ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR
SIPAT ADVANCE ULTRA SUPER CRITICAL TECHNOLOGY DEMONSTRATION PLANT (AUSCTDP) STAGE-III (1X 800 MW)

EXECUTIVE SUMMARY

Project Proponent

M/s. NTPC Limited, Noida
(A Government of India Enterprise)

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1.0 EXECUTIVE SUMMARY

Power development is a key infrastructural element in the development of the economy. The development of the power sector in the country, since independence of India has been predominantly through the State Electricity Boards formed in each state under the Electricity (Supply) Act 1948, with the responsibility for generation, transmission and distribution of electric power.

NTPC Limited (A Govt. of India Enterprise), is the largest power generating company in India. Government of India (GoI) set it up in November, 1975 with the objective of planning, promoting and organizing integrated development of thermal power in the country. NTPC was the first public sector company to be granted "Maharatna" status. NTPC is now emerging as a well-diversified company on its way of becoming an Integrated Power Major, having entered into hydro power, coal mining, power trading, equipment manufacturing, power distribution business and renewable energy generation.

Present installed capacity of NTPC as on 31.08.2019 is 55,786 MW (including 8461 MW through JVs/Subsidiaries) comprising of 43 NTPC Stations (22 coal based stations, 7 combined cycle gas/liquid fuel based stations, 2 hydro based station, 1 wind based Station), 9 Joint Venture stations (9 coal based and one gas based) and 11 renewable energy projects.

Apart from integrated power development in the country, NTPC always focuses on adoption of efficient and clean technologies for power generation. Starting from sub-critical 200 MW/500 MW units, NTPC has adopted super-critical & ultra super critical units of 660/800 MW capacity. NTPC now intends to develop Advance Ultra Super Critical (AUSC) technology under AUSC mission of Govt of India.

The Advanced Ultra Super Critical (AUSC) mission of GOI envisages development of indigenous technology for steam parameters of 310 kg/cm^2 and 710°C / 720°C temperature under the mission of development of clean coal (carbon) technologies.

To pursue the project, a consortium of BHEL, Indira Gandhi Centre of Atomic Research (IGCAR) and NTPC have signed an MOU in August 2010. The project aims to execute 800 MW AUSC coal fired unit in seven years from the date of financial sanction by the Govt. of India. The seven year period comprises of 2½ years for 'R&D Phase (Design and Development)' and 4½ years for 'Project Construction Phase' of AUSC Technology Demonstration Plant (TDP). AUSC initiative is an ambitious and unique project aimed at establishing best in class power plant with target efficiency of 46 %. This is an increase from the contemporary efficiency levels of 38 % (sub-critical units) & 43 % (super-critical units) to 46 % in AUSC. To make it truly contemporary and at par with the best in the world, the target for the plant efficiency has been set at 46% for Indian ambient conditions. This is equivalent to 50 % plant efficiency for European ambient conditions as being targeted for similar AUSC programs concurrently on progress at Europe, USA, Japan. It will result in substantial reduction of CO_2 emissions compared to a sub-critical plant.

It is pertinent to mention here that the proposed unit under Sipat AUSC Stage-III is a Technology Demonstration Plant (TDP), which shall be developed for the first time in the world and it is not available commercially.

1.1 Purpose of the Report

As per Environmental Impact Assessment (EIA) Notification dated 14th September, 2006, commissioning or operation of thermal power plants (≥500 MW) falls under category 'A' under project [Type-1(D)] and requires prior Environmental Clearance (EC) to be obtained from MOEF&CC before the commencement of ground activity.

In line with the said notification, online application for TOR (Form-1 & Pre-feasibility report) for EIA study was submitted to MOEF&CC on 29.01.2019 vide online proposal no. IA/CG/THE/89473/2018. The Terms of Reference (TOR) was accorded by MOEF&CC vide letter J-13012/02/2019-IA.I (T) dated 03.05.2019. The draft Environmental Impact Assessment report (EIA) has been prepared based on the TOR accorded by MOEF&CC.

Vimta Labs Limited, Hyderabad, an accredited agency with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) vide registration no. NABET/EIA/1720/SA 088 dated 16.04.2019 is assigned by NTPC to undertake an Environmental Impact Assessment (EIA) study and prepare Environment Management Plan (EMP) on various environmental components, which may be affected due to the impacts arising out of the proposed expansion of thermal power plant.

1.2 Environmental Setting

Sipat AUSC TDP, Stage-III (1x800 MW) is an expansion project to be established within the existing premises of Sipat STPS, Stage-I (3x660 MW) and Stage-II (2x500 MW) both of which are under commercial operation. The project is located in Bilaspur district of Chhattisgarh state situated near village Sipat. The site is bounded by latitude and longitude of 22^0 07' 00' N to 22^0 08" 53.40 "N and 82^0 16' 43" E to $82^0$18' 49.37' E respectively.

The topography of the project site is plain with minor undulation. Existing ground level elevation of the proposed thermal power plant ranges from 280 m to 287 m above mean sea level and the general slope is towards north to south.

The site is approximately 12.0 km from Bilaspur city and is approachable via Bilaspur-Baloda state highway, which passes through Sipat. The nearest village is Janj village which is about 0.7 km from the project site. The nearest railway station is Bilaspur which is about 12.5 km from the project site. The nearest commercial airport, Raipur is about 116 km from the project site.

The nearest reserve forests from the project site are Bitkuli (Sonathi Pahar) Reserved Forest (3.7 km, NE), Dalha Protected Forest (7.0 km, ESE). The nearest water bodies from the project site are Kurung left canal (adjacent to west side boundary), Lilagarh nadi (3.0 km, E), Kurung nadi (3.5 km, W) and Arpa nadi

(8.8 km, SW). There are no national park, no wildlife sanctuary located within 10 km of radius of plant site.

About 170 acres of industrial land is available for locating the unit within the vacant space in the MGR bulb. The land in existing ash dyke is sufficient to accommodate the ash for additional 800 MW unit. Existing Sipat STPS, has already established a dedicated township. Additional quarters/facilities shall be constructed to accommodate staff of Stage-III. No additional land is proposed to be acquired for the project. The study area showing 10 km radius is shown in **Figure-1.**

1.3 Brief Description of Project

1.3.1 Nature of the Project

Sipat Advanced Ultra Super Critical Technology Demonstration Plant (AUSC TDP), Stage-III will be a pulverised coal fired thermal power project based on advance ultra-super critical boiler parameters. The proposal involves construction and operation of one unit of 800 MW. The main components of the project include:

- Steam generator, turbine generator and auxiliary units;
- Coal handling system including dust extraction and suppression system;
- Closed cycle cooling system with cooling towers;
- Water & effluent treatment system;
- Fire protection system;
- Air conditioning & ventilation system;
- Electrostatic precipitators, NOx control and Flue Gas Desulphurisation (FGD) system;
- Chimney;
- Limestone and gypsum storage and disposal facilities;
- Ash handling system with dry ash extraction and wet mix system, storage and disposal facilities; and
- Electrical Systems: Generator bus duct, transformers, switchgears, switch yard etc.

1.4 Salient Features

The salient features of the proposed expansion of AUSCTDP are given in **Table-1.** The site photographs of proposed expansion site are shown in **Figure-2.**

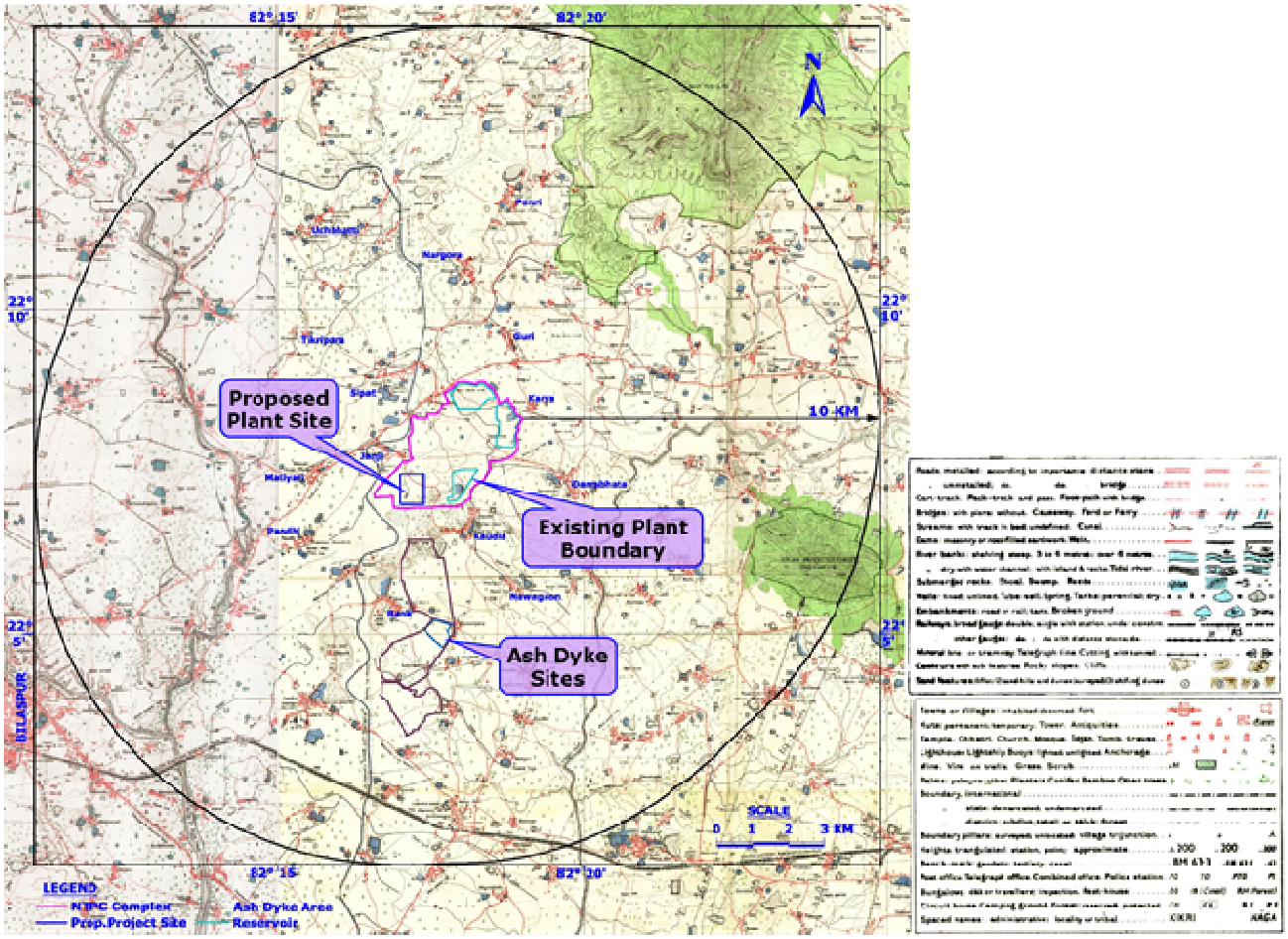

FIGURE-1
STUDY AREA MAP (10 KM RADIUS)

FIGURE-2
SITE PHOTOGRAPHS

TABLE-1
SALIENT FEATURES OF PROPOSED EXPANSION OF AUSCTDP PROJECT

Sr. No.	Particulars	Details
1	Stage- I Stage- II Stage-III	**Under Operation** Stage-I: 1980 MW (3x660 MW) Stage-II: 1000 MW (2x500 MW) **Proposed Expansion** Stage-III: 800 MW (1x800 MW)
2	Technology	Advanced Ultra Super Critical (AUSC)
3	Total area of the plant	170 acres of land within the vacant space in MGR bulb.No additional land is proposed to be acquired
4	Fuel	Coal
A	Source of fuel	NTPC approached Ministry for Coal linkage.
B	Fuel transportation	MGR/Indian Railways
C	Average fuel requirement (Coal)	3.34 MTPA with 90 % PLF
D	Gross calorific value range	3700 Kcal/kg
E	Ash content	39 % (Max)
F	Sulphur content	0.36% (Max)
5	Ash generation Fly ash Bottom ash Total ash	 1.04 MTPA 0.26 MTPA 1.30 MTPA
6	Water requirement and its source	The water requirement is estimated to be about 24 cusecs, which is proposed to be drawn from the Right Bank Canal (RBC) originating from Hasdeo Barrage pondage. No additional water commitment is required for the expansion project. The water requirement for AUSC unit will be met from the available committed quantity of 120 MCM from WRD, Govt. of Chhattisgarh for Sipat STPS.
7	Cooling system	Closed Cycle Cooling System
8	Power requirement and its source	Two number of 11 kV feeder shall be provided from existing 11 KV switchgear of Sipat STPP to meet the construction power requirement.
9	Power evacuation	765 KV with appropriate transmission utility
10	Discharge	Zero Liquid Discharge (ZLD)
11	Wastewater treatment	Existing ETP & STP
12	Fire fighting system	Adequate firefighting systems as per Tariff Advisory Committee (TAC) and OISD guidelines will be provided
13	Project cost	Rs.10,500 crores
14	Budget for environmental measures	Rs. 957.32 crores

Source: NTPC

1.5 Resource Requirement

- *Land Requirement*

The total land at NTPC project site is 4,850 acres. No additional land is proposed to be acquired for the project. About 170 acres of land is available for locating the unit within the vacant space in the MGR bulb. One double lane road under bridge (RUB) and four lane road with a level crossing are available for access to this area.

This space is adequate for locating the BTG & BOP facilities of 800 MW AUSC unit. Unit can be easily connected to the existing 765 kV switchyard for power evacuation. The land in existing ash dyke is sufficient to accommodate the ash for additional 800 MW unit.

For ash dyke, 970 acres of land is available for Sipat STPS (2980 MW). The area is sufficient to accommodate the ash for additional 800 MW unit.

- *Water Requirement & its Source*

The water requirement is estimated to be about 24 cusecs which is proposed to be drawn from the Right Bank Canal (RBC) originating from Hasdeo Barrage pondage. No additional water commitment is required for the expansion project.

The water requirement for AUSC unit will be met from the available committed quantity of 120 MCM from WRD, Govt. of Chhattisgarh for Sipat STPS. However, water system of stage I & II will be optimized and saving in water thus achieved will be more than 20 cusecs, which will be adequate for Stage-III.

- *Coal*

Coal requirement for the proposed 800 MW AUSC unit will be about 3.34 MTPA at 90% PLF. Coal from coal blocks with GCV of 3700 Kcal/Kg has been considered.

- *Manpower Requirement*

The proposed power plant will require skilled and semi-skilled personal during construction and operational phase. Many of the people from neighboring villages, as found suitable will get opportunity for indirect employment during construction and operational phase.

The total manpower from various agencies during construction of Stage-III would be about 1000 and during operation period is estimated to be about 150.

- *Power Requirement & Source*

Two number of 11 kV feeder shall be provided from existing 11 KV switchgear of Sipat STPS to meet the construction power requirement.

- *Power Evacuation System*

Step up/power evacuation voltage of the project is 765 kV in line with all other units of existing Sipat STPS.

1.6 Process Description

In a thermal power plant, the chemical energy of the fuel (coal) is first converted into thermal energy (during combustion), which is then converted into mechanical energy (through a turbine) and finally into electrical energy (through a generator). It has the following steps:

- The coal is transferred from the coal handling plant by conveyor belt to the coal bunkers, from where it is fed to the pulverizing mills, which grind it to fine powder. The finely powdered coal, mixed with air is then blown into the boiler by a fan where it burns like a gas.

- The process of combustion releases thermal energy from coal. The boiler walls are lined with boiler tubes containing high quality de-mineralized water (known as boiler feed water). The combustion heat is absorbed by the boiler tubes and the heat converts the boiler feed water into steam at high pressure and temperature. The steam, discharged through nozzles on the turbine blades, makes the turbine to rotate, which in turn rotates the generator coupled to the end of the turbine. Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently. The power is evacuated via switchyard through a transmission system.

- During combustion, the non-combustible part of coal is converted into ash. A small part of ash (about 20%) binds together to form lumps, which fall into the ash pits at the bottom of the furnace. This part of ash, known as bottom ash is water quenched, ground and then conveyed to pits for subsequent disposal to ash disposal area or sale.

- Major part of the ash (about 80%) is in fine powder form, known as fly ash, and is carried out of the boiler along with the flue gas. The flue gas, after heat recovery, is passed through the electrostatic precipitators, where the ash is trapped by electrodes charged with high voltage electricity.

- The flue gases exiting from the Electrostatic Precipitators (ESPs) shall be treated in Flue Gas Desulphurisation (FGD) system and discharged through a tall chimney for wider dispersal of remaining ash particles and gases. Suitable system for control of NOx shall also be established. The ash collected in the ESP hoppers is extracted in dry form and conveyed to dry ash storage silos from where it is supplied to user industries.

- Any unused part of fly ash is mixed with water and conveyed to ash disposal area in a slurry form.

The steam, after passing through the turbines, is condensed back into water in condensers and the same is re-used as a boiler feed water for making steam. The reasons for condensing and reusing the steam are following:

- The cost of boiler feed water is very high as it is very pure demineralized water hence reuse is economical.
- The use of condenser lowers the temperature at the exit end and hence increases the efficiency of the turbine.
- The condenser contains tubes through which cold water is constantly pumped. The steam passing around the tubes of condenser loses heat and condenses as water. During this process, the steam gets cooled while cooling water gets heated up (by about 10^{o}C). This hot water is cooled in a cooling tower and recycled for cooling.

However, in order to control dissolved solids, a certain amount of blow down is required from the cooling towers, which is used in the plant for other usages such as service water, coal dust suppression etc.

1.7 Baseline Environmental Status

The baseline data monitoring studies have been carried out for three months from 20th March 2019 to 20th June 2019 (Pre-monsoon season). The baseline studies are in progress to cover the remaining seasons.

1.7.1 Meteorology

The meteorological parameters were recorded on hourly basis during the study period and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover. The meteorological parameters have been recorded and are presented in **Table-2**.

TABLE-2
SUMMARY OF THE METEOROLOGICAL DATA GENERATED AT SITE

Month	Temperature (^{0}C)		Relative Humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	
March	43.1	16.5	52	37	0
April	45.2	22.0	49	33	0
May	46.2	24.9	54	38	0
June	43.2	20.8	55	43	0
Range	**16.5-46.2**		**33-55**		**0**

The maximum and minimum temperatures recorded at site during study period were 46.2^{0}C and 16.5^{o}C. The relative humidity was observed to range from 33 % – 55 % during the study period. Predominant winds are mostly from W followed by WSW. Calm conditions prevailed for 9.6 % of the total time.

1.7.2 Ambient Air Quality

Ambient air quality location has been monitored at ten locations in and around project site. The minimum and maximum concentrations for PM_{10} were recorded as 28.9 µg/m^3 and 67.9 µg/m^3. The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 17.2 µg/m^3 and 39.0 µg/m^3. The minimum and maximum concentrations for SO_2 were recorded as 8.1 µg/m^3 and 19.0 µg/m^3. The minimum and maximum concentrations for NO_2 were recorded as 10.9 µg/m^3 and 21.2 µg/m^3.

The concentrations of $PM_{2.5}$, PM_{10}, SO_2, NO_2, O_3, CO, NH_3, Pb, Hg, BaP, As, Ni and C_6H_6 are observed to be well within the NAAQ standards 2009 for industrial and rural /residential zone.

1.7.3 Land Use

As per satellite imagery, the built-up land is 6.2 %, forest land occupies 7.7 %, agricultural land is about 68.2 %, water body is 7.4 % and remaining land is either area available for cultivation or cultivable waste land. It can be observed that the study area is having predominantly agricultural land.

1.7.4 Soil Characteristics

The pH of the soil in the study area ranged from 7.16 to 8.23. The electrical conductivity was observed to be in the range of 59.6 µmhos/cm to 196.2 µmhos/cm. The nitrogen values range between 38.6 to 83.4 kg/ha. The phosphorus values range between 78.6 to 195.6 kg/ha. The potassium values range between 152.8 to 346.5 kg/ha. The chlorides were found to be in the range of 71.0 to 296 mg/kg of soil. The analysis of soil samples does not indicate any external industrial contamination.

1.7.5 Water Quality

The baseline water quality status in the region is established by analysing samples at 12 locations consisting of six ground water samples and six surface water samples.

Surface Water Quality

The pH value was observed to be in the range of 6.4 to 7.6. Electrical conductivity of surface water samples was observed to be in the range of 441 µS/cm to 892 µS/cm. The dissolved oxygen was observed in the range of 5.2 mg/l to 5.8 mg/l. The total hardness was found to be in the range of 135.35 mg/l to 225.18 mg/l. The chloride concentration was observed in the range of 86.2 mg/l to 205.2 mg/l and the sulphates were found to be in the range of 20.8 mg/l to 34.2 mg/l. Fluoride content was found to be in the range of 0.3 mg/l to 0.7 mg/l. Bacteriological studies revealed that the total coliform count is measured 1180-3840 MPN/100ml.

The surface water quality in the study area does not indicate any industrial contamination.

Ground Water Quality

The pH is in range of 6.4 -7.4 which are with the specified standard limits of 6.5 to 8.5. Color and turbidity of the samples ranged from 2-7 Hazens and <1-5 NTU respectively. Electrical conductivity of the samples ranged from 515-1462 µS/cm.

The total hardness of the samples ranged from 160.5-386.9 mg/l. Calcium and magnesium concentrations ranged from 31.8-86.8 mg/l and 19.2 -42.6 mg/l.

The total dissolved solids of the samples ranged from 293.7 -820.9 mg/l. Range of chlorides and sulphates concentrations at all the locations 105.4-294.5 mg/l and 14.8-82.6 mg/l.

Fluoride concentration ranged from 0.4-0.7 mg/l and is found to be within the permissible limits. Similarly, nitrates are also found to be ranging in between 10.4–25.6 mg/l. Iron concentrations in ground water varied from 0.02-0.11 mg/l. Zinc levels varied from 0.02 mg/l to 0.11 mg/l. Aluminum concentration in ground water is <0.01-0.09 mg/l which are within the limits stipulated. The total coliform counts is absent in all the samples against the standard limit of 10 MPN/100 ml.

Based on the above results, it is evident that all of the parameters in ground water fairly meet the desirable standard limits of IS: 10500. The ground water quality in the study area does not indicate any industrial contamination.

1.7.6 Noise Levels

The noise monitoring has been conducted for determination of noise levels at fifteen locations in the study area. The day time noise levels at all the locations were ranged in between 37.9 dB(A) to 51.8 dB(A). The night time noise levels were ranged in between 34.9 to 48.6 dB (A).

Noise monitoring results reveal that the ambient noise levels in all the locations are well within the limits as per NAAQS with respect to noise 14.02.2000. The higher range can be attributed to local industrial and commercial activities.

1.7.7 Flora and Fauna

From the primary survey and as per forest department records and review of literature, there are no sanctuaries, national park, biosphere reserves in the study area. The study area does not have migratory corridors of any important species. The study area did not record the presence of any critically threatened species in the study area. The records of Botanical Survey of India and forest department also did not indicate presence of any endangered or rare and vulnerable plant species in this area.

On comparison of the check list given in the Schedule-I of the Indian Wildlife Protection Act,1972 and the list of wildlife recorded in the study area, it can be concluded that two species belong to Schedule-I, and rest of the species belong to Schedule-II, III, IV and V of the Indian Wildlife (Protection) Act, 1972.

1.8 Anticipated Environmental Impacts and Mitigation Measures

1.8.1 Impact on Land Use

The land selected for proposed expansion of power plant project Stage-III (1x800 MW) is within the premises of Sipat STPP, which is categorized as industrial area. There will not be any change in land use. There will not be any additional land acquisition for the expansion project. Hence, there is no impact on land use due to the proposed expansion.

There is no additional ash pond for Stage-III expansion project. The ash pond for stage-I & II will be used for Stage-III also. The present land use of the area falls under industrial category. The project site will not be having any adverse impact on the surrounding land use during the operation period.

1.8.2 Impact on Soil

The impact on soil during operation of the project could result due to deposition of residual particulate matter and gaseous emissions on the soil. The soil within the deposition zone of pollutants may undergo physico-chemical changes due to deposition of PM (ash particles) and washout of gases (SO_2 and NO_2) during the rains. The impacts on soil due to operation of the power plant and gaseous emission are likely to be negligible as the incremental concentration of particulate matter (PM), SO_2 & NO_2 levels are observed to be within the limit.

1.8.3 Impact on Air Quality

The major air pollutants from a power project are Particulate Matter (PM), SO_2, NO_2 and CO which are emitted continuously from the stacks (point sources), attached with coal combustion boilers. The fugitive emissions of coal dust are also contributed by coal handling activities at storage yard, wind erosion, spillages from conveyor system, pulverization etc.

Prediction of impacts on air environment has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model. The incremental concentrations of the proposed project (Stage-III) are super imposed on the maximum baseline data to arrive at resultant concentrations during operational phase of the proposed expansion project. The resultant concentrations with FGD are given in **Table-3.**

TABLE-3
RESULTANT CONCENTRATION WITH FGD & NOX CONTROL

Pollutant	Baseline ($\mu g/m^3$)	Incremental ($\mu g/m^3$)	Resultant ($\mu g/m^3$)	NAAQS Limits (Industrial/Residential) ($\mu g/m^3$)
PM_{10}	67.9	0.74	68.64	100
SO_2	19.0	2.48	21.48	80
NO_2	21.2	2.48	23.68	80

The incremental concentrations when superimposed over the existing maximum baseline concentrations, the resultant concentrations are observed to be within the permissible levels for residential/rural conditions.

The mitigative measures recommended for control of air pollution in the plant are:

- Installation of ESP of efficiency more than 99.90% to limit the particulate matter (PM) concentrations below 30 mg/Nm^3;
- Installation of Flue Gas De-sulfurization (FGD) system;
- Combustion control for NO_x (Low NO_x burner);
- Provision of twin/single flue stack of 150 m height for dispersion of gaseous emissions;
- Online flue gas monitors as well as flue gas flow rates and temperature measurement shall be provided for all stacks;
- Dust suppression and extraction system in coal handling plant;
- Provision of water sprinkling system at raw material storage yard; and
- Asphalting of the roads within the plant area.

1.8.4 Impact on Water Resources

➢ *Water Resources*

Water for the project is being pumped from the Hasdeo Right Bank Canal (RBC). Water is conveyed to the raw water reservoirs from the canal via two 29 km long subsurface pipelines. The water requirement is estimated to be about 24 cusecs, which is proposed to be drawn from the Right Bank Canal (RBC) originating from Hasdeo Barrage pondage. No additional water commitment is required for the expansion project.

However, the use of surface water resource for irrigation, municipal and industrial purposes is regulated by the Water Resource Department, Govt. Of Chhattisgarh which allocates water considering other users. It may, therefore, be concluded that the drawl of water for Sipat AUSCTDP, Stage-III (1X800 MW) does not pose any adverse impact on the availability of water to down streams users.

The water system of the Sipat AUSCTDP Stage-III has been designed with Zero Liquid Discharge (ZLD) concept in order to reduce the quantity of effluents generated from the plant. The entire effluent generated from the Stage-I & II is being treated in existing effluent treatment plant and thereafter reused for

various industrial purpose upto the maximum possible extent. The same will be implemented for the proposed expansion also.

1.8.5 Impact of Solid Waste

Ash generated due to combustion of coal will be the main industrial/ solid waste generated from the project. About 80% of the ash shall be generated as fly ash while 20 % of the ash shall be generated as bottom ash. With average annual coal requirement of 3.34 MTPA and average 39 % ash in coal, it is estimated that about 1.3 MTPA of ash shall be generated annually.

In addition, gypsum shall be generated as solid waste from FGD system, which shall be utilized/ disposed off in an environmentally suitable manner. The details of the solid waste generated in the plant are given in **Table-4.**

TABLE-4
EXPECTED SOLID WASTE FROM THE PROPOSED EXPANSION PROJECT

Sr. No.	Plant	Quantity	Mode of Disposal
1	**Ash Generation** Fly ash Bottom ash Total ash	 1.04 MTPA 0.26 MTPA 1.30 MTPA	Ash will be supplied to cement industries. In case the ash could not be lifted, the same will be disposed in ash pond using HCSD disposal method.
2	Gypsum Generation	360 tonnes /day	Byproduct used by cement industries

1.8.6 Impact on Noise Levels

The main sources of noise and vibration during operations will be:

- Delivery of equipment and raw materials by trucks;
- Transfer of coal through railway line;
- Operation of generators and turbine inside the power house; and
- Operation of various pumps, fans and motors.

Scheduling deliveries to daytime as much as possible would minimize noise generation by truck movement. Turbines, transformers, compressors, pumps, vehicles and miscellaneous equipment during plant operation, will generate noise. However, proper acoustic enclosures would be provided to control the noise level within 80 dB(A), as per the requirement of Occupational Safety and Health Administration Standard (OSHA). The predicted noise levels at the boundary due to various plant activities do not exceed 30 dB (A). Hence, there will not be any adverse impact due to the noise generation on the habitations falling on the boundary of the proposed expansion project.

Noise Pollution Mitigation Measures

In the process, various equipment's like pumps, compressors and boilers etc will generate the noise. Greenbelt, landscaping with horticulture at power block areas

to reduce noise impacts is already being implemented. The recommendations to mitigate higher noise levels are:

Equipment's should be designed to conform to noise levels prescribed by regulatory authorities:

- Provision of acoustic barriers or shelters in noisy work places;
- Provision of hoods to noise generating equipments like pumps;
- Provision of thick greenbelt to attenuate the noise levels; and
- Provision of personal protective equipment (PPE) such as earplugs, earmuffs to the workers working in high noise level area.

1.8.7 Impacts on Socio-Economics

The requirement of skilled, unskilled and semi skilled manpower will be met from nearby villages during construction phase. The project will also help in generation of the indirect employment apart from direct employment. This will be a positive socio-economic development for the region. There will be a general upliftment of standard of living in the region.

1.9 Environmental Monitoring Program

Post project environmental monitoring is important in terms of evaluating the performance of pollution control equipment installed in the project. The sampling and analysis of the environmental attributes will be as per the guidelines of CPCB/ Chhattisgarh Environment Conversation Board (CECB). The frequency of air, noise, surface water and ground water sampling and location of sampling being as per the directives of CECB.

1.10 Risk Assessment and Disaster Management Plan

Risk assessment has been carried out to quantify the extent of damage and suggest recommendations for safety improvement for the proposed expansion project. Risk mitigation measures based on consequence analysis and engineering judgments are incorporated in order to improve overall system safety and mitigate the effects of major accidents.

An effective Disaster Management Plan (DMP) to mitigate the risks involved is in place for proposed expansion of power plant. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

1.11 Project Benefits

Proposed expansion of Sipat AUSC TDP Stage-III is a technology development project, which aims at development of higher efficiency power generation technology. After its successful implementation it will change the power

generation scenario in India and abroad, with an overall benefit of conservation of resources and reduction in pollution load per unit of electricity generated.

In addition, there will be beneficial impact of proposed expansion project on the civic amenities, as corporate social responsibility various activities will be started like welfare for poor/widows/physically challenged persons, capacity building programs, sports events, assistance to government schools, scholarships will be done. For community development trainings will be provided for woman for self-employment, community toilets, drinking water facilities etc. A separate budget will be made for these activities during operation of plant. Medical camps/health awareness camp will be organized in nearby villages for the state of Chhattisgarh.

1.12 Environmental Cost

A cost provision Rs. 957.32 crores has been kept towards providing environmental measures.

1.13 Conclusions

The proposed project would add significant benefits to technology development and self-reliance in power sector. The proposed expansion project would have minimal impacts on the environment. However, with proper and judicious implementation of the mitigation and environment management measures, the impacts can be further minimized and can be maintained well within the permissible limits specified by the regulatory authorities.

Thus, it can be concluded that with the strict implementation of the pollution control and mitigation measures, with proper environment management system in place the proposed expansion project will be beneficial to the society and will contribute to the economic development of the state in particular and the country in general.