PRE FEASIBILITY REPORT

FOR

Sipat Advanced Ultra Super Critical Technology Demonstration Project, Stage-III (1x800 MW)

NTPC Limited
(A Government of India Enterprise)

Engineering Office Complex
Sector -24, Noida
U.P. – 201301

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1.0 Executive Summary

Name of Project:	Sipat Advanced Ultra Super Critical Technology Demonstration (AUSC TDP), Stage-III (1x800MW) at Sipat, Dist. Bilaspur, Chhattisgarh
Name of Project Proponent:	M/s NTPC Ltd. (A Government of India Enterprise)
Location of the Project:	The plant is located in Bilaspur district of Chhattisgarh, having a latitude and longitude of 22° - 05’ to 22°-09’ (N) and 82° -16’ to 82° - 18' (E) respectively. The main plant, additional township facilites and other areas for Stage-III (1x800 MW) shall be accommodated in the land available with existing project. The vicinity map of the project is shown in **Exhibit-I**.
Capacity & Unit Configurations:	**Under Operation** Stage-I: 1980 MW (3x660 MW) Stage-II: 1000 MW (2x500 MW) **Proposed Expansion** Stage-III: 800 MW (1x800 MW)
Land Requirement, Current Land Use and Availability:	No additional land is proposed to be acquired for the project. About 170 acres of industrial 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 main plant 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.
Water Requirement and Availability:	Normal Make up water requirement for this project would be about 2400 Cu.M/hr with ash water re-circulation system in operation. However, whenever ash water system needs to be operated in once through mode, water drawl shall be of the order of 2650 cum/hr. Water requirement of Sipat STPS is being met from Right Bank Canal (RBC) originating from Hasdeo Barrage pondage. The same shall be used as water source for Stage-III also. 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.

Fuel Requirement:	Coal requirement for 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.
Environmental Setting of the Project	No ecological sensitive area exist within 15 km radius except for Amilipali Protected Forest (about 8 km E) and Sonathi Pahar Protected Forest (about 4.5 km NE) is located. Lilagarh river is about 3 km East and Kharung River (5 km, West), Arpa (12 km SW) from the project site.
Cost of the Project:	Approximate capital cost of the project would be about Rs. 9,484 Crore.

2.0 Introduction of the Project & Background Information

2.1 Identification of Project & Project Proponent

NTPC Limited (A Govt. of India Enterprise), is the largest power generating company in India. It was set up by Government of India (GoI) in November, 1975 with the objective of planning, promoting and organizing integrated development of thermal power in the country. In 1997, NTPC was conferred "Navratna" status by GoI and in 2007, it became 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. Company also plans to enter into nuclear power development.

Presently, NTPC generates power from Coal, Gas, Hydro and Renewable (i.e. Solar and Wind) projects. With an installed capacity of 52946 MW (as on October 2018), NTPC is the largest power generating major in the country. NTPC has also diversified itself into coal mining, power equipment manufacturing, power trading & distribution. With an increasing presence in the power value chain, NTPC is well on its way to becoming an Integrated Power Major.

The Advanced Ultra Super Critical (AUSC) mission of GOI envisages development of indigenous technology for steam parameters of 310 Kg/cm2 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.

2.2 Brief Description and Nature of the Project

Sipat AUSC TDP, Stage-III shall be a pulverised coal fired thermal power project based on advance ultra super critical boiler parameters. The proposal involves construction and operation of one units of 800 MW each. 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 System*
- *Chimney,*
- *Limestone and Gypsum Storage and Disposal Facilities,*
- *Ash Handling System with Dry Ash Extraction and wet mix system, Storage and Disposal Facilities,*
- *Electrical Systems: Generator Bus Duct, Transformers, Switchgears, Switch Yard etc.*

2.3 Need for the Project & Its Importance to the Country & Region

Power is one of the key infrastructural elements for the economic growth of a country. Proposed AUSC TDP is an ambitious and unique initiative aimed at establishing best in class power plant in India with target efficiency of 46%. Stage-III, is envisaged as a base load station to meet the power demand of Chhattisgarh and other States in Western Region.

2.4 Demand Supply Gap

Since Sipat AUSC TDP is a technology development project, the demand supply gap is not a prime consideration for this project. However, the demand supply scenario has been analysed in the following sections to establish the techno-economic feasibility of the project.

The anticipated power demand supply position of All India, Western Region and Chhattisgarh with and without the benefits of subject project has been worked out considering the following:

1) The demand as per 19th EPS.
2) The benefit of Power from Private Sector Projects is considered only to the state in which the Project is located.
3) The Commercial production is likely to commence in 2027 as the program envisages a 3 year demonstration period for proving the equipment designs in order to establish the technology.
4) The anticipated power supply position of the country excluding Sipat AUSCT Plant (1x800 MW) is summarized below:

Table-1: All India Demand-Supply Scenarios by 2026-27

DESCRIPTION	UNITS	2022-23	2023-24	2024-25	2025-26	2026-27
Peak Load	MW	238899	252288	266844	282418	298774
Energy Requirement	MKWH	1650594	1739618	1836001	1939111	2047434

Table-2: Western Region Demand-Supply Scenario by 2026-27

DESCRIPTION	UNITS	2022-23	2023-24	2024-25	2025-26	2026-27
Peak Load	MW	75275	79748	84502	89528	94825
Energy Requirement	MKWH	508032	535810	564915	595591	627624

The beneficiaries of Western Region/ other region(s) will be approached seeking their consent for allocation of power from this project. The power allocation by MoP, GOI will further be subject to the beneficiary states/distribution utilities concluding the Power Purchase Agreement (PPA) with NTPC emergencies and deficits of beneficiary states.

2.5 Imports vs. Indigenous Production

Not Applicable

2.6 Export Possibility

Not Applicable

2.7 Domestic/ Exports Market

Export Not Applicable. Power is envisaged to sell power in domestic market.

2.8 Employment Generation (Direct & Indirect) due to the Project

The project will generate direct and indirect employment opportunities as well as opportunities for self-employment. Power projects are mechanised and automated plants, therefore, the direct opportunities for employment during operation phase are limited. The estimated no. of employees during operation phase of the project is estimated to be about 150. However, during construction phase, the total no. of workers likely to be employed will be much higher (about 1000). In addition to the people directly involved in construction and operation of the power project, employment opportunities in subsidiary industries and service sectors as well as self employment opportunities shall also be generated.

3.0 Project Description:

3.1 Type of Project, Interlinked Project & Interdependent Project

Sipat AUSC TDP, Stage-III, shall be a pulverised coal fired thermal power project based on advance ultra super critical boiler parameters.

Location

The project is located in Bilaspur district of Chhattisgarh State situated near village Sipat. The site is bounded by latitude and longitude of 22o - 05’ to 22o-09’ (N) and 82 o -16’ to 82 o - 18' (E) respectively.

The site is approximately 20 Kms. from Bilaspur city and is approachable via Bilaspur-Baloda State Highway which passes through Sipat. The nearest railway station is Jairamnagar on the Nagpur-Raipur-Kolkata mainline. Bilaspur city is about 20 Kms. from Sipat STPS.

The nearest commercial airport, Raipur is about 150 kms from the project site.

The vicinity map of the project (on 1:50,000 scale toposheet) is shown in Exhibit-I. The latitudes and longitudes of the proposed site are as follows:

The Tentative General Layout Plan (GLP) of proposed site is enclosed as **Exhibit-II**.

3.2 Details of Alternate Sites

The Stage-I & II of the project are already under operation in the land acquired for the ultimate stage of Sipat STPP. Since, it is an expansion project for implementing Stage-III units and no additional land is proposed to be acquired; no alternative sites have been explored.

3.3 Size & Magnitude of Operation

The capacity of the proposed expansion would be 800 MW with installation of 1 units of 800 MW. It will consume about 3.34 Million Tonnes of coal per annum and 24 cusecs of water. The project will operate round the clock in three shifts of operation. Existing Sipat STPP, has already established a dedicated township. Additional quarters/facilities shall be constructed to accommodate staff of Stage-III.

3.4 Project Description & Process Details

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). The schematic diagram of the process of power generation a coal based thermal power plant is shown in **Exhibit III**. It has the following steps:

(1) 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.

(2) 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.

(3) 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.

(4) 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.

(5) The flue gases exiting from the Electrostatic Precipitators (ESPs) shall be treated in Flue Gas Desulphurisation 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.

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

(7) 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 demineralised water hence reuse is economical.*
- *The use of condenser lowers the temperature at the exit end and hence increases the efficiency of the turbine.*

(8) 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°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.

3.5 Requirement of Raw Materials

Coal and Water are the main raw materials proposed to be used in Sipat AUSC TDP, Stage-III for power generation.

Normal Make up water requirement for this project would be about 2400 Cu.M/hr with ash water re-circulation system in operation. However, whenever ash water system needs to be operated in once thru mode, water drawl shall be of the order of 2650 cum/hr.

Coal requirement for proposed project would be about 3.34 MTPA million at 90% PLF. In addition, LDO/ LSHS shall be used during start-up, warm up and low load

(up to 30%) operations. The hourly limestone requirement for 1x 800 MW unit shall be about 8 TPH based on design coal conditions.

3.6 Resource Optimization, Recycle & Reuse

Coal, Water and Land are the three main natural resources required for setting up of Sipat AUSC TDP Stage-III. With extensive experience in thermal power generation, NTPC shall make the best efforts to optimize the utilization of resources.

AUSC TDP shall be based on advanced ultra-super critical boiler parameters, which have higher thermal efficiency as compared to conventional pulverized coal has fired units based on super-critical boiler parameters. The increase in efficiency results in lower coal consumption as well as lower generation of ash and gaseous emissions per unit of electricity generated. NTPC shall make maximum efforts to utilize the ash generated from the project.

While developing the details of water system for the project utmost care shall be taken to minimize water requirement as well as effluent generation. Main features of the water system shall include:

- Recirculating type C.W. system with cooling towers.
- Utilization of Cooling Tower blow down for Coal dust suppression and extraction system, Service water system, Ash handling and Firefighting system.
- Recycle and reuse of effluents from coal dust suppression and extraction system and service water system
- Ash water recirculation system.
- Recirculation of filter backwash to clarifier inlet.

3.7 Availability of Water & Power

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..

The requirement of the construction power supply for the project would be met from the Sipat Stage-I &II.

3.8 Quantity of Wastes to be Generated

The wastes generated in a coal based power station consist of flue gas and ash generated due to combustion of coal and liquid effluents generated due to cooling, various industrial processes and domestic use of water.

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, it is estimated that about 1.3 MTPA of ash shall be generated annually. Gypsum 15 TPH generated from FGD plant shall also be utilized.

The project will have effluent treatment plant and various systems for recycle and reuse of treated effluents.

Domestic solid waste will be disposed by existing disposal systems.

3.9 Schematic Representation of Feasibility Drawing

A schematic of power generation process is presented in **Section 3.4** above. Further, details like Lay-out Plan, Plant Sections etc. shall be worked out during detailed Engineering stage.

4 Site Analysis

4.1 Connectivity

The site is approximately 20 Kms. from Bilaspur city and is approachable via Bilaspur-Baloda State Highway which passes through Sipat. The nearest railway station is Jairamnagar on the Nagpur-Raipur-Kolkata mainline. Bilaspur city is about 20 Kms. from Sipat STPS. The nearest commercial airport, Raipur is about 150 kms from the project site.

4.2 Existing Land Form, Land Use, Ownership & Topography

As the rock is encountered at shallow depth, open foundation for different facilities/structures is envisaged. The existing land available with NTPC is classified as Industrial land. As the site is already developed, hence plain topography with minor undulation have been observed.

4.3 Existing Infrastructure/ social infrastructure

A detailed analysis of social infrastructure available at site shall be undertaken during EIA Study. However, as the proposed site is located near Bilaspur district Headquarters, the social infrastructure available is of moderate level.

4.4 Soil Classification

The site is located in Chhattisgarh state (Central India) dominated by Black soils which is in local language called Bhata land. The colour of the soil is generally brownish to Black and sandy loam in nature.

4.5 Climatic Data

The climate is warm and temperate. When compared with winter, the summers have much more rainfall. The annual daily max temperature is 42.4 °C and annual daily minimum temperature is 13.8 °C. About 1018.2 mm of total precipitation falls

annually. The climatological tables for nearest IMD station at Durg are published by India Meteorological Department are enclosed at **Annexure-II**.

5 Brief Planning

5.1 Planning Concept

Since Sipat AUSC TDP is a technology development project, the demand supply gap is not a prime consideration for this project. However, the demand supply scenario has been analysed in Para 2.4 above to establish the techno-economic feasibility of the project. The site for project is selected based on the following considerations:

i. *Availability of suitable and adequate land*
ii. *Availability of reliable source of water*
iii. *Road and railway access*
iv. *Availability of infrastructural facilities*
v. *Conformity of Environmental Guidelines*

5.2 Population Projection

Power projects are highly mechanised and automated plants. Therefore, the direct opportunities for employment during operation phase are limited. The estimated no. of employees during operation phase of the project is estimated to be about 150. Considering the staff of CISF and support services, it is estimated that about 200 additional families will reside in the project township during operation stage. However, during construction stage, the number of workers will be much higher (about 1000). Temporary labour colonies with amenities like water supply and sanitation facilities shall be developed for the construction phase.

5.3 Land Use Planning

The land is already available with NTPC and proposed project will be accommodated within the existing land of Sipat STPP. About 170 acres of land is available for locating the unit within the vacant space in the MGR bulb. The land available is already under industrial use, therefore no land use change is envisaged. A green belt of is already being established all around main plant area except the switchyard site. In addition, large scale afforestation and plantation activities shall be undertaken in and around main plant and township areas in all available spaces.

5.4 Assessment of Infrastructure Demand and Amenities/ Facilities

The area possesses moderate level of infrastructural facilities. However, NTPC has already developed a township with various amenities/ facilities like Hospital (general hospital with support facilities), Pre-Nursery/ Nursery School, Higher Secondary School, Bank, Post Office, Telephone Exchange, Shopping Centre, Transport Centre, Petrol Pump, Community Center/ Club/ Welfare Association, Bal Bhawan, Sports

Complex, Auditorium, etc. Therefore, there will be no stress on the existing amenities/ facilities in the area.

6 Proposed Infrastructure

6.1 Industrial Area

Major part of the project shall be developed as Industrial Area – consisting of main plant area and ash disposal area. Major components of main power house complex are

- Main Plant Building
- Coal Handling & Storage Area
- Fuel Oil Handling & Storage Area
- Makeup Water System and Water Treatment Plant
- Cooling System with Cooling Towers
- Effluent Treatment Plant
- Electrostatic Precipitators, NOx Control System, FGD System and Chimney
- Ash Handling Plant
- Limestone and Gypsum Handling and Storage Area
- Switch Yard etc.

In addition, the project will have an ash disposal area connected with the main plant area through service roads and ash pipelines.

6.2 Residential Area

NTPC has already developed a full-fledged township consisting of various residential and non-residential buildings for staff of NTPC, CISF, Support Staff & staff of Associate Agencies, Trainees Hostel (Rooms), Guest Houses, Field Hostel etc.

Non-residential Buildings include Training Centre (Including Workshop), Hospital (general hospital with support facilities), Administrative Office, Pre-Nursery/ Nursery School, Higher Secondary School, Bank, Post Office, Telephone Exchange, Shopping Centre, Transport Centre, Petrol Pump, Community Center/ Club/ Welfare Association, Bal Bhawan, Sports Complex, Auditorium, CISF Armoury etc.

Additional residential buildings shall be constructed as per requirement.

6.3 Green Belt

A green belt has already been provided all around the project, covering both Stage-I and Stage-II units except switchyard side. In addition, large scale afforestation and green belt development activities shall be taken within all balance available spaces in plant and township areas. Beside this mass plantation will be carried out at surrounding villages, after availability of district administration.

6.4 Social Infrastructure

The proposed site is rural in nature located near Bilaspur district Headquarters. The social infrastructure available in area is of moderate level. However, as discussed

above, additional social infrastructural facilities like Hospital, Schools, Bank, Post Office, Shopping Centre, Welfare Association etc. are already developed.

6.5 Connectivity

The site is approximately 20 Kms. from Bilaspur city and is approachable via Bilaspur-Baloda State Highway which passes through Sipat. The nearest railway station is Jairamnagar on the Nagpur-Raipur-Kolkata mainline. Bilaspur city is about 20 Kms. from Sipat STPS. The nearest commercial airport, Raipur is about 150 kms from the project site.

6.6 Drinking Water Management

Entire Main Plant and Township areas has been provided with piped drinking water supply with a water treatment plant under Stage-I &II. The same shall be extended for Stage-III units also.

6.7 Sewerage System

Entire Main Plant and Township area of Stage I&II has been provided with an underground sewerage system with a sewage treatment plant based on biological process for treatment of sewage. The same shall be extended for Stage III units also.

6.8 Industrial Waste/ Solid Waste Management

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.

The fly ash shall be extracted in dry form from the electrostatic precipitator hoppers. This dry ash shall either be taken to buffer hoppers for its onward transportation in dry form for utilization or shall be slurrified in wetting units for its ultimate disposal in ash disposal area. The bottom ash shall be extracted and disposed off in wet form. It is envisaged to have disposal system sized for 100% generation of ash.

The ash management scheme for fly ash and bottom ash involves dry collection of fly ash, supply of ash to entrepreneurs for utilisation, promoting ash utilisation and safe disposal of unused ash. NTPC shall make maximum efforts to utilise the fly ash for various purposes. Unused fly ash and bottom ash shall be disposed off in the ash pond. A blanket of water shall be maintained over the entire ash pond to control fugitive dust emission. After the ash pond is abandoned, it shall be reclaimed through green vegetation. About 15 tonne per hour, Gypsum will be generated from FGD system shall also be utilized by user industries like POP/wall board gypsum and Cement Industries etc. There would be some additional domestic waste will be generated from 200 families and facilities of Stage-III. The solid waste management will be done as per Solid Waste Management Rules, 2016.

6.9 Power Requirement & Source

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

7 Coal Transportation

Mode of coal transportation from the coal mines to the power plant is by MGR/ IR. The same shall be used for Stage-III also.

8 Power Evacuation

Step up/power evacuation voltage of the project is 765 kV in line with all other units of exiting Sipat STPP. The issue of power evacuation of the proposed project shall be taken up with appropriate Transmission Utility (STU or CTU) as per regulatory provision.

9 Ash Utilization and Management

About 4000 tonne of ash per day i.e. about 1.3 million tonne ash per annum is envisaged from proposed project. The Ministry of Environment, Forests and Climate Change has issued a Gazette Notification dated 03.11.2009 which is an amendment to its earlier notifications dated 14.09.1999 and amendment dated 27.08.2003. The new notification stipulates that all coal based power stations/ units commissioned after the date of issue of notification have to utilize at least 50% of ash generated within 1 year, 70% within 2 years, 90% within 3 years and 100% within 4 years, respectively from the commissioning of the units. The notification dated 03.11.2009 further amended on 25.01.2016 also calls for utilization of 100% ash generated.

The amendment dated 25.01.2016 stipulates that the cost of transportation of ash for road construction projects or for manufacturing of ash based products or use as soil conditioner in agriculture activity (i) up to radius of 100 km shall be borne by TPP (ii) beyond 100 km and up to 300 km shall be shared equally between the user and TPP (iii) TPPs shall bear entire cost of transportation of ash within a radius of 300 km in the road construction projects under Pradhan Mantri Gramin Sadak Yojna and asset creation programs of the Govt. involving construction of buildings, road, dams and embankments.

10 Rehabilitation and Resettlement (R&R) Plan

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. Proposed 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. Therefore, no R&R involved in proposed project.

However, Community development/Corporate Environmental Responsibility activities will be taken up in the neighboring area. Some of the activities for community development are as follows:

Health	Upgradation of local PHC with equipments and infrastructure
	Partnership with Govt. for National Health Programmes like Polio, TB, Malaria etc.
	Health Camps for Family Planning and communicable diseases.
	Subsidized treatment in company hospitals
	Specific programmes to improve health indicators e.g. fertility rates, mortality rate, nutrition levels of children and vulnerable
	Specific Programmes for hygiene and sanitation
Education	Targeted programmes for primary education specially for girl child
	Augmentation of infrastructure and equipments, furniture, blackboard, toilets etc. in village schools
	Scholarships to meritorious students
	Adult education
	Partnerships in state sponsored education programmes
Physically Challenged	Helping aids to each category of physically challenged as per requirement
	Health Camps
Water Supply	Provision of potable drinking water supply in nearby villages through wells, hand pumps, tankers etc
	Awareness campaigns for water borne diseases, sanitation and hygiene
Capacity Building	Setting up new ITI with necessary infrastructure and machinery
	Sponsorship of old PAPs/ wards
	Short term courses for skill up gradation
	Vocational training (dairy, poultry, bee keeping, sericulture)
	Specific Programmes for Ladies (stitching, embroidery, tailoring etc)
Infrastructure Development	Construction of roads, drainage, community halls, school buildings, health centres, street lighting, equipments to educational institutions, public utilities, sanitation facilities, Health centres etc in nearby and affected area
Sports and Culture	Regular Rural Sports
	Facilitation/ Sponsorship to local talent
	Promotion of local festivals

	Participation of local community in national festivals
	Preservation of culture and heritage

11 Project Schedule & Cost Estimates

This power project is a technology demonstration project. The project is aimed to be executed within 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). The R&D Phase (2½ years) shall be completed in October, 2019, when the project construction is scheduled to start. The estimated cost of the Project is Rs. 9,484 Crores.

12 Analysis of Proposal (Recommendations)

Keeping in view the availability of sufficient land generally free from habitation and forests, nearness of source of water, proximity to Indian Railway system & National Highway and generally meeting the requirements of environmental guidelines, the site is considered prima-facie feasible for setting up a power project of capacity 1x800 MW.

Sipat AUSC TDP is a technology demonstration project. It's successful implementation shall begin a new era in thermal power generation. Construction and operation of the project will generate employment potential both directly or indirectly. Local people will have employment opportunities as skilled, semi-skilled and unskilled laborers as well as self-employment opportunities. Thus, there will be overall improvement in the socio-economic status of the people of the surrounding areas. Power plant will have a positive effect on the socio-economic conditions of the people nearby. With the implementation of the Stage-III of the project, employment opportunities, communication, medical facilities, education and skill up-gradation facilities etc. in the area will improved.

Besides, there will be marked improvement for various facilities in the local areas as shown below.

- Improvement in medical and health care system.
- Improvement in educational services.
- Improvement of drinking water & sanitation facilities.
- Vocational training facilities for local eligible youth of local community to enable them to seek employment in suitable project operations and elsewhere.
- Benefit to the State and the Central Governments through financial revenues from this project directly and indirectly.
- Employment opportunities to local persons of different skills and trades.
- Improvement in the socio-economic conditions of the inhabitants of the area

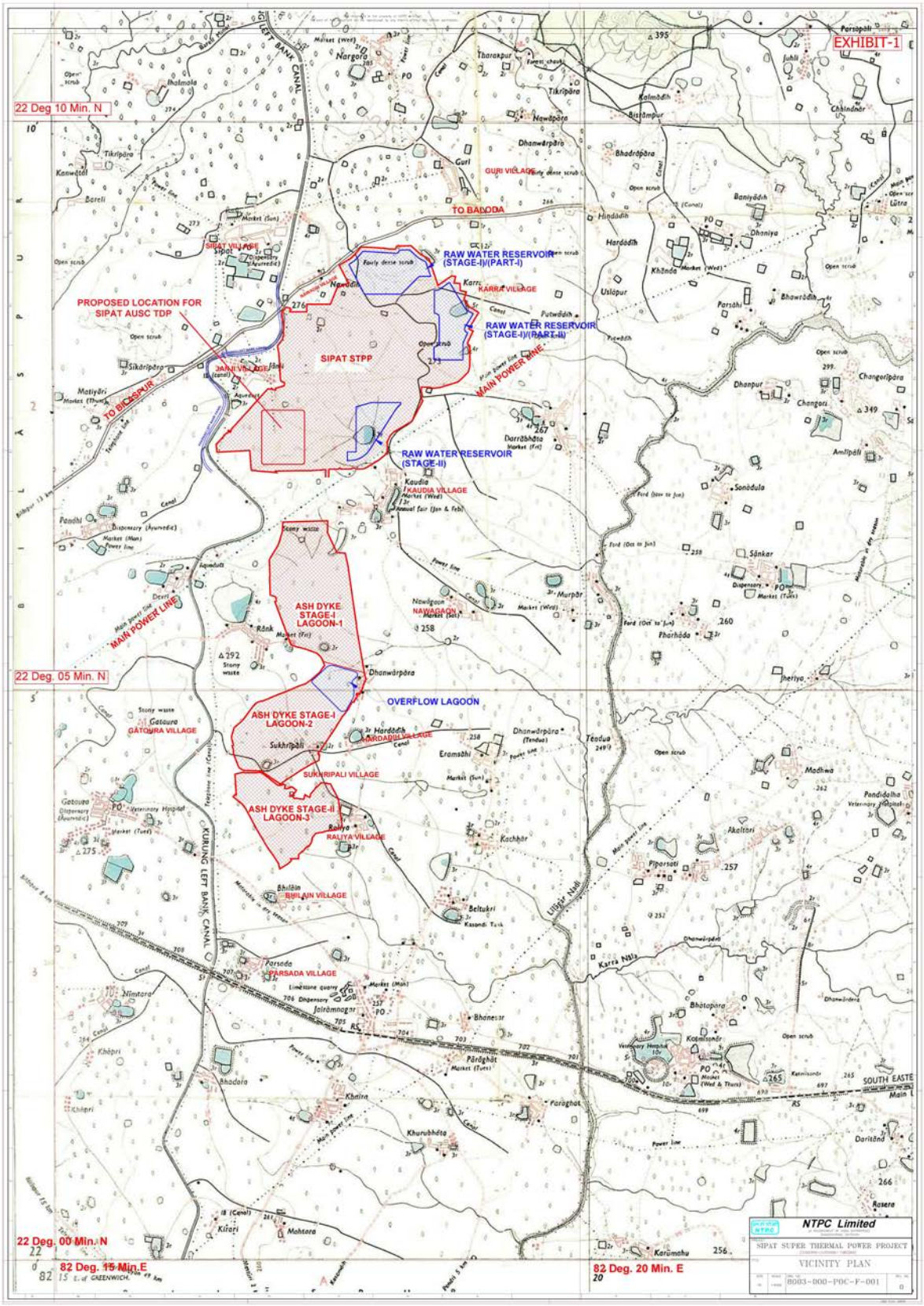

Exhibit-I: Vicinity Map of Sipat AUSCTDP Stage III

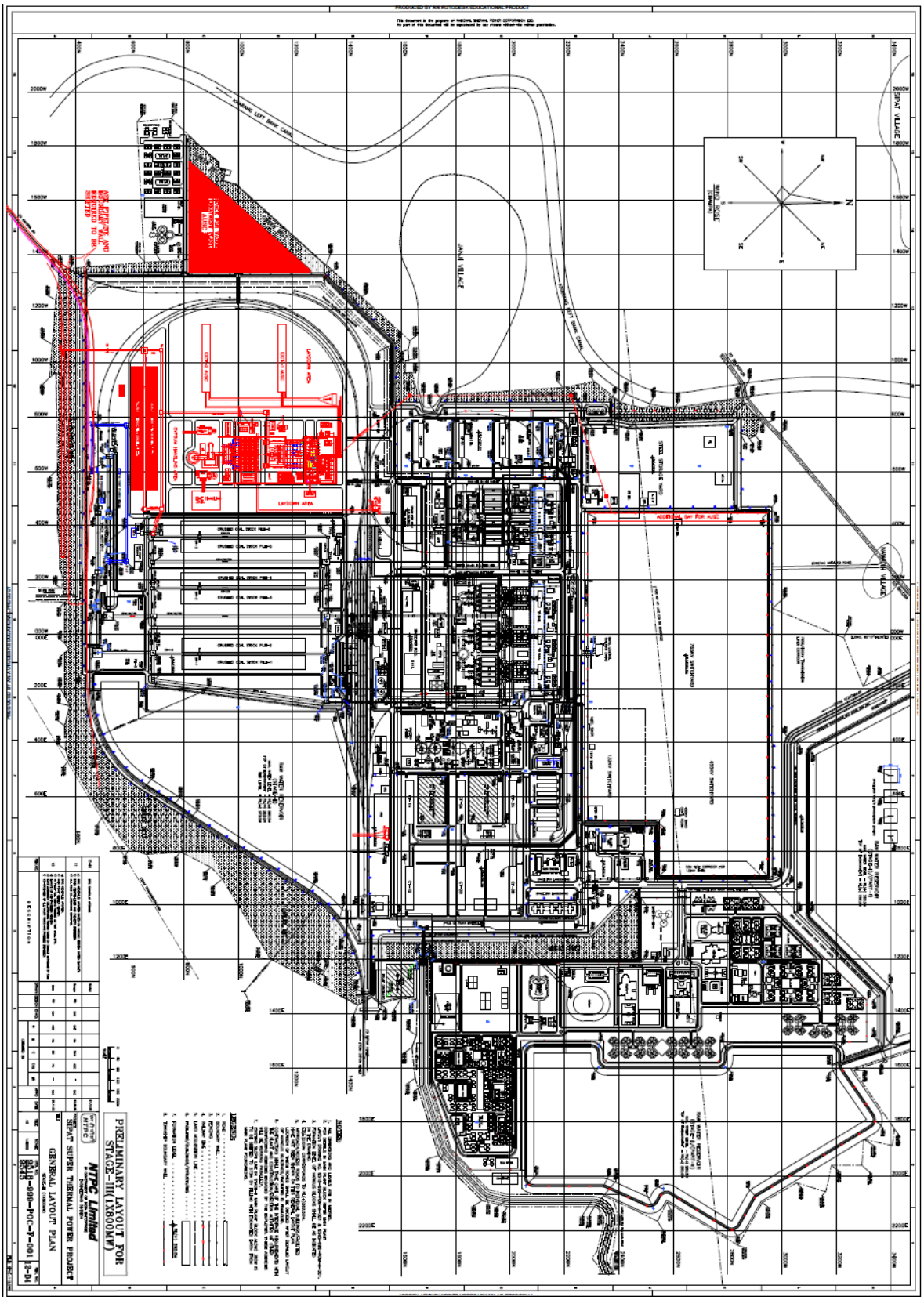

Exhibit-II: Tentative General Layout Plan

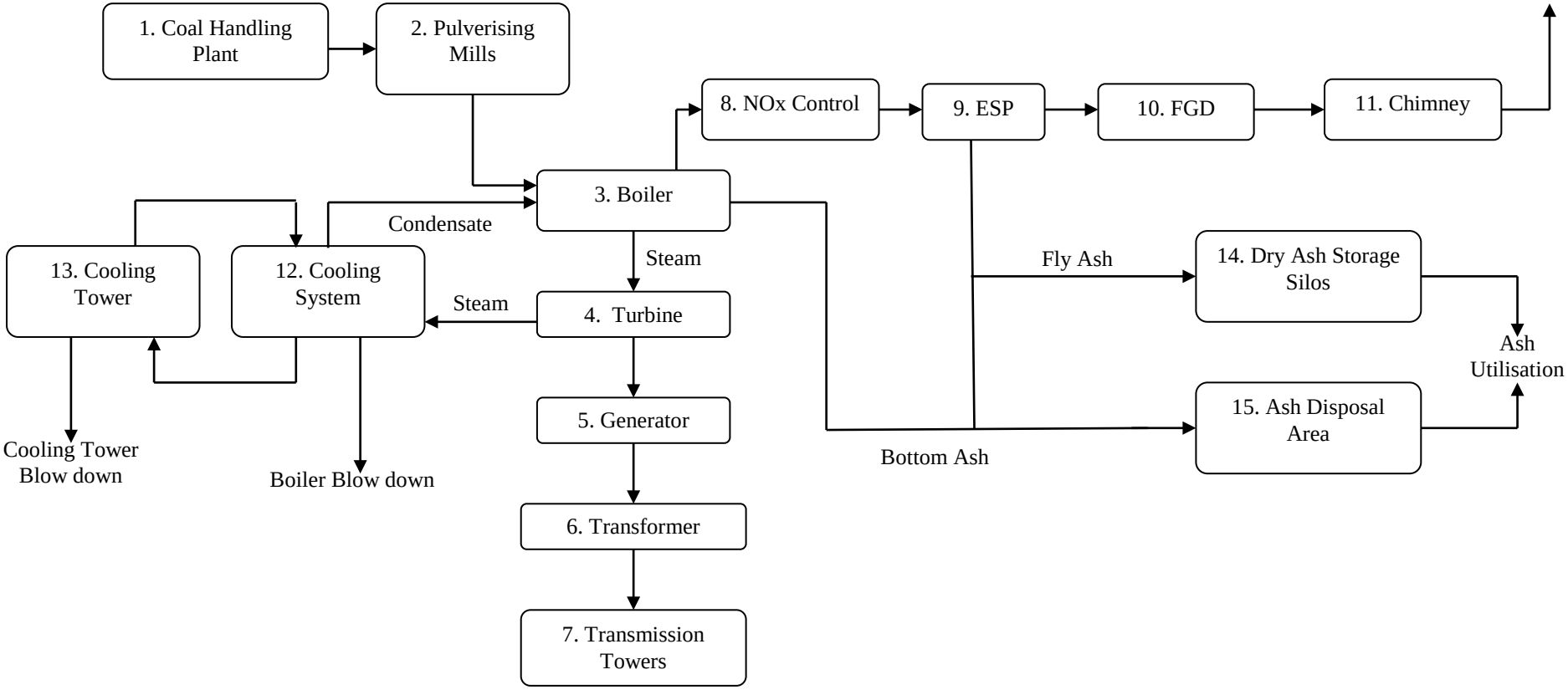

Exhibit-III: Schematic Representation of Thermal Power Generation in Coal Based Thermal Power Plant

Annexure-I

छत्तीसगढ़ शासन
जल संसाधन विभाग
मंत्रालय

क्र॰ /7/जल संसा/तकशाख/बो॰जल॰/2001/डी-4, रायपुर,दि॰ /11/01

प्रति,

मुख्य अभियंता
एसईसी-बांगो परियोजना
जल संसाधन विभाग
बिलासपुर (छत्तीसगढ़)

विषय- एनटीपीसी के सीपत सुपर थर्मल पॉवर प्रोजेक्ट (स्टेज-III) हेतु 120 मिलियन घनमीटर वार्षिक जल प्रदाय की पुनः अनुमति बाबत।

संदर्भ - म॰प्र॰शासन,जल संसाधन विभाग,भोपाल का पत्र क्र॰29/4/96/7/31/926, दिनांक 14-5-97.

राज्य जल संसाधन उपयोग समिति छत्तीसगढ़ की द्वितीय बैठक दिनांक 22/10/2001 के कार्यवाही विवरण के एजेण्डा आयटम क्र॰-2 में लिये गये निर्णय अनुसार छत्तीसगढ़ शासन नेशनल थर्मल पॉवर कार्पोरेशन के जिला बिलासपुर में प्रस्तावित सीपत सुपर थर्मल पॉवर प्रोजेक्ट (स्टेज-III) हेतु एसईसी बांगो परियोजना की दायीं मुख्य नहर के 37.95 किलोमीटर से योजना आयोग एवं केंद्रीय जल आयोग द्वारा औद्योगिक जल प्रदाय हेतु अनुमोदित कुल 400 मि॰घ॰मी॰ वार्षिक जल आपूर्ति के प्रावधान के अंतर्गत 120 मि॰घ॰मीटर वार्षिक जल प्रदाय की पुनः स्वीकृति म॰प्र॰शासन,जल संसाधन विभाग के संदर्भित पत्र दि॰ 14-5-97 के संदर्भ में निम्न शर्तों के साथ प्रदान करता है :--

(1) एनटीपीसी-सीपत को एसईसी बांगो परियोजना की दायीं तट मुख्य नहर के 37.95 कि॰मी॰ से जल प्रदाय किया जावेगा एवं इस हेतु आवश्यक सभी स्ट्रक्चरों का निर्माण जल संसाधन विभाग द्वारा स्थल की उपयुक्त उपलब्धता के आधार पर किया जावेगा। एनटीपीसी द्वारा इस हेतु एक वेट रेग्युलेटर बनाने की मांग की गई है,जिसकी तिरस्कार क्षमता का निर्धारण मुख्य अभियंता,एसईसी बांगो परियोजना,बिलासपुर द्वारा किया जावेगा।

(2) एनटीपीसी द्वारा जल प्रदाय बाबत् आवश्यक स्ट्रक्चरों के निर्माण तथा अन्य कार्य हेतु व्यय का वहन करना पड़ेगा तथा इस हेतु जल संसाधन विभाग को रू॰ 8.00 करोड़ की राशि एनटीपीसी द्वारा

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आदेश जारी होने की तिथि से एक माह की अवधि में प्रदान की जायेगी। विभाग द्वारा भविष्य में कराये जाने वाले उन कार्यों पर लगने वाली वास्तविक राशि का पूरा व्यय एन०टी०पी०सी० को (यदि व्यय 8.00 करोड़ रुपये से अधिक आता है तब) वहन करना होगा।

(3) छत्तीसगढ़ शासन,जल संसाधन विभाग द्वारा समय-समय पर निर्धारित जल दर एवं अन्य दरें जो इस प्रयोजन हेतु लागू की जायेगी,एन०टी०पी०सी० द्वारा देय होगी। एन०टी०पी०सी० ने अपने पत्र दिनांक 1/10/2001 द्वारा छत्तीसगढ़ शासन द्वारा निर्धारित जल दर भुगतान हेतु सहमति दी है।

(4) एन०टी०पी०सी० को इसदेव बांगो बांधी तट नहर के कमांड सायफिल अवधि में जल प्रदाय किये जाने की दशा में जल प्रदाय की मात्रा पर इसदेव मुख्य नहर से 37.95 कि०मी० के छोर तक लगभग 30% जल क्षति का समायोजन कर बिलिंग की जायेगी।

(5) एन०टी०पी०सी० को स्वीकृति जारी होने के दिनांक से 5 वर्ष के अंदर जल का उपयोग प्रारंभ करना होगा,अन्यथा यह स्वीकृति निरस्त मानी जायेगी।

(6) एन०टी०पी०सी० उपयोग के पश्चात् निस्सारित जल को रिसायकलिंग करके क्षेत्र में उपयोग करेगा तथा राज्य प्रदूषण नियंत्रण बोर्ड के नियमानुसार अवधारित कर निस्सारित करेगा,ताकि निचले भाग (डाउन स्ट्रीम) के क्षेत्र में जल प्रदूषण की कोई समस्या उत्पन्न न हो।

(7) एन०टी०पी०सी० द्वारा जल प्रदाय संबंधी समस्त औपचारिकताएं शासन द्वारा निर्धारित प्रारूप-7(क) में अनुबंध कर पूर्ण करने की बाध्यता होगी एवं यदि किसी कारण से जल प्रदाय में बाधा आती है,तो जल संसाधन विभाग पर एन०टी०पी०सी० का कोई दावा मान्य नहीं होगा।

संलग्न- शून्य।

(एस०के०भादुड़ी)
विशेष कार्यपालन अधिकारी(अधीक्षण यंत्री)
छत्तीसगढ़ शासन,जल संसाधन विभाग
मंत्रालय

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पृ०क्रम कि /ए/जलसं/तकनीकी/[illegible] रायपुर, दिनांक [illegible]

प्रतिलिपि–

1) सचिव, ऊर्जा विभाग, छत्तीसगढ़ शासन, रायपुर ।

2) अध्यक्ष, छत्तीसगढ़ राज्य विद्युत मण्डल, रायपुर ।

3) प्रमुख अभियंता, जल संसाधन विभाग, रायपुर ।

4) डायरेक्टर (पी०एण्डसी०) केन्द्रीय जल आयोग, भारत शासन, 400, सेवा भवन, आर०के०पुरम, नई दिल्ली ।

5) सचिव, सी०ई०ए०, सेवा भवन, आर०के०पुरम नई दिल्ली ।

6) श्री एबिलीस, डायरेक्टर (टेक्नीकल), एन०टी०पी०सी०लिमिटेड, एन०टी०पी०सी० भवन, स्कोप काम्प्लेक्स, 7 इन्स्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली- 110003.

7) श्री एस०त्रिवेदी, जनरल मैनेजर, एन०टी०पी०सी०लिमिटेड, सीपत सुपर थर्मल पावर प्रोजेक्ट, सीपत - 495558, जिला बिलासपुर (छ०ग०) की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित ।

संलग्न- शून्य ।

(एस०के०भाटुड़ी)
विशेष कर्तव्यस्थ अधिकारी-(कनिष्ठ मंत्री)
छत्तीसगढ़ शासन, जल संसाधन विभाग
मंत्रालय

Annexure-II

जलवायवी सारणी
CLIMATOLOGICAL TABLE

BACK

स्टेशन : दुर्ग
STATION : Durg

अक्षांश LAT. 21°11' देशांतर LONG. 81°17' समुद्री तल माध्य से ऊंचाई HEIGHT ABOVE M.S.L. 293 मीटर METRES

प्रेक्षणों पर आधारित BASED ON OBSERVATIONS 1971-1991

माह / MONTH		स्टेशन का सतह दाब / STATION LEVEL PRESSURE (एच.पी.ए / hPa)	वायु तापमान / AIR TEMPERATURE — माध्य / MEAN: शुष्क बल्ब / DRY BULB (डि. से / °C)	नम बल्ब / WET BULB (डि. से / °C)	दैनिक अधिकतम / DAILY MAX (डि. से / °C)	दैनिक न्यूनतम / DAILY MIN (डि. से / °C)	माह में उच्चतम / HIGHEST IN THE MONTH (डि. से / °C)	माह में निम्नतम / LOWEST IN THE MONTH (डि. से / °C)	चरम / EXTREMES: उच्चतम / HIGHEST (डि. से / °C)	दिनांक और वर्ष / DATE AND YEAR	निम्नतम / LOWEST (डि. से / °C)	दिनांक और वर्ष / DATE AND YEAR	आर्द्रता / HUMIDITY: सापेक्ष आर्द्रता / RELATIVE HUMIDITY (प्रतिशत / %)	वाष्प दाब / VAPOUR PRESSURE (एच.पी.ए / hPa)	मेघ की मात्रा / CLOUD AMOUNTS (आकाश के अष्ठमाश / Oktas of sky): समस्त मेघ / ALL CLOUDS	निम्न मेघ / LOW CLOUDS	वर्षा / RAINFALL: मासिक योग / MONTHLY TOTAL (मि.मि. / mm)	वर्षा के दिनोंकी संख्या / NO. OF RAINY DAYS	वर्षसहित सबसे नम महीने का योग / TOTAL IN WETTEST MONTH WITH YEAR (मि.मि. / mm)	वर्षसहित शुष्कतम महीने का योग / TOTAL IN DRIEST MONTH WITH YEAR (मि.मि. / mm)	24 घंटोंकी सबसे भारी वर्षा / HEAVIEST FALL IN 24 HOURS (मि.मि. / mm)	दिनांक और वर्ष / DATE AND YEAR	माध्य पवन गति / MEAN WIND SPEED (कि.मी. प्र. घं. / Kmph)
जनवरी JAN	I	982.5	16.7	13.8	28.2	13.8	31.5	9.9	36.3	2 1980	8.0	5 1991	70	13.3	1.1	0.6	11.1	0.5	142.0 1984	0.0	42.2	10 1984	2.2
फरवरी FEB	I	980.6	19.6	15.4	30.3	16.3	34.7	11.9	39.3	22 1974	10.2	9 1972	62	14.3	1.2	0.6	6.6	0.7	34.0 1979	0.0	32.0	7 1979	3.1
मार्च MAR	I	978.6	24.9	18.2	35.8	20.7	39.9	15.9	42.4	30 1985	12.0	2 1971	51	15.8	0.9	0.3	7.5	0.6	48.2 1971	0.0	48.2	5 1971	3.2
अप्रैल APR	I	975.2	30.4	22.2	40.1	25.0	43.2	21.1	45.3	28 1973	18.1	19 1971	47	20.3	0.7	0.5	16.6	0.7	94.0 1978	0.0	90.0	22 1978	4.4
मई MAY	I	971.2	33.6	24.1	42.4	28.2	45.3	23.2	47.4	31 1988	20.4	3 1987	44	22.6	1.2	0.5	11.9	0.6	65.5 1977	0.0	65.5	8 1977	5.0
जून JUN	I	968.0	30.1	25.1	37.6	26.6	43.6	22.4	46.0	11 1979	20.0	3 1988	68	27.9	4.7	2.9	163.4	7.5	370.6 1971	12.0 1987	113.0	11 1970	6.4
जुलाई JUL	I	968.5	26.3	24.4	31.0	24.2	35.5	21.9	40.4	1 1987	20.5	17 1972	85	29.1	6.6	4.5	300.9	12.8	718.5 1973	11.2 1988	169.6	2 1970	6.4
अगस्त AUG	I	969.0	26.3	24.5	30.5	24.3	34.0	22.3	35.4	4 1987	20.5	21 1971	85	29.3	6.1	4.5	274.7	11.6	470.3 1978	219.4 1979	115.4	18 1983	5.1
सितम्बर SEP	I	973.2	26.8	24.6	31.7	24.3	34.5	22.1	36.4	28 1987	20.4	13 1978	82	29.1	3.7	2.2	161.1	6.5	483.2 1980	25.1 1984	130.4	15 1983	3.6
अक्तूबर OCT	I	977.5	25.0	22.2	32.3	22.0	34.8	18.1	38.0	2 1984	15.0	29 1974	77	24.7	2.0	1.1	55.5	3.0	236.0 1973	0.0	65.8	4 1973	2.9
नवम्बर NOV	I	980.8	20.7	17.5	30.2	17.5	32.7	13.6	38.3	3 1975	9.0	30 1975	70	17.5	1.1	0.6	6.5	0.3	82.0 1972	0.0	59.6	26 1972	2.2
दिसम्बर DEC	I	983.2	16.8	14.1	27.7	13.9	30.5	10.6	34.4	14 1984	7.8	8 1970	71	14.0	0.8	0.4	2.4	0.1	41.0 1978	0.0	41.0	2 1978	1.9
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	975.8	24.5	20.4	33.0	21.4	44.7	10.3	47.4	31	7.8	8	68	21.5	2.5	1.6	1018.2	44.8	1519.1	740.3	169.6	2	3.9
वर्षोंकी सं NUMBER OF YEARS	I	20	20	20	19	19	19	19	22		22		20	18	20	20	19	19	19	19	19		13

जलवायवी सारणी
CLIMATOLOGICAL TABLE

स्टेशन : दुर्ग
STAION : Durg

	मौसम परिघटना						पवन													मेघ												टृश्यता				
	के साथ दिनों की संख्या						पवन की गती के साथ दिनों की संख्या (कि. मी. प्र. घं.)				पवन की दिशा के दिनों की संख्या का प्रतिशत									मेघ मात्रा (सभी मेघ) सहित दिनों की संख्या - अष्ठमांश					निम्न स्तरी मेघ मात्रा सहित दिनों की संख्या - अष्ठमांश						टृश्यता सहित दिनों की संख्या				
माह	वर्षण 0.3 मि.मि.या अधिक	ओले	गर्जन	कुहरा	धूल भरी आंधी	चंड वात	62 या अधिक	20-61	1-19	0	उ	उपू	पू	दपू	द	दप	प	उप	शांत	0	ले-2	3-5	6-7	8	0	ले-2	3-5	6-7	8	कुहरा 8	1 कि.मी. तक	1-4 कि.मी.	4-10 कि.मी.	10-20 कि.मी.	20 कि.मी. से अधिक
	WEATHER PHENOMENA						WIND													CLOUD											VISIBILITY				
	No. OF DAYS WITH						No. OF DAYS WITH WIND SPEED (Km. p. h.)				PERCENTAGE No. OF DAYS WIND FROM									No. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) O K T A S					No. OF DAYS WITH LOW CLOUD AMOUNT O K T A S						No. OF DAYS WITH VISIBILITY				
MONTH	PPT 0.3 mm Or more	HAIL	THUN DER	FOG	DUST STORM	SQU ALL	62 Or more	20-61	1-19	0	N	NE	E	SE	S	SW	W	NW	CALM	0	T-2	3-5	6-7	8	0	T-2	3-5	6-7	8	FOG 8	UP TO 1 Km.	1-4 Kms.	4-10 Kms.	10-20 Kms.	OVER 20 Kms.
जनवरी I	0.5	0.0	0.0	0.0	0.0	0.0	0	0	28	3	38	27	1	5	2	8	2	7	10	24	1	2	2	2	28	1	1	0	1	0	0.1	0.0	0.8	7.3	23.0
JAN II																				27	1	1	1	1	28	1	1	0	1	0	0.0	0.0	0.1	8.5	22.4
फरवरी I	1.1	0.0	0.1	0.0	0.0	0.0	0	0	26	2	37	29	2	1	5	11	1	7	7	23	1	1	2	1	24	1	2	0	1	0	0.1	0.0	0.2	7.9	19.8
FEB II																				24	1	1	1	1	24	1	1	1	1	0	0.0	0.0	0.0	8.1	19.9
मार्च I	0.6	0.0	0.2	0.0	0.0	0.0	0	0	28	3	23	20	2	4	9	20	4	7	11	26	1	2	1	1	28	1	1	0	1	0	0.0	0.0	0.9	5.4	24.7
MAR II																				27	1	1	1	1	29	1	1	0	0	0	0.0	0.0	1.1	5.6	24.4
अप्रैल I	1.3	0.0	1.0	0.0	0.0	0.0	0	0	29	1	13	8	0	4	11	47	4	7	6	25	1	2	1	1	27	1	1	0	1	0	0.0	0.0	0.7	6.1	23.3
APR II																				23	1	3	2	1	25	2	2	1	0	0	0.0	0.0	0.5	8.5	20.9
मई I	0.9	0.0	0.5	0.0	0.0	0.0	0	1	29	1	13	10	1	2	6	46	7	12	3	22	3	3	2	1	27	2	1	1	0	0	0.0	0.0	0.1	7.1	23.8
MAY II																				21	2	3	3	2	24	2	3	1	1	0	0.0	0.0	0.2	8.3	22.5
जून I	8.7	0.0	1.1	0.0	0.0	0.0	0	0	28	2	4	3	1	2	6	59	9	8	8	7	2	4	4	13	14	3	5	3	5	0	0.0	0.0	1.1	13.2	15.8
JUN II																				7	1	3	6	13	14	1	6	4	5	0	0.0	0.0	1.2	16.4	12.4
जुलाई I	14.3	0.0	1.6	0.0	0.0	0.0	0	0	31	0	2	2	1	1	12	70	8	3	1	2	1	3	3	22	9	1	3	4	14	0	0.0	0.0	2.4	22.7	5.9
JUL II																				3	0	3	5	20	6	1	4	4	16	0	0.0	0.0	2.2	23.1	5.7
अगस्त I	12.8	0.0	0.1	0.0	0.0	0.0	0	0	30	1	5	4	1	2	9	58	10	7	4	3	1	5	5	17	8	1	4	5	13	0	0.0	0.0	2.8	19.6	8.6
AUG II																				4	1	4	5	17	6	1	6	5	13	0	0.0	0.0	2.1	20.6	8.4
सितम्बर I	7.3	0.0	0.1	0.0	0.0	0.0	0	0	29	1	10	8	1	2	8	42	13	12	4	13	2	5	3	7	18	2	3	2	5	0	0.0	0.0	1.9	10.8	17.3
SEP II																				7	1	4	6	12	12	3	6	3	6	0	0.0	0.0	1.3	18.0	10.8
अक्तूबर I	3.1	0.0	0.1	0.0	0.0	0.0	0	0	28	3	28	24	2	4	4	17	4	8	9	20	2	2	3	4	25	1	2	1	2	0	0.1	0.0	0.7	7.9	22.4
OCT II																				22	1	1	4	3	23	2	2	2	2	0	0.1	0.0	0.7	9.8	20.4
नवम्बर I	0.5	0.0	0.0	0.0	0.0	0.0	0	0	25	5	34	31	3	3	4	7	0	5	13	25	1	1	1	2	27	1	1	0	1	0	0.0	0.0	0.2	7.2	22.5
NOV II																				27	0	1	1	1	27	0	1	1	1	0	0.0	0.0	0.1	7.9	22.0
दिसम्बर I	0.1	0.0	0.0	0.0	0.0	0.0	0	0	28	3	39	30	4	2	5	5	1	5	9	26	2	1	1	1	28	1	1	0	1	0	0.0	0.0	0.4	6.0	24.6
DEC II																				29	1	1	0	0	29	1	1	0	0	0	0.0	0.0	0.1	6.5	24.4
वार्षिक योग या माध्य I	51.2	0.0	4.7	0.0	0.0	0.0	0	1	339	25	20	16	2	3	7	33	5	7	7	225	17	31	28	64	267	18	24	18	38	0	0.2	0.0	12.1	115.5	237.3
ANNUAL TOTAL OR MEAN II																				237	10	27	35	56	258	15	33	22	37	0	0.1	0.0	9.5	124.6	230.9
वर्षोंकी सं I NUMBER OF YEARS II	19						16				18									20					20						20				