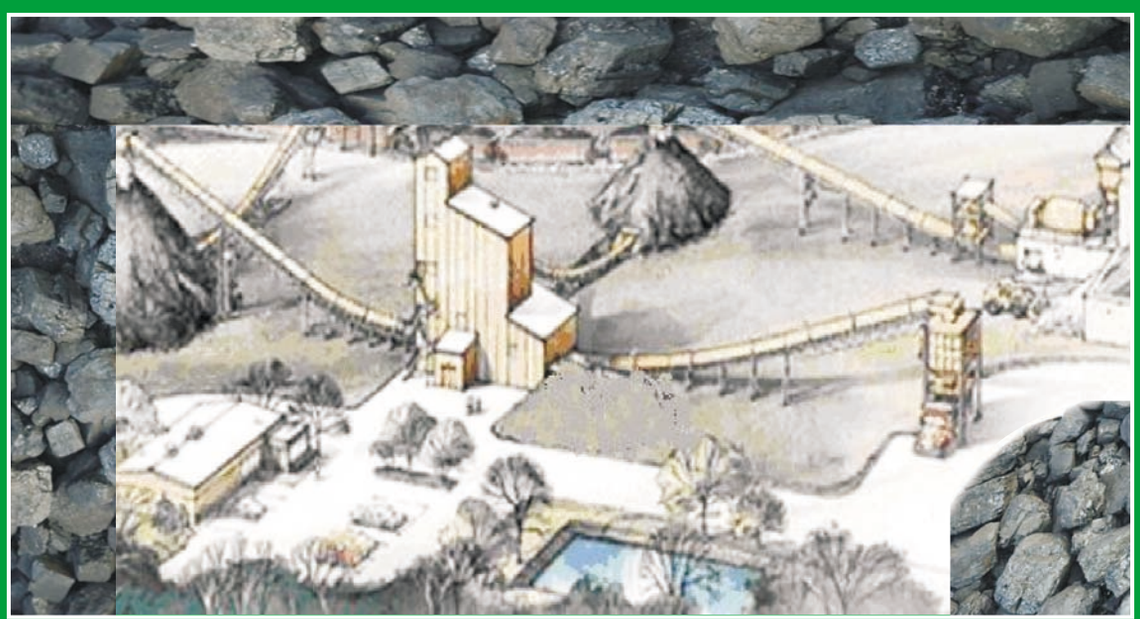
जहाँ है हरियाली ।
वहाँ है खुशहाली ।।

Ministry of Environment & Forests
GOVERNMENT OF INDIA, NEW DELHI

Environmental Impact Assessment Guidance Manual for COAL WASHERIES



Prepared by

Administrative Staff College of India
Bellavista, Khairatabad, Hyderabad

February 2010

Environmental Impact Assessment Guidance Manual for COAL WASHERIES

Foreword

The EIA Notification 2006 not only reengineered the entire EC process specified under the EIA Notification 1994 but also highlighted the need to introduce specific sectors/categories under the sectors such as Industry and Infrastructure and also introduced new sectors such as Construction to be brought in the ambit of the EC process based on their extent of impacts on environment. The EIA Notification 2006 has notified 39 developmental sectors, which require prior environmental clearance. Based on the capacity, the Projects have been categorised into Category A or B which has been further categorised as B1 or B2. The Ministry of Environment and Forests (MOEF) has so far constituted 25 State level Environmental Impact Assessment Authorities (SEIAs) and State Expert Appraisal Committees (SEACs) to appraise B category projects.

The need for Sector specific manuals and guidelines for appraisal of projects under the EIA Notification 2006 has been felt for some time with a view to bringing clarity in the EC process consists of Screening, Scoping, Public Consultation and Appraisal for the purpose of granting and expediting environmental clearance. This need was further reinforced after the constitution of various SEIAs and SEACs in the various States, who were assigned this task for the first time. It was also felt that Manuals on each Sector would help in standardisation of the quality of appraisal and in reducing inconsistencies between SEACs/SEIAAs in granting ECs for similar projects in different States.

The MOEF at the first instance decided to bring out EIA Sector Specific Manuals for 37 developmental projects and the preparation of EIA Manuals of ten of these Sectors was assigned to Administrative Staff College of India (ASCI), Hyderabad.

1. Mining
2. Mineral Beneficiation
3. Ports & Harbours
4. Airports
5. (A) Building Construction
5. (B) Townships
6. Asbestors
7. Highways
8. Coal Washery
9. Aerial Ropeways
10. Nuclear Power Plants, Nuclear Fuel Processing Plants and Nuclear Waste Management Plants

The Manual for the sectors contain Model TOR of that Sector, technological options and processes for a cleaner production and waste minimisation, wherever applicable, monitoring of environmental quality, related regulations, and procedure of obtaining EC if linked to other clearances for eg., CRZ, etc.

The draft Manuals were uploaded on the MOEF website and comments/responses received were considered and finalised. Since the environmental clearance process itself is a dynamic one dependent on developmental needs, technologies available and standards for cleaner environment for a sustainable development, these manuals would require regular updation in the future. I hope the Manuals in their present form are of use and we would appreciate receiving responses from various stakeholders for further improvements that could be taken up in the future.

I congratulate the entire team in the Administrative Staff College of India, Hyderabd, experts of the sectors who were involved in the preparation of the Manuals, members of the Core and Peer Committees of various sectors and various Resource persons whose inputs were indeed valuable in the preparation and finalisation of the Manuals.

(JAIRAM RAMESH)
MINISTER OF STATE FOR ENVIROMENT & FORESTS

5th May 2010

Siripurapu K. Rao
M.A. (Cantab), Ph.D. (Cantab)
DIRECTOR GENERAL

asci
Leadership through Learning

Acknowledgements

Environmental Impact Assessment (EIA) is a planning tool generally accepted as an integral component of sound decision-making. EIA is to give the environment its due place in the decision-making process by clearly evaluating the environmental consequences of the proposed activity before action is taken. Early identification and characterization of critical environmental impacts allow the public and the government to form a view about the environmental acceptability of a proposed developmental project and what conditions should apply to mitigate or reduce those risks and impacts.

Environmental Clearance (EC) for certain developmental projects has been made mandatory by the Ministry of Environment & Forests through its Notification issued on 27.01.1994 under the provisions of Environment (Protection) Act, 1986. Keeping in view a decade of experience in the Environmental Clearance process and the demands from various stakeholders, the Ministry of Environment and Forests (MoEF) issued revised Notification on EC process in September 2006 and amended it in December 2009.It was considered necessary by MoEF to make available EIA guidance manuals for each of the development sector.

Accordingly, at the instance of the MoEF, the Administrative Staff College of India, with the assistance of experts, undertook the preparation of sector specific Terms of Reference (TOR) and specific guidance manual for **Coal Washeries**. I wish to thank **Mr. J. M. Mauskar,** IAS, Additional Secretary, Govt. of India MoEF for his continuing support during the preparation of the manuals. I wish to place on record also my sincere thanks to **Dr. B. Sengupta**, former Member Secretary, Central Pollution Control Board and Chairman of the Core Committee for his help in the preparation of the manuals. His suggestions helped us a great deal in improving the technical quality of the manuals. **Mr. M. Parabrahmam**, Former advisor MoEF and Chairman of the Peer Committee for this project, has given constant guidance to the ASCI project team. His vast experience has been immensely helpful in preparing these manuals. I would like to thank the officials of the Ministry, **Dr. Nalini Bhat** and **Dr. T. Chandini,** for coordinating the project from the Ministry side and for providing guidance whenever needed My thanks are also due to **Dr. T. Chandini** of MoEF for the valuable inputs they had given during our interactions with the officials at Delhi and Hyderabad.

I thank **Mr. G. Bala Subramanyam**, Advisor, Environment Area, ASCI, who, drawing on his vast experience, prepared the EIA guidance manual for the **Coal Washeries**. The efforts put by him is commendable.

I would like to thank all the Peer and Core Committee members for having given a valuable feed back in the preparation of the manual. I hope the manuals would prove to be useful to the community at large and to the experts working in this area in particular.

26 February, 2010

S.K. Rao

ADMINISTRATIVE STAFF COLLEGE OF INDIA
Bella Vista, Raj Bhavan Road, Hyderabad-500 082 (India)
Tel: +91-40-2331-0852, Fax: 2332-1401 Email: skrao@asci.org.in

CONTENTS

Team

Project Coordination Ministry of Environment & Forests	**Dr. Nalini Bhat** Advisor, Ministry of Environment and Forests
	Dr. T. Chandini Director, Ministry of Environment and Forests
Chairman, Core Committee & Peer Committee I	**Dr. B. Sengupta** Former Member Secretary, Central Pollution Control Board
Chairman, Peer Committee II	**Shri. M. Parabrahmam** Former Advisor, Ministry of Environment & Forests
Project Coordination Team ASCI	**Prof. V.S. Chary** Director, Centre for Energy, Environment Urban Governance, and Infrastructure Development, Administrative Staff College of India
	Shri. G. Bala Subramanyam Advisor, Environment Area, ASCI, Hyderabad
	Dr. Valli Manickam Area Chairperson Environment Area, ASCI & Project Coordinator
Resource Persons	**Shri. G. Bala Subramanyam** Advisor, Environment Area, ASCI

Core Committee

Dr. B. Sengupta Former Member Secretary Central Pollution Control Board, New Delhi	**Chairman**
Shri. M. Parabrahmam Former Advisor, Ministry of Environment & Forests, New Delhi	
Chairman Karnataka Pollution Control Board	
Dr. M. S. Narayanan Former Chairman, Coal India, New Delhi	
Dr. S. R. Wate Head, EIA Division NEERI, Nagpur	
Prof. P. G. Sastry Former Chairman EAC (River Valley Projects), MoEF	
Member Secretary Rajasthan Pollution Control Board	
Mrs. Rohini Devi Director, HTCC, Sg -'G' ASL Representative of DRDO, Hyderabad	
Dr. M. Irulappan General Manager (Com), Representative of Airport Authority of India, New Delhi	
Shri. V. K. Sharma Head, Environment Division, Representative of NHAI, New Delhi	
Shri A. K. Debnath CG M, Central Mine Plan & Design Institute, Ranchi	
Ms. Sarita Sawhny Representative of Confederation of Indian Industry, New Delhi	

Peer Committee II

Shri. M. Parabrahmam Former Adivsor-MoEF, GoI	**Chairman**
Prof. M.A. Ramulu Ex-Head, Dept. of Mining Engineering Indian Institute of Technology, Khargpur	
Dr. S.P. Vivek Chandra Rao Vice President – Occupational Health, Hyderabad Industries Limited	
Dr. S. Ramakrishna Rao AP State Expert Appraisal Committee	
Shri. G. Suryanarayana Head (EE&M), Environmental Protection Training Research Institute	
Dr. J.A. Kamalakar Representative of National Mineral Development Corporation	
Mr. P. Sharath Kumar Representative of Sigareni Collories Co. Ltd.	

ABBREVIATIONS

AAQ	-	Ambient Air Quality
ASCI	-	Administrative Staff College of India
BOD	-	Biological Oxygen Demand
BIS	-	Bureau of Indian Standards
CRZ	-	Coastal Regulation Zone
CPCB	-	Central Pollution Control Board
COD	-	Chemical Oxygen Demand
CO	-	Carbon Monoxide
DO	-	Dissolved Oxygen
DMP	-	Disaster Management Plan
DC	-	District Collector
Dy. Com	-	Deputy Commissioner
DM	-	District Magistrate
DG	-	Diesel Generator
EIA	-	Environmental Impact Assessment
EAC	-	Expert Appraisal Committee
EC	-	Environmental Clearance
EMP	-	Environmental Management Plan
FBC	-	Fluidized Bed Combustion
GoI	-	Government of India
GW	-	Ground Water
GC	-	General Conditions
HWA	-	Hazardous Waste Authorization
ISO	-	International Organization for Standardization
IMD	-	Indian Meteorological Department
Leq	-	Equivalent Continuous Sound Level
MoEF	-	Ministry of Environment and Forests
MoU	-	Memorandum of Understanding
NAAQS	-	National Ambient Air Quality Standards
NO_x	-	Oxides of Nitrogen
NABET	-	National Accreditation Board of Education & Training
O & M	-	Operation & Management
pH	-	Hydrogen Ion Concentration
PM	-	Particulate Matter
PCC	-	Physical Coal Cleaning
QCI	-	Quality control of India
ROM	-	Run off Mine
SEIAA	-	State Level Environmental Assessment Authority
SEAC	-	State Level Expert Appraisal Committee
SPCB	-	State Pollution Control Board
TOR	-	Terms of Reference
TDS	-	Total Dissolved Solids
UTPCC	-	Union Tertiary Pollution Control Committee
WII	-	Wildlife Institute of India
ZSI	-	Zoological Survey of India
ZP	-	Zilla Parishad

List of Tables

List of Annexures

List of Figures

ABOUT THE MANUAL

Environmental Impact Notification S.O.1533 (E), of 14th September 2006 as amended in 2009 has made it mandatory to obtain environmental clearance for scheduled development projects. The notification has classified these projects as Category A & B. Category A projects (including expansion and modernization of existing projects) require clearance from Ministry of Environment and Forests (MoEF), Govt. of India (GoI) and for category B, from State Environmental Impact Assessment Authority (SEIAA), constituted by the Govt. of India

The existing Environmental Impact Assessment Manual of MoEF is common for all the sectors requiring prior environmental clearance. Considering the diversity in all the sectors related to infrastructure and industrial development, MoEF launched a programme for development of sector specific EIA guidance manuals. The EIA guidance manual will help the project proponent and consultant in the preparation of EIA report. It also helps the regulatory authority while reviewing the report and the public as well to be aware of the related environmental issues. This EIA guidance manual accordingly addresses their related environmental concerns for the specific sector, that is, Coal Washeries. The sector specific manual consists of twelve chapters, corresponding to the generic structure as per the EIA Notification.

Chapter 1: Introduction

This chapter contains the general information on coal washeries, Classification of Indian coal, major sources of pollution from Coal Washeries, coal cleaning methods and details of the environmental clearance process.

Chapter 2: Project Description

This chapter should cover the description of the project, such as, the type of project, need for the project, project location, project layout, implementation schedule, and estimated cost of the project.

Chapter 3: Analysis of Alternatives (Technologies)

This chapter should cover the details of various alternatives both in respect of location of site and technologies to be deployed, in case the initial scoping exercise considers such a need.

Chapter 4: Description of Environment

This chapter should cover the baseline data of the project area and study area

Chapter 5: Anticipated Environmental Impact and Mitigation Measures

This chapter should cover the anticipated impact on the environment and mitigation measures. The method of assessment of impact including studies carried out, modeling techniques adopted to assess the impact where pertinent shall be elaborated in this chapter. It should give the details of the impact on the baseline parameters, both during the construction and operational phases and suggests the mitigation measures to be implemented by the proponent.

Chapter 6: Environmental Monitoring Programme

This chapter should cover on Environmental Monitoring Program. It should include the technical aspects of monitoring the effectiveness of mitigation measures

Chapter 7: Additional Studies

This chapter should cover the details of the additional studies required and which are necessary to cater to more specific issues applicable to the particular project. These studies may be suggested either by the proponent himself or the regulatory authority.

Chapter 8: Project Benefits

This chapter should cover the benefits accruing to the locality, neighborhood, region and nation as a whole. It should bring out details of benefits by way of improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit Analysis

This chapter shall cover Environmental Cost Benefit Analysis of the project, if recommended by the Expert Appraisal Committee at the scoping stage.

Chapter 10: Environmental Management Plan

This chapter should comprehensively present the Environmental Management Plan , which includes the administrative and technical set-up, summary matrix of EMP, the cost involved to implement the EMP, both during the construction and operational phases

Chapter 11: Summary & Conclusions

This chapter forms the summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should provide the overall justification for implementation of the project explaining how the adverse effects are proposed to be mitigated

Chapter 12: Disclosure of Consultants Engaged

This chapter should include the names of the consultants engaged with their brief resume, expertise and nature of consultancy rendered

The contents of the manual are to be considered as version 1.0 (2010). An updating/revision of the manual will be taken up by the ministry as per requirements. In case of interpretation of any question related to law, the provisions of the original law and the rules made thereunder with various government directions/resolutions will have to be read and followed. In case of amendment to the original Act/Rules/Notifications made thereunder, the provisions as amended from time to time shall be applicable.

1

INTRODUCTION

1.0 Preamble

Environmental management plays a vital role in sustainable development of a country. Recognizing its importance, the Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in developmental projects.

The Ministry of Environment & Forest has made prior environmental clearance (EC) for certain developmental projects mandatory through its notification issued on 14th September 2006 and as amended on 1st December 2009.

1.1 General information on Coal Washeries

As a result of exploration carried out up to the maximum depth of 1200m by GSI, CMPDIL and MECL etc, a cumulative total of 257.38 billion tonnes of geological resources of coal have been estimated in our country as on 1.4.2007. The State wise distribution of coal resources and its categorization are as follows:

Table No. 1.1 State Wise Distribution of Coal Resources

State	Geological Resources of Coal in Million Tonnes			
	Proved	Indicated	Inferred	Total
Andhra Pradesh	8791	6266	2658	17715
Arunachal Pradesh	31	40	19	90
Assam	314	27	34	375
Bihar	0	0	160	160
Chhattisgarh	10182	26826	4442	41450
Jharkhand	36960	31094	6338	74392
Madhya Pradesh	7872	9692	2782	20346
Maharashtra	4856	2822	1992	9670
Meghalaya	118	41	301	460
Nagaland	4	1	15	20
Orissa	17712	31207	14314	63233
Sikkim	0	55	18	73
Uttar Pradesh	766	296	0	1062
West Bengal	11454	11810	5071	28335
Total	**99060**	**120177**	**38144**	**257381**

Table No.1.2 Formation Wise Coal Resources in Million Tonnes

Formation	Proved	Indicated	Inferred	Total
Gondwana coals	98593	120071	37775	256439
Tertiary coals	467	106	369	942
Total	**99060**	**120177**	**38144**	**257381**

Table No.1.3 Type wise Coal Resources in Million Tonnes

Type of coal	Proved	Indicated	Inferred	Total
A. Coking				
Prime coking	4614	699		5313
Medium coking	11853	11601	1880	25334
Semi coking	482	1003	222	1707
Sub total coking	16949	13303	2102	32354
B. Non-coking	81644	106768	35673	224085
C. Tertiary coal	467	106	369	942
Grand Total	99060	120177	38144	257381

The Working Group (WG) for coal & lignite for formulations of XI plan has assesses the coal demand of 731.00 million tones in the terminal year of XI plan i.e. 2011-12. The sector wise break -up is given in **Table No 1.4**

Table No 1.4 Sector Wise Coal Demand

S. No	Sectors	2007-08	2008-09	XI Plan Project (2011-12)
1	Steel & Coke oven	38.00	44.00	68.50
2	Power (Utility)	330.00	378.00	483.00
3	Power (Captive)	33.60	38.00	57.06
4	Cement	26.80	25.00	31.90
5	Sponge iron	15.10	18.00	28.96
6	BRK & Others	49.00	52.00	61.58
	Total	**492.50**	**555.00**	**731.00**

(Source: Table No 1.1,1.2,1.3 &1.4: Annual Report 2007-08, Ministry of Coal, GoI)

Coal based power plants will continue to play a leading role in power generation in our country. About 70% of country's power is generated from coal-based power plants. The quality of the coal plays an important role in the environmental aspects of a power plant. The quality of Indian coal is mainly attributed to its origin. Due to drift origin of Indian coal, inorganic impurities are intimately mixed in the coal matrix, resulting in difficult beneficiation characteristics. Over 200 million tonnes of coal reach the consumers with ash content averaging 40 percent as per the CPCB report (Clean Coal Initiatives June 2000). Based on the ash content, gross calorific value and useful heat value, Indian coal is classified in six categories as given in **Table 1.5**

Table No. 1.5 Classification of Indian coal

Grade	(Ash + Moisture%) Approx. (UHV) (Kcal/kg)	Useful heat value
A	19.5 or less	Above 6200
B	24-19.5	5600-6200
C	28.7-24	4940-5600
D	34-28.7	4200-4940
E	40-34	3360-4200
F	47-40	2400-3360
G	55-47	1300-2400

Table. 1.6 Grading of Indian Coal

S.No	Grading of Coal	Criteria
1.	Superior grade	Grade – (A+B+C) (5800 Kcal/kg)
2.	Intermediate grade	Grade (D) (5800 Kcal/kg)
3.	Inferior grade	Grade (E+F+G) (4000 Kcal/kg)
(Source: Parivesh- Clean Coal Initiatives June 2000, CPCB		

High ash content in the coal supplied to the power pants not only poses environmental problems but also results in poor plant performance and high cost for Operation & Maintenance and ash disposal. Based on review undertaken by MoEF, use of beneficiated/blended coal containing ash not more than 34 percent in power plants was stipulated as mentioned below (Ref: GSR 560 (E) & GSR 378 (E) dated 19th September 1997 and 30th June 1998):

- Power plants located beyond 1000kms from pit head
- Power plants located in critically polluted areas, urban areas and in ecologically sensitive areas

The power plants using Fluidized Bed Combustion (CFBC, PFBC & AFBC) and Integrated Gasification Combined Cycle combustion technologies are exempted to use beneficiated coal irrespective of their locations

Benefits of Using Washed Coal

- Increased generation efficiency, mainly due to the reduction in energy loss as inert material passes through the combustion process
- Increased plant availability
- Reduced investment costs
- Reduced operation and maintenance (O&M) costs due to less wear and reduced costs for fuel and ash handling
- Energy conservation in the transportation sector and lower transportation costs
- Less impurities and improved coal quality
- Reduced load on the air pollution control system; and
- Reduction in the amount of solid waste that has to be disposed off

The following are the details of the coal washeries in India (2007-08)

Table 1.7 Statistics of Coal Washeries

Coking Coal	
Location	**Capacity (MTY)**
Dudga-II	2.00
Bhojudih	1.70
Patherdih	1.60
Sudamdih	1.60
Moonidih	1.60
Mahuda	0.63
BCCL	**9.13**
Kathara	3.00
Swang	0.75
Rajrappa	3.00
Kedla	2.60
CCL	**9.35**
Nandan	1.20
WCL	**1.20**
CIL (07-08)	**19.68**
Non Coking Coal Washeries	
Dudga-I	1.00
Madhuban	2.50

BCCL	**3.50**
Gidi	2.50
Piparwar	6.50
Kargali	2.72
CCL	**11.72**
Bina	4.50
NCL	**4.50**
CIL (07-08)	**19.72**
CIL is planning to set up 19 coal washeries with total capacity of 100.6 MTY by 2011-12	
(Source: Coal Statistics-Coal washeries (http://coal.nic.in)	

Ministry of Coal identified coal washing as an important area aiming at value addition. To reap the benefits of economics as well as environment, Coal India Limited is planning to expand the capacity of thermal coal from 103 MT per annum to 250 MT per annum in the next five years. Also, CIL decided that all new opencast projects of more than 2.5 million capacity, which are not linked to pithead power stations should be designed with an integrated washery (Annual Report 2007-08, Ministry of Coal)

The beneficiation consists of cleaning of raw coal by separation of mineral matter (ash) from the coal. How extensively the coal is cleaned before use depends on the purpose for which it is mined and on the specifications it must meet for its use.

The cleaning of coal is mainly based on separation of the impurities by physicochemical methods based on the differences in the specific gravity of coal constituents and on the differences in surface properties of the coal and its mineral matter required. The wastes characteristics from coal preparation plant are highly dependent on the raw coal utilized and the final product. The major potential sources of pollution from coal washery and related operations are:

S.No	Source of Pollution	Type of Pollution
1.	Coal Storage & Handling	Fugitive emission of dust Run-off Coal pile leachate
2.	Coal Transportation	Fugitive emission of dust Air pollution due to spillages Automobile emissions
3.	Washery Rejects	Solid waste Fugitive emissions of dust Run-off of reject area Leachate

4.	Coal crushing & screening	Fugitive emission of dust Point source emissions (dust) Noise
5.	ETP – Settling ponds	Solid waste of treatment systems Fugitive emission of dust due to wind erosion
6.	Conveyor belts between different operations	Fugitive emissions of dust
7.	Liquid effluent streams	Water pollution
8.	Various feeding and transfer points	Fugitive emissions of dust
9.	Intermediate storage bins/ product house	Fugitive emissions of dust
10.	Air pollution control equipments	Solid waste
11.	Thermal dryers	Air pollution
12.	Waste oils	Hazardous waste
13.	Batteries	Hazardous waste

Discharge of coal washery effluents gives rise to the serious problem of visual and aesthetic pollution. The appearance of these effluents during discharge from the outlet of washery premises, in general are black/ brownish-black in color coupled with high turbid appearance and high load of suspended solids particularly in the form of coal fines.

Coal Cleaning Methods

The various procedures are broadly classified as the 'Wet' 'and Dry' processes. The dry process doesn't involve the use of water, where as in the wet process, the water is the main medium for washing and jigging.

Crushing

Purpose of the crushing is to reduce the Run of Mine (ROM) coal to a size suitable for washing and, size reduction involving various principles such as compression, impact, shearing, splitting and attrition

- Primary crusher(s) are generally designed to receive ROM coal and reduce it to a top size of 2" to 8''
- Secondary crushers are generally designed to reduce the size (to a top size of 1 ¾") of the middling fraction from jigs or the middling fraction from heavy – medium trough separators, and, in turn these fractions would be rewashed.

Types of Crushers:

- Rotary Breakers

- Single – Roll Crusher
- Double – Roll Crusher
- Hammer Mills
- Ring Crushers

Screening

Sizing is the separation of a heterogeneous mixture of particle sizes into groups wherein all particles range between a maximum and minimum size

Screens Used in Coal Preparation:

- Scalping screen – for separating refuse and fines prior to size reduction
- Raw coal sizing screen- for separating the raw coal into coarse and fine size for further processing
- Pre-wet screen- to remove fines prior to the mechanical cleaning
- Heavy media recovery screens- for recovery and reuse of magnetite
- Desliming screens-to remove extreme fines; and
- Dewatering screens-to remove water

Jigs

The methods operate by differences in specific gravity. Jigs rely on stratification in a bed of coal when the carrying water is pulsed. The shale tends to sink, and the cleaner coal rises. The basic jig is suitable for larger feed sizes. Although the Baum jig can clean a wide range of coal sizes, it is most effective at 10-35 mm. A modification of the Baum jig is the Batac jig, which is used for cleaning fine coals. The coal is stratified by bubbling air directly through the coal-water-refuse mixture in this cleaning unit.

For intermediate sizes the same principles are applied, although the pulsing may be from the side or from under the bed. In addition, a bed or hard dense mineral is used to enhance the stratification and prevent remixing. The mineral is usually feldspar, consisting of lumps of silicates of about 60mm size. **Figure 1.1** shows a Baum Jig and a feldspar Jig for finer coal

Jigs offer cost effective technology with a clean coal yield of 75-85% at about 34% ash content. The jigs are used more frequently than dense-medium vessels because of their larger capacities and cheaper costs.

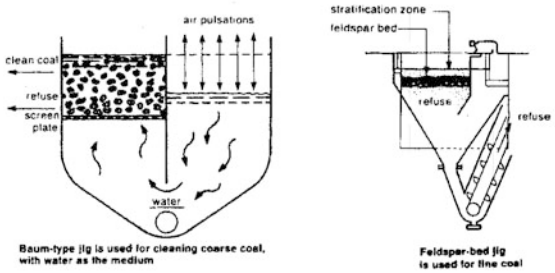


Figure 1.1 Baum Jig and a feldspar Jig

Dense-medium Separators

Dense-medium vessels also operate by specific gravity difference; however rather than using water as the separation medium, a suspension of magnetite and water is used. This suspension has a specific gravity between that of coal and the refuse and a better separation can be obtained. The slurry of fine magnetite in water can achieve relative densities up to about 1.8. Different types of vessels are used for dense-medium separators such as baths, cyclones and cylindrical centrifugal separators. For larger particle sizes, various kinds of baths are used, but these require a substantial quantity of dense- medium, and therefore of magnetite. For smaller sizes, cyclones are used where the residence time is short and throughput relatively high. Cylindrical centrifugal separators are used for coarse and intermediate coal.

Dense-medium cyclones clean coal by accelerating the dense-medium, coal and refuse by centrifugal force. The coal exits the cyclones from the top and the refuse from the bottom. Better separation of smaller-sized coals can be achieved by this method.

Key factors in the operation of any dense-medium system based on magnetite are the control equipment and the efficiency of magnetic recovery for recycle. There can be a build-up of other minerals in the medium, making control more difficult. **Figure 1.2** shows example of a dense-medium bath and a dense-medium cyclone

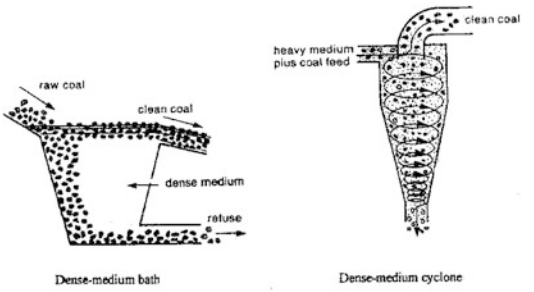


Figure 1.2 Dense Medium separators

Hydrocyclone

Hydro-cyclones are water-based cyclones where the heavier particles accumulate near the walls and are removed via the base cone. Lighter (cleaner) particles stay nearer the center and are removed at the top via the vortex finder **(Figure 1.3).** The cyclones diameter has a significant influence on the sharpness of separation

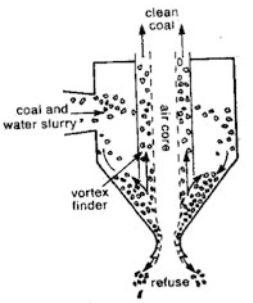


Figure 1.3 Hydrocyclone

Concentration Tables

Concentration tables are titled and ribbed and they move back and forth in a horizontal direction. The lighter coal particles to the bottom of the table, while the heavier refuse particles are collected in the ribs and are carried to the end of the table **(Figure 1.4).** Fine coal can be cleaned inexpensively with this unit, however, the capacity is quite small and they are only effective on particles with specific gravities greater than 1.5

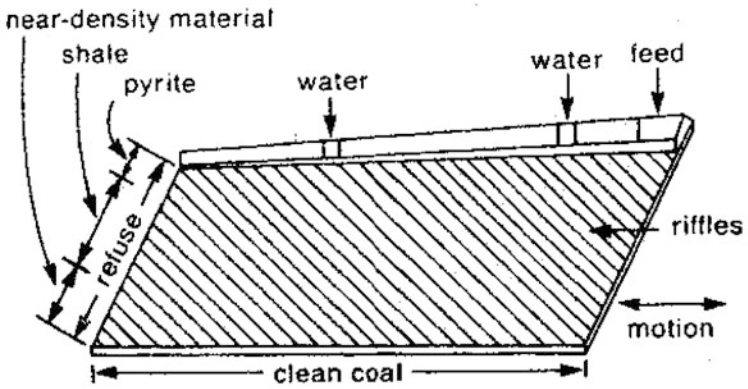


Figure 1.4 Concentration Tables

Froth flotation

Froth flotation is the most widely used method for cleaning fines. Froth flotation cells utilize the difference in surface characteristics of coal and refuse to clean ultra fine coal. The coal-water mixture is conditioned with chemical reagents so that air bubbles will adhere only to the coal and float it to the top, while the refuse particles sink. Air is bubble dup through the slurry in the cell and clean coal is collected in the froth that forms the top. **Figure 1.5** shows an example of froth flotation. This type of cleaning is very complex and expensive and is principally for metallurgical coals. One of the commonest steps to improve the performance of a flotation unit is to separate the pyrite at an earlier stage using cyclones, spirals or tables

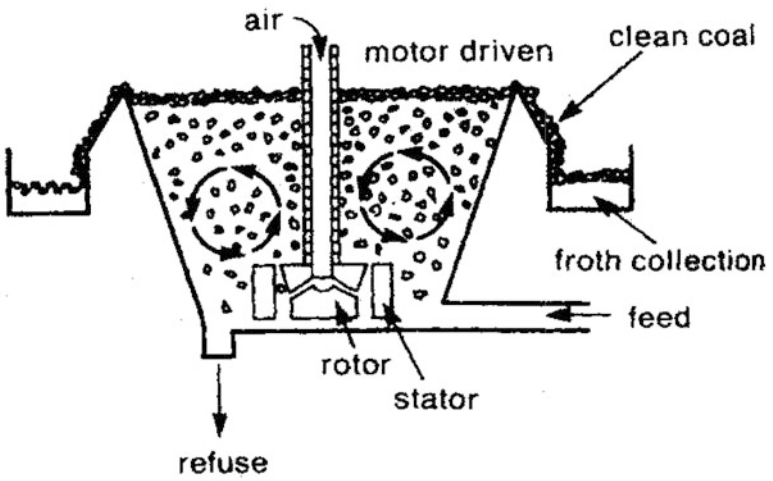


Figure 1.5 Froth Flotation

Dry Cleaning

The dry coal preparation technique uses an air dense fluidized bed, which makes use of the character of an air-solid fluidized bed-like liquid. The uniform and stable air-solid suspension is formed, which processes a certain density; light and heavy feed is separated by density in suspension. The low-density material floats up to the top and the high-density material sinks down to the bottom. Two qualified products are obtained after separating and removing the magnetic. The separator is comprised of an air chamber, an air distributor, a separating vessel as well as a transportation scraper. In the separating process the screened (6-50mm) coal and dense medium are fed into the separator, the compressed air from an air receiver is provided to the air-chamber, and then uniformly to the distributor which fluidize the denser-medium. The comparative stable fluidized air-solid suspension, which processes a certain density, is formed under certain technical conditions. The feed is stratified and separated according to its density. The separated materials are transported in counter flow **(Figure 1.6).** The floated light product such as clean coal is discharged to the right, and the sunken heavy product to the left.

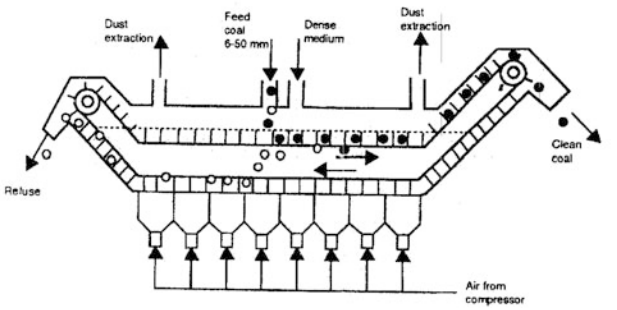


Figure 1.6 Dry Cleaning

Humphrey Spiral

Coal-water slurry is fed into a spiral conduit. As it flows downward, stratification of the solids occurs with the heavier particles concentrated in a band along the spiral. An adjustable splitter separates the stream into two product streams – a clean coal and the middlings

Launder

Raw coal is fed into the high end of a trough with a stream of water. As the stream of coal and water flows down the incline, particles having the highest settling rate settle into the lower strata of the stream. These are the middling or refuse particles. The clean coal particles gravitate into the upper strata before separation

A typical flow chart for coal beneficiations of a coal washery is given in **Figure 1.7**

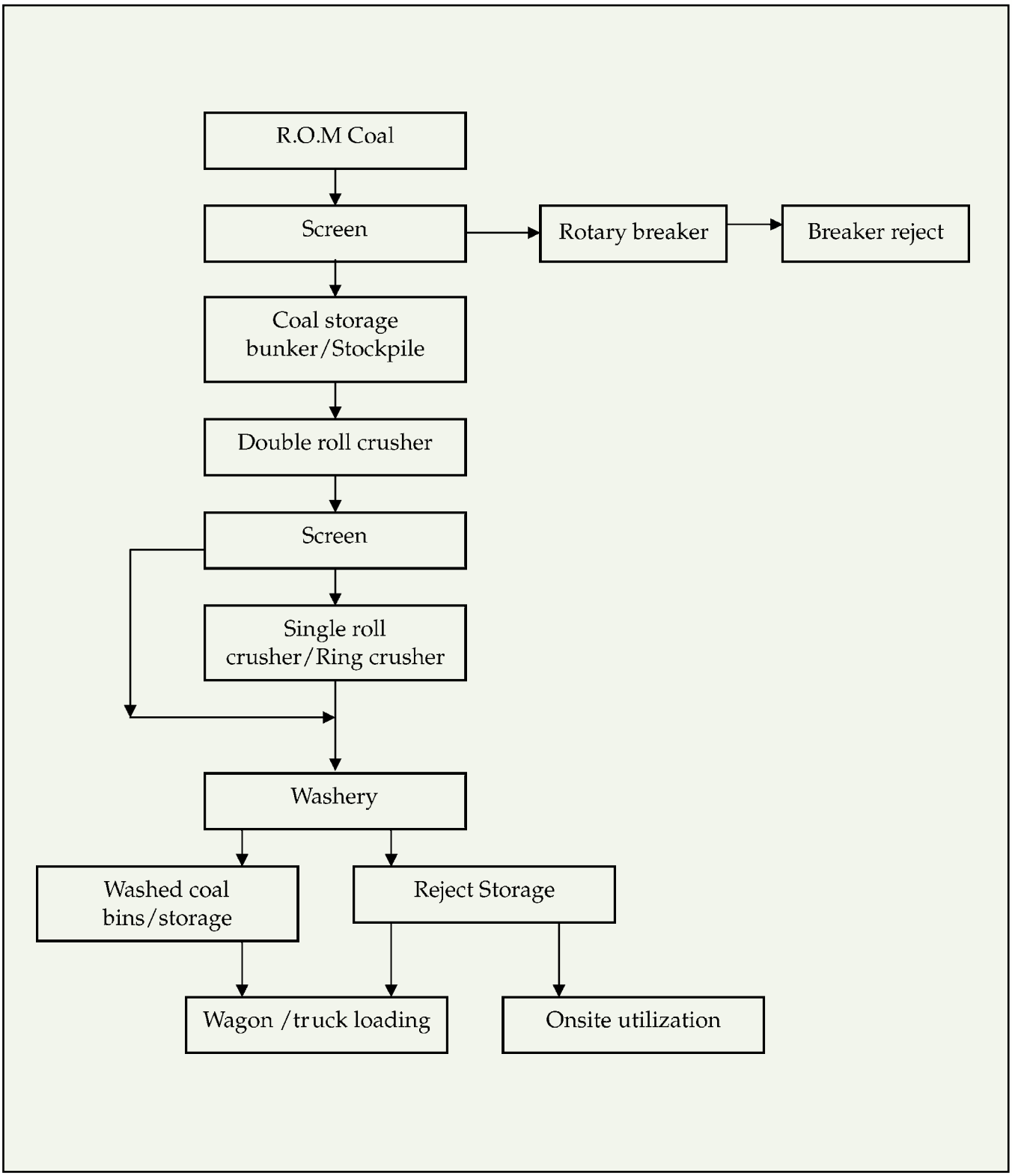


Figure 1.7 A typical flow chart for Coal Beneficiation of a Coal Washery

Tables 1.8 & 1.9 show the comparison of different coal cleaning methods regarding the state of technology, performance, advantage and disadvantages costs and suitability

Table No. 1.8 Comparison of different methods – Jigs, dense-medium separators and hydro cyclones

Methods	Jigs	Dense-medium separators	Hydro cyclones
State of technology	Commercial	Commercial	Commercial
Advantages	Large capacity Inexpensive Common type - world wide usage	Good separation Second most common method	—
Disadvantages	Lower separation than dense-medium	Small capacities	Water consumption
Costs	Inexpensive	Expensive	—
Suitability	Intermediate efficiency device. For moderately difficult to clean coal. Specific gravity > 1.5-1.6, Size: 0.5-150 mm	For difficult or most difficult to clean coal. Specific gravity > 1.3-1.9, Size: 0.5-150mm	For coarse to intermediate particles Size: 0.5-150mm

Table No. 1.9 Comparison of different methods – concentration tables, froth flotation and dry cleaning

Methods	Concentration	Froth flotation	Dry cleaning
State of technology	Commercial	Commercial	Commercial
Advantages	Inexpensive Good pyrite separation	Good results on fines	No water required
Disadvantages	Quite small capacities; 10-15 tones/h	Complex Poor pyrite separation Poor dewatering characteristics	Not for difficult to clean coal
Costs	Inexpensive	Expensive	Lower than wet processes
Suitability	Used for fine coal containing a great deal of pyrite. Specific gravity > 1.5, Size: 0.0-15mm	Used for fines. Mainly used for metallurgical coals Size: <0.5mm	Requires easy coal, Size: > 100mm Rough separation For coal tending to form slimes in wet processes

(Source: Table 1.7 & 1.8 Evaluation of Clean Coal Technologies, 2002- CPCB)

1.2. Environmental Clearance Process

In terms of the EIA notification dated 14th September 2006 by the MoEF, the activity of Coal Washeries is indicated in the list of projects or activities required prior Environmental Clearance i.e. at S.No. 2 (a) of the schedule of the EIA notification dated. 14th September 2006. Based on the threshold limit of throughput of coal, they are classified into following two categories -

Project or Activity	**Category with Threshold Limit**	
Coal Washeries	**Category - A**	**Category - B**
	≥ 1 million ton/annum throughput of coal	< 1million ton/annum throughput of coal
Authority for approval of TOR and issue/ reject the Environmental Clearance	MoEF, GoI on the recommendations of Expert Appraisal Committee (EAC)	State / Union Territory Environmental Impact Assessment Authority (SEIAA) on the recommendations of State/ Union Territory Level Expert Appraisal Committee (SEAC)

General Condition shall apply

i. "Any project or activity specified in Category 'B' will be treated as Category 'A' if located in whole or in part within 10 km from the boundary of: i. Protected areas notified under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar, Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries.

Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above.

ii. If the coal washery is located within mining area the proposal shall be appraised together with the mining proposal.

The Environmental Clearance process for Coal Washeries will comprise of the following four stages. These stages in sequential order:

Stage (1) – Screening (only for category – B projects)

'Screening' refers to Category 'B' projects or activities, the process of scrutiny of application seeking EC made in Form 1 by the SEAC to determine whether the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) or not for its appraisal prior to the grant of environmental clearance depending up on the nature and location specificity of the project. The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the updated guidelines from time to time by Ministry of Environment and Forests shall be followed.

Stage (2)- Scoping

'Scoping' refers to the process by which the EAC in the case of category 'A' projects or activities, and SEAC in the case of category 'B1' projects or activities, including applications for expansion and/or change in product mix of existing projects or activities, determine detailed and comprehensive TOR addressing all relevant environmental concerns for the preparation of an EIA report in respect of the project or activity for which prior Environmental Clearance is sought. The EAC and SEAC concerned shall determine the TOR on the basis of information furnished in the prescribed application Form 1 including TOR proposed by the applicant, a site visit by a sub-group of EAC only if considered necessary by the EAC or SEAC concerned and other information that may be available with the EAC or SEAC.

Stage (3) – Public Consultation

"Public consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impact of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate.

After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation.

Stage (4)- Appraisal

Detailed scrutiny by the EAC of the application and other document like the final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of EC.

Flow-chart depicting the stages involved in obtaining the prior Environmental Clearance for Coal Washeries under for Category – A is presented in **Figure 1.8** and for Category – B projects is presented in **Figure 1.9.**

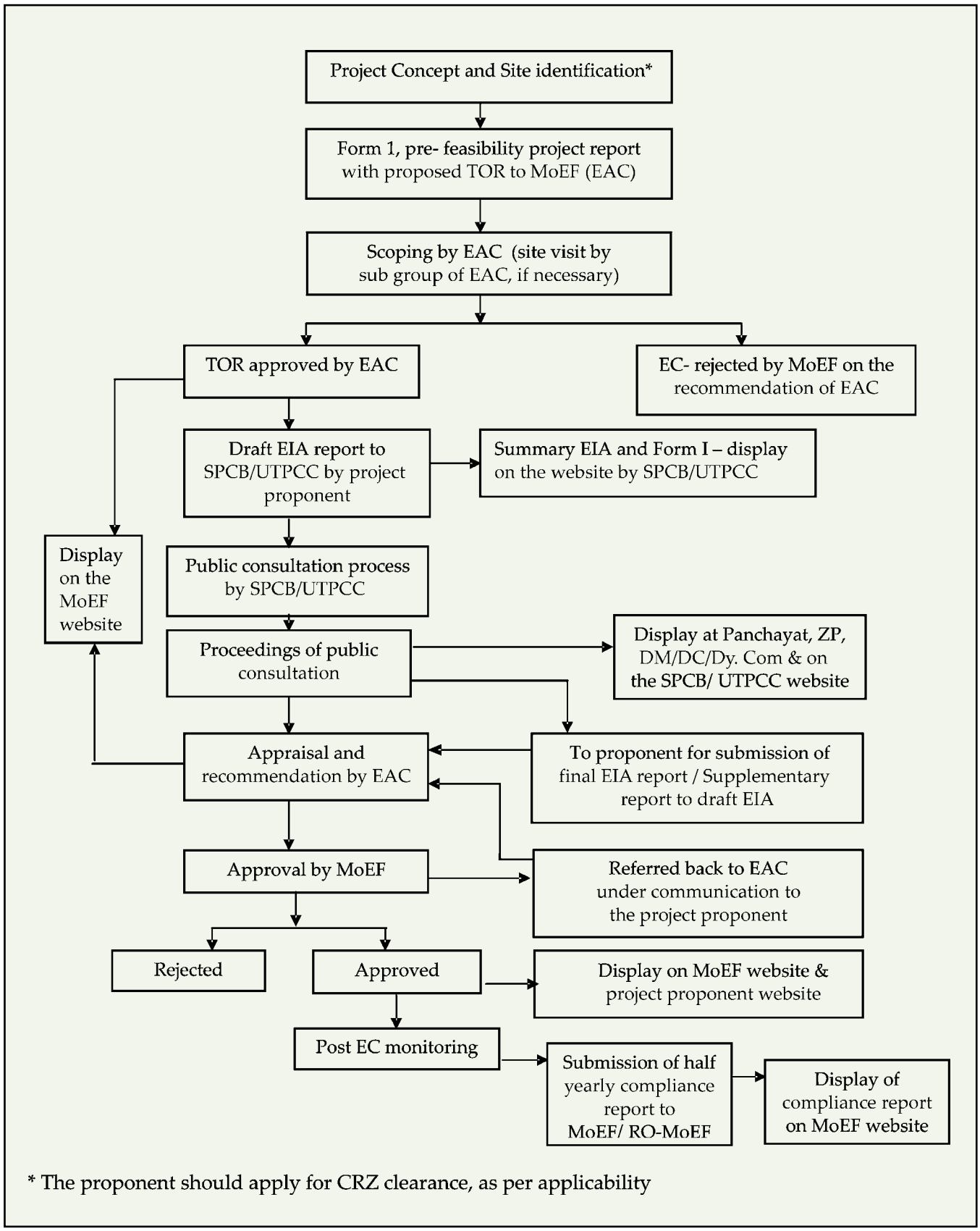


Figure 1.8 Prior Environmental Clearance Process for Category A Projects

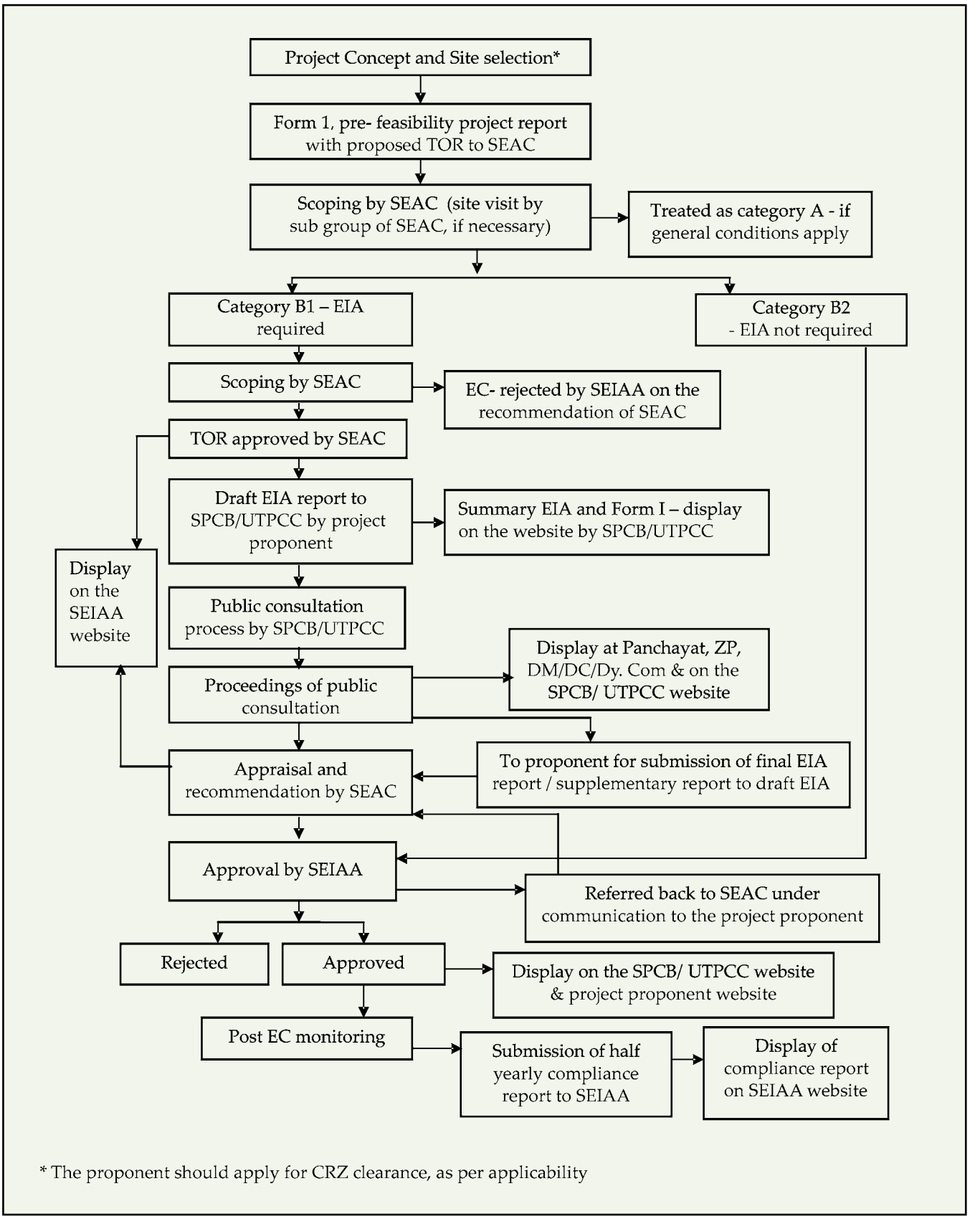


Figure 1.9 Prior Environmental Clearance Process for Category B Projects

- The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a CRZ map duly demarcated by one of the authorized agencies, showing the project activities, w.r.t. C.R.Z (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be take to obtain the requisite clearance under the provisions of the CRZ notification, 1991 for the activities to be located in the CRZ#
- The projects to be located within 10km of the National parks, Sanctuaries, Biosphere reserves, Migratory corridors of wild animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)#
- All correspondence with the Ministry of Environment & Forests including submission "of application for TOR/Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC meeting on behalf of the project proponent shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project"**

#S.O 3067 (E) dated 1st December 2009

** Circular dated 5th August 2009, MoEF

1.3 Terms of Reference (TOR)

Terms of Reference (TOR) for the Coal Washeries is prepared and attached as "**Annexure 1"** to this document. In addition, the proponent is required to identify specific issues, if any, pertinent to the project and include those issues also in the TOR for preparation of EIA and EMP report upon approval of the TOR by the Expert Appraisal Committee.

1.4 Validity of Environmental Clearance

The prior Environmental Clearance granted is valid for a period of five years. The regulatory authority concerned may further extend this validity period by a maximum period of five years.

1.5 Post Environmental Clearance Monitoring

In respect of category A projects, it shall be mandatory for the project proponent to make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the district or state where the project is located and in addition, this shall also be displayed in the project proponent's website permanently.

In respect of category B projects, irrespective of its clearance by MoEF/SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of MoEF website where it is displayed.

The Project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions on 1st June and 1st December of each calendar year. All such reports shall be public documents. The latest such compliance report shall also be displayed on the website of the concerned regulatory

1.6 Transferability of Environmental Clearance

A prior Environmental Clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor or the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period.

1.7 Generic Structure of Environmental Impact Assessment Document

In terms of the EIA notification of the MoEF, GoI dated 14th September 2006; the generic structure of the EIA document shall be as detailed below:

- Introduction
- Project Description
- Description of the Environment
- Anticipated Environmental Impact & Mitigation Measures
- Analysis of Alternatives (Technology& Site)
- Environmental Monitoring Program
- Additional Studies
- Environmental Cost - Benefit Analysis
- Environmental Management Plan (EMP)
- Summary & Conclusion
- Disclosure of Consultants engaged

1.8 Identification of Project Proponent

Profile of the project proponent, contact address with e-mail, fax, phone number etc should be furnished. The authorized signatory shall make all correspondence with MoEF . The authorized signatory shall submit a document in support of his claim of being an authorized signatory for the specific project

1.9 Brief Description of Project

Details of the project nature, size, location and its importance to the country and the region are to be included. Project site description- survey/ village, tehsil, district, state & extent of the land, latitude & longitude of the boundaries should be furnished.

Description of existing environmental laws/regulations on the proposed activity is to be brought out clearly. If there are any notified restrictions/limitations from environmental angle, issued by the District administration, State or Central government, the same should be furnished. Details of litigation(s) pending against the project/ proposed site and or any direction passed by the court of law against the project, if any, should be stated.

Any other local/state regulations concerning the establishment of the industrial unit on conversion of land use, the same should be adopted as per the procedures.

Approval/clearance required under the following acts should be specifically stated:

- The Forest (Conservation) Act, 1980
- The Wildlife (Protection) Act, 1972
- The CRZ Notification, 1991

In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be furnished for the following:

- Status of Environmental Clearance and compliance for the terms & conditions for the existing project
- Validity of the Air & Water Consent orders, and Hazardous Waste Authorization (HWA) from SPCB/ PCC for existing project
- Compliance status to the Standards and specific conditions issued by SPCB/PCC
- Notices/directions issued by the regulatory agencies under section 33(A) of the Water Act, 1974 as amended, under section 31(A) of the Air Act 1981 as amended and any directions issued under the provisions of the E (P) Act, 1986 during the last one year
- Compliance status for the directions / enactments which are binding on activity of the project as per the notifications issued by regulatory authorities from time to time

Details of the scope of study in terms of Terms of Reference (TOR) approved by the Expert Appraisal Committee and the details of regulatory scoping carried out should be mentioned.

2

PROJECT DESCRIPTION

2

2.0 General

The description of the project to be given in this chapter of the EIA study report should be reasonably adequate to understand the possible overall impact during construction and operational phases of the project on various facets of Environment.

2.1 Description of the Project

Description of the project should be brief but elaborate enough to assess the impact of the project location on the environment. Therefore these brief details should include:

- Land description: The location of the project with longitude, latitude, revenue village, tehsil, district and state and extant of the land should be furnished
- Type of the project – new, expansion and/or modernization
- In case of stand-alone coal washery, details of run-of-mine (ROM) coal supply or a captive coal washery on the mine site along with the mining/power generation, if they are linked should be furnished. In case of integrated operations of mining/washery/power generation, cumulative environmental impact should be considered
- General description of unit operations such as crushing, screening, sorting, grinding, classification and washing with their capacities and flow chart.
- Description of technology and justification of chosen technology should be given. Impact of choice of technology selected on air quality, water quality and solid waste generation should be furnished
- Details of the main process equipments should be given as in **Table 2.1**
- The mode of transport of incoming unwashed coal and the outgoing washed coal by rail, road, water or combination of these should be furnished. The operations should give various resources utilized, their sequencing and planned reuse/utilization/disposal.
- Whether coal is transported through slurry pipeline? If yes, whether the slurry pipeline is passing through national parks/ sanctuaries/coral reefs/ecologically sensitive areas? If yes, status of obtaining environmental clearance for the slurry pipeline should be furnished. Capacity of the slurry pipeline, route of the slurry pipeline etc, should be furnished.
- Storage facilities and truck parking rail/road/waterways requirements should be furnished. Land requirement for storage of rejects should be specifically mentioned
- Location of coal mines, their distance from the proposed washery, transport of raw coal to the proposed washery plant, and on-site storage facility with capacity

- Source(s) and availability of water for project requirements and domestic use in terms of both quality and quantity and status of obtaining necessary permissions
- Possibility to use excess mine water from coal mines, treated domestic effluents from urban local bodies or treated effluents from nearby industries viz., cooling bleed off from thermal plants, treated non-colored effluents from paper industry etc. should be explored
- Land requirement – status of land acquisition, total land requirement, built-up area and provision for green belt
- Land ownership status/lease deed agreement details
- Details about the location of washeries within 15kms should be reported along with their installed capacities and present environmental setting

Essential topo sheets/maps to be provided with TOR application

- A map specifying locations of the state, districts and project location
- A map covering aerial distance of 15 km from the proposed project location delineating environmental sensitive areas as specified in Form I of EIA Notification dated 14th Sep 06. In the same map the details of environmental sensitive areas present within a radial distance of 1 km from the project boundary should be specifically shown
- Land use and land cover map of the study area (project area and 5 km area from project boundary) in 1:25,000 scales based on recent satellite imagery of the study area delineating the vegetation (agricultural land, irrigated, un-irrigated, un-cultivable land as per the revenue records, forest area (s)- as per the records) grazing and waste land is to be shown
- Layout plan to a scale 1: 5000 clearly showing latitude and longitude of the boundaries covering administrative and operational buildings, storage yards, township, green belt etc., should be submitted
- Contour map of the project area and 2 km from the project boundary should be clearly indicated.
- The drainage map of the study area (1: 25,000) indicating the hydro geological features (rivers, canals, streams, nallahs, water tanks etc) for the project area and 2kms from the project boundary should be furnished. In case of any diversion of nallah/stream (temporary or permanent), it should be clearly shown on the map

The list of critically polluted industrial clusters/areas identified by CPCB is given in **Annexure 2**

2.2 Capacity of the Project

The proponent should furnish the throughput capacity of coal washery at peak load on annual basis and on daily basis. All input requirements including ancillary facilities are to be given to estimate their impact on the environment. Receipt and storage of raw materials and other inputs at peak capacity is to be furnished. As the operating capacity of the washery plant is solely

dependent on run-of-mine (ROM) and also its specific use, the proponent should furnish details of the source of coal mine, life of the mine, daily/ annual output mining capacity and potential consumers for beneficiated coal.

- Details of sample test analysis of the following should be furnished:
  - Characteristics of coal to be washed – this includes grade of coal and other characteristics – percentage of ash, percentage of fixed carbon, calorific value in K. Cal/kg, sulphur and heavy metals including levels of Hg, As, Pb, and Cd
  - Characteristics of washed coal for the above parameters
  - Characteristics of coal washery rejects for the above parameters and quantum of rejects
  - Washability characteristics (results of float and sink test)
  - Characteristics of coal, washed coal and washery rejects should be given as in **Table 2.2**
- Copies of MoU/agreement with linkages (for stand alone washery) for the capacity for which EC has been sought should be furnished

2.3 Disposal of Washery Rejects

- Details of washery rejects used for power generation (FBC boiler) on site, if any
- Disposal of washery rejects including handling practices during transit, storage, mode of conveyance, end user details, mode of disposal, frequency of evacuation of washery rejects from on-site, storage capacity for rejects
- Short- term & long- term plan adopted by the end user for utilization of washery rejects should be furnished
- In case of expansion projects, the details of MoU with the end user for disposal of washery rejects from the existing plant, on-site available facilities for transit storage of washery rejects should be furnished

2.4 Manpower Requirement

The proponent should indicate the requirement of various categories of manpower such as skilled, semi-skilled, unskilled workers, technicians, engineers, managers and other professionals for both construction and operational phases.

2.5 Use of Public Infrastructure

The proponent should furnish the connectivity of the project site to the road network. In case the existing road facilities are utilized, the proponent should furnish details of extra capacities required to augment the existing connectivity to minimize the infrastructure congestion. The layout of such road facilities should be incorporated in the project layout. Approval of appropriate authorities for the proposed layout of the connectivity should be pursued by the proponent and

implemented as part of the project such that the public hitherto availing these utilities are not deprived of these road facilities as a consequence of the project implementation.

Detailed water balance for the regular operation of the washery and at peak load should be furnished

2.6 Project Implementation Schedule

The proponent should also submit the project implementation schedule - bar chart /CPM.

3

ANALYSIS OF ALTERNATIVES (TECHNOLOGIES & SITES)

3.0 General

In case, the scoping exercise results in need for consideration of alternative technologies on account of predicted environmental impact, the details of such alternatives considered should be included in this chapter

These details shall comprise:

- Description of various alternatives like locations or layouts or technologies.
- Summary of adverse impact of each alternative.
- Selection of an alternative
- Selection of disposal options for washery rejects in terms of both short and long term plans.

DESCRIPTION OF THE ENVIRONMENT

4.0 General

Environmental components to be considered in general are (a) Land (b) Water environment (c) Air and meteorological (d) Noise (e) Biological environment (f) Socio-economic environment and (g) solid waste facilities. Hence it is necessary to ascertain the baseline data of these environmental components. As a primary requirement of EIA process, the proponent should collect baseline data in the project area as well as the study area, which is likely to be affected by the project activity

4.1Study Area

As a primary requirement of EIA process, the proponent should collect primary baseline data in the project area as well as the area falling within 5 km from the proposed project boundary and secondary data with in 15 km aerial distance for the parameters as specifically mentioned at column 9 (III) of Form I of EIA Notification, 2006. Details of secondary data, the method of their collection, meteorological data of nearest station of IMD along wind rose and proposed monitoring locations shown on the study area should be furnished. Similarly the proposed locations of monitoring stations of water, air, soil and noise etc should be shown on the study area map.

The study areas mentioned in this document should be considered for guidance purpose only but the exact study area for different environmental attributes (water, air, noise , soil etc) is to be submitted considering the proposed activities and location, along with proper reasoning, for review and approval by the Expert Appraisal Committee.

4.2 Land Environment

Land use of the proposed project site and the adjacent areas is to be ascertained from the existing approved master plans, if any, and from the revenue records. The environmental sensitive areas as mentioned at para 9 (III) of form I of EIA notification 2006, covering the following with in an aerial distance of 15 km should be furnished along with the aerial distance from the project boundary:

- Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value
- Areas which are important or sensitive for ecological reasons – wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests
- Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration
- Inland, coastal, marine or underground waters

- State, national boundaries
- Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas
- Defense installations
- Densely populated or built-up area
- Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, heritage sites, community facilities)*
- Areas containing important, high quality or scarce resources *(groundwater resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*
- Areas already subjected to pollution or environmental damage *(those where existing legal environmental standards are exceeded)*
- Areas susceptible to natural hazards, which could cause the project to present environmental problems *(earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)*

Demographic profile at project site and within one km from the boundary should be given as in **Table 4.1**. Coal washery projects require land for the purpose of storage of raw mined coal, beneficiated coal and also significantly for storage of washery rejects, and for railway sidings and accordingly land requirement should be assessed.

Specific importance should be given to areas close proximity to the project boundary say up to one km and land use classification and presence of ecologically sensitive areas should be described in detail, as adjoining areas are more vulnerable for impact

Topography

Study of the land use pattern, habitation, cropping, forest cover, environmentally sensitive areas etc, should be done with the help of latest remote sensing map and also through the secondary data sources. The land use/ land cover classification as per **Annexure 3** should be followed.

Soil Quality

Soil data including type, classification, characteristics, soil properties etc., are important from engineering considerations for design of structures, loading capacities, stockpiles etc. changes in parameters of soil also may affect plantation and vegetation growth, which in turn may endanger the health of the local community.

Baseline data of the soil obtained by soil investigations carried out is to be provided. Field surveys usually involve a combination of hand auger boring and drilling over the site in a systematic grid pattern, with focus on specific areas of interest. Soil surveys should consider both the physical and engineering properties of the soil. Soil sampling locations and results should be given as in **Table 4.2 & 4.3.**

Soil data in the proposed greenbelt area to ascertain suitability of development of greenbelt and for rain water harvesting should be covered

4.3 Water Environment

This section should document the baseline scenario of the water environment in the study area and at the project site. Details of surface water bodies within the project site and within 5 km from the boundary of the project should be documented along with their present usage. Monitoring of water quality within 5 km for relevant parameters should be done. The samples should be collected and analyzed as per the standard procedures. The description of the water sampling locations should be given as in **Table No. 4.4 & 4.5.** The water quality monitoring data should be given as in **Table 4.6 & 4.7.**

Suggested parameters for monitoring: pH, Total Suspended Solids, Total Dissolved Solids, oil & grease, BOD, COD, sulphates, sulphides calcium, magnesium, sodium, phenolics, iron, zinc, copper, manganese, Mercury, Arsenic, Lead, Chromium (total & hexavalent) and Cadmium.

4.4 Air Environment

Meteorological Data

Meteorological data covering the following should be incorporated in the EIA report. The data for at least a 10-year period should be presented from the nearest meteorological station, except for the history of cyclones and floods for which 50-year data is required.

- Wind speed and direction
- Rainfall
- Relative humidity
- Temperature
- Barometric pressures and
- History of cyclones/floods

Wind Speed and Direction

For preliminary studies, information may be obtained from the available meteorological records of area. Recording of velocity and direction of wind at the proposed site should be obtained by installing, continuous and self-recording anemometers. The data collected should also be correlated with the data available at places nearest to the site. From the data so collected, monthly and yearly wind rose should be prepared. Seasonal changes and monsoon periods affect the wind direction, intensity and duration of maximum wind velocity. Obtaining accurate wind data and its interpretation are of importance to assess the impact of particulates, generated both during construction and operational phases of coal washery on surrounding receptors. The dispersal, however, depends upon the wind direction, intensity and period as well as the density and size of the particulate matter.

Rainfall, Humidity and Temperature

Historical data on other parameters like rainfall, temperature, and humidity of the proposed site area also could be collected. Data on rainfall and temperature are very important to plan and design safe operating systems, equipment, methods etc.

Ambient Air Quality

Baseline data of the ambient air for the parameters – particulate matter size less than 10µm or PM_{10} µg/m^3, particulate matter size less than 2.5µm or $PM_{2.5}$ µg/m^3, sulphur dioxide (µg/m^3), nitrogen dioxide (µg/m^3) and carbon monoxide (µg/m^3) in the study area should be generated for one season other than monsoon as per CPCB norms One station should be located in the up-wind/non-polluting area as a control station. The locations of the ambient air-monitoring stations should be selected carefully as representativeness of the monitoring of critical environmental receptors.

The number of monitoring stations should be selected based on the general criteria as mentioned in the **Annexure 4** duly giving consideration to the sensitive environmental receptors in the study area. The National Ambient Air Quality Standards (NAAQS) are given in **Annexure 5.** Location of ambient air quality monitoring stations should be presented as in **Table No. 4.8** and the monitoring results should be presented as in **Table 4.9.**

Specific importance should be attached to areas in close proximity of project say up to 1 km and areas of habitation, recreation places and sensitive zones such as schools and hospitals in the neighborhood, if any

4.5 Noise Environment

Hourly monitoring of noise levels (Leqs) should be recorded for 24 hours by using integrated noise meter. The noise levels at the project boundary and the study area especially at nearest habitation should be monitored. The noise monitoring locations should be given as in **Table 4.10.** Noise standards have been designated for different types of land use i.e. residential, commercial, industrial areas and silence zones as per the Noise Pollution (Regulation and Control) Rules, 2001 **(Annexure 6).**

Noise levels at outer limits of the project boundary during daytime and nighttime and current noise levels within 1 km from the project boundary especially at habitation and sensitive receptors should to be monitored

4.6 Biological Environment

Details on secondary data on the existing flora and fauna in the study area as well as 15 km from its boundary, carried out by an university/institution under the relevant discipline (such as BSI, ZSI, WII, etc) should be included in the list of flora and fauna along with classification as per schedule given in the Wild Life Protection Act, 1972 and in the Red Data Book and a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna. Information on the dependence of the local people on the minor forest products should be furnished. Photograph showing the project site status for

vegetative cover, if any, should be furnished. List of flora and fauna issued by the concerned Divisional Forest officer should be furnished.

For the projects located within 10 km from the national parks, sanctuaries, biosphere reserves, migratory corridors of wild animals, a map duly authenticated by chief wildlife warden showing these features vis-à-vis the project location and the recommendations or comments of the chief wildlife warden shall be submitted at the stage of EC

4.7 Socio-economic Environment

Baseline data in the study area particularly on human settlements, health status of the communities, existing infrastructure facilities should be collected through secondary sources. Present employment and livelihood of the populations, awareness of the population about the proposed project should be collected. The wastewater from the coal washery may contaminate the water of nearby natural nallah/lake/reservoir, which is used for drinking or bathing or any other purposes. The details of the water bodies and the population depending on these water bodies should be collected.

4.8 Solid Waste Facilities

Type and quantity of solid waste generated during the construction and operational stages is to be quantified. In case of expansion of the unit, the solid waste generated category wise should be quantified. Details of authorized hazardous waste disposal facilities should be ascertained and this will help the project proponent to know the availability of common TSDF.

5

ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

5.0 General

The aim is to ensure that potential environmental problems are foreseen and avoided at an early stage in the planning cycle so as to prevent measures to minimize anticipated impact. The EIA mechanism should be applied to the project in the following order of priority:

- **Avoid** adverse environmental impact
- **Minimize** and control adverse environmental impact
- **Mitigate** adverse environmental impact

The major potential source of environmental contamination from coal washeries includes: washery rejects (solid waste), thermal dryers (air pollution), liquid effluent streams, coal storage and handling (fugitive dust and runoff), and coal transportation (fugitive dust)

The disposal of coal washery waste is a potentially serious problem. Coal washery rejects consists of waste coal, slate, carbonaceous and pyretic shales, and clay associated with the coal seam. It varies considerably in physical and chemical characteristics depending on both its source and the nature of the preparation process

The main air pollutant from storage, transportation and handling of raw coal and washed coal is fugitive dust. The amount of dust generated and its impact varies widely and depends on meteorology, topography and characteristics of coal

The water pollutants directly associated with the washing of coal are primarily dissolved and suspended solids. The dissolved solids are mostly inorganic in nature and compounds leached from the ash fraction during the washing process.

Another environmental consideration associated with coal storage is coal pile leachate resulting in contaminating surface and groundwater. Coal pile leachate is generally similar to acid mine drainage. The quantity of coal pile leachate is highly variable depending upon the coal residence time, the topography and drainage area of the coal pile site, the configuration and volume of the stockpile, precipitation and temperature

5.1 Land Environment

Anticipated Impact

- Impact on topography, water drainage pattern, land use with respect to agriculture, forestry, human habitation and wetlands
- Impact due to change in land use from non- industrial purpose to industrial purpose

- Impact due to incompatible land development with the surrounding land use (present and future uses)
- Impact on surface streams in the project area
- Impact on nature and quality of soil
- Impact due to project development on the surrounding areas
- Impact in the surrounding areas due to transportation of raw materials and finished products
- Impact due to laying of slurry pipelines, if any

Mitigation Measures

Land acquisition should be carefully done and should be acquired in acceptable transparent manner as may be directed/ notified by the concerned authorities and to the extent possible attempt should be made to minimize impact on affected communities/ villages

- Selection of site duly meeting the land use pattern and compatible with the already developed/developing activities in the surrounding environment
- Prevention/ minimize of adverse impact on drainage pattern of the area
- Measures to prevent run-off/ discharge from the project area contaminating surroundings
- Integration with the local land use for achieving compatibility with future developments
- Development of sensitive receptors in the areas/ surrounding project areas need careful consideration
- Development of green belt with suitable plant varieties as per CPCB guidelines
- Strengthening of approach roads and parking facilities to mitigate the traffic congestion
- Possibility of utilizing alternative building materials such as fly ash and overburden rocks

5.2 Water Environment

Anticipated impact

- Quantity and characteristics of industrial and domestic effluent and their impact on the environment
- Impact on ground and surface water due to leachate, run-off from stockpiles and washery rejects
- Impact on water bodies due to siltation from coal washery dumps caused by coal fines
- Impact on surface water bodies due to the discharge of effluent during the heavy rainfall and during periodic cleaning of the system, if any
- Impact on ground water and surface water availability due to the project usage

Mitigation Measures

- Provision of operation with zero effluent discharge should be made. Effluent Treatment Flow chart along with design parameters should be furnished. Assessment for requirement of stand by pumps/motors should be made. If, in case, due to some genuine problems like periodic cleaning of the system, heavy rainfall etc., it become necessary to discharge the

effluent to sewer/ land /stream, the effluent should conform to the standards at the final outlet of the coal washery: pH - 5.5-9.0, Total suspended solids - 100 mg/l, Oil & Grease - 10 mg/l, B.O.D (3 days 27 °C) - 30 mg/l, COD - 250 mg/l and Phenolics - 1.0 mg/l. The efficiency of the settling pond and wastewater treatment system should achieve minimum 90 percent efficiency. Design parameters of proposed ETP should be furnished

- The settling pond should be constructed with suitable impervious lining to prevent percolation into ground water, if required. Settling pond over flow should be recycled fully
- Garland drain(s) around the stockpiles and other process areas to collect and carry the contaminated water to treatment/settling pond should be provided.
- Properly designed system to collect and divert the storm water should be provided
- Provision of Sewage treatment plant to treat domestic sewage from the plant and colony
- In case of proposal for tapping of treated industrial effluents from nearby thermal plant/ mine, adequate provisions for storage and their use should be planned
- Explore possibility to cover the stockpiles
- Design of catch drains and garland drains around the plant and storage yards to cater the maximum run off from the catchment
- Conservation of water by adopting rain water harvest system (depending upon the site suitability)
- Establish management practices to achieve water consumption norms, not to exceed 1.5 cu.m per ton of coal processed. Standard automatic measurement practices should be adopted. Flow diagram showing the details of reuse/recycle and location(s) of water meters to demonstrate the zero discharge operation should be furnished

5.3 Air Environment

Anticipated Impact

The source of air pollution from the coal washery includes from run-of-mine, transportation, loading and unloading from trucks, handling, grinding, sizing, screening, grinding and intermediate process operations, drying and storage etc.

- All relevant aspects covering material transportation, material handling at site, processing, having significant adverse effect on air environment should be identified
- Total pollution load generation with/without mitigation measures should be estimated.
- Assessment of changes in AAQ parameters by suitable modeling techniques. Anticipated impact during construction stage, start-up stage and operational stage should be discussed
- The impact on the immediate surrounding up to 1 km should be addressed specifically
- Prediction of impact due to sanctioned/ on going projects in the surrounding area on the proposed project and on the ambient environment should be discussed

Mitigation Measures

- Provision of control systems to achieve the fugitive emission standards of " the difference in the value of suspended particulate matter, delta (?), measured between 25 and 30 meter from the enclosure of coal crushing plant in the downward and leeward wind direction shall not exceed 150 microgram per cubic meter
- The crushers/pulverizers of the coal washeries shall be provided with enclosures fitted with suitable air pollution control measures and finally emitted through a stack of minimum height of 30m. Conforming particulate matter emission standard of 150mg/Nm^3 or provide with adequate waster sprinkling arrangements. Piping layout diagram showing dust suppression system and provision of water meters to demonstrate the operation of dust suppression system should be furnished
- Water or water mixed chemical spray arrangements should be provided at all strategic coal transfer points. Enclosures, for conveyors, transfer points etc may be considered. All the transfer points should be listed and mitigation measures should be planned. Details should be given as in **Table 5.1.**
- Area, in and around the washery is to be made pucca either asphalted or concreted
- Transportation of coal by closed trucks or tarpaulin covered should be provided. Smoke emission from heavy duty vehicles operating in the coal washeries area should conform to the prescribed standards. Necessary provision should be made in tender documents of transport contracts for compliance
- Development of green belt along the boundary of the project area and around storage areas

5.4 Noise Environment

Anticipated Impact

During the construction phase of the site, the following source of noise pollution is expected:

- Construction equipment

During operational phase, the following sources of noise pollution is expected:

- Due to operation of the machinery and /or DG sets
- Due to noise generated by large trucks for transportation of materials by, crushing, grinding, screening and conveying machinery etc

Mitigation Measures

- Environmental specifications for equipment purchase to meet the noise standards
- Regular preventive maintenance of mechanical equipments to minimize noise generation at source
- Operational / work zone – not to exceed 85 db (A) Leq for 8 hours exposure
- Use of silencer for equipments such as diesel sets and air displacement equipments

- Select machinery with specification to meet ambient noise standards as notified in G.S.R 1063 (E) dated 26.12.1989 by MoEF, GoI
- Provision of mandatory acoustic enclosure (s)/acoustic treatment of room (s) for stationary DG sets (5KVA and above). The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss for meeting the ambient noise standards, whichever is on the higher side. The DG set should also be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A)
- Enclosing the process operations with rubber sheets / acoustic arrangements where more noise is likely to be generated including windows, leaving adequate ventilation for the work.

5.5 Biological Environment

Anticipated Impact

- Loss of forest resources, economically important plants including medicinal plants and threat to rare, endemic and endangered species
- Impact on terrestrial and aquatic flora and fauna
- Impact on wildlife including avi-fauna
- Impact on wildlife habitat, migratory corridors
- Impact on flora and fauna due to air emissions, noise and vibration, illumination, vehicular movement, waste water discharges, changes in land use, township etc

Mitigation Measures

- Identification of sensitive areas in the early planning stage around the site so that alternative site can be examined
- Mitigation measures to compensate for the loss of forest cover through afforestration
- Conservation of rare plants of economic importance including medicinal plants and wild life species
- Green belt development

5.6 Socio-economic Environment

Anticipated impact

- Positive and negative impact on present status of livelihood in the area
- Impact on heritage/historical sites in the study area
- Fuel savings in transportation of washed coal in place of raw coal to the power plants
- Reduction in the generation of fly ash quantity /reduced land requirement for fly ash disposal facilities, at the user point by using washed coal in place of coal
- Impact on the cropping pattern and crop productivity

- Impact on community resources such as grazing land
- Displacement of human settlement from project area
- Revenue contribution to government/local bodies and local area development activities

Mitigation Measures

- Rehabilitation and Resettlement plan for Project Affected Families (PAFs) and Project Displaced Families (PDFs)
- Budgetary provision for R&R
- Agency responsible for implementation of R&R
- Training to locals for employment in the project
- Employment opportunity and access to other amenities such as education, health care facilities for local people
- Socio-economic survey conducted and the analysis to identify areas of corporate contribution to improve quality of life
- Project specific CSR initiatives, if any planned

5.7 Solid Waste Management

Anticipated Impact

- Middlings, coal fines, slurries and washery reject – quantification and impact during handling, utilization and disposal should be addressed
- Impact on surrounding agricultural lands should be assessed
- The impact due to cleaning of settling pond and disposal of settled solids of the settling pond should be addressed

Mitigation Measures

- The proponent shall prepare detailed action plan for collection of rejects from coal washery, transit storage and handling practices and end disposal. The most significant issue in operational phase of the coal washery is safe handling and disposal of washery rejects.
- Suitable collection facilities for safe collection of solid waste pneumatic cleaning, dewatered refuses and from settling tanks for washing, thickeners, clariflocculator, filter press, silt from settling ponds etc should be planned.
- Provision of suitable wind breaking walls to be examined along the storage yards to minimize the generation of fugitive dust emission
- Plan for use of washery rejects and middlings for either in-house power generation or linkages to a power generator unit, and the details should be furnished.

ENVIRONMENTAL MONITORING PROGRAMME

6.0 General

This chapter should cover the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency preparedness plans and budget). It should also include:

- Summary matrix of environmental monitoring covering location of monitoring stations, frequency of sampling, method of sampling analysis and data interpretation - during construction and operational stages
- Requirement / establishment of monitoring facilities
- Frequency of air and water quality monitoring, representative locations, parameters etc.
- Stack monitoring provisions as per CPCB norms
- Performance evaluation of pollution control systems
- Preventive maintenance and special precautions during flood season or program of cleaning settling tanks
- Compilation and trend analysis of the monitored data, compare with baseline data, scope for investigation for any changes and recording the events, compliance to regulatory norms
- Plantation monitoring programme
- The details such as source of raw coal, type of coal, ash percentage in the raw coal, quantity of washed coal, end user of the washed coal, percentage of ash in the washed coal, stock details of raw and washed coal at site, quantity of washery rejects generated, disposed and stock available at the site should be kept on the company's web as given in **Table 6.1.** This data should be uploaded on 1st June and 1st December of each calendar year and should be submitted to the regulatory authority.

It shall also cover different statutory returns / compliance reports to be submitted such as:

- Submission of half yearly compliance report in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year
- Submission of environmental statement for the financial year ending 31st March to the concerned state pollution control board on or before 30th September every year
- Submission of annual returns in Form 4 as per Hazardous Waste (Management, Handling and Transboundary movement) Rules, 2008 on or before 30th June
- Format for maintaining records of hazardous waste in Form 3 as per Hazardous Waste (Management, Handling and Transboundary movement) Rules, 2008
- Submission of Water Cess returns in Form 1 as per Rule 4 (1) of Water (Prevention & Control of Pollution) Cess Rules 1978 on or before the 5th of every calendar month

7

ADDITIONAL STUDIES

7.0 General

TOR to be adopted for coal washery as commonly applicable is prepared and attached to this manual as **Annexure 1.** It may however, be necessary to consider specific issues as applicable to individual projects and in specific areas based on site-specific conditions. The EIA report and EMP should therefore address such issues also

7.1 Items Identified by the Proponent

The proponent may be able to identify issues beyond those included in the common TOR as may be specifically considered by him important from environmental point of view for the proposed project or site selected. In such cases the proponent shall include such issues as additional studies under TOR and pursue them in the EIA study after the regulatory authority approves TOR.

7.2 Items Identified by the Regulatory Authority

During the scoping process, the regulatory authority may direct specific issues, beyond those included in the TOR proposed by the proponent, as may be specifically considered important from environmental point of view. In such cases the proponent should pursue those issues as additional studies in the EIA report after the regulatory authority approves TOR.

7.3 Items Identified by the Public and Other Stakeholders

After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during the process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal. The applicant may alternatively submit a supplementary report to draft EIA and EMP addressing all the concerns expressed during the public consultation. A statement of the issues raised by the public and the comments of the applicant shall also be prepared in the local language and in English and annexed to the proceedings.

7.4 Employee Education

Employees should be informed of the need to take precautions and use all protective measures to control fugitive emissions in working environment. They should also be advised consequences of ignoring these precautions. Employee should be trained in coal handling, and in spill management. Written policies, procedures and measures should be disseminated throughout the different departments of the plant and workers should be trained with regard to their implementation. The employee should be educated about the safety features incorporated by written literature with pictorial and color-coded signs.

7.5 Risk assessment and Disaster Management Plan

All aspects of emergencies like fire due to storage of coal, washed coal & breaching of settling pond and potential risks with magnitude should be elaborately furnished in the report. Contingency plan with objectives, role and responsibility to handle the emergency should be discussed.

7.6 Natural Resources Conservation and Optimization

Plan of action for conservation of natural resources such as utilization of refuses and other waste generation stream from coal washery plants should be examined to reuse, such as utilization of washery rejects in FBC / CFBC power plants and to recycle the waste water after treatment in closed circuit. Zero discharge principle should be implemented for conservation of water resources. Utilization of fly ash during the construction of the project should be explored.

7.7 Rehabilitation & Resettlement Plan

R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the disposal people, civil and housing amenities being offered etc, and the schedule of the implementation of the project specific R&R plan. Details of provisions (capital & recurring) for the project specific R&R plan

8

PROJECT BENEFITS

8.0 General

This chapter should include the improvements in physical infrastructure and social infrastructure

- Improvements in the social infrastructure like roads, educational institutions, hospitals, township etc
- Improvements in the physical infrastructure by way addition of project infrastructure, ancillary industries that may come up on account of the project
- Employment potential – skilled, semiskilled and unskilled labor both during construction and operational phases of the project with specific attention to employment potential of local population as well as necessity for imparting any specialized skills to them to be eligible for such employment in the project on a long term basis i.e., during operational and maintenance stages of the project
- Other tangible benefits like improved standards of living, health, education etc.,
- Energy conservation in the transportation sector and lower transportation cost
- Reduction in the amount of solid waste that has to be take care at the power plant

9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.0 General

If recommended by the Expert Appraisal Committee at the scoping stage this chapter shall include the environmental cost benefit analysis of the project

9

ENVIRONMENTAL MANAGEMENT PLAN

10.0 General

The objective of Environmental Management Plan is to…

- Monitor the effectiveness of mitigation measures
- Ensure the efficient operation of mitigation measures is implemented
- Establish systems and procedures for this purpose and
- Take any necessary action when unforeseen impact occur

10.1 Components of EMP

- Summary of potential impact and proposed mitigation measures
- Allocation of resources and responsibilities for implementation
- Administrative and technical setup for management of environment
- Institutional arrangements proposed with other organizations/Govt. authorities for effective implementation of environmental measures proposed in the EIA
- Safe guards/mechanism to continue the assumptions/field conditions made in the EIA
- Environmental specifications for contractors should cover the required safeguards during the design and construction stage
- EMP to comply the standards and code of practices under E (P) Act 1986
- EMP for washery rejects usage
- Approach towards voluntary compliance mechanism such as ISO 14001

10.3 Environmental Management Cell

Proposal to set up a separate environmental cell to oversee implementation of the EMP and evaluate the results of monitoring should be furnished. Establishing a multidisciplinary internal environmental audit team for compliance review should be planned.

11

SUMMARY AND CONCLUSIONS

11.0 General

Summary EIA shall be a summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should necessarily cover in brief the following chapters of the full EIA report.

- Introduction
- Project description
- Description of the environment
- Anticipated environmental impact & mitigation measures
- Additional studies
- Project benefits
- Important Aspects of the Environmental Management Plan and
- Important Aspects of the Environmental Monitoring Programme
- Disclosure of consultants engaged

DISCLOSURE OF CONSULTANTS ENGAGED

12.0 General

The EIA consultants shall have accreditation with Quality Control of India (QCI)/National Accreditation Board of Education and Training (NABET) as per office memorandum dated 2nd December 2009 of MoEF. This chapter shall include the names of the consultants engaged with their brief resume and nature of consultancy rendered. The consultants shall include the copy of the accreditation certificate and data provided by the other organizations/ laboratories including their status of approvals etc.

Bibliography

- EIA Notification S.O 1533 dated 14th September 2006 and as amended 1st December 2009 (www.envfor.nic.in)
- Pollution Control Acts, Rules and Notifications issued thereunder (Pollution Control Law Series), CPCB (www.cpcb.nic.in)
- Proceedings for the workshop on Environmental Impact Assessment studies for developmental projects, CPCB
- Guidelines for developing green belts, Programme Objective Series, PROBES/75/1999-2000, CPCB
- Comprehensive Environmental Assessment of Industrial Clusters, Ecological Impact Assessment Series, EIAS/5/2009-10, CPCB
- Guidelines for Ambient Air Quality Monitoring, National Ambient Air Quality Series NAAQMS/25/2003-04, CPCB
- Assessment of Impact of Air Environment: Guidelines for conducting air quality modeling, Programme objective series: PROBES/70/1997-98, CPCB
- Environmental Impact Assessment Manual, 2001, MoEF
- Fly Ash Notification G.S.R 560 (E) & G.S.R 378 (E) dated 19th September 1997 and 30th June 1998 and as amended– MoEF
- Clean Coal Initiatives, June 2000, Parivesh, CPCB
- Introduction to PCC, D. Khoury 1981
- Alternative Coal ash transportation and disposal systems for thermal power plants-Programme objective series, PROBES/94/2002-03, CPCB
- Evaluation of Clean Coal technologies, Programme Objective Series, PROBES/88/2001-2002, CPCB
- Operating guidelines for processing of consent to establish application for establishment of coal washeries in the State of Orissa, Orissa Pollution Control Board
- Central Mine Planning & Design Institute Limited (www.**cmpdi**.co.in)
- Annual Report (2007-08), Ministry of Coal (http://coal.nic.in/)
- Coal India Limited (http://www.coalindia.in/)
- Environmental Assessment of Coal Cleaning Processes: Technology Overview, EPA Report 600/7-79-073e, September 1979
- Wills Mineral Processing Technology, 7th Edition, Barry A. Wiils, Elsevier

TABLES

Table No. 2.1 Equipments and Their Estimated Capacity

S. No	Equipment Name	Capacity	Purpose

Table No. 2.2 Characteristics of Raw Coal, Washed Coal and Washery Rejects

S. No	Parameter	Raw Coal	Washed Coal	Coal rejects
1.	Quantity (MTPA)			
2.	Grade			
3.	Percentage of ash			
4.	Percentage of fixed carbon			
5.	Calorific value (K. cal/kg)			
6.	Sulphur			
7.	Mercury			
8.	Arsenic			
9.	Lead			
10.	Cadmium			

Table No. 4.1 Demographic Profile

Particulars	With in the project area	With in 1 km from the project boundary
Population		
No. of villages		
Number of households village-wise		

Table No. 4.2 Description of Soil Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.3 Analysis of Soil Samples

Station No	Parameters	Unit	Result			Standards
			SS1	SS2	SS3	

Table No. 4.4 Description of Ground Water Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.5 Description of Surface Water Sampling Locations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.6 Analysis of Ground Water

Station No	Parameters	Unit	Result			Standards
			GW1	GW2	GW3	

Table No. 4.7 Analysis of Surface Water

Station No	Parameters	Unit	Result			Standards
			SW1	SW2	SW3	

Table No. 4.8 Description of Ambient Air Quality Monitoring Stations

Station	Location	Distance & Direction from project area	Project area/ study area	Environmental setting

Table No. 4.9 Ambient Air Quality - Monitoring Results

Parameter	Particulate Matter ($PM_{2.5}$)**				Particulate Matter (PM_{10})**				Nox**				SO_2**				CO**			
Monitoring Station & Category*	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile	No. of samples	Range	Mean	98 percentile

*Industrial, residential, rural and other areas/ ecologically sensitive area

** $\mu g/m^3$

Table No. 4.10 Description of Noise Monitoring Stations

S. No	Locations	Class*	Average Day noise level (dBA)	Average Night noise level (dBA)	Day time (6.00 A.M. to 10.00 P.M)	Day time (10.00 P.M. to to 6.00 A.M)	Remarks
					Standard (L_{eq} in dBA)	Standard (L_{eq} in dBA)	

*Industrial area/ Commercial area /Residential area /Silence zone

Table No. 5.1 Details of Fugitive Emission Sources and Mitigation Measures

S. No	Identified source of fugitive emission	Planned mitigation measures

Table No. 6.1 Specific Information to be Kept in Company's web

a. Name & Location of the coal washery :

b. Installed capacity :

c. Half yearly report for the period :

d. Raw material procurement and production details :

S. No	Particulars	Quantity (Tons)	Details
1.	Raw coal procured		Source of procurement of raw coal should be furnished
2.	Type of coal received		
3.	Percentage of ash in raw coal		
4.	Quantity of washed coal produced		
5.	Quantity of washed coal dispatched		Details of the end users should be furnished
6.	Percentage of ash in the washed coal		
7.	Quantity of washery rejects generated		
8.	Percentage of the ash in washery rejects		
9.	Quantity of washery reject utilized for power generation on site and power generated on monthly basis		
10.	Quantity of washery reject sent to outside parties for its utilization		Details of the end user along with purpose of usage should be furnished
11.	Quantity of coal stock available at the site at the end of the reporting period		
12.	Quantity of washed coal stock available at the site at the end of the reporting period		
13.	Quantity of washery rejects stock available at the site at the end of the reporting period		

Note: This specific data should be uploaded on 1st June and 1st December of each calendar year on the company's web and also to submit to the regulatory authority by the authorized signatory.

ANNEXURES

Annexure 1

Terms of Reference (TOR) for Coal Washeries

Objective

Terms of Reference (TOR) for preparation of Environmental Impact assessment (EIA) and Environmental Management Plan for coal washeries as per the EIA notification, 2006 has been devised to improve the quality of the reports and facilitate the decision making transparent and easy. TOR will help the project proponent and consultant to prepare report with relevant project specific data and easily interpretable information. TOR for coal washeries is expected to cover all environment related features.

General information

Development of coal washeries can make a significant contribution to the economic development of the country. At the same time it may also create adverse impact on the surrounding environment during the construction and operational stages. To minimize the adverse effects that may be created by the project, techniques of Environmental Impact Assessment (EIA) become necessary

Coal washeries with ^{3} 1 million ton per annum throughput of coal are classified as category A, projects with < 1 million ton per annum throughput of coal are classified as category B, subject to the applicability of general conditions (GC)* as stipulated in the EIA notification, 2006. *If located with in mining area the proposal shall be appraised together with the mining proposal.*

*** General Conditions (GC)Project or Activity**	**Category with Threshold Limit**	
Coal Washeries	Category - A	Category - B
	≥ 1 million ton/annum throughput of coal	< 1million ton/annum throughput of coal
Authority for approval of TOR and issue/ reject the Environmental Clearance	MoEF, GoI on the recommendations of Expert Appraisal Committee (EAC)	State / Union Territory Environmental Impact Assessment Authority (SEIAA) on the recommendations of State/ Union Territory Level Expert Appraisal Committee (SEAC)

General Condition shall apply

i. "Any project or activity specified in Category 'B' will be treated as Category 'A' if located in whole or in part within 10 km from the boundary of: i. Protected areas notified under the Wildlife (Protection) Act, 1972; (ii) Critically polluted areas as identified by the Central Pollution Control Board from time to time; (iii) Eco-sensitive areas as notified under section 3 of the Environment (Protection) Act, 1986, such as, Mahabaleswar, Panchgani, Matheran, Pachmarhi, Dahanu, Doon Valley and (iv) inter-state boundaries and international boundaries

Provided that the requirement regarding distance of 10km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective states or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometers of the areas mentioned at item (i), (ii) and (iii) above

ii. If the coal washery is located within mining area the proposal shall be appraised together with the mining proposal.

The EIA – EMP report should be based on the highest achievable peak rated capacity of the project. The report should be based on generic structure given in the Appendix III to the EIA Notification 2006, for the project. The report should incorporate the page numbers of various chapters, sections and sub-sections, tables, appendices, drawings and figures etc., with titles shall be clearly indicated under the heading contents.

1.0 Introduction

This chapter should cover:

Purpose of the project, brief description of the project, project name, nature, size, its importance to the region and the country

- Profile of the project proponent, name and contact address with e-mail, organizational chart, project consultants etc., should be mentioned clearly
- Land description- plot/ survey / khasra nos, village, tehsil, district, state and extent of the land must be mentioned clearly
- Whether the project attract the provisions of General Conditions of EIA Notification 2006. If so, applicability should be discussed
- The project site to confirm to the CRZ guidelines or modifications or stipulations made by the central/state government, as applicable
- The proponent should confirm that the project meets the central/state/local environmental regulations and standards applicable for coal washeries
- Any litigation(s) pending against the proposed project and/or any directions or orders passed by any court of law/any statutory authority against the project is to be detailed out

- In case of expansion/ modernization of the project, the environmental compliance status for the existing project should be explained

2.0 Project Description

This chapter should cover the following:

- Broader details of the basic activities, location of coal washery
- Type of the project – new/expansion/modernization
- Details whether stand-alone coal washery, if so details of run-of-mine (rom) coal supply or captive coal washery on the mine site along with the mining/power production should be furnished. In case of integrated coal washing, cumulative environmental impact should be considered
- General description of unit operations such as crushing, screening, sorting coal washing with their capacities and flow chart
- The technology used for coal washing, description of technology and justification of chosen technology should be given. The mode of transport of incoming unwashed coal and the outgoing washed coal by rail, road, water or combination of these should be furnished. The operations should give various resources utilized, their sequencing and planned reuse/ utilization/disposal. Impact of choice of the selected use of technology and impact on air quality and waste generation should be furnished.
- Whether coal is transported through slurry pipeline? If yes, whether the slurry pipeline is passing through national parks/ sanctuaries/coral reefs/ecologically sensitive areas? If yes, status of obtaining environmental clearance for the slurry pipeline in accordance with the EIA Notification 2006 should be furnished. Capacity of the slurry pipeline, route of the slurry pipeline etc, should be furnished.
- Raw material requirement and capacity of the product output for daily and yearly average and peak values, route of travel and method of transportation of coal from mines to washery and the product to the end user. Storage facilities and truck parking/rail/road/waterways requirements should be furnished. Land requirement for reject storage should be specifically mentioned. Description of technology for washery rejects should be provided
- Water requirement for processing, domestic, dust suppression and for green belt and its reliability should be furnished
- Details of sample test analysis of the following should be furnished
- Characteristics of coal to be washed – this includes grade of coal and other Characteristics – percentage of ash, percentage of fixed carbon, calorific value, sulphur and heavy metals including levels of Hg, As, Pb, and Cd
- Characteristics of washed coal for the above parameters
- Characteristics of coal waste rejects for the above parameters and quantum of rejects
- Copies of MoU/Agreement with linkages (for stand alone washery) for the capacity for which EC has been sought should be furnished

- Manpower requirement at different stages of the project and time frame
- Estimated cost: capital/operational cost. State specifically, the cost for environmental issues (capital and operational cost)

Essential Topo Sheets/Maps to be Provided with TOR Application

- A map specifying locations of the state, districts and project location
- A map covering aerial distance of 15 km from the proposed project location delineating environmental sensitive areas as specified in Form I of EIA Notification dated 14th Sep 06. In the same map the details of environmental sensitive areas present within a radial distance of 1 km from the project boundary should be specifically shown
- Land use and land cover map of the study area (project area and 5 km area from project boundary) in 1:25,000 scales based on recent satellite imagery of the study area delineating the vegetation (agricultural land, irrigated, un-irrigated, un-cultivable land as per the revenue records, forest area (s)- as per the records) grazing and waste land is to be shown
- Layout plan to a scale 1: 5000 clearly showing latitude and longitude of the boundaries covering administrative and operational buildings, storage yards, township, green belt etc., should be submitted
- Contour map of the project area and 2 km from the project boundary should be clearly indicated. The drainage map of the study area (1:25,000) indicating the hydro geological features (rivers, canals, streams, nallahs, water tanks etc) for the project area and 2kms from the project boundary should be furnished. In case of any diversion of nallah/stream (temporary or permanent), it should be clearly shown on the map

3.0 Analysis of Alternatives (Technology & Sites)

In case, the scoping exercise results in need for alternatives this chapter shall include:

- Description of various alternatives like locations or layouts or technologies
- Summary of adverse impact of each alternative
- Selection of alternative

4.0 Description of the Environment/ Baseline Environmental Status

4.1 Study Area

As a primary requirement of EIA process, the proponent should collect primary baseline data in the project area as well as the area falling within 5 km from the proposed project boundary and secondary data should be collected with in 15 kms aerial distance as specifically mentioned at column no 9(iii) of Form I of EIA Notification 2006. The study areas mentioned in this document shall be considered for guidance purpose only. The exact study area for different environmental attributes (water, air, noise, soil etc) is to be submitted considering the proposed project activity and location, with proper reasoning, for review and approval by the expert appraisal committee.

TOR application should contain details of secondary data; the source of secondary data, meteorological data of nearest station of IMD along with wind roses and proposed monitoring

locations should be marked on the study map. Similarly the proposed locations of monitoring stations of water, air, soil, noise etc shall be shown on the study area map. One season monitoring data excluding monsoon should be collected. Period/date of data collection should be clearly indicated.

4.2 Land Environment

- Study of land use pattern, habitation, forest cover, surface water bodies, fauna and flora, environmentally sensitive places etc. by using recent satellite imagery or through secondary data sources
- Baseline data of soil at the project site and within study area is to be included. Soil data should be generated to ascertain suitability for development of greenbelt and rainwater harvesting structures
- Road/rail/waterways connectivity and suitability for transporting the raw material and finished product should be discussed

4.3 Water Environment

- Water requirement during construction and operational stages from various activities should be furnished
- Information on surface water bodies and ground water table along with present use should be furnished. Locations of monitoring stations should be shown on a scale map. Criteria for selecting the locations for monitoring stations should be discussed
- Suggested parameters for monitoring: pH, TSS, TDS, oil & grease, BOD, COD, Total Organic Carbon, sulphates, sulphides, calcium, sodium, magnesium, phenolics, iron, zinc, copper, manganese, Hg, As, Pb, and Cd

4.4 Air Environment

The baseline data should include the following:

- Climate and meteorology (temperature, relative humidity, and rainfall). Indicate the nearest IMD meteorological station from which climatological data have been obtained.
- Wind rose (Wind directions and speeds, 24 hourly data)
- Air Quality Monitoring data for pollutants like particulate matter size less than 10µm or PM_{10} µg/m^3, particulate matter size less than 2.5µm or $PM_{2.5}$ µg/m^3, sulphur dioxide (µg/m^3), nitrogen dioxide (µg/m^3) and carbon monoxide (µg/m^3). Monitoring should cover one full season except monsoon. Frequency and methodology adopted should be as per CPCB/ MoEF guidelines/norms
- Monitoring stations should be located based on dominating wind direction, habitations and terrain features in the study area. The direction and distance of monitoring stations with respect to project area should be clearly specified. The monitoring stations should cover upwind, downwind, , human settlements and sensitive areas

4.5 Noise Environment

Noise levels at outer limits of the project boundary during daytime and nighttime and current noise levels within 1 km from the project boundary especially at habitation should to be monitored

4.6 Biological Environment

Secondary data on the existing flora and fauna in the study area generated by any university or institution under the relevant discipline (such as BSI, ZSI, WII, etc) should be included in the list of flora and fauna along with classification as per schedule given in the Wild Life Protection Act, 1972 and in the Red Data Book and a statement clearly specifying whether the study area forms a part of an ecologically sensitive area or migratory corridor of any endangered fauna.

4.7 Socio-economic Environment

The baseline study should include

- Data on demography, traditional skills, sources of livelihood within the study area
- Data relating to historically, culturally and ecologically important places
- Information on notified tribal settlements, if any
- Human settlements and health status of population in study area based on information from nearby hospitals and one time survey

4.8 Solid Waste Facilities

The details of authorized TSDF facilities available for disposal of hazardous waste generated, if required

5.0 Anticipated Environmental Impact and Mitigation Measures

This chapter should describe the likely impact of the project during its construction and operational phases, on each of the environmental parameters, methods adopted for assessing the impact, reference to existing similar situations, reference to previous studies, details of mitigation methods proposed to reduce adverse effects of the project, best environmental practices and conservation of natural resources.

5.1. Land Environment

Anticipated Impact

- Impact on the land use pattern should be assessed by standard procedures. Loss of productive soil and impact on natural drainage pattern of the area should be assessed
- Impact due to storage of coal and washery rejects on the surrounding land, crops, and habitation is to be assessed. Impact on infrastructure like road/rail network etc. should be assessed
- The immediate surroundings may have a greater impact. The existing surrounding features up to 1 km and impact on them should be specifically addressed

Mitigation Measures

Site selection on environmental considerations like nearness to mines or users of rejects, selection of suitable local plant species for green belt development along the road side, coal handling plant, office building and all along the boundary, improved road/rail/waterways network to handle the increase in traffic and truck parking arrangements, usage of alternative building materials such as fly-ash and integration with the existing local master plans, if any.

5.2 Water Environment

Anticipated Impact

- Quantity and characteristics of industry and domestic effluent and its impact on the environment should be assessed. Impact on ground water and surface water on account of leachate, runoff from stockpiles should be assessed
- Impact on the short/long time ground water and surface water availability due to the project usage should be assessed

Mitigation Measures

- Provision of operation with zero effluent discharge should be made. If in case due to some genuine problems like periodic cleaning of the system, heavy rainfall etc., it become necessary to discharge the effluent to sewer/ land /stream, the effluent should conform to the standards at the final outlet of the coal washery: P^H - 5.5-9.0, Total suspended solids - 100 mg/l, Oil & Grease - 10 mg/l, B.O.D (3 days 27 ^oC) - 30 mg/l, COD - 250 mg/l and Phenolics - 1.0 mg/l. The efficiency of the settling pond and wastewater treatment system should achieve minimum 90 %
- Establish management practices to achieve water consumption norms, not to exceed 1.5 cu.m per ton of coal processed. Standard measurement practices should be adopted
- Garland drain(s) around the stockpiles and other process areas to collect and carry the contaminated water to treatment/settling pond should be provided. Properly designed system to collect and divert the storm water should be provided

5.3 Air Environment

Anticipated Impact

- All relevant aspects covering material transportation, material handling at site, processing, having significant adverse effect on air environment should be identified
- Total pollution load generation before mitigation measures should be estimated. Impact due to accidental discharges should be addressed
- Assessment of changes in AAQ parameters by suitable modeling techniques. Anticipated impact during construction stage, start-up stage and operational stage shall be discussed
- The impact on the immediate surrounding up to 1 km shall be addressed specifically

- Prediction of impact due to sanctioned/ on going projects in the surrounding area on the proposed project and on the ambient environment should be addressed

Mitigation Measures

- Provision of control systems should meet the fugitive emission standards of " the difference in the value of suspended particulate matter, delta (?), measured between 25 and 30 meter from the enclosure of coal crushing plant in the downward and leeward wind direction shall not exceed 150 microgram per cubic meter
- The crushers/pulverizers/screen should be provided with suitable control measures to meet stack emission standard of 150 mg/nm^3, if stack is provided or provision of adequate water sprinkling arrangement
- Water or water mixed chemical spray arrangements should be provided at all strategic coal transfer points. Enclosures, as practically possible, for conveyors, transfer points etc should be provided
- Area, in and around the washery is to be made pucca either asphalted or concreted
- Transportation of coal by closed trucks or tarpaulin covered should be provided. Smoke emission from heavy duty vehicles operating in the coal washeries should confirm to the standards

5.4 Noise Environment

Anticipated Impact

Anticipated impact due to operation of machinery and DG sets during normal operation and commissioning of equipments

Mitigation Measures

- Environmental specifications for contractors and equipment purchase to meet the noise standards
- Operational / working zone – not to exceed 85 db (A) Leq for 8 hours exposure. The ambient air quality standards in respect of noise as notified under Environment (Protection) Rules, 1986 should be complied at the boundary of the project
- Noise from the DG set should be controlled by providing an acoustic enclosure or by treating the room acoustically

5.5 Biological Environment

Anticipated Impact

- Loss of forest resources, economically important plants including medicinal plants and threat to rare, endemic and endangered species
- Impact on terrestrial and aquatic flora and fauna
- Impact on wildlife including avi-fauna

- Impact on wildlife habitat, migratory corridors
- Impact on flora and fauna due to air emissions, noise and vibration, illumination, vehicular movement, waste water discharges, changes in land use, township etc

Mitigation Measures

- Identification of sensitive areas in the early planning stage around the site so that alternative site can be examined
- Mitigation measures to compensate for the loss of forest cover
- Conservation of rare plants of economic importance including medicinal plants and wild life species
- Green belt development

5.6 Socio-economic Environment

Anticipated Impact

- Positive and negative impact on present status of livelihood in the area
- Impact on heritage/historical sites in the study area
- Fuel savings in transportation of washed coal in place of coal to the power plants
- Reduction in the generation of fly ash quantity at the user point by using washed coal in place of coal
- Impact on the cropping pattern and crop productivity with in 2 km
- Impact on community resources such as grazing land
- Displacement of human settlement from project area
- Revenue contribution to government/local bodies and local area development activities

Mitigation Measures

- Rehabilitation plan for land oustees and displaced people
- Training to locals for employment in the project
- Employment opportunity and access to other amenities such as education, health care facilities for local people
- Socio-economic survey conducted and the analysis to identify areas of corporate contribution to improve quality of life

5.7 Solid Waste Management

Anticipated Impact

- Impact due to solid waste should be assessed
- Middlings, coal fines, slurries and washery reject – quantification, handling, utilization and disposal

- Impact on surrounding agricultural lands should be assessed

Mitigation Measures

Plan for use of washery rejects and middlings for either in-house power generation or linkages to a power generator unit, near by and the details should be furnished

6.0 Environmental Monitoring Program

It should include the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules.

- Summary matrix of environmental monitoring during construction and operational stages
- Planned monitoring program to evaluate the effectiveness of various mitigation measures
- Requirement of monitoring facilities
- Compilation and analysis of data, comparison with base line data and compliance to accepted norms and reporting system
- Plantation monitoring programme during post project period

7.0 Additional Studies

Specific condition	Study required
Scoping stage	Studies directed by the Expert Appraisal ommittee while deciding the TOR for the project
Public consultation	Public consultation should be conducted as per the procedure laid down in EIA Notification 2006. The issues raised by the public and response of the project proponent should be furnished in a tabular form
Risk Assessment and Disaster Management Plan	Identification of all aspects of emergencies like catching fire etc, which may have environmental risk and discuss contingency plan with objectives, role and responsibility t o handle the emergency.

8.0 Project Benefits

This chapter shall include the improvements in physical infrastructure and social infrastructure (s), if any. Employment potentials – skilled; semi-skilled and unskilled labour both during construction and operational phases of the project with specific attention to employment potential of local population. Skill development of the project related activities

9.0 Environmental Cost Benefit Analysis

If recommended by the expert appraisal committee at the scoping stage, the environmental cost benefit analysis of the project should be done

10.0 Environmental Management Plan (EMP)

- Administrative and technical set up for management of environment.
- Summary matrix of EMP and costing of EMP, during construction and operation stage
- Mechanism of self monitoring for compliance with environmental regulations
- Institutional arrangements proposed with other organizations / Govt. authorities for effective implementation of environmental measures proposed in the EIA
- Safe guards/mechanism to continue the assumptions/field conditions made in the EIA for arriving the site suitability

11.0 Summary & Conclusion (Summary EIA)

It shall be a summary of the full EIA report condensed to ten A4 size pages at the maximum. It should necessarily cover in brief the chapters of the full EIA report – introduction/project description/analysis of alternatives/description of the environment/anticipated impact and mitigation measures/ environmental monitoring programme/additional studies/project benefits/ /environment management plan/ disclosure of consultants engaged

12.0 Disclosure of Consultants Engaged

This chapter shall include the names of the consultants engaged with their brief resume and nature of consultancy rendered.

Enclosures

Feasibility report/Form I/Photos of proposed project site

Annexure 2
List of Critically Polluted Industrial Clusters/Areas Identified by CPCB

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
1	Ankleshwar (Gujarat) *CEPI-88.50* (*Ac_Wc_Lc*)	GIDC Ankleshwar and GIDC, Panoli
2	Vapi (Gujarat) *CEPI-88.09 (Ac_Wc_Lc)*	GIDC Vapi
3	Ghaziabad (Uttar Pardesh) *CEPI-87.37* (*Ac_Wc_Lc*)	**Sub-cluster A** • Mohan nagar Industrial area • Rajinder nagar Industrial area • Sahibabad Industrial area **Sub-cluster B** • Pandav nagar Industrial area • Kavi nagar Industrial area • Bulandshahar Road Industrial area • Amrit nagar • Aryanagar Industrial area **Sub-cluster C** • Merrut road Industrial area **Sub-cluster D** • Loni Industrial area • Loni Road Industrial area • Roop Nagar Industrial area **Sub-cluster E** • Hapur Road Industrial area • Dasna • Phikua **Sub-cluster F** (other scattered Industrial areas) • South side of GT road • Kavi Nagar • Tronica city • Anand Nagar • Jindal Nagar • Prakash Nagar • Rural Industrial estate
4	Chandrapur (Maharashtra) *CEPI-83.88* (*Ac_Wc_Lc*)	Chandrapur (MIDC Chandrapur, Tadali, Ghuggus, Ballapur)
5	Korba (Chhatisgarh) *CEPI-83.00* (*Ac_Ws_Lc*)	a) Industrial areas and their townships of NTPC, BALCO, CSEB (East) & CSEB (West) b) Korba town
6	Bhiwadi (Rajassthan) *CEPI-82.91* (*Ac_Wc_Ls*)	a) RIICO Industrial areas Phase I to IV b) Bhiwadi town c) Other surrounding industrial areas: Chopanki, Rampura Mundana, Khuskhera Phase I to III.
7	Angul Talcher (Orissa) *CEPI-82.09* (*Ac_Wc_Lc*)	a) MCL Coal Mining Area, Angul – Talcher region b) Industrial Area (60 km x 45 km) Following blocks of Angul District: - Kohina block - Talcher block - Angul block - Chhendipada block - Banarpal block And Odapada block of Dhenkamal District
8	Vellore (North Arcot) (Tamilnadu) *CEPI-81.79 (Ac_Wc_Lc)*	Ranipet, SIPCOST Industrial Complex
9	Singurauli (Uttar Pradesh) *CEPI-81.73* (*Ac_Wc_Ls*)	Sonebhadra (UP) • Dala-Tola • Obra • Renukoot • Anpara • Renusagar • Kakri • Dudhichuwa • Bina • Khadia • Shakti Nagar • Rihand Nagar • Bijpur Sigrauli (Madhya Pradesh) Vindhyachal Nagar and Jayant, Nigahi, Dudhichua, Amlohri & Jhingurdah townships

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
10	Ludhiana (Punjab) *CEPI-81.66* (*Ac_Wc_Ls*)	Ludhiana Muncipal limits covering industrial clusters: • Focal Point Along with NH_I_Tota Eight Phase • Industrial Area-B-From Sherpur chowk to Gill road & Gill road to Miller Kotla road (left Side of Road) • Mixed Industrail Area – Right side of Gill road • Industrial area – C (near Jugiana Village) • Industrial Area A & Extension: Area between old GT Road and Ludhiana by pass road • Industrial Estate : Near Dholwal chowk • Mixes Industrial Area (MIA) Miller gunj • MIA-By pass road • Bahdur Industrial Area • Tejpur industrial Complex.
11	Nazafgarh drain basin, Delhi *CEPI-79.54* (*As_Wc_Lc*)	Industrial areas : Anand Parvat, Naraina, Okhla and Wazirpur
12	NOIDA (Uttar Pradesh) *CEPI-78.90* (*Ac_Wc_Lc*)	Territorial jurisdiction of : • Noida Phase - 1 • Noida Phase - 2 • Noida Phase – 3 • Surajpur Industrial Area • Greater Noida Industsrial Area • Village-Chhaparaula
13	Dhanbad (Jharkhand) *CEPI-78.63* (*Ac_Ws_Lc*)	Four blocks of Dhanbad district: • Sadar (Dhanbad Municipality) • Jharia (Jharia Municipality, Sindri Industrial Area) • Govindpur (Govindpur Industrial Estate) • Nirsa
14	Dombivalli (Maharashtra) *CEPI-78.41*(*Ac_Wc_Ls*)	MIDC Phase-I, Phase-II
15	Kanpur (UttarPradesh) *CEPI-78.09* (*Ac_Wc_Ls*)	• Industrial areas: • Dada Nagar • Panki • Fazalganj • Vijay Nagar • Jajmau
16	Cuddalore (Tamilnadu) *CEPI-77.45* (*As_Wc_Lc*)	SIPCOT Industrial Complex, Phase I & II
17	Aurangabad (Maharashtra) *CEPI-77.44* (*Ac_Wc_Ls*)	MIDC Chikhalthana, midc Waluj, MIDC Shendra, and Paithan Road industrial area
18	Faridabad (Haryana) *CEPI-77.07* (*Ac_Ws_Lc*)	• Sector 27 - A, B, C, D • DLF Phase – 1, Sector 31, 32 • DLF Phase – 2, Sector 35 • Sector 4, 6, 24, 25, 27, 31, 59 • Industrial area Hatin • Industrial Model town Ship
19	Agra (Uttar Pradesh) *CEPI-76.48* (*As_Wc_Ls*)	Nunihai Industraial Estate, Rambag Nagar, UPSIDC Industrial Area, and Runukata Industrial Area
20	Manali (Tamilnadu) *CEPI-76.32* (*Ac_Ws_Ls*)	Manali Industrial Area
21 22	Haldia (West Bengal) *CEPI-75.43* (*As_Wc_Ls*) Ahmedabad (Gujarat) *CEPI-75.28* (*Ac_Ws_Ls*)	5 km wide Strip (17.4 x 5.0 km) of industrial area on the southern side of the confluence point of Rivers Hugli and Rupnarayan, covering Haldia Municipa Area & Sutahata Block-I and II • GIDC Odhav • GIDC Naroda
23	Jodhpur (Rajasthan) *CEPI-75.19 (As_Wc_Ls*)	• Industrial areas including Basni Areas (Phase-I & II), Industrial Estate, Light & Heavy industrial areas, industrial areas behind new Power House, Mandore, Bornada, Sangariya and Village Tanwda & Salawas. • Jodhpur city
24	Greater Coach (Kerala) *CEPI-75.08* (*As_Wc_Ls*)	Eloor-Edayar Industrail Belt, Ambala Mogal Industrial areas
25	Mandi Gobind Garh (Punjab) *CEPI-75.08* (*Ac_Ws_Lc*)	Mandi Govindgarh municipal limit and Khanna area
26	Howrah (West Bengal) *CEPI-74.84* (*As_Ws_Lc*)	a) Liluah-Bamangachhi Region, Howrah b) Jalah Industrial Complex-1, Howrah
27	Vatva (Gujarat) *CEPI-74.77* (*Ac_Wc_Ls*)	GIDC Vatva, Narol Industrial Area (Villages Piplaj, Shahwadi, Narol)

S. No.	Critically Polluted Industrial Area and CEPI	Industrial Clusters/Potential Impact Zones
28	Ib Valley (Orissa) *CEPI-74.00* (*Ac_Ws_Ls*)	Ib Valley of Jharsuguda (Industrial and Mining area)
29	Varansi-Mirzapur (Uttar Pradesh) *CEPI-73.79* (*As_Wc_Ls*)	• Industrial Estate, Mirzapur • Chunar • Industrial Estate, Chandpur Varanasi • UPSIC, Industrial Estate, Phoolpur • Industrial Area, Ramnagar, Chandaull
30	Navi Mumbai (Maharashtra) *CEPI-73.77* (*Ac_Ws_Ls*)	TTC Industrial Area, MIDC, Navi Mumbai (including Blocks-D, C, EL, A, R, General, Kalva)
31	Pali (Rajasthan) *CEPI-73.73* (*As_Wc_Ls*)	a) Existing industrial areas: Mandia Road, Puniyata Road, Sumerpur b) Pali town
32	Mangalore (Karnataka) *CEPI-73.68* (*Ac_Ws_Ls*)	Baikampady Industrial Area
33	Jharsuguda (Orissa) *CEPI-73.34* (*Ac_Ws_Ls*)	Ib Valley of Jharsuguda (Industrial and Mining area)
34	Coimbatore (Tamil Nadu) *CEPI-72.38* (*Ac_Ws_Ln*)	SIDCO, Kurichi Industrial Clusters
35	Bhadravati (Karnataka) *CEPI-72.33* (*Ac_Ws_Ln*)	KSSIDC Industrial Area Mysore Paper Mill & VISL Township Complex
36	Tarapur (Maharashtra) *CEPI-72.01* (*Ac_Ws_Ls*)	MIDC Tarapur
37	Panipat (Haryana) *CEPI-71.91* (*As_Ws_sc*)	Panipat Municipal limit and its industrial clusters
38	Indore (Madhya Pradesh) *CEPI-71.26* (*As_Ws_Ls*)	Following 09 industrial areas: • Sanwer Road • Shivaji Nagar • Pologround • Laxmibai Nagar • Scheme No. 71 • Naviakha, • Pipliya • Palda • Rau • Indore city • Other surrounding industrial areas : Manglia, Rajoda, Barlal, Asrawad, Tejpur Gadwadi
39	Bhavnagar (Gujarat) *CEPI-70.99* (*As_Ws_Ls*)	GIDC Chitra, Bhavnagar
40	Vishakhapatnam (Andhra Pradesh) *CEPI-70.82* (*As_Ws_Ls*)	Bowl area (the area between Yarada hill range in the south to Simhachalam hill range in the north and sea on the east and the present NH-5 in the West direcdtion)
41	Junagarh (Gujarat) *CEPI-70.82* (*As_Ws_Ls*)	Industrial Areas: • Sabalpur • Jay Bhavani • Jay Bhuvneshwari • GIDC Junagarh (I&II)
42	Asansole (West Bengal) *CEPI-70.20* (*As_Ws_Ls*)	Burnpur area surrounding IISCO
43	Patancheru- -Bollaram (Andhra Pradesh) *CEPI-70.07* (*As_Ws_Ls*)	Industrial Area: • Patancheru • Bollaram

Note: Names of identified industrial clusters/ potential impact zones are approximate location based on rapid survey and assessment and may alter partially subject to the detailed field study and monitoring. Detailed mapping will be made available showing spatial boundaries of the identified industrial clusters including zone of influence/buffer zone, after in depth field study.

Aggregated Comprehensive Environmental Pollution Index (CEPI) scores of 70 and above are considered as critically polluted industrial clusters/ areas.

Source: Ecological Impact Assessment Series: EIAS/5/2009-10
Details of Critically Polluted Industrial Areas and Clusters/ Potential Impact Zone in terms of the Office Memorandum no. J-11013/5/2010-IA.II(I) dated 13.1.2010

Annexure 3

Land use / Land Cover Classification System

Level -I	Level -II	Level -III
1. Built – up land	1.1. Built –up land	1.1.1. Urban (towns & cities)
2. Agricultural land	2.1. Crop land (i) Kharif (ii) Rabi (iii) Double cropped	2.1.1. Irrigated crop land
		2.1.2. Unirrigated crop land
	2.2. Fallow	2.2.1. Fallow
	2.3. Plantation	2.3.1. Types of plantation, casuarina, coconut, tea etc.
3. Forest	3.1 evergreen/semi-evergreen	3.1.1. Dense / closed
		3.1.2. Open
	3.2. Deciduous	
	3.3. Degraded scrub land	
	3.4. Forest blank	3.4.1. Degraded forest
		3.4.2. Forest blank
	3.5. Forest plantation	3.5.1. Types of plantation eg. teak, sal etc.
	3.6. Mangrove	
4. Wastelands	4.1. Salt affected land	
	4.2. Water logged land	
	4.3. Marshy / swampy land	
	4.4. Gullied / ravinous land	
	4.5. Land with or without scrub	
	4.6. Sandy area (Coastal & desertic)	Minimum mappable unit IS 2.25 hectares on 1:50,000 scale
	4.7. Barren rocky / stony waste / sheet rock areas	
5. Water bodies	5.1. River / stream	
	5.2 Lake/reservoir/tank/canal	
6. Others	6.1. Shifting cultivation	6.1.1. Current
		6.1.2. Old / abandoned
	6.2.grassland / grazing land	6.2.1. Grassland / grazing land
	6.3. Snow covered/glacial area	6.3.1. Snow covered / glacial area
	6.4. Mining area	6.4.1. Mining dumps

Note: Land use / Land cover categories at different levels and corresponding scales for mapping are as follows:

Level – I – categories – 1:1000,000 scale
Level – II – categories – 1:250,000 scale
Level – III – categories – 1:50,000 scale and 1:25,000 scale

(Sources: Description and classification of land use / land cover : NRSA – TR – LU & CD – 01 –90)

Annexure 4

Air Quality Network Requirements

Pollutant	Region Population	Minimum No. of Air Quality Monitoring Stations
Particulate matter	Less than 100,000 100,000-1,000,000 1,000,001-5,000,000 Above 5,000,000	4 4+0.6 per 100,000 population 7.5+0.25 per 100,000 population 12+0.16 per 100,000 population
SO_2	Less than 1,00,000 1,00,001-5,00,000 5,00,001-10,00,000 Above 10,00,000	3 2.5+0.5 per 1,00,000 population 6+0.15 per 1,00,000 population 20
NO_2	Less than 1,00,000 1,00,000-5,00,000 Above 1,000,000	4 4+0.6 per 1,00,000 population 10
CO	Less than 1,00,000 1,00,000-5,00,000 Above 5,000,000	1 1+0.15 per 1,00,000 population 6+0.05 per 1,00,000 population
Region means the study area around the project boundary area decided in scopin. Additional monitoring locations should be set up if sensitive sites such as places of archeological importance and biosphere reserves exist		

(Source: National Ambient Air Quality Series: NAAQMS/25/2003-04-CPCB)

Annexure 5

National Ambient Air Quality Standards

S.No	Pollutants	Time Weighted Average	Concentration in Ambient Air		
			Industrial Residential, Rural and Other Areas	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
1.	2.	3.	4.	5.	6.
1.	Sulphur Dioxide (SO_2), µg/m^3	Annual*	50	20	Improved west & Gaeke
		24 hours**	80	80	Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_x), µg/m^3	Annual*	40	30	- Modified Jacob & Hochhieser
		24 hours**	80	80	(Na-Arsenite) Chemilumine scence
3	Particulate Matter (size less than 10µm) or PM_{10}, µg/m^3	Annual*	60	60	- Gravimetric - TOEM - Beta Attenuation
		24 hours**	100	100	
4	Particulate Matter (size less than 25µm) or PM_{10}, µg/m^3	Annual*	40	40	- Gravimetric - TOEM - Beta Attenuation
		24 hours**	60	60	
5	Ozone (O_3), µg/m^3	8 hours**	100	100	- UV Photometric - Chemiluminescence - Chemical method
		1 hour**	180	180	
6	Lead (Pb), µg/m^3	Annual*	0.50	0.50	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO), mg/m^3	8 hours**	02	02	- Non-Dispersive Infra Red (NDIR) Spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3), µg/m^3	Annual*	100	100	- Chemiluminescence - Indophenol blue method
		24 hours**	400	400	
9	Benzene (C_6H_6), µg/m^3	Annual*	05	05	- Gas Chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis

10	Benzo(O)Pyrene (BaP) – Particulate phae only, ng/m^3	Annual*	01	01	- solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note:

Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limit specified above for the respective category, it shall be considered adequate reason to institute regular/continuous monitoring and further investigations.

(*Source: As notified by CPCB in the Gazette vide No. b- 29016/20/90/PCI-I, dated. 18th November, 2009)*

Annexure 6

Noise Ambient Air Quality Standards

Area code	Category of area	Limits in db (A) Leq	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Note:

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area, which is declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) L_{eq}, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

L_{eq}: It is an energy mean of the noise level over a specified period.

(Source: Noise Pollution (Regulation and control) Rules, 2000)

Annexure 7

General Standards for Discharge of Effluents

S. No	Parameter	Inland surface water	Standards		
			Public sewers	Land for irrigation	Marine coastal areas
		(a)	(b)	(c)	(d)
1	Color & odour	*	*	*	*
2	Suspended solids mg/l, Max	100	600	200	1. For process waste water-100 2. For cooling water effluent 10% above total suspended matter of influent
3	Particle size of suspended solids	Shall pass 850 Micron IS sieve	—	—	1. Floatable solids max. 3 mm 2. Settleable solids max. 850 microns
4	pH Value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	Shall not exceed 5^0 C above the receiving water temperature	—	—	Shall not exceed 5^0 C above the receiving water temperature
6	Oil and grease mg/l Max.	10	20	10	20
7	Total residual chlorine mg/l Max.	10	20	10	20
8	Ammonical Nitrogen (as N), mg/l Max.	50	50	—	50
9	Total Kjeldahl nitrogen (as NH_3), mg/l Max.	100	—	—	100
10	Free ammonia (as NH_3), mg/l Max.	5.0	—	—	5.0
11	Bio-chemical oxygen demand (3 days at 27^0 C), mg/l max.	30	350	100	100
12	Chemical oxygen demand, mg/l max.	250	—	—	250
13	Arsenic (as As), mg/l max.	0.2	0.2	0.2	0.2
14	Mercury (as Hg), mg/l max.	0.01	0.01	—	0.01
15	Lead (as Pb), mg/l max.	0.1	1.0	—	2.0

16	Cadmium (as Cd), mg/l max.	0.1	2.0	—	1.0
17	Hexavalent chromium (as Cr +6), mg/l max.	0.1	2.0	—	1.0
18	Total chromium (as Cr), mg/l max.	2.0	2.0	—	2.0
19	Copper (as Cu), mg/l max.	3.0	3.0	—	3.0
20	Zinc (as Zn), mg/l max.	5.0	15	—	15
21	Selenium (as Se), mg/l max.	0.05	0.05	—	0.05
22	Nickel (as Ni), mg/l max.	3.0	3.0	—	5.0
23	Cyanide (as CN), mg/l max.	0.2	2.0	0.2	0.2
24	Fluoride (as F), mg/l max.	2.0	15	—	15
25	Dissolved phosphates (as P), mg/l max.	5.0	—	—	—
26	Sulphide (as S), mg/l max.	2.0	—	—	5.0
27	Phenolic compounds (as C_6H_5OH), mg/l max.	1.0	5.0	—	5.0
28	Radio activematerials				
	a. Alpha emitter micro curie/ml	10^{-7}	10^{-7}	10^{-8}	10^{-7}
	b. Beta emitter micro curie/ml	10^{-6}	10^{-6}	10^{-7}	10^{-6}
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent effluent
30	Manganese (as Mn), mg/l	2	2	—	2
31	Iron (as Fe), mg/l	3	3	—	3
32	Vanadium (as V), mg/l	0.2	0.2	—	0.2
33	Nitrate nitrogen, mg/l	10	—	—	20

* All efforts should be made to remove colour and unpleasant odour as far as practicable

These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified of the Environment Protection Rules, 1989.

Source: G.S.R 422 (E) dated 19.05.1993 and G.S.R 801 (E) dated 31.12.1993 issued under the provisions of E (P) Act 1986

Annexure 8

Environmental Standards for Coal Washeries - MoEF, GoI

1. Fugitive Emission Standards

The difference in the value of suspended particulate matter; delta (D), measure between 25 and 30 meter from the enclosure of coal crushing plant in the downward and leeward wind direction shall not exceed 150 microgram per cubic meter. Method of measurement shall be High Volume Sampling and Average flow rate, not less than 1.1 m^3 per minute, using upwind downwind method of measurement.

2. Effluent Discharge Standards

- The coal Washeries shall maintain the close circuit operation with zero effluent discharge
- If in case due to some genuine problems like periodic cleaning of the system, heavy rainfall etc. it become necessary to discharge the effluent to sewer land stream then the effluent shall conform to the following standards at the final outlet of the coal washery

S. No	Parameter	Limits
1.	PH	5.5-9.0
2.	Total suspended solids	100 mg/l
3.	Oil & grease	10 mg/l
4.	B.O.D (3 days 27 deg C)	30 mg/l
5.	COD	250 mg/l
6.	Phenolics	1.0 mg/l

3. Noise Level Standards

- Operational/working zone-not to exceed 85 dB (A) Leq for 8 hours exposure
- The ambient air quality standards in respect on noise as notified under Environmental (Protection) Rules, 1986 shall be followed at the boundary line of the coal washery

4. Code of Practice for Coal Washery

- Water or water mixed chemical shall be sprayed at all strategic coal transfer points such as conveyors, loading/unloading points etc. as far as practically possible conveyors. Transfer points etc. shall be provided with enclosures
- The crushers/pulverisers of the coal Washeries shall be provided with enclosures fitted with suitable air pollution control measures and finally emitted through a stack of minimum height of 30m. Conforming particulate matter emission standard of 150 mg/Nm^3 or provided with adequate water sprinkling arrangement

- Water sprinkling by using fine atomizer arrangement shall be provided on the coal heaps and on around the crushers/pulverisers
- Area, in and the coal washery shall be pucca either asphalted or concreted
- Water consumption in the coal washery shall not exceed 1.5 cubic meters per tonne of coal
- The efficiency of the setting ponds of the wastewater treatment system of the coal washery shall not be less than 90%
- Green belt shall be developed along the roadside, coal handling plants, residential complex, office building and all around the boundary line of the coal washery
- Storage bunkers, hoppers, rubber decks in chutes and centrifugal chutes shall be provided with proper rubber linings
- Vehicles movement in the coal washery area shall be regulated effectively to avoid traffic congestion. High-pressure horn shall be prohibited. Smoke emission from heavy duty vehicle operating in the coal Washeries should confirm the standards prescribed under Motor Vehicle Rules, 1989

(Source: G.S.R. 7 dated 27/12/1998 of MoEF, GoI)

QUESTIONNAIRE

QUESTIONNAIRE FOR ENVIRONMENTAL APPRAISAL FOR COAL WASHERY PROJECTS

Note 1: All information to be given in the form of Annexures should be properly numbered and form part o this proforma

Note 2: No abbreviations to be used – Not available or not applicable should be clearly mentioned

I. General Information

(a) Name of the project :

(b) Name of the authorized signatory :

(c) Mailing Address :

E-mail :

Telephone :

Fax No. :

(d) Does the proposal relate to new project/expansion/modernization :

(e) Plant capacity (TPD) :

Existing capacity :

After expansion/modernization :

(f) Whether stand-alone coal washery or integrated coal washery :

(g) Details of MoU/agreement with linkages for stand-alone washery :

II. Site Information

(a) Location of Coal Washery

Village(s)	Tehsil	District	State

(b) Geographical information

- Latitude :

- Longitude :
- Total area envisaged for setting up of project (in ha) :
- Nature of terrain (hilly, valley, plains, coastal plains etc) :
- Nature of soil (sandy, clayey, sandy loam etc) :
- Seismic zone classification :
- Does the site falls under CRZ classification? :
- Land usage of the proposed project site :
- Indicate area earmarked for each of the following (in ha)

  i. Plant facilities :
  ii. Administrative building/workshop :
  iii. Storage (raw material) :
  iv. Storage (finished product) :
  v. Storage (hazardous waste) :
  vi. Storage (refuse/rejects) :
  vii. Effluent Treatment Plant :
  viii. Approach road (s) :
  ix. Railway sliding :
  x. Green belt :
  xi. Truck parking facility :
  xii. Others (specify) :
  Total :

III. Environmental sensitivity details within 10 km from the boundary of the project for applicability of "General Condition (GC)" as per EIA notification dated 14.9.2006 and amendments as on date

S.No	Item	Name	Aerial Disance (in Km)
1	Protected areas notified under the wild life (Protection) Act, 1972		
2	Critically polluted areas as identified by the CPCB		
3	Eco-sensitive areas as notified unedr section 3 of the E (P) Act 1986		
4	Inter-state boundaries and international boundaries		

IV. Environmental sensitivity areas as mentioned at column 9(III) of EIA Notification 2006

S.No	Areas	Name/ Identity	Aerial distance (within 15 km) from project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value		
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests		
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration		
4	Inland, coastal, marine or underground waters		
5	State, National boundaries		
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas		
7	Defense installations		
8	Densely populated for built-up area		
9	Areas occupied by sensitive man-made land uses *(hospitals, schools, places of worship, community facilities)*		
10	Areas containing important, high quality or scarce resources *(ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)*		
11	Areas already subjected to pollution or environmental damage *(those where existing legal environmental standards are exceeded)*		
12	Areas susceptible to natural hazard which could cause the project to present environmental problems *(earthquakes, subsidence, land slides, erosion, flooding or extreme or adverse climatic conditions)*		

*** 0.5 km from Railway lines/National / State Highway should be maintained**

Description of the flora/vegetation in the project area and within 1 km from the project boundary

Description of fauna (non-domesticated) in the project area and within 1 km from the project boundary

V. Baseline Data

Meteorological Data

Ambient Air Quality Data

Water Quality Data

VI. Human Settlement

	With in the project site	With in 1 km from the project boundary
Population*		
No. of villages		
Number of households village-wise		

VII. Surface Drainage Pattern at Proposed Coal Washery Site

Does the project requires any modification / diversion in the existing natural drainage pattern at any stage? If yes, when. Provide location map indicating contours, dimensions of water body to be diverted, direction of flow of water and proposed route / changes, if any i.e. alignment of river / nallah / any other water body falling within core zone and its impact.

VIII. Raw Materials and Manufacturing Process

a. Raw materials requirement at peak rated capacity
b. Brief description of the process with flow chart
c. Alternate technologies considered
d. Reasons for selecting the proposed technology on environmental considerations

IX. Transportation Details (Road/Rail/Conveyors/Ropeway/Waterway)

a. Mode and details of transportation for coal :

b. Mode and details of transportation of washed coal :

c. Mode and details of transportation of rejects :

d. Whether the existing infrastructure for transportation is adequate or not?:
If no provide details of alternative proposal :

X. Water Management

a. Source of water :

b. Whether availability and suitability of mine discharge water /power plant effluents etc are explored? :

c. Water requirement (KLD) :

d. Waste water generation :

e. Description of wastewater treatment plant with flow chart :

f. Details of recycling mechanism proposed :

g. Characteristics of waste water stream (s) before and after treatment :

Waste stream & quantity (KLD)	Characteristics		Point of disposal
	Before	After	

XI. Air Emissions

Fugitive/source emissions	Control system

XII. Solid Waste Management

Type of waste	Categorization as per HW Rules	Quantity (TPM)	Storage facility (open/covered/silo etc)	Method of disposal

XIII. Noise Pollution Control and Management

a. Source

b. Abatement measures

XIV. Rehabilitation & Resettlement (R&R) Plan (where ever applicable)

XV. Environmental Management Plan

a. Details of Pollution Control Systems:

	Existing	Proposed
Air		
Water		
Noise		
Solid Waste		

b. Expenditure on environmental measures:

S. No		Capital cost		Annual recurring cost	
		Existing	Proposed	Existing	Proposed
1	Pollution control (provide break-up separately)				
2	Pollution monitoring (provide break-up separately)				
3	Fire fighting & emergency handling				
4	Green Belt				
5	Training in the area of environment & occupational health				
6	Others (specify)				

c. Details of organizational set up/cell for environmental management and monitoring:

d. Details of community welfare/peripheral development programmes envisaged/being undertaken by the project proponent:

XVI. Compliance with Environmental Safeguards (for existing units)

a. Status of the compliance of conditions of Environmental Yes ☐ ☐ No

Clearance issued by MoEF, if any enclosed

b. Status of compliance of 'Consent to Operate' issued by SPCB, if any, enclosed Yes ☐ ☐ No

c. Latest 'Environmental Statement' enclosed Yes ☐ ☐ No

XVII. Compliance with standards notified under E (P) Act 1986

<table>
<tr><th>Standards</th><th>Proposal</th></tr>
<tr><td>

Fugitive emission standards

The difference in the value of suspended particulate matter; delta (D), measure between 25 and 30 meter from the enclosure of coal crushing plant in the downward and leeward wind direction shall not exceed 150 microgram per cubic meter. Method of measurement shall be High Volume Sampling and Average flow rate, not less than 1.1 m^3 per minute, using upwind downwind method of measurement.

</td><td></td></tr>
<tr><td>

Effluent discharge standards

- The coal Washeries shall maintain the close circuit operation with zero effluent discharge
- If in case due to some genuine problems like periodic cleaning of the system, heavy rainfall etc. it become necessary to discharge the effluent to sewer land stream then the effluent shall conform to the following standards at the final outlet of the coal washery

S. No	Parameter	Limits
1.	PH	5.5-9.0
2.	Total suspended solids	100 mg/l
3.	Oil & grease	10 mg/l
4.	B.O.D (3 days 27 deg C)	30 mg/l
5.	COD	250 mg/l
6.	Phenolics	1.0 mg/l

</td><td></td></tr>
<tr><td>

Noise level standards

- Operational/working zone-not to exceed 85 dB (A) Leq for 8 hours exposure
- The ambient air quality standards in respect on noise as notified under Environmental (Protection) Rules, 1986 shall be followed at the boundary line of the coal washery

</td><td></td></tr>
</table>

Code of practice for Coal Washery ▸ Water or water mixed chemical shall be sprayed at all strategic coal transfer points such as conveyors, loading/unloading points etc. as far as practically possible conveyors. Transfer points etc. shall be provided with enclosures ▸ The crushers/pulverisers of the coal Washeries shall be provided with enclosures fitted with suitable air pollution control measures and finally emitted through a stack of minimum height of 30m. Conforming particulate matter emission standard of 150 mg/Nm^3 or provided with adequate water sprinkling arrangement ▸ Water sprinkling by using fine atomizer arrangement shall be provided on the coal heaps and on around the crushers/ pulverizers ▸ Area, in and the coal washery shall be pucca either asphalted or concreted ▸ Water consumption in the coal washery shall not exceed 1.5 cubic meters per tonne of coal ▸ The efficiency of the setting ponds of the wastewater treatment system of the coal washery shall not be less than 90% ▸ Green belt shall be developed along the roadside, coal handling plants, residential complex, office building and all around the boundary line of the coal washery ▸ Storage bunkers, hoppers, rubber decks in chutes and centrifugal chutes shall be provided with proper rubber linings ▸ Vehicles movement in the coal washery area shall be regulated effectively to avoid traffic congestion. High-pressure horn shall be prohibited. Smoke emission from heavy duty vehicle operating in the coal Washeries should confirm the standards prescribed under Motor Vehicle Rules, 1989	

XVIII. Public Hearing

(a)	Date of Advertisement	
(b)	Newspapers in which the advertisement appeared	
(c)	Date of public hearing (DD/MM/YYYY)	

(d) Public Hearing Panel chaired by & members present

(e) No. of people attended the public hearing meeting and number of people from the lease area.

(f) Summary/details of public hearing in tabular form.

Issues raised by the Public	Response/Commitment of Project Proponents

(g) Observations made by the public hearing panel:

XIX. Court Cases

Was / is there any court case relating to the project or related activities? So, provide details present status.

Verification: The data and information given in this proforma are true to the best of my knowledge and belief.

Date:

Signature of the applicant* with full name & address

Place:

[*authorized signatory]
Given under the seal of organisation on behalf of whom the applicant is signing

Note:

All correspondence with MoEF shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project (refer notification No. SO. 3067 (E) dated 1st December 2009)