

TABLE-3D

Results of Chemical Analysis of water samples collected in and around the Buffer Zone of the proposed ash pond area (Parameters in mg/l)

SL.NO	CHARACTERISTICS	Sample Number and Code								BIS Requirement (desirable limits)	TESTING METHOD
		Dug Well: S1	Bore Well: S2	Dug Well: S3	Dug Well: S5	Dug Well: S8	Bore Well: S9	Dug Well: S10	Dug Well : S12		
		Village									
		Manjhapara	Dolesara	Dolesara	Chitwahi	Kunjemura	Regoan	Basanpali	Jarikela		
		Formation									
		Barakar	Barakar	Barakar	Barakar	Barakar	Barakar	Barakar	Barakar		
1	pH Value	7.6	6.95	7.4	6.8	7.2	7.25	7.65	7.3	6.5 to 8.5	Digital pH meter
4	Turbidity, NTU, Max.	0.8	0.7	0.5	0.95	0.6	0.85	1.4	3	5	
5	Electrical Conductivity, pmhos/cm, Max	572	375	266	332	413	358	1503	1180	-	Digital conductivity meter
6	Total Hardness (as $CaCO_3$), mg/l, Max.	200	108	104	108	88	132	288	332	300	EDTA Titration Method
7	Iron (as Fe), mg/l, Max.	0.08	0.05	0.06	0.05	0.07	0.09	0.1	0.83	0.3	
8	Chloride (as Cl), mg/l, Max.	39.7	22.68	20.1	34.1	48.21	11.34	133.3	141.8	250	EDTA Titration Method
9	Fluoride (as F) mg/L, Max.	0.45	0.5	0.6	0.55	0.5	0.6	0.55	0.5	1	Photometric Method
10	Arsenic (as As), mg/l, Max	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	
11	Dissolved Solids mg/l, Max.	343	225	160	200	248	215	902	708	500	Digital TDS Method
12	Calcium (as Ca), mg/l, Max.	44.8	24.1	33.7	20.84	14.43	27.3	27.2	43.29	75	
13	Magnesium (as Mg), mg/L, Max.	21.38	11.65	4.86	13.61	12.64	15.6	53.46	54.43	30	Photometric Method
14	Sulphate (as SO_4), mg/l, Max.	1.03	6.5	5.51	10.5	9.85	4.61	82.1	52.6	200	Photometric Method
15	Nitrate (as NO_3), mg/l, Max.	6	7	4	8	9	6	14	11	45	Photometric Method
16	Alkalinity (as $CaCO_3$) mg/l, Max.	260	160	120	100	160	120	460	360	200	
17	Mercury (as Hg), mg/l, Max.	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.001	
18	Lead (as Pb), mg/l, Max.	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.01	
19	Chromium (as Cr6 +), mg/l, Max.	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05	

CHAPTER 4:

HEAVY METALS IN FLY ASH AND SOIL PARAMETERS ANALYSIS

A substantial amount of ground water pollution is caused by heavy metals leaching from the effluents running through ash pond. The fate and transport of heavy metals in landfill leachates depend on their variable complexing abilities, the relative concentrations of other constituents and on the environmental conditions, such as the acidic value. The generation of leachate is a result of the percolation of precipitation through open landfill or through cap of the completed site. Leachates contain many contaminants that may have a deleterious effect on ground water. This can result in ecological and health risks if not managed properly resulting in contamination of the groundwater.

Several heavy metals that may be present in landfill leachates are considered as priority pollutants for ground water resources like Cd. The composition of landfill leachates is dependent on many factors such as the origin, waste composition, climate condition, site hydrology, bacterial activities and the duration of waste generation. In an aquatic environment, the metals will exist as free metal ions, inorganic complexes, and organic complexes and associated with colloids. The solubility and mobility of heavy metals is often controlled by complexation with dissolved organic matter. The behavior of metal in polluted ground water due to long term leakage of landfill leachates into the ground water is influenced by several factors such as dilution and adsorption on the soil.

After ignition of coal at 1250°C, volatile matter escapes to the environment leaving coal ash. From this coal ash, fly ash is collected by the electrostatic precipitator (ESP) and then it is piped out to ash pond in the form of slurry. The metal content of the incinerated ash can vary widely due to a wide variation in the materials.

The behavior of metal and its leachability depends on soil characteristics and on the sub surface geological features. The sub surface geological features of the buffer zone were studied with the help of secondary data of bore well available.

4.1 Subsurface Litholog:

Subsurface geological features in and around the proposed Ash pond area

The borehole data of the buffer zone of the study area was used to study the subsurface geological feature around the proposed Ash pond.

From the study of the subsurface lithology, it is evident that the sequence of the geological formation in the buffer zone belongs to the Barakar formation of the Gondwana Supergroup. The lithological sequence is the sequence of coal, shaly coal, carbonaceous shale, shale, a very-very-fined grained sandstone, a very-fined grained sandstone, medium grained sandstone and coarse grained sandstone.

The leaching property of the Fly ash sample is shown in the Table - 4.1. The table clearly indicates that the top soil is sandy soil which is prone to leaching. The top soil is continuous up to a depth of 6 m BGL. Further up to the depth of 25 m BGL, the leaching property of the aquifer is poor to moderate. Beyond this depth, there occurs a layer of grey shale of non-leaching in nature, followed by aquifer with poor leaching ability.

The above sequence indicates that leaching effect of any contamination of Ash pond is limited up to 25 m BGL. This is the zone of unconfined aquifer. The effect of contamination due to leaching is localized in this zone and is present only up to dug well zone. The deeper aquifer will not be affected by any contamination from leaching.

Table - 4.1

Details of Sub – Surface Litholog in Buffer zone at 22˚10’ 5.932” & 83˚24’42.922”

Run Ription		Thickness (m)	Depth (m)	Lithology	Properties
From	To				
00.00	6.00	6.00	6.00	Sandy Soil	Prone to Leaching
6.00	16.00	10.00	16.00	SST FGD	Poorly Leaching
16.00	25.00	9.00	25.00	SST MGD	Moderate Leach
25.00	28.00	3.00	28.00	Grey Shale	Non-leach
28.00	33.83	5.83	33.83	F-VFGD SST WITH SH/SST INTERCAL	Poorly Leach
33.83	34.91	1.08	34.91	SH+SST BD	Poorly Leach
34.91	47.80	2.02	47.80	SST VFGD/SH/SST INTERCAL	Poorly Leach
47.80	52.00	4.20	52.00	SST VFGD/SST FGD	Poorly Leach
52.00	53.17	1.17	53.17	SST MGD	Moderate Leach
53.17	65.69	12.52	65.69	SST FGD/SH/SST INTERCAL	Poorly Leach
65.69	66.62	0.93	66.62	COAL WITH CSH	Impervious Layer
66.62	68.18	1.56	68.18	SANDY SHALE	Poorly Leach
68.18	75.30	7.12	75.30	SST VCGDGRT/ SST VFGD	Poorly leach
75.30	78.83	3.53	78.83	SH/SST INTERCAL	Poorly Leach
78.83	84.68	5.15	84.68	SHALY COAL/CSH WITH COAL	Impervious Layer
84.68	85.84	1.26	85.84	D.GREY SH	Non-Leach
85.84	90.03	4.79	90.03	SST FGD	Poorly Leach
90.03	93.52	3.49	93.52	SST CGD	Poorly Leach

93.52	97.00	3.48	97.00	SH/SST INTERCAL	Poorly Leach
97.00	97.92	0.92	97.92	SST FGD+SH BD	Poorly Leach
97.92	98.42	0.50	98.42	COAL	Impervious Layer
98.42	103.00	4.58	103.00	SST FGD/SH/SST INTERCAL	Poorly Leach
103.00	112.00	9.00	112.00	SST MGD	Moderate Leach
112.00	115.00	3.00	115.00	SST FGD	Poorly Leach
115.00	116.30	1.00	116.30	SST MGD	Moderate Leach
116.30	125.88	9.58	125.88	SST VFGD/SH/SST INTERCAL/D.GREY SH	Poorly Leach
125.88	126.76	0.19	126.76	COAL WITH CSH	Impervious Layer
126.76	138.16	11.40	138.16	SST VFGD/SH/SST INTERCAL	Poorly Leach
138.16	141.26	3.10	141.26	COAL	Impervious Layer
141.26	144.55	3.29	144.55	GREY SH WITH CSH	Poorly Leach
144.55	149.92	5.37	149.92	SH+SST BD/SH/SST INTERCAL	Poorly Leach
149.92	154.67	4.75	154.67	SH/SST INTERCAL	Poorly Leach
154.67	160.00	5.33	160.00	SANDY SH/GREY SH	Non-Leach
160.00	161.48	1.48	161.48	SST MGD FER	Moderate Leach
161.48	164.05	2.57	164.05	SHALY COAL/ CSH	Impervious Layer
164.05	173.37	9.32	173.37	SANDY SH/SH/SST	Poorly Leach
173.37	185.30	11.93	185.30	SST VFGD+SH BD/GREY SH/SH AREN	Poorly Leach
185.30	190.00	4.70	190.00	CSH/COAL	Impervious Layer
190.00	195.85	5.85	195.85	GREY SH/SH/SST	Poorly Leach

195.85	204.78	8.93	204.78	COAL/CSH/SHALY COAL	Impervious Layer
204.78	210.43	5.65	210.43	SST FGD	Poorly Leach
210.43	222.39	11.96	222.39	SST FGD/SH/SST INTERCAL/GRE	Poorly Leach
222.39	231.10	8.71	231.10	D.GREY SH/CSH	Impervious layer
231.10	236.92	5.82	236.92	COAL	Impervious Layer
236.92	240.57	3.65	240.57	SANDY SH	Poorly Layer
240.57	242.75	2.18	242.75	GREY SH	Non Leach
242.75	249.04	6.29	249.04	GREY SH	Non Leach
249.04	6.60	255.10	SST FGD	SST FGD	Poorly Leach
255.10	265.00	9.90	265.00	SST MGD-CGD	Moderate Leach
265.00	271.14	6.14	271.14	SST CGD	Poorly Leach
271.14	277.00	5.86	277.00	SST MGD	Moderate Leach
277.00	285.00	8.00	285.00	SST CGD	Poorly Leach
285.00	292.10	7.10	292.10	SST MGD	Moderate Leach
292.10	292.97	0.87	292.97	COAL	Impervious Layer
292.97	312.85	29.88	312.85	SST MGD	Moderate Leach
312.85	315.80	2.95	315.80	GREY SH	Non Leach
315.80	326.00	10.20	326.00	SST FGD+SH BD/SST CGD	Poorly Leach
326.00	335.00	9.00	335.00	SST CGD	Poorly Leach
335.00	351.00	16.00	351.00	SST MGD	Moderate Leach
351.00	359.00	8.00	359.00	SST FGD	Poorly Leach
359.00	368.00	9.00	368.00	SST MGD	Moderate Leach

368.00	392.00	24.00	392.00	SST CGD-GRT	Poorly Leach
392.00	415.11	23.11	415.11	SST CGD	Poorly Leach
415.11	417.46	2.35	417.46	TAL-SST	Poorly leach
417.46	419.45	1.99	419.45	TAL-SH	Poorly Leach
419.45	422.00	2.45	422.00	GNEISS	Impervious Layer

4.2 Leachate Test (Soil) for Heavy Metals for Fly Ash from Ash Pond area:

The common method of disposal of fly ash from a power plant is mixing with water. The resultant slurry is transferred to an ash disposal pond. Samples of freshly generated fly ash have been collected from the ash pond of the Jindal Thermal Power Plant. The chemical analysis of the sample was carried out by an independent scientific research laboratory based in Kolkata from 18th June 2016 to 09th July 2016. The sample was extracted with Extraction fluid-1 (pH 4.93 ± 0.05) in 1:10 ratio for 18 hours. The extraction fluid was selected after pH study of the sample (Ref: EPA Method 1311).

In order to evaluate the environmental suitability of fly ash-stabilized soil, a series of short term batch water and long term column leaching experiments were conducted. The leachability of heavy metals from fly ash sample was compared. During these studies, extraction and leaching of various heavy metals like Zn, Ni, Cu, Fe, Pb, Mn, Mg, and Cd was carried out by applying batch leach test and toxicity characteristic leaching procedure (TCLP) to check the possibility of ground water contamination.

The metals selected for analysis were Si, Al, Fe, Ca, Mg, Na, K, Mn, S, Cl, As, Hg, Cd, Cr, Cu, Pb, Ni, Zn, NH, and P. The selection was based on the total elemental analysis presented in Table 4.2 and 4.3. Table 4.2 indicates the chemical composition of Fly ash sample by % weight. Table 4.3 shows the metal concentration of the ash sample.

Table 4.2
Chemical Composition of Fly Ash, All Concentrations is in percentage by weight

SL. NO.	PARAMETERS	CONC. LIMITS**	RESULTS
I.	**Composition***		
1	Moisture, %	-	4.3
2	Organic Matter, %	-	0.52
3	Loss on Ignition, %	-	8.71
4	Silica (as SiO_2), %	-	79.8
5	Aluminum (as Al_2O_3), %	-	2.93
6	Iron (as Fe_2O_3), %	-	3.90
7	Calcium (as CaO), %	-	0.71
8	Magnesium (as MgO), %	-	0.95
9	Sodium (as Na_2O), %	-	0.024
10	Potassium (as K_2O), %	-	0.066
11	Manganese (as MnO_2), %	-	0.036
12	Sulphate (as SO_4), %	-	0.12
13	Chloride (as Cl), %	-	0.015
II.	**Inorganics & Toxic Metals ***		
1	Arsenic (as As), mg/kg	**50**	3.84
2	Cadmium (as Cd), mg/kg	**50**	55.03
3	Chromium VI (as Cr), mg/kg	**50**	<1.0
4	Mercury (as Hg), mg/kg	**50**	1.37
5	Chromium III (as Cr), mg/kg	**5,000**	77.1
6	Copper (as Cu), mg/kg	**5,000**	13.66
7	Lead (as Pb), mg/kg	**5,000**	7.67
8	Nickel (as Ni), mg/kg	**5,000**	6.83
9	Zinc (as Zn), mg/kg	**20,000**	13.19
III.	**Organic Compounds***		
1	Phenolic compounds (as C_6H_5OH), mg/kg	**5,000**	<1.0
2	Organic Nitrogen compounds (as N), mg/kg	**50,000**	189.2
3	Presence of Flammable Substances	**Absent**	Absent
IV.	**Inorganics***		
1	Ammonium Compounds (as N), mg/kg	**20,000**	91.3
2	Phosphorus Compounds (as P), mg/kg	**20,000**	710.5

* As per Hazardous Wastes (Management and Handling) Amendment rules, 2003 (Schedule 2).

Table-4.3
Chemical Composition of Fly Ash, All Concentrations is in mg / L

Sl. No	Parameters	Results
		mg / L in Extract
1	Zinc (as Zn)	0.621
2	Manganese (as Mn)	1.227
3	Copper (as Cu)	0.064
4	Iron (as Fe)	0.257
5	Lead (as Pb)	0.132
6	Nickel (as Ni)	0.122
7	Cadmium (as Cd)	<0.01
8	Chromium (as Cr)	0.072
9	Cobalt (as Co)	0.069
10	Calcium (as Ca)	59.1
11	Magnesium (as Mg)	23.6
12	Mercury (as Hg)	<0.001

The chemical analysis report was further interpreted as:-

- Fly ash can be classified into two classes: F and C, based on the chemical composition of the fly ash. The fly ash investigated in this study was classified as Class F with a high (SiO2 [%] + Al2O3 [%] + Fe2O3 [%] (>70 %) and very low Fe [%] grade. F type ashes are commonly reused as concrete additive or in cement production.

- The initial spectroscopy analyses showed effluent concentrations below the detection limits for all metals - Zn, Mn, Cu, Fe, Pb, Ni, Cd, Cr, Co, Mg and Hg. (Table 4.2). An important indicator for the analysis of the leaching test results is represented by "percentage (%) leaching". This value is defined as:

% leaching = [(leaching amount) / (element concentration in fly ash)] x 100

The heavy metals leached out according to their leachability, that is, the metals that have a high percentage of leachability are leached out first and that with the least percent of leachability leached out the last as shown in Table 4.4.

In the Fly ash sample, the heavy metal with highest value of % leaching is Cr VI (7.2%), followed by Zn (4.46%), Ni (1.79%) and Pb (1.72%). For other heavy metals, the % of leaching is less than 1% and Arsenic is below detection limit(BDL) in leaching test.

Table - 4.4

Metal concentrations on ash and slag leachability (mg metal / KG ash)

	Cd	Cr III	Cr VI	Cu	Hg	Ni	Pb	Zn
Ash and slag	55.03	77.10	<1.00	13.66	1.37	6.83	7.67	13.19
Leachability Limit	1	10	10	50	0.2	10	10	50
Leachability of heavy metals	<0.018%	0.09%	7.2%	0.47%	0.05%	1.79%	1.72%	4.46%

Though fly ash is known to be an inert material, general apprehensions exist about certain soluble chemicals in the decanted water due to potential adverse effects. Since the leachability tests have been done at PH<5.such situation is unlikely to occur and there is no trace of arsenic in the leaching test. To alleviate this, the provision of HDPE/LDPE liner over the entire bottom of the pond and on the upstream face of the ash dyke shall be made during the execution stage.

The ash pond will need to include HDPE/LDPE liner to prevent pollution of ground water. The presence of liner will ensure that the consolidation and deposition of undesirable sediments is minimized.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

The main findings of this study report are:

• The area is generally characterized by rolling topography. The highest elevation is of 302 meters above mean sea level (AMSL) in the north east and lowest elevation point is of 240 meters AMSL in the south western region of the buffer zone. Thus the general slope of the buffer zone is towards South-West. The average ground level elevation is around 225 meters AMSL.

• The average Monsoon rainfall of the district is recorded as 1097.25 mm.

• The bulk of the complex comprising the buffer zone is of the Barakar formation. The Barakars are represented by thick sequence (>500 m) of sandstone, shale, clay stone, and sand shale intercalation.

• The ground water occurs in both phreatic and semi-confined to confined conditions. Tamnar is one of the two distinct perennial auto-flow zones that have been demarcated in the Kelo river sub basin.

• The depth to water level is observed through 12 observation wells distributed throughout the buffer zone. The deepest water level occurs in central region (8 m and above 8 m BGL) and the shallowest water level occurs in south western portion of the buffer zone (below 3 m BGL).

• The regional flow of ground water has been found to be towards South that is in the direction of the flow of the Pajhar Nadi that is running from North to South in the of the study area.

• The ground water quality was assessed during March 2016. The quality of ground water was within permissible limit prescribed by the Bureau of Indian Standards.

On the basis of the study of the leaching of heavy metals from coal ashes, the following conclusions can be drawn:

• The concentrations of all the heavy metals under study in the leachates were well below the permissible limits for discharge of effluents as per the Indian standards and WHO Limits for drinking water quality.

• Comparison of water samples near the ash ponds and at the surrounding villages indicates that the concentration of heavy metals is within the permissible limits of Indian standard IS: 10500 and WHO limits for drinking water quality.

• The fly ash samples from JPL Thermal Power Plant were found to be environmentally safe for disposal. It is classifies under Class - F which shows that it can be engineered for their bulk utilization in industry and agriculture.

• Cr VI has the highest leachability of (7.2%), followed by Zn (4.46%), Ni (1.79%) and Pb (1.72%). For other heavy metals the leachability is less than 1%. This shows the sequence in which the metals will leach out is : Cr VI >> Ni >> Pb >> Cu >> Cr III >> Hg >> Cd

• The leaching effect of any contamination of ash pond is limited up to 25 m BGL depths. This is the zone of unconfined aquifer. The effect of contamination due to leaching is localized and is only up to dug well zone. The deeper aquifer will not be affected owing to leaching

• Since the leachability tests have been done at PH<5, such situations are unlikely to occur. It is advised that the ash pond should include a suitable HDPE/LDPE liner over the entire bottom of the pond and on the upstream face of the ash dyke as a precautionary measure to prevent pollution of ground water. The presence of liner will ensure that the consolidation and deposition of undesirable sediments is minimized.

M/S. VOLCONS SOLUTIONS ROURKELA

....

(Signature)

CHAPTER 6

REFERENCES

- Dynamic Ground Water Resources of Chhattisgarh state, published by the Central Ground Water Board (CGWB)
- Atlas of Chhattisgarh State, published by NRSA, Hyderabad
- Ground Water Assessment, development and management by K.R.Karanth (Tata Mcgraw Hill).
- Quadrangle Geological Map, Published by Geological Survey of India (GSI)
- Ground Water Estimation Committee report (1997)
- Groundwater Information Booklet, Chhattisgarh (September 2013)
- District brochure report of Raigarh district (CGWB).
- Research paper published in the International Journal of Engineering Sciences & Research Technology on "Effect of Seasonal Variation on Metal Speciation in Leachate from a Thermal Power Plant Ash Pond: Impact on Ground Waters" by Balaram Pani, Sidhharth Sirohi and Manjeet Singh Barwa.
- Research paper published in the Polish J. of Environ. Stud. Vol. 19, No. 6 (2010), 1325-1330 on "Extraction and Leaching of Heavy Metals from Thermal Power Plant Fly Ash and Its Admixtures" by Dhananjay Bhaskar Sarode, Ramanand Niwratti Jadhav, Vasimshaikh Ayubshaikh Khatik, Sopan Tukaram Ingle and Sanjay Baliram Attarde.
- Research paper published in the Journal of Radiation Research and Applied Science s8 (2015) 523 e 537 on "Suitability of leaching test methods for fly ash and slag: A review".

END OF REPORT

Annexure-II

जांजगीर-चांपा | महाकोशल | dainikmahakoshal.com | रायपुर, रविवार 3 अप्रैल 2016

मुख्यमंत्री कन्या दान योजना के तहत सामूहिक विवाह संपन्न

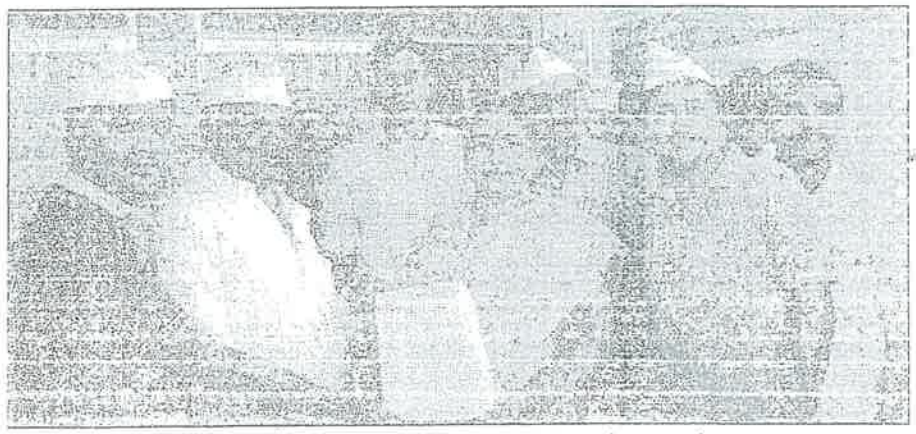
जांजगीर-चांपा।

मुख्यमंत्री कन्या दान योजना के तहत जांजगीर के अग्रसेन भवन प्रांगण में महिला बाल विकास विभाग द्वारा सामूहिक विवाह का आयोजन किया गया। आयोजित कार्यक्रम में चयनित जोड़ों का विवाह सामाजिक विधिविधान के साथ किया गया। इस अवसर पर क्षेत्रिय सांसद श्रीमती कमला देवी पाटले अग्रसेन भवन

पेयजल व्यवस्था हेतु राशि स्वीकृत

बेमेतरा। बेमेतरा जिला के चारों नगर पंचायत को पेयजल की व्यवस्था हेतु जिला कलेक्टर द्वारा 6 लाख रूपए की राशि स्वीकृत कर राशि का चेक प्रदाय किया जा चुका है। इस राशि से नगर पंचायत को पेयजल की व्यवस्था तथा नए नलकूप खनन, पावर पंप स्थापना अथवा आवश्यकतानुसार टैंकर से पेयजल प्रदाय किया जाना है। लोक स्वास्थ्य यांत्रिकी विभाग बेमेतरा के कार्यपालन अभियंता श्री समीर शर्मा से मिली जानकारी के अनुसार विगत दिनों लोक स्वास्थ्य अभियांत्रिकी के अधीक्षण अभियंता श्री ...

सराफा व्यापारी संघ ने सांसद को सौंपा ज्ञापन



... मैदानी अमले बैठक में उपस्थित थे।

... किया जाता है कि आवेदक / आवेदिका श्री रघुनाथ तिवारी आ./ध.प. श्री राजेन्द्र तिवारी निवासी न्यू पुलिस लाईन दुर्ग तह. व जिला दुर्ग के द्वारा अपने भूमिस्वामी हक की क्रयशुदा भूमि ग्राम बोरसी प.ह.नं. 23 तहसील व जिला दुर्ग में स्थित भूमि खसरा नंबर 241/13 एवं 241/14 का टु. रकबा 0.804 हे. भूमि को पंजीकृत विक्रय पत्र के आधार पर विक्रेता श्री कल्याण आ. श्री आत्माराम के नाम से पृथक कर आवेदक का नाम पटवारी अभिलेख में दर्ज करने हेतु आवेदन पेश किया है। जिसका प्रकरण इस न्यायालय में विचाराधीन है।

अत: जिस किसी भी व्यक्ति अथवा संस्था को उजर / दावा पेश करना हो तो पेशी दिनांक 20/4/2016 तक स्वयं अथवा स्वयं के द्वारा अधिकृत व्यक्ति के माध्यम से न्यायालय में उपस्थित होकर लिखित में आपत्ति आक्षेप पेश कर सकते है। बाद में प्राप्त आपत्ति पर कोई विचार नहीं किया जावेगा।

आज दिनांक 30/3/2016 को मेरे स्वयं के हस्ताक्षर एवं न्यायालय के पद मुद्रा से प्रकाशन हेतु जारी किया गया है।

मुहर — तहसीलदार, दुर्ग (छ.ग.)

एतद् द्वारा सर्वसाधारण को सूचनार्थ प्रकाशित किया जाता है कि आवेदक श्रीमती सुशीला उपाध्याय ध.प. रविकान्त उपाध्याय साकिन जुनवानी द्वारा ग्राम जुनवानी प.ह.नं. 21 रा.नि.मं. दुर्ग तहसील व जिला दुर्ग स्थित भूमि स्वामी हक की भूमि ख.नं. 1222/43 रकबा 1800 वर्गफीट को रजिस्टर्ड बैनामा के माध्यम से जमुनादास शर्मा आ. बद्रीप्रसाद शर्मा से रजिस्टर्ड बैनामा से क्रय किया है की नामान्तरण किये के संबंध में आवेदन पत्र प्रस्तुत किया गया है। जिस पर प्रकरण न्यायालय में विचाराधीन है।

अत: उपरोक्त भूमि को आवेदक के नाम पर नामान्तरण किये जाने पर जिस किसी भी व्यक्ति को आपत्ति या उजर दावा हो तो सुनवाई तिथि दिनांक 12/4/ 2016 तक या उसके पूर्व स्वयं या अपने मान्य अधिवक्तागण के साथ उपस्थित होकर अपना आपत्ति प्रस्तुत कर सकते हैं। निर्धारित तिथि के बाद प्राप्त आवेदन पर कोई विचार नहीं किया जावेगा।

आज दिनांक 22/3/2016 को मेरे हस्ताक्षर एवं न्यायलयीन मुहर के साथ जारी किया गया।

मुहर — तहसीलदार, दुर्ग (छ.ग.)

... किया जाता है कि आवेदक पदम जैन, अन्य 1 पिता ज्ञानमल जैन साकिन गवलीपारा दुर्ग तहसील व जिला दुर्ग के द्वारा अपने भूमिस्वामी हक की क्रयशुदा भूमि ग्राम बोरसी प.ह.नं. 23 तहसील व जिला दुर्ग में स्थित भूमि खसरा नंबर 256 का टु. रकबा 0.206 हे. भूमि को पंजीकृत विक्रय पत्र के आधार पर विक्रेता श्रीमती राज्य श्री गुप्ता ध.प. अजय सिंह गुप्ता आ. मु. के तरफ से परीक्षित गुप्ता आ. अजय सिंह गुप्ता के नाम से पृथक कर आवेदक का नाम पटवारी अभिलेख में दर्ज करने हेतु आवेदन पेश किया है। जिसका प्रकरण विचाराधीन है।

अत: जिस किसी भी व्यक्ति अथवा संस्था को इस संबंध में आपत्ति दावा या उजर पेश करना हो तो पेशी दिनांक 8/4/2016 तक स्वयं अथवा अपने द्वारा अधिकृत व्यक्ति के माध्यम से न्यायलय में उपस्थित होकर लिखित आपत्ति दावा या उजर प्रस्तुत कर सकते है। बाद में प्राप्त आपत्ति आवेदन पर कोई कार्यवाही नहीं किया जावेगा।

आज दिनांक 22/3/2016 को मेरे स्वयं के हस्ताक्षर एवं न्यायलय के पद मुद्रा से प्रकाशन हेतु जारी किया गया है।

मुहर — तहसीलदार, दुर्ग (छ.ग.)

एतद् द्वारा सर्व आम जनता को सूचित किया जाता है कि आवेदक / आवेदिका श्री करमजीत सिंह पिता/पति भीम सिंह डिकोला निवासी शंकर नगर दुर्ग द्वारा ग्राम दुर्ग प.ह.नं. 16 तहसील दुर्ग जिला दुर्ग में स्थित भूमि खसरा नंबर 1195/15 रकबा 0.012 हे. भूमि को आवासीय प्रयोजनार्थ हेतु व्यपवर्तन के संबंध में प्रतिवेदन बावत प्रकरण इस न्यायालय में विचाराधीन है।

अतएव इस संबंध में आवेदित भूमि के संबंध में जिस किसी व्यक्ति अथवा संस्था को किसी प्रकार का दावा/ आपत्ति प्रकरण में नियत दिनांक 8/4/2016 तक स्वयं अथवा अधिकृत अधिवक्ता के माध्यम से न्यायालय में उपस्थित होकर आपत्ति प्रस्तुत कर सकते है। नियत तिथि के बाद प्राप्त दावा/ आपत्ति पर कोई विचार नहीं किया जावेगा।

यह उद्घोषणा आज दिनांक 2/4/2016 को मेरे हस्ताक्षर एवं न्यायालय की मुद्रा के साथ जारी किया गया।

मुहर — अधीक्षक, भू-अभिलेख, परिवर्तित भूमि, जिला- दुर्ग (छ.ग.)

एतद् द्वारा सर्वसाधारण को सूचनार्थ प्रकाशित किया जाता है कि आवेदक श्रीमती मीना मेश्राम ध.प. कुसुम राव मेश्राम साकिन गांधी नगर भिलाई द्वारा ग्राम जुनवानी प.ह.नं. 21 रा.नि.नं. दुर्ग तहसील व जिला दुर्ग स्थित भूमि स्वामी हक की भूमि ख.नं. 1222/103 रकबा 2400 व.फु. को रजिस्टर्ड बैनामा के माध्यम से विक्रेता सुनैना देवी से क्रय किया था जिसका नामान्तरण हो गया था किन्तु वर्तमान अभिलेख में विक्रेता का ही नाम पर दर्ज है जिसके त्रुटि सुधार के संबंध में आवेदन पत्र प्रस्तुत किया गया है। जिस पर प्रकरण न्यायालय में विचाराधीन है।

अत: उपरोक्त भूमि के संबंध में त्रुटि सुधार किये जाने पर जिस किसी भी व्यक्ति को आपत्ति या उजर दावा हो तो सुनवाई तिथि दिनांक 26/4/ 2016 तक या उसके पूर्व स्वयं या अपने मान्य अधिवक्तागण के साथ उपस्थित होकर अपना आपत्ति प्रस्तुत कर सकते है। निर्धारित तिथि के बाद प्राप्त आवेदन पर कोई विचार नहीं किया जावेगा।

आज दिनांक 29/3/2016 को मेरे हस्ताक्षर एवं न्यायलयीन मुहर के साथ जारी किया गया।

मुहर — तहसीलदार, दुर्ग (छ.ग.)

जांजगीर-चांपा।

एतद् द्वारा सर्वसाधारण को सूचनार्थ प्रकाशित किया जाता है कि आवेदक नरेन्द्र साहू आ. श्री अर्जुन राम साकिन सरस्वती नगर दुर्ग द्वारा ग्राम दुर्ग प.ह.नं. 16/24 रा.नि.मं. दुर्ग तहसील व जिला दुर्ग स्थित भूमि स्वामी हक की भूमि ख.नं. 682/29 - 686/29 रकबा 0.007 हे. 750 वर्गफीट को रजिस्टर्ड बैनामा के माध्यम से गंगा यादव आ. श्री प्रेमलाल यादव से क्रय किया है की नामान्तरण किये के संबंध में आवेदन पत्र प्रस्तुत किया गया है। जिस पर प्रकरण न्यायालय में विचाराधीन है।

अत: उपरोक्त भूमि को आवेदक के नाम पर नामान्तरण किये जाने पर जिस किसी भी व्यक्ति को आपत्ति या उजर दावा हो तो सुनवाई तिथि दिनांक 12/4/ 2016 तक या उसके पूर्व स्वयं या अपने मान्य अधिवक्तागण के साथ उपस्थित होकर अपना आपत्ति प्रस्तुत कर सकते हैं। निर्धारित तिथि के बाद प्राप्त आवेदन पर कोई विचार नहीं किया जावेगा।

आज दिनांक 15/3/2016 को मेरे हस्ताक्षर एवं न्यायलयीन मुहर के साथ जारी किया गया।

मुहर — तहसीलदार, दुर्ग (छ.ग.)

मुहर — दुर्ग, जिला- दुर्ग

PUBLIC NOTICE

Public is hereby informed that ash pond at a new location which is south of Dolesara Village,Raigarh District, Chhattisgarh is proposed for expansion project of 2400 MW of Jindal Power Limited Thermal Power Plant at Tamnar, Raigarh, Chhattisgarh. As directed by Ministry of Environment, Forests and Climate Change (MOEF & CC), a Hydro-geological study of the proposed new location is also being carried out.

Notice is hereby given to the concerned to submit comments, if any, on the proposed new location of ash dyke to AVP (Liaison & PR) ,Jindal Power Limited, Tamnar, Raigarh (C.G.)-496107 as well as to Director (Thermal) MOEF & CC, Indira Paryavaran Bhawan, Jor Bagh, NewDelhi-110003, within 30 days of the publication of this notice

सार्वजनिक सूचना

सर्व साधारण को एतद द्वारा सूचित किया जाता है कि राख तालाब (राखड़ बांध) का निर्माण नयें स्थान जो कि ग्राम रोडोपाली के दक्षिण स्थित, जिला रायगढ़, छत्तीसगढ़ में जिंदल पावर लिमिटेड, तमनार के विस्तार परियोजना 2400 मेगावाट थर्मल पावर प्लांट के प्रस्तावित है। नये प्रस्तावित स्थल का भू-जल वैज्ञानिक अध्ययन करने हेतु पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय द्वारा निर्देशित भी किया गया है।

संबंधित लोगों को एतद द्वारा सूचना दिया जाता है कि प्रस्तावित राख तालाब (राखड़ बांध) के स्थल परिवर्तन हेतु , यदि कोई टिप्पणी हो तो, इस सूचना के प्रकाशन के 30 दिवस के भीतर सह-उपाध्यक्ष (लायजन एवं जनसंपर्क) जिंदल पावर लिमिटेड, तमनार, जिला रायगढ़ छत्तीसगढ़ के साथ-साथ निदेशक (थर्मल), पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, जोर बाग, नई दिल्ली-110003 को प्रस्तुत करें।

Annexure - II

दैनिक नवीन कदम | स्पोर्ट्स | रायगढ़, रविवार 03 अप्रैल 2016 | पेज 07

विश्वकप टी20 फाइनल: क्या सच होगी सचिन की भविष्यवाणी?

कोलकाता : भारत को सेमीफाइनल में हराकर आत्मविश्वास से भरी वेस्टइंडीज की टीम रविवार को आईसीसी विश्व टी20 में इंग्लैंड के खिलाफ उतरेगी। दोनों टीमों के पावर हिटर बल्लेबाजों के बीच रोमांचक मुकाबला होने की उम्मीद है।

देश के क्रिकेट बोर्ड के साथ वेतन भुगतान के कारण टूर्नामेंट के लिए आने से ही लगभग इनकार कर चुकी कैरेबियाई टीम ने भारत आने के बाद से शानदार प्रदर्शन किया है। ग्रुप चार के अंतिम मैच में हालांकि टीम अफगानिस्तान के खिलाफ उलटफेर का शिकार हो गई थी, लेकिन इसके अलावा टीम का प्रदर्शन बेजोड़ रहा [illegible] गेंद से काफी प्रभावी साबित हो सकती है।

ऑस्ट्रेलिया के खिलाफ सात रन से हार का सामना करना पड़ा था। अब 29 साल बाद इंग्लैंड की टीम एक बार फिर इस मैदान पर विश्व टी20 फाइनल खेलेगी और गैटिंग के उस बदनाम रिवर्स स्विप के बुरे सपने से उबरने की कोशिश करेगी।

इंग्लैंड ने वेस्टइंडीज के खिलाफ अब तक चार मैच जीते हैं, जबकि नौ मैच में उसे हार का सामना करना पड़ा लेकिन इयोन मोर्गन की धैर्यपूर्ण कप्तानी उसे मजबूत दावेदार बनाती है। वेस्टइंडीज का सफर अब तक बेहतरीन रहा है। टीम के 15 में से 12 सदस्य टूर्नामेंट से ठीक पहले यहां आने के लिए राजी हुए और [illegible] हारेंगे।

के तीसरे नंबर के बल्लेबाज रूट टूर्नामेंट में अब तक 145 के स्ट्राइक रेट से 195 रन बना चुके हैं और इस टूर्नामेंट में उनसे अधिक रन भारत के विराट कोहली ने ही बनाए हैं। इसके अलावा टीम को जेसन राय और एलेक्स हेल्स की सलामी जोड़ी से एक और तूफानी शुरुआत की उम्मीद होगी।

राय ने सेमीफाइनल में न्यूजीलैंड के खिलाफ शानदार पारी खेलकर टीम को जीत दिलाई, जबकि कीवी टीम को टूर्नामेंट की सबसे बेहतर टीम माना जा रहा था। इसके अलावा जोस बटलर की आक्रामक बल्लेबाजी भी टीम के लिए अहम साबित हो सकती है। [illegible]

मैच विजयी पारी खेली थी।

बड़े शाट खेलने की बात करें तो वेस्टइंडीज के क्रिस गेल का कोई जवाब नहीं है। गेल ने टूर्नामेंट के पहले मैच में इंग्लैंड के खिलाफ ही नाबाद 100 रन की पारी खेली थी और एक बार फिर सभी की नजरें रन पर होंगी। यह गेल का अंतिम अंतरराष्ट्रीय मैच भी हो सकता है। चार्ल्स ने भारत के खिलाफ 36 गेंद में 52 रन की पारी खेली थी और फिर सिमंस ने 51 गेंद में नाबाद 82 रन बनाकर वेस्टइंडीज को जीत दिलाई थी।

इसके अलावा टीम के पास आंद्रे रसेल, ड्वेन ब्रावो और कप्तान डेरेन सैमी जैसे बड़े [illegible]

पर प्रतिक्रिया देंगे। पाकिस्तान विश्व टी20 में चार में से तीन मैच हारकर ग्रुप चरण से ही बाहर हो गया था। इसमें चिर प्रतिद्वंद्वी भारत के खिलाफ हार भी शामिल है। शहरयार इससे पहले 2003 से 2006 तक भी पीसीबी अध्यक्ष रहे थे।

मानती है तो उनके [illegible] कार्यकाल को आगे बढ़ाया जा सकता है। शास्त्री का बीसीसीआई के साथ टी-20 वर्ल्ड कप के आखिर तक का करार था और वेस्टइंडीज के हाथों टीम इंडिया की सेमीफाइनल में हार के साथ ही उनका करार खत्म हो गया। ठाकुर ने कहा, शास्त्री का बतौर डायरेक्टर करार खत्म हो गया है। हम अब टीम के लिए पूर्णकालिक कोच चाहते हैं और सीएसी इस पर फैसला लेगी। टीम के लिए पूर्णकालिक कोच और टीम डायरेक्टर दोनों पद नहीं हो सकते इसलिए शास्त्री के करार का भी नवीनीकरण हो सकता है। शास्त्री के बारे में उन्होंने कहा, यह पूरी तरह से समिति का फैसला होगा लेकिन इस बात की पूरी संभावना है कि यह पद पूर्णकालिक कोच का ही होगा। समिति को इस पद के लिए संभावित उम्मीदवारों के नाम तय करने के लिए कहा गया है। समिति की बैठक 8 अप्रैल के बाद होगी। यह आईपीएल शुरू होने से पहले भी हो सकता है। गौरतलब है कि शास्त्री ने 2014 में टीम डायरेक्टर की जिम्मेदारी संभाली थी। उनके कार्यकाल में टीम इंडिया ने इंग्लैंड में वनडे सीरीज जीती, ऑस्ट्रेलिया में टेस्ट सीरीज गंवाई। हालांकि टीम वनडे वर्ल्ड कप के सेमीफाइनल में पहुंची और ऑस्ट्रेलिया को उसी की धरती पर टी-20 सीरीज में 3-0 से हराया था। इसके अलावा टीम टी-20 वर्ल्ड रैंकिंग में नंबर वन भी बनी। एशिया कप जीता और टी-20 वर्ल्ड कप में सेमीफाइनल तक का सफर तय किया।

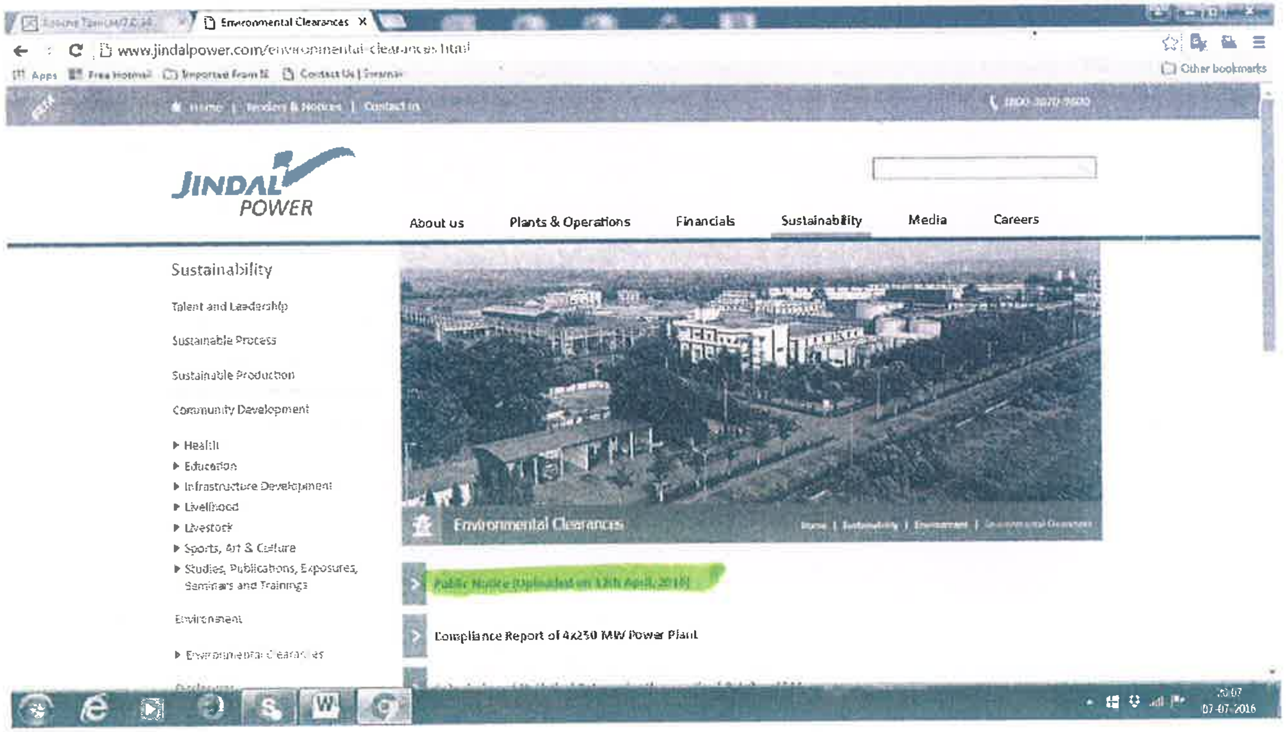
इंडिया ओपन सुपर सीरीज: सायना सेमीफाइनल में, सिंधू बाहर

नई दिल्ली। डिफेंडिंग चैंपियन और सेकेंड सीडेड सायना नेहवाल ने पहला गेम गंवाने के बाद जबर्दस्त वापसी करते हुए कोरिया की सुंग जी ह्युन को 19-21, 21-14, 21-19 से हराकर योनेक्स सनराइज इंडिया ओपन सुपर सीरीज बैडमिंटन टूर्नामेंट के विमेन सिंगल्स के सेमीफाइनल में जगह बना ली दो करोड़ रुपये की पुरस्कार राशि वाले इस टूर्नामेंट से दूसरी भारतीय खिलाड़ी पीवी सिंधू हारकर बाहर हो गईं। सायना ने यह मुकाबला एक घंटे 23 मिनट के कड़े संघर्ष में जीता। सायना जब पहला गेम हार गईं थीं तो एक समय लग रहा था कि कहीं टूर्नामेंट में एक और उलटफेर देखने को ना

मिले। गुरुवार को मेंस सिंगल्स में चौथी सीड चीन के लिन डैन और टॉप सीड मलेशिया के ली चोंग वेई हारकर बाहर हो गए थे लेकिन सायना ने अपने अनुभव का पूरा इस्तेमाल करते हुए और दर्शकों के जोरदार समर्थन से पांचवीं सीड कोरियाई खिलाड़ी को उलटफेर नहीं करने दिया। सायना ने जहां

अपना मुकाबला पहला गेम हारने के बाद जीता वहीं सिंधू पहला गेम जीतने के बाद अपना मुकाबला गंवा बैठीं। सिंधू को कोरिया की बेई यिओन जू ने एक घंटे 21 मिनट में 15-21, 21-19, 21-15 से हराकर सेमीफाइनल में जगह बना ली। दुनिया में 11वें नंबर की खिलाड़ी सिंधू का 15वें नंबर की कोरियाई खिलाड़ी के खिलाफ 1-2 का रिकॉर्ड था जिसे अब बेई ने 3-1 पहुंचा दिया है। सिंधू ने दूसरे और तीसरे गेम में लगातार गलतियां कर कोरियाई खिलाड़ी को वापसी करने का मौका दिया। बेई ने इन मौकों का पूरा फायदा उठाते हुए यह गेम जीतकर मुकाबला जीत लिया।

Annexure - III



सार्वजनिक नोटिस

सर्व साधारण को एतद द्वारा सूचित किया जाता है कि राख तालाब (राखड़ बांध) का निर्माण नये स्थान जो कि ग्राम रोडोपाली के दक्षिण स्थित, जिला रायगढ़, छत्तीसगढ़ में जिंदल पावर लिमिटेड, तमनार के विस्तार परियोजना 2400 मेगावाट थर्मल पावर प्लांट के प्रस्तावित है। नये प्रस्तावित स्थल का भू-जल वैज्ञानिक अध्ययन करने हेतु पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय द्वारा निर्देशित भी किया गया है।

संबंधित लोगों को एतद द्वारा सूचना दिया जाता है कि प्रस्तावित राख तालाब (राखड़ बांध) के स्थल परिवर्तन हेतु, यदि कोई टिप्पणी हो तो, इस सूचना के प्रकाशन के 30 दिवस के भीतर सह-उपाध्यक्ष (लायजन एवं जनसंपर्क) जिंदल पावर लिमिटेड, तमनार, जिला रायगढ़ छत्तीसगढ़ के साथ-साथ निदेशक (थर्मल), पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, इंदिरा पर्यावरण भवन, जोर बाग, नई दिल्ली-110003 को प्रस्तुत करें।

PUBLIC NOTICE

Public is hereby informed that ash pond at a new location which is south of Dolesara Village,Raigarh District, Chhattisgarh is proposed for expansion project of 2400 MW of Jindal Power Limited Thermal Power Plant at Tamnar, Raigarh, Chhattisgarh. As directed by Ministry of Environment, Forests and Climate Change (MOEF & CC), a Hydro-geological study of the proposed new location is also being carried out.

Notice is hereby given to the concerned to submit comments, if any, on the proposed new location of ash dyke to AVP (Liaison & PR) ,Jindal Power Limited, Tamnar, Raigarh (C.G.)-496107 as well as to Director (Thermal), MOEF & CC, Indira Paryavaran Bhawan, Jor Bagh, NewDelhi-110003, within 30 days of the publication of this notice

Annexure - IV

कार्यालय- ग्राम पंचायत डोलेसरा जनपद पंचायत तमनार, जिला- रायगढ़ (छ0ग0)

बैठक कार्यवाही स्थान - आदर्श चौक डोलेसरा   दिनांक - 22.8.2015

क्रमांक	उपस्थित सदस्यों के नाम	विषय	कार्यवाही संक्षिप्त में	प्रस्ताव जो पारित किये गये	हस्ताक्षर
प्रस्ताव क्रं. 08 दिनांक 22-8-2015	क्रमांक 1 से 44 तक	औद्योगिक प्रयोजन हेतु ग्राम डोलेसरा की निजि भूमि 181.038 हेक्टे. एवं 9.524 हे. शासकीय भूमि मे ऐश डाईक निर्माण हेतु भू अर्जन हेतु अनापत्ति प्रमाण पत्र प्रदान करने के संबंध में।	आज दिनांक 22-8-2015 को श्री अर्जुन पैंकरा की अध्यक्षता मे ग्राम सभा के समक्ष उपस्थित सदस्यों के मध्य औद्योगिक प्रयोजन हेतु ग्राम डोलेसरा की निजी भूमि 181.038 हेक्टे. एवं 9.524 हेक्टे. में ऐश डाईक निर्माण हेतु भू अर्जन किया जाना प्रस्तावित है जिसके तहत ग्राम सभा के समक्ष विषय को रखा गया। उपस्थित सदस्यों के द्वारा विचार विमर्श पश्चात निम्न शर्तो के आधार पर जमीन दिये जाने हेतु प्रस्तावित किया जाता है। 1. भू अर्जन अध्यादेश 2013 के तहत बाजार भाव के चार गुनी मुआवजा राशि भुगतान किया जावे। 2. प्रभावित कृषकों के परिवार के सदस्यों को योग्यतानुसार नौकरी प्रदान किया जावे। 3. गांव के विकास में सहयोग नियमित किया जावे। उपरोक्त शर्तो के अनुसार सर्व सम्मति से प्रस्ताव पारित किया गया। सत्य प्रतिलिपि	सर्व सम्मति से प्रस्ताव पारित	1 से 44 तक सही

सचिव
ग्राम पंचायत डोलेसरा
(छ.ग.)

सरपंच
ग्राम पंचायत डोलेसरा
जि.प.-तमनार
जि. रायगढ़ (छ.ग.)

Annexure-V

Reply to Representation of Jan-Chetna Manch, Raigarh

1. **The site for proposed ash dyke falls within coal mine area of Gare Palma sector–1, earlier allocated to M/s CMDC and later allocated to GSECL.**

Response:

The map enclosed with the representation of Jan Chetna does not depict the actual location of the area as submitted by JPL vide letter dated 23.09.2015 to MOEF and CC as same is outside the Gare Palma Sector -1 coal block. The State Govt. has granted in-principle agreed for acquisition of land and initiated land acquisition process for the proposed ash dyke area only after ascertaining that the survey numbers of the area proposed to be acquired for the ash dyke is outside the Gare Palma Sector-1 coal block. In support please refer to letter (obtained under RTI) dated 27.08.2015 from SDM (Revenue), Ghargoda to Collector (Land Acquisition), Raigarh stating that the proposed land of Dolesara is outside coal block area(**Enclosure-A).**

Therefore, allegation that the proposed ash dyke area is within the coal block of Gare Palma Sector-1 is not correct and is misleading.

2. **Gram Sabha of Dolesara unanimously passed resolution on 07.10.2015 against land acquisition for Ash Dyke as land being agricultural land.**

Response:

In order to obtain No Objection Certificate from Gram Sabha, the District Trade and Industry Centre issued the letter to SDM (Land Acquisition Officer) – Gharghoda for NOC from Gram Sabha. SDM – Gharghoda in turn issued a letter to CEO – Janpad Panchayat, Tamnar for conducting Gram Sabha. The Gram Sabha was conducted under the supervision of CEO – Janpad Panchayat office. CEO – Janpad Panchayat issued letter to Sarpanch /Secretary with agenda for conducting Gram Sabha.

In line with the above requirement Gram Sabha of Dolesara village was conducted on 22.08.2015 wherein it has unanimously passed resolution in favor of acquisition of land for proposed ash dyke subject to certain demands related to compensation, etc. The Gram Sabha resolution was duly forwarded by Sachiv (Secretary) to CEO – Janpad Panchayat vide letter dated 25.08.2015. The same was forwarded by CEO – Janpad Panchayat to SDM – Gharghoda vide letter dated 26.08.2015 and same was forwarded by SDM to DTIC vide letter dated 27.08.2015.

Further, under Section 45 of "Chhattisgarh Panchayat Raj Adhiniyam", 1993, if a unanimous decision on a subject matter has been taken by Gram Sabha, the same subject matter cannot be re-considered again in Gram Sabha, within a period of six months, unless a written consent is received from $3/4^{th}$ of the entitled members of the Gram Sabha or direction from the nominated officer is received. It is understood that neither a written consent from $3/4^{th}$ of the entitled members of the Gram Sabha was received by Panchayat nor any direction was issued by the nominated officer to re-conduct Gram Sabha. Therefore, the said Gram Sabha Resolution dated 07.10.2015, enclosed with the representation, is legally not valid.

Therefore, allegation that Gram Sabha of Dolesara unanimously passed resolution against the land acquisition is not correct and is misleading.

3. **Proposed site of Ash Dyke situated in the Schedule area within meaning of Constitution of India and 908 families including Schedule Tribes are likely to be displaced.**

Response:

It is true that the proposed area falls under Schedule Area. However, due procedures are being followed by the State Government for acquisition of land. The total no. of 'Khatedars' (loosing land) are 287 and not 908 families as mentioned in the representation.

Therefore, it is not correct that 908 families are likely to be displaced.

4. **So as to information received through RTI Act from Sub Division Officer of Gharghoda (Land Acquisition Authority), the PP has not deposited Processing Fee for the Social Impact Assessment no initiative has been taken towards preparation of SIA under "Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Social Impact Assessment and Consent) Rules, 2014".**

Response:

Land acquisition process for the proposed area of ash dyke location was initiated by the State Govt. under *'Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013'* and requirement of SIA was exempted as per Ordinance, 2014 (No. 9 of 2014). SIA was made pre-requisite from 01.09.2015. In the present case section 11 notifications was completed before the requirement of SIA became mandatory.

Therefore, Social Impact Assessment was not required for the acquisition of land for proposed ash dyke.

Enclosure - 'A'

कार्यालय अनुविभागीय अधिकारी (राजस्व)घरघोड़ा जिला रायगढ़ (छ.ग.)

क्रमांक [illegible] /वाचक-1/2015 घरघोड़ा, दिनांक 27.08.2015

प्रति,

कलेक्टर
(भू–अर्जन शाखा)
रायगढ़

विषय – औद्योगिक प्रयोजन ग्राम डोलेसरा के निजी भूमि अर्जन बावत ।
सन्दर्भ – आपका निर्देश दिनांक 25.08.2015

विषयान्तर्गत लेख है कि ग्राम डोलेसरा तहसील तमनार जिला रायगढ़ (छ.ग.) मे ग्राम डोलेसरा के 181.038 हे. निजी भूमि का औद्योगिक प्रयोजन हेतु निजी भूमि अर्जन किया जाना प्रस्तावित है। आपके द्वारा दिये गये निर्देश दिनांक 25.08.2015 के संदर्भ में जानकारी निम्नानुसार है:–

1. आवेदित क्षेत्र ग्राम डोलेसरा कुल रकबा 179.724 हे. असिंचित भूमि है एवं उक्त भूमि में से अवैधानिक रूप से छोटे –छोटे टुकड़े, नामांतरण एव बंटवारा नही किया गया है।

2. ग्राम सभा के प्रस्ताव कार्यालय जनपद पंचायत तमनार जिला रायगढ़ (छ0ग0) के पत्र क्रमांक 777/ज.प./ग्राम सभा/2015 दिनांक 26.08.2015 से ग्राम सभा का अभिमत प्राप्त हुआ सलग्न कर सादर प्रेषित है।

3. आवेदित भूमि कोल ब्लॉक क्षेत्र के अन्तर्गत प्रभावित नही है।

अतः जांच प्रतिवेदन अग्रिम कार्यवाही हेतु सादर प्रेषित ।

सलग्न :–उपरोक्तानुसार ।

अनुविभागीय अधिकारी
(राजस्व)घरघोड़ा

Rs.5 INDIA भारत FIVE RUPEES CANCELLED

Memo 544

Annexure VI

REPORT

ON

IMPACT ASSESSMENT DUE TO TRANSPORTATION OF COAL

FROM
MCL AND SECL MINES
TO
4 X 600 MW POWER PLANT
AT
VILLAGE- TAMNAR,
DISTRICT - RAIGARH, CHHATTISGARH

OF

M/s JINDAL POWER Ltd.

AUGUST, 2016
(Issue 01, Rev. 0)

Prepared by:

Estb. 1983

MIN MEC CONSULTANCY PVT. LTD.
A-121, Paryavaran Complex, IGNOU Road, New Delhi – 110 030
Ph : 29534777, 29532236, 29535891 ; Fax: +91-11-29532568
Email :min_mec@vsnl.com; Web site : http://www.minmec.co.in

An ISO 9001:2008 approved company

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

1.0 INTRODUCTION

Jindal Power Limited (JPL) has installed Coal Based Thermal Power Plant of 3400 MW capacity which constitutes 4x250 MW and 4x 600 MW (Expansion Project).

Units 1 & 2 of expansion project (4x600 MW) are based on coal being sourced from MCL & SECL mines whereas Units 3 & 4 of expansion project are based on Imported coal.

Coal for Units 1 & 2 of the Expansion project is presently being transported by road from MCL & SECL Mines to the Power Plant for which necessary time bound permission to transport the coal by road has been granted by MOEF.

Similarly imported coal for Units 3 & 4 is being transported by road from Raigarh Railway siding to the Power Plant and the permission for the same has been granted by MoEF, Now the Company has proposed to change Coal source of Units 3 & 4 from Imported Coal to Domestic Coal to be procured through special E-auction route from MCL & SECL mines being conducted by Ministry of Coal (MoC) and transport the same by road.

To assess the impact due to the proposed transportation of domestic coal from MCL and SECL mines for Units 3 & 4, the following have been carried out:

(i) Traffic and road surveys for assessment of carrying capacity and

(ii) Air quality modelling for impact assessment of incremental ground level concentration of air pollutants.

Both the above are described in subsequent sections.

The road width measurement, traffic surveys and the air quality prediction modelling was carried out by staff of M/s Min Mec R&D Laboratory, New Delhi between 22 - 26th July, 2016. Min Mec has ISO 17025 accreditation from NABL (Certificate no. T-1157) & recognition from MoEF (Sl. No. 97 of Gazette dated 22.05.2012). Also necessary required Contractual manpower required during survey at various locations was also provided by the Jindal Power Limited.

2.0 ASSESSMENT OF PROPOSED ROAD FOR ITS CATEGORISATION & CARRYING CAPACITY AS PER IRC 64 (1990)-GUIDELINES ON CAPACITY OF ROADS IN RURAL AREA

2.1 Road width measurement

The proposed route of coal transportation

1. From Kulda/ Basundhra mines to JPL (Route-1) is approximately 42 km,

2. Barod/ Jampali mines to JPL (Route-2) it is about 39 km

3. Chhal mine to JPL (Route-3) it is about 51 km

The route via various villages is given below:

ROUTE 1- Kulda/ Basundhra Mines to JPL	Distance in Km from Kulda	ROUTE 2- Barod/ Jampali Mines to JPL	Distance in Km from Barod	ROUTE 3- Chhal Mines to JPL	Distance in Km from Chall
Gopalpur	2.9	Phaguram	3.8	Khedapali	1.0
Hamirpur	23.7	Teram	6.9	Nawapara	17.3
Dhaurabhanta	31.7	Gharghoda	12.0	Baihamura	24.0
Plant	41.3	Amaghat	32.0	Amlidih	32.0
		Tamnar	35.8	Amaghat	44.6
		Plant	38.1	Tamnar	48.3
				Plant	50.6

The width of the road was measured. Since the road width was not uniform, the road length traversed till the road width changed and at that location road width was measured. Thus, at a total of 21 locations road width measurement was carried out, which are shown in **Fig. 1**.

The width of the road was measured at each location by using metre tape and the road widths along with their geographical coordinates are given in **Table 1**. The photographs of these points can be seen in ***Annexure 1***.

FIG. 1: PROPOSED ROUTE ALIGNMENT FROM MCL AND SECL MINES TO JPL AT TAMNAR WITH LOCATION CODES OF ROAD MEASUREMENT & TRAFFIC CENSUS POINTS

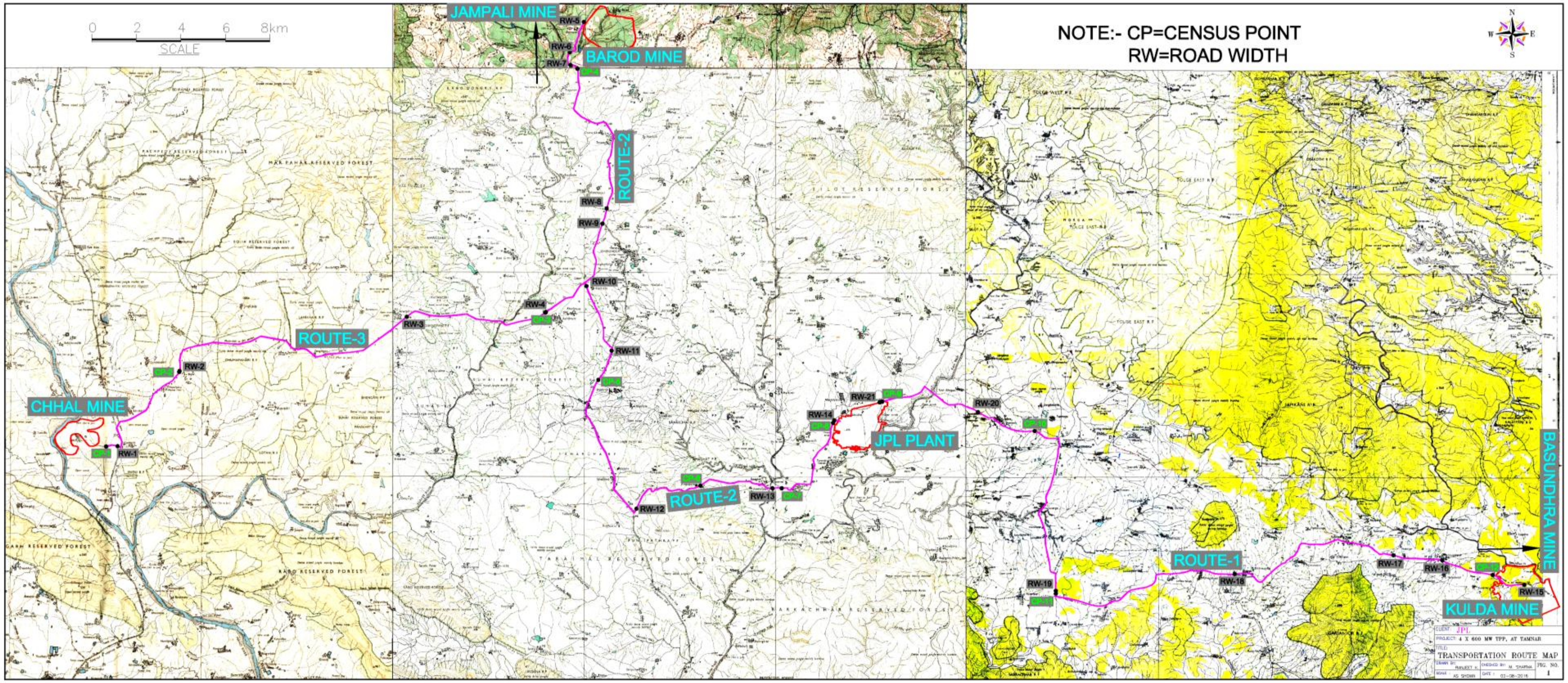


TABLE 1
ROAD WIDTH MEASURED

Location	Latitude, N	Longitude, E	Road Width, m
Chhal Mine to Gharghoda Bypass			
1.	22°05’47.8”	83°07’43.3”	7.0
2.	22°07’37.2”	83°09’19.0”	7.1
3.	22°08’57.2”	83°15’13.5”	6.7
4.	22°09’04.6”	83°18’52.9”	7.0
Barod Mine to Gharghoda Bypass			
5.	22°16’15.4”	83°19’53.4”	7.0
6.	22°15’24.9”	83°19’26.6”	10.1
7.	22°15’06.9”	83°19’30.2”	5.9
8.	22°11’35.3”	83°20’28.9”	5.6
9.	22°11’13.4”	83°20’22.1”	6.2
Gharghoda Bypass to Plant			
10.	22°09’42.3”	83°19’55.6”	6.7
11.	22°08’09.3”	83°20’36.4”	5.8
12.	22°04’10.5”	83°21’12.9”	6.0
13.	22°04’46.2”	83°24’46.6”	7.1
14.	22°06’26.0”	83°26’25.2”	7.0
Kulda Mine to Plant			
15.	22°02’25.7”	83°44’22.7”	5.6
16.	22°02’58.2”	83°42’17.5”	6.6
17.	22°03’08.5”	83°40’59.4”	7.0
18.	22°02’40.1”	83°36’52.1”	7.2
19.	22°02’12.6”	83°32’08.6”	7.0
20.	22°06’39.3”	83°30’05.9”	16.2
21.	22°06’53.1”	83°27’39.5”	16.5

Roads are provided with good shoulders on either sides, thus, can be expected to support 15% additional volume than the designed service volume as per IRC 64:1990. The locations of the width measurement from MCL and SECL mines to JPL are shown in Photograph 1 to Photograph 21 (Each location refers to its corresponding no. photograph) in ***Annexure 1***.

2.2 Traffic Survey

The traffic survey was conducted as per IRC: 9-1972. The sites for traffic survey monitoring were fixed away from the villages or intersections. The roads were studied at various sections. The traffic density was monitored in the up and down directions of the following locations:

- Census Point 1- Near Chhal Mines
- Census Point 2- Near Bhojia Village
- Census Point 3- Near Baihamuda Village
- Census Point 4- Near Barod Mines
- Census Point 5- Near Bhalumar Village
- Census Point 6- Near Jhingolpara Village
- Census Point 7- Near Gorhi Village
- Census Point 8- Near JPL Gate No. 5
- Census Point 9- Near JPL Gate No. 3
- Census Point 10- Near Dhaurabhatta Village
- Census Point 11- Near Hamirpur Village
- Census Point 12- Near Kulda Mines

The locations can be seen in **Fig 1** and their photographs in ***Annexure 1***. The monitoring was done at each location for a period of 24 hours continuously. The observed traffic density has been processed for an interval of 1 hour. The total no. of vehicles was calculated on hourly basis as well as for 24 hours. The monitoring plan included the following vehicles namely LMV, buses, trucks, motor cycles and scooters, cycles and the others.

2.3 Traffic Load Carrying Capacity of the Road

In the study, the route considered is a rural highway, which is considered as an all-purpose road, with no control of access and with heterogeneous mix of fast and slow-moving vehicles.

There are two terms which are two be considered - (a) Capacity and (b) Design Service Volume

(i) Capacity is defined as the maximum hourly volume (Vehicles per hour) at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions.

(ii) Design Service Volume is defined as the maximum hourly volume (Vehicles per hour) at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions while maintaining a designated level of service.

Under normal circumstance, use of Level of Service “B” (available are from A to F) is considered adequate for the design of rural highways. At this level, volume of traffic will be around 0.5 times the maximum capacity and this is taken as the “design service volume” for the purpose of adopting design values.

The recommended design service volume for plain roads with low curvature (0-50 degrees/km) as is the case in the study area is given in **Table 2**.

TABLE 2
RECOMMENDED DESIGN SERVICE VOLUMES FOR PLAIN ROADS WITH LOW CURVATURE AS PER IRC: 64-1990

Type of Road	Description	Recommended Design Service Volume in PCU/day
Single Lane Roads	A single lane bi-directional road should have at least 3.75 metre wide paved carriageway with good quality shoulders such as moorum shoulders of minimum 1.0 metre width on either side.	2000
Intermediate Lane Roads	Intermediate lane roads should have a pavement width of around 5.5 metre with good usable shoulders on either side	6000
Two Lane Roads	Two lane roads shall have a 7 metre wide carriageway and good earthen shoulders	15000
Two Lane Roads +	Two lane roads + paved & surface shoulders of atleast 1.5 m width on either side	17250

In case of two lane roads, where the shoulder width or carriageway width on a two lane road are restricted, there will be a certain reduction in capacity. **Table 3** given the recommended reduction factors in this account over the capacity values given in **Table 2**.

TABLE 3
CAPACITY REDUCTION FACTORS SUGGESTED FOR SUB-STANDARD LANE AND SHOULDER WIDTH ON TWO-LANE ROAD

Usable shoulder width, m	3.50 m lane	3.25 m lane	3.00 m lane
>/= 1.8	1.0	0.92	0.84
1.2	0.92	0.85	0.77
0.6	0.81	0.75	0.68
0	0.70	0.64	0.58

2.4 Current load on proposed route

The current traffic load on the proposed route was monitored as per procedure outlined in IRC: 9-1972. Slow moving vehicles produce interference to the free movement of traffic. Hence, to account for the interaction of the different kinds of vehicles moving on the route, the capacity of the roads has been converted into Passenger Car Unit as per IRC: 64-1990 and the current traffic load was found after applying the conversion factors. The current traffic is given in **Table 4** and **Table 5**.

2.5 Additional Traffic on proposed route

The traffic volume estimated due to the movement of trucks for transportation of coal has been assessed as follows:

Proposed Capacity of coal to be transported for units 3 and 4	13187 Tonnes/day
Carrying capacity of dumpers	40 Tonnes
Daily movement of dumpers at present	330 No./day
Total no. of additional dumpers required	330 No./day
Hourly dumper movement (to & fro)	28 Nos.
Daily dumper movement (to & fro)	672 Nos.

Scenarios:

There are three routes and the distribution of the 672 trucks on these three routes has been considered under two scenarios as follows:

(1) ***Scenario 1*** - equal distribution of anticipated trucks on all three routes i.e. 220 trucks on route 1, 2 & 3.

(2) ***Scenario 2*** - 50% of the anticipated traffic (384 trucks) will be on route 1 to Kulda/ Basundhra, 25% on route 2 to Barod/ Jampali and 25% on route 3 to Chhal (144 trucks each).

Table 4 for Scenario 1 and **Table 5** for Sceanrio 2 also shows the road width, the design service volume according to road width, the present plus proposed traffic expressed as a percentage of the designed service volume of the road.

TABLE 4
SCENARIO 1: CARRYING CAPACITY CALCULATION FOR ROAD LENGTH FROM MCL AND SECL MINES TO JPL (FOR EXISTING AND ADDITIONAL TRAFFIC INCLUDING COAL CARRYING TRUCKS TO PLANT) FOR 220 TRUCKS PER DAY (TO & FRO) ON EACH ROUTE

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		**0.50**	**0.50**	**1.00**	**3.00**	**3.00**	**8.00**	**1.50**		**3.00**					
3	**1**	**Near Chhal Mine (UP)**	Observed count	308	501	445	17	991	0	19	**2281**	110	**2391**				
			Equivalent PCU	154	251	445	51	2973	0	29	**3902**	330	**4232**				
		Near Chhal Mine (Down)	Observed count	307	623	435	14	975	0	20	**2374**	110	**2484**				
			Equivalent PCU	154	311.5	435	42	2925	0	30	**3897**	330	**4227**				
			Sub Total of Equivalent PCU	**308**	**562**	**880**	**93**	**5898**	**0**	**59**	**7799**	**660**	**8459**	**10.6**	**15000**	**30000**	**DSV-56.4 MC- 28.2**
3	**2**	**Near Bhojia (UP)**	Observed count	71	578	203	23	621	0	13	**1509**	110	**1619**				
			Equivalent PCU	36	289	203	69	1863	0	20	**2479**	330	**2809**				
		Near Bhojia (Down)	Observed count	115	646	267	22	776	3	19	**1848**	110	**1958**				
			Equivalent PCU	58	323	267	66	2328	24	29	**3094**	330	**3424**				
			Sub Total of Equivalent PCU	**93**	**612**	**470**	**135**	**4191**	**24**	**48**	**5573**	**660**	**6233**	**7.0**	**15000**	**30000**	**DSV-41.6 MC- 20.8**
3	**3**	**Near Baihamura (UP)**	Observed count	152	654	455	27	673	0	25	**1986**	110	**2096**				
			Equivalent PCU	76	327	455	81	2019	0	38	**2996**	330	**3326**				
		Near Baihamura (Down)	Observed count	212	749	498	33	700	0	35	**2227**	110	**2337**				
			Equivalent PCU	106	375	498	99	2100	0	53	**3230**	330	**3560**				
			Sub Total of Equivalent PCU	**182**	**702**	**953**	**180**	**4119**	**0**	**90**	**6226**	**660**	**6886**	**7.0**	**15000**	**30000**	**DSV-45.9 MC- 22.9**
2	**4**	**Near Barod Mine (UP)**	Observed count	121	599	569	68	699	0	27	2083	110	**2193**				
			Equivalent PCU	61	300	569	204	2097	0	41	3271	330	**3601**				
		Near Barod Mine (Down)	Observed count	80	639	481	76	651	0	22	1949	110	**2059**				
			Equivalent PCU	40	320	481	228	1953	0	33	3055	330	**3385**				
			Sub Total of	**101**	**619**	**1050**	**432**	**4050**	**0**	**74**	**6325**	**660**	**6985**	**5.6**	**6000 at LOS B**	**12000**	**DSV-116.4 at**

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		**0.50**	**0.50**	**1.00**	**3.00**	**3.00**	**8.00**	**1.50**		**3.00**					
			Equivalent PCU												**8400 at LOS C**		**LOS B, 83.15 at LOS C MC- 58.2**
2	**5**	**Near Bhalumar (UP)**	Observed count	50	669	626	83	761	0	17	**2206**	220	**2426**				
			Equivalent PCU	25	335	626	249	2283	0	26	**3543**	660	**4203**				
		Near Bhalumar (Down)	Observed count	42	881	702	89	896	0	23	**2633**	220	**2853**				
			Equivalent PCU	21	441	702	267	2688	0	35	**4153**	660	**4813**				
			Sub Total of Equivalent PCU	**46**	**775**	**1328**	**516**	**4971**	**0**	**60**	**7696**	**1320**	**9016**	**7.0**	**15000**	**30000**	**DSV-60.1 MC- 30.0**
2	**6**	**Near Jhingolpara (UP)**	Observed count	144	575	444	41	801	0	24	**2029**	220	**2249**				
			Equivalent PCU	72	288	444	123	2403	0	36	**3366**	660	**4026**				
		Near Jhingolpara (Down)	Observed count	200	607	418	33	750	0	15	**2023**	220	**2243**				
			Equivalent PCU	100	304	418	99	2250	0	23	**3193**	660	**3853**				
			Sub Total of Equivalent PCU	**172**	**591**	**862**	**222**	**4653**	**0**	**59**	**6559**	**1320**	**7879**	**7.0**	**15000**	**30000**	**DSV-52.5 MC- 26.2**
2	**7**	**Near Gorhi (UP)**	Observed count	273	786	409	49	752	0	26	**2295**	220	**2515**				
			Equivalent PCU	137	393	409	147	2256	0	39	**3381**	660	**4041**				
		Near Gorhi (Down)	Observed count	286	680	442	43	750	8	33	**2242**	220	**2462**				
			Equivalent PCU	143	340	442	129	2250	64	50	**3418**	660	**4078**				
			Sub Total of Equivalent PCU	**280**	**733**	**851**	**276**	**4506**	**64**	**89**	**6798**	**1320**	**8118**	**7.1**	**15000**	**30000**	**DSV-54.1 MC- 27.0**

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		**0.50**	**0.50**	**1.00**	**3.00**	**3.00**	**8.00**	**1.50**		**3.00**					
2	**8**	**Near JPL Gate No. 5 (UP)**	Observed count	622	1400	630	125	1003	1	33	**3814**	220	**4034**				
			Equivalent PCU	311	700	630	375	3009	8	50	**5083**	660	**5743**				
		Near JPL Gate No. 5 (Down)	Observed count	569	1205	590	95	1028	0	33	**3520**	220	**3740**				
			Equivalent PCU	285	603	590	285	3084	0	50	**4896**	660	**5556**				
			Sub Total of Equivalent PCU	**596**	**1302.5**	**1220**	**660**	**6093**	**8**	**99**	**9978**	**1320**	**11298**	**7.2**	**15000**	**30000**	**DSV-75.3 MC- 37.6**
1	**9**	**Near JPL Gate No. 3 (UP)**	Observed count	233	1263	688	113	802	0	33	**3132**	110	**3242**				
			Equivalent PCU	117	632	688	339	2406	0	50	**4231**	330	**4561**				
		Near JPL Gate No. 3 (Down)	Observed count	288	1481	719	73	764	0	32	**3357**	110	**3467**				
			Equivalent PCU	144	741	719	219	2292	0	48	**4163**	330	**4493**				
			Sub Total of Equivalent PCU	**261**	**1372**	**1407**	**558**	**4698**	**0**	**98**	**8393**	**660**	**9053**	**16.4**	**15000**	**30000**	**DSV-60.4 MC- 30.2**
1	**10**	**Near Dhaurabhatta (UP)**	Observed count	219	1452	330	39	891	0	24	**2955**	110	**3065**				
			Equivalent PCU	110	726	330	117	2673	0	36	**3992**	330	**4322**				
		Near Dhaurabhatta (Down)	Observed count	189	1319	319	22	779	0	26	**2654**	110	**2764**				
			Equivalent PCU	95	660	319	66	2337	0	39	**3515**	330	**3845**				
			Sub Total of Equivalent PCU	**204**	**1386**	**649**	**183**	**5010**	**0**	**75**	**7507**	**660**	**8167**	**7.0**	**15000**	**30000**	**DSV-54.4 MC- 27.2**

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		**0.50**	**0.50**	**1.00**	**3.00**	**3.00**	**8.00**	**1.50**		**3.00**					
1	**11**	**Near Hamirpur (UP)**	Observed count	74	595	241	225	536	0	12	**1683**	110	**1793**				
			Equivalent PCU	37	298	241	675	1608	0	18	**2877**	330	**3207**				
		Near Hamirpur (Down)	Observed count	93	552	209	22	832	0	22	**1730**	110	**1840**				
			Equivalent PCU	47	276	209	66	2496	0	33	**3127**	330	**3457**				
			Sub Total of Equivalent PCU	**84**	**573.5**	**450**	**741**	**4104**	**0**	**51**	**6003**	**660**	**6663**	**7.0**	**15000**	**30000**	**DSV-44.4 MC- 22.2**
1	**12**	**Near Kulda Mines (UP)**	Observed count	559	986	457	37	686	8	123	**2289**	110	**2399**				
			Equivalent PCU	280	493	457	111	2058	64	185	**3368**	330	**3698**				
		Near Kulda Mines (Down)	Observed count	518	870	437	41	618	4	67	**2037**	110	**2147**				
			Equivalent PCU	259	435	437	123	1854	32	101	**2982**	330	**3312**				
			Sub Total of Equivalent PCU	**539**	**928**	**894**	**234**	**3912**	**96**	**285**	**6349**	**660**	**7009**	**6.0**	**8700**	**17400**	**DSV-80.6 MC- 40.3**

* ***Note**: As per the "Assessment of Impact Due to Transportation of Coal Through Road From Mines to TPP at Tamnar" report prepared by EMTRC Consultants Private Limited, April 2013, the road width near Kulda mine site was reported as 6.7 m. At the time of site visit by team of M/s Min Mec R&D Laboratory in July 2016, it was reported that though the road near Kulda mine site was wider, but the repairing of road had been done only for a width of 6.0 m, thus, reducing its* original *carriageway width. All the roads surveyed around the project are two lane roads. As per IRC: 64-1990, if the carriageway width on a two lane road is restricted, then there is a certain reduction in carrying capacity. The road near Kulda mine has a lane width of 3.00m and are without any shoulders, so as per Table 5 of IRC: 64-1990 the reduction factor has been taken as 0.58% of 15000 (Design Service Volume of Two Lane Roads). Thus, the effective carrying capacity of the road near Kulda mine site comes out to be 8700 PCU/day.*

It can be seen from the above table that the current traffic volume plus the projected additional traffic volume on all Census Points on the entire length of Route 1 (Kulda/ Badundhara to plant) will be well within the Design Service Volumes (DSV) i.e. Varying between 44.4% to

86.8% of the DSV. The Maximum capacity the roads can carry is around twice the DSV and the future load will be between 22.2 to 43.4% of the maximum capacity. Thus, route 1 is capable of supporting the present as well as the additional traffic.

On Route 2 (Barod/ Jampali to Plant), the current traffic volume plus the projected additional traffic volume on all Census Points (except one near Barod) on the entire length will be well within the Design Service Volumes (DSV). The present plus additional traffic is varying between 52.5% to 116.4% of the DSV. However, since the Maximum capacity the roads is around twice the DSV and the future load will be between 26.2 to 58.2% of the maximum capacity. Thus, route 2 is capable of supporting the present as well as the additional traffic. In view of the DSV utilisation at Barod, which is 16.4% higher than designed, the State Government may be requested to strengthen the shoulders for a width of 0.6 m on either side or widen the carriage to its previous width (by 0.4 m to more than 6 m) to ensure Level of Service "B". If there is no action taken for strengthening of shoulders/ widening of carriageway, the only impact on traffic would be that it will be lowered from Level of Service "B" to Level of Service "C", wherein the DSV is 40% higher than that of "B". It may be noted that there are six levels of service available from "A" (highest, free flow) to "F" (lowest, forced or breakdown flow) and the DSV is generally designed for Level of Service "B" with flexibility allowed in IRC : 64-1990 for Level of Service "C". Thus, the utilisation of DSV at Level of Service "C" for current and additional traffic would be 83.15%.

It may be further noted that the existing traffic on Census point 6, 7 and 8 are comprising of trucks carrying imported coal from Raigarh to the plant for the Unit 3. When the coal will come from domestic sources, there will be a reduction of 336 trucks/day at these Census points, therefore, further decreasing the traffic by 2.2% of DSV at all the three Census points 6, 7 and 8. Thereafter addition of additional anticipated traffic shall occur.

On Route 3 (Chhal to Plant), the current traffic volume plus the projected additional traffic volume on all Census Points on the entire length will be well within the Design Service Volumes (DSV). The present plus additional traffic is varying between 41.6% to 56.4% of the DSV. However, since the Maximum capacity the roads is around twice the DSV and the future load will be between 20.8 to 28.2% of the maximum capacity. Thus, route 3 is capable of supporting the present as well as the additional traffic.

TABLE 5

SCENARIO 2 : CARRYING CAPACITY CALCULATION FOR ROAD LENGTH FROM MCL AND SECL MINES TO JPL (FOR EXISTING AND ADDITIONAL TRAFFIC INCLUDING COAL CARRYING TRUCKS TO PLANT) FOR 384, 144, 144 TRUCKS PER DAY (TO & FRO) ON ROUTE 1, 2 AND 3 RESPECTIVELY

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		0.50	0.50	1.00	3.00	3.00	8.00	1.50		3.00					
3	1	Near Chhal Mine (UP)	Observed count	308	501	445	17	991	0	19	**2281**	72	**2281**				
			Equivalent PCU	154	251	445	51	2973	0	29	**3902**	216	**4118**				
		Near Chhal Mine (Down)	Observed count	307	623	435	14	975	0	20	**2374**	72	**2374**				
			Equivalent PCU	154	311.5	435	42	2925	0	30	**3897**	216	**4113**				
			Sub Total of Equivalent PCU	**308**	**562**	**880**	**93**	**5898**	**0**	**59**	**7799**	**432**	**8231**	**10.6**	**15000**	**30000**	**DSV-54.9 MC- 27.4**
3	2	Near Bhojia (UP)	Observed count	71	578	203	23	621	0	13	**1509**	72	**1581**				
			Equivalent PCU	36	289	203	69	1863	0	20	**2479**	216	**2695**				
		Near Bhojia (Down)	Observed count	115	646	267	22	776	3	19	**1848**	72	**1920**				
			Equivalent PCU	58	323	267	66	2328	24	29	**3094**	216	**3310**				
			Sub Total of Equivalent PCU	**93**	**612**	**470**	**135**	**4191**	**24**	**48**	**5573**	**432**	**6005**	**7.0**	**15000**	**30000**	**DSV-40.0 MC-20.0**
3	3	Near Baihamura (UP)	Observed count	152	654	455	27	673	0	25	**1986**	72	**2058**				
			Equivalent PCU	76	327	455	81	2019	0	38	**2996**	216	**3212**				
		Near Baihamura (Down)	Observed count	212	749	498	33	700	0	35	**2227**	72	**2299**				
			Equivalent PCU	106	375	498	99	2100	0	53	**3230**	216	**3446**				
			Sub Total of Equivalent PCU	**182**	**702**	**953**	**180**	**4119**	**0**	**90**	**6226**	**432**	**6658**	**7.0**	**15000**	**30000**	**DSV-44.4 MC-22.2**
2	4	Near Barod Mine (UP)	Observed count	121	599	569	68	699	0	27	2083	72	**2155**				

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		0.50	0.50	1.00	3.00	3.00	8.00	1.50		3.00					
			Equivalent PCU	61	300	569	204	2097	0	41	3271	216	**3487**				
		Near Barod Mine (Down)	Observed count	80	639	481	76	651	0	22	1949	72	**2021**				
			Equivalent PCU	40	320	481	228	1953	0	33	3055	216	**3271**				
			Sub Total of Equivalent PCU	**101**	**619**	**1050**	**432**	**4050**	**0**	**74**	**6325**	**432**	**6757**	**5.6**	**6000 at LOS B 8400 at LOS C**	**12000**	**DSV-112.6 at LOS B, 80.4 at LOS C MC-56.3**
2	**5**	**Near Bhalumar (UP)**	Observed count	50	669	626	83	761	0	17	**2206**	144	**2350**				
			Equivalent PCU	25	335	626	249	2283	0	26	**3543**	432	**3975**				
		Near Bhalumar (Down)	Observed count	42	881	702	89	896	0	23	**2633**	144	**2777**				
			Equivalent PCU	21	441	702	267	2688	0	35	**4153**	432	**4585**				
			Sub Total of Equivalent PCU	**46**	**775**	**1328**	**516**	**4971**	**0**	**60**	**7696**	**864**	**8560**	**7.0**	**15000**	**30000**	**DSV-57.1 MC-28.5**
2	**6**	**Near Jhingolpara (UP)**	Observed count	144	575	444	41	801	0	24	**2029**	144	**2173**				
			Equivalent PCU	72	288	444	123	2403	0	36	**3366**	432	**3798**				
		Near Jhingolpara (Down)	Observed count	200	607	418	33	750	0	15	**2023**	144	**2167**				
			Equivalent PCU	100	304	418	99	2250	0	23	**3193**	432	**3625**				
			Sub Total of Equivalent PCU	**172**	**591**	**862**	**222**	**4653**	**0**	**59**	**6559**	**864**	**7423**	**7.0**	**15000**	**30000**	**DSV-49.5**

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		0.50	0.50	1.00	3.00	3.00	8.00	1.50		3.00					
																	MC-24.7
2	**7**	**Near Gorhi (UP)**	Observed count	273	786	409	49	752	0	26	**2295**	144	**2439**				
			Equivalent PCU	137	393	409	147	2256	0	39	**3381**	432	**3813**				
		Near Gorhi (Down)	Observed count	286	680	442	43	750	8	33	**2242**	144	**2386**				
			Equivalent PCU	143	340	442	129	2250	64	50	**3418**	432	**3850**				
			Sub Total of Equivalent PCU	**280**	**733**	**851**	**276**	**4506**	**64**	**89**	**6798**	**864**	**7662**	**7.1**	**15000**	**30000**	**DSV-51.1 MC-25.6**
2	**8**	**Near JPL Gate No. 5 (UP)**	Observed count	622	1400	630	125	1003	1	33	**3814**	144	**3958**				
			Equivalent PCU	311	700	630	375	3009	8	50	**5083**	432	**5515**				
		Near JPL Gate No. 5 (Down)	Observed count	569	1205	590	95	1028	0	33	**3520**	144	**3664**				
			Equivalent PCU	285	603	590	285	3084	0	50	**4896**	432	**5328**				
			Sub Total of Equivalent PCU	**596**	**1302.5**	**1220**	**660**	**6093**	**8**	**99**	**9978**	**864**	**10842**	**7.2**	**15000**	**30000**	**DSV-72.3 MC-36.1**
1	**9**	**Near JPL Gate No. 3 (UP)**	Observed count	233	1263	688	113	802	0	33	**3132**	192	**3324**				
			Equivalent PCU	117	632	688	339	2406	0	50	**4231**	576	**4807**				
		Near JPL Gate No. 3 (Down)	Observed count	288	1481	719	73	764	0	32	**3357**	192	**3549**				
			Equivalent PCU	144	741	719	219	2292	0	48	**4163**	576	**4739**				
			Sub Total of Equivalent PCU	**261**	**1372**	**1407**	**558**	**4698**	**0**	**98**	**8393**	**1152**	**9545**	**16.4**	**15000**	**30000**	**DSV-63.6 MC-31.8**

ROUTE	CENSUS POINT NO.	Location		Cycles	Motor Cycles & Scooters	LMV	Buses	Trucks	Animal Drawn vehicles	Others	Total	Additional proposed Traffic	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4	Maximum capacity (MC) as per IRC 64-1990, section 6.1 = DSV/0.5	% Utilization
		Equivalency factor		0.50	0.50	1.00	3.00	3.00	8.00	1.50		3.00					
1	**10**	**Near Dhaurabhatta (UP)**	Observed count	219	1452	330	39	891	0	24	**2955**	192	**3147**				
			Equivalent PCU	110	726	330	117	2673	0	36	**3992**	576	**4568**				
		Near Dhaurabhatta (Down)	Observed count	189	1319	319	22	779	0	26	**2654**	192	**2846**				
			Equivalent PCU	95	660	319	66	2337	0	39	**3515**	576	**4091**				
			Sub Total of Equivalent PCU	**204**	**1386**	**649**	**183**	**5010**	**0**	**75**	**7507**	**1152**	**8659**	**7.0**	**15000**	**30000**	**DSV-57.7 MC-28.8**
1	**11**	**Near Hamirpur (UP)**	Observed count	74	595	241	225	536	0	12	**1683**	192	**1875**				
			Equivalent PCU	37	298	241	675	1608	0	18	**2877**	576	**3453**				
		Near Hamirpur (Down)	Observed count	93	552	209	22	832	0	22	**1730**	192	**1922**				
			Equivalent PCU	47	276	209	66	2496	0	33	**3127**	576	**3703**				
			Sub Total of Equivalent PCU	**84**	**573.5**	**450**	**741**	**4104**	**0**	**51**	**6003**	**1152**	**7155**	**7.0**	**15000**	**30000**	**DSV-47.7 MC-23.8**
1	**12**	**Near Kulda Mines (UP)**	Observed count	559	986	457	37	686	8	123	**2289**	192	**2481**				
			Equivalent PCU	280	493	457	111	2058	64	185	**3368**	576	**3944**				
		Near Kulda Mines (Down)	Observed count	518	870	437	41	618	4	67	**2037**	192	**2229**				
			Equivalent PCU	259	435	437	123	1854	32	101	**2982**	576	**3558**				
			Sub Total of Equivalent PCU	**539**	**928**	**894**	**234**	**3912**	**96**	**285**	**6349**	**1152**	**7501**	**6.0***	**8700**	**17400**	**DSV-86.2 MC-43.1**

* ***Note**: As per the "Assessment of Impact Due to Transportation of Coal Through Road From Mines to TPP at Tamnar" report prepared by EMTRC Consultants Private Limited, April 2013, the road width near Kulda mine site was reported as 6.7 m. At the time of site visit by team of M/s Min Mec R&D Laboratory in July 2016, it was reported that though the road near Kulda mine site was wider, but the repairing of road had been done only for a width of 6.0 m, thus, reducing its* original *carriageway width. All the roads surveyed around the project are two lane roads. As per IRC: 64-1990, if the carriageway width on a two lane road is restricted, then there is a certain reduction in carrying capacity. The road near Kulda mine has a lane width of 3.00m and are without any shoulders, so as per Table 5 of IRC: 64-1990 the reduction factor has been taken as 0.58% of 15000 (Design Service Volume of Two Lane Roads). Thus, the effective carrying capacity of the road near Kulda mine site comes out to be 8700 PCU/day.*

It can be seen from the above table that the current traffic volume plus the projected additional traffic volume on all Census Points on the entire length of Route 1 (Kulda/ Badundhara to plant) will be well within the Design Service Volumes (DSV) i.e. Varying between 47.7% to 92.4% of the DSV. The Maximum capacity the roads can carry is around twice the DSV and the future load will be between 23.8 to 46.2% of the maximum capacity. Thus, route 1 is capable of supporting the present as well as the additional traffic.

On Route 2 (Barod/ Jampali to Plant), the current traffic volume plus the projected additional traffic volume on all Census Points (except one near Barod) on the entire length will be well within the Design Service Volumes (DSV). The present plus additional traffic is varying between 49.5% to 112.6% of the DSV. However, since the Maximum capacity the roads is around twice the DSV and the future load will be between 24.7 to 56.3% of the maximum capacity. Thus, route 2 is capable of supporting the present as well as the additional traffic. In view of the DSV utilisation at Barod, which is 12.6% higher than designed, the State Government may be requested to strengthen the shoulders for a width of 0.6 m on either side or widen the carriage to its previous width (by 0.4 m to more than 6 m) to ensure Level of Service "B". If there is no action taken for strengthening of shoulders/ widening of carriageway, the only impact on traffic would be that it will be lowered from Level of Service "B" to Level of Service "C", wherein the DSV is 40% higher than that of "B". It may be noted that there are six levels of service available from "A" (highest, free flow) to "F" (lowest, forced or breakdown flow) and the DSV is generally designed for Level of Service "B" with flexibility allowed in IRC : 64-1990 for Level of Service "C". Thus, the utilisation of DSV at Level of Service "C" for current and additional traffic would be 80.4%.

It may be further noted that the existing traffic on Census point 6, 7 and 8 are comprising of trucks carrying imported coal from Raigarh to the plant for the Unit 3. When the coal will come from domestic sources, there will be a reduction of 336 trucks/day at these Census points, therefore, further decreasing the traffic by 2.2% of DSV at all the three Census points 6, 7 and 8. Thereafter addition of additional anticipated traffic shall occur.

On Route 3 (Chhal to Plant), the current traffic volume plus the projected additional traffic volume on all Census Points on the entire length will be well within the Design Service Volumes (DSV). The present plus additional traffic is varying between 40.0% to 54.9% of the DSV. However, since the Maximum capacity the roads is around twice the DSV and the future load will be between 20.0 to 27.4% of the maximum capacity. Thus, route 3 is capable of supporting the present as well as the additional traffic.

2.6 Growth in existing traffic

It is proposed to use the road for coal transportation for 3 years. During three years, the existing road traffic is likely to experience a natural growth also, which is affected by the following factors:

Economic	1.	Gross National Product (GNP) or Gross Domestic Product (GDP)
	2.	Agricultural Output
	3.	Industrial Output
Demographic	4.	Population
	5.	Rural/ Urban mix of population

The natural growth can be assessed through various ways which is related to either one or more of the above parameters. Past trends of data related to traffic flow from census, vehicle registration or fuel sales can also be used, if available. In this case, being a rural road, past trend data was not available for sufficient number of years from authentic sources for extrapolations. Hence, a growth rate of 2.26% has been assumed on the basis of 22.6% population growth rate in Chhattisgarh in the previous decade, as per Census 2001 & 2011.

The growth in traffic has been projected for three years based on the formula prescribed by IRC:108-1996 (Guidelines for Traffic Prediction on Rural Highways) in **Table 4** for **Scenario 1** where 220 additional trucks have been considered on all the three routes. **Scenario 2** is represented in **Table 5,** which shows the growth in traffic when 384 and 144 additional trucks would be plying on Route-1 and Route-2, 3 respectively.

The formula used for projection is $Pn = Po(1+r)^n$

Where

Pn = Traffic in the nth year i.e. in 3 years

Po = Traffic flow in the base year

n = number of years (3 years)

r = annual rate of growth of traffic, expressed in decimals. (0.0226)

The projections have been made and given in **Table 6** and **Table 7**.

TABLE 6

SCENARIO 1: CARRYING CAPACITY CALCULATION FOR ROAD LENGTH FROM MCL AND SECL MINES TO JPL FOR 220 TRUCKS PER DAY (TO & FRO) ON EACH ROUTE (FOR PROJECTED TRAFFIC AFTER 3 YEARS)

Route	Census Point No.	Location	Total (Year 2016), PCU	Projected Traffic after 3 years, PCU	Additional proposed Traffic, PCU	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4		Maximum capacity as per IRC 64-1990, section 6.1 = DSV/0.5	
								Capacity	% utilised	Capacity	% utilised
3	1	Near Chhal Mine (Up & Down)	7799	8337	660	8997	10.6	15000	60	30000	30
3	2	Near Bhojia (Up & Down)	5573	5958	660	6618	7.0	15000	44	30000	22
3	3	Near Baihamura (Up & Down)	6226	6656	660	7316	7.0	15000	49	30000	24.5
2	4	Near Barod Mine (Up & Down)	6325	6761	660	7421	5.6	6000 at LOS B 8400 at LOS C	124 88	12000	62
2	5	Near Bhalumar (Up & Down)	7696	8227	1320	9547	7.0	15000	64	30000	32
2	6	Near Jhingolpara (Up & Down)	6559	7012	1320	8332	7.0	15000	56	30000	28
2	7	Near Gorhi (Up & Down)	6798	7267	1320	8587	7.1	15000	57	30000	28.5
2	8	Near JPL Gate No. 5 (Up & Down)	9978	10666	1320	11986	7.2	15000	80	30000	40
1	9	Near JPL Gate No. 3 (Up & Down)	8393	8972	660	9632	16.4	15000	64	30000	32
1	10	Near Dhaurabhatta (Up & Down)	7507	8025	660	8685	7.0	15000	58	30000	59
1	11	Near Hamirpur (Up & Down)	6003	6417	660	7077	7.0	15000	47	30000	23.5
1	12	Near Kulda Mine (Up & Down)	6349	6787	660	7447	6.0	8700	86	17400	43

Note : ***Kindly refer to notes below Tables 4 & 5 regarding Design Service volume calculations, Level of Service provides and Maximum capacity calculation.***

Thus, from **Table 6** it can be seen that after considering the natural growth rate in traffic, the roads at all points will have sufficient capacity to accommodate the present & proposed traffic for the next three years, including Census point 4 near Barod mine, where the road width is narrow and therefore, the Level of Service will reduce from “B” to “C” for Design Service Volume. It may be noted that the maximum capacity is around twice of the design service volume at level of service B, the projected volume at all points will be well within the maximum capacity i.e. Between 22% to 62%.

TABLE 7
SCENARIO 2: CARRYING CAPACITY CALCULATION FOR ROAD LENGTH FROM MCL AND SECL MINES TO JPL FOR 384, 144, 144 TRUCKS PER DAY (TO & FRO) ON ROUTE 1, 2 AND 3 RESPECTIVELY (FOR PROJECTED TRAFFIC AFTER 3 YEARS)

Route	Census Point No.	Location	Total (Year 2016), PCU	Projected Traffic after 3 years, PCU	Additional proposed Traffic, PCU	Total resultant traffic in future	Width of road (m)	Design Service Volume (DSV) in PCU/day as per IRC:64-1990, Table 3&4		Maximum capacity as per IRC 64-1990, section 6.1 = DSV/0.5	
								Capacity	% utilised	Capacity	% utilised
3	1	Near Chhal Mine (Up & Down)	7799	8337	432	8769	10.6	15000	58	30000	29
3	2	Near Bhojia (Up & Down)	5573	5958	432	6390	7	15000	43	30000	21.5
3	3	Near Baihamura (Up & Down)	6226	6656	432	7088	7	15000	47	30000	23.5
2	4	Near Barod Mine (Up & Down)	6325	6761	432	7193	5.6	6000 at LOS B 8400 at LOS C	120 86	12000	60
2	5	Near Bhalumar (Up & Down)	7696	8227	864	9091	7	15000	61	30000	30.5
2	6	Near Jhingolpara (Up & Down)	6559	7012	864	7876	7	15000	53	30000	26.5
2	7	Near Gorhi (Up & Down)	6798	7267	864	8131	7.1	15000	54	30000	27
2	8	Near JPL Gate No. 5 (Up & Down)	9978	10666	864	11530	7.2	15000	77	30000	38.5
1	9	Near JPL Gate No. 3 (Up & Down)	8393	8972	1152	10124	16.4	15000	67	30000	33.5
1	10	Near Dhaurabhatta (Up & Down)	7507	8025	1152	9177	7	15000	61	30000	30.5
1	11	Near Hamirpur (Up & Down)	6003	6417	1152	7569	7	15000	50	30000	25
1	12	Near Kulda Mine (Up & Down)	6349	6787	1152	7939	6	8700	91	17400	40.5

Note : Kindly refer to notes below Tables 4 & 5 regarding Design Service volume calculations, Level of Service provides and Maximum capacity calculation.

In the second case, when the no. of trucks per day on Route 1 is 384 and on Routes 2 & 3 is 144, then it can be seen that after considering the natural growth rate in traffic, the roads at all points will have sufficient capacity to accommodate the present & proposed traffic for the next three years, including Census point 4 near Barod mine, where the road width is narrow and therefore, the Level of Service will reduce from “B” to “C” for Design Service Volume. It may be noted that the maximum capacity is around twice of the design service volume at level of service B, the projected volume at all points will be well within the maximum capacity i.e. Between 21.5% to 60%.

3.0 IMPACT DUE TO TRAFFIC

The impact of increase in traffic on various parameters of the environment is discussed in subsequent paragraphs.

3.1 Ambient Air Quality

The plying of trucks for Units 1 and 2 started in the year 2015 from MCL and SECL mines to the power plant in Tamnar. The trucks have been emitting particulates, HCs, SO_2, NOx and CO. The ambient air quality near the project, has a component of the pollutants from the coal carrying trucks as well.
The Dispersion modelling for the additional coal carrying trucks for units 3 and 4 are given in ***Annexure 2*** for Scenario 1 and ***Annexure 3*** for Scenario 2**.** As a consequence of the air quality prediction model, the incremental values for Scenario 1 and 2 are given in **Table 8**.

TABLE 8
RESULTANT AIR QUALITY AFTER PREDICTION MODELLING FOR SCENARIO 1 AND 2

Parameters	**Incremental Values from dispersion modelling (µg/m^3)**							
1	**Scenario 1**				**Scenario 2**			
	Max	**Route 1**	**Route 2**	**Route 3**	**Max**	**Route 1**	**Route 2**	**Route 3**
PM10	0.11	0.05	0.11	0.05	0.09	0.09	0.08	0.04
NOx	3.50	1.75	3.5	1.6	2.75	2.75	2.37	1.125
SO_2	0.38	0.13	0.38	0.13	0.25	0.25	0.25	<0.12
CO	3.88	1.88	3.88	1.75	3.00	3.00	2.50	0.875
HC	0.50	0.25	0.50	0.25	0.375	0.375	0.375	0.125

The particulate matter increment values in the above table pertain to the emission from the exhausts of the vehicles only. However, there will be an additional component of particulate matter in the form of dust becoming airborne from roads due to wheel movement. The dust on roads comes from various sources such as settlement of fugitive dust, spillage from vehicles, peeling of mud stuck on wheels, weathering of road itself, dust storms, etc. The movement of wheels disturbs the area under the wheels and creates disturbances in the air which are localised, temporary, and reversible. The dust becomes airborne and resettles according particle size. As per various research papers, Silt content of this dust is of consequence in addition to the speed/ weight of the vehicle to determine magnitude of airborne dust.

As per AP-42, 5th Edition of US EPA, Section 13.2.1.3, the quantity of particulate emissions from resuspension of loose material on the road surface due to vehicle travel on a dry paved road may be estimated using the following empirical expression:

$$E = k\ (sL)^{0.91} \times (W)^{1.02}$$

where: E = particulate emission factor (having units matching the units of k), k = particle size multiplier for particle size range and units of interest, which will be 0.62 gm/vehicle per km travelled as per Table 13.2.1-1 of AP-42, US EPA

sL = road surface silt loading (grams per square meter) (g/m^2). This was found to be 12.4 gm/square meter by taking average of weight measurement of dust collected over 1 m^2, at any one random location of each of the Census Points.

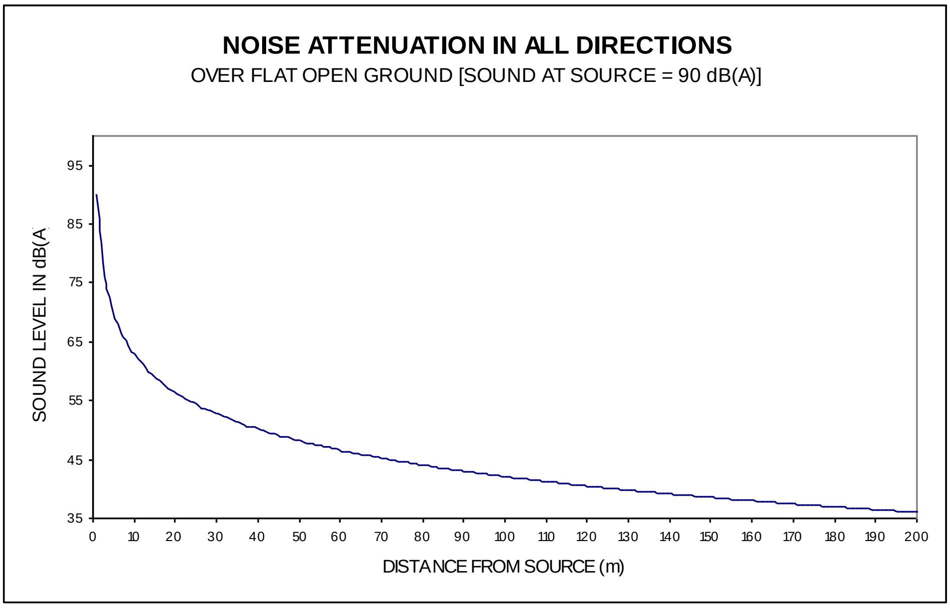
W = average weight (tons) of the vehicles traveling the road, which is 40 Tonnes for the additional traffic

Thus,
obs
$E = 0.62\ (12.4)^{0.91} \times (40)^{1.02}$
$= 0.62 \times 9.886 \times 43.063$
= 263.95 gm/vehicle per km travelled

The above calculations do not apply on unclean and muddy roads.

3.2 Ambient Noise

The number of trucks anticipated are 672 per day on the three routes i.e. an average of 9-10 trucks per hour on each route for Scenario 1, while in Scenario 2 it will be 16 trucks per hour on Route-1 and 6 trucks each on Route-2 & 3. The sound level from the movement of a truck passing on the road is approximately 90 dBA. This will be a short term increase, prevailing only at the time of passage of truck. The overall Leq will be lower. As the distance increases from the line of truck movement, the anticipated Leqs will be as follows:



At a distance of 7 m, the LeQ is anticipated to be approximately 65 dB(A), falling within the limits for commercial areas, which is the usual case within along roads.

3.3 Human Health

Referring to Tables 8 earlier, it can be seen that the incremental ground level concentration values anticipated due to plying of additional trucks for PM10, SO_2 and NOx in the two cases will be:

Scenario 1: PM10 is 0.11, SO_2 is 0.38 and NOx is 3.50 $\mu g/m^3$, respectively due to emissions from vehicle exhaust. JPL has been monitoring the ambient air quality in and around the plant. The incremental values, when added to the baseline concentration give a resultant concentration of 67.33, 9.88 and 25.8 $\mu g/m^3$, respectively, for PM10, SO_2 and NOx, which are well within the limits of 100, 60, 80 & 80, respectively, prescribed by CPCB.

Scenario 2: PM10 is 0.09, SO_2 is 0.25 and NOx is 2.75 $\mu g/m^3$, respectively due to emissions from vehicle exhaust. The resultant concentrations anticipated are 67.29, 9.75 and 25.05 $\mu g/m^3$, respectively, for PM10, SO_2 and NOx, which are also well within the limits of 100, 60, 80 & 80, respectively, prescribed by CPCB.

The impact of various pollutants is discussed below:

3.3.1 Particulates

Impact on Health: PM10 and PM2.5 include inhalable particles that are small enough to penetrate the thoracic region of the respiratory system. The health effects of inhalable PM are well documented in ‘Health effects of particulate matter, Policy implications for countries in eastern Europe, Caucasus and Central Asia by World Health Organisation, Regional Office for Europe, 2013’. They are due to exposure over both the short term (hours, days) and long term (months, years) and include:

- respiratory and cardiovascular morbidity, such as aggravation of asthma, respiratory symptoms and an increase in hospital admissions;
- mortality from cardiovascular and respiratory diseases and from lung cancer.

Threshold concentrations for humans : As described in detail in Chapter 7.3, Particulate Matter, Air Quality Guidelines, Second Edition, World Health Organisation Regional Office for Europe, Copenhagen, Denmark, 2000, at low levels of (short-term) exposure (defined as 0–100 $\mu g/m^3$ for PM10), the exposure response curve fits a straight line reasonably well, there are indications from studies conducted in the former German Democratic Republic and in China that at higher levels of exposure (several hundreds of $\mu g/m^3$ PM10), the curve is shallower for at least effects on mortality than at low levels of exposure.

The relative risk increase between 1.0074-1.0356 for daily mortality, respiratory hospital admissions, reporting of bronchodilator use, cough and lower respiratory symptoms, and changes in peak expiratory flow has been associated with a 10 μg/m^3 increase in PM10 or PM2.5

In this case, the particulate emissions are 0.11 μg/m^3 for **Scenario 1** and 0.09 μg/m^3 **Scenario 2** in comparison to significant figures (10 μg/m^3).

3.3.2 Sulphur dioxides

Impact on Health: Sulfur dioxide irritates the skin and mucous membranes of the eyes, nose, throat, and lungs. High concentrations of SO_2 can cause inflammation and irritation of the respiratory system, particularly during heavy physical activity. The resulting symptoms may include pain when taking a deep breath, coughing, throat irritation, and breathing difficulties. High concentrations of SO_2 can affect lung function, worsen asthma attacks, and aggravate existing heart disease in sensitive groups. This gas can also react with other chemicals in the air and convert to a small particle that can lodge in the lungs and cause similar health effects.

Threshold concentrations for humans : As described in detail in Chapter 7.4, Sulfur dioxide, Air Quality Guidelines, Second Edition, World Health Organisation Regional Office for Europe, Copenhagen, Denmark, 2000, the health risk evaluation for short term exposures (less than 24 hours) has been done. Only small changes, not regarded as of clinical significance, were seen at 572 μg/m^3 (0.2 ppm); reductions representing about 10% of baseline FEV1 occurred at about 1144 μg/m^3 (0.4 ppm); and reductions of about 15% occurred at about 1716 μg/m^3 (0.6 ppm). The response was not greatly influenced by the severity of asthma. These findings are consistent with those reported from other exposure studies. In one early series, however, a small change in airway resistance was reported in two of the asthmatic patients at 286 μg/m^3 (0.1 ppm). For long term exposure, the lowest-observed-adverse-effect level of sulfur dioxide was judged to be 100 μg/m^3 (0.035 ppm) annual average, together with particulate matter.

In this case, the incremental being 0.38 and resultant being 9.88 μg/m^3 for **Scenario 1** and incremental being 0.25 and resultant being 9.75 μg/m^3 for S**cenario 2** which is much lower than the thresholds which impact human health.

3.3.3 Nitrogen oxides

Impact on Health: Human health concerns include effects on breathing and the respiratory system, damage to lung tissue, and premature death. Small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and aggravate existing heart disease.

Threshold concentrations for humans : As described in detail in Chapter 7.1, Nitrogen dioxide, Air Quality Guidelines, Second Edition, World Health Organisation Regional Office for Europe, Copenhagen, Denmark, 2000, a significant amount of research has been directed at evaluating the effect of nitrogen dioxide on pulmonary function and airway responsiveness to pharmacological, physical (e.g. cold air) or natural (i.e. allergens) bronchoconstrictors. Generally, concentrations higher than 1880 $\mu g/m^3$ (1.0 ppm) are required to increase responsiveness to bronchoconstrictors and to induce changes in pulmonary function in healthy adults.

Analysis of lung lavage from healthy humans indicated that high levels (5640-7520 $\mu g/m^3$; 3–4 ppm) reduce the activity of alpha-1-protease inhibitor, a protein that acts to protect the lung from the proteolytic enzyme elastase by inhibiting connective tissue damage. However, 2820 $\mu g/m^3$ (1.5 ppm) had no such effect.

Such concentrations as mentioned above, almost never occur in ambient air, thus, the incremental values of nitrogen oxide (3.50 $\mu g/m^3$ for **Scenario 1** and 2.75 $\mu g/m^3$ for **Scenario 2**) is not expected to have any impact on the healthy human beings. On the basis of these human clinical data, WHO has given a 1-hour guideline of 200 $\mu g/m^3$. At double this recommended guideline (400 $\mu g/m^3$), there is evidence to suggest possible small effects in the pulmonary function of asthmatics. Should the asthmatic be exposed either simultaneously or sequentially to nitrogen dioxide and an aeroallergen, the risk of an exaggerated response to the allergen is increased. At 50% of the suggested guideline (100$\mu g/m^3$, 50 ppb), there have been no studies of acute response in 1 hour.

3.4 Ecology

It has been generally accepted that dust originating from unpaved roads can aggravate respiratory ailments, create driving hazards and cause considerable discomfort to those living alongside these roads.

Dust may affect photosynthesis, respiration, transpiration and allow the penetration of phytotoxic gaseous pollutants. Dust from highways and roads greatly affect the roadside vegetation communities by inducing changes in pH, Relative Water Content and species diversity. Vegetation act as natural filters by depositing dust particles on their leaf surface, susceptible and highly exposed part of a plant and, thus, makes an important contribution in the improvement of air quality. Leaves act as pollution receptors and decrease dust load of the air.

According to a research by D. L. Becker in 1978 (referenced by McCrea), the total downwind deposition from infinite instantaneous line source of 1.0 gm/m during neutral conditions at distance of 4, 8, 16, 32, 64, 128, 256 and 512 m from road have been estimated as 263, 188, 118, 70, 39, 22, 12 and 5 g/m. The deposited dust reduces the light availability to the plant and therefore affects photosynthesis as follows :

% reduction of light due to dust	Photosynthesis Rate (mg/sq.m./s)	% reduction of photosynthesis
(a) Average Summer Sun (225 W/m)		
0	0.69	0.0
10	0.69	0.0
20	0.68	1.5
30	0.67	2.9
40	0.65	5.8
50	0.64	7.3
(b) Average Winter Sun (40 W/m)		
0	0.39	0.0
10	0.36	7.7
20	0.33	15.4
30	0.30	23.1
40	0.27	30.8
50	0.23	41.1

Source: Table 9, An Assessment of the effects of road dust on agricultural production systems, P. R. McCrea, Research Report No. 156

The McCrea study also assessed the observed reduction of yield in various roadside orchards for a traffic volume of 500 per day, affecting an area of 12.5 ha/ km and arrived it to be 1.0% during wet season and 2.2% during dry season. For a traffic volume of 250 per day, affecting an area of 12.5 ha/ km it is 0.5% during wet season and 1.1% during dry season.

Thus, under worse case scenario of high dust on roads, adverse weather conditions and absence of mitigation measures, the plying of additional 672 trucks per day can lead to a maximum cumulative reduction of yield in roadside plantation as follows:

The range of reduction in **Scenario 1** where 220 trucks are plying on each of the three routes will be 0.5-1.1% if mitigation measures like water sprinkling, road maintenance, cleaning and road side plantations are not carried out.

Similarly, the range of reduction in **Scenario 2** where 384 trucks are plying on Route-1 the reduction in yield will be 1.0-2.2%, while on Routes-2 & 3 where 144 trucks will be plying on each of the two routes the reduction in yield will be 0.5-1.1% if mitigation measures like water sprinkling, road maintenance, cleaning and road side plantations are not carried out.

4.0 OBSERVATIONS

During site visit, the following observations were made along the three routes:

- Route 1 (to Kulda/ Basundhara) is 42 km long and has 15 villages on the route, namely. Tehli Rampur, Jhinkabahl, Libra, Dhaurabhata, Khuruslenga, Lamdand, Hamirpur, Taparia, Sambarpinda, Kandadhuda, Bilaimunda, Chatabar, Ratanpur, Naktijor and Gopalpur.
- Route 2 (to Kulda/ Basundhara) is 39 km long and has 13 villages on the route, namely, Tamnar, Gorhi, Amaghat, Jhingolpara, Samarauna, Amlidih, Bhalumar, Kapradihi, Kanchanpur, Teram, Chamarpara, Phaguram and Oramura.
- Route 3 (to Kulda/ Basundhara) is 51 km long and has 16 villages on the route, namely, Tamnar, Gorhi, Amaghat, Jhingolpara, Samarauna, Amlidih, Bhalumar, Kapradihi, Baihamura, Nawapara, Dongabona, Deormal, Bojhia, Nawapara, Bandhapali and Khedapali.
- Eight villages are overlapping on the Route 2 & 3.
- The study found that all the roads were black topped and in good condition except 2.5 km from Hamirpur to Lamdand (part of Route-1), which is being repaired as evidenced by the aggregates heaped on the roadside on 25.07.2016 and 6.2 km of Ghargoda bye-pass (part of Route-2) due to potholes and damage due to water logging at certain places.
- The roads at the different locations had variable width. The average width was found to be 7.7 m with a minimum width of 5.6 m at locations 8 & 15 and a maximum width of 16.5 m at location 21.
- No bottle necks and issues were found at any location at the time of study.
- No traffic jam observed.
- Various kinds of vehicles are using the roads such as cars, jeeps, motorcycles, scooters, buses, trucks, etc.
- Currently, the coal is being transported under total tarpaulin covered trucks to arrest coal fines emission.
- Issues related to safety, over loading, over speed etc. are being overseen and controlled by the Company
- Only well maintained trucks are allowed to load & transport coal. Overloaded trucks are not been allowed to entry inside the factory.
- Avenue plantation has been done along the roads as stipulated by MoEF

- There is a Trauma Centre at Punjipatra to handle emergency medical cases. Ambulance facilities are available round the clock to take patients to hospitals for treatment. The Trauma centre is being operated as a part of the Corporate Social Responsibility (CSR) program of Jindal Group.
- Furthermore, a multi-speciality hospital is run at Raigarh by the Company in collaboration with Fortis and called "Fortis O.P.Jindal Hospital & research Centre". It is a 100 bedded hospital with state of the art tertiary care facilities including advanced medical & surgical procedures for both in patients & out patients. Through 2014-2015 it served 3798 indoor and 81,189 outdoor patients.
- JPL has cleaning crew working on various stretches of roads around the plant to clean the road regularly

5.0 CONCLUSION AND RECOMMENDATIONS

This study has been conducted to assess the impact of coal transportation from domestic source i.e. Coal mines of SECL and MCL to Units 3&4 (2 X 600 MW) of the 2400 MW thermal power plant at Tamnar, Chhatisgarh of M/s Jindal Power Ltd.

The required coal is 13187 tonnes per day to be brought through trucks of 40 tonnes capacity from various mines located at Chhal (51 km, south west), Barod/ Jampali (39 km, north west) and Kulda/ Basundhara (42 km, south east). The route from plant to Kulda/ Basundhara has been considered as Route-1, to Barod/ Jampali as Route-2 and to Chhal as Route-3. The coal will be bought through special e-auction which makes it difficult to do an exact estimation of quantity available from each mine. Thus, two alternate scenarios have been studied:

(i) ***Scenario 1*** - equal distribution of anticipated trucks on all three routes i.e. 220 trucks on route 1, 2 & 3.

(ii) ***Scenario 2*** - 50% of the anticipated traffic (384 trucks) will be on route 1 to Kulda/ Basundhra, 25% on route 2 to Barod/ Jampali and 25% on route 3 to Chhal (144 trucks each).

All surveys, calculations and assessments have been carried out in line with Standards available from Indian Road Congress (IRC), Ministry of Environment, Forest and Climate Change (MoEF&CC) and United States Environment Protection Agency (US EPA). Road width along entire length has been measured on all three routes besides observation of traffic volumes at twelve "Census Point" locations.

Based on the various aspects studied, the following conclusions are arrived at:

- ***From the aspect of Traffic Volume and capacity of the road*** - A perusal of table 4 and 6 for Scenario-1 and of Table 5 and 7 for Scenario-2 shows that all routes have adequate Maximum Capacity to cater to the additional traffic for coal transportation as well as natural growth of the existing traffic for the next 3 years. The percentage utilization shall be from 22% to 62% for Scenario-1 and 21.5% to 60% for Scenario-2, of maximum capacity. In all cases, the anticipated traffic after 3 years with additional trucks will lie within Design Service Volume with minimum Level of Service “C”

- It may be further noted that the existing traffic on Census point 6, 7 and 8, which is currently experiencing traffic carrying imported coal from Raigarh to the plant for the Units 3, will see a reduction of 336 trucks/day i.e. 2.2% of Design Service Volume since those trucks will cease movement from Raigarh.

- ***From the aspect of Impact on Ambient Air quality*** - A perusal of table 8 for Scenario-1 and 2 shows that there shall be increment in air pollutants due to exhaust emissions from the additional vehicles. However, the magnitude of incremental ground level concentrations will be low and to the tune of maximum 0.11 $\mu g/m^3$ for PM10, 3.50 $\mu g/m^3$ for NOx, 0.38 $\mu g/m^3$ for SO_2, 3.88 $\mu g/m^3$ for CO and 0.50 $\mu g/m^3$ for HC. The airborne dust due to wheel movement on paved surface will be temporary, localized and reversible and has been calculated to the tune of 263.95 gm/vehicle per km traveled

- ***From the aspect of Impact on Ambient Noise*** - The sound level from the movement of a truck passing on the road is approximately 90 dBA. This will be a short term increase, prevailing only at the time of passage of truck. The overall Leq will be lower. At a distance of 7 m, the LeQ is anticipated to be approximately 65 dB(A), falling within the limits for commercial areas, which is the usual case within along roads.

- ***From the aspect of Impact on Human Health***- The incremental values have been compared against the Air Quality Guidelines, Second Edition, World Health Organization Regional Office for Europe, Copenhagen, Denmark, 2000 and found to be lower than the significant figures

- ***From the aspect of Impact on Ecology***- Under worst case scenario of high dust on roads, adverse weather conditions and absence of mitigation measures, the plying of additional 672 trucks per day can lead to a maximum cumulative reduction of yield in roadside plantation to the tune of 0.5-1.1% in Scenario-1 and 1.0-2.2% in Scenario-2.

- ***Observations*** have been made at site and given in para 4.0 earlier. Significant to note is that all the roads were black topped, most was in good condition with average width of 7.7 m. No bottle necks or traffic jams was observed at time of survey. The imported coal is being transported under total tarpaulin covered trucks and is optimally loaded. Issues related to safety, over loading, over speed etc. are being overseen and controlled by the Company. Avenue plantation has been done along the roads as stipulated by MoEF. Trauma Centre and Hospitals are available within reasonable distance along with ambulance and patient transportation facilities.

Based on the study and observations, the following are recommended:

A. Plantation

- Continue to maintain plantation already done and replace damaged saplings
- Carry out additional plantation along the traffic route for dust and noise control on either side of road, in consultation with villagers, where ever possible.

B. Air pollution mitigation for protection of ecology & human health

- The vehicles used for transportation should be covered with tarpaulin, should continue to be spill-proof
- The trucks have to have periodic PUC certification as per manufacturers norms and it shall be ensured that unadulterated diesel is procured and used from authorised dealers only
- Only those vehicles having fitness certificate shall be allowed to ply
- The practice of road cleaning by JPL along various stretches of various roads shall be continued to minimize road dust generation .
- Make provision for tyre washing at power plant which will aid in reducing fugitive dust on roads

C. Noise mitigation

- No honking along the settlements stretch, which would be silent zones.
- All trucks will undergo preventive maintenance as per manufacturers schedule and their silencers shall be maintained and operational at all times.
- Plantation along roadside as suggested for air pollution mitigation will also act as buffer against noise propagation

D. Safety

- Installation of speed bumps near settlements to ensure slow driving
- Awareness to Truck drivers & villagers through hoardings on roads regarding road safety

- Contact number of crane operators along the routes shall be made available to all vehicle drivers

- All trucks will carry first aid kits and drivers will be trained in provision of first aid in case of emergency

- Continue to provide services of ambulance, Trauma Centre at Punjipatra and Hospital at Raigarh, if an when required

- To ensure that road safety measures are rightly implemented, Road Safety Committee shall be constituted by JPL comprising of Safety Officer of plant, a representative of the District Administration, a senior citizen, a woman and a School. The responsibility of the committee shall be to ensure safety of inhabitants in the 36 villages falling along the three routes and addressing & solving any grievances received from these villagers regarding transportation vehicle movement

- Creating awareness for road safety to villagers and drivers and ensuring availability of ambulance, trauma centre and blood bank facility for the accident victims, if any.

E. Road status

- Inform the state government immediately in case of observation of any damage to the road so that repairs can be requested and carried out at the earliest.

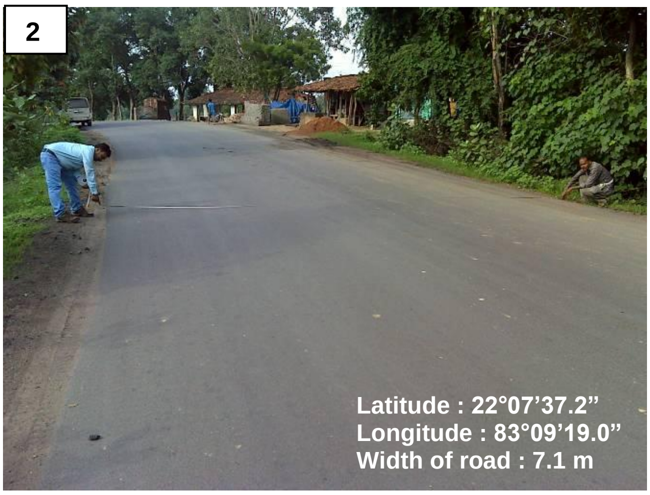
- Communicate and request the State Government for improving the Level of Service near Barod mines by either stregthening shoulders by 0.6 m on either side or restoring the current carriage width (5.6 m) to the width before repairs, which was more than 6 m.

- Communicate and request the State Government for speedy repair of Ghargoda bypass

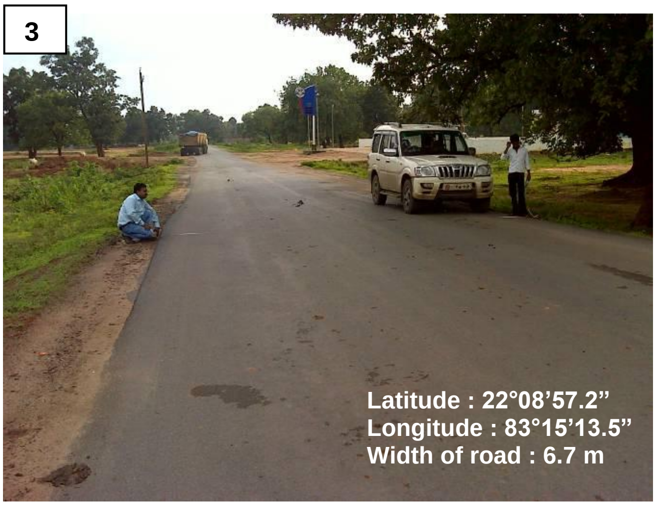
PHOTOGRAPHS OF PROPOSED ROUTE AT ROAD WIDTH MEASUREMENT LOCATIONS

1

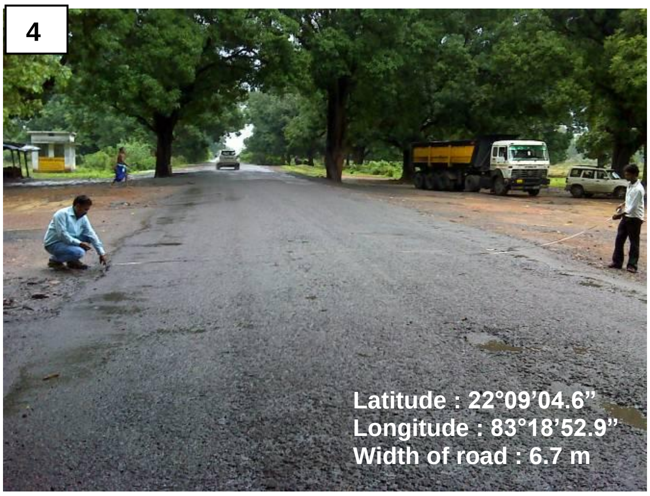
2



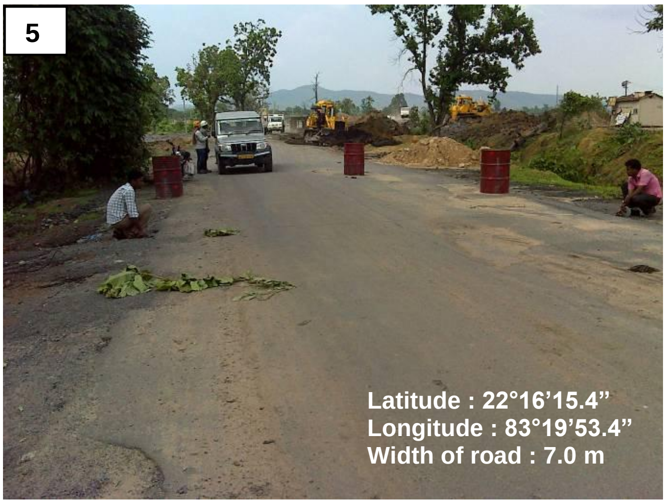
3



4



5



6

7


Latitude : 22°15'06.9"
Longitude : 83°19'30.2"
Width of road : 5.9 m

8


Latitude : 22°11'35.3"
Longitude : 83°20'28.9"
Width of road : 5.6 m

9


Latitude : 22°11'13.4"
Longitude : 83°20'22.1"
Width of road : 6.2 m

10


Latitude : 22°09'42.3"
Longitude :83°19'55.6"
Width of road : 6.7 m

11

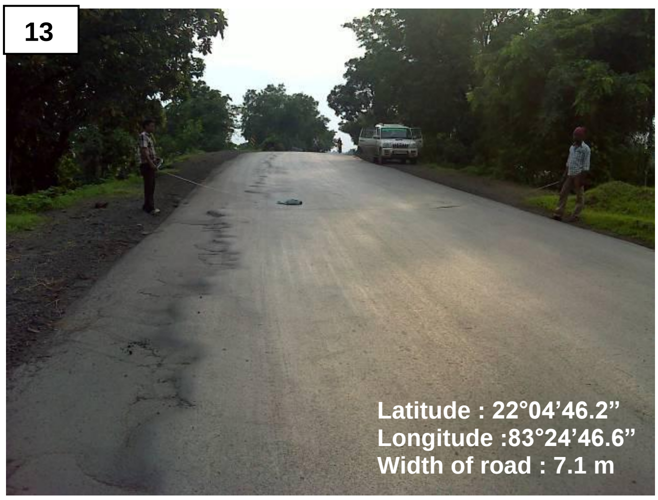

Latitude : 22°08'09.3"
Longitude :83°20'36.4"
Width of road : 5.8 m

12


Latitude : 22°04'10.5"
Longitude :83°21'12.9"
Width of road : 6.0 m

ANNEXURE : 1 Contd.

13



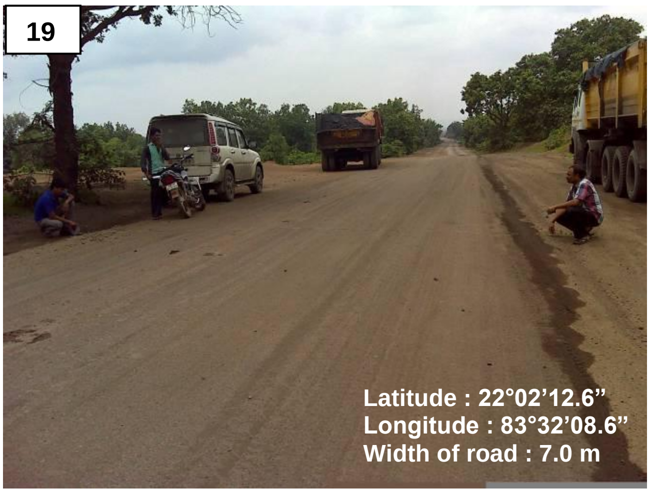
14

15

16

17

18


19
Latitude : 22°02’12.6”
Longitude : 83°32’08.6”
Width of road : 7.0 m


20
Latitude : 22°06’39.3”
Longitude : 83°30’05.9”
Width of road : 16.2 m

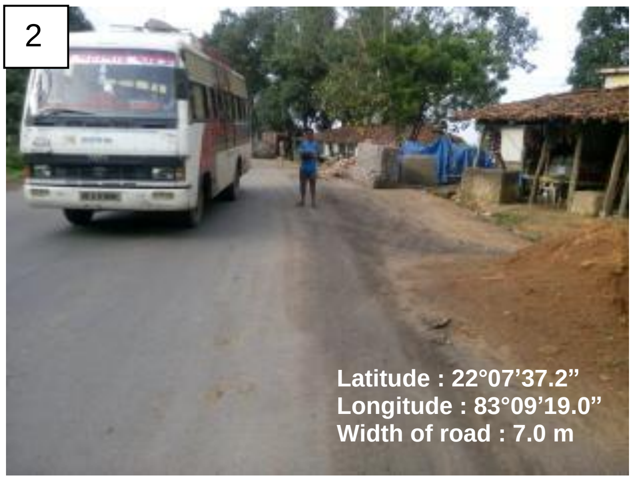

21
Latitude : 22°06’53.1”
Longitude : 83°27’39.5”
Width of road : 16.5 m

PHOTOGRAPHS OF TRAFFIC CENSUS POINT LOCATIONS

1

Latitude : 22°05'44.9"
Longitude : 83°07'22.1"
Width of road : 10.6 m

2



Latitude : 22°07'37.2"
Longitude : 83°09'19.0"
Width of road : 7.0 m

3

Latitude : 22°09'03.9"
Longitude : 83°18'52.8"
Width of road : 7.0 m

4

Latitude : 22°15'04.1"
Longitude : 83°19'42.1"
Width of road : 5.6 m

5

Latitude : 22°07'26.4"
Longitude : 83°20'15.0"
Width of road : 7.0 m

6

Latitude : 22°04'50.8"
Longitude : 83°22'56.1"
Width of road : 7.0 m

7


Latitude : 22°04’46.6”
Longitude : 83°25’04.2”
Width of road : 7.0 m

8


Latitude : 22°06’24.7”
Longitude : 83°26’24.4”
Width of road : 7.2 m

9


Latitude : 22°06’53.3”
Longitude : 83°27’40.6”
Width of road : 16.4 m

10


Latitude : 22°06’09.7”
Longitude : 83°13’08.5”
Width of road : 7.0 m

11


Latitude : 22°02’14.9”
Longitude : 83°32’08.7”
Width of road : 7.0 m

12


Latitude : 22°02’40.5”
Longitude : 83°43’35.5”
Width of road : 6.0 m

SCENARIO - 1 ANNEXURE : 2

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL, JUNE 1989 VERSION
RUN: Hour 1 (WORST CASE ANGLE), POLLUTANT: CO, NOx, HC, PM

CALINE4 is the last in a series of line source air quality models developed by the California Department of Transportation (Caltrans). It is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway.

The purpose of the model is to assess air quality impacts near transportation facilities. Given source strength, meteorology and site geometry, CALINE4 can predict pollutant concentrations for receptors located within 500 meters of the roadway. In addition to predicting concentrations of relatively inert pollutants such as carbon monoxide (CO), the model can predict nitrogen dioxide (N02) and suspended particle concentrations. It also has special options for modelling air quality near intersections, street canyons and parking facilities.

I. SITE VARIABLES

U= 4.5 M/S	Z0= 100. CM	ALT= 0. (M)
BRG= WORST CASE	VD= .0 CM/S	
CLAS= 2 (B)	VS= .0 CM/S	
MIXH= 500. M	AMB= .0 PPM	
SIGTH= 9. DEGREES	TEMP= 24.0 DEGREE (C)	

II. LINK VARIABLES

ROUTE-1

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
A.	Link A	39276	12481	41294	13186	AG	10	102000	3220	31950	34830	4990	0	13.0
B.	Link B	41294	13186	42362	12375	AG	10	102000	3220	31950	34830	4990	0	13.0
C.	Link C	42362	12375	47321	10764	AG	10	102000	3220	31950	34830	4990	0	13.0
D.	Link D	47321	10764	46512	7199	AG	10	102000	3220	31950	34830	4990	0	13.0
E.	Link E	46512	7199	47199	3743	AG	10	102000	3220	31950	34830	4990	0	13.0
F.	Link F	47199	3743	49370	3355	AG	10	102000	3220	31950	34830	4990	0	13.0
G.	Link G	49370	3355	52109	4769	AG	10	102000	3220	31950	34830	4990	0	13.0
H.	Link H	52109	4769	55833	4806	AG	10	102000	3220	31950	34830	4990	0	13.0
I.	Link I	55833	4806	56373	4406	AG	10	102000	3220	31950	34830	4990	0	13.0
J.	Link J	56373	4406	58445	6114	AG	10	102000	3220	31950	34830	4990	0	13.0
K.	Link K	58445	6114	60042	6232	AG	10	102000	3220	31950	34830	4990	0	13.0
L.	Link L	60042	6232	62068	5652	AG	10	102000	3220	31950	34830	4990	0	13.0
M.	Link M	62068	5652	64485	5401	AG	10	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

ROUTE-2

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
N.	Link N	37246	11701	36077	8796	AG	18	102000	3220	31950	34830	4990	0	13.0
O.	Link O	36077	8796	35111	8617	AG	18	102000	3220	31950	34830	4990	0	13.0
P.	Link P	35111	8617	31664	9012	AG	18	102000	3220	31950	34830	4990	0	13.0
Q.	Link Q	31664	9012	30497	8490	AG	18	102000	3220	31950	34830	4990	0	13.0
R.	Link R	30497	8490	28889	8568	AG	18	102000	3220	31950	34830	4990	0	13.0
S.	Link S	28889	8568	28241	7523	AG	18	102000	3220	31950	34830	4990	0	13.0
T.	Link T	28241	7523	27336	8619	AG	18	102000	3220	31950	34830	4990	0	13.0
U.	Link U	27336	8619	27364	9133	AG	18	102000	3220	31950	34830	4990	0	13.0
V.	Link V	27364	9133	26107	12160	AG	18	102000	3220	31950	34830	4990	0	13.0
W.	Link W	26107	12160	27269	14922	AG	18	102000	3220	31950	34830	4990	0	13.0
X.	Link X	27269	14922	26053	17867	AG	18	102000	3220	31950	34830	4990	0	13.0

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
Y.	Link Y	26053	17867	26442	18170	AG	9	102000	3220	31950	34830	4990	0	13.0
Z.	Link Z	26442	18170	27302	24508	AG	9	102000	3220	31950	34830	4990	0	13.0
A1.	Link A1	27302	24508	25598	25898	AG	9	102000	3220	31950	34830	4990	0	13.0
A2.	Link A2	25598	25898	25719	27515	AG	9	102000	3220	31950	34830	4990	0	13.0
A3.	Link A3	25719	27515	25297	27638	AG	9	102000	3220	31950	34830	4990	0	13.0
A4.	Link A4	25297	27638	25320	28216	AG	9	102000	3220	31950	34830	4990	0	13.0
A5.	Link A5	25320	28216	25625	28322	AG	9	102000	3220	31950	34830	4990	0	13.0
A6.	Link A6	25625	28322	25997	29568	AG	9	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

ROUTE-3

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
A7.	Link A7	26053	17867	25310	17177	AG	9	102000	3220	31950	34830	4990	0	13.0
A8.	Link A8	25310	17177	23905	16273	AG	9	102000	3220	31950	34830	4990	0	13.0
A9.	Link A9	23905	16273	22520	15954	AG	9	102000	3220	31950	34830	4990	0	13.0
A10.	Link A10	22520	15954	20741	16437	AG	9	102000	3220	31950	34830	4990	0	13.0
A11.	Link A11	20741	16437	19120	16382	AG	9	102000	3220	31950	34830	4990	0	13.0
A12.	Link A12	19120	16382	18413	16570	AG	9	102000	3220	31950	34830	4990	0	13.0
A13.	Link A13	18413	16570	16069	14808	AG	9	102000	3220	31950	34830	4990	0	13.0
A14.	Link A14	16069	14808	13990	14532	AG	9	102000	3220	31950	34830	4990	0	13.0
A15.	Link A15	13990	14532	12615	15247	AG	9	102000	3220	31950	34830	4990	0	13.0
A16.	Link A16	12615	15247	11472	15441	AG	9	102000	3220	31950	34830	4990	0	13.0
A17.	Link A17	11472	15441	10500	15087	AG	9	102000	3220	31950	34830	4990	0	13.0
A18.	Link A18	10500	15087	9357	15170	AG	9	102000	3220	31950	34830	4990	0	13.0
A19.	Link A19	9357	15170	8000	14820	AG	9	102000	3220	31950	34830	4990	0	13.0
A20.	Link A20	8000	14820	7846	13850	AG	9	102000	3220	31950	34830	4990	0	13.0
A21.	Link A21	7846	13850	5948	11880	AG	9	102000	3220	31950	34830	4990	0	13.0
A22.	Link A22	5948	11880	5084	11425	AG	9	102000	3220	31950	34830	4990	0	13.0
A23.	Link A23	5084	11425	5217	10466	AG	9	102000	3220	31950	34830	4990	0	13.0
A24.	Link A24	5217	10466	4636	10521	AG	9	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

The location of receptors is shown in **Fig. 1**

III. RECEPTOR LOCATIONS (at 100 m from vehicle path on right and left side)

ROUTE-1				ROUTE-2			
	COORDINATES (M)				COORDINATES (M)		
RECEPTOR	X	Y	Z	RECEPTOR	X	Y	Z
1. Recpt 1	39270	12434	1.5	29. Recpt 29	37199	11719	1.5
2. Recpt 2	41285	13130	1.5	30. Recpt 30	36040	8840	1.5
3. Recpt 3	42338	12330	1.5	31. Recpt 31	35109	8668	1.5
4. Recpt 4	47262	10731	1.5	32. Recpt 32	31657	9063	1.5
5. Recpt 5	46461	7199	1.5	33. Recpt 33	30487	8541	1.5
6. Recpt 6	47156	3700	1.5	34. Recpt 34	28862	8619	1.5
7. Recpt 7	49378	3303	1.5	35. Recpt 35	28235	7608	1.5
8. Recpt 8	52121	4719	1.5	36. Recpt 36	27387	8636	1.5
9. Recpt 9	55817	4756	1.5	37. Recpt 37	27414	9141	1.5
10. Recpt 10	56375	4342	1.5	38. Recpt 38	26161	12160	1.5
11. Recpt 11	58465	6066	1.5	39. Recpt 39	27323	14922	1.5
12. Recpt 12	60037	6182	1.5	40. Recpt 40	26114	17851	1.5
13. Recpt 13	62058	5603	1.5	41. Recpt 41	26489	18143	1.5
14. Recpt 14	64475	5352	1.5	42. Recpt 42	27355	24529	1.5
15. Recpt 15	39260	12528	1.5	43. Recpt 43	25650	25920	1.5

16.	Recpt 16	*	41303	13242	1.5
17.	Recpt 17	*	42385	12419	1.5
18.	Recpt 18	*	47380	10798	1.5
19.	Recpt 19	*	46563	7198	1.5
20.	Recpt 20	*	47241	3787	1.5
21.	Recpt 21	*	49362	3407	1.5
22.	Recpt 22	*	52096	4818	1.5
23.	Recpt 23	*	55849	4856	1.5
24.	Recpt 24	*	56372	4469	1.5
25.	Recpt 25	*	58425	6163	1.5
26.	Recpt 26	*	60047	6283	1.5
27.	Recpt 27	*	62077	5701	1.5
28.	Recpt 28	*	64495	5450	1.5
44.	Recpt 44	*	25772	27552	1.5
45.	Recpt 45	*	25348	27675	1.5
46.	Recpt 46	*	25369	28180	1.5
47.	Recpt 47	*	25666	28283	1.5
48.	Recpt 48	*	26045	29554	1.5
49.	Recpt 49	*	37292	11682	1.5
50.	Recpt 50	*	36113	8752	1.5
51.	Recpt 51	*	35113	8567	1.5
52.	Recpt 52	*	31672	8960	1.5
53.	Recpt 53	*	30506	8439	1.5
54.	Recpt 54	*	28916	8517	1.5
55.	Recpt 55	*	28247	7437	1.5
56.	Recpt 56	*	27285	8602	1.5
57.	Recpt 57	*	27313	9124	1.5
58.	Recpt 58	*	26052	12160	1.5
59.	Recpt 59	*	27215	14922	1.5
60.	Recpt 60	*	26034	17781	1.5
61.	Recpt 61	*	25994	17880	1.5
62.	Recpt 62	*	26395	18197	1.5
63.	Recpt 63	*	27248	24487	1.5
64.	Recpt 64	*	25547	25876	1.5
65.	Recpt 65	*	25666	27478	1.5
66.	Recpt 66	*	25245	27601	1.5
67.	Recpt 67	*	25272	28252	1.5
68.	Recpt 68	*	25585	28361	1.5

ROUTE-3

RECEPTOR	*	COORDINATES (M) X	Y	Z
69. Recpt 69	*	26034	17781	1.5
70. Recpt 70	*	25341	17138	1.5
71. Recpt 71	*	23924	16226	1.5
72. Recpt 72	*	22519	15902	1.5
73. Recpt 73	*	20736	16387	1.5
74. Recpt 74	*	19115	16332	1.5
75. Recpt 75	*	18424	16515	1.5
76. Recpt 76	*	16089	14760	1.5
77. Recpt 77	*	13981	14480	1.5
78. Recpt 78	*	12599	15199	1.5
79. Recpt 79	*	11477	15390	1.5
80. Recpt 80	*	10507	15036	1.5
81. Recpt 81	*	9361	15119	1.5
82. Recpt 82	*	8044	14780	1.5
83. Recpt 83	*	7893	13827	1.5
84. Recpt 84	*	5978	11840	1.5
85. Recpt 85	*	5138	11397	1.5
86. Recpt 86	*	5275	10411	1.5
87. Recpt 87	*	4632	10471	1.5
88. Recpt 88	*	25994	17880	1.5
89. Recpt 89	*	25279	17217	1.5
90. Recpt 90	*	23885	16319	1.5
91. Recpt 91	*	22521	16005	1.5
92. Recpt 92	*	20747	16487	1.5
93. Recpt 93	*	19126	16432	1.5
94. Recpt 94	*	18402	16624	1.5
95. Recpt 95	*	16049	14856	1.5
96. Recpt 96	*	14000	14583	1.5
97. Recpt 97	*	12631	15294	1.5
98. Recpt 98	*	11467	15493	1.5
99. Recpt 99	*	10493	15137	1.5

100.Recpt 100	*	9352	15220	1.5
101.Recpt 101	*	7956	14860	1.5
102.Recpt 102	*	7799	13874	1.5
103.Recpt 103	*	5917	11921	1.5
104.Recpt 104	*	5030	11452	1.5
105.Recpt 105	*	5159	10522	1.5
106.Recpt 106	*	4641	10570	1.5

IV.A MODEL RESULTS (WORST CASE WIND ANGLE)FOR CARBON MONOXIDE

ROUTE-1

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK **#** (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	57.	1.4	1.4	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	115.	1.4	.0	1.2	.2	.0	.0	.0	.0	.0
3. Recpt 3	98.	1.2	.0	.0	1.2	.0	.0	.0	.0	.0
4. Recpt 4	183.	1.3	.0	.0	.0	1.2	.0	.0	.0	.0
5. Recpt 5	25.	1.2	.0	.0	.0	1.2	.0	.0	.0	.0
6. Recpt 6	85.	1.3	.0	.0	.0	.0	.0	1.2	.0	.0
7. Recpt 7	293.	1.3	.0	.0	.0	.0	.0	1.2	.0	.0
8. Recpt 8	80.	1.3	.0	.0	.0	.0	.0	.0	.0	1.2
9. Recpt 9	111.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
10. Recpt 10	38.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
11. Recpt 11	250.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
12. Recpt 12	278.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
13. Recpt 13	299.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
14. Recpt 14	284.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
15. Recpt 15	97.	1.3	1.2	.0	.0	.0	.0	.0	.0	.0
16. Recpt 16	140.	1.3	.0	1.2	.0	.0	.0	.0	.0	.0
17. Recpt 17	292.	1.3	.0	1.2	.0	.0	.0	.0	.0	.0
18. Recpt 18	279.	1.3	.0	.0	1.2	.0	.0	.0	.0	.0
19. Recpt 19	360.	1.3	.0	.0	.0	1.2	.0	.0	.0	.0
20. Recpt 20	336.	1.3	.0	.0	.0	.0	1.2	.0	.0	.0
21. Recpt 21	75.	1.3	.0	.0	.0	.0	.0	.0	1.2	.0
22. Recpt 22	99.	1.3	.0	.0	.0	.0	.0	.0	.0	1.2
23. Recpt 23	260.	1.3	.0	.0	.0	.0	.0	.0	.0	1.2
24. Recpt 24	282.	1.5	.0	.0	.0	.0	.0	.0	.0	.3
25. Recpt 25	96.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
26. Recpt 26	253.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
27. Recpt 27	276.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
28. Recpt 28	266.	1.3	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M
1. Recpt 1	.0	.0	.0	.0	.0
2. Recpt 2	.0	.0	.0	.0	.0
3. Recpt 3	.0	.0	.0	.0	.0
4. Recpt 4	.0	.0	.0	.0	.0
5. Recpt 5	.0	.0	.0	.0	.0
6. Recpt 6	.0	.0	.0	.0	.0
7. Recpt 7	.0	.0	.0	.0	.0
8. Recpt 8	.0	.0	.0	.0	.0
9. Recpt 9	1.2	.1	.0	.0	.0
10. Recpt 10	.0	1.2	.0	.0	.0
11. Recpt 11	.0	1.2	.0	.0	.0
12. Recpt 12	.0	.0	1.2	.0	.0
13. Recpt 13	.0	.0	.0	1.2	.0

14. Recpt 14 *	.0	.0	.0	.0	1.2
15. Recpt 15 *	.0	.0	.0	.0	.0
16. Recpt 16 *	.0	.0	.0	.0	.0
17. Recpt 17 *	.0	.0	.0	.0	.0
18. Recpt 18 *	.0	.0	.0	.0	.0
19. Recpt 19 *	.0	.0	.0	.0	.0
20. Recpt 20 *	.0	.0	.0	.0	.0
21. Recpt 21 *	.0	.0	.0	.0	.0
22. Recpt 22 *	.0	.0	.0	.0	.0
23. Recpt 23 *	.0	.0	.0	.0	.0
24. Recpt 24 *	1.2	.0	.0	.0	.0
25. Recpt 25 *	.0	.0	1.2	.1	.0
26. Recpt 26 *	.0	.1	1.2	.0	.0
27. Recpt 27 *	.0	.0	.0	1.2	.0
28. Recpt 28 *	.0	.0	.0	.0	1.2

 # Magnified 1000 times

The non-magnified maximum concentration of 1.5 X 10^{-3} ppm is equivalent to 1.5 X 10^{-3} ppm X 1250 = 1.88 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) N	O	P	Q	R	S	T	U
29. Recpt 29	189.	2.2	2.2	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	244.	2.2	.0	2.2	.0	.0	.0	.0	.0	.0
31. Recpt 31	267.	2.4	.0	.0	2.2	.0	.0	.0	.0	.0
32. Recpt 32	230.	2.2	.0	.0	.0	2.2	.0	.0	.0	.0
33. Recpt 33	82.	2.6	.0	.0	.3	2.2	.0	.0	.0	.0
34. Recpt 34	196.	2.2	.0	.0	.0	.0	.0	2.2	.0	.0
35. Recpt 35	67.	2.4	.0	.0	.0	.1	.1	2.1	.0	.0
36. Recpt 36	347.	3.0	.0	.0	.0	.0	.0	.0	.0	2.2
37. Recpt 37	325.	2.2	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	10.	2.3	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	325.	2.2	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	170.	2.4	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	358.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	297.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
43. Recpt 43	352.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
44. Recpt 44	197.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
45. Recpt 45	151.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
46. Recpt 46	45.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
47. Recpt 47	1.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
48. Recpt 48	207.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
49. Recpt 49	221.	2.3	2.2	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	270.	2.7	.0	2.1	.5	.0	.0	.0	.0	.0
51. Recpt 51	64.	2.4	.2	2.2	.0	.0	.0	.0	.0	.0
52. Recpt 52	258.	2.6	.0	.0	.0	2.2	.3	.0	.0	.0
53. Recpt 53	288.	2.3	.0	.0	.0	.0	2.2	.0	.0	.0
54. Recpt 54	83.	2.6	.0	.0	.2	.2	2.2	.0	.0	.0
55. Recpt 55	333.	2.6	.0	.0	.0	.0	.0	.0	2.2	.0
56. Recpt 56	92.	2.5	.0	.0	.0	.0	.3	.0	2.0	.0
57. Recpt 57	163.	2.6	.0	.0	.0	.0	.0	.0	.5	2.2
58. Recpt 58	145.	2.3	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	190.	2.3	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	29.	3.1	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	145.	2.2	.0	.0	.0	.0	.0	.0	.0	.0

62. Recpt 62	178.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	179.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
64. Recpt 64	117.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
65. Recpt 65	310.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
66. Recpt 66	23.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
67. Recpt 67	163.	1.5	.0	.0	.0	.0	.0	.0	.0	.0
68. Recpt 68	225.	1.3	.0	.0	.0	.0	.0	.0	.0	.0

	CONC/LINK (PPM)										
RECEPTOR	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
29. Recpt 29	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32. Recpt 32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
33. Recpt 33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
34. Recpt 34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
35. Recpt 35	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
36. Recpt 36	.8	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
37. Recpt 37	2.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	.0	2.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	.0	.0	2.2	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	.0	.0	2.2	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0	.0
42. Recpt 42	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0
43. Recpt 43	.0	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0
44. Recpt 44	.0	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0
45. Recpt 45	.0	.0	.0	.0	.0	.0	.2	1.0	.0	.0	.0
46. Recpt 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1	.3
47. Recpt 47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1
48. Recpt 48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1
49. Recpt 49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51. Recpt 51	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
52. Recpt 52	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53. Recpt 53	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
54. Recpt 54	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55. Recpt 55	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
56. Recpt 56	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
57. Recpt 57	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
58. Recpt 58	2.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	.0	2.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	.0	.0	1.9	1.0	.2	.0	.0	.0	.0	.0	.0
61. Recpt 61	.0	.0	2.2	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	.0	.0	.4	.9	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0	.0
64. Recpt 64	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0
65. Recpt 65	.0	.0	.0	.0	.0	.0	.0	1.1	.2	.0	.0
66. Recpt 66	.0	.0	.0	.0	.0	.0	.0	.0	1.1	.1	.2
67. Recpt 67	.0	.0	.0	.0	.0	.0	.2	.1	1.1	.0	.0
68. Recpt 68	.0	.0	.0	.0	.0	.0	.0	.0	.3	1.1	.0

 # Magnified 1000 times

The non-magnified maximum concentration of 3.1 X 10^{-3} ppm is equivalent to 3.1 X 10^{-3} ppm X 1250 = 3.88 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	A7	A8	A9	A10	A11	A12	A13	A14
			CONC/LINK # (PPM)							
69. Recpt 69	211.	1.1	1.1	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	63.	1.1	1.1	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	70.	1.1	.0	1.1	.0	.0	.0	.0	.0	.0
72. Recpt 72	276.	1.2	.0	.0	.0	1.1	.0	.0	.0	.0
73. Recpt 73	256.	1.2	.0	.0	.0	.0	1.1	.0	.0	.0
74. Recpt 74	263.	1.3	.0	.0	.0	.0	.0	1.1	.1	.0
75. Recpt 75	221.	1.1	.0	.0	.0	.0	.0	.0	1.1	.0
76. Recpt 76	66.	1.2	.0	.0	.0	.0	.0	.0	1.1	.0
77. Recpt 77	285.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	267.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	109.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	85.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	229.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
82. Recpt 82	85.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	25.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
84. Recpt 84	216.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
85. Recpt 85	156.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
86. Recpt 86	34.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	115.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
88. Recpt 88	237.	1.3	1.0	.2	.0	.0	.0	.0	.0	.0
89. Recpt 89	247.	1.2	.0	1.1	.0	.0	.0	.0	.0	.0
90. Recpt 90	270.	1.3	.0	.0	1.1	.1	.0	.0	.0	.0
91. Recpt 91	67.	1.2	.0	.1	1.1	.0	.0	.0	.0	.0
92. Recpt 92	93.	1.2	.0	.0	.0	1.1	.0	.0	.0	.0
93. Recpt 93	76.	1.1	.0	.0	.0	.0	1.1	.0	.0	.0
94. Recpt 94	93.	1.4	.0	.0	.0	.0	.3	1.1	.0	.0
95. Recpt 95	275.	1.2	.0	.0	.0	.0	.0	.0	.0	1.1
96. Recpt 96	70.	1.2	.0	.0	.0	.0	.0	.0	.0	1.1
97. Recpt 97	105.	1.2	.0	.0	.0	.0	.0	.0	.0	.1
98. Recpt 98	262.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	54.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	84.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	208.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
102.Recpt 102	233.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
103.Recpt 103	35.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
104.Recpt 104	50.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
105.Recpt 105	336.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
106.Recpt 106	43.	1.3	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
	CONC/LINK (PPM)									
69. Recpt 69	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
73. Recpt 73	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
74. Recpt 74	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
75. Recpt 75	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
76. Recpt 76	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
77. Recpt 77	1.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	.0	1.1	.1	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	.2	1.1	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	.0	.1	1.1	.0	.0	.0	.0	.0	.0	.0

81. Recpt 81 *	.0	.0	.0	.0	1.1	.0	.1	.0	.0	.0
82. Recpt 82 *	.0	.0	.0	.0	1.1	.0	.0	.0	.0	.0
83. Recpt 83 *	.0	.0	.0	.0	.0	1.1	.0	.0	.0	.0
84. Recpt 84 *	.0	.0	.0	.0	.0	.0	.0	1.1	.0	.0
85. Recpt 85 *	.0	.0	.0	.0	.0	.0	.0	.0	1.1	.0
86. Recpt 86 *	.0	.0	.0	.0	.0	.0	.2	.0	1.0	.0
87. Recpt 87 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.1
88. Recpt 88 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
89. Recpt 89 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
90. Recpt 90 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91. Recpt 91 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
92. Recpt 92 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
93. Recpt 93 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
94. Recpt 94 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
96. Recpt 96 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
97. Recpt 97 *	1.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98 *	.0	.0	1.1	.1	.0	.0	.0	.0	.0	.0
99. Recpt 99 *	.0	.0	1.1	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100 *	.0	.0	.1	1.1	.0	.0	.0	.0	.0	.0
101.Recpt 101 *	.0	.0	.0	.0	.0	1.1	.2	.0	.0	.0
102.Recpt 102 *	.0	.0	.0	.0	.0	.0	1.1	.0	.0	.0
103.Recpt 103 *	.0	.0	.0	.0	.0	.0	1.1	.0	.0	.0
104.Recpt 104 *	.0	.0	.0	.0	.0	.0	.2	1.1	.0	.0
105.Recpt 105 *	.0	.0	.0	.0	.0	.0	.0	.0	1.1	.0
106.Recpt 106 *	.0	.0	.0	.0	.0	.0	.1	.0	.1	1.0

 # Magnified 1000 times

The non-magnified maximum concentration of 1.4 X 10^{-3} ppm is equivalent to 1.4 X 10^{-3} ppm X 1250 = 1.75 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.B MODEL RESULTS (WORST CASE WIND ANGLE)FOR HYDROCARBON EMISSION

ROUTE-1

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	57.	.2	.2	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	115.	.2	.0	.2	.0	.0	.0	.0	.0	.0
3. Recpt 3	98.	.2	.0	.0	.2	.0	.0	.0	.0	.0
4. Recpt 4	183.	.2	.0	.0	.0	.2	.0	.0	.0	.0
5. Recpt 5	25.	.2	.0	.0	.0	.2	.0	.0	.0	.0
6. Recpt 6	85.	.2	.0	.0	.0	.0	.0	.2	.0	.0
7. Recpt 7	293.	.2	.0	.0	.0	.0	.0	.2	.0	.0
8. Recpt 8	80.	.2	.0	.0	.0	.0	.0	.0	.0	.2
9. Recpt 9	111.	.2	.0	.0	.0	.0	.0	.0	.0	.0
10. Recpt 10	38.	.2	.0	.0	.0	.0	.0	.0	.0	.0
11. Recpt 11	250.	.2	.0	.0	.0	.0	.0	.0	.0	.0
12. Recpt 12	278.	.2	.0	.0	.0	.0	.0	.0	.0	.0
13. Recpt 13	299.	.2	.0	.0	.0	.0	.0	.0	.0	.0
14. Recpt 14	284.	.2	.0	.0	.0	.0	.0	.0	.0	.0
15. Recpt 15	97.	.2	.2	.0	.0	.0	.0	.0	.0	.0
16. Recpt 16	140.	.2	.0	.2	.0	.0	.0	.0	.0	.0
17. Recpt 17	292.	.2	.0	.2	.0	.0	.0	.0	.0	.0
18. Recpt 18	279.	.2	.0	.0	.2	.0	.0	.0	.0	.0
19. Recpt 19	360.	.2	.0	.0	.0	.2	.0	.0	.0	.0
20. Recpt 20	336.	.2	.0	.0	.0	.0	.2	.0	.0	.0
21. Recpt 21	75.	.2	.0	.0	.0	.0	.0	.0	.2	.0

22. Recpt 22	99.	.2	.0	.0	.0	.0	.0	.0	.0	.2
23. Recpt 23	260.	.2	.0	.0	.0	.0	.0	.0	.0	.2
24. Recpt 24	282.	.2	.0	.0	.0	.0	.0	.0	.0	.0
25. Recpt 25	96.	.2	.0	.0	.0	.0	.0	.0	.0	.0
26. Recpt 26	253.	.2	.0	.0	.0	.0	.0	.0	.0	.0
27. Recpt 27	276.	.2	.0	.0	.0	.0	.0	.0	.0	.0
28. Recpt 28	266.	.2	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M
1. Recpt 1	.0	.0	.0	.0	.0
2. Recpt 2	.0	.0	.0	.0	.0
3. Recpt 3	.0	.0	.0	.0	.0
4. Recpt 4	.0	.0	.0	.0	.0
5. Recpt 5	.0	.0	.0	.0	.0
6. Recpt 6	.0	.0	.0	.0	.0
7. Recpt 7	.0	.0	.0	.0	.0
8. Recpt 8	.0	.0	.0	.0	.0
9. Recpt 9	.2	.0	.0	.0	.0
10. Recpt 10	.0	.2	.0	.0	.0
11. Recpt 11	.0	.2	.0	.0	.0
12. Recpt 12	.0	.0	.2	.0	.0
13. Recpt 13	.0	.0	.0	.2	.0
14. Recpt 14	.0	.0	.0	.0	.2
15. Recpt 15	.0	.0	.0	.0	.0
16. Recpt 16	.0	.0	.0	.0	.0
17. Recpt 17	.0	.0	.0	.0	.0
18. Recpt 18	.0	.0	.0	.0	.0
19. Recpt 19	.0	.0	.0	.0	.0
20. Recpt 20	.0	.0	.0	.0	.0
21. Recpt 21	.0	.0	.0	.0	.0
22. Recpt 22	.0	.0	.0	.0	.0
23. Recpt 23	.0	.0	.0	.0	.0
24. Recpt 24	.2	.0	.0	.0	.0
25. Recpt 25	.0	.0	.2	.0	.0
26. Recpt 26	.0	.0	.2	.0	.0
27. Recpt 27	.0	.0	.0	.2	.0
28. Recpt 28	.0	.0	.0	.0	.2

The non-magnified maximum concentration of 0.2 X 10^{-3} ppm is equivalent to 0.2 X 10^{-3} ppm X 1250 = 0.25 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) N	O	P	Q	R	S	T	U
29. Recpt 29	189.	.3	.3	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	244.	.3	.0	.3	.0	.0	.0	.0	.0	.0
31. Recpt 31	267.	.3	.0	.0	.3	.0	.0	.0	.0	.0
32. Recpt 32	230.	.3	.0	.0	.0	.3	.0	.0	.0	.0
33. Recpt 33	82.	.4	.0	.0	.0	.3	.0	.0	.0	.0
34. Recpt 34	196.	.3	.0	.0	.0	.0	.0	.3	.0	.0
35. Recpt 35	67.	.3	.0	.0	.0	.0	.0	.3	.0	.0
36. Recpt 36	347.	.4	.0	.0	.0	.0	.0	.0	.0	.3
37. Recpt 37	325.	.3	.0	.0	.0	.0	.0	.0	.0	.0

38. Recpt 38	10.	.3	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	325.	.3	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	170.	.3	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	358.	.2	.0	.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	297.	.2	.0	.0	.0	.0	.0	.0	.0	.0
43. Recpt 43	352.	.2	.0	.0	.0	.0	.0	.0	.0	.0
44. Recpt 44	197.	.2	.0	.0	.0	.0	.0	.0	.0	.0
45. Recpt 45	151.	.2	.0	.0	.0	.0	.0	.0	.0	.0
46. Recpt 46	45.	.2	.0	.0	.0	.0	.0	.0	.0	.0
47. Recpt 47	1.	.2	.0	.0	.0	.0	.0	.0	.0	.0
48. Recpt 48	207.	.2	.0	.0	.0	.0	.0	.0	.0	.0
49. Recpt 49	221.	.3	.3	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	270.	.4	.0	.3	.0	.0	.0	.0	.0	.0
51. Recpt 51	64.	.3	.0	.3	.0	.0	.0	.0	.0	.0
52. Recpt 52	258.	.4	.0	.0	.0	.3	.0	.0	.0	.0
53. Recpt 53	288.	.3	.0	.0	.0	.0	.3	.0	.0	.0
54. Recpt 54	83.	.4	.0	.0	.0	.0	.3	.0	.0	.0
55. Recpt 55	333.	.4	.0	.0	.0	.0	.0	.0	.3	.0
56. Recpt 56	92.	.4	.0	.0	.0	.0	.0	.0	.3	.0
57. Recpt 57	163.	.4	.0	.0	.0	.0	.0	.0	.0	.3
58. Recpt 58	145.	.3	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	190.	.3	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	29.	.4	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	145.	.3	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	178.	.2	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	179.	.2	.0	.0	.0	.0	.0	.0	.0	.0
64. Recpt 64	117.	.2	.0	.0	.0	.0	.0	.0	.0	.0
65. Recpt 65	310.	.2	.0	.0	.0	.0	.0	.0	.0	.0
66. Recpt 66	23.	.2	.0	.0	.0	.0	.0	.0	.0	.0
67. Recpt 67	163.	.2	.0	.0	.0	.0	.0	.0	.0	.0
68. Recpt 68	225.	.2	.0	.0	.0	.0	.0	.0	.0	.0

	CONC/LINK (PPM)										
RECEPTOR	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
29. Recpt 29	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32. Recpt 32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
33. Recpt 33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
34. Recpt 34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
35. Recpt 35	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
36. Recpt 36	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
37. Recpt 37	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0	.0
42. Recpt 42	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0
43. Recpt 43	.0	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0
44. Recpt 44	.0	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0
45. Recpt 45	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
46. Recpt 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0
47. Recpt 47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
48. Recpt 48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
49. Recpt 49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51. Recpt 51	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
52. Recpt 52	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53. Recpt 53	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

54. Recpt 54	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55. Recpt 55	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
56. Recpt 56	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
57. Recpt 57	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
58. Recpt 58	*	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	*	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	*	.0	.0	.3	.1	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	*	.0	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	*	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	*	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0	.0
64. Recpt 64	*	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0
65. Recpt 65	*	.0	.0	.0	.0	.0	.0	.0	.2	.0	.0	.0
66. Recpt 66	*	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0	.0
67. Recpt 67	*	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0	.0
68. Recpt 68	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0

 # Magnified 1000 times

The non-magnified maximum concentration of 0.4 X 10^{-3} ppm is equivalent to 0.4 X 10^{-3} ppm X 1250 = 0.50 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) A7	A8	A9	A10	A11	A12	A13	A14
69. Recpt 69	211.	.2	.2	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	63.	.2	.2	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	70.	.2	.0	.2	.0	.0	.0	.0	.0	.0
72. Recpt 72	276.	.2	.0	.0	.0	.2	.0	.0	.0	.0
73. Recpt 73	256.	.2	.0	.0	.0	.0	.2	.0	.0	.0
74. Recpt 74	263.	.2	.0	.0	.0	.0	.0	.2	.0	.0
75. Recpt 75	221.	.2	.0	.0	.0	.0	.0	.0	.2	.0
76. Recpt 76	66.	.2	.0	.0	.0	.0	.0	.0	.2	.0
77. Recpt 77	285.	.2	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	267.	.2	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	109.	.2	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	85.	.2	.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	229.	.2	.0	.0	.0	.0	.0	.0	.0	.0
82. Recpt 82	85.	.2	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	25.	.2	.0	.0	.0	.0	.0	.0	.0	.0
84. Recpt 84	216.	.2	.0	.0	.0	.0	.0	.0	.0	.0
85. Recpt 85	156.	.2	.0	.0	.0	.0	.0	.0	.0	.0
86. Recpt 86	34.	.2	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	115.	.2	.0	.0	.0	.0	.0	.0	.0	.0
88. Recpt 88	237.	.2	.1	.0	.0	.0	.0	.0	.0	.0
89. Recpt 89	247.	.2	.0	.2	.0	.0	.0	.0	.0	.0
90. Recpt 90	270.	.2	.0	.0	.2	.0	.0	.0	.0	.0
91. Recpt 91	67.	.2	.0	.0	.2	.0	.0	.0	.0	.0
92. Recpt 92	93.	.2	.0	.0	.0	.2	.0	.0	.0	.0
93. Recpt 93	76.	.2	.0	.0	.0	.0	.2	.0	.0	.0
94. Recpt 94	93.	.2	.0	.0	.0	.0	.0	.2	.0	.0
95. Recpt 95	275.	.2	.0	.0	.0	.0	.0	.0	.0	.2
96. Recpt 96	70.	.2	.0	.0	.0	.0	.0	.0	.0	.2
97. Recpt 97	105.	.2	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	262.	.2	.0	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	54.	.2	.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	84.	.2	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	208.	.2	.0	.0	.0	.0	.0	.0	.0	.0

102.Recpt 102	*	233.	*	.2	*	.0	.0	.0	.0	.0	.0	.0	.0
103.Recpt 103	*	35.	*	.2	*	.0	.0	.0	.0	.0	.0	.0	.0
104.Recpt 104	*	50.	*	.2	*	.0	.0	.0	.0	.0	.0	.0	.0
105.Recpt 105	*	336.	*	.2	*	.0	.0	.0	.0	.0	.0	.0	.0
106.Recpt 106	*	43.	*	.2	*	.0	.0	.0	.0	.0	.0	.0	.0

	*	CONC/LINK (PPM)									
RECEPTOR	*	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
69. Recpt 69	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
73. Recpt 73	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
74. Recpt 74	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
75. Recpt 75	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
76. Recpt 76	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
77. Recpt 77	*	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	*	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	*	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	*	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	*	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0
82. Recpt 82	*	.0	.0	.0	.0	.2	.0	.0	.0	.0	.0
83. Recpt 83	*	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0
84. Recpt 84	*	.0	.0	.0	.0	.0	.0	.0	.2	.0	.0
85. Recpt 85	*	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0
86. Recpt 86	*	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0
87. Recpt 87	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.2
88. Recpt 88	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
89. Recpt 89	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
90. Recpt 90	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91. Recpt 91	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
92. Recpt 92	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
93. Recpt 93	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
94. Recpt 94	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
96. Recpt 96	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
97. Recpt 97	*	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	*	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	*	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	*	.0	.0	.0	.2	.0	.0	.0	.0	.0	.0
101.Recpt 101	*	.0	.0	.0	.0	.0	.2	.0	.0	.0	.0
102.Recpt 102	*	.0	.0	.0	.0	.0	.0	.2	.0	.0	.0
103.Recpt 103	*	.0	.0	.0	.0	.0	.0	.2	.0	.0	.0
104.Recpt 104	*	.0	.0	.0	.0	.0	.0	.0	.2	.0	.0
105.Recpt 105	*	.0	.0	.0	.0	.0	.0	.0	.0	.2	.0
106.Recpt 106	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1

 # Magnified 1000 times

The non-magnified maximum concentration of 0.2 X 10^{-3} ppm is equivalent to 0.2 X 10^{-3} ppm X 1250 = 0.25 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.C MODEL RESULTS (WORST CASE WIND ANGLE)FOR PARTICULATE MATTER EMISSION

ROUTE-1

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	57.	4.2	4.2	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	115.	4.2	.0	3.6	.6	.0	.0	.0	.0	.0
3. Recpt 3	98.	3.6	.0	.0	3.6	.0	.0	.0	.0	.0
4. Recpt 4	183.	3.8	.0	.0	.0	3.6	.2	.0	.0	.0
5. Recpt 5	25.	3.6	.0	.0	.0	3.6	.0	.0	.0	.0
6. Recpt 6	84.	4.0	.0	.0	.0	.0	.0	3.6	.2	.1
7. Recpt 7	293.	3.8	.0	.0	.0	.0	.1	3.6	.0	.0
8. Recpt 8	80.	3.8	.0	.0	.0	.0	.0	.0	.0	3.6
9. Recpt 9	111.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
10. Recpt 10	38.	3.6	.0	.0	.0	.0	.0	.0	.0	.0
11. Recpt 11	250.	3.9	.0	.0	.0	.0	.0	.0	.0	.2
12. Recpt 12	281.	3.6	.0	.0	.0	.0	.0	.0	.0	.0
13. Recpt 13	299.	3.6	.0	.0	.0	.0	.0	.0	.0	.0
14. Recpt 14	284.	3.8	.0	.0	.0	.0	.0	.0	.0	.0
15. Recpt 15	97.	3.9	3.6	.0	.3	.0	.0	.0	.0	.0
16. Recpt 16	140.	3.7	.0	3.6	.0	.0	.0	.0	.0	.0
17. Recpt 17	292.	3.9	.3	3.6	.0	.0	.0	.0	.0	.0
18. Recpt 18	279.	3.7	.0	.0	3.6	.0	.0	.0	.0	.0
19. Recpt 19	360.	3.7	.0	.0	.0	3.6	.0	.0	.0	.0
20. Recpt 20	336.	3.7	.0	.0	.0	.0	3.6	.0	.0	.0
21. Recpt 21	75.	3.9	.0	.0	.0	.0	.0	.0	3.6	.2
22. Recpt 22	99.	3.7	.0	.0	.0	.0	.0	.0	.0	3.6
23. Recpt 23	260.	3.8	.0	.0	.0	.0	.0	.0	.1	3.6
24. Recpt 24	282.	4.3	.0	.0	.0	.0	.0	.0	.0	.8
25. Recpt 25	96.	4.1	.0	.0	.0	.0	.0	.0	.0	.0
26. Recpt 26	253.	4.2	.0	.0	.0	.0	.0	.0	.0	.1
27. Recpt 27	276.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
28. Recpt 28	266.	3.7	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M
1. Recpt 1	.0	.0	.0	.0	.0
2. Recpt 2	.0	.0	.0	.0	.0
3. Recpt 3	.0	.0	.0	.0	.0
4. Recpt 4	.0	.0	.0	.0	.0
5. Recpt 5	.0	.0	.0	.0	.0
6. Recpt 6	.0	.0	.0	.0	.0
7. Recpt 7	.0	.0	.0	.0	.0
8. Recpt 8	.0	.0	.0	.0	.0
9. Recpt 9	3.6	.4	.0	.0	.0
10. Recpt 10	.0	3.6	.0	.0	.0
11. Recpt 11	.0	3.6	.0	.0	.0
12. Recpt 12	.0	.0	3.6	.0	.0
13. Recpt 13	.0	.0	.0	3.6	.0
14. Recpt 14	.0	.0	.0	.2	3.5
15. Recpt 15	.0	.0	.0	.0	.0
16. Recpt 16	.0	.0	.0	.0	.0
17. Recpt 17	.0	.0	.0	.0	.0
18. Recpt 18	.0	.0	.0	.0	.0
19. Recpt 19	.0	.0	.0	.0	.0

20. Recpt 20	.0	.0	.0	.0	.0
21. Recpt 21	.0	.0	.0	.0	.0
22. Recpt 22	.0	.0	.0	.0	.0
23. Recpt 23	.0	.0	.0	.0	.0
24. Recpt 24	3.5	.0	.0	.0	.0
25. Recpt 25	.0	.0	3.6	.4	.2
26. Recpt 26	.0	.3	3.6	.0	.0
27. Recpt 27	.0	.0	.2	3.6	.0
28. Recpt 28	.0	.0	.0	.0	3.6

 # Magnified 100000 times

The non-magnified maximum concentration is 4.3 X 10^{-5} ppm is equivalent to 0.2 X 10^{-5} ppm X 1250 = 0.05 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK **#** (PPM)							
			N	O	P	Q	R	S	T	U
29. Recpt 29	189.	6.5	6.5	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	244.	6.5	.0	6.5	.0	.0	.0	.0	.0	.0
31. Recpt 31	267.	7.0	.0	.0	6.5	.1	.2	.0	.0	.0
32. Recpt 22	230.	6.5	.0	.0	.0	6.5	.0	.0	.0	.0
33. Recpt 33	82.	7.5	.1	.0	.8	6.5	.0	.0	.0	.0
34. Recpt 34	196.	6.5	.0	.0	.0	.0	.0	6.5	.0	.0
35. Recpt 35	67.	7.1	.0	.0	.2	.4	.3	6.2	.0	.0
36. Recpt 36	347.	8.9	.0	.0	.0	.0	.0	.0	.0	6.3
37. Recpt 37	325.	6.6	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	10.	6.9	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	325.	6.5	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	173.	7.0	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	358.	3.4	.0	.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	297.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
43. Recpt 43	352.	3.6	.0	.0	.0	.0	.0	.0	.0	.0
44. Recpt 44	200.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
45. Recpt 45	151.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
46. Recpt 46	45.	4.1	.0	.0	.0	.0	.0	.0	.0	.0
47. Recpt 47	1.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
48. Recpt 48	207.	3.5	.0	.0	.0	.0	.0	.0	.0	.0
49. Recpt 49	221.	6.7	6.5	.0	.2	.0	.0	.0	.0	.0
50. Recpt 50	270.	8.1	.0	6.2	1.4	.1	.1	.0	.0	.0
51. Recpt 51	64.	7.1	.6	6.5	.0	.0	.0	.0	.0	.0
52. Recpt 52	258.	7.6	.0	.0	.0	6.5	.8	.2	.2	.0
53. Recpt 53	288.	6.7	.0	.0	.0	.0	6.5	.0	.0	.0
54. Recpt 54	83.	7.6	.0	.0	.5	.6	6.4	.0	.0	.0
55. Recpt 55	333.	7.7	.0	.0	.0	.0	.0	.0	6.5	.2
56. Recpt 56	92.	7.3	.0	.0	.2	.2	.8	.2	5.8	.0
57. Recpt 57	163.	7.8	.0	.0	.0	.0	.0	.0	1.4	6.4
58. Recpt 58	145.	6.7	.0	.0	.0	.0	.0	.1	.0	.0
59. Recpt 59	190.	6.8	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	29.	9.1	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	145.	6.6	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	178.	4.2	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	179.	3.4	.0	.0	.0	.0	.0	.0	.0	.0
64. Recpt 64	117.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
65. Recpt 65	310.	3.7	.0	.0	.0	.0	.0	.0	.0	.0
66. Recpt 66	23.	4.2	.0	.0	.0	.0	.0	.0	.0	.0
67. Recpt 67	163.	4.3	.0	.0	.0	.0	.0	.0	.0	.0
68. Recpt 68	225.	3.9	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
29. Recpt 29	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32. Recpt 32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
33. Recpt 33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
34. Recpt 34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
35. Recpt 35	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
36. Recpt 36	2.3	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
37. Recpt 37	6.6	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	.0	6.5	.3	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	.0	.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	.2	.3	6.5	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	.0	.0	.0	.0	3.3	.0	.0	.0	.0	.0	.0
42. Recpt 42	.0	.0	.0	.0	.0	3.3	.0	.0	.0	.0	.0
43. Recpt 43	.0	.0	.0	.0	.0	.0	3.3	.1	.2	.0	.0
44. Recpt 44	.0	.0	.0	.0	.0	.0	3.3	.0	.0	.0	.0
45. Recpt 45	.0	.0	.0	.0	.0	.2	.5	3.0	.0	.0	.0
46. Recpt 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.2	.9
47. Recpt 47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.3
48. Recpt 48	.0	.0	.0	.0	.0	.0	.0	.0	.2	.1	3.2
49. Recpt 49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51. Recpt 51	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
52. Recpt 52	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53. Recpt 53	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
54. Recpt 54	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55. Recpt 55	.9	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
56. Recpt 56	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
57. Recpt 57	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
58. Recpt 58	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	.3	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	.0	.0	5.6	2.8	.6	.0	.0	.0	.0	.0	.0
61. Recpt 61	.0	.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	.2	.2	1.0	2.8	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	.0	.0	.0	.0	3.3	.0	.0	.0	.0	.0	.0
64. Recpt 64	.0	.0	.0	.0	.0	3.3	.0	.0	.0	.0	.0
65. Recpt 65	.0	.0	.0	.0	.0	.0	.0	3.2	.5	.0	.0
66. Recpt 66	.0	.0	.0	.0	.0	.0	.0	.0	3.2	.3	.7
67. Recpt 67	.0	.0	.0	.0	.1	.2	.5	.3	3.2	.0	.0
68. Recpt 68	.0	.0	.0	.0	.0	.0	.0	.0	.7	3.2	.0

The non-magnified maximum concentration is 9.1×10^{-5} ppm is equivalent to 9.1×10^{-5} ppm X 1250 = 0.11 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) A7	A8	A9	A10	A11	A12	A13	A14
69. Recpt 69	211.	3.3	3.2	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	63.	3.3	3.3	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	70.	3.3	.0	3.3	.0	.0	.0	.0	.0	.0
72. Recpt 72	276.	3.6	.0	.0	.0	3.2	.2	.0	.0	.0

73. Recpt 73	256.	3.5	.0	.0	.0	.0	3.2	.0	.2	.0
74. Recpt 74	263.	3.7	.0	.0	.0	.0	.0	3.2	.4	.0
75. Recpt 75	121.	3.2	.0	.0	.0	.0	.0	3.2	.0	.0
76. Recpt 76	66.	3.4	.0	.0	.0	.0	.1	.0	3.3	.0
77. Recpt 77	285.	3.5	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	267.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	109.	3.7	.0	.0	.0	.0	.0	.0	.0	.1
80. Recpt 80	85.	3.8	.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	229.	3.7	.0	.0	.0	.0	.0	.0	.0	.0
82. Recpt 82	85.	3.8	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	25.	3.5	.0	.0	.0	.0	.0	.0	.0	.0
84. Recpt 84	216.	3.6	.0	.0	.0	.0	.0	.0	.0	.0
85. Recpt 85	156.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
86. Recpt 86	34.	3.7	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	115.	3.2	.0	.0	.0	.0	.0	.0	.0	.0
88. Recpt 88	237.	3.7	3.1	.5	.2	.0	.0	.0	.0	.0
89. Recpt 89	247.	3.5	.0	3.2	.2	.0	.0	.0	.0	.0
90. Recpt 90	270.	3.8	.0	.0	3.3	.3	.1	.0	.0	.0
91. Recpt 91	67.	3.6	.0	.4	3.2	.0	.0	.0	.0	.0
92. Recpt 92	93.	3.5	.0	.0	.2	3.3	.0	.0	.0	.0
93. Recpt 93	76.	3.3	.0	.0	.0	.0	3.3	.0	.0	.0
94. Recpt 94	93.	4.2	.0	.0	.0	.2	.8	3.1	.0	.0
95. Recpt 95	275.	3.7	.0	.0	.0	.0	.0	.0	.0	3.3
96. Recpt 96	70.	3.6	.0	.0	.0	.0	.0	.0	.2	3.3
97. Recpt 97	105.	3.6	.0	.0	.0	.0	.0	.0	.0	.3
98. Recpt 98	262.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	54.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	84.	3.9	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	208.	3.7	.0	.0	.0	.0	.0	.0	.0	.0
102.Recpt 102	233.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
103.Recpt 103	35.	3.4	.0	.0	.0	.0	.0	.0	.0	.0
104.Recpt 104	50.	4.0	.0	.0	.0	.0	.0	.0	.0	.0
105.Recpt 105	336.	3.3	.0	.0	.0	.0	.0	.0	.0	.0
106.Recpt 106	43.	3.9	.0	.0	.0	.0	.0	.0	.0	.0

	CONC/LINK (PPM)									
RECEPTOR	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
69. Recpt 69	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
73. Recpt 73	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
74. Recpt 74	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
75. Recpt 75	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
76. Recpt 76	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
77. Recpt 77	3.3	.1	.1	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	.0	3.2	.3	.2	.1	.0	.0	.0	.0	.0
79. Recpt 79	.5	3.1	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	.0	.4	3.2	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	.0	.0	.0	.0	3.2	.1	.3	.0	.0	.0
82. Recpt 82	.0	.0	.1	.3	3.2	.0	.0	.0	.0	.0
83. Recpt 83	.0	.0	.0	.0	.3	3.3	.0	.0	.0	.0
84. Recpt 84	.0	.0	.0	.0	.0	.0	.0	3.2	.3	.1
85. Recpt 85	.0	.0	.0	.0	.0	.0	.0	.0	3.3	.0
86. Recpt 86	.0	.0	.0	.0	.0	.0	.5	.0	3.1	.0
87. Recpt 87	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.2
88. Recpt 88	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

89. Recpt 89 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
90. Recpt 90 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91. Recpt 91 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
92. Recpt 92 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
93. Recpt 93 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
94. Recpt 94 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95 *	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
96. Recpt 96 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
97. Recpt 97 *	3.3	.0	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98 *	.0	.0	3.2	.4	.3	.0	.0	.0	.0	.0
99. Recpt 99 *	.0	.0	3.3	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100 *	.0	.2	.4	3.1	.0	.0	.0	.0	.0	.0
101.Recpt 101 *	.0	.0	.0	.0	.0	3.2	.5	.0	.0	.0
102.Recpt 102 *	.0	.0	.0	.0	.0	.0	3.2	.0	.0	.0
103.Recpt 103 *	.0	.0	.0	.0	.0	.0	3.2	.0	.0	.0
104.Recpt 104 *	.0	.0	.0	.0	.0	.0	.7	3.2	.0	.0
105.Recpt 105 *	.0	.0	.0	.0	.0	.0	.0	.0	3.2	.0
106.Recpt 106 *	.0	.0	.0	.0	.0	.0	.4	.2	.4	2.8

The non-magnified maximum concentration is 4.2 X 10^{-5} ppm is equivalent to 4.2 X 10^{-5} ppm X 1250 = 0.05 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.D MODEL RESULTS (WORST CASE WIND ANGLE)FOR NITROGEN OXIDES

ROUTE-1

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) A	B	C	D	E	F	G	H
1. Recpt 1	57.	1.3	1.3	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	115.	1.3	.0	1.1	.2	.0	.0	.0	.0	.0
3. Recpt 3	98.	1.1	.0	.0	1.1	.0	.0	.0	.0	.0
4. Recpt 4	183.	1.2	.0	.0	.0	1.1	.0	.0	.0	.0
5. Recpt 5	25.	1.1	.0	.0	.0	1.1	.0	.0	.0	.0
6. Recpt 6	85.	1.2	.0	.0	.0	.0	.0	1.1	.0	.0
7. Recpt 7	293.	1.2	.0	.0	.0	.0	.0	1.1	.0	.0
8. Recpt 8	80.	1.2	.0	.0	.0	.0	.0	.0	.0	1.1
9. Recpt 9	111.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
10. Recpt 10	38.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
11. Recpt 11	250.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
12. Recpt 12	278.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
13. Recpt 13	299.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
14. Recpt 14	284.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
15. Recpt 15	97.	1.2	1.1	.0	.0	.0	.0	.0	.0	.0
16. Recpt 16	140.	1.2	.0	1.1	.0	.0	.0	.0	.0	.0
17. Recpt 17	292.	1.2	.0	1.1	.0	.0	.0	.0	.0	.0
18. Recpt 18	279.	1.1	.0	.0	1.1	.0	.0	.0	.0	.0
19. Recpt 19	360.	1.2	.0	.0	.0	1.1	.0	.0	.0	.0
20. Recpt 20	336.	1.2	.0	.0	.0	.0	1.1	.0	.0	.0
21. Recpt 21	75.	1.2	.0	.0	.0	.0	.0	.0	1.1	.0
22. Recpt 22	99.	1.2	.0	.0	.0	.0	.0	.0	.0	1.1
23. Recpt 23	260.	1.2	.0	.0	.0	.0	.0	.0	.0	1.1
24. Recpt 24	282.	1.4	.0	.0	.0	.0	.0	.0	.0	.2
25. Recpt 25	96.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
26. Recpt 26	253.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
27. Recpt 27	276.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
28. Recpt 28	266.	1.2	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M
1. Recpt 1	.0	.0	.0	.0	.0
2. Recpt 2	.0	.0	.0	.0	.0
3. Recpt 3	.0	.0	.0	.0	.0
4. Recpt 4	.0	.0	.0	.0	.0
5. Recpt 5	.0	.0	.0	.0	.0
6. Recpt 6	.0	.0	.0	.0	.0
7. Recpt 7	.0	.0	.0	.0	.0
8. Recpt 8	.0	.0	.0	.0	.0
9. Recpt 9	1.1	.1	.0	.0	.0
10. Recpt 10	.0	1.1	.0	.0	.0
11. Recpt 11	.0	1.1	.0	.0	.0
12. Recpt 12	.0	.0	1.1	.0	.0
13. Recpt 13	.0	.0	.0	1.1	.0
14. Recpt 14	.0	.0	.0	.0	1.1
15. Recpt 15	.0	.0	.0	.0	.0
16. Recpt 16	.0	.0	.0	.0	.0
17. Recpt 17	.0	.0	.0	.0	.0
18. Recpt 18	.0	.0	.0	.0	.0
19. Recpt 19	.0	.0	.0	.0	.0
20. Recpt 20	.0	.0	.0	.0	.0
21. Recpt 21	.0	.0	.0	.0	.0
22. Recpt 22	.0	.0	.0	.0	.0
23. Recpt 23	.0	.0	.0	.0	.0
24. Recpt 24	1.1	.0	.0	.0	.0
25. Recpt 25	.0	.0	1.1	.1	.0
26. Recpt 26	.0	.1	1.1	.0	.0
27. Recpt 27	.0	.0	.0	1.1	.0
28. Recpt 28	.0	.0	.0	.0	1.1

The non-magnified maximum concentration of 1.4 X 10^{-3} ppm is equivalent to 1.4 X 10^{-3} ppm X 1250 = 1.75 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) N	O	P	Q	R	S	T	U
29. Recpt 29	189.	2.0	2.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	244.	2.0	.0	2.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	267.	2.2	.0	.0	2.0	.0	.0	.0	.0	.0
32. Recpt 32	230.	2.0	.0	.0	.0	2.0	.0	.0	.0	.0
33. Recpt 33	82.	2.4	.0	.0	.3	2.0	.0	.0	.0	.0
34. Recpt 34	196.	2.0	.0	.0	.0	.0	.0	2.0	.0	.0
35. Recpt 35	67.	2.2	.0	.0	.0	.1	.1	1.9	.0	.0
36. Recpt 36	347.	2.8	.0	.0	.0	.0	.0	.0	.0	2.0
37. Recpt 37	325.	2.1	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	10.	2.1	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	325.	2.0	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	170.	2.2	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	358.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	297.	1.0	.0	.0	.0	.0	.0	.0	.0	.0
43. Recpt 43	352.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
44. Recpt 44	197.	1.0	.0	.0	.0	.0	.0	.0	.0	.0
45. Recpt 45	151.	1.2	.0	.0	.0	.0	.0	.0	.0	.0

46. Recpt 46	45.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
47. Recpt 47	1.	1.0	.0	.0	.0	.0	.0	.0	.0	.0
48. Recpt 48	207.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
49. Recpt 49	221.	2.1	2.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	270.	2.5	.0	2.0	.5	.0	.0	.0	.0	.0
51. Recpt 51	64.	2.2	.2	2.0	.0	.0	.0	.0	.0	.0
52. Recpt 52	258.	2.4	.0	.0	.0	2.0	.2	.0	.0	.0
53. Recpt 53	288.	2.1	.0	.0	.0	.0	2.0	.0	.0	.0
54. Recpt 54	83.	2.4	.0	.0	.2	.2	2.0	.0	.0	.0
55. Recpt 55	333.	2.4	.0	.0	.0	.0	.0	.0	2.0	.0
56. Recpt 56	92.	2.3	.0	.0	.0	.0	.2	.0	1.8	.0
57. Recpt 57	163.	2.4	.0	.0	.0	.0	.0	.0	.4	2.0
58. Recpt 58	145.	2.1	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	190.	2.1	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	29.	2.8	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	145.	2.1	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	178.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	179.	1.1	.0	.0	.0	.0	.0	.0	.0	.0
64. Recpt 64	117.	1.0	.0	.0	.0	.0	.0	.0	.0	.0
65. Recpt 65	310.	1.2	.0	.0	.0	.0	.0	.0	.0	.0
66. Recpt 66	23.	1.3	.0	.0	.0	.0	.0	.0	.0	.0
67. Recpt 67	163.	1.4	.0	.0	.0	.0	.0	.0	.0	.0
68. Recpt 68	225.	1.2	.0	.0	.0	.0	.0	.0	.0	.0

	CONC/LINK (PPM)										
RECEPTOR	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
29. Recpt 29	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32. Recpt 32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
33. Recpt 33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
34. Recpt 34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
35. Recpt 35	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
36. Recpt 36	.7	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
37. Recpt 37	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	.0	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	.0	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	.0	.0	.0	.0	1.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	.0	.0	.0	.0	.0	1.0	.0	.0	.0	.0	.0
43. Recpt 43	.0	.0	.0	.0	.0	.0	1.0	.0	.0	.0	.0
44. Recpt 44	.0	.0	.0	.0	.0	.0	1.0	.0	.0	.0	.0
45. Recpt 45	.0	.0	.0	.0	.0	.0	.2	.9	.0	.0	.0
46. Recpt 46	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0	.3
47. Recpt 47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
48. Recpt 48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
49. Recpt 49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51. Recpt 51	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
52. Recpt 52	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53. Recpt 53	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
54. Recpt 54	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55. Recpt 55	.3	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
56. Recpt 56	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
57. Recpt 57	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
58. Recpt 58	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

60. Recpt 60 *	.0	.0	1.7	.9	.2	.0	.0	.0	.0	.0	.0
61. Recpt 61 *	.0	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62 *	.0	.0	.3	.9	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63 *	.0	.0	.0	.0	1.0	.0	.0	.0	.0	.0	.0
64. Recpt 64 *	.0	.0	.0	.0	.0	1.0	.0	.0	.0	.0	.0
65. Recpt 65 *	.0	.0	.0	.0	.0	.0	.0	1.0	.2	.0	.0
66. Recpt 66 *	.0	.0	.0	.0	.0	.0	.0	.0	1.0	.0	.2
67. Recpt 67 *	.0	.0	.0	.0	.0	.0	.1	.1	1.0	.0	.0
68. Recpt 68 *	.0	.0	.0	.0	.0	.0	.0	.0	.2	1.0	.0

The non-magnified maximum concentration of 2.8 X 10^{-3} ppm is equivalent to 2.8 X 10^{-3} ppm X 1250 = 3.5 μg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	* BRG * (DEG) *	* PRED * CONC (PPM) *	CONC/LINK # (PPM) A7	A8	A9	A10	A11	A12	A13	A14
69. Recpt 69	* 211. *	1.0 *	1.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	* 63. *	1.0 *	1.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	* 70. *	1.0 *	.0	1.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	* 276. *	1.1 *	.0	.0	.0	1.0	.0	.0	.0	.0
73. Recpt 73	* 256. *	1.1 *	.0	.0	.0	.0	1.0	.0	.0	.0
74. Recpt 74	* 263. *	1.2 *	.0	.0	.0	.0	.0	1.0	.1	.0
75. Recpt 75	* 221. *	1.0 *	.0	.0	.0	.0	.0	.0	1.0	.0
76. Recpt 76	* 66. *	1.1 *	.0	.0	.0	.0	.0	.0	1.0	.0
77. Recpt 77	* 285. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	* 267. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	* 109. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	* 85. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	* 229. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
82. Recpt 82	* 85. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	* 25. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	.0
84. Recpt 84	* 216. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	.0
85. Recpt 85	* 156. *	1.0 *	.0	.0	.0	.0	.0	.0	.0	.0
86. Recpt 86	* 34. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	* 115. *	1.0 *	.0	.0	.0	.0	.0	.0	.0	.0
88. Recpt 88	* 237. *	1.2 *	1.0	.1	.0	.0	.0	.0	.0	.0
89. Recpt 89	* 247. *	1.1 *	.0	1.0	.0	.0	.0	.0	.0	.0
90. Recpt 90	* 270. *	1.2 *	.0	.0	1.0	.1	.0	.0	.0	.0
91. Recpt 91	* 67. *	1.1 *	.0	.1	1.0	.0	.0	.0	.0	.0
92. Recpt 92	* 93. *	1.1 *	.0	.0	.0	1.0	.0	.0	.0	.0
93. Recpt 93	* 76. *	1.0 *	.0	.0	.0	.0	1.0	.0	.0	.0
94. Recpt 94	* 93. *	1.3 *	.0	.0	.0	.0	.2	1.0	.0	.0
95. Recpt 95	* 275. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	1.0
96. Recpt 96	* 70. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	1.0
97. Recpt 97	* 105. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	* 262. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	* 54. *	1.0 *	.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	* 84. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	* 208. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
102.Recpt 102	* 233. *	1.0 *	.0	.0	.0	.0	.0	.0	.0	.0
103.Recpt 103	* 35. *	1.1 *	.0	.0	.0	.0	.0	.0	.0	.0
104.Recpt 104	* 50. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0
105.Recpt 105	* 336. *	1.0 *	.0	.0	.0	.0	.0	.0	.0	.0
106.Recpt 106	* 43. *	1.2 *	.0	.0	.0	.0	.0	.0	.0	.0

* CONC/LINK

RECEPTOR	*	A15	A16	A17	A18	A19 (PPM)	A20	A21	A22	A23	A24
69. Recpt 69	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
73. Recpt 73	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
74. Recpt 74	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
75. Recpt 75	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
76. Recpt 76	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
77. Recpt 77	*	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	*	.0	1.0	.1	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	*	.1	1.0	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	*	.0	.1	1.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	*	.0	.0	.0	.0	1.0	.0	.1	.0	.0	.0
82. Recpt 82	*	.0	.0	.0	.0	1.0	.0	.0	.0	.0	.0
83. Recpt 83	*	.0	.0	.0	.0	.0	1.0	.0	.0	.0	.0
84. Recpt 84	*	.0	.0	.0	.0	.0	.0	.0	1.0	.0	.0
85. Recpt 85	*	.0	.0	.0	.0	.0	.0	.0	.0	1.0	.0
86. Recpt 86	*	.0	.0	.0	.0	.0	.0	.1	.0	1.0	.0
87. Recpt 87	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	1.0
88. Recpt 88	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
89. Recpt 89	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
90. Recpt 90	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91. Recpt 91	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
92. Recpt 92	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
93. Recpt 93	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
94. Recpt 94	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
96. Recpt 96	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
97. Recpt 97	*	1.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	*	.0	.0	1.0	.1	.0	.0	.0	.0	.0	.0
99. Recpt 99	*	.0	.0	1.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	*	.0	.0	.1	1.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	*	.0	.0	.0	.0	.0	1.0	.2	.0	.0	.0
102.Recpt 102	*	.0	.0	.0	.0	.0	.0	1.0	.0	.0	.0
103.Recpt 103	*	.0	.0	.0	.0	.0	.0	1.0	.0	.0	.0
104.Recpt 104	*	.0	.0	.0	.0	.0	.0	.2	1.0	.0	.0
105.Recpt 105	*	.0	.0	.0	.0	.0	.0	.0	.0	1.0	.0
106.Recpt 106	*	.0	.0	.0	.0	.0	.0	.1	.0	.1	.9

The non-magnified maximum concentration of 1.3 X 10^{-3} ppm is equivalent to 2.8 X 10^{-3} ppm X 1250 = 1.6 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.E MODEL RESULTS (WORST CASE WIND ANGLE)FOR SULPHUR DI-OXIDES

ROUTE-1

RECEPTOR	*	BRG (DEG)	*	PRED CONC (PPM)	*	A	B	C	D (CONC/LINK (PPM))	E	F	G	H
1. Recpt 1	*	57.	*	.1	*	.1	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	*	115.	*	.1	*	.0	.1	.0	.0	.0	.0	.0	.0
3. Recpt 3	*	98.	*	.1	*	.0	.0	.1	.0	.0	.0	.0	.0
4. Recpt 4	*	183.	*	.1	*	.0	.0	.0	.1	.0	.0	.0	.0
5. Recpt 5	*	25.	*	.1	*	.0	.0	.0	.1	.0	.0	.0	.0
6. Recpt 6	*	85.	*	.1	*	.0	.0	.0	.0	.0	.1	.0	.0
7. Recpt 7	*	293.	*	.1	*	.0	.0	.0	.0	.0	.1	.0	.0

8. Recpt 8	80.	.1	.0	.0	.0	.0	.0	.0	.0	.1
9. Recpt 9	111.	.1	.0	.0	.0	.0	.0	.0	.0	.0
10. Recpt 10	38.	.1	.0	.0	.0	.0	.0	.0	.0	.0
11. Recpt 11	250.	.1	.0	.0	.0	.0	.0	.0	.0	.0
12. Recpt 12	278.	.1	.0	.0	.0	.0	.0	.0	.0	.0
13. Recpt 13	299.	.1	.0	.0	.0	.0	.0	.0	.0	.0
14. Recpt 14	284.	.1	.0	.0	.0	.0	.0	.0	.0	.0
15. Recpt 15	97.	.1	.1	.0	.0	.0	.0	.0	.0	.0
16. Recpt 16	140.	.1	.0	.1	.0	.0	.0	.0	.0	.0
17. Recpt 17	292.	.1	.0	.1	.0	.0	.0	.0	.0	.0
18. Recpt 18	279.	.1	.0	.0	.1	.0	.0	.0	.0	.0
19. Recpt 19	360.	.1	.0	.0	.0	.1	.0	.0	.0	.0
20. Recpt 20	336.	.1	.0	.0	.0	.0	.1	.0	.0	.0
21. Recpt 21	75.	.1	.0	.0	.0	.0	.0	.0	.1	.0
22. Recpt 22	99.	.1	.0	.0	.0	.0	.0	.0	.0	.1
23. Recpt 23	260.	.1	.0	.0	.0	.0	.0	.0	.0	.1
24. Recpt 24	282.	.1	.0	.0	.0	.0	.0	.0	.0	.0
25. Recpt 25	96.	.1	.0	.0	.0	.0	.0	.0	.0	.0
26. Recpt 26	253.	.1	.0	.0	.0	.0	.0	.0	.0	.0
27. Recpt 27	276.	.1	.0	.0	.0	.0	.0	.0	.0	.0
28. Recpt 28	266.	.1	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M
1. Recpt 1	.0	.0	.0	.0	.0
2. Recpt 2	.0	.0	.0	.0	.0
3. Recpt 3	.0	.0	.0	.0	.0
4. Recpt 4	.0	.0	.0	.0	.0
5. Recpt 5	.0	.0	.0	.0	.0
6. Recpt 6	.0	.0	.0	.0	.0
7. Recpt 7	.0	.0	.0	.0	.0
8. Recpt 8	.0	.0	.0	.0	.0
9. Recpt 9	.1	.0	.0	.0	.0
10. Recpt 10	.0	.1	.0	.0	.0
11. Recpt 11	.0	.1	.0	.0	.0
12. Recpt 12	.0	.0	.1	.0	.0
13. Recpt 13	.0	.0	.0	.1	.0
14. Recpt 14	.0	.0	.0	.0	.1
15. Recpt 15	.0	.0	.0	.0	.0
16. Recpt 16	.0	.0	.0	.0	.0
17. Recpt 17	.0	.0	.0	.0	.0
18. Recpt 18	.0	.0	.0	.0	.0
19. Recpt 19	.0	.0	.0	.0	.0
20. Recpt 20	.0	.0	.0	.0	.0
21. Recpt 21	.0	.0	.0	.0	.0
22. Recpt 22	.0	.0	.0	.0	.0
23. Recpt 23	.0	.0	.0	.0	.0
24. Recpt 24	.1	.0	.0	.0	.0
25. Recpt 25	.0	.0	.1	.0	.0
26. Recpt 26	.0	.0	.1	.0	.0
27. Recpt 27	.0	.0	.0	.1	.0
28. Recpt 28	.0	.0	.0	.0	.1

The non-magnified maximum concentration of 0.1 X 10^{-3} ppm is equivalent to 0.1 X 10^{-3} ppm X 1250 = 0.13 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK # (PPM) N	O	P	Q	R	S	T	U
29. Recpt 29	189.	.2	.2	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	244.	.2	.0	.2	.0	.0	.0	.0	.0	.0
31. Recpt 31	267.	.2	.0	.0	.2	.0	.0	.0	.0	.0
32. Recpt 32	230.	.2	.0	.0	.0	.2	.0	.0	.0	.0
33. Recpt 33	82.	.2	.0	.0	.0	.2	.0	.0	.0	.0
34. Recpt 34	196.	.2	.0	.0	.0	.0	.0	.2	.0	.0
35. Recpt 35	67.	.2	.0	.0	.0	.0	.0	.2	.0	.0
36. Recpt 36	347.	.3	.0	.0	.0	.0	.0	.0	.0	.2
37. Recpt 37	325.	.2	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	10.	.2	.0	.0	.0	.0	.0	.0	.0	.0
39. Recpt 39	325.	.2	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40	170.	.2	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41	358.	.1	.0	.0	.0	.0	.0	.0	.0	.0
42. Recpt 42	297.	.1	.0	.0	.0	.0	.0	.0	.0	.0
43. Recpt 43	352.	.1	.0	.0	.0	.0	.0	.0	.0	.0
44. Recpt 44	197.	.1	.0	.0	.0	.0	.0	.0	.0	.0
45. Recpt 45	151.	.1	.0	.0	.0	.0	.0	.0	.0	.0
46. Recpt 46	45.	.1	.0	.0	.0	.0	.0	.0	.0	.0
47. Recpt 47	1.	.1	.0	.0	.0	.0	.0	.0	.0	.0
48. Recpt 48	207.	.1	.0	.0	.0	.0	.0	.0	.0	.0
49. Recpt 49	221.	.2	.2	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50	270.	.3	.0	.2	.0	.0	.0	.0	.0	.0
51. Recpt 51	64.	.2	.0	.2	.0	.0	.0	.0	.0	.0
52. Recpt 52	258.	.2	.0	.0	.0	.2	.0	.0	.0	.0
53. Recpt 53	288.	.2	.0	.0	.0	.0	.2	.0	.0	.0
54. Recpt 54	83.	.2	.0	.0	.0	.0	.2	.0	.0	.0
55. Recpt 55	333.	.2	.0	.0	.0	.0	.0	.0	.2	.0
56. Recpt 56	92.	.2	.0	.0	.0	.0	.0	.0	.2	.0
57. Recpt 57	163.	.2	.0	.0	.0	.0	.0	.0	.0	.2
58. Recpt 58	145.	.2	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59	190.	.2	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60	29.	.3	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61	145.	.2	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62	178.	.1	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63	179.	.1	.0	.0	.0	.0	.0	.0	.0	.0
64. Recpt 64	117.	.1	.0	.0	.0	.0	.0	.0	.0	.0
65. Recpt 65	310.	.1	.0	.0	.0	.0	.0	.0	.0	.0
66. Recpt 66	23.	.1	.0	.0	.0	.0	.0	.0	.0	.0
67. Recpt 67	163.	.1	.0	.0	.0	.0	.0	.0	.0	.0
68. Recpt 68	225.	.1	.0	.0	.0	.0	.0	.0	.0	.0

RECEPTOR	CONC/LINK (PPM) V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
29. Recpt 29	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30. Recpt 30	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31. Recpt 31	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
32. Recpt 32	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
33. Recpt 33	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
34. Recpt 34	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
35. Recpt 35	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
36. Recpt 36	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
37. Recpt 37	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
38. Recpt 38	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0

39. Recpt 39 *	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
40. Recpt 40 *	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
41. Recpt 41 *	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0
42. Recpt 42 *	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
43. Recpt 43 *	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0
44. Recpt 44 *	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0
45. Recpt 45 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
46. Recpt 46 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0
47. Recpt 47 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
48. Recpt 48 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
49. Recpt 49 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50. Recpt 50 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51. Recpt 51 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
52. Recpt 52 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53. Recpt 53 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
54. Recpt 54 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55. Recpt 55 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
56. Recpt 56 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
57. Recpt 57 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
58. Recpt 58 *	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
59. Recpt 59 *	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0	.0
60. Recpt 60 *	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
61. Recpt 61 *	.0	.0	.2	.0	.0	.0	.0	.0	.0	.0	.0
62. Recpt 62 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
63. Recpt 63 *	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0	.0
64. Recpt 64 *	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
65. Recpt 65 *	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
66. Recpt 66 *	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0
67. Recpt 67 *	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0
68. Recpt 68 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

The non-magnified maximum concentration of 0.3 X 10^{-3} ppm is equivalent to 0.3 X 10^{-3} ppm X 1250 = 0.38 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	* BRG * (DEG) *	* PRED * CONC (PPM) *	CONC/LINK # (PPM) A7	A8	A9	A10	A11	A12	A13	A14
69. Recpt 69	211.	.1	.1	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	63.	.1	.1	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	70.	.1	.0	.1	.0	.0	.0	.0	.0	.0
72. Recpt 72	276.	.1	.0	.0	.0	.1	.0	.0	.0	.0
73. Recpt 73	256.	.1	.0	.0	.0	.0	.1	.0	.0	.0
74. Recpt 74	263.	.1	.0	.0	.0	.0	.0	.1	.0	.0
75. Recpt 75	221.	.1	.0	.0	.0	.0	.0	.0	.1	.0
76. Recpt 76	66.	.1	.0	.0	.0	.0	.0	.0	.1	.0
77. Recpt 77	285.	.1	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	267.	.1	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	109.	.1	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	85.	.1	.0	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	229.	.1	.0	.0	.0	.0	.0	.0	.0	.0
82. Recpt 82	85.	.1	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	25.	.1	.0	.0	.0	.0	.0	.0	.0	.0
84. Recpt 84	216.	.1	.0	.0	.0	.0	.0	.0	.0	.0
85. Recpt 85	156.	.1	.0	.0	.0	.0	.0	.0	.0	.0
86. Recpt 86	34.	.1	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	115.	.1	.0	.0	.0	.0	.0	.0	.0	.0
88. Recpt 88	237.	.1	.0	.0	.0	.0	.0	.0	.0	.0

89. Recpt 89	*	247.	*	.1	*	.0	.1	.0	.0	.0	.0	.0	.0
90. Recpt 90	*	270.	*	.1	*	.0	.0	.1	.0	.0	.0	.0	.0
91. Recpt 91	*	67.	*	.1	*	.0	.0	.1	.0	.0	.0	.0	.0
92. Recpt 92	*	93.	*	.1	*	.0	.0	.0	.1	.0	.0	.0	.0
93. Recpt 93	*	76.	*	.1	*	.0	.0	.0	.0	.1	.0	.0	.0
94. Recpt 94	*	93.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95	*	275.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.1
96. Recpt 96	*	70.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.1
97. Recpt 97	*	105.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	*	262.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	*	54.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	*	84.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	*	208.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
102.Recpt 102	*	233.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
103.Recpt 103	*	35.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
104.Recpt 104	*	50.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
105.Recpt 105	*	336.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0
106.Recpt 106	*	43.	*	.1	*	.0	.0	.0	.0	.0	.0	.0	.0

	*	CONC/LINK (PPM)									
RECEPTOR	*	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
69. Recpt 69	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
70. Recpt 70	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
71. Recpt 71	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
72. Recpt 72	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
73. Recpt 73	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
74. Recpt 74	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
75. Recpt 75	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
76. Recpt 76	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
77. Recpt 77	*	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
78. Recpt 78	*	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0
79. Recpt 79	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
80. Recpt 80	*	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0
81. Recpt 81	*	.0	.0	.0	.0	.1	.0	.0	.0	.0	.0
82. Recpt 82	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
83. Recpt 83	*	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0
84. Recpt 84	*	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0
85. Recpt 85	*	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0
86. Recpt 86	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
87. Recpt 87	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1
88. Recpt 88	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
89. Recpt 89	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
90. Recpt 90	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91. Recpt 91	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
92. Recpt 92	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
93. Recpt 93	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
94. Recpt 94	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
95. Recpt 95	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
96. Recpt 96	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
97. Recpt 97	*	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0
98. Recpt 98	*	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0
99. Recpt 99	*	.0	.0	.1	.0	.0	.0	.0	.0	.0	.0
100.Recpt 100	*	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
101.Recpt 101	*	.0	.0	.0	.0	.0	.1	.0	.0	.0	.0
102.Recpt 102	*	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
103.Recpt 103	*	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
104.Recpt 104	*	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0

```
105.Recpt 105 *   .0   .0   .0   .0   .0   .0   .0   .0   .1   .0
106.Recpt 106 *   .0   .0   .0   .0   .0   .0   .0   .0   .0   .0
```

The non-magnified maximum concentration of 0.1 X 10^{-3} ppm is equivalent to 0.1 X 10^{-3} ppm X 1250 = 0.13 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

V. BACKGROUND NOTES

A. Calculation for number of trucks

Incoming raw materials The total incoming coal accounts for 13187 TPD. Transportation of coal shall be carried out by trucks of 40 tonnes capacity. The calculation for the same is as follows:

Total coal = 13187 TPD, i.e. 4396 TPD on each of the three routes.
Trucks estimated to transport= 100% i.e. 4396 TPD of 40 T payload capacity on each route.
Thus, number of trucks = 110 trucks/ day on each the three routes or approx. 5 trucks per hour X 2 trips = 10/h on each route.

B. Emission from trucks as per norms

Emission standards for new heavy-duty engines—applicable to vehicles of GVW > 3,500 kg as per Bharat Stage III (applicable nation wide since April 2010)

Emission Standards for Diesel Truck and Bus Engines, g/kWh

Year	Reference	Test	CO	HC	NOx	PM
1992	-	ECE R49	17.3-32.6	2.7-3.7	-	-
1996	-	ECE R49	11.20	2.40	14.4	-
2000	Euro I	ECE R49	4.5	1.1	8.0	0.36*
2005	Euro II	ECE R49	4.0	1.1	7.0	0.15
2010	Euro III	ESC	2.1	0.66	5.0	0.10
		ETC	5.45	0.78	5.0	0.16
2010	Euro IV	ESC	1.5	0.46	3.5	0.02
		ETC	4.0	0.55	3.5	0.03

C. Calculation for Emission from trucks of 40 T capacity which will be plying

	Units	CO	HC	NOx	PM	SO_2
Capacity of Diesel Engine =	KW	upto 800				
Emission permitted =	g/KWH	5.45	0.78	5	0.16	
Carrying capacity of the Truck (Assuming TATA LPS-4923 BS-3 model(approx.)=	tonnes	40	40	40	40	40
Resultant horsepower =	HP	213	213	213	213	213
Resultant KWH =	KWH	159.75	159.75	159.75	159.75	159.75
Average speed of Vehicle =	Kmph	40	40	40	40	40
Emission from one truck=	g/truck per hour	870.64	124.61	798.75	25.56	80.51
Emission from 1 truck/ km=	g/km	21.77	3.12	19.97	0.64	2.01
Emission from 1 truck/mile=	g/mile	34.83	4.99	31.95	1.02	3.22
Note: actual emissions will be much less since above calculation are for maximum permitted value						

D. Standards for Ambient air quality

Pollutants	Concentration of ambient air (All concentrations are micro g/m³ except for CO in mg/m³) for 24 hours average		
	Industrial area	Residential, Rural & other areas	Sensitive area
Sulphur Dioxide (SO_2)	120	80	30
Oxides of Nitrogen as NO_x	120	80	30
Suspended Particulate Matter (SPM)	500	200	100
Respirable Particulate Matter (RPM)	150	100	75
Lead (Pb)	1.5	1.00	0.75
Carbon Monoxide (CO)- 8 hr	5.0	2.0	1.0
1 hr	10.0	4.0	2.0

VI. Findings

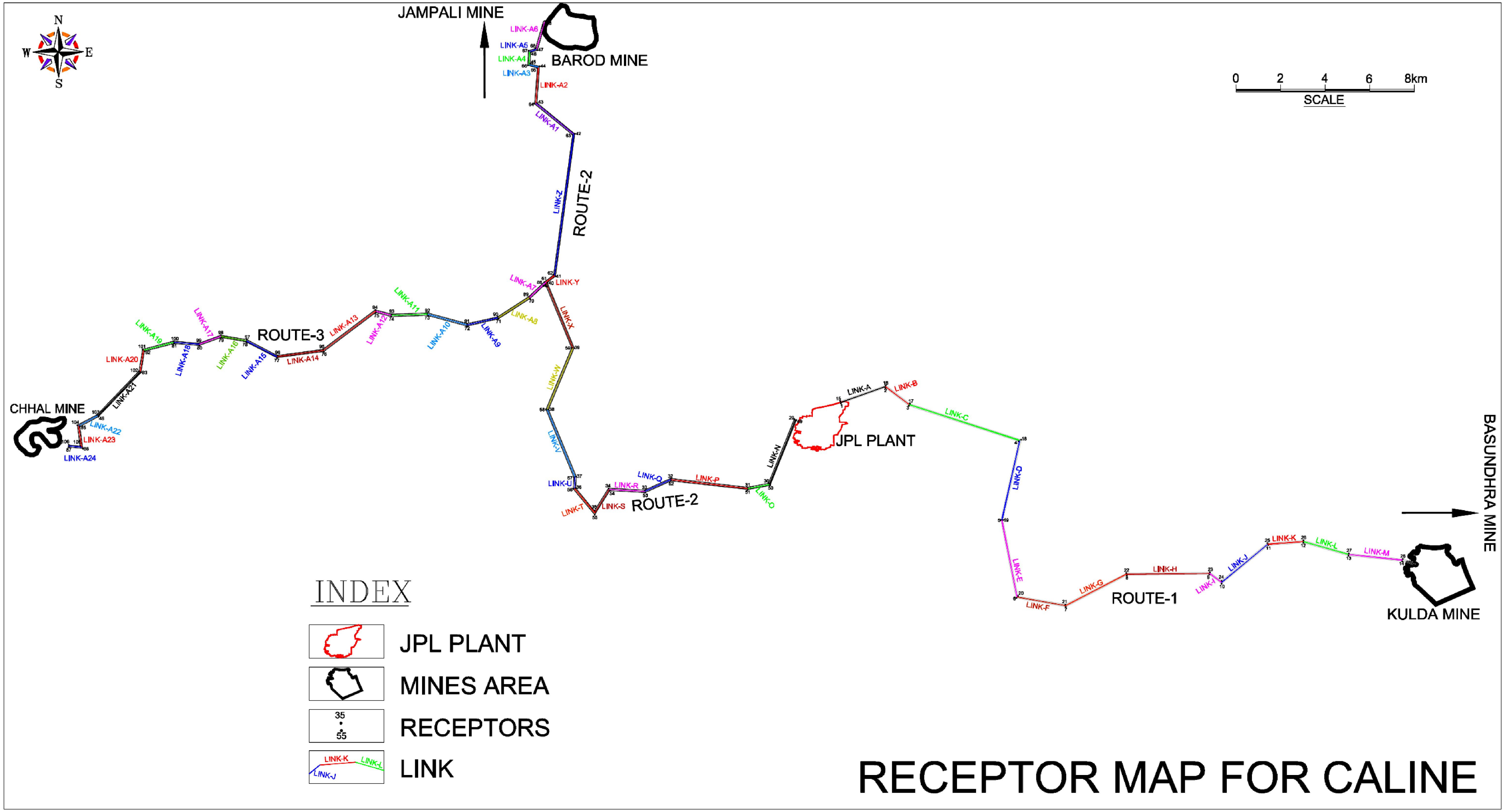
A. Impact on Air Quality

Pollutant	Maximum Incremental anticipated GLC from road (μg/m³)			
	Max	**Route 1**	**Route 2**	**Route 3**
PM	0.11	0.05	0.11	0.05
NOx	3.50	1.75	3.5	1.6
SO_2	0.38	0.13	0.38	0.13
CO	3.88	1.88	3.88	1.75
HC	0.50	0.25	0.50	0.25

It can be seen from above dispersion modelling results that increase in number of trucks would lead to a minor increase in the concentration of pollutants.

SCENARIO - 1

Fig.1 Receptor Locations and route of transportation



CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL, JUNE 1989 VERSION
RUN: Hour 1 (WORST CASE ANGLE), POLLUTANT: CO, NOx, HC, PM

CALINE4 is the last in a series of line source air quality models developed by the California Department of Transportation (Caltrans). It is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize pollutant dispersion over the roadway.

The purpose of the model is to assess air quality impacts near transportation facilities. Given source strength, meteorology and site geometry, CALINE4 can predict pollutant concentrations for receptors located within 500 meters of the roadway. In addition to predicting concentrations of relatively inert pollutants such as carbon monoxide (CO), the model can predict nitrogen dioxide (N02) and suspended particle concentrations. It also has special options for modelling air quality near intersections, street canyons and parking facilities.

I. SITE VARIABLES

```
      U=   4.5 M/S             Z0= 100. CM             ALT=     0. (M)
    BRG= WORST CASE            VD=   .0 CM/S
   CLAS=     2 (B)             VS=   .0 CM/S
   MIXH=  500. M              AMB=   .0 PPM
  SIGTH=    9. DEGREES       TEMP= 24.0 DEGREE (C)
```

II. LINK VARIABLES

ROUTE-1

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
A.	Link A	39276	12481	41294	13186	AG	16	102000	3220	31950	34830	4990	0	13.0
B.	Link B	41294	13186	42362	12375	AG	16	102000	3220	31950	34830	4990	0	13.0
C.	Link C	42362	12375	47321	10764	AG	16	102000	3220	31950	34830	4990	0	13.0
D.	Link D	47321	10764	46512	7199	AG	16	102000	3220	31950	34830	4990	0	13.0
E.	Link E	46512	7199	47199	3743	AG	16	102000	3220	31950	34830	4990	0	13.0
F.	Link F	47199	3743	49370	3355	AG	16	102000	3220	31950	34830	4990	0	13.0
G.	Link G	49370	3355	52109	4769	AG	16	102000	3220	31950	34830	4990	0	13.0
H.	Link H	52109	4769	55833	4806	AG	16	102000	3220	31950	34830	4990	0	13.0
I.	Link I	55833	4806	56373	4406	AG	16	102000	3220	31950	34830	4990	0	13.0
J.	Link J	56373	4406	58445	6114	AG	16	102000	3220	31950	34830	4990	0	13.0
K.	Link K	58445	6114	60042	6232	AG	16	102000	3220	31950	34830	4990	0	13.0
L.	Link L	60042	6232	62068	5652	AG	16	102000	3220	31950	34830	4990	0	13.0
M.	Link M	62068	5652	64485	5401	AG	16	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

ROUTE-2

Link description		Link coordinates				Type	VPH	EF# (g/mile)					H	W
		X1	Y1	X2	Y2			PM	SO_2	NOx	CO	HC	(M)	(M)
N.	Link O	37246	11701	36077	8796	AG	12	102000	3220	31950	34830	4990	0	13.0
O.	Link P	36077	8796	35111	8617	AG	12	102000	3220	31950	34830	4990	0	13.0
P.	Link Q	35111	8617	31664	9012	AG	12	102000	3220	31950	34830	4990	0	13.0
Q.	Link R	31664	9012	30497	8490	AG	12	102000	3220	31950	34830	4990	0	13.0
R.	Link S	30497	8490	28889	8568	AG	12	102000	3220	31950	34830	4990	0	13.0
S.	Link T	28889	8568	28241	7523	AG	12	102000	3220	31950	34830	4990	0	13.0
T.	Link U	28241	7523	27336	8619	AG	12	102000	3220	31950	34830	4990	0	13.0
U.	Link V	27336	8619	27364	9133	AG	12	102000	3220	31950	34830	4990	0	13.0
V.	Link W	27364	9133	26107	12160	AG	12	102000	3220	31950	34830	4990	0	13.0
W.	Link X	26107	12160	27269	14922	AG	12	102000	3220	31950	34830	4990	0	13.0
X.	Link Y	27269	14922	26053	17867	AG	12	102000	3220	31950	34830	4990	0	13.0
Y.	Link Z	26053	17867	26442	18170	AG	6	102000	3220	31950	34830	4990	0	13.0
Z.	Link A1	26442	18170	27302	24508	AG	6	102000	3220	31950	34830	4990	0	13.0
A1.	Link A2	27302	24508	25598	25898	AG	6	102000	3220	31950	34830	4990	0	13.0
A2.	Link A3	25598	25898	25719	27515	AG	6	102000	3220	31950	34830	4990	0	13.0

Link description		Link coordinates				Type	VP	EF# (g/mile)					H	W
		X1	Y1	X2	Y2		H	PM	SO_2	NOx	CO	HC	(M)	(M)
A3.	Link A4	25719	27515	25297	27638	AG	6	102000	3220	31950	34830	4990	0	13.0
A4.	Link A5	25297	27638	25320	28216	AG	6	102000	3220	31950	34830	4990	0	13.0
A5.	Link A6	25320	28216	25625	28322	AG	6	102000	3220	31950	34830	4990	0	13.0
A6.	Link A7	25625	28322	25997	29568	AG	6	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

ROUTE-3

Link description		Link coordinates				Type	VP	EF# (g/mile)					H	W
		X1	Y1	X2	Y2		H	PM	SO_2	NOx	CO	HC	(M)	(M)
A7.	Link A8	26053	17867	25310	17177	AG	6	102000	3220	31950	34830	4990	0	13.0
A8.	Link A9	25310	17177	23905	16273	AG	6	102000	3220	31950	34830	4990	0	13.0
A9.	Link A10	23905	16273	22520	15954	AG	6	102000	3220	31950	34830	4990	0	13.0
A10.	Link A11	22520	15954	20741	16437	AG	6	102000	3220	31950	34830	4990	0	13.0
A11.	Link A12	20741	16437	19120	16382	AG	6	102000	3220	31950	34830	4990	0	13.0
A12.	Link A13	19120	16382	18413	16570	AG	6	102000	3220	31950	34830	4990	0	13.0
A13.	Link A14	18413	16570	16069	14808	AG	6	102000	3220	31950	34830	4990	0	13.0
A14.	Link A15	16069	14808	13990	14532	AG	6	102000	3220	31950	34830	4990	0	13.0
A15.	Link A16	13990	14532	12615	15247	AG	6	102000	3220	31950	34830	4990	0	13.0
A16.	Link A17	12615	15247	11472	15441	AG	6	102000	3220	31950	34830	4990	0	13.0
A17.	Link A18	11472	15441	10500	15087	AG	6	102000	3220	31950	34830	4990	0	13.0
A18.	Link A19	10500	15087	9357	15170	AG	6	102000	3220	31950	34830	4990	0	13.0
A19.	Link A20	9357	15170	8000	14820	AG	6	102000	3220	31950	34830	4990	0	13.0
A20.	Link A21	8000	14820	7846	13850	AG	6	102000	3220	31950	34830	4990	0	13.0
A21.	Link A22	7846	13850	5948	11880	AG	6	102000	3220	31950	34830	4990	0	13.0
A22.	Link A23	5948	11880	5084	11425	AG	6	102000	3220	31950	34830	4990	0	13.0
A23.	Link A24	5084	11425	5217	10466	AG	6	102000	3220	31950	34830	4990	0	13.0
A24.	Link A25	5217	10466	4636	10521	AG	6	102000	3220	31950	34830	4990	0	13.0

 # Magnified 1000 times
PM Magnified 100000 times

The location of receptors is shown in **Fig. 1**

III. RECEPTOR LOCATIONS (at 100 m from vehicle path on right and left side)

ROUTE-1				ROUTE-2			
RECEPTOR	X (M)	Y (M)	Z (M)	RECEPTOR	X (M)	Y (M)	Z (M)
1. Recpt 1	39270	12434	1.5	29. Recpt 29	37199	11719	1.5
2. Recpt 2	41285	13130	1.5	30. Recpt 30	36040	8840	1.5
3. Recpt 3	42338	12330	1.5	31. Recpt 31	35109	8668	1.5
4. Recpt 4	47262	10731	1.5	32. Recpt 32	31657	9063	1.5
5. Recpt 5	46461	7199	1.5	33. Recpt 33	30487	8541	1.5
6. Recpt 6	47156	3700	1.5	34. Recpt 34	28862	8619	1.5
7. Recpt 7	49378	3303	1.5	35. Recpt 35	28235	7608	1.5
8. Recpt 8	52121	4719	1.5	36. Recpt 36	27387	8636	1.5
9. Recpt 9	55817	4756	1.5	37. Recpt 37	27414	9141	1.5
10. Recpt 10	56375	4342	1.5	38. Recpt 38	26161	12160	1.5
11. Recpt 11	58465	6066	1.5	39. Recpt 39	27323	14922	1.5
12. Recpt 12	60037	6182	1.5	40. Recpt 40	26114	17851	1.5
13. Recpt 13	62058	5603	1.5	41. Recpt 41	26489	18143	1.5
14. Recpt 14	64475	5352	1.5	42. Recpt 42	27355	24529	1.5
15. Recpt 15	39260	12528	1.5	43. Recpt 43	25650	25920	1.5
16. Recpt 16	41303	13242	1.5	44. Recpt 44	25772	27552	1.5
17. Recpt 17	42385	12419	1.5	45. Recpt 45	25348	27675	1.5
18. Recpt 18	47380	10798	1.5	46. Recpt 46	25369	28180	1.5
19. Recpt 19	46563	7198	1.5	47. Recpt 47	25666	28283	1.5
20. Recpt 20	47241	3787	1.5	48. Recpt 48	26045	29554	1.5
21. Recpt 21	49362	3407	1.5	49. Recpt 49	37292	11682	1.5

22. Recpt 22	*	52096	4818	1.5
23. Recpt 23	*	55849	4856	1.5
24. Recpt 24	*	56372	4469	1.5
25. Recpt 25	*	58425	6163	1.5
26. Recpt 26	*	60047	6283	1.5
27. Recpt 27	*	62077	5701	1.5
28. Recpt 28	*	64495	5450	1.5
50. Recpt 50	*	36113	8752	1.5
51. Recpt 51	*	35113	8567	1.5
52. Recpt 52	*	31672	8960	1.5
53. Recpt 53	*	30506	8439	1.5
54. Recpt 54	*	28916	8517	1.5
55. Recpt 55	*	28247	7437	1.5
56. Recpt 56	*	27285	8602	1.5
57. Recpt 57	*	27313	9124	1.5
58. Recpt 58	*	26052	12160	1.5
59. Recpt 59	*	27215	14922	1.5
60. Recpt 60	*	26034	17781	1.5
61. Recpt 61	*	25994	17880	1.5
62. Recpt 62	*	26395	18197	1.5
63. Recpt 63	*	27248	24487	1.5
64. Recpt 64	*	25547	25876	1.5
65. Recpt 65	*	25666	27478	1.5
66. Recpt 66	*	25245	27601	1.5
67. Recpt 67	*	25272	28252	1.5
68. Recpt 68	*	25585	28361	1.5

ROUTE-3

RECEPTOR	*	COORDINATES (M) X	Y	Z
69. Recpt 69	*	26034	17781	1.5
70. Recpt 70	*	25341	17138	1.5
71. Recpt 71	*	23924	16226	1.5
72. Recpt 72	*	22519	15902	1.5
73. Recpt 73	*	20736	16387	1.5
74. Recpt 74	*	19115	16332	1.5
75. Recpt 75	*	18424	16515	1.5
76. Recpt 76	*	16089	14760	1.5
77. Recpt 77	*	13981	14480	1.5
78. Recpt 78	*	12599	15199	1.5
79. Recpt 79	*	11477	15390	1.5
80. Recpt 80	*	10507	15036	1.5
81. Recpt 81	*	9361	15119	1.5
82. Recpt 82	*	8044	14780	1.5
83. Recpt 83	*	7893	13827	1.5
84. Recpt 84	*	5978	11840	1.5
85. Recpt 85	*	5138	11397	1.5
86. Recpt 86	*	5275	10411	1.5
87. Recpt 87	*	4632	10471	1.5
88. Recpt 88	*	25994	17880	1.5
89. Recpt 89	*	25279	17217	1.5
90. Recpt 90	*	23885	16319	1.5
91. Recpt 91	*	22521	16005	1.5
92. Recpt 92	*	20747	16487	1.5
93. Recpt 93	*	19126	16432	1.5
94. Recpt 94	*	18402	16624	1.5
95. Recpt 95	*	16049	14856	1.5
96. Recpt 96	*	14000	14583	1.5
97. Recpt 97	*	12631	15294	1.5
98. Recpt 98	*	11467	15493	1.5
99. Recpt 99	*	10493	15137	1.5
100.Recpt 100	*	9352	15220	1.5
101.Recpt 101	*	7956	14860	1.5
102.Recpt 102	*	7799	13874	1.5
103.Recpt 103	*	5917	11921	1.5
104.Recpt 104	*	5030	11452	1.5
105.Recpt 105	*	5159	10522	1.5

```
106.Recpt 106 *   4641  10570    1.5
```

IV.A MODEL RESULTS (WORST CASE WIND ANGLE)FOR CARBON MONOXIDE

ROUTE-1

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 1	57	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 2	115	2.3	0.0	2.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 3	98	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 4	183	2.1	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 5	25	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 6	85	2.2	0.0	0.0	0.0	0.0	0.0	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 7	293	2.1	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 8	80	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Recpt 9	111	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.2	0.0	0.0	0.0
Recpt 10	38	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0
Recpt 11	250	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.0	0.0	0.0	0.0
Recpt 12	278	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
Recpt 13	299	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
Recpt 14	284	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Recpt 15	97	2.1	1.9	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 16	140	2.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 17	292	2.1	0.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 18	279	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 19	360	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 20	336	2.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 21	75	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 22	99	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Recpt 23	260	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Recpt 24	282	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.9	0.0	0.0	0.0	0.0
Recpt 25	96	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.2	0.0
Recpt 26	253	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.0	0.0	0.0
Recpt 27	276	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.0	0.0
Recpt 28	266	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0

 # Magnified 1000 times

The non-magnified maximum concentration of 2.4 X 10^{-3} ppm is equivalent to 2.4 X 10^{-3} ppm X 1250 = 3.0 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED. CONC (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 29	189	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 30	244	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 31	267	1.6	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 32	230	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 33	82	1.7	0.0	0.0	0.2	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 34	196	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 35	67	1.6	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 36	347	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 37	325	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 38	10	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 39	325	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 40	170	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 41	358	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 42	297	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 43	352	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 44	197	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 45	151	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0
Recpt 46	45	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2
Recpt 47	1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Recpt 48	207	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Recpt 49	221	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 50	270	1.8	0.0	1.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 51	64	1.6	0.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 52	258	1.7	0.0	0.0	0.0	1.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 53	288	1.5	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 54	83	1.7	0.0	0.0	0.1	0.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 55	333	1.7	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 56	92	1.6	0.0	0.0	0.0	0.0	0.2	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 57	163	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 58	145	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 59	190	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 60	29	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 61	145	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 62	178	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 63	179	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 64	117	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 65	310	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0
Recpt 66	23	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2
Recpt 67	163	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	0.0
Recpt 68	225	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.0

 # Magnified 1000 times

The non-magnified maximum concentration of 2.0 X 10^{-3} ppm is equivalent to 2.0 X 10^{-3} ppm X 1250 = 2.5 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 69	211	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 70	63	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 71	70	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 72	276	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 73	256	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 74	263	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 75	221	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 76	66	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 77	285	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 78	267	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 79	109	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 80	85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 81	229	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 82	85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 83	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 84	216	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Recpt 85	156	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Recpt 86	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	0.0
Recpt 87	115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7
Recpt 88	237	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 89	247	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 90	270	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 91	67	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 92	93	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 93	76	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 94	93	0.0	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 95	275	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 96	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 97	105	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 98	262	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 99	54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 100	84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 101	208	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0
Recpt 102	233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 103	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 104	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0
Recpt 105	336	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Recpt 106	43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6

 # Magnified 1000 times

The non-magnified maximum concentration of 0.7 X 10^{-3} ppm is equivalent to 0.7 X 10^{-3} ppm X 1250 = 0.875 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

IV.B MODEL RESULTS (WORST CASE WIND ANGLE)FOR HYDROCARBON EMISSION

ROUTE-1

RECEPTOR	BRG (DEG)	PRED. CONC.	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 1	57	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 2	115	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 3	98	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 4	183	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 5	25	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 6	85	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 7	293	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 8	80	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Recpt 9	111	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Recpt 10	38	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Recpt 11	250	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
Recpt 12	278	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Recpt 13	299	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Recpt 14	284	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Recpt 15	97	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 16	140	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 17	292	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 18	279	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 19	360	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 20	336	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 21	75	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 22	99	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Recpt 23	260	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Recpt 24	282	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Recpt 25	96	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Recpt 26	253	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Recpt 27	276	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Recpt 28	266	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3

 # Magnified 1000 times

The non-magnified maximum concentration of 0.3 X 10^{-3} ppm is equivalent to 0.3 X 10^{-3} ppm X 1250 = 0.375 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 29	189	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 30	244	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 31	267	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 32	230	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 33	82	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 34	196	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 35	67	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 36	347	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 37	325	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 38	10	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 39	325	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 40	170	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 41	358	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 42	297	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Recpt 43	352	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Recpt 44	197	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Recpt 45	151	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 46	45	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Recpt 47	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Recpt 48	207	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Recpt 49	221	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 50	270	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 51	64	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 52	258	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 53	288	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 54	83	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 55	333	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 56	92	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 57	163	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 58	145	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 59	190	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 60	29	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 61	145	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 62	178	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 63	179	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 64	117	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Recpt 65	310	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Recpt 66	23	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Recpt 67	163	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Recpt 68	225	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

 # Magnified 1000 times

The non-magnified maximum concentration of 0.3 X 10^{-3} ppm is equivalent to 0.3 X 10^{-3} ppm X 1250 = 0.375 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 69	211	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 70	63	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 71	70	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 72	276	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 73	256	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 74	263	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 75	221	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 76	66	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 77	285	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 78	267	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 79	109	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 80	85	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 81	229	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Recpt 82	85	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Recpt 83	25	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Recpt 84	216	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Recpt 85	156	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Recpt 86	34	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Recpt 87	115	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Recpt 88	237	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 89	247	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 90	270	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 91	67	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 92	93	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 93	76	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 94	93	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 95	275	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 96	70	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 97	105	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 98	262	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 99	54	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 100	84	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 101	208	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Recpt 102	233	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Recpt 103	35	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Recpt 104	50	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Recpt 105	336	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Recpt 106	43	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

 # Magnified 1000 times

The non-magnified maximum concentration of 0.1 X 10^{-3} ppm is equivalent to 0.1 X 10^{-3} ppm X 1250 = 0.125 µg/m^3 at a perpendicular distance of 100 m from the vehicle path.

IV.C MODEL RESULTS (WORST CASE WIND ANGLE) FOR PARTICULATE MATTER EMISSION

ROUTE-1

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 1	57	6.7	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 2	115	6.8	0.0	5.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 3	98	5.8	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 4	183	6.1	0.0	0.0	0.0	5.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 5	25	5.8	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 6	85	6.3	0.0	0.0	0.0	0.0	0.0	5.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0
Recpt 7	293	6.0	0.0	0.0	0.0	0.0	0.2	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 8	80	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.1	0.0	0.0	0.0
Recpt 9	111	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.6	0.0	0.0	0.0
Recpt 10	38	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0
Recpt 11	250	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	5.7	0.0	0.0	0.0
Recpt 12	278	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0
Recpt 13	299	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0
Recpt 14	284	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	5.6
Recpt 15	97	6.2	5.7	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 16	140	5.9	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 17	292	6.2	4.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 18	279	5.9	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 19	360	6	0.0	0.0	1.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 20	336	5.9	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 21	75	6.2	0.0	0.0	0.0	0.0	0.0	0.0	5.8	3.0	0.0	0.0	0.0	0.0	0.0
Recpt 22	99	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0
Recpt 23	260	6.1	0.0	0.0	0.0	0.0	0.0	0.0	2.0	5.8	0.0	0.0	0.0	0.0	0.0
Recpt 24	282	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	5.6	0.0	0.0	0.0	0.0
Recpt 25	96	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.6	0.3
Recpt 26	253	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.5	5.8	0.0	0.0
Recpt 27	276	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	5.7	0.0
Recpt 28	266	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7

 # Magnified 100000 times

The non-magnified maximum concentration is 6.9 X 10^{-5} ppm is equivalent to 6.9 X 10^{-5} ppm X 1250 = 0.09 μg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 29	189	4.4	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 30	244	4.3	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 31	267	4.6	0.0	0.0	4.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 32	230	4.3	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 33	82	5.0	0.0	0.0	0.6	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 34	196	4.3	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 35	67	4.7	0.0	0.0	0.1	0.3	0.2	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 36	347	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 37	325	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 38	10	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 39	325	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 40	170	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 41	358	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 42	297	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0
Recpt 43	352	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.1	0.0	0.0
Recpt 44	197	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0
Recpt 45	151	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.0	0.0	0.0	0.0
Recpt 46	45	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.6
Recpt 47	1	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
Recpt 48	207	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.1
Recpt 49	221	4.4	4.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 50	270	5.4	0.0	4.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 51	64	4.7	0.4	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 52	258	5.1	0.0	0.0	0.0	4.3	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 53	288	4.5	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 54	83	5.0	0.0	0.0	0.3	0.4	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 55	333	5.1	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 56	92	4.8	0.0	0.0	0.1	0.1	0.5	0.1	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 57	163	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 58	145	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 59	190	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 60	29	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	1.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 61	145	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 62	178	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 63	179	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 64	117	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0
Recpt 65	310	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.3	0.0	0.0
Recpt 66	23	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.2	0.5
Recpt 67	163	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	2.1	0.0	0.0
Recpt 68	225	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	0.0

 # Magnified 100000 times

The non-magnified maximum concentration is 6.0 X 10^{-5} ppm is equivalent to 6.0 X 10^{-5} ppm X 1250 = 0.08 $\mu g/m^3$ at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 69	211	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 70	63	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 71	70	2.2	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 72	276	2.4	0.0	0.0	0.0	2.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 73	256	2.4	0.0	0.0	0.0	0.0	2.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 74	263	2.5	0.0	0.0	0.0	0.0	0.0	2.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 75	221	2.2	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 76	66	2.3	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 77	285	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 78	267	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 79	109	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 80	85	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 81	229	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.2	0.0	0.0	0.0
Recpt 82	85	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.1	0.0	0.0	0.0	0.0	0.0
Recpt 83	25	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0	0.0	0.0	0.0
Recpt 84	216	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.2	0.0
Recpt 85	156	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0
Recpt 86	34	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.0
Recpt 87	115	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Recpt 88	237	2.5	2.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 89	247	2.3	0.0	2.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 90	270	2.5	0.0	0.0	2.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 91	67	2.4	0.0	0.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 92	93	2.3	0.0	0.0	0.1	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 93	76	2.2	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 94	93	2.8	0.0	0.0	0.0	0.2	0.5	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 95	275	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 96	70	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 97	105	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 98	262	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0
Recpt 99	54	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 100	84	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	2.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 101	208	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.3	0.0	0.0	0.0
Recpt 102	233	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0
Recpt 103	35	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0
Recpt 104	50	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.1	0.0	0.0
Recpt 105	336	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0
Recpt 106	43	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	1.9

 # Magnified 100000 times

The non-magnified maximum concentration is 2.8 X 10^{-5} ppm is equivalent to 2.8 X 10^{-5} ppm X 1250 = 0.04 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.D MODEL RESULTS (WORST CASE WIND ANGLE) FOR NITROGEN OXIDES

ROUTE-1

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 1	57	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 2	115	2.1	0.0	1.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 3	98	1.8	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 4	183	1.9	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 5	25	1.8	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 6	85	2.0	0.0	0.0	0.0	0.0	0.0	1.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 7	293	1.9	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 8	80	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Recpt 9	111	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.0	0.0	0.0
Recpt 10	38	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0
Recpt 11	250	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.8	0.0	0.0	0.0
Recpt 12	278	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0
Recpt 13	299	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0
Recpt 14	284	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Recpt 15	97	1.9	1.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 16	140	1.9	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 17	292	1.9	0.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 18	279	1.8	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 19	360	1.9	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 20	336	1.8	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 21	75	1.9	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 22	99	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Recpt 23	260	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0
Recpt 24	282	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.8	0.0	0.0	0.0	0.0
Recpt 25	96	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.0
Recpt 26	253	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.8	0.0	0.0
Recpt 27	276	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0
Recpt 28	266	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8

 # Magnified 1000 times

The non-magnified maximum concentration of 2.2 X 10^{-3} ppm is equivalent to 2.2 X 10^{-3} ppm X 1250 = 2.75 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 29	189	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 30	244	1.4	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 31	267	1.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 32	230	1.4	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 33	82	1.6	0.0	0.0	0.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 34	196	1.4	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 35	67	1.5	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 36	347	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 37	325	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 38	10	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 39	325	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 40	170	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 41	358	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 42	297	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 43	352	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 44	197	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 45	151	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0
Recpt 46	45	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.2
Recpt 47	1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Recpt 48	207	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Recpt 49	221	1.4	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 50	270	1.7	0.0	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 51	64	1.5	0.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 52	258	1.6	0.0	0.0	0.0	1.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 53	288	1.4	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 54	83	1.6	0.0	0.0	0.1	0.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 55	333	1.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 56	92	1.5	0.0	0.0	0.0	0.0	0.2	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 57	163	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 58	145	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 59	190	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 60	29	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 61	145	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 62	178	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 63	179	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 64	117	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 65	310	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0
Recpt 66	23	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1
Recpt 67	163	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Recpt 68	225	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.0

 # Magnified 1000 times

The non-magnified maximum concentration of 1.9 X 10^{-3} ppm is equivalent to 1.9 X 10^{-3} ppm X 1250 = 2.37 μg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 69	211	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 70	63	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 71	70	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 72	276	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 73	256	0.7	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 74	263	0.8	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 75	221	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 76	66	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 77	285	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 78	267	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 79	109	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 80	85	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 81	229	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 82	85	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Recpt 83	25	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
Recpt 84	216	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0
Recpt 85	156	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Recpt 86	34	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
Recpt 87	115	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
Recpt 88	237	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 89	247	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 90	270	0.8	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 91	67	0.8	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 92	93	0.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 93	76	0.7	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 94	93	0.9	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 95	275	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 96	70	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 97	105	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 98	262	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 99	54	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 100	84	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 101	208	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0
Recpt 102	233	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Recpt 103	35	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Recpt 104	50	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.0
Recpt 105	336	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
Recpt 106	43	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6

 # Magnified 1000 times

The non-magnified maximum concentration of 0.9 X 10^{-3} ppm is equivalent to 0.9 X 10^{-3} ppm X 1250 = 1.125 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

IV.E MODEL RESULTS (WORST CASE WIND ANGLE)FOR SULPHUR DI-OXIDES

ROUTE-1

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)												
			A	B	C	D	E	F	G	H	I	J	K	L	M
Recpt 1	57	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 2	115	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 3	98	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 4	183	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 5	25	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 6	85	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 7	293	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 8	80	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Recpt 9	111	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Recpt 10	38	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Recpt 11	250	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Recpt 12	278	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Recpt 13	299	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Recpt 14	284	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Recpt 15	97	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 16	140	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 17	292	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 18	279	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 19	360	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 20	336	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 21	75	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 22	99	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Recpt 23	260	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Recpt 24	282	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Recpt 25	96	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Recpt 26	253	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Recpt 27	276	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Recpt 28	266	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2

 # Magnified 1000 times

The non-magnified maximum concentration of 0.2 X 10^{-3} ppm is equivalent to 0.2 X 10^{-3} ppm X 1250 = 0.25 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-2

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 29	189	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 30	244	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 31	267	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 32	230	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 33	82	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 34	196	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 35	67	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 36	347	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 37	325	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 38	10	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/ LINK# (PPM)																		
			N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A1	A2	A3	A4	A5	A6
Recpt 39	325	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 40	170	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 41	358	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 42	297	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 43	352	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 44	197	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 45	151	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 46	45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 47	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 48	207	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 49	221	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 50	270	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 51	64	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 52	258	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 53	288	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 54	83	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 55	333	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 56	92	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 57	163	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 58	145	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 59	190	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 60	29	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 61	145	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 62	178	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 63	179	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 64	117	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 65	310	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 66	23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 67	163	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 68	225	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

 # Magnified 1000 times

The non-magnified maximum concentration of 0.2 X 10^{-3} ppm is equivalent to 0.2 X 10^{-3} ppm X 1250 = 0.25 µg/m^3 at a perpendicular distance of 50 m from the vehicle path.

ROUTE-3

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 69	211	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 70	63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 71	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 72	276	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 73	256	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 74	263	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 75	221	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 76	66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 77	285	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

RECEPTOR	BRG (DEG)	PRED. CONC. (PPM)	CONC/LINK# (PPM)																	
			A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
Recpt 78	267	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 79	109	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 80	85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 81	229	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 82	85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 83	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 84	216	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 85	156	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 86	34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 87	115	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 88	237	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 89	247	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 91	67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 92	93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 93	76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 94	93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 95	275	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 96	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 97	105	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 98	262	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 99	54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 100	84	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 101	208	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 102	233	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 103	35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 104	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 105	336	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recpt 106	43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

 # Magnified 1000 times

The concentration is <0.125 µg/m³ from the vehicle path.

V. BACKGROUND NOTES

A. Calculation for number of trucks

Incoming raw materials The total incoming coal accounts for 13000 TPD. Transportation of coal shall be carried out by trucks of 40 tonnes capacity. The calculation for the same is as follows:

Total coal = 13000 TPD, out of which 7000 TPD will be through Route-1 and 3000 TPD will be from Route-2 and Route-3 each.
For Route-1, Trucks estimated to transport= 7000 TPD of 40 T payload capacity.
For Route-2 and 3, Trucks estimated to transport= 3000 TPD of 40 T payload capacity on each route.
Thus, number of trucks for Route-1= 175 trucks/ day or approx. 8 trucks per hour X 2 trips = 16/h.

Number of trucks for Route-2 & 3= 75 trucks/ day on each route or approx. 3 trucks per hour X 2 trips = 6/h on each of the two routes.

B. Emission from trucks as per norms

Emission standards for new heavy-duty engines—applicable to vehicles of GVW > 3,500 kg as per Bharat Stage III (applicable nation wide since April 2010)

Emission Standards for Diesel Truck and Bus Engines, g/kWh

Year	Reference	Test	CO	HC	NOx	PM
1992	-	ECE R49	17.3-32.6	2.7-3.7	-	-
1996	-	ECE R49	11.20	2.40	14.4	-
2000	Euro I	ECE R49	4.5	1.1	8.0	0.36*
2005	Euro II	ECE R49	4.0	1.1	7.0	0.15
2010	Euro III	ESC	2.1	0.66	5.0	0.10
		ETC	5.45	0.78	5.0	0.16
2010	Euro IV	ESC	1.5	0.46	3.5	0.02
		ETC	4.0	0.55	3.5	0.03

C. Calculation for Emission from trucks of 40 T capacity which will be plying

	Units	CO	HC	NOx	PM	SO_2
Capacity of Diesel Engine =	KW	upto 800				
Emission permitted =	g/KWH	5.45	0.78	5	0.16	
Carrying capacity of the Truck (Assuming TATA LPS-4923 BS-3 model(approx.)=	tonnes	40	40	40	40	40
Resultant horsepower =	HP	213	213	213	213	213
Resultant KWH =	KWH	159.75	159.75	159.75	159.75	159.75
Average speed of Vehicle =	Kmph	40	40	40	40	40
Emission from one truck=	g/truck per hour	870.64	124.61	798.75	25.56	80.51
Emission from 1 truck/ km=	g/km	21.77	3.12	19.97	0.64	2.01
Emission from 1 truck/mile=	g/mile	34.83	4.99	31.95	1.02	3.22
Note: actual emissions will be much less since above calculation are for maximum permitted value						

D. Standards for Ambient air quality

Pollutants	Concentration of ambient air (All concentrations are micro g/m^3 except for CO in mg/m^3) for 24 hours average		
	Industrial area	Residential, Rural & other areas	Sensitive area
Sulphur Dioxide (SO_2)	120	80	30
Oxides of Nitrogen as NO_x	120	80	30
Suspended Particulate Matter (SPM)	500	200	100
Respirable Particulate Matter (RPM)	150	100	75
Lead (Pb)	1.5	1.00	0.75
Carbon Monoxide (CO)- 8 hr	5.0	2.0	1.0
1 hr	10.0	4.0	2.0

VI. Findings

A. Impact on Air Quality

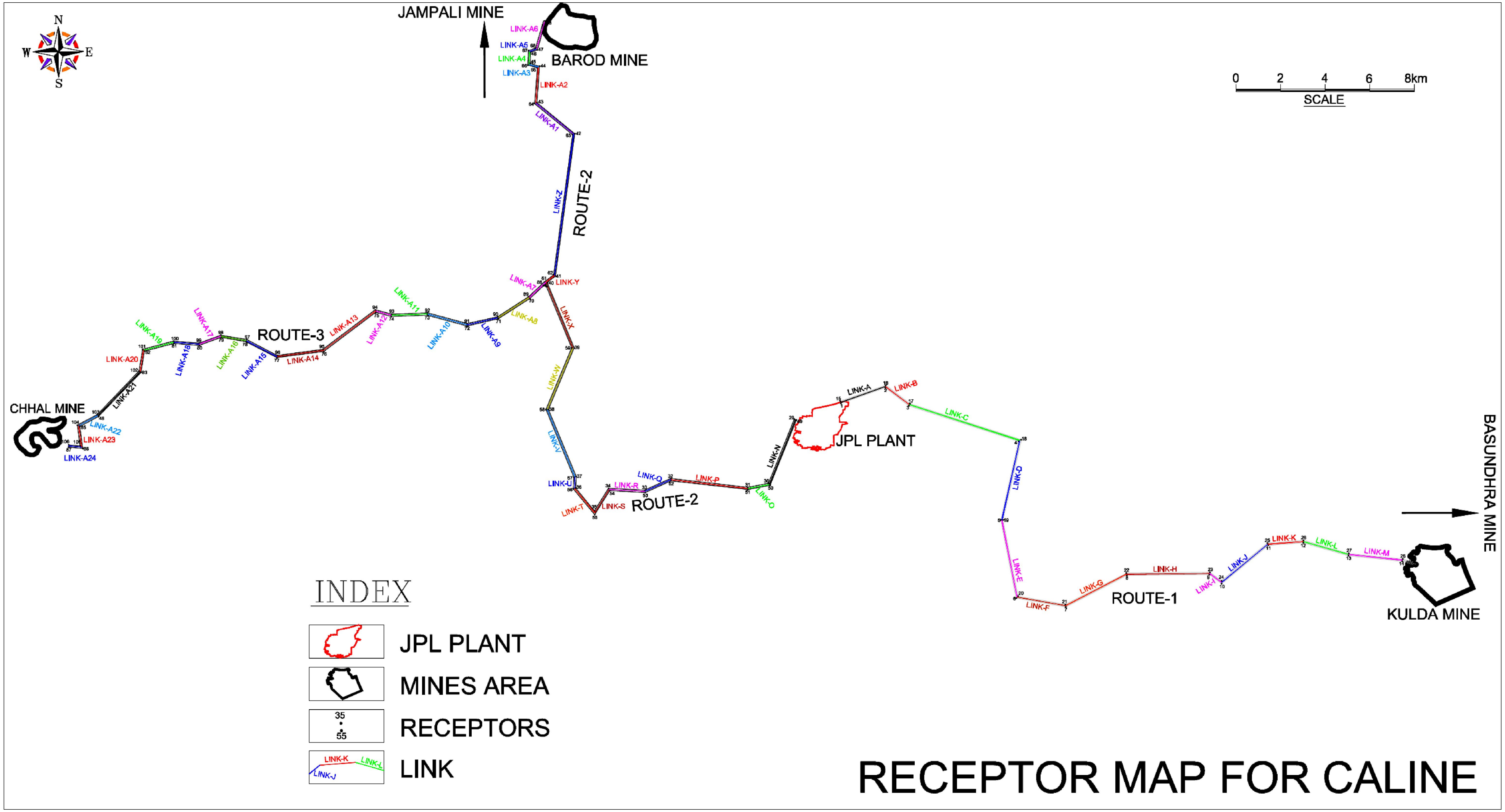
Pollutant	Maximum Incremental anticipated GLC from road ($\mu g/m^3$)			
	Max	**Route 1**	**Route 2**	**Route 3**
PM	0.09	0.09	0.08	0.04
NOx	2.75	2.75	2.37	1.125
SO_2	0.25	0.25	0.25	<0.12
CO	3.00	3.00	2.50	0.875
	0.375	0.375	0.375	0.125

It can be seen from above dispersion modeling results that increase in number of trucks would lead to a minor increase in the concentration of pollutants.

SCENARIO-2

ANNEXURE : 3 Contd.

Fig.1 Receptor Locations and route of transportation



Annexure-VII

Cross country Pipe Conveyer (CCPC)

Environmental Clearance for Unit1 & 2 was granted vide letter dated 18.03.2011 based on linkage coal from SECL (2.497 MTPA) and MCL (2.315 MTPA) mines. At the time of grant of long term linkage of coal, specific mines from which the coal is to be sourced was not known and therefore in the EIA report it was proposed that coal from the mines of SECL and MCL will be transported by railways up to Parsada, near Raigarh Railway Station from where coal will be transported by pipe conveyor up to the plant site at Tamnar.

Subsequently, while signing of Fuel Supply Agreement, SECL and MCL have indicated that the coal can be supplied from the nearby operating mines, namely Kulda of MCL and Barod/ Chhal of SECL. All these mines are at a distance of 20 - 50 Kms located at either side of our power plant.

In light of the above, we reviewed the original plan of coal transportation as indicated in EIA and proposed to MOEF vide letter dated 09.05.2014 to transport the entire coal for 4x600 MW from the mines of MCL located in Odisha. The entire coal shall be transported by Close Circuit Pipe Conveyer (CCPC), also known as Cross Country Pipe Conveyer (CCPC) from the MCL mines up to the plant site. The proposed scheme of transportation of coal will reduce the coast towards transportation of fuel, avoid loss of coal in the trans-shipment process, reduce the environment pollution hazard & furthermore will reduce the additional burden on the Railway network especially in South, Eastern & Central railway where the rail network is heavily burdened.

The capacity of CCPC will be 2000 tons/Hr. Total length of CCPC will be about 22 km, out of which about 10 km falls in Odisha & remaining 12km in Chhattisgarh state. The total cost of the project will be about Rs. 450 Crores.

The CCPC for 4x600 MW Tamnar plant will pass through Odisha & Chhattisgarh states for which following statutory approvals have been obtained:-

1. The Consent to establish (CTE) from State Pollution Control Board Odisha was granted on 16.09.2014.
2. The clearance from Industrial Promotion & Investment Corporation Odisha Ltd (IPICOL) was received 27.01.2015.
3. The EC amendment received on 27.03.2015
4. The application for the Consent to establish (CTE) from Chhattisgarh Environment conservation Board (CECB) was submitted vide application 24.09.2013 & subsequent clarification ending 19.10.2015 after which the CTE granted on 04.11.2015.

After receipt of various statutory clearances, last clearance being from CECB on 04.11.2015 (at Sl. No. 4 above), the execution agency was finalized. Engineering activity and detailed survey of CCPC route are under progress. Soil investigation will start after the land acquisition. The construction & commissioning targeted to be completed by March,2020.

Annexure - VIII

छत्तीसगढ़ शासन
जल संसाधन विभाग
मंत्रालय
महानदी भवन, कैपिटल कॉम्प्लेक्स,
नया रायपुर (छ.ग.)

क्रमांक /29/1/91/म/31/औजप्र/01/डी–4, नया रायपुर, दि. /01/2016

प्रति,

मुख्य अभियंता,
हसदेव कछार,
जल संसाधन विभाग,
बिलासपुर (छ.ग.)

विषयः– **मेसर्स जिंदल पॉवर लि., (JPL) नई दिल्ली के 1000 (4X250) मेगावाट थर्मल पॉवर प्लांट हेतु कुरकेट नदी/राबो बांध से आबंटित 54.00 मि.घ.मी. वार्षिक जल के विरूद्ध वास्तविक रूप से उपयोग किये जा रहे 31.60 मि.घ.मी. जल के पश्चात् शेष बचे 22.40 मि.घ.मी. जल में से, 17.00 मि.घ.मी. जल को, JPL के 2640(4X660) मेगावाट थर्मल पॉवर प्लांट हेतु महानदी/कलमा बैराज से आबंटित 70.00 मि.घ.मी. वार्षिक जल के विरूद्ध वार्षिक आधार पर स्थाई रूप से समायोजित/आबंटित करने की स्वीकृति।**

संदर्भः–
1. शासन का पत्र क्रमांक–487–488/29/1/91/म/31/औजप्र/01/डी–4, दिनांक 31.01.2002.
2. शासन का पत्र क्रमांक–1041–1042/29/1/91/म/31/औजप्र/01/डी–4, दिनांक 26.02.2009.
3. प्रमुख अभियंता का पत्र क्र.–3451366/औजप्र/छ.ग./015/7646–7647, दिनांक 15.06.2015.
4. शासन का पत्र क्रमांक–5162–5163/7/जसं/तशा/औजप्र/01/डी–4, दिनांक 09.11.2015

उपरोक्त विषय के संदर्भ में, राज्य जल संसाधन उपयोग समिति, छत्तीसगढ़ की 39वीं बैठक, दिनांक 06.11.2015 में लिये गये निर्णयानुसार, मेसर्स जिंदल पॉवर लि., (JPL) नई दिल्ली के 1000 (4X250) मेगावाट थर्मल पॉवर प्लांट हेतु कुरकेट नदी/राबो बांध से आबंटित 54.00 मि.घ.मी. वार्षिक जल के विरूद्ध वास्तविक रूप से उपयोग किये जा रहे 31.60 मि.घ.मी. जल के पश्चात् शेष बचे 22.40 मि.घ.मी. जल में से, 17.00 मि.घ.मी. जल को, JPL के 2640(4X660) मेगावाट थर्मल पॉवर प्लांट हेतु महानदी/कलमा बैराज से आबंटित 70.00 मि.घ.मी. वार्षिक जल के विरूद्ध वार्षिक आधार पर स्थाई रूप से समायोजित/आबंटित करने की निम्नलिखित शर्तों पर स्वीकृति प्रदान की जाती है :–

1. संस्थान द्वारा, कलमा बैराज के स्थान पर कुरकेट बांध से 17.00 मि.घ.मी. वार्षिक जल के उपयोग के एवज में, कलमा बैराज से औद्योगिक जल उपयोग हेतु समय–समय पर निर्धारित जल दर पर जल कर देय होगा।

..2

2. विषयांतर्गत जल आबंटन/समायोजन पश्चात् JPL (संस्थान) द्वारा रायगढ़ में प्रस्तावित 2640(4X660) मेगावाट थर्मल पॉवर प्लांट हेतु शासन के पत्र दिनांक 26.02.2009 द्वारा महानदी/कलमा बैराज से आबंटित 70.00 मि.घ.मी. वार्षिक जल के स्थान पर 53.00 (70.00–17.00) मि.घ.मी. वार्षिक जल का पुनरीक्षित आबंटन रहेगा। इस संबंध में शेष शर्तें जल आबंटन स्वीकृति पत्र दिनांक 26.02.2009 के अनुसार यथावत रहेगी।
3. एनीकट निर्माण की विभागीय नीति अनुसार संस्थान को कलमा बैराज से आबंटित 70.00 मि.घ.मी. वार्षिक जल के तारतम्य में, उनके द्वारा कलमा बैराज के निर्माण हेतु संस्थान द्वारा जमा राशि किसी भी दशा में वापस नहीं की जायेगी। राशि का समायोजन, कलमा बैराज से जल आहरण प्रारंभ करने पर प्रत्येक माह की जल–कर राशि में किया जायेगा।
4. विषयांतर्गत प्रकरण में जारी की जाने वाली सशर्त स्वीकृति, कुरकेट बांध से 54.00 मि.घ.मी. वार्षिक जल प्रदाय बाबत् संस्थान एवं विभाग के मध्य निष्पादित अनुबंध का भाग होगा।

सहपत्रः– शून्य।

(आर.के. नारद)
अवर सचिव
जल संसाधन विभाग
मंत्रालय, नया रायपुर

....3

पृ०क्र० 284 /29/1/91/म/31/औजप्र/01/डी–4, नया रायपुर, दि.21/01/2016

प्रतिलिपि –

1. प्रमुख अभियंता, जल संसाधन विभाग, सिहावा भवन, रायपुर को संदर्भित पत्रों के परिप्रेक्ष्य में सूचनार्थ अग्रेषित।
2. अधीक्षण अभियंता, जल संसाधन मंडल, रायगढ़,
3. कार्यपालन अभियंता, जल संसाधन संभाग, रायगढ़, एवं
4. कार्यपालन अभियंता, जल संसाधन संभाग, जांजगीर, मुख्यालय–चांपा,

   को सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित।
5. संयुक्त संचालक, राज्य निवेश प्रोत्साहन बोर्ड, रेणुका द्वार, शास्त्री चौक, रायपुर को सूचनार्थ अग्रेषित।
6. अधीक्षण अभियंता, ऊर्जा विभाग, मंत्रालय, नया रायपुर को सूचनार्थ अग्रेषित।
7. वरिष्ठ उपाध्यक्ष, मेसर्स जिन्दल पॉवर लि., कार्यालय–कार्पोरेट अफेयर्स, पो.–मंदिर हसौद, रायपुर–492101 (छ.ग.) को उनके पत्र क्र.–JPL/WRD/2013-14/02, दिनांक 10.10.2014 के संदर्भ में सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित।
8. विशेष सहायक, माननीय मंत्रीजी, जल संसाधन विभाग को उनकी नोटशीट जावक क्र. –17/OFF/मंत्री/ज.सं./आ./कृ.प.म./धा., दिनांक 28.01.2014 के परिप्रेक्ष्य में सूचनार्थ अग्रेषित।

सहपत्रः– शून्य।

अवर सचिव
जल संसाधन विभाग
मंत्रालय, नया रायपुर

D 2/2016/January/Hindi Letter