



**Monitoring report form
(Version 04.0)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Waste Heat Recovery based captive power generation by SKS Ispat Ltd
Reference number of the project activity	0674
Version number of the monitoring report	01
Completion date of the monitoring report	15/09/2014
Registration date of the project activity	17/12/2006
Monitoring period number and duration of this monitoring period	5 th Monitoring Period 01/01/2013 to 31/12/2013
Project participant(s)	SKS Ispat & Power Limited Chubu Electric Power Co., Inc.
Host Party(ies)	India
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	<p>Sectoral scope : 1 - Energy industries (Renewable - / non-renewable sources)</p> <p>Methodology applied: Methodology: "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"</p> <p>Reference: Approved consolidated baseline methodology ACM0004/Version 02</p>
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	116,773 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	49,397 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	Not Applicable
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1	49,397 tCO ₂ e

January 2013 onwards (if applicable).	
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SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The purpose of the project activity is to contribute to the welfare of environment at large considering the carbon di-oxide emissions that would have been generated by a thermal plant of equal capacity. The project hence decreases the future needs for coal based power generation by the grid and thereby reducing the CO₂ emissions from the electricity sector.

Brief description of the installed technology and equipment:

There are 2x350TPD DRI Kilns and 2x100TPD DRI Kilns installed for sponge iron production. Waste gas coming out from 2x350TPD DRI Kilns and 2x100TPD DRI Kilns are recovered through 2x38TPH and 2x12TPH Waste Heat Recovery Boiler (WHRBs) respectively. Combined capacity of all 04 WHRBs produces about 25 MW of Electrical Power.

Each 350 TPD DRI Kiln for Sponge Iron production emits normally around 90,000Nm³/hr of hot gas (temperature of 950-1000°C) that contains heat energy of ~29,000,000 kcal/hr which, if not suitably utilized, goes to waste. Similarly exit gas flow for each 100 TPD kiln is around 30000 Nm³/hr at around 950°C that contains heat energy ~ 9,000,000 kcal/hr.

The DRI Gas, as it comes out of the After Burning Chamber, contains sufficient quantity of Heat-Energy. This energy waste could be abated by installing Waste Heat Recovery Boiler at the tail end of each DRI Kiln which in fact works as a cooler for the high temperature gas. Heat that is extracted from the hot gas is utilised in transforming water to high temperature – high pressure Steam to run conventional condensing type Steam Turbo – Generator. There is a 25 MW Turbo-generator to be fed by 2 x 12 TPH and 2 x 38 TPH WHRB Boilers. The temperature and pressure maintained in the boiler are 495°C and 66 kg/cm². It has been envisaged that the Captive Power Plant will operate in synchronous mode with 132 kV grid of Chhatisgarh State Electricity Board.

Date of commissioning of equipments can be referred from section B.1.

Total GHG emission reductions achieved during this monitoring period (01/01/2013 to 31/12/2013) is 49,397 tCO₂e.

A.2. Location of project activity

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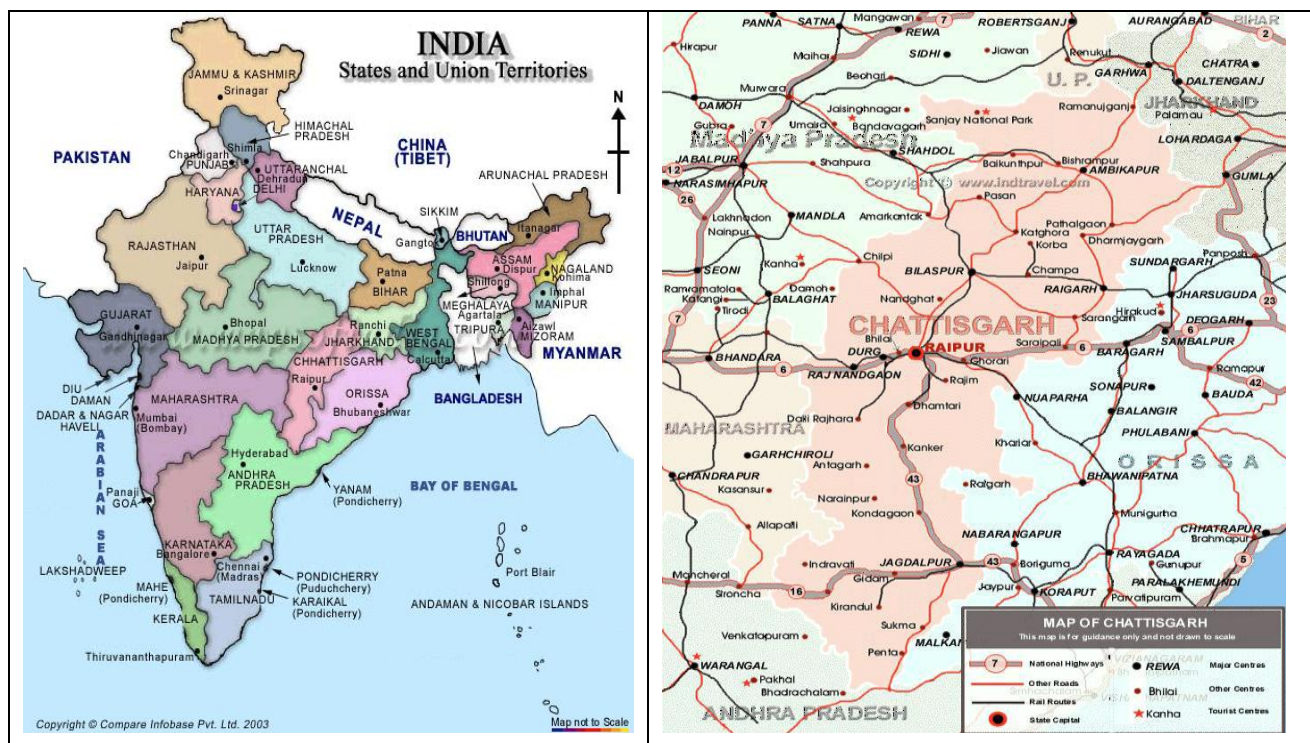
India is the host party for the project activity.

Region: Raipur
Village: Siltara
District: Raipur
State : Chhatisgarh

The plant is located at Siltara, which is a well developed industrial area. The plant site is situated at about 1km from NH-6 on Bilaspur-Raipur route. Nearest railway station (7km from site) is Mandhar on South Eastern railway between Mumbai and Kolkata route.

The plant site is located at 81°35' E Longitude, 21°20' N Latitude.

The physical location is depicted in maps below.



A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Party)	SKS Ispat and Power Limited (Private Entity)	No
Japan	Chubu Electric Power Co., Inc. (Public Entity)	No

A.4. Reference of applied methodology and standardized baseline

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Methodology: "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"

Reference: Approved consolidated baseline methodology ACM0004/Version 02, Sectoral Scope: 1, 03 March 2006

A.5. Crediting period of project activity

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01/01/2007 - 31/12/2016 (Fixed)

5th monitoring period: (01/01/2013 – 31/12/2013)

A.6. Contact information of responsible persons/ entities

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Bipin Jain, Mobile no – 09752447518, Designation - President (power)

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The project activity is undergoing verification for its fifth monitoring period.

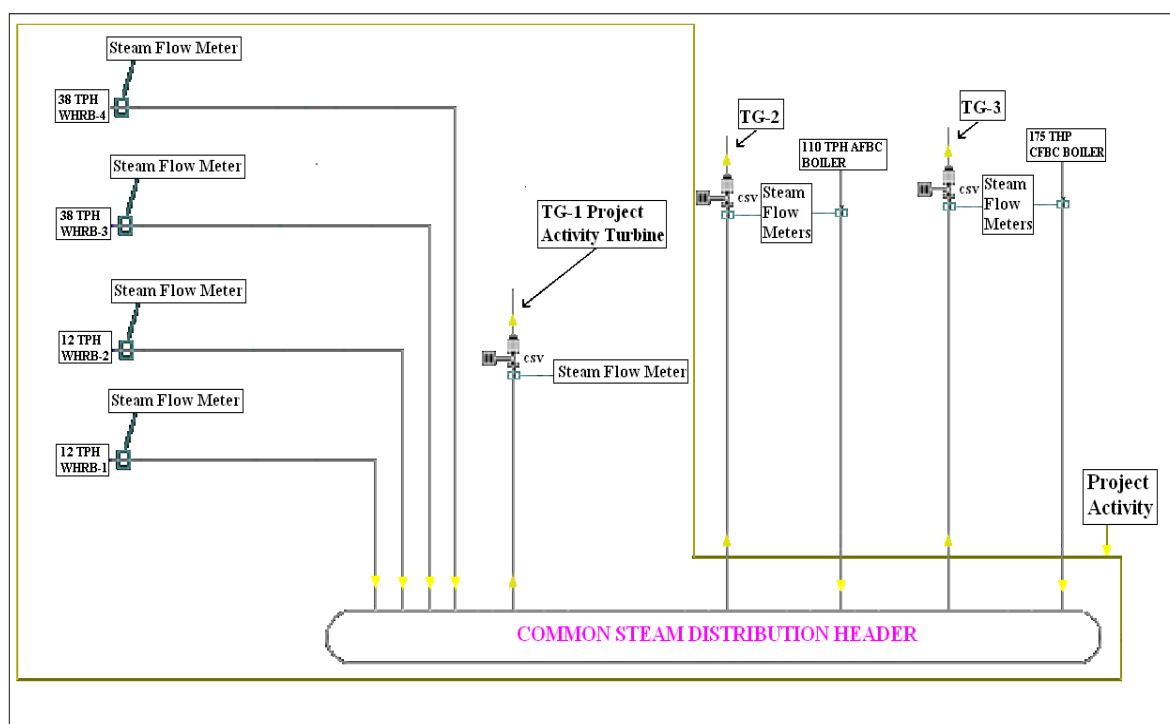
During this monitoring period (01/01/2013 - 31/12/2013), the project activity was operated and monitored in accordance with the approved monitoring methodology and approved monitoring plan of registered PDD.

Dates of commissioning of various components of the project activity are as follow:

Equipments	Date of commissioning
TG-1	27/02/2006
TG-2	01/09/2007
TG-3	17/02/2010
AFBC	02/06/2007
CFBC	06/02/2010
WHRB-1	20/04/2006
WHRB- 2	20/04/2006
WHRB-3	30/06/2006
WHRB- 4	30/06/2006

Description of the installed technology, technical process can be referred from section A.1.

Line diagram from the project activity can be referred from the following page:



Outage Details of Turbine:

2013	Running hrs.	Outage hrs.	Total	Days
January	736.32	7.68	744	31

February	628.92	43.08	672	28
March	587.25	156.75	744	31
April	720.00	0	720	30
May	738.85	5.15	744	31
June	319.66	400.34	720	30
July	0	744.00	744	31
August	445.68	298.32	744	31
September	719.91	0.09	720	30
October	526.05	217.95	744	31
November	716.68	3.32	720	30
December	743.7	0.30	744	31
Total	6883.02	1876.98	8760	365

The project is in operation since commissioning. There is no exchange of equipments or major breakdown of equipments during the current monitoring period. Also, no such event occurred during the current monitoring period that may have impact on the applicability of methodology.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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This section is left blank intentionally as not applicable.

B.2.2. Corrections

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This section is left blank intentionally as not applicable.

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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The revision in monitoring plan is approved by EB on 11/05/2012.¹

B.2.4. Changes to project design of registered project activity

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This section is left blank intentionally as not applicable.

B.2.5. Changes to start date of crediting period

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This section is left blank intentionally as not applicable.

B.2.6. Types of changes specific to afforestation or reforestation project activity

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This section is left blank intentionally as not applicable.

¹ <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1159469829.04/view>

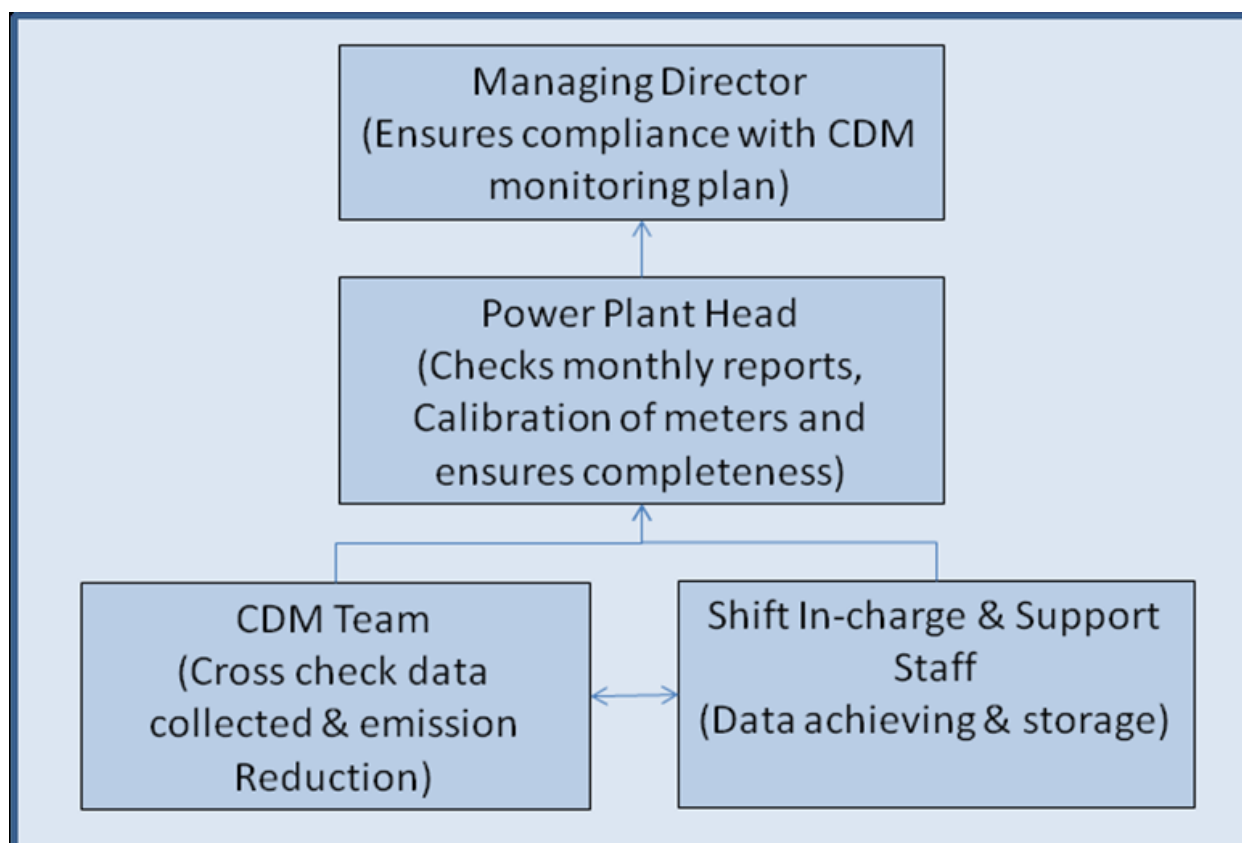
SECTION C. Description of monitoring system

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Monitoring Plan:

Project activity monitoring is carried out by a team which is responsible for plant operations & maintenance. This team is responsible for data collection and archiving. This team meets periodically to review CDM project activity check data collected, emissions reduced etc. On a periodic basis, the monitoring reports are checked and discussed by the senior team members. In case of any irregularity observed, it is informed to the concerned person for necessary actions. The below flow chart indicates the personnel involved and respective responsibilities follows.

Project Management Plan:



MD: Overall responsibility of compliance with the CDM monitoring plan

Power Plant Head: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation

CDM Team: This team is responsible to review CDM project activity data collected, emissions reduced etc.

Shift In-charge: Responsibility of daily report generation, log preparation, data recording, maintenance and calibration of monitoring equipments

Data Monitoring:

The methodology requires monitoring of the following:

- ☐ Net electricity generation from the proposed project activity;

- ☐ Data needed to calculate carbon dioxide emissions from fossil fuel consumption due to the project activity;
- ☐ Data needed to estimate combined margin- grid emission factor fixed ex-ante and hence no requirement to monitor data on periodic basis.

Completeness-

For Electricity generation data: The project activity has installed the latest state of art monitoring and control equipment that measure, record, report, monitor and control various key parameters. Real time data collection happens using these control systems. A daily log of data is also prepared by the shift in-charge. A monthly report of aggregation of these data is also prepared. Parameters monitored are the total power generated and auxiliary power generated. Apart from main meters there are parallel check meters installed for main power and auxiliary power.

For steam related data: The project activity has installed steam flow meters and temperature and pressure gauge to monitor the flow, temperature and pressure of steam. The data is recorded as per section D.2. Log for all the parameters are prepared and reports are generated on monthly basis.

For diesel consumption in DG sets (project activity emissions): Actual usage is monitored using dip level/oil level indicator/ purchase and inventory data. Regular internal audit ensures reliability of this data.

Reliability-

For Electricity generation data: automatic control meters regarding power generation are regularly maintained. The regular plant operating & maintenance procedures also include process of regular meter calibration & maintenance. Also for key parameters (electricity generation) check meters are installed. Energy meters are calibrated at-least once every year by national level independent third party.

Data Adjustments-

A coal based AFBC and coal based CFBC boiler has been implemented in the project boundary. Sometimes in case of kiln stoppage or some other situations steam from AFBC and/or CFBC boiler could be used in the 25 MW WHRB connected turbine. In such a scenario power generation from WHRBs is based on pro-rata basis on the steam supplied by WHRBs to 25 MW turbine.

Frequency-

Frequency of measurement is as described in section D.2 of the monitoring report.

Training-

Plant personnel are trained on plant operations & maintenance procedures. Technical training regarding equipments in use is provided by equipment manufacturer.

Archiving-

Credit period + 2 yrs

Details of energy meters

There are each two number of energy meters (one main & one check meter) installed to monitor EG_{GEN} and EG_{AUX} . The details of energy meters are tabulated below:

Parameter	Total electricity generated by 25 MW turbine (TG1) in the project activity (EG _{GEN})		Auxiliary electricity generated by 25 MW turbine (TG1) in the project activity (EG _{AUX})	
Meter	Main meter	Check meter	Main meter	Check meter
Data unit	MWh/yr	MWh/yr	MWh/yr	MWh/yr
Accuracy class	0.2s	1.0s	0.5s	1.0s
Meter standard	IEC 60687	IS 13779:1999	IS 13779:1999	IS 13779:1999

Line diagram for the project activity can be referred from section B.1.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EF_{OM,y}
Unit:	tCO ₂ /MWh
Description:	Emission factor of the grid
Source of data:	CO ₂ operating margin emission factor of the grid (grid & IPCC data)
Value(s) applied):	0.934
Purpose of data:	Baseline emissions calculation
Additional comment:	Fixed ex-ante

Data / Parameter:	EF_{BM,y}
Unit:	tCO ₂ /MWh
Description:	Emission factor of the grid
Source of data:	CO ₂ operating margin emission factor of the grid (grid & IPCC data)
Value(s) applied):	0.704
Purpose of data:	Baseline emissions calculation
Additional comment:	Fixed ex-ante

Data / Parameter:	EF_{electricity,y}
Unit:	tCO ₂ /MWh
Description:	CO ₂ emission factor of the grid
Source of data:	Calculated as a weighted average of the OM and BM
Value(s) applied):	0.819

Purpose of data:	Baseline emissions calculation
Additional comment:	Fixed ex-ante

Data / Parameter:	P
Unit:	Tonne/kl
Description:	Density of diesel
Source of data:	http://www.iocl.com/Products/DieselSpecifications.pdf
Value(s) applied):	0.86
Purpose of data:	Project Emission Calculations
Additional comment:	Fixed ex-ante

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EG _{GEN}
Unit:	MWh/yr
Description:	Total electricity Generated by 25 MW turbine (TG1) in the project activity
Measured/ Calculated / Default:	Measured
Source of data:	Plant records
Value(s) of monitored parameter:	120302 MWh

Monitoring equipment:	<p>Monitoring equipment: Energy meter Type: E3V021, 3PH 3 WIRE Make: SEMS(main meter) /SEMS(check meter) Accuracy class: 0.2s (main meter)/1.0 (check meter) Serial number: KAU02025 (main meter)/ PNL 11653 (check meter) Calibration frequency: Once in a year</p> <p>Location: TG UNIT- 1 PCC room power plant (main meter)/ TG UNIT- 1 power plant (check meter)</p> <p>Calibration Details for KAU02025 (main meter):</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>08/06/2012</td><td>07/06/2013</td></tr> <tr> <td>02/06/2013</td><td>02/06/2014</td></tr> </tbody> </table> <p>All the above meter calibrations has been carried out by “Balaji Control”</p> <p>Calibration Details for PNL 11653 (check meter):</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>08/06/2012</td><td>07/06/2013</td></tr> <tr> <td>02/06/2013</td><td>01/06/2014</td></tr> </tbody> </table> <p>All the above meter calibrations has been carried out by “Balaji Control”</p>	Date of calibration	Validity	08/06/2012	07/06/2013	02/06/2013	02/06/2014	Date of calibration	Validity	08/06/2012	07/06/2013	02/06/2013	01/06/2014
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02/06/2013	01/06/2014												
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly												
Calculation method (if applicable):	-												
QA/QC procedures:	Check meter is installed in parallel to main meter and the meters are calibrated annually												
Purpose of data:	Baseline Emission Calculations												
Additional comment:	-												

Data / Parameter:	EG _{AUX}
Unit:	MWh/yr
Description:	Auxiliary electricity consumption in the project activity
Measured/ Calculated / Default:	Measured
Source of data:	Plant records
Value(s) of monitored parameter:	8325 MWh

Monitoring equipment:	<p>Monitoring equipment: Energy meter Type: EM6004, 3 PH 3 WIRE Make: Konzerv (main meter) / SEMS (check meter) Accuracy class: 0.5 (main meter) / 1.0 (check meter) Serial number: 82925/92-4505 (main meter) / PNL 11658 (check meter) Calibration frequency: Once in a year</p> <p>Location: TG UNIT- 1 PCC room power plant (main meter)/ TG UNIT- 1 PCC room power plant (check meter)</p> <p>Calibration Details for 82925/92-4505 (main meter):</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>08/06/2012</td><td>07/06/2013</td></tr> <tr> <td>02/06/2013</td><td>01/06/2014</td></tr> </tbody> </table> <p>All the above meter calibrations has been carried out by "Balaji Control"</p> <p>Calibration Details for PNL 11658 (check meter):</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>08/06/2012</td><td>07/06/2013</td></tr> <tr> <td>01/07/2013</td><td>30/06/2014</td></tr> </tbody> </table> <p>All the above meter calibrations has been carried out by "Balaji Control"</p>	Date of calibration	Validity	08/06/2012	07/06/2013	02/06/2013	01/06/2014	Date of calibration	Validity	08/06/2012	07/06/2013	01/07/2013	30/06/2014
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01/07/2013	30/06/2014												
Measuring/ Reading/ Recording frequency:	<p>Measuring Frequency: Continuously Recording: Daily Reporting: Monthly</p>												
Calculation method (if applicable):	-												
QA/QC procedures:	Check meter is installed in parallel to main meter and the meters are calibrated annually												
Purpose of data:	Baseline emission calculation												
Additional comment:	-												

Data / Parameter:	EG _y
Unit:	MWh
Description:	Net electricity generation in the project activity
Measured/ Calculated / Default:	Calculated
Source of data:	Plant records
Value(s) of monitored parameter:	60343.82 MWh
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Recording: Daily Reporting: Monthly

Calculation method (if applicable):	$EG_y = F \times (EG_{GEN} - EG_{AUX})$ <p>Where: F Pro-rata factor² EG_{GEN} Total electricity generated by the project activity EG_{AUX} Auxiliary electricity consumption by the project activity</p>
QA/QC procedures:	Calculated hence no QA/QC required.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	Q _{WHRB1}						
Unit:	Tonnes						
Description:	Steam Quantity supplied by WHRB1						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	48234 tonnes						
Monitoring equipment:	<p>Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 215784 (tag no: FT-12119A) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
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20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at outlet of the WHRB 1.						

Data / Parameter:	Q _{WHRB2}
Unit:	Tonnes
Description:	Steam Quantity supplied by WHRB2
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data

² Refer annex-1

Value(s) of monitored parameter:	39168 tonnes						
Monitoring equipment:	<p>Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 50215783 (Tag no: FT-22119A) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
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19/06/2013	18/06/2014						
Measuring/ Reading/ Recording frequency:	<p>Measuring Frequency: Continuously Recording: Daily Reporting: Monthly</p>						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at outlet of the WHRB 2.						

Data / Parameter:	Q _{WHRB3}						
Unit:	Tonnes						
Description:	Steam Quantity supplied by WHRB3						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	178599 tonnes						
Monitoring equipment:	<p>Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 217922 (Tag no: FT-751A) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>20/06/2013</td><td>19/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	21/06/2012	20/06/2013	20/06/2013	19/06/2014
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20/06/2013	19/06/2014						
Measuring/ Reading/ Recording frequency:	<p>Measuring Frequency: Continuously Recording: Daily Reporting: Monthly</p>						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at outlet of the WHRB 3.						

Data / Parameter:	Q _{WHRB4}						
Unit:	Tonnes						
Description:	Steam Quantity supplied by WHRB4						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	197624 tonnes						
Monitoring equipment:	<p>Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 217921 (Tag no: FT-751B) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>20/06/2013</td><td>19/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	21/06/2012	20/06/2013	20/06/2013	19/06/2014
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21/06/2012	20/06/2013						
20/06/2013	19/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at outlet of the WHRB 4.						

Data / Parameter:	Q _{TG1}
Unit:	Tonnes
Description:	Steam Quantity at inlet of TG1
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	520248 tonnes

Monitoring equipment:	Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: S-241822 (Tag no: FT- 15102) Calibration frequency: Once in a year <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>22/06/2012</td><td>21/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	22/06/2012	21/06/2013	21/06/2013	20/06/2014
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22/06/2012	21/06/2013						
21/06/2013	20/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at TG1 inlet.						

Data / Parameter:	Q AFBC						
Unit:	Tonnes						
Description:	Steam Quantity supplied by the coal based boiler						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	278955.0 tonnes						
Monitoring equipment:	Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 236232 (Tag no: FT-5201) Calibration frequency: Once in a year <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>22/06/2012</td><td>21/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	22/06/2012	21/06/2013	21/06/2013	20/06/2014
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22/06/2012	21/06/2013						
21/06/2013	20/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meters are installed at outlet of the coal fired AFBC boiler.						

Data / Parameter:	Q _{TG2}						
Unit:	Tonnes						
Description:	Steam Quantity at TG2 inlet						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	228214 tonnes						
Monitoring equipment:	<p>Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 282915,01/07 (Tag no: FT-729B) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>22/06/2012</td><td>21/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	22/06/2012	21/06/2013	21/06/2013	20/06/2014
Date of calibration	Validity						
22/06/2012	21/06/2013						
21/06/2013	20/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at TG2 inlet.						

Data / Parameter:	Q _{TG3}
Unit:	Tonnes
Description:	Steam Quantity at TG3 inlet
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	737342 tonnes

Monitoring equipment:	Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Yokagawa) Accuracy class: +/- 0.075% of FS Serial number: 91H730333 (Tag no: FT-901) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>15/02/2012</td><td>14/02/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	15/02/2012	14/02/2013	21/06/2013	20/06/2014
Date of calibration	Validity						
15/02/2012	14/02/2013						
21/06/2013	20/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meter is installed at TG3 inlet.						

Data / Parameter:	Q _{CFBC}						
Unit:	Tonnes						
Description:	Steam quantity supplied by the coal based CFBC boiler						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	807393 tonnes						
Monitoring equipment:	Monitoring equipment: Steam Flow Meter Type: Flow transmitter (Make: Yokogawa) Accuracy class: +/- 0.075% of FS Serial number: 91J319563 (Tag no: FT-203C) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>03/02/2012</td><td>02/02/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	03/02/2012	02/02/2013	21/06/2013	20/06/2014
Date of calibration	Validity						
03/02/2012	02/02/2013						
21/06/2013	20/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring: continuously Reading: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Steam flow meter is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Steam flow meters are installed at outlet of the coal fired CFBC boiler.						

Data / Parameter:	$Q_{\text{Steam loss}}$
Unit:	Tonnes
Description:	Steam quantity loss
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	64169 tonnes
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	$Q_{\text{Steam Loss}} = (Q_{\text{WHRB1}} + Q_{\text{WHRB2}} + Q_{\text{WHRB3}} + Q_{\text{WHRB4}} + Q_{\text{AFBC}} + Q_{\text{CFBC}}) - (Q_{\text{TG1}} + Q_{\text{TG2}} + Q_{\text{TG3}})$ <p>Where;</p> <p>Q_{WHRB1} = Steam Quantity generated by WHRB1 in Tonne. Q_{WHRB2} = Steam Quantity generated by WHRB2 in Tonne Q_{WHRB3} = Steam Quantity generated by WHRB3 in Tonne. Q_{WHRB4} = Steam Quantity generated by WHRB4 in Tonne. Q_{AFBC} = Steam Quantity generated by the coal based AFBC boiler in Tonne. Q_{CFBC} = Steam Quantity generated by the coal based CFBC boiler in Tonne. Q_{TG1} = Steam Quantity at inlet of TG1 in Tonne. Q_{TG2} = Steam quantity at inlet of TG2 in Tonne. Q_{TG3} = Steam quantity at inlet of TG3 in Tonne.</p>
QA/QC procedures:	This is a calculated data and hence no QA/QC is required for this parameter
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	T_{WHRB1}
Unit:	deg C
Description:	Temperature of steam generated by WHRB1
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet

Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: Temperature Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 359225 (Tag no: TT – 12116) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by “Bhilai Calibration Laboratory”						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Temperature gauge is installed at outlet of the WHRB 1.						

Data / Parameter:	T _{WHRB2}						
Unit:	deg C						
Description:	Temperature of steam generated by WHRB2						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: Temperature Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 215782 (Tag no : TT-22116) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by “Bhilai Calibration Laboratory”						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Temperature gauge is installed at outlet of the WHRB 2.						

Data / Parameter:	T _{WHRB3}						
Unit:	deg C						
Description:	Temperature of steam generated by WHRB3						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	<p>Monitoring equipment: Temperature Gauge Type: Temperature Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 218056 (Tag no: TT-174A) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>20/06/2013</td><td>19/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	21/06/2012	20/06/2013	20/06/2013	19/06/2014
Date of calibration	Validity						
21/06/2012	20/06/2013						
20/06/2013	19/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Temperature gauge is installed at outlet of the WHRB 3.						

Data / Parameter:	T _{WHRB4}
Unit:	deg C
Description:	Temperature of steam generated by WHRB4
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet

Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: Temperature Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 218068 (Tag No: TT-174B) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>20/06/2013</td><td>19/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	21/06/2012	20/06/2013	20/06/2013	19/06/2014
Date of calibration	Validity						
21/06/2012	20/06/2013						
20/06/2013	19/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Temperature gauge is installed at outlet of the WHRB 4.						

Data / Parameter:	T _{TG1}						
Unit:	deg C						
Description:	Temperature of steam at TG1 inlet						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: Thermocouple "K" type (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: TC - 5102 Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>22/06/2012</td><td>21/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	22/06/2012	21/06/2013	21/06/2013	20/06/2014
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22/06/2012	21/06/2013						
21/06/2013	20/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	Temperature gauge is installed at TG1 inlet.						

Data / Parameter:	T Feed Water _{WHRB1}						
Unit:	deg C						
Description:	Temperature of feed water supplied to WHRB1						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	<p>Monitoring equipment: Temperature Gauge Type: RTD (Make: Rosemount) Accuracy class: Class "B" Serial number: TI - 11107 Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	-						

Data / Parameter:	T Feed Water _{WHRB2}
Unit:	deg C
Description:	Temperature of feed water supplied to WHRB2
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet

Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: RTD (Make: Not Specified) Accuracy class: Class "B" Serial number: TI 21107 Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline Emission Calculations						
Additional comment:	-						

Data / Parameter:	T Feed Water _{WHRB3}						
Unit:	deg C						
Description:	Temperature of feed water supplied to WHRB3						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	Monitoring equipment: Temperature Gauge Type: Temperature Transmitter "K" Type t/c Input (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 218052 Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	-						

Data / Parameter:	T Feed Water _{WHRB4}						
Unit:	deg C						
Description:	Temperature of feed water supplied to WHRB4						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	<p>Monitoring equipment: Temperature Gauge Type: Temperature Transmitter “K” Type t/c Input (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 218064 Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by “Bhilai Calibration Laboratory”</p>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Temperature gauge is calibrated annually.						
Purpose of data:	Baseline emission calculation						
Additional comment:	-						

Data / Parameter:	P _{WHRB1}
Unit:	kg/cm ²
Description:	Pressure of steam generated by WHRB1
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet

Monitoring equipment:	Monitoring equipment: Pressure Gauge Type: Pressure Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 5021577 (Tag no: PT-22101) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
Date of calibration	Validity						
20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Pressure gauge is calibrated annually						
Purpose of data:	Baseline emission calculation						
Additional comment:	Pressure gauge is installed at outlet of the WHRB 1						

Data / Parameter:	P _{WHRB2}						
Unit:	kg/cm ²						
Description:	Pressure of steam generated by WHRB2						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	Monitoring equipment: Pressure Gauge Type: Pressure Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 50215769 (Tag no: PT-11101) Calibration frequency: Once in a year						
	<table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>20/06/2012</td><td>19/06/2013</td></tr> <tr> <td>19/06/2013</td><td>18/06/2014</td></tr> </tbody> </table>	Date of calibration	Validity	20/06/2012	19/06/2013	19/06/2013	18/06/2014
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20/06/2012	19/06/2013						
19/06/2013	18/06/2014						
	All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Pressure gauge is calibrated annually						
Purpose of data:	Baseline emission calculation						
Additional comment:	Pressure gauge is installed at outlet of the WHRB 2.						

Data / Parameter:	P _{WHRB3}						
Unit:	kg/cm ²						
Description:	Pressure of steam generated by WHRB3						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	<p>Monitoring equipment: Pressure Gauge Type: Pressure Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 50217898 (Tag no: PT-750) Calibration frequency: Once in a year</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>20/06/2013</td><td>19/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	21/06/2012	20/06/2013	20/06/2013	19/06/2014
Date of calibration	Validity						
21/06/2012	20/06/2013						
20/06/2013	19/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Pressure gauge is annually						
Purpose of data:	Baseline emission calculation						
Additional comment:	Pressure gauge is installed at outlet of the WHRB 3.						

Data / Parameter:	P _{WHRB4}
Unit:	kg/cm ²
Description:	Pressure of steam generated by WHRB4
Measured/ Calculated / Default:	Measured
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet

Monitoring equipment:	Monitoring equipment: Pressure Gauge Type: Pressure Transmitter (Make: Rosemount) Accuracy class: +/- 0.075% of FS Serial number: 50217894 (Tag no: PT-754) Calibration frequency: Once in a year <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>21/06/2012</td><td>20/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	21/06/2012	20/06/2013	21/06/2013	20/06/2014
Date of calibration	Validity						
21/06/2012	20/06/2013						
21/06/2013	20/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Pressure gauge is calibrated annually						
Purpose of data:	Baseline emission calculation						
Additional comment:	Pressure gauge is installed at outlet of the WHRB 4.						

Data / Parameter:	P _{TG1}						
Unit:	kg/cm ²						
Description:	Pressure of steam at TG1 inlet						
Measured/ Calculated / Default:	Measured						
Source of data:	Plant Data						
Value(s) of monitored parameter:	Refer ER sheet						
Monitoring equipment:	Monitoring equipment: Pressure Gauge Type: Pressure Transmitter (Make: ABB) Accuracy class: +/- 0.075% of FS Serial number: 05G0264 (Tag no: PT-5102) Calibration frequency: Once in a year <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>22/06/2012</td><td>21/06/2013</td></tr> <tr> <td>21/06/2013</td><td>20/06/2014</td></tr> </tbody> </table> <p>All the above meter calibration has been carried out by "Bhilai Calibration Laboratory"</p>	Date of calibration	Validity	22/06/2012	21/06/2013	21/06/2013	20/06/2014
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22/06/2012	21/06/2013						
21/06/2013	20/06/2014						
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly						
Calculation method (if applicable):	-						
QA/QC procedures:	Pressure gauge is calibrated annually						
Purpose of data:	Baseline emission calculation						
Additional comment:	Pressure gauge is installed at inlet of TG1						

Data / Parameter:	Enthalpy _{WHRB1}
Unit:	kJ/Tonne
Description:	Enthalpy of steam generated by WHRB1
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> Enthalpy of steam generated from WHRB 1 is derived from the lowest of temperature and pressure values of steam supplied from WHRB 1, recorded over the whole month. This is most conservative when used for calculating $\sum ST_{WHRB\ i}$. Enthalpy of steam generated from WHRB 1 is derived from the highest of temperature and pressure values of steam supplied from WHRB 1, recorded over the whole month. This is most conservative when used for calculating Enthalpy_{steam loss}.

Data / Parameter:	Enthalpy _{WHRB2}
Unit:	kJ/Tonne
Description:	Enthalpy of steam generated by WHRB2
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation

Additional comment:	<ul style="list-style-type: none"> Enthalpy of steam generated from WHRB 2 is derived from the lowest of temperature and pressure values of steam supplied from WHRB 2, recorded over the whole month. This is most conservative when used for calculating $\sum ST_{WHRB\ i}$. Enthalpy of steam generated from WHRB 2 is derived from the highest of temperature and pressure values of steam supplied from WHRB 2, recorded over the whole month. This is most conservative when used for calculating $Enthalpy_{steam\ loss}$.
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Data / Parameter:	Enthalpy $_{WHRB3}$
Unit:	kJ/Tonne
Description:	Enthalpy of steam generated by WHRB3
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> Enthalpy of steam generated from WHRB 3 is derived from the lowest of temperature and pressure values of steam supplied from WHRB 3, recorded over the whole month. This is most conservative when used for calculating $\sum ST_{WHRB\ i}$. Enthalpy of steam generated from WHRB 3 is derived from the highest of temperature and pressure values of steam supplied from WHRB 3, recorded over the whole month. This is most conservative when used for calculating $Enthalpy_{steam\ loss}$.

Data / Parameter:	Enthalpy $_{WHRB4}$
Unit:	kJ/Tonne
Description:	Enthalpy of steam generated by WHRB4
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data

Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> Enthalpy of steam generated from WHRB 4 is derived from the lowest of temperature and pressure values of steam supplied from WHRB 4, recorded over the whole month. This is most conservative when used for calculating $\sum ST_{WHRB\ i}$ Enthalpy of steam generated from WHRB 4 is derived from the highest of temperature and pressure values of steam supplied from WHRB 4, recorded over the whole month. This is most conservative when used for calculating $Enthalpy_{steam\ loss}$.

Data / Parameter:	Enthalpy $_{Steam\ Loss}$
Unit:	kJ/Tonne
Description:	Enthalpy of steam loss
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx based on highest of pressure and temperature values of steam supplied from the HRBs, recorded over a month and minimum of the feed water temperature values supplied to the WHRBs, recorded over the month) observed for all four WHRBs.
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation
Additional comment:	Highest of the Net enthalpy values (based on highest of pressure and temperature values of steam supplied from the WHRBs, recorded over a month and minimum of the feed water temperature values supplied to the WHRBs, recorded over the month) observed for the 4 WHRBs is taken as "Enthalpy $_{Steam\ Loss}$ ".

Data / Parameter:	Enthalpy T_{G1}
Unit:	kJ/Tonne
Description:	Enthalpy of steam supplied to TG1
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/esc/SH_Properties.aspx
QA/QC procedures:	This is derived from other data based on the steam table and hence no QA/QC is required.
Purpose of data:	Baseline emission calculation
Additional comment:	Enthalpy of TG1 considered is derived for the highest of temperature (T_{TG1}) and pressure (P_{TG1}) values recorded over the whole month. This is most conservative.

Data / Parameter:	Enthalpy Feed Water $WHRB1$
Unit:	kJ/Tonne
Description:	Enthalpy of feed water being supplied to WHRB1
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/resources/steam-tables/saturated-water.asp
QA/QC procedures:	Temperature gauge is calibrated annually.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> The highest temperature values of feed water supplied to WHRB 1 values recorded over the whole month is considered to make a conservative calculation of $\sum ST_{WHRBi}$. The lowest temperature values of feed water supplied to WHRB 1 recorded over the whole month is considered to make a conservative calculation of Enthalpy_{steam loss}.

Data / Parameter:	Enthalpy Feed Water _{WHRB2}
Unit:	kJ/Tonne
Description:	Enthalpy of feed water being supplied to WHRB2
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Measuring Frequency: Continuously Recording: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/resources/steam-tables/saturated-water.asp
QA/QC procedures:	Temperature gauge is calibrated annually.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> The highest temperature values of feed water supplied to WHRB 2 values recorded over the whole month is considered to make a conservative calculation of $\sum ST_{WHRBi}$. The lowest temperature values of feed water supplied to WHRB 2 recorded over the whole month is considered to make a conservative calculation of Enthalpy_{steam loss}.

Data / Parameter:	Enthalpy Feed Water _{WHRB3}
Unit:	kJ/Tonne
Description:	Enthalpy of feed water being supplied to WHRB3
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/resources/steam-tables/saturated-water.asp
QA/QC procedures:	Temperature gauge is calibrated annually.
Purpose of data:	Baseline emission calculation

Additional comment:	<ul style="list-style-type: none"> The highest temperature values of feed water supplied to WHRB 3 values recorded over the whole month is considered to make a conservative calculation of $\sum ST_{WHRBi}$. The lowest temperature values of feed water supplied to WHRB 3 recorded over the whole month is considered to make a conservative calculation of $Enthalpy_{steam\ loss}$.
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Data / Parameter:	Enthalpy Feed Water $_{WHRB4}$
Unit:	kJ/Tonne
Description:	Enthalpy of feed water being supplied to WHRB4
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Estimated: Daily Reporting: Monthly
Calculation method (if applicable):	Calculated from source: http://www.spiraxsarco.com/resources/steam-tables/saturated-water.asp
QA/QC procedures:	Temperature gauge is calibrated annually.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> The highest temperature values of feed water supplied to WHRB 4 values recorded over the whole month is considered to make a conservative calculation of $\sum ST_{WHRBi}$. The lowest temperature values of feed water supplied to WHRB 4 recorded over the whole month is considered to make a conservative calculation of $Enthalpy_{steam\ loss}$.

Data / Parameter:	Net Enthalpy $_{WHRB\ 1}$
Unit:	kJ/Tonne
Description:	Net Enthalpy of steam generated by WHRB1
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly

Calculation method (if applicable):	<ul style="list-style-type: none"> Calculated as difference between “Enthalpy_{WHRB1}” (based on lowest pressure and temperature of steam recorded for WHRB1 over the whole month) and “Enthalpy Feed Water_{WHRB1}”(highest temperature of feed water supplied to WHRB 1 values recorded over the whole month) to make a conservative calculation of $\sum ST_{WHRBi}$. Calculated as difference between “Enthalpy_{WHRB1}” (based on highest pressure and temperature of steam recorded for WHRB1 over the whole month) and “Enthalpy Feed Water_{WHRB1}” (lowest temperature of feed water supplied to WHRB 1 values recorded over the whole month) to make a conservative calculation of Enthalpy_{steam loss}.
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	Net Enthalpy _{WHRB2}
Unit:	kJ/Tonne
Description:	Net Enthalpy of steam generated by WHRB2
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly
Calculation method (if applicable):	<ul style="list-style-type: none"> Calculated as difference between “Enthalpy_{WHRB2}”(based on lowest pressure and temperature of steam recorded for WHRB2 over the whole month) and “Enthalpy Feed Water_{WHRB2}”(highest temperature of feed water supplied to WHRB 2 values recorded over the whole month) to make a conservative calculation of $\sum ST_{WHRBi}$. Calculated as difference between “Enthalpy_{WHRB2}” (based on highest pressure and temperature of steam recorded for WHRB2 over the whole month) and “Enthalpy Feed Water_{WHRB2}” (lowest temperature of feed water supplied to WHRB 2 values recorded over the whole month) to make a conservative calculation of Enthalpy_{steam loss}.
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	Net Enthalpy _{WHRB3}
Unit:	kJ/Tonne

Description:	Net Enthalpy of steam generated by WHRB3
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly
Calculation method (if applicable):	<ul style="list-style-type: none"> Calculated as difference between “Enthalpy_{WHRB3}” (based on lowest pressure and temperature of steam recorded for WHRB 3 over the whole month) and “Enthalpy Feed Water_{WHRB3}”(highest temperature of feed water supplied to WHRB 3 values recorded over the whole month) to make a conservative calculation of $\sum ST_{WHRBi}$. Calculated as difference between “Enthalpy_{WHRB3}” (based on highest pressure and temperature of steam recorded for WHRB 3 over the whole month) and “Enthalpy Feed Water_{WHRB3}” (lowest temperature of feed water supplied to WHRB 3 values recorded over the whole month) to make a conservative calculation of Enthalpy_{steam loss}.
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	Net Enthalpy _{WHRB4}
Unit:	kJ/Tonne
Description:	Net Enthalpy of steam generated by WHRB4
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly

Calculation method (if applicable):	<ul style="list-style-type: none"> Calculated as difference between “Enthalpy_{WHRB4}” (based on lowest pressure and temperature of steam recorded for WHRB 4 over the whole month) and “Enthalpy Feed Water WHRB4” (highest temperature of feed water supplied to WHRB 4 values recorded over the whole month) to make a conservative calculation of $\sum ST_{WHRBi}$. Calculated as difference between “Enthalpy_{WHRB4}” (based on highest pressure and temperature of steam recorded for WHRB 4 over the whole month) and “Enthalpy Feed Water _{WHRB4}” (lowest temperature of feed water supplied to WHRB 4 values recorded over the whole month) to make a conservative calculation of Enthalpy_{steam loss}.
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	$\sum ST_{WHRBi}$
Unit:	kJ
Description:	Energy content of steam supplied by the WHRBs
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly

Calculation method (if applicable):	$\sum ST_{WHRBi} = \{(Q_{WHRB1} \times Net\ Enthalpy_{WHRB1}) + (Q_{WHRB2} \times Net\ Enthalpy_{WHRB2}) + (Q_{WHRB3} \times Net\ Enthalpy_{WHRB3}) + (Q_{WHRB4} \times Net\ Enthalpy_{WHRB4}) - (Q_{steam\ Loss} \times Enthalpy_{Steam\ Loss})\}$ <p>Where;</p> <p>Q_{WHRB1} = Steam Quantity generated by WHRB1 in Tonne.</p> <p>Net Enthalpy_{WHRB1} = Net Enthalpy of steam generated by WHRB1 in kJ/Tonne.</p> <p>Q_{WHRB2} = Steam Quantity generated by WHRB2 in Tonne.</p> <p>Net Enthalpy_{WHRB2} = Net Enthalpy of steam generated by WHRB2 in kJ/Tonne.</p> <p>Q_{WHRB3} = Steam Quantity generated by WHRB3 in Tonne.</p> <p>Net Enthalpy_{WHRB3} = Net Enthalpy of steam generated by WHRB3 in kJ/Tonne.</p> <p>Q_{WHRB4} = Steam Quantity generated by WHRB4 in Tonne.</p> <p>Net Enthalpy_{WHRB4} = Net Enthalpy of steam generated by WHRB4 in kJ/Tonne.</p> <p>$Q_{steam\ Loss}$ = Loss of steam in the project activity in Tonne</p> <p>Enthalpy_{Steam Loss} = Enthalpy of steam loss in the project activity in kJ/Tonne.</p>
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	<ul style="list-style-type: none"> Net enthalpies for WHRBs are based on lowest pressure and temperature of steam supplied by WHRBs, recorded for the whole month) and values of highest temperature of feed water supplied to WHRBs recorded over the whole month. This is conservative. Enthalpy Steam Loss is calculated based on highest of temperature and pressure values of steam supplied from WHRBs, recorded over the whole month and values of lowest temperature of feed water supplied to WHRBs recorded over the whole month. This is conservative.

Data / Parameter:	ST _{TG1}
Unit:	kJ
Description:	Energy content of steam supplied to TG1
Measured/ Calculated / Default:	Calculated
Source of data:	Plant Data
Value(s) of monitored parameter:	Refer ER sheet
Monitoring equipment:	NA
Measuring/ Reading/ Recording frequency:	Calculated: Daily Reporting: Monthly

Calculation method (if applicable):	Calculated as product of Q_{TG1} and $Enthalpy_{TG1}$
QA/QC procedures:	This is a calculated value based on other parameters and hence no QA/QC is required for this parameter.
Purpose of data:	Baseline emission calculation
Additional comment:	-

Data / Parameter:	Q_i				
Unit:	KL				
Description:	Quantity of the auxiliary fuel (Diesel) used by project activity				
Measured/ Calculated / Default:	Monitored				
Source of data:	Plant Data				
Value(s) of monitored parameter:	12.4 KL				
Monitoring equipment:	<p>Monitoring equipment: Dip Stick Accuracy class: +/- 1.00% of FS Serial number/Tag No: SKS/Scale/01 Calibration frequency: Once in a year. Date of last calibration:</p> <table border="1"> <thead> <tr> <th>Date of calibration</th><th>Validity</th></tr> </thead> <tbody> <tr> <td>14/05/2012</td><td>13/05/2013</td></tr> </tbody> </table>	Date of calibration	Validity	14/05/2012	13/05/2013
Date of calibration	Validity				
14/05/2012	13/05/2013				
Measuring/ Reading/ Recording frequency:	Recording Frequency: Daily				
Calculation method (if applicable):	NA				
QA/QC procedures:	<p>Diesel is used in the DG sets installed at the site which is used to provide start up power or during emergency. The consumption of diesel would be measured based on dip-stick measurement of the diesel storage tank. These can also be cross checked with the store records as well as the diesel purchase records. The data is reported on monthly basis.</p> <p>To be measured and used for estimation of Project emissions.</p>				
Purpose of data:	Project Emission Calculations				
Additional comment:	-				

Data / Parameter:	NCV_i
Unit:	TJ/Tonne
Description:	Net calorific value of the diesel used
Measured/ Calculated / Default:	Measured
Source of data:	Latest IPCC default values (2006 guidelines, volume 2, Table 1.2 ³ , (Upper value of NCV at 95 % confidence interval)

³ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Value(s) of monitored parameter:	0.0433
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	-
QA/QC procedures:	
Purpose of data:	Project emission calculation
Additional comment:	The net calorific values of diesel were not available from the supplier. Hence latest IPCC default values are used for estimation of Project emissions.

Data / Parameter:	EF_i
Unit:	tCO ₂ /TJ
Description:	Emission Factor of the diesel used
Measured/ Calculated / Default:	Measured
Source of data:	Latest IPCC default values (2006 guidelines, volume 2, Table 1.4, Upper value of emission factor at 95 % confidence interval) ⁴
Value(s) of monitored parameter:	74.80
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	
Calculation method (if applicable):	-
QA/QC procedures:	
Purpose of data:	Project emission calculation
Additional comment:	The emission factor of diesel is sourced from the latest IPCC default value.

D.3. Implementation of sampling plan

>>

This section is left blank intentionally as not applicable.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

Sample calculation for the baseline emissions for month Feb - 2013 is shown below:

First we need to find out the Pro-rata factor to prorate the power generation based on steam supplied by the WHRBs as per the approach mentioned under annex-1:

⁴ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

$$F = \sum ST_{WHRBi} / ST_{TG1}$$

$\sum ST_{WHRBi}$ = Total steam energy supplied by the WHRBs in kJ. Calculated as per formula (3) given in Annex 1.

ST_{TG1} = Energy content of steam fed to the project turbine in kJ.

$$F = 111095400989 \text{ kJ} / 177401661390 \text{ kJ} \\ = 0.63$$

Hence, F for month Feb - 2013 = 0.63 (please refer ER sheet for complete calculation)

Now to prorate power generation based on steam supplied by the WHRBs, the following formula is used:

$$EG_y = F \times (EG_{GEN} - EG_{AUX})$$

Where:

F Pro-rata factor

EG_{GEN} Total electricity generated by the project activity

EG_{AUX} Auxiliary electricity consumption by the project activity

$$EG_y = .63 \times (12109-775.43)$$

$$= 7097.50 \text{ MWh (Feb 2013)}$$

$$BE_{\text{electricity},y} = EG_y \times EF_{\text{electricity},y}$$

EG_y = Net quantity of electricity supplied to the manufacturing facility by the project during the year y in MWh,

$EF_{\text{electricity},y}$ = CO₂ emission factor of the grid (0.819 tCO₂/MWh fixed ex-ante)

$$BE_{\text{electricity},y} = 7097.50 \times 0.819 \\ = 5812.85 \text{ tCO}_2\text{e (Feb 2013)}$$

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

Project Emissions are applicable only if auxiliary fuels are fired for generation startup, in emergencies, or to provide additional heat gain before entering the Waste Heat Recovery Boiler. Project Emissions are given as:

$$PE_y = \sum_i Q_i \times \rho \times NCV_i \times EF_i \times OXID_i$$

Parameter	Unit	Value	Source of data
Density of diesel (ρ)	Tonne/ kL	0.860	http://www.iocl.com/Products/DieselSpecifications.pdf
Net calorific value of the diesel (NCVi)	TJ/ Tonne	0.0433	IPCC data, from 2006 guidelines, volume 2, Table 1.2 (Upper value of NCV at 95 % confidence interval) ⁵
Emission Factor of the diesel used (EFi)	tCO ₂ / TJ	74.80	IPCC data, from 2006 guidelines, volume 2, Table 1.4 (Upper value of emission factor at 95 % confidence interval) ⁶
Oxidation Factor	-	1.000	IPCC data, from 2006 guidelines chapter 1, Table 1.4 ⁷

Sample calculation for the project emissions for month Feb -2013:

⁵ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

⁶ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

⁷ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

$$\begin{aligned}
 PE_y &= \sum_i Q_i \times \rho \times NCV_i \times EF_i \times OXID_i \\
 &= 0 \times 0.860 \times 0.0433 \times 74.80 \times 1.00 \\
 &= 0 \text{ tCO}_2\text{e}
 \end{aligned}$$

E.3. Calculation of leakage

>>

This section is left blank intentionally as not applicable.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
January 2013	3546.82	0.00	0	3546.82
February 2013	5812.85	0.00	0	5812.85
March 2013	5952.23	0.00	0	5952.23
April 2013	3912.10	8.63	0	3903.47
May 2013	4276.84	3.06	0	4273.78
June 2013	3998.67	4.46	0	3994.21
July 2013	0.00	5.57	0	0.00
August 2013	0.00	4.46	0	0.00
September 2013	5283.53	0.00	0	5283.53
October 2013	3885.49	5.57	0	3879.92
November 2013	5436.03	0.00	0	5436.03
December 2013	7317.03	2.79	0	7314.24
Total	49421.59	35.00	0	49397 (Rounddown)

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	116,773 tCO ₂ e	49,397 tCO ₂ e

E.6. Remarks on difference from estimated value in registered PDD

>>

Item	Emission reductions for the considered period as per estimates in the PDD	Actual Emission Reduction	Variation (%)
Emission reductions (tCO ₂ e)	116,773 tCO ₂ e	49,397 tCO ₂ e	-57.70%

Actual emission reductions are less as compared to estimate in PDD.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO ₂ e)	NA	49,397

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	SKS Ispat & Power Limited
Street/P.O. Box	Siltara Industrial Growth Centre Phase-II
Building	
City	Raipur
State/Region	Chattisgarh
Postcode	493111
Country	India
Telephone	
Fax	
E-mail	bipinjain@sksisapt.com
Website	www.skssipat.com
Contact person	Bipin Jain
Title	President
Salutation	Mr.
Last name	Jain
Middle name	
First name	Bipin
Department	Power Plant
Mobile	09752447518
Direct fax	
Direct tel.	
Personal e-mail	

Annex-1Description of formula used to estimate EG_y

As mentioned in the monitoring plan under “data adjustment” steam from Coal fired AFBC boiler can also be used in TG1 (25 MW Project turbine). In such a scenario power generation from WHRB is done on pro-rata basis on the steam supplied by WHRB to TG1.

Now, along with the coal fired AFBC boiler there is another coal fired CFBC boiler, the steam from which can also be used in TG1 in the same manner. Hence, in this scenario as well, power generation from WHRBs is done on pro-rata basis on the steam supplied by WHRBs to TG1.

Formula mentioned below is used to prorate power generation based on steam supplied by the WHRB.

$$EG_y = F \times (EG_{GEN} - EG_{Aux}) \quad (1)$$

Where:

F Pro-rata factor
 EG_{GEN} Total electricity generated by the project activity
 EG_{Aux} Auxiliary electricity consumption by the project activity

The value of F will be calculated as per formula (2) mentioned below. Here F is calculated as the ratio between “the total energy of steam supplied by WHRBs (from which energy in Steam Loss is deducted)” to the total energy of steam at TG1 inlet. In all the events, the value of F will either be less than 1 or restricted to 1. By restricting the value of F to 1 it is ensured that emission reductions are not accounted for the surplus steam energy from WHRBs which is supplied to TG2 or TG3.

F is calculated as mentioned below:

$$F = \frac{\sum ST_{WHRBi}}{ST_{TG1}} \quad (2)$$

Where;

$\sum ST_{WHRBi}$ = Total steam energy supplied by the WHRBs in kJ. Calculated as per formula (3) given below.
 ST_{TG1} = Energy content of steam fed to the project turbine in kJ.

$$\sum ST_{WHRBi} = \{(Q_{WHRB1} \times \text{Net Enthalpy}_{WHRB1}) + (Q_{WHRB2} \times \text{Net Enthalpy}_{WHRB2}) + (Q_{WHRB3} \times \text{Net Enthalpy}_{WHRB3}) + (Q_{WHRB4} \times \text{Net Enthalpy}_{WHRB4}) - (Q_{\text{steam Loss}} \times \text{Enthalpy}_{\text{Steam Loss}})\} \quad (3)$$

Where;

Q_{WHRB1} = Steam Quantity generated by WHRB1 in Tonne.
 $\text{Net Enthalpy}_{WHRB1}$ = Net Enthalpy of steam generated by WHRB1 in kJ/Tonne.
 Q_{WHRB2} = Steam Quantity generated by WHRB2 in Tonne.
 $\text{Net Enthalpy}_{WHRB2}$ = Net Enthalpy of steam generated by WHRB2 in kJ/Tonne.
 Q_{WHRB3} = Steam Quantity generated by WHRB3 in Tonne.
 $\text{Net Enthalpy}_{WHRB3}$ = Net Enthalpy of steam generated by WHRB3 in kJ/Tonne.
 Q_{WHRB4} = Steam Quantity generated by WHRB4 in Tonne.
 $\text{Net Enthalpy}_{WHRB4}$ = Net Enthalpy of steam generated by WHRB4 in kJ/Tonne.
 $Q_{\text{steam Loss}}$ = Loss of steam in the project activity in Tonne
 $\text{Enthalpy}_{\text{Steam Loss}}$ = Enthalpy of steam loss in the project activity in kJ/Tonne.

$$Q_{\text{Steam Loss}} = (Q_{WHRB1} + Q_{WHRB2} + Q_{WHRB3} + Q_{WHRB4} + Q_{AFBC} + Q_{CFBC}) - (Q_{TG1} + Q_{TG2} + Q_{TG3}) \quad (4)$$

Where;

Q_{WHRB1} = Steam Quantity generated by WHRB1 in Tonne.
 Q_{WHRB2} = Steam Quantity generated by WHRB2 in Tonne

Q_{WHRB3} = Steam Quantity generated by WHRB3 in Tonne.
 Q_{WHRB4} = Steam Quantity generated by WHRB4 in Tonne.
 Q_{AFBC} = Steam Quantity generated by the coal based AFBC boiler in Tonne.
 Q_{CFBC} = Steam Quantity generated by the coal based CFBC boiler in Tonne.
 Q_{TG1} = Steam Quantity at inlet of TG1 in Tonne.
 Q_{TG2} = Steam quantity at inlet of TG2 in Tonne.
 Q_{TG3} = Steam quantity at inlet of TG3 in Tonne.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	<p>Revisions to:</p> <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		