

UNFCCC Project activity Reference No: 1753

5 MW Sahu Hydro Electric Project for a grid connected system in
Himachal Pradesh, India

FIRST MONITORING REPORT

Ver.01, 21 April 2010

[Monitoring period is chosen from **24.06.2009 to 28.02.2010** both days included]

Net Emission Reductions

10083 tCO₂e

| Registered Office: | Project Site: |
|---|---|
| Him Kailash Hydro Power Private Limited 6-3-668/10/49, Plot No. 56, Durga Nagar Colony, Punjagutta. Hyderabad - 730082, Andhra Pradesh, India. | Him Kailash Hydro Power Private Limited Village : Paleur Tehsil : Chamba District : Chamba State : Himachal Pradesh Country : India |

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1. Current Status of the Project

Him Kailash Hydro Power Private Limited has established a 5 MW (comprising of 2 X 2.5 MW hydro turbines) Sahu Hydro Electric Project at Paleru Village of Chamba District in Himachal Pradesh, India. The project activity is a run of the river scheme constructed across Sahu Nallah, a tributary of river Ravi in Chamba district. The project activity is generation of electricity for the Himachal Pradesh State Electricity Board (HPSEB) grid system utilizing the hydro potential available in Sahu Nallah tributary of river Ravi in Chamba. The project units have been commissioned and are in operation since 22 April 2008.

The purpose of this Monitoring Report is to calculate the Greenhouse Gas emission reductions achieved by 5 MW Sahu Hydro Electric CDM Project for periodic verification. This is the first periodic verification for the project activity.

2. Reference

Project Ref.No 1753: 5 MW Sahu Hydro Electric Project for a grid connected system in Himachal Pradesh, India.

The project has registered with UNFCCC on 24 Jun 09 and the crediting period is from 24 Jun 09 to 23 Jun 19 (Fixed). For further details of this project, please refer to the following link on the UNFCCC web site

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1206606044.99/view>

3. Monitoring Period

The present monitoring period is chosen from 24 June 2009 to 28 February 2010. The net electricity exported to the State grid by the project activity is 12.7157 GWh and the net emission reductions are of 10083 tCO₂e for the present monitoring period.

4. List of Abbreviations

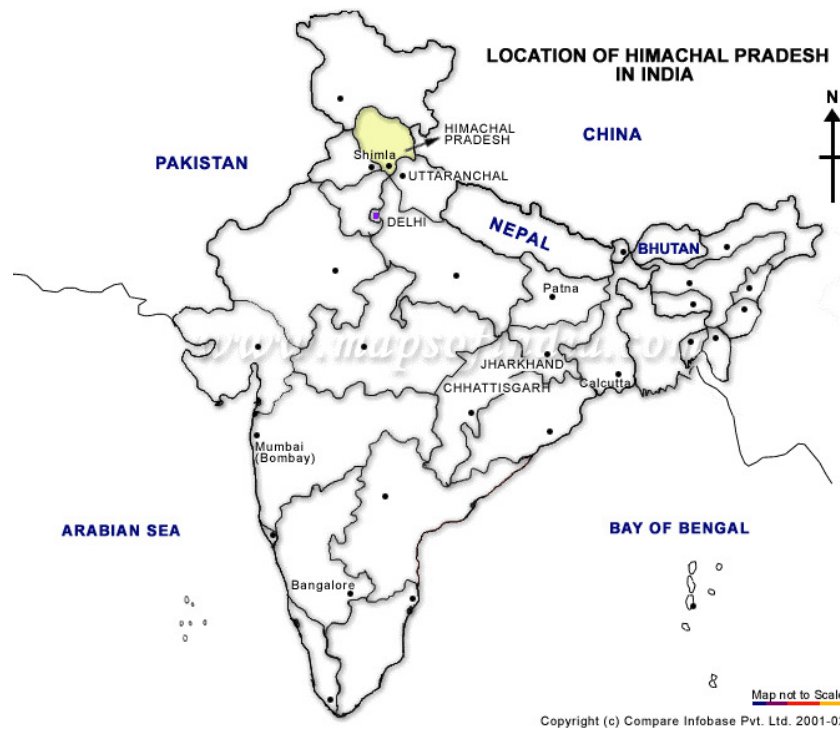
| | |
|--------|---|
| CEA | : Central Electricity Authority, Government of India. |
| GHG | : Greenhouse Gases |
| H | : Hours |
| HKHPPL | : Him Kailash Hydro Power Private Limited |
| HPSEB | : Himachal Pradesh State Electricity Board |
| IPCC | : Intergovernmental Panel on Climate Change |

| | |
|-----|-----------------------------|
| MM | : Minutes |
| PP | : Project Proponent |
| PPA | : Power Purchase Agreement. |
| PDD | : Project Design Document |

5. Plant Location

The project is located near Paleur Village, which is located at a distance of 18 km from Chamba. The Project site is located 390 km from state Head Quarters Shimla. The project site can be accessed through Shimla-Chamba road or Pathankot-Chamba road. The nearest railway station is at Pathankot / Chakki Bank, at a distance of 134 km. The nearest airport is at Gaggal at a distance of 185 km.

The project area lies between the geographical coordinates of latitude 32° 31' 56" to 32° 39' 44" North and longitude 76° 12' 30" to 76° 22' 58" East.



Map1: Location of Himachal Pradesh state (Marked in Yellow) in India



Map 2: Physical location of the Project in Chamba district of Himachal Pradesh State

6. Details of Major Equipments of the Project

The details of major equipments of the plant and suppliers are presented in Table 1.

Table 1 – Details of Plant major equipments and Suppliers:

| S.No | Equipment Details | Name of the Supplier |
|------|--|---|
| 1 | Turbine: Model : HL 110-WJ-77 Type : Horizontal Impulse wheel Flow : 1.94 cumecs Head: 174 m Qty. : 2 Nos. | Shanghai Leichun (I) Trading Co. Pvt. Ltd., Bangalore |
| 2 | Generator: Type : SFW 3000-6 / 1730 Rated Power : 3125 KVA Voltage at Generator terminal: 3.3 kV 1000 RPM, 3 Phase, 50 Hz, 0.9 PF. Qty. : 2 Nos. | |

7. Parameters being monitored according to monitoring plan

The project activity uses the approved AMS I.D - Grid connected renewable electricity generation, Version-13, Sectoral scope: 1

Monitoring Methodology – “**Grid connected renewable electricity generation**” version-13. It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM website

<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

The following parameters are being monitored on continuous basis

| | |
|--|--|
| Data / Parameter: | EG _{grossy} |
| Data unit: | GWh |
| Description: | Total electricity generated by the project during the year y |
| Source of data to be used: | On-site measurements |
| Value of data | 13.342349 |
| Description of measurement methods and procedures to be applied: | Measured daily using calibrated meters and aggregated monthly. |

| | |
|---------------------------------|--|
| QA/QC procedures to be applied: | The meters are tested for accuracy at least 15 days before synchronization of the unit and every six months with a portable Standard meter, which is of accuracy class compatible with the class of meter under test and as per the Prudent Utility Practices. |
| Any comment: | Data are archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

| | |
|--|--|
| Data / Parameter: | EG _{Auxiliary} |
| Data unit: | GWh |
| Description: | Auxiliary electricity consumption of the project |
| Source of data to be used: | On-site measurements |
| Value of data | 0.626649 (Calculated on difference between the gross energy generation and the net electricity export to the grid system) |
| Description of measurement methods and procedures to be applied: | Measured daily using calibrated meters and aggregated monthly or the difference between the gross energy generation and the net electricity export to the grid system, can be arrived as auxiliary consumption of the project activity. |
| QA/QC procedures to be applied: | Meter is calibrated as per industry standards. Sales records to the grid and other records are used to ensure consistency. If the data is calculated as the difference between gross and net power export, no QA/ QC procedures are applicable, since, both parameters already underwent the QA/QC procedures. |
| Any comment: | Data will be archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later |

| | |
|--|---|
| Data / Parameter: | EG _y |
| Data unit: | GWh |
| Description: | Net power exported to grid |
| Source of data to be used: | On site measurement |
| Value of data | 12.716500 |
| Description of measurement methods and procedures to be applied: | For measuring the energy delivered by the project activity, one set of Main meter (part of interconnection facilities) and check meter is provided by the company and the HPSEB at the interconnection point. Monthly joint meter readings of the main meter and |

| | |
|---------------------------------|--|
| | check meter at the interconnection point are taken by the designated officials of the company and HPSEB on the synchronisation of the first unit and every six months thereafter. Monthly joint meter readings are taken by the designated officials of the two parties on the synchronisation date of each unit as well as at 12.00 hours on the first day of the next month in which the first unit is synchronised and subsequently also at 12.00 hours of the first day of each month authorised representatives of both the parties on each of the above instances. |
| QA/QC procedures to be applied: | The main meter and check meter is tested for accuracy at least 15 days before synchronization of the unit and every six months thereafter. The test for the main meter and the check meter is done with reference to a portable Sub Standard meter, which is of accuracy class compatible with the class of meter under test and as per the Prudent Utility Practices. |
| Any comment: | Data is archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

| | |
|--|---|
| Data / Parameter: | EG _{import,y} |
| Data unit: | GWh |
| Description: | Grid electricity import to the project activity during the year y |
| Source of data to be used: | On site measurement |
| Value of data | 0.0008 |
| Description of measurement methods and procedures to be applied: | Measured monthly using calibrated meters and aggregated annually. |
| QA/QC procedures to be applied: | Meters were calibrated as per the industry standards. Project proponent has paid to the HPSEB based on the meter reading recorded in the import meter. The maintenance and/or other quality control measures are taken by HPSEB, since any false reading in the meter is a financial loss to HPSEB. Since, the data item is not under the control of project proponents, no QA/QC procedures are provided here. |
| Any comment: | Data will be archived electronically and on paper. Archived data will be kept during the crediting period plus 2 years or the last issuance of CERs for this project activity, whichever occurs later. |

| | |
|--|--|
| Data / Parameter: | $F_{i,y}$ |
| Data unit: | <i>Liters</i> |
| Description: | Quantity of Diesel combusted in the project plant during year y |
| Source of data to be used: | On-site measurements |
| Value of data | 195 |
| Description of measurement methods and procedures to be applied: | The total number of operating hours of DG set and the corresponding quantity of diesel consumed for the purpose were recorded in the log book maintained at the DG set room. |
| QA/QC procedures to be applied: | The data recorded can be cross checked against the fuel purchase receipts. |
| Any comment: | Data archived: Crediting period + two years. |

Note: As the annual units of the electricity associated monitoring parameters and diesel quantity have not generated in this monitoring period, these are reported in units appropriate to actual monitored vintage.

Management system and quality assurance:

Electricity: (Quality check & assurance is as per PPA signed between HPSEB & Him Kailash Hydro Power Pvt Ltd). Both Main and Check meters (export & import) installed by Him Kailash Hydro Power Pvt Ltd. are of 0.2s accuracy class. Each meter is jointly inspected and sealed on behalf of the parties.

Both Main and Check meters are being tested by accredited agency for every six months as per accepted laboratory standard meter in accordance with electricity standards. The meters are deemed to be working satisfactorily if the errors are within specifications of 0.2s accuracy class meters.

Methods of data transfer and archiving policy

The energy data were recorded both at the project site as well as at the grid substation, which is under the control of HPSEB. The energy is being measured using calibrated meters and recorded at the HPSEB Sub-station by HPSEB officials. Records of Monthly joint meter reading reports were used for emissions reduction calculations. Sales bills / receipts are being used for cross verification of electricity to/from grid as an alternative proof of the electricity exported to the grid.

Data Recording and Storage

For measuring the delivery/import of energy by the project at the interconnection point, one set of Main meter and Check Meter shall be provided by the Project proponent and the HPSEB respectively at the interconnection point. Representatives of both the project proponent and HPSEB sign the document which will contain all details such as the equipment data, calibration status, previous reading, current reading, export, import, net billable units, date and time of recording etc. This document was used as a basic document for monitoring and verification of the net energy exported to the grid. HPSEB paid to project proponents based on this document.

The above document will be kept at safe storage for verification of emission reductions generated from the project activity. Supporting documents such as receipts of payments released by HPSEB will also be kept in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

Technical details of monitoring instruments used during monitored period:

Energy Meters (Main & Check Meters):

| Description | 24 Jun 09 to 10 Dec 09 | | 10 Dec 09 to 28 Feb 10 | |
|---------------------------|--------------------------------------|-------------|------------------------|-------------|
| | Main meter | Check meter | Main meter | Check meter |
| Serial No. | 07033706 | 07033714 | 07041595 | 07360975 |
| Year of Manufacture | 2007 | 2007 | 2007 | 2007 |
| Type | ER 300 P | | ER 300 P | |
| Make | Larson & Turbo | | Larson & Turbo | |
| Accuracy class | 0.2s | | 0.2s | |
| Multiplication Factor | 1000 | | 1000 | |
| Date of Calibration Test | 18.05.2009 | | 06.11.2009 | |
| Next testing suggested on | 17.05.2010 | | 05.11.2010 | |
| Calibrating agency | Power Grid Corporation of India Ltd. | | | |

Meter failure and replacement are being registered in the log book as well as in Monthly Joint meter reading reports. As advised by HPSEB officials, the energy meters were changed in the presence of HPSEB officials on 10 December 2009 for regular periodic calibration test.

Gross generation meter:

| Description | Gross Generation Meter | |
|-----------------------|---------------------------|--------------|
| | Unit – I | Unit – II |
| Model | TM 7400 | TM 7400 |
| Serial No. | 75689 TM1108 | 75691 TM1108 |
| Accuracy class | 0.5 | 0.5 |
| Calibration Tested on | 28.11.2008 | 28.11.2008 |
| Calibration due date | 28.11.2010 | 28.11.2010 |
| Calibrating agency | Elmeasure India Pvt. Ltd. | |

Calibration test records have been maintained at project site and copies of the same are submitted to DOE for verification.

As per the Billing period, the Month wise data on electricity export to grid and electricity import from grid is presented in the table given below:

Table -2: Details of gross generation, Auxiliary Consumption, electricity exported to grid, electricity imported from grid and net electricity exported for the reported period.

| Monitoring Period | Gross Electricity Generation [EG _{gross,y}], kWh | | | Auxiliary consumption [EG _{Auxiliary,y}], kWh | | Electricity Exported to Grid [EG _{export,y}] | Electricity Imported from Grid [EG _{import,y}] | Net Electricity Exported [EG _y] |
|-------------------|--|-----------|---------|---|-------------------------|--|--|---|
| | Unit - I | Unit - II | Total | Measured at Proj. Site (See Note-1) | Calculated (See Note-2) | kWh | kWh | kWh |
| 24 to 30 June | 0 | 354750 | 354750 | 570 | 17650 | 337100 | 0 | 337100 |
| July | 1172987 | 1038975 | 2211962 | 3420 | 106562 | 2105500 | 100 | 2105400 |
| August | 1540750 | 1692950 | 3233700 | 6450 | 148000 | 3086100 | 400 | 3085700 |
| September | 1105562 | 1845475 | 2951037 | 7060 | 137837 | 2813400 | 200 | 2813200 |
| October | 3200 | 1505500 | 1508700 | 6060 | 72300 | 1436500 | 100 | 1436400 |
| November | 21925 | 1053050 | 1074975 | 5580 | 50275 | 1024700 | 0 | 1024700 |
| December | 0 | 636225 | 636225 | 5520 | 29725 | 606500 | 0 | 606500 |

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|--------------|----------------|----------------|-----------------|--------------|---------------|-----------------|------------|-----------------|
| January | 0 | 545900 | 545900 | 4250 | 26100 | 519800 | 0 | 519800 |
| February | 0 | 825100 | 825100 | 4570 | 38200 | 786900 | 0 | 786900 |
| Total | 3844424 | 9497925 | 13342349 | 43479 | 626649 | 12716500 | 800 | 12715700 |

Note-1: Measured aux. consumption includes part of electricity generated by the project activity and electricity imported from grid. The losses on account of power transformer & transmission line are not included in the measured aux. consumption.

Note-2: Calculated by the formula Gross electricity generation recorded in the plant + electricity imported from grid - electricity exported to the grid

8. GHG Calculations

The following formula is adopted for calculating emission reductions generated by the project activity:

$$ER_y = BE_y - PE_y - L_y$$

Where ER_y : emission reductions in a given year (tCO₂e)

BE_y : baseline emissions in a given year (tCO₂e)

PE_y : project emissions in a given year (tCO₂e)

L_y : leakage in a given year (tCO₂e)

Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_y * EF_y$$

Where EF_y : Baseline emission factor for a given year (tCO₂/GWh)

EG_y : net electricity export to grid in a given year (GWh)

Project Emissions

Since the project activity is small scale, no project emissions are applicable as per methodology. However, as the project is equipped with diesel generator to meet the

emergency requirements of power house etc., emissions out of usage of fossil fuel (diesel) are being accounted as project emissions by using the following equation.

$$PE_y = F_{i,y} \times COEF_i$$

$$PE_y = F_{i,y} * Density * NCV * EF_{CO_2} * OXID / 10^6$$

Where,

$F_{i,y}$: Quantity of diesel used during the year (Ltrs.)

Density : Density of diesel (0.845 kg/Ltr. as per Society of Indian Automobile Mfgs.

<http://www.siamindia.com/scripts/Diesel.aspx>

NCV : Net calorific value of diesel (43 TJ/Gg as per IPCC 2006 default value)

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

EF_{CO_2} : CO_2 emission factor of Diesel (74.1 t CO_2 /TJ as per IPCC 2006)

[http://www.ipcc-](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

[nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

OXID : Oxidation factor of the coal (1 as per IPCC 2006 default value).

Leakage Emissions

Since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity, hence leakage considered as zero.

$$L_y = 0$$

Using the above formulas, the Emission reductions from the project activity are shown below.

9. Emission Reductions

The emission reductions for the reported period from 24 Jun 2009 to 28 Feb 2010 are estimated and presented below:

Table -3: Net Emission Reductions for the Monitored period.

| Monitored Period | Year | Net Electricity Exported | | Baseline Emission Factor * | Diesel Consumption | Baseline Emissions | Project Emissions | Net Emission Reductions |
|------------------|------|--------------------------|-----|----------------------------|---------------------|--------------------|--------------------|-------------------------|
| | | [EG _y] | | [EF _y] | [F _{i,y}] | [BE _y] | [PE _y] | [ER _y] |
| | | kWh | GWh | tCO ₂ /GWh | Ltrs. | tCO ₂ e | tCO ₂ e | tCO ₂ e |

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|--------------------|------|-----------------|----------------|-----|------------|----------------|-------------|----------------|
| 24 June to 30 June | 2009 | 337100 | 0.3371 | 793 | 5 | 267.3 | 0.01 | 267.3 |
| July | 2009 | 2105400 | 2.1054 | 793 | 20 | 1669.6 | 0.05 | 1669.5 |
| August | 2009 | 3085700 | 3.0857 | 793 | 20 | 2447.0 | 0.05 | 2446.9 |
| September | 2009 | 2813200 | 2.8132 | 793 | 20 | 2230.9 | 0.05 | 2230.8 |
| October | 2009 | 1436400 | 1.4364 | 793 | 20 | 1139.1 | 0.05 | 1139.0 |
| November | 2009 | 1024700 | 1.0247 | 793 | 20 | 812.6 | 0.05 | 812.5 |
| December | 2009 | 606500 | 0.6065 | 793 | 30 | 481.0 | 0.08 | 480.9 |
| January | 2010 | 519800 | 0.5198 | 793 | 40 | 412.2 | 0.11 | 412.1 |
| February | 2010 | 786900 | 0.7869 | 793 | 20 | 624.0 | 0.05 | 624.0 |
| T o t a l | | 12715700 | 12.7157 | | 195 | 10083.6 | 0.53 | 10083.0 |

* Regd. PDD wherein the project had been chosen the Combined Margin emissions of the current generation mix and the same was fixed for the crediting period.

Comparison for Actual emission reductions and Estimated in the PDD:

| Description | Unit | As per PDD | Actual | Variation |
|----------------------------|-----------------------|------------|---------|-----------|
| Net Electricity Generation | GWh | 15.692 \$ | 12.7157 | - 19% |
| Baseline Emission Factor | tCO ₂ /GWh | 793 | 793 | |
| Baseline Emissions | tCO ₂ e | 12444 | 10083 | |
| Project Emissions | tCO ₂ e | 0 | 1 | |
| Net Emission reductions | tCO ₂ e | 12444 | 10082 | - 19% |

\$ As the reported period is less than one year, the annual net electricity generation which was indicated in the registered PDD i.e. 20.75 GWh is adjusted by taking expected electricity generation (about 5.0576 GWh) for the period from March to June based on the plant generation data. Copies of the relevant Joint Meter Reading Reports certified by HPSEB officials are being submitted to DOE for verification.

The net emission reductions occurred during the reported period are 19% less than the estimated in the PDD because of deficient rainfall (around 58.6%) in the region (Himachal Pradesh).

| Rainfall (in mm) During the Year 2009 | | | |
|--|---------------|---------------|------------------|
| | Normal | Actual | Variation |
| Monsoon (Jun – Sep 09) | 773.7 | 494.2 | -36% |
| Post-Monsoon (Oct - Dec 09) | 109.1 | 71.6 | - 34% |
| Winter (Jan – Feb 10) | 177.3 | 102.3 | - 42% |
| Total | 1060.1 | 668.1 | - 58.6% |

Source: Maps of India Meteorological Department. Copies of these maps are being provided to DOE for verification.

10. Details of Monitoring team and Responsibilities

A CDM team has been formed in Him Kailash Hydro Power Private Limited for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management of HKHPPL. Qualified and trained personnel monitor the parameters and emission reduction calculations. For implementation of the monitoring Plan, Him Kailash Hydro Power Private Limited is the sole agency responsible for implementation and monitoring. The details of monitoring team are detailed below:

Table -4: Monitoring Team

| S.No | Name of the Person | Designation |
|-------------|----------------------------|--------------------|
| 1 | Mr. Ch.V. Narasimha Raju | Managing Director |
| 2 | Mr. A.K.Raghu | General Manager |
| 3 | Mr. Surjeet Singh Malhotra | Plant Incharge |
| 4 | Mr. Avtar Singh | Shift Incharge |
| 5 | Mr. Ashok Kumar | Shift Incharge |
| 6 | Mr. Chaman Singh | Shift Incharge |

Roles and Responsibilities – Monitoring Team

Managing Director

Managing Director is responsible for the total monitoring plan He has reviewed the reports regularly and taken necessary corrective action conform to CDM.

General Manager

General Manager has been examined the reports generated by the Plant Incharge with respect to the monthly electricity generated; net electricity exported to grid and annual emission reduction calculations as per the monitoring plan. He also examined the internal audit reports prepared by internal auditor and taken care for any deviations in data.

He would cross check plant operation reports regularly and report to Managing Director for any abnormality.

Plant Incharge

Plant Incharge is responsible for the electricity generation of the project. He has cross verified and signed the daily plant operation reports regularly and reported to General Manager. The periodical tests of the monitoring equipments have been taken care by the plant incharge in line with monitoring plan.

The responsibility of storage and archiving of information in good condition also lies with the Plant Incharge. He also co-ordinated to obtain audit reports as per the monitoring plan from internal auditors.

Shift Incharge

Shift incharge is responsible for monitoring and recording of monitoring parameters as described in the registered PDD. He collected the recorded data from log sheets of respective sections and prepared the consolidated report on electricity generation, export to grid, diesel consumption, plant shut down time, etc. for a day. He prepared daily reports and submit to the Plant incharge for review.