

# **EXECUTIVE SUMMARY**

## **1.0 INTRODUCTION**

As a result of International Competitive Bidding Process, the ISN International, USA was selected by the U.P Government to construct 2000 MW (Phase-1) Thermal Power Project on build own and operate basis. The April 23, 2005 Minutes stated that the plant, as an Inter-State Project, shall be constructed on a pithead location to provide cheaper power. For further reducing transportation costs a new site was located in District Sidhi, M.P.

In order to assess the likely impacts on various environmental components which may be affected due to the proposed project, a Rapid Environmental Impact Assessment (REIA) Study was carried out. The REIA Report consists of field data generated during the winter season of 2006. An Environmental Management Plan, including proposed pollution control systems, Risk Analysis (RA), and a Disaster Management Plan (DMP) have also been included in the EIA Report.

## **2.0 THE SITE AND THE SURROUNDINGS**

The site selected for the proposed Thermal Power Project is located near Bagaiya, Jamaliswa & Badhghadh villages in Chitrangi Tehsil about 14 km from north of Singrauli in Sidhi District of Madhya Pradesh. The nearest railway station is Singrauli (15 kms). The National Highway is located at a distance of 16 km from the site. The river Bijul (South) and river Gotan (north) pass very close to the vicinity of proposed TPP site. The Chitrangi Protected Forest is located within 10 km radius of the study area.

## **3.0 THE PROJECT**

### **3.1 The Power Plant**

The proposed TPP has a capacity of 2000 MW (Phase-I). The site chosen for the TPP at Singrauli is a barren land.

The principal features or highlights of the proposed TPP at Singrauli are as follows :

Location	: Chitrangi Tehsil, District Sidhi, Madhya Pradesh
Capacity	: 3 x 660 MW (Phase-1), 3 x 660 MW (Phase-2)
Land Requirement	: 5,087 acres (2,059 hectares) for Phase I and II.
Mode of Operation	: Base Load

Main Fuel	:	Coal
Cooling System	:	Recirculating type with induced draft cooling towers.
Source of Water	:	From the Govind Ballav Pant Sagar/Rihand Reservoir

### **3.2 Land Requirement**

The land required for setting up the plant is 2059 hectares. The proposed site is only 12 km from the coal source connected by Merry-Go-Round. The source of water is nearly 25 km from the site. Since the objective was to reduce transportation costs to the consumer, the proposed site thus provides an ideal location for a pit-head thermal power project.

### **3.3 Fuel**

The fuel for the power plant would be coal. The annual requirement of coal for the proposed power plant at 100% PLF is 10.95 M.t.y. However, considering a PLF of 95%, the requirement would be 10.37 M.t.y.

### **3.4 Ash Disposal**

It is suggested that a plot of land measuring about 375 ha at a distance of 2.5 km from the power plant site be used for this purpose.

### **3.5 Stack Emissions**

The combustion gases from the power plant would be dedusted through an ESP and then discharged through two RCC single/double flue stack of 275 m height. The internal diameter of the flue would be 7.65 m at emission point.

The operation of the power plant would result in stack emissions into the atmosphere consisting of particulates and gases like sulphur dioxide and oxides of nitrogen (NO<sub>x</sub>). Electrostatic Precipitator (ESP) of 98-99% efficiency would be installed, that would reduce the SPM emission through the stacks to 100 mg/Nm<sup>3</sup>. SO<sub>2</sub> and NO<sub>x</sub> emissions would be released through two 275 m tall stack to effect wide disposal of pollutants. SO<sub>2</sub> and NO<sub>x</sub> emissions per unit would be 12,500 kg/h and 400 ppm respectively. The emissions would be released at a velocity of 24.0 m/sec at a temperature of 125°C and density of 0.89 kg/Nm<sup>3</sup>.

### **3.6 Water Requirement and Effluent Quantity**

The water requirement of the plant would be met from Rihand Dam (Govind Ballav Pant Reservoir).

Liquid effluent will be generated from different sources of the plant and necessary treatment would be ensured to satisfy the norms of EPA, 1986/IS2490.

### **3.7 Noise Pollution**

The major noise generating sources are turbines, generators, compressors, pumps, fans, coal handling plant, etc. Acoustic enclosures would be provided to control the noise levels below 90 dB(A). Personnel protective equipments would be provided to the persons working in the high noise areas.

### **3.8 Transmission System**

The 400 KV transmission system of Power Grid Corporation/Madhya Pradesh Transco will need to be provided for power evacuation from the power plant.

## **4.0 BASELINE ENVIRONMENTAL SCENARIO**

The baseline environmental status for various environmental attributes within the study area of 10 km radius around the plant site (Refer Exhibit-1) has been generated through primary and secondary sources. The major environmental disciplines studied include hydrology, meteorology, landuse, air quality, water quality, soils, ecological environment, socioeconomic conditions and noise.

### **4.1 Meteorology**

The climate of the area is tropical monsoon type with three distinct seasons as hot and dry summer/premonsoon (March-May), monsoon (June-October), and winter (November - February). The climate of the area is dry during the period of November to the beginning of June while during rainy season the atmosphere is very humid. The average annual rainfall varies from 1000-1200 mm, peaks in the months of July and August. August is the hottest month with the mean daily maximum temperature being about 41°C. January is generally the coolest month with mean daily maximum temperature at about 9°C.

## 4.2 Landuse

The project site of about 2059 hectares is located in the Sidhi District of Madhya Pradesh.

The total study area has been classified under three different landuse categories.

- a) Forest Land
- b) Human Settlement
- c) Arable Land

As would be observed, the forest occupies 54.53%, human settlements occupy 8.37% and arable lands occupy about 37.10%.

## 4.3 Air Quality

Ambient air quality was monitored at 6 locations around the project site. The results indicate that while the concentrations of Suspended Particulate Matter (SPM) is below the National Ambient Air Quality Standards for industrial areas, the Sulphur Dioxide (SO<sub>2</sub>) and Oxides of Nitrogen (NO<sub>x</sub>) concentrations in the area are below the National Ambient Air Quality Standards for residential and rural areas. The 98 percentile pollutant levels observed covering the 6 stations are presented in Table-1 below :

**Table-1**  
**Ambient Air Quality in the Study Area**

Parameters	P-98 AAQ levels (µg/m <sup>3</sup> )	AAQ Standards for residential/rural areas (µg/m <sup>3</sup> )	AAQ Standards for Industrial areas (µg/m <sup>3</sup> )
SPM	271.0	200	500
SO <sub>2</sub>	16.3	80	120
NO <sub>x</sub>	38.2	80	120

## 4.4 Water Quality

To assess the physical, chemical and bacteriological properties of water in the region, water samples were drawn from 10 stations within 10 km radius of the project site. Five (5) stations were for surface water & 5 stations for ground water. The analysis results indicate that pH of the surface water varies between 8.2-8.52, TDS varied between 294-384 mg/l, TSS ranged between 46 mg/l, DO is consistently high and BOD levels ranged between 0.4-2.0 mg/l. Comparison of water quality between the 5 stations does not reveal significant spatial variation in the monitoring stretch.

The analysis results of groundwater indicate that the pH varies between 7.8-8.37, hardness ranges from 136-324 mg/l, chloride ranges from 30.1-60.4 mg/l, while coliforms in the tubewell water are found to be absent. The groundwater quality is generally good.

#### **4.5 Soil Quality**

10 stations were selected within the study area in five (5) villages, with two (2) stations in each villages around the proposed power plant, for determination of soil quality. Samples were collected from the 10 sites and analysed for physical and chemical constituents. The soils can be classified as sandy silt in nature. The soils are neutral in character (avg pH:6.6). The organic content is low (range:0.153-0.692%). The phosphorus content is low (range:0.0010-0.018%). Nitrogen content in the soil ranges between ND-0.110. The levels of phosphorus, nitrogen and organic matter indicates low fertility of soils.

#### **4.6 Ecology**

The proposed project site lies in barren land. Chitrangi Protected Forest (PF) is located towards the south-eastern part and open mixed jungle is present towards the southern part within 10 km radius of the study area. The terrestrial and aquatic ecosystems harbour different types of floral as well as faunal species. The sacred plants and medicinal plants are the indicators of the phenomenon of ethnoenvironmental management of the rural area. The project site and its vicinity at Singrauli is inhabited by rural people and their ancestors are fully aware about the conservation of biological resources.

#### **4.7 Socioeconomic Environment**

The total population in the study area was 27,336 in 2001, with a household size of about 6.11. The literacy rate was about 28.91%. Main workers comprised 32% of the total population, while the percentage of non-workers was about 56.47%. The percentage of Scheduled Caste (SC) to the overall population was 14.39, while the Scheduled Tribe (ST) population percentage was 32.06.

#### **4.8 Noise**

Ambient noise levels were measured at 10 locations around the project site. It is observed that the day and nighttime noise levels varies between 42.3-61.14 dB(A) and 29-44.12 dB(A), respectively.

As normal, the nighttime noise levels are lower compared to the daytime values. The average difference between day and nighttime levels in the area is of the order of 14 dB(A).

## 5.0 IMPACT ASSESSMENT, ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN

The impact analysis results and the mitigation measures adopted in the cardinal environmental disciplines are discussed in the following sections.

### 5.1 Landuse

Land to the tune of 2059 hectares would be used for the proposed project, which is already under the possession of the Authority.

### 5.2 Air Quality

The fuel for the project would be coal, resulting in emissions to ambient air from its combustion. The point source emissions would consist of particulates, sulphur dioxide and oxides of nitrogen (NO<sub>x</sub>). The prediction of the atmospheric dispersion of the stack emissions and estimation of the incremental and resultant ground level concentrations of SPM, SO<sub>2</sub> and NO<sub>x</sub> have been predicted with the Industrial Source Complex (ISC) Model.

Based on the emissions from the power plant, the maximum 24 hourly incremental concentrations of SPM, SO<sub>2</sub> and NO<sub>x</sub> are predicted to be 4.47, 49.98 and 26.84 µg/m<sup>3</sup> respectively at the project site. The 98 percentile ambient air concentration of SPM, SO<sub>2</sub> and NO<sub>x</sub> being 271.0, 16.3 and 38.2 µg/m<sup>3</sup> during the winter season, the maximum resultant concentration of SPM, SO<sub>2</sub> and NO<sub>x</sub> would be about 275.47, 66.28 and 65.04 µg/m<sup>3</sup> (Refer Table-2), which are much lower than the National Ambient Air Quality Standard for industrial areas.

**Table-2**

**Maximum Resultant Concentration Due to Incremental GLCs**

Pollutant	Overall 98-percentile AAQ Concentrations Recorded (µg/m <sup>3</sup> )	Incremental Concentration due to operations of the Power Plant (µg/m <sup>3</sup> )	Resultant Concentration (µg/m <sup>3</sup> )
SO <sub>2</sub>	16.3	49.98	66.28
NO <sub>x</sub>	38.2	26.84	65.04
SPM	271.0	4.47	275.47

The following mitigation measures are proposed to be adopted to minimize the impact on air quality :

1. 2 no., 275 m single/double flue stack to emit flue gas.
2. High Efficiency ESPs (Electrostatic Precipitators) to limit particulate emission to 100 mg/Nm<sup>3</sup>.
3. Space provision for retrofitting FGD (Flue Gas Desulphurisation) systems.
4. Dust suppression and extraction system at CHP (Coal Handling Plant) area to control fugitive emission.
5. Plantation and afforestation in the available spaces.

### **5.3 Surface Water Quality**

The effluent of the plant would be treated as per guidelines of the statutory authorities. The various water quality parameters of concern are within the threshold limits. As such, it may be concluded that no adverse effects leading to the depletion of growth of the existing aquatic biota are envisaged due to the discharges from the project operation.

Various effluent treatment measures proposed to be installed in the plant are as follows :

- 1, Cooling towers to cool down the recirculating cooling water.
2. Neutralisation pit for pH adjustment of the DM plant regeneration waste.
3. Oil and grease separators to arrest oil from different operations.
4. Recirculation of ash water in the system.
5. Sludge treatment and disposal systems.

### **5.4 Ground Water Quality**

The impact on ground water due to the power plant operations would primarily result due to likely leaching of toxic metals from the ash pond area. In conclusion, the nature of the leachate and the soil and groundwater characteristics of the area indicate that contamination due to leachate phenomena from the ash pond is extremely unlikely.

### **5.5 Ecology**

The impact of the construction activities would be primarily confined to the project site. As stated in Section-5.1, about 2059 hectares of land would be converted to industrial use, which is barren. The plant, township and the ash disposal area would be extensively landscaped with development of green belts and afforestation, consisting of

a variety of species. Such plantation activities would enrich the ecology and improve the aesthetics of the area.

The resultant ambient air quality is well within the applicable standards and much below the threshold limit for damage to terrestrial flora. As such, the impact on the terrestrial ecosystem would be negligible due to this phenomena.

## **5.6 Social Environment**

The peak labour strength during construction would be about a few thousand persons. ISNI officials and supervisors may constitute another few hundred persons.

However, labour camps with provision of basic amenities of water supply, sanitation etc would be provided which would go a long way in curbing the degradation of the physical and aesthetic environment.

Construction of any major industrial project invariably results in socioeconomic changes. The influx of material and money tends to change the economic status of the community. The change in social status almost always causes humility and discontent to the related people. Proper publicity of the beneficial aspects of the project would largely defuse the social discontent. .

## **5.7 Noise**

The construction phase would witness operation of heavy construction and earthmoving machineries which are known to emit sounds with high decibel levels. Careful scheduling of the operation of the high noise machineries is required during this period, particularly at night time so that minimum disturbances are caused.

The following mitigation measures to curb noise impacts would be provided in the plant :

1. Turbine generators would be provided with acoustic enclosures.
2. Silencers would be provided for the air intake system and the exhaust stacks.
3. Workers would be provided with protection equipments as helmets, earplugs etc.
4. A green belt would be implemented along the plant periphery to dampen noise effects.

## **6.0 ENVIRONMENTAL MANAGEMENT**

The following measures have been taken by ISNI for pollution control :

1. Air Pollution Control
  - Electrostatic Precipitator
  - Chimney
  - Dust Extraction and Suppression System
2. Water Pollution Control
  - Cooling tower
  - Ash Handling
  - Ash Dyke
  - Effluent Treatment Plant
  - Sewage Collection, Treatment and Disposal
3. Environmental Laboratory Equipment
4. Green Belt
5. Afforestation

## **7.0 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN**

Despite all precautions and protective measures, emergencies/accidents like fire, explosion, release of chemicals can occur. Even though such occurrences may be rare and a remote possibility, such accidents have an adverse effect on the plant, property and people working inside the plant. To cope, to manage and contain such “Emergency”, a Risk Analyses exercise has been conducted, based on which a Disaster Management Plan has been constructed.