

**PATIKARI POWER PVT LTD**  
**2X8000KW**  
**Mandi District, Himachal Pradesh**



*Annual O&M Report*  
*FY 2010-11*

# *Contents*

- 1. Introduction*
- 2. Plant Performance*
- 3. Preventive and Breakdown Maintenance*
- 4. Post Monsoon Inspections*
- 5. Annual Maintenance and Overhauling Works*
- 6. Loss of Generation-Causes and Corrective Steps*
- 7. Civil Structures – Inspections & Restoration Works*
- 8. Inventory Management*
- 9. Critical Issues – Resolved / Under Follow up*
- 10. Safety, Health & Environment Protection*
- 11. Social Development Activities*
- 12. HR Issues and Employees Welfare Measures*

## 1. Introduction



16 MW Patikari Project, implemented by Patikari Power Private Limited, is a run of the river hydro power project developed on Bakhli Khad, a tributary of Beas River and is located in Mandi district of Himachal Pradesh, India. Two (2) generating Units driven by horizontal shaft Pelton Turbines, each having a rated output of 8.0 MW, are installed in the Power Station. These generating Units are designed to run at fifteen (15) % continuous overload. The Design Energy of the Power Plant is 78.81 million KWh of electrical energy based on the 90% Dependable Discharge and rated output of 16 MW.

The project comprises of the following component structures:

- i. A solid gravity un-gated weir of about 5m height, built in stone masonry and cement concrete
- ii. One gated under sluice built in reinforced cement concrete
- iii. A 2-bay power intake combined with surface de-silting chamber built in stone masonry /reinforced cement concrete
- iv. Cut and cover conduit outlet from the de-silting chamber connecting the head race tunnel
- v. Concrete lined head race tunnel of 1.8m width and 2.1m height with a D-shape. Total length of tunnel from intake to surge shaft is about 3600m
- vi. Two numbers of steel pipe aqueducts in the HRT, one across the Bakhli Khad and the other across the Bakora Nallah
- vii. Restricted orifice type steel surge shaft of 3m diameter, at the outlet portal of HRT
- viii. Penstock Butterfly Valve at the surge shaft

## ANNUAL PROJECT O&M REPORT

- ix. One main surface steel penstock of 1.3m diameter and 680m length, bifurcated at the end into 0.9m diameter unit penstocks
- x. Surface powerhouse on the left bank of the Bakhli Khad, equipped with 2 horizontal Pelton Wheel units each of 8 MW capacity
- xi. Two numbers of 3-phase unit transformers and a surface switch yard located beside the powerhouse

Patikari Project harnesses energy from the water in Bakhli Khad River diverted through a Diversion Weir and led to Desilting Tanks. After flushing the silt, if any, clean water is then fed to the Water Conductor System comprising of 3.6 km Head Race Tunnel including two (2) Aqueducts enroute, followed by Surface Steel Surge Shaft and 715 m long Penstock feeding water under pressure for driving two (2) hydro-generating Units in the Power House. After passing through the Turbines, water is led back to Bakhli Khad through Tail Race Channel.

Each of the two (2) Generating Units in Patikari Hydropower station comprises horizontal Pelton Turbine to which synchronous Generator is directly coupled, generating rated power of 8.0 MW at 11kV. Besides appropriate Unit and Station Auxiliaries, state of the art Control and Monitoring System (SCADA) has been installed in the Power Station to ensure optimum generation there from.

Power so generated is then being stepped up to 33kV through two (2) 11MVA Step-up Transformers and being evacuated through one (1) double circuit 11km long 33kV Transmission Line terminating at the other end in 33kV Substation of HPSEB at Pandoh which is part of the HPSEB network. Patikari Power Private Limited have entered into a long term Power Purchase Agreement dated 5<sup>th</sup> July 2004 with HPSEB envisaging delivery of power from the Project at 33kV Substation of the Board at Pandoh in Mandi district of Himachal Pradesh. Tariff for the electricity to be supplied by the Project to the Board at this Delivery Point is Rs. 2.25 per kWh (fixed).

Design Energy of the project, based on the 90% Dependable year Discharge as adopted in the Detailed Project Report and without taking into account mandatory release of 15% discharge during lean discharge period, is 78.81 MU. However, discharge trend in Bakhli Khad as actually observed since commissioning of the project, does not match with above said Design discharges especially during eight lean discharge months even in years with normal monsoon rains. As a result, actual annual energy generation from the Project till date has been less than that of the Design Energy even during years with normal monsoon rains and in spite of both the units having been run continuously at around 20% overload capacity during monsoon months.

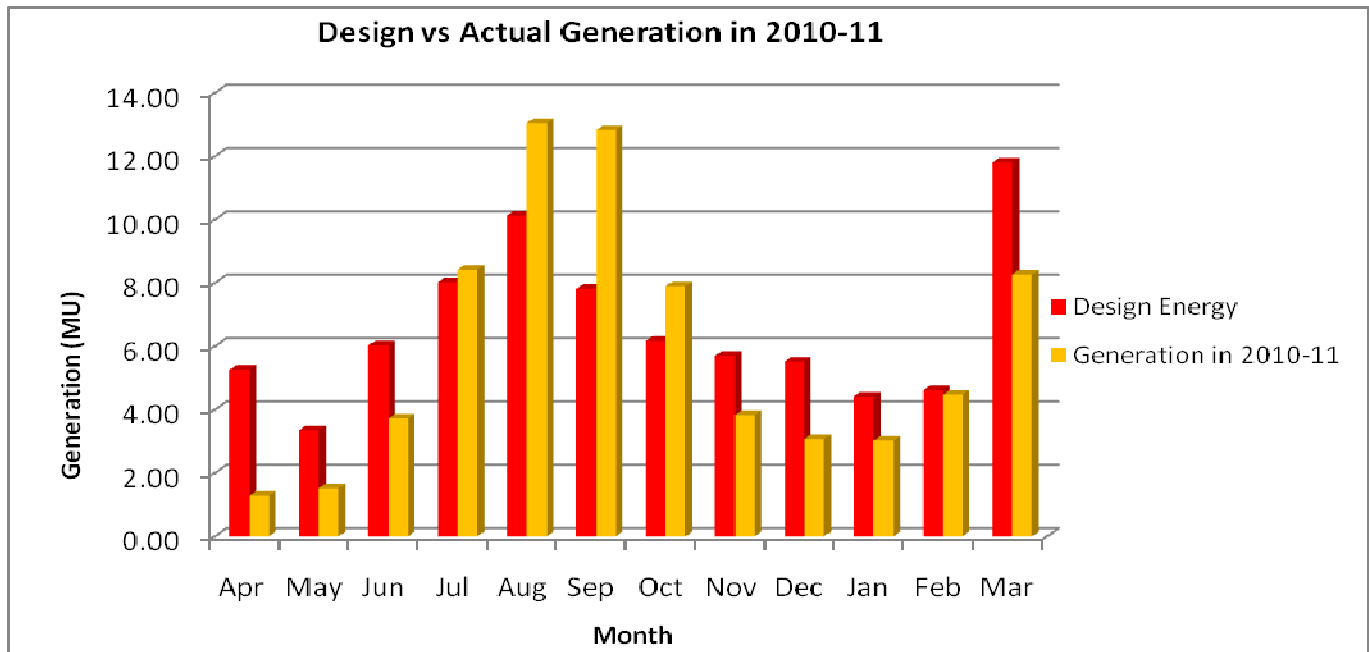
## 2. Plant Performance

### 2.1 Generation Data during the Year

Month wise Design Energy and corresponding actual generation from the Project during 2010-11 are tabulated hereunder.

| Month        | Design Energy (90% Dependable Year in MUs) | Actual Generation (MUs) during 2010-11 | Shortfall in Generation (MUs) | Remarks              |
|--------------|--|--|-------------------------------|----------------------|
| Apr          | 5.26                                       | 1.29                                   | - 3.98                        | Due to low discharge |
| May          | 3.35                                       | 1.51                                   | - 1.84                        | Due to low discharge |
| Jun          | 6.03                                       | 3.72                                   | - 2.31                        | Due to low discharge |
| Jul          | 8.02                                       | 8.42                                   | + 0.40                        |                      |
| Aug          | 10.12                                      | 13.05                                  | + 2.93                        |                      |
| Sep          | 7.82                                       | 12.82                                  | + 5.00                        |                      |
| Oct          | 6.17                                       | 7.90                                   | + 1.73                        |                      |
| Nov          | 5.70                                       | 3.83                                   | - 1.87                        | Due to low discharge |
| Dec          | 5.51                                       | 3.07                                   | - 2.44                        | Due to low discharge |
| Jan          | 4.41                                       | 3.03                                   | - 1.39                        | Due to low discharge |
| Feb          | 4.62                                       | 4.47                                   | - 0.15                        | Due to low discharge |
| Mar          | 11.80                                      | 8.26                                   | - 3.54                        | Due to low discharge |
| <b>Total</b> | <b>78.81</b>                               | <b>71.36</b>                           | <b>- 7.45</b>                 |                      |

*As evident from above, against Design Energy of 78.81 MU based on 90% Dependable Year Discharges, Project generated 71.36 MU during the financial year 2010-11. The Generation during financial year 2010-11 was thus 90.55% of the Design Energy*



## 2.2 Generation Data during preceding three years of Operation:

| Month        | Design Energy (90% Dependable Year in MUs) | Actual Generation (MUs) during 2008-09 | Actual Generation (MUs) during 2009-10 | Actual Generation (MUs) during 2010-11 |
|--------------|--|--|--|--|
| Apr          | 5.26                                       | 3.08                                   | 2.28                                   | 1.29                                   |
| May          | 3.35                                       | 2.36                                   | 1.68                                   | 1.51                                   |
| Jun          | 6.03                                       | 7.20                                   | 1.50                                   | 3.72                                   |
| Jul          | 8.02                                       | 12.02                                  | 2.22                                   | 8.42                                   |
| Aug          | 10.12                                      | 13.21                                  | 5.49                                   | 13.05                                  |
| Sep          | 7.82                                       | 11.61                                  | 8.99                                   | 12.82                                  |
| Oct          | 6.17                                       | 8.60                                   | 3.47                                   | 7.90                                   |
| Nov          | 5.70                                       | 4.34                                   | 2.34                                   | 3.83                                   |
| Dec          | 5.51                                       | 3.22                                   | 1.84                                   | 3.07                                   |
| Jan          | 4.41                                       | 2.62                                   | 1.65                                   | 3.03                                   |
| Feb          | 4.62                                       | 2.16                                   | 2.46                                   | 4.47                                   |
| Mar          | 11.80                                      | 2.18                                   | 2.59                                   | 8.26                                   |
| <b>Total</b> | <b>78.81</b>                               | <b>72.60</b>                           | <b>36.52</b>                           | <b>71.36</b>                           |

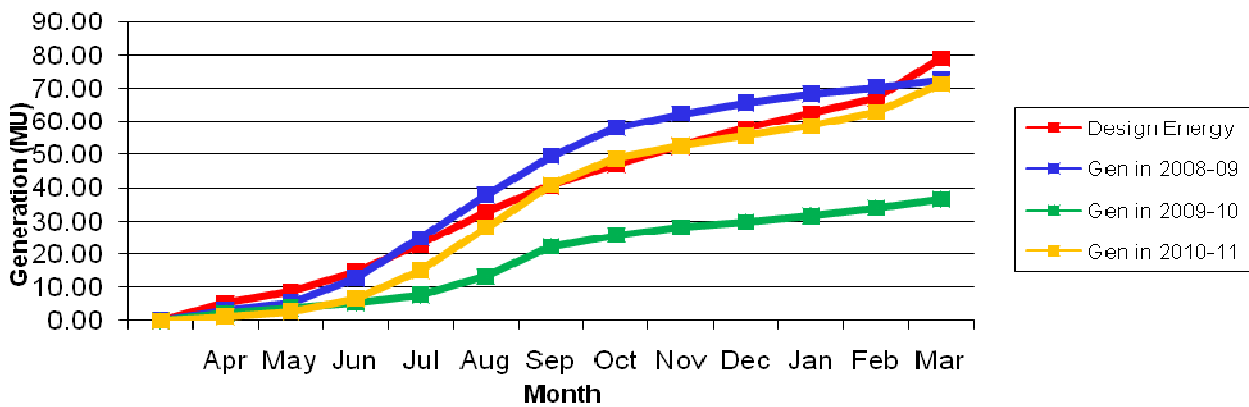
ANNUAL PROJECT O&M REPORT

Actual Generation during 2008-09 & 2009-10 was **72.60 MU** & **36.52 MU** respectively. Hence the Generation during 2010-11 is **98.29%** and **195.43%** of the Generation during 2008-09 & 2009-10.

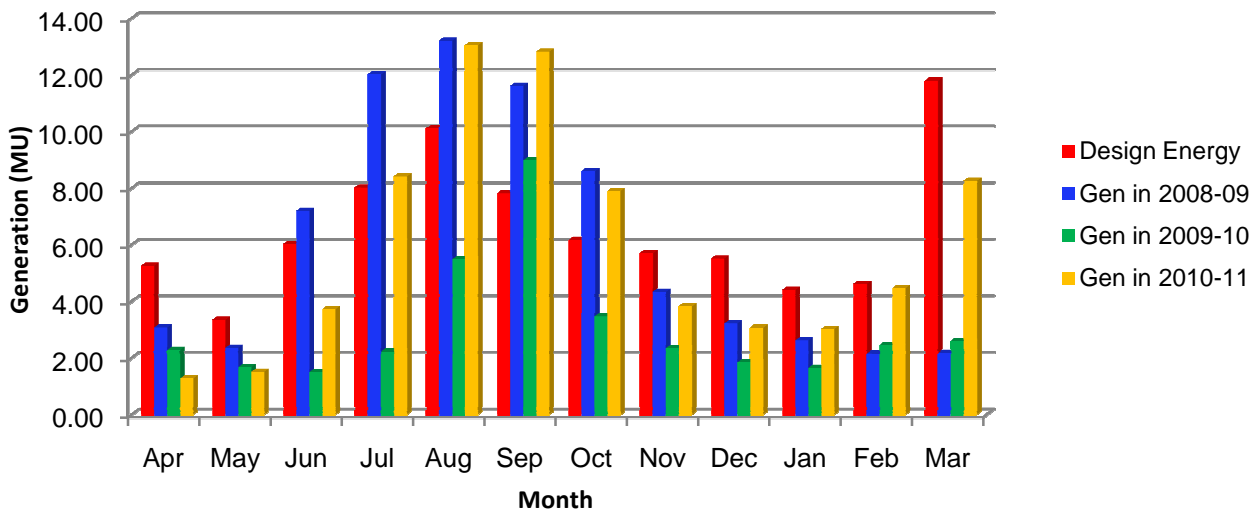
Generation during Sept-10, Jan-11, Feb-11 & Mar-11 is now the highest since commissioning of the project for the corresponding months. However the generation in these months was still less than the Design Energy.

Generation during the fourth quarter i.e. Jan-11 to Mar-11 was **15.76 MU** which is the highest for this quarter since commissioning of the project.

Cumulative Generation at a Glance



Monthly Generation at a Glance





### 2.3 Revenue Generation / Realization

Project delivered 61,147,680 Units of electricity to HPSEB during financial year 2010-11 after accounting for 12% Free Power to the Home State. Against the energy supplied and billed for the year 2010-11 amounting to INR 137,582,280 HPSEB have released payments amounting to INR 126,583,776 only. The details of the revenue generated by the Project by sale of Power to HPSEB and amounts realized during 2010-11 are tabulated hereunder.

| <b>Revenue Generation/Realization during Financial Yr 2010-11</b> |                      |                                    |                         |                             |
|---|----------------------|------------------------------------|-------------------------|-----------------------------|
| <b>S.No.</b>  | <b>Period</b>        | <b>Total Saleable Energy (kWh)</b> | <b>Bill Raised (Rs)</b> | <b>Amount Received (Rs)</b> |
| 1   | -----                | -----                              | -----                   | 5,010,984 *                 |
| 2   | 01/04/10 to 01/05/10 | 1,096,128                          | 2,466,288               | 2,466,288                   |
| 3   | 01/05/10 to 01/06/10 | 1,298,880                          | 2,922,480               | 2,922,480                   |
| 4   | 01/06/10 to 01/07/10 | 3,220,800                          | 7,246,800               | 7,246,800                   |
| 5   | 01/07/10 to 01/08/10 | 7,339,200                          | 16,513,200              | 16,513,200                  |
| 6   | 01/08/10 to 01/09/10 | 11,083,776                         | 24,938,496              | 24,938,496                  |
| 7   | 01/09/10 to 01/10/10 | 10,916,928                         | 24,563,088              | 24,563,088                  |
| 8   | 01/10/10 to 01/11/10 | 6,670,752                          | 15,009,192              | 15,009,192                  |
| 9   | 01/11/10 to 01/12/10 | 3,283,104                          | 7,386,984               | 7,386,984                   |
| 10  | 01/12/10 to 01/01/11 | 2,676,960                          | 6,023,160               | 6,023,160                   |
| 11  | 01/01/11 to 01/02/11 | 2,575,584                          | 5,795,064               | 5,795,064                   |
| 12  | 01/02/11 to 01/03/11 | 3,870,240                          | 8,708,040               | 8,708,040                   |
| 13  | 01/03/11 to 01/04/11 | 7,115,328                          | 16,009,488 **           | -----                       |
|   | <b>Total</b>         | <b>61,147,680</b>                  | <b>137,582,280</b>      | <b>126,583,776</b>          |

- \* Energy bill amount of Rs. 5,010,984 raised for March-2010 was received during April-2011.
- \*\* Energy bill amount of Rs. 16,009,488 for saleable energy of 7,115,680 MU during March-2011 would be realized in April-2011.
- Received amounts for saleable energy are net of the cash discount availed by HPSEB as per PPA for early payments.
- As per HPERC order dated 16th Jul, 2010, additional energy charges @ 27 paisa/ unit amounting to Rs.1.6 Crores are due to us for the energy supplied which can be billed after signing of Supplementary PPA with HPSEBL only.



### ***3. Preventive and Breakdown Maintenance***

To minimize the breakdowns / plant outages and consequent avoidable generation loss of the project, periodic preventive maintenance schedules for all the equipments have been prepared & are being complied with. These periodic maintenance schedules are listed below.

- Daily maintenance schedule
- Weekly maintenance schedule
- Monthly maintenance schedule
- Quarterly maintenance schedule
- Half-Yearly maintenance schedule
- Yearly maintenance schedule

Apart from the above schedules, following works are being carried out

✓ **Cleaning of both Desanders at Weir Site –**

To avoid the choking of Desanding channel during monsoon months, regular cleaning of the Trash Racks and De-sanders, as depicted in following photograph, is being carried out during monsoon months.



✓ **CGI Sheets Covering Arrangement on the Trash Rack Bridge –**

During monsoon season, it was becoming difficult for the deployed labour force to stand in rain and continuously keep clearing the wooden trash and debris collecting upstream of the Trash Racks at the beginning of the De-sanders. To overcome this problem, a CGI sheets covering arrangement has been provided over the trash rack bridge.



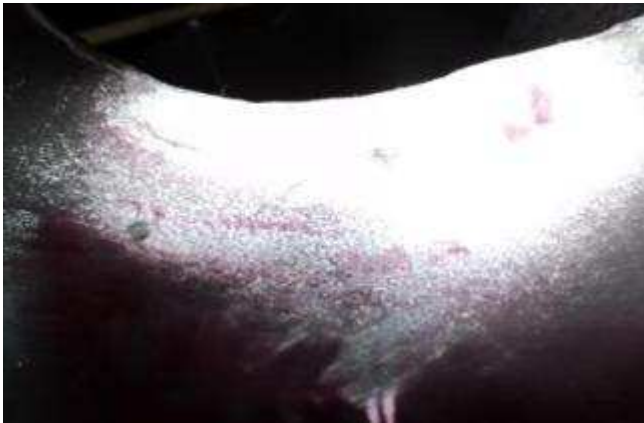
## 4. Post Monsoon Inspections

### 4.1 Underwater Parts

#### 4.1.1 Runners:

Runners of both the units have been inspected after the monsoon months. The unit wise photographs of Runner Buckets as taken during these inspections are shown below.

#### Unit-I:

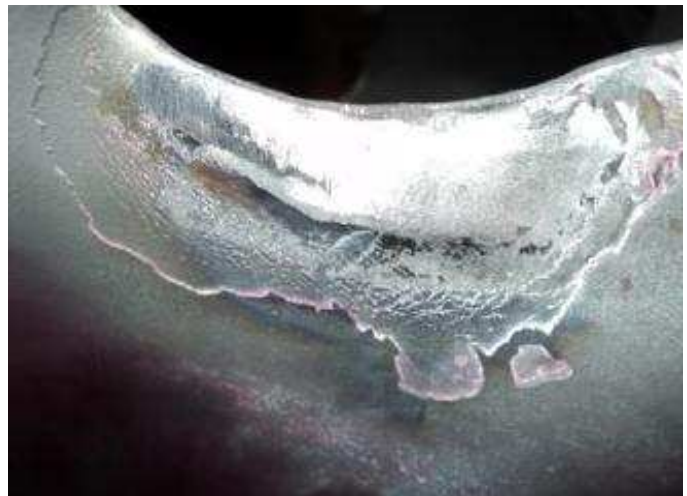




**Unit-II:**







***Observations during the Inspections:***

- ***Unit-I :***
  - ✓ Traces of erosion at the edges were found
  - ✓ One bucket was damaged probably due to striking of the broken parts of flange with buckler
- ***Unit-II:***
  - ✓ Dents on a few buckets were found due to striking of foreign materials
  - ✓ One bucket was damaged due to striking of the broken parts of flange with buckler

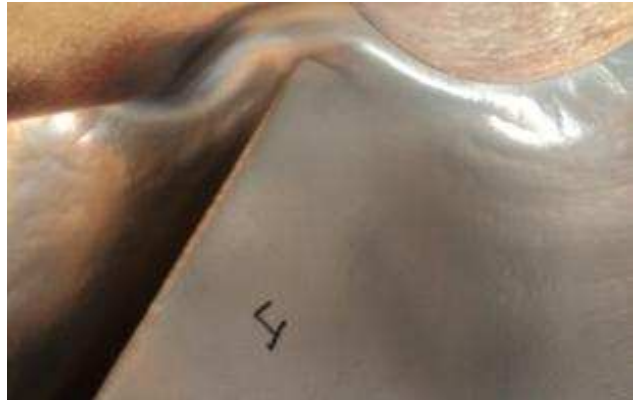
No major overhauling works were required to be done on runners. Above said damages can be rectified by welding/grinding/touch up works. Accordingly minor touch up works such as welding, grinding was carried out on the runners. The photographs showing such touch up works under progress are given below.



***Photographs after Touch up works:***

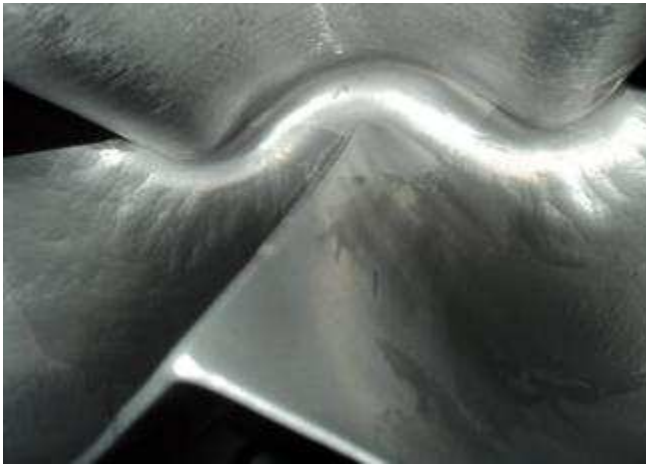
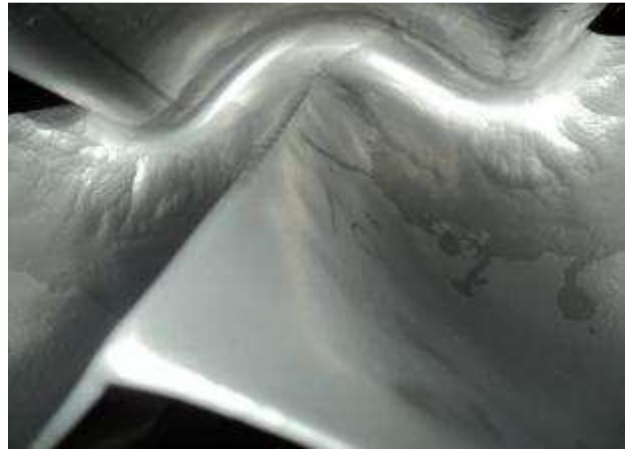
**Unit-I:**

ANNUAL PROJECT O&M REPORT

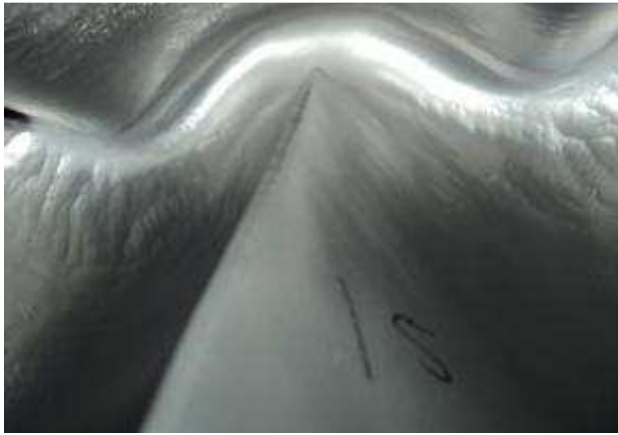




ANNUAL PROJECT O&M REPORT

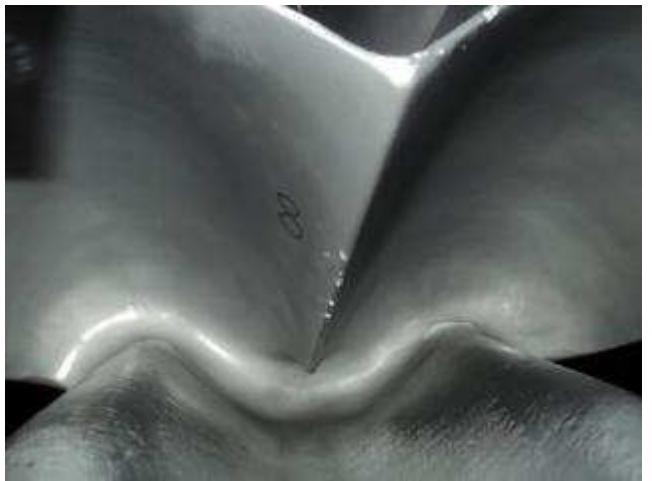
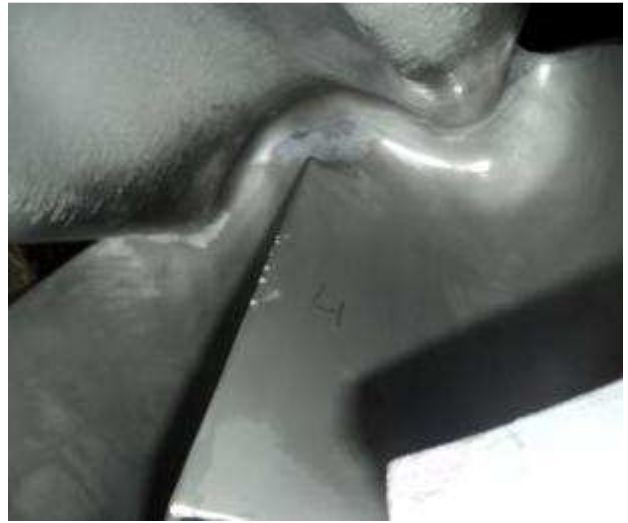


ANNUAL PROJECT O&M REPORT



**Unit-II:**

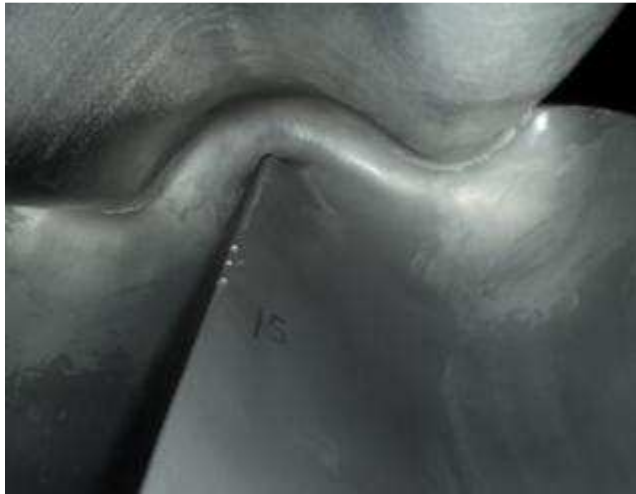




ANNUAL PROJECT O&M REPORT







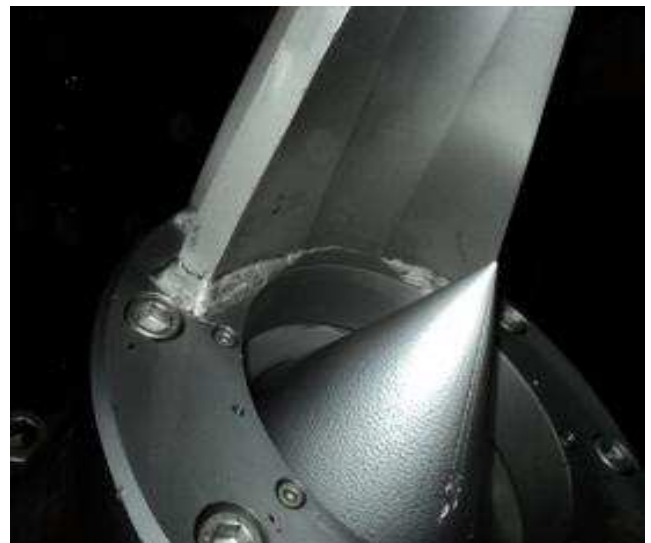
#### 4.1.2 Nozzles:

##### Unit-I:





**Unit-II:**



**Observations during the Inspections:**

- ✓ One dent in Unit-II nozzle due to striking of foreign material which might have come from Penstock earlier
- ✓ No other dents/damages were found

The nozzles, as such, didn't require any major maintenance/overhauling work.

**4.1.3. Flanges with Buckler:**

As the Flanges with Buckler of both units had been getting damaged, the same were inspected from time to time during the year. The unit wise photographs of such damaged Flanges are shown below.

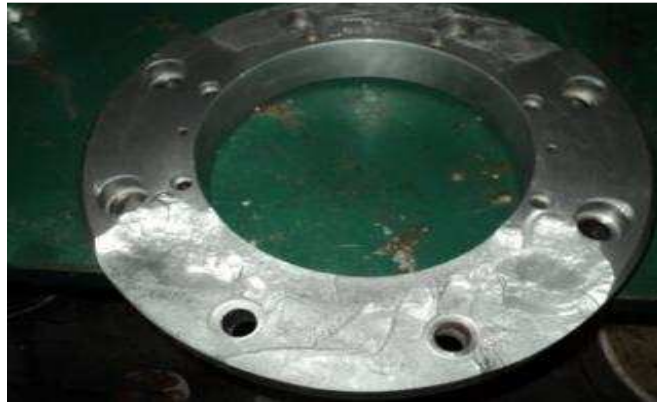
**Unit-I:**



**Unit-II:**







***Observations during the Inspections:***

Flanges with Buckler of both units had got damaged. Two (2) no. of Flange with Bucklers were got modified locally through M/s New Namhari Auto engineers. Modified Flange with Bucklers has now been replaced. Performances of these modified Flanges with Buckler are under observation now & decision would be taken accordingly after next post monsoon inspections. Meanwhile to cater for any exigencies, additional four Flanges with Buckler will be got fabricated and kept in stock. The photographs of the Modified Flange with Bucklers are shown below.



## *5. Annual Maintenance and Overhauling Works*

Equipment wise maintenance schedule viz. Generator, Turbine & MIV, Power Transformers, Switchyard equipments, weir site structures has already been issued to the project site. These maintenance schedules are strictly complied by the project on regular basis. Maintenance of the following equipments/structures was carried out as per the maintenance schedule.

- Generator
- Generator Transformers & other Transformers
- Turbine & MIV
- Switchyard equipments
- EOT Crane
- Weir site structures

Following major Annual Maintenance and restoration works of the Power Plant were carried out during the year:

- ✓ Replacement of damaged Flanges with Buckler of both Units
- ✓ Flushing of Nozzles & MIV of both Units
- ✓ Cleaning of MIV Seal Filters, Cooling water filters & pump strainer and Lube Oil Filters of both Units
- ✓ Cleaning of Cooling Water Pit
- ✓ Servicing of Compressor
- ✓ Repair and restoration of affected Runner buckets of both units

No other major overhauling / capital works were required to be done during the year. It has been observed that, runner of Unit-I, which was not hard coated, was comparatively more eroded. Hence it is planned to get the available spare runner hard coated and replace the runner of Unit-I with it after the next monsoons. Repairing & hard coating of the existing Runner of Unit-I is scheduled to be taken up in the coming financial year depending on the availability of funds.

## 6. Loss of Generation - Causes and Corrective steps

**6.1.** Loss of Generation due to various reasons viz. plant outages & forced Grid outages during the year under report was to the tune of 1.51 MU. Loss of Generation during preceding three years is summarized below.

| <b>Loss of Generation</b>   |  |                             |                        |                             |                        |                             |                     |                             |                        |
|-----------------------------|--|-----------------------------|------------------------|-----------------------------|------------------------|-----------------------------|---------------------|-----------------------------|------------------------|
|                             | Year                                       | FY 2007-08                  |                        | FY 2008-09                  |                        | FY 2009-10                  |                     | FY 2010-11                  |                        |
| Outage/<br>Tripping<br>Type | Description                                | Outage<br>Duration<br>(Min) | Energy<br>Loss<br>(MU) | Outage<br>Duration<br>(Min) | Energy<br>Loss<br>(MU) | Outage<br>Duration<br>(Min) | Energy<br>Loss (MU) | Outage<br>Duration<br>(Min) | Energy<br>Loss<br>(MU) |
| <b>Plant<br/>Outage</b>     | Malfunctioning of Vibration sensor related | 184                         | 0.01747                | 298                         | 0.04361                | 0                           | 0.00000             | 254                         | 0.04020                |
|                             | Trash Rack choking related                 | 0                           | 0.00000                | 4283                        | 0.57517                | 0                           | 0.00000             | 323                         | 0.03722                |
|                             | Cooling water filter & MIV filter related  | 0                           | 0.00000                | 32                          | 0.00511                | 101                         | 0.00909             | 1976                        | 0.27827                |
|                             | Flange with Buckler related                | 0                           | 0.00000                | 0                           | 0.00000                | 231                         | 0.03080             | 921                         | 0.14584                |
|                             | Transmission Line Related                  | 0                           | 0.00000                | 579                         | 0.08252                | 88                          | 0.00293             | 290                         | 0.03190                |
|                             | Governor software modification             | 0                           | 0.00000                | 0                           | 0.00000                | 0                           | 0.00000             | 539                         | 0.06030                |
|                             | Other miscellaneous trippings              | 2434                        | 0.15629                | 6387                        | 0.88956                | 0                           | 0.00000             | 820                         | 0.11698                |
| <b>Forced<br/>Outage</b>    | Grid Outage (>20 min)                      | 587                         | 0.05260                | 1199                        | 0.20433                | 349                         | 0.01955             | 524                         | 0.04990                |
|                             | Grid Outage (<20 min)                      | 95                          | 0.02672                | 946                         | 0.44762                | 89                          | 0.04021             | 775                         | 0.58561                |

ANNUAL PROJECT O&M REPORT

|  |                      |             |                |              |                |            |                |             |                |
|--|----------------------|-------------|----------------|--------------|----------------|------------|----------------|-------------|----------------|
|  | Backdown Instruction | 0           | 0.00000        | 10234        | 0.74394        | 99         | 0.00528        | 2245        | 0.16782        |
|  | <b>Total</b>         | <b>3300</b> | <b>0.25308</b> | <b>23958</b> | <b>2.99186</b> | <b>957</b> | <b>0.10786</b> | <b>8667</b> | <b>1.51404</b> |

There are following two main factors responsible for the loss of generation from the Project:

- External Evacuation Constraints
- Plant Outages

### 6.2. External Evacuation Constraints

External constraints mainly comprise of the Grid outages in the HPSEB networks & back down instructions. Generation loss due to grid/HPSEB transmission lines tripping incidents during financial year 2010-11 was to the tune of 0.803 MU.

This issue has been persistently followed up with the Board to eliminate such outages to the maximum extent possible and remove all evacuation constraints being faced by the project. Other than following up with HPSEB authorities to improve and properly maintain their network, the Project have very little control on Grid trippings.

### 6.3. Plant Outages

Short and prolonged plant outages are the other major factor contributing to substantial generation loss from the project. However, by strictly implementing the preventive maintenance schedules, these outages can be reduced to a large extent thus minimizing the breakdown time of the machines. As minimization of plant outages is in our control, it was thought appropriate to glean the generation data to find out the causes for such outages and take corrective steps to avoid these failures to the maximum extent in future.

In this context it would be appropriate to look into the break up of generation loss due to different categories of Plant outages. Actual generation loss due to various plant outages during financial year 2010-11 was as under:

- ✓ Choking of Cooling Water and MIV Filters - 0.278MU
- ✓ Break down of Flanges with Buckler - 0.146MU
- ✓ Malfunctioning of various sensors - 0.040MU
- ✓ Choking of Trash Racks - 0.037MU
- ✓ Patikari Feeders' faults - 0.032MU
- ✓ Other miscellaneous causes - 0.116MU

Main factors contributing the plant outages & their mitigating measures are detailed below;

#### **6.3.1. Cooling water filter related:**

Earlier only one (1) set of cooling water filters was installed in the cooling water system. Cooling water filters used to get choked due to the silt coming from the river water leading to the forced shutdown of the plant and consequent loss of generation.

To cater for such exigency, one (1) additional (spare) set of cooling water filters has been procured from M/s Hydac (India) Pvt. Ltd. and installed to act as the standby filter thereby reducing the downtime of the plant.

#### **6.3.2. Flange with Buckler related:**

Flanges with Buckler have been getting damaged off and on during operation of the Turbines. Different modified versions of Flanges with Buckler have been tried but problem is still not completely solved. Two (2) no. of damaged Flanges with Buckler have been got repaired with some modifications. Their performance will be monitored during coming monsoon rains. In the meantime, change in design of the Flange with Buckler in consultation with the OEM and other manufacturers is also being explored.

#### **6.3.3. Malfunctioning of sensors:**

High vibrations indication and tripping of Units was due to malfunctioning of the sensors. Vibration monitoring sensors are being procured and faulty ones are being replaced to cater for such problems in future.

#### **6.3.4. Trash Rack choking related:**

Trash Rack choking has contributed to the generation loss during monsoon season. Drum arrangement for diversion of drift wood has been provided at the intake to stop the clogging of the trash rack. Continuous clearing of Trash Racks manually during monsoon months is being carried out. These measures have yielded the desired results.



To uninterrupted clearing out of the trash / debris upstream of Trash Racks during monsoon months, a CGI sheets covering arrangement has been provided over the trash rack bridge.

#### **6.3.5. Other miscellaneous trippings:**

The operating philosophy of the Turbine Unit and the software of the associated Digital Governor of the project was programmed and engineered considering that in case of any fault, the turbine unit would come to a standstill condition and main inlet valve (spherical valve) would also be closed till the fault is removed. Subsequently it has been observed during the operation of the plant that even for transitory external non urgent electrical faults, the turbine is tripped with closure of Main Inlet Valve which led to delayed restarting / synchronization of Units and consequent avoidable loss of generation.

To reduce the restoration time in the event of tripping, modification in the software of the Governor was proposed. The proposed modification in the Governor software would reduce the start up duration of the machines following the grid failures, consequently minimizing the generation loss.

Regular patrolling and inspection and preventive maintenance of Patikari to Pandoh sub-station feeders has reduced trippings on these feeders and consequent generation loss.



## 7. Civil Structures – Inspection & Restoration Works

### 7.1. Weir Site

#### 7.1.1. Wire Crates and Concrete Blocks

Wire crates downstream of the Weir had got damaged due to the monsoon floods during the year under report. No other visible damages were observed at Weir site.



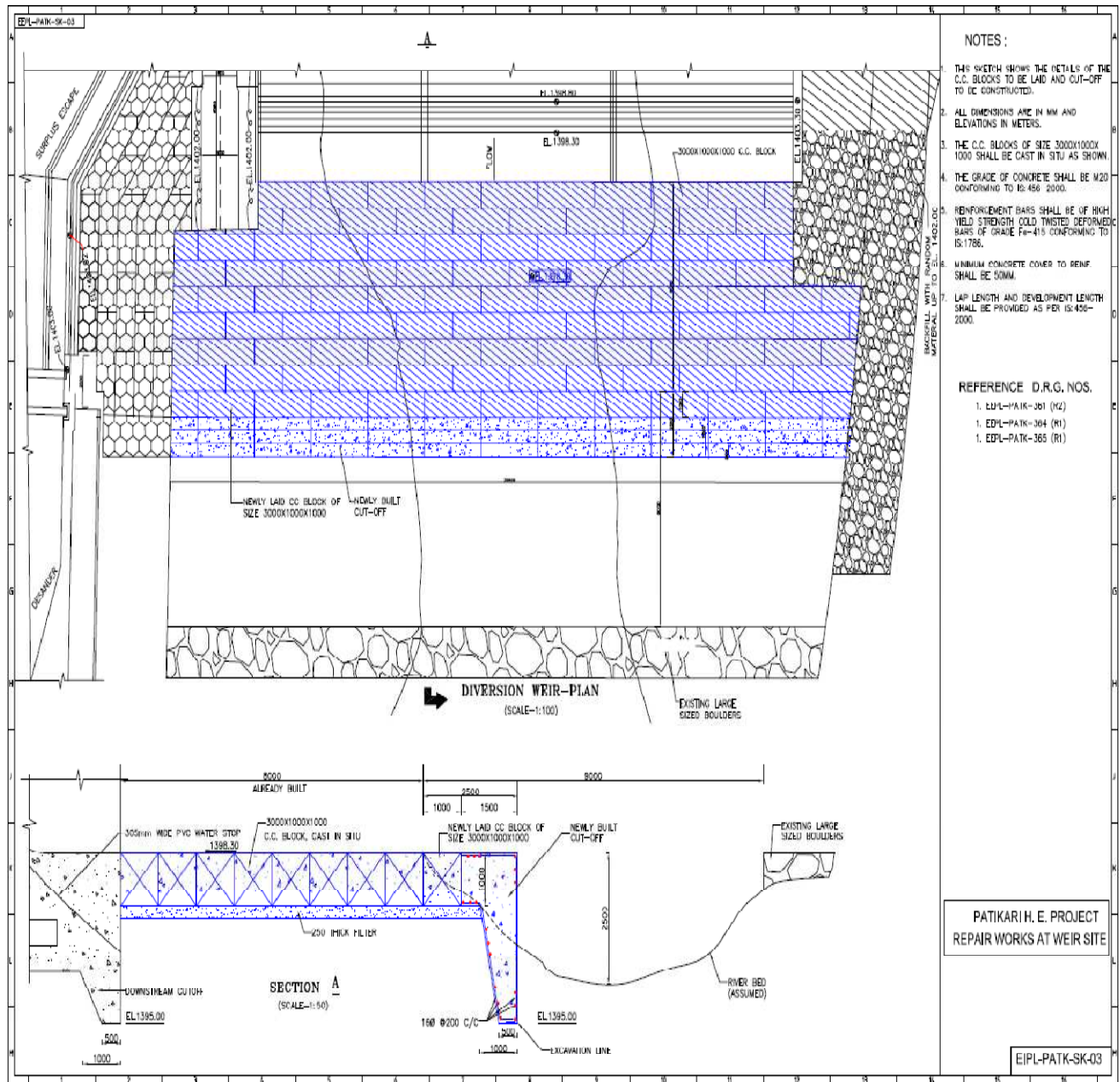
Repair works of these damaged wire crates would be taken up during the first quarter of the financial year 2011-12.

Restoration of the civil structures as well as Wire Crates at Weir Site, which were damaged during the monsoon rains of 2009-10, were carried out during first quarter of year 2010-11.

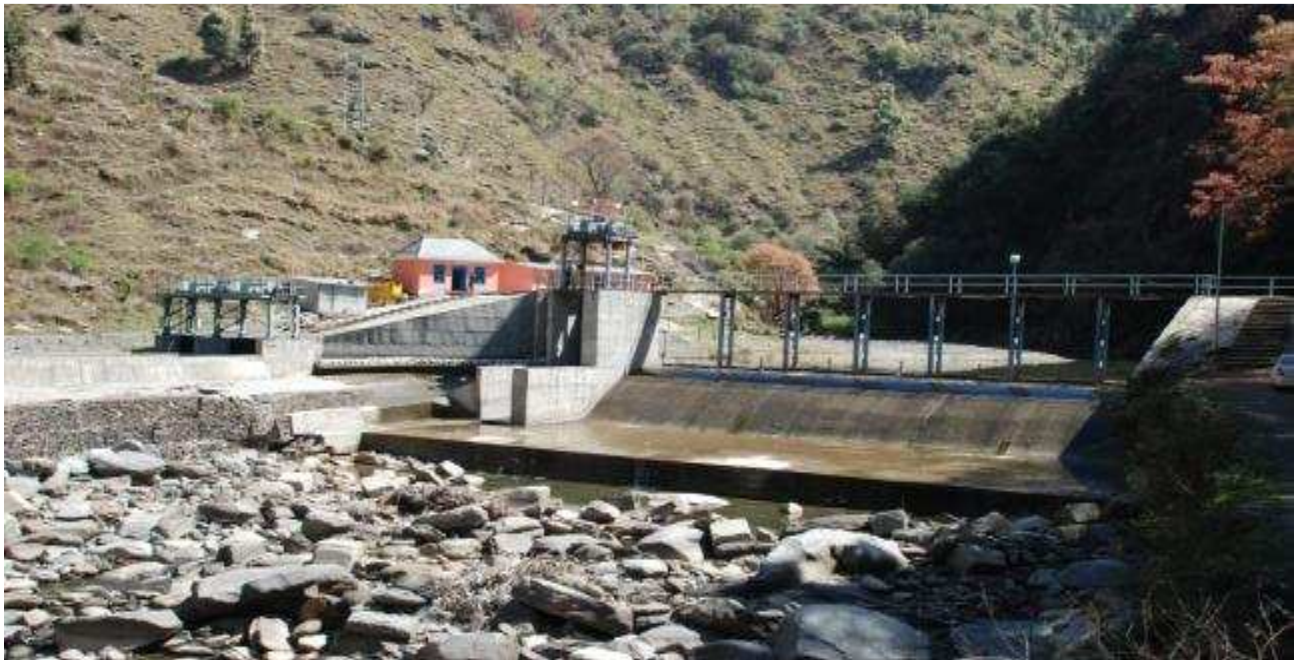
Wire Crate works in the riverbed downstream of Weir Site used to get damaged or washed away during monsoon season. In this context Civil Design Wing at HO was requested to evolve a permanent solution for this problem. Civil Wing suggested to extend the CC blocks in the riverbed downstream of the Weir Site & issued a drawing for the same as shown below in this context.



# ANNUAL PROJECT O&M REPORT



Thus the restoration works as suggested by civil design wing were carried out as per the above approved drawing before the onset of monsoons during year under report. Besides restoring the damaged crates, the concrete cladding on vertical faces of these crates was provided up to certain length. The performance of the restored / modified civil structures was found to be satisfactory as it is evident from the following photographs during and after restoration works that these structures are intact after the monsoons of 2010-11.



### **7.1.2. CGI Sheets Covering Arrangement on the Trash Rack Bridge:**

CGI Sheets covering arrangement was provided on the Trash Rack Bridge to carry out the cleaning works of the Trash Rack during monsoon season. It would also prevent the deposition of debris in the Trash Rack.





### 7.1.3. Erosion on right bank of Weir Site

It has been pointed out by Civil Design Wing that the upstream River Bed on right side of the Weir structure had eroded to some extent and may require some additional protection works. However, it is evident from the recent photographs below that the silt has now got deposited at the right bank & there is no immediate threat as such to nearby civil structures. It would be monitored regularly & pre-emptive action, if required, would be taken in due course of time. The photographs of the right bank upstream of the Intake Structure are depicted below.



### 7.2. Repairing of Power House road

The power house road was damaged due to the land slides during the monsoons. The repairing / restoration works of the road was carried out.

## *8. Inventory Management*

Adequate stocks of necessary spares are being maintained in the Plant stores to cater for any preventive as well as other maintenance requirements of the Power Station. The consumption of Electrical, Mechanical & General store material is being regularly reported and monitored on monthly basis.

Following important items of equipment and spares had been procured during the FY 2010-11.

- Spares for GCS & Turbine
- Display Monitor for MIV Position Display (2 Nos) & Analog Card for Governor PLC (1 No.)
- One(1) set of Cooling Water Filter elements (6 Nos)
- One(1) No of Discharge Monitoring equipment for installation at weir site
- Speed Sensor (2 Nos) for Generator & Rotational Speed monitor with Frequency convertor (1 No) for Governor
- Repairing of two (2 Nos) of Flange with Bucklers

## 9. *Critical Issues – Resolved / Under Follow up*

### 9.1 Governor Software Modification

Digital Governors for 2X8 MW Patikari Project were sourced from M/s Ingos Ltd, Czech Republic through Energy Infratech Private Limited and CKD Blansko under the EPC Contract for E& M Equipment. The operating philosophy of the Turbine Unit and the software of the associated Digital Governor was programmed and engineered considering that in case of any fault the turbine unit would come to a standstill condition and main inlet valve (spherical valve) would also be closed till the fault is removed. Subsequently it has been observed during the operation of the plant that even for transitory external non urgent electrical faults e.g. tripping of transmission lines, the turbine is tripped with closure of Main Inlet Valve which led to avoidable loss of generation.

Now the software of Digital Governor has been modified suitably such that subsequent to any non urgent electrical fault, the unit after isolation from the faulty electrical system run in no load spin mode so that it could be re-synchronized at the earliest once the electrical system is restored. As the software modification was carried out during lean season (Feb.-2011), there was not any appreciable loss of generation during short shutdowns.

The available operational data has been analyzed for the grid outages below 20 min during Jan-09 to Dec-10 (two years) and found that the total starting time for 290 numbers of outages with the water spillage at dam site as 3220 min. The average starting time of the machine after each tripping during the above duration was approximately 11 min. With the modification in the software and considering the average starting time of 5 min (as evident from the trippings following the modification) for each tripping, loss of energy for the above mentioned outages is calculated as 0.605487 MU and the corresponding revenue loss is worked out as ₹ 15,25,826/= considering the tariff of ₹ 2.52 per unit for above duration. It may thus fairly be concluded that for average 145 nos of Line / Grid trippings with starting duration of 1610 min, saving of loss would be to the tune of ₹ 7.629 Lacs per year.

Thus it is evident that the investment for the modification of software was well justified and would be paid off within a year. With the modification in the Governor software, the start up duration of the machines after Grid trippings and consequent generation loss is reduced. Moreover, with this modification in the software now, Main Inlet Valve (MIV) will remain open during all conditions except emergency trip & protection trip (86A & 86C). It will definitely increase the life of MIV sealing by reduction in wear and tear. Consequently the operation & maintenance charges of MIV will get reduced.

## **9.2. Permanent Residential set up for O&M staff**

Earlier O&M Staff was accommodated in the Porta cabin installed near the power house. However, as the land on which the Porta cabin transit camp had been installed happened to be in the state forest area, concerned HP forest division ordered vacation of the forest land. Now the Porta Cabin has been dismantled as per these orders and the O&M staff residing there has been shifted to a hired accommodation in Pandoh wherefrom they are required to commute daily to and from Power House in three shifts.

Alternative locations for construction of residential buildings for O&M staff were being explored. A survey of the land adjacent to Power Plant Gate and some land behind it along the hill slope already acquired by the Project which is not a Forest land, was accordingly got conducted. The necessary drawings & estimates have now been issued by Civil Design wing. Procurement of material and construction of the accommodation set up as per approved drawings is planned to be taken up in the financial year 2011-12.

## **9.3. Mandatory Discharge Measurement**

As per notification issued by HPPCB, a discharge equivalent to 15% of the minimum inflow observed during lean season in the river has to be released. Every year, Project is required to get formal Consent to operate the plant from the H.P. State Pollution Control Board. The HPPCB has made it obligatory to first install the on-line discharge monitoring equipment at the weir site for the compliance of the release of the mandatory release before the permission to operate is renewed. In this regard, on-line discharge monitoring equipment has already been procured through M/s Interface Devices & Services amounting to Rs. 3, 32,500. Related Installation Drawing prepared by our Design Wing had been forwarded to HPPCB for their approval which is still awaited. The Board has now given their consent to go ahead with the related works at weir site. The installation of the above said system would now be carried out at Weir Site accordingly in the first quarter of 2011-12.

## **9.4. Tariff Revision**

Petition was filed with HPERC on August 22, 2008 for upward revision of the existing tariff of Rs. 2.25 for Patikari HEP. In connection with the above, HPERC's decision dated 16th Jul, 2010 had been received. Relevant extracts from this order are summarized below.

- ✓ The Commission allows an increase of 27 paise per unit as per the mandatory release impact assessment carried out by the Board. However on the availability of actual data for a period of 10 years, the Commission can be approached by either party to review the said increase.

- ✓ The impact of additional 1% of the royalty payable under Govt. Notification dated 30.11.2009 for Local Area Development fund shall be pass through in the tariff & increase in the account of the same shall be 2 paise per unit.
- ✓ The net present value of additional tariff component levelised over a period of 40 years to off set the charge on account of LADC, shall be as per the following formula.

$$x = \frac{PV}{8.80075 y}$$

where PV = Total amount paid on account of LADC minus amount payable for Local Area Development works specified in the approved DPR

x = Additional Tariff component in Rs./unit levelised over a period of 40 years to off set the charge on account of LADC

y = Annual saleable energy units in lacs (as per approved DPR)

However this tariff component is subjected to the production of sufficient document proof to the satisfaction of the Board & shall be payable from the date of complete payment of LADC or commercial operation date whichever is earlier.

Hence in view of the above the tariff of Rs 2.25 shall be increased by 29 paise per unit. The Board has, however, filed an Appeal in HP High Court against above said HPERC Order. Since HPERC have not agreed to our request for determination of the Tariff but have allowed a relief under change of law only, a petition had been filed to Appellate Tribunal for Electricity (APTEC) for determination of tariff based on the incurred cost as per CERC norms. This petition is still under consideration of CERC.

### **9.5. Signing of Supplementary PPA**

As per the HPERC's Order dated 16th Jul, 2010, increase of 29 paise in the tariff under change of Law has been allowed. The increase of 29 paise in the tariff has not been implemented so far, since the Supplementary PPA has not been signed till date by the Board.

Additional revenue amounting to Rs. 1.6 Crores (27 paise /unit) is due to PPPL on this account till March 2011 for which bill can be raised only after signing of the SPPA.

Case was being pursued regularly but the Board, as mentioned above, has now filed an appeal in HP High Court against above said HPERC Order. The court has granted the stay of said Order and as such signing of the SPPA is now in limbo.



## **9.6. CDM Benefit to the Project**

CDM revenue to the tune of 2.17 Crores against the generation during 2009 calendar year is due to be realized now.

Verification of the documents pertaining to Generation records of 2010 calendar year at project site has already been completed. CDM revenue to the tune of 3.5 Crores, for the generation of 2010 calendar year is likely to be released by UNFCCC.

## **9.7. Deductions from Energy Bills by the Board**

HPSEB had unilaterally deducted an amount of Rs. 133 lakhs from Energy Bills for September 2010 & October 2010 without any prior intimation to PPPL against Survey & Investigation expenditure claimed to have been incurred by the Board. A petition had already been filed in HPERC for restitution of the deducted amount from the energy bills & restraining HPSEB for any further deductions. In this context, HPERC had passed an order in its hearing in third week of November 2010 restraining the Board not to effect any further deductions from our Energy Bill till further orders. HPERC had further asked the Parties to meet and try to mutually sort out the issue. Director (Projects), HPSEBL had taken meetings in this regard with the representatives of PPPL. The issue is yet to be resolved. Next date of HPERC hearing is fixed for 19.05.2011.

## **9.8. Survey & Investigation Claim of HPSEB**

HPSEB's had earlier preferred a claim of Rs.308.45 lakhs against the expenditure incurred by them on Survey & Investigations in the Project including compound interest @10% per annum up to 31.08.2008. It was noted that an amount of Rs. 48.94 lakhs was indicated to be spent in year 2004-05 i.e. after the Effective Date. When this anomaly was pointed out, HPSEB revised its claim to Rs.2.84 Crores (0.90 Crs principal + 1.94 Crs interest till 31.07.2010).

In this connection, a meeting was held at Shimla on 19th Jan, 2011. During this meeting, it was pointed out by PPPL that the DPR for the Project was handed over by HPSEB to PPPL in June, 1998 and that no other document /report regarding Survey and Investigation of Patikari HEP has been handed over to PPPL. It was, therefore, represented by us that the survey and investigations in the Project would have been carried out by the Board from October 1995 (when Discharge measurements were started by the Board on Bakhli Khad) up to the date of completion of the DPR i.e. June, 1998 only and as such the expenditure incurred during the intervening period only should be chargeable to PPPL.

Under these circumstances, we conveyed our willingness to accept the S&I expenditure (principal) amounting to Rs. 23.75 lakhs only based on the percentages of the figures conveyed by HPSEB for the years 1995-96, 1996-97, 1997-98 and 1998-99 as under:

- 1995-1996: Accepted 50% of HPSEB Claim, as DPR flow measurement started from Oct 1995
- 1996-1997: Accepted 100%
- 1997 – 98: Accepted 100%
- 1998 – 99: Accepted 25% of HPSEB Claim, as DPR completed in June 1998

The matter is still under follow up with the concerned officials of the Board. This matter is likely to be resolved during the financial year 2011-12.

### **9.9. Reimbursement of costs incurred on strengthening of HPSEB network at and beyond Delivery Point**

A claim amounting to Rs.1,17,60,414.87, covering costs incurred on renovation of installations at Pandoh Substation and strengthening of 33 kV feeders of the HPSEB from Pandoh to Bijni as carried out by our Company on behalf of HPSEB prior to commissioning of the Project is yet to be settled by the Board.

It was agreed in the meeting held in Shimla on 16<sup>th</sup> Nov, 2010 that joint re-verification of the supplies and works executed by PPPL shall be carried out. In this context, joint re-verification of the supplies and works executed by PPPL had been completed by PPPL on 27<sup>th</sup> & 28<sup>th</sup> Jan, 2011 along with the designated officials of HPSEB. Joint Report had already been submitted to the Board. Case is under regular and persistent follow up by our officials with the concerned officials of HPSEB.

Meanwhile, HPSEB have raised O&M Bills for Patikari bays at Pandoh substation from time to time totaling Rs. 29, 18, 483/- payable to HPSEB as per Interconnection Agreement. The same have not been released by us and the Board has been asked to set off these charges against our aforesaid claim.

### **9.10. Insurance Claims**

The estimated cost of damages due to rains during 2nd week of September, 2009 was approximately Rs. 10 Lakhs. The claim has now been settled & approved for an amount of Rs. 7 Lakhs which has been realised.

A claim on Insurance Company pertaining to the damages in Project area due to floods during 2nd week of August, 2007 is still under follow up. The estimated cost of restoration works for Insurance claims was around Rs. 5.60 Crores for damages in 2007. The surveyor assessed damages at Rs. 3.60 Crores against said claim. The Insurance Co. has, however, offered to pay Rs. 0.48 Crores only. Hence, the matter has been referred for arbitration. This claim however is still a pending adjudication / settlement.

### **9.11. Payment to Penstock Land owners**

Private land had been used for the construction of Penstocks of the project. However the registry of the land in favour of the company was not done at that time.

Land owners whose land was acquired for the construction of Penstocks have been identified now. Negotiations with the land owners for settlement & registration are under process. As of now there is no breakthrough in this matter.

### **9.12. Taking Over of Project Roads by HP PWD**

Mr. Jai Ram Thakur, Cabinet Minister of HP Government and local MLA, along with the SE PWD, Mandi and XEN PWD had visited the Power House site on 23<sup>rd</sup> July 2010 to assess the possibility of routing a road on the river side upstream of the Patikari Power House.

After site inspection the SE HPPWD was of the opinion that routing of the road by extending the crates into the river and by pushing the fence inside towards the power house shall be feasible.

It was thereafter suggested that HPPWD prepare their proposal for routing the road and share it with us for review by the design wing.

Following roads have been constructed by the project during its execution

- Kuklah village to Power House (Length – 5.25 km)
- Road to Weir site (Length – 3.85 km)
- Main Road to Adit-II (Length – 3.75 km)

Our company had incurred an expenditure of Rs. 10.34 Crores on the construction of above roads and acquisition of land for the same.

Handing over of the Project roads to HP PWD is still pending as the State Govt. has not evinced further interest in this regard so far.

## 10. Safety, Health & Environment Protection

Safety Manual had been issued to the Plant & the Safety measures as per the manual had been strictly complied. Safety charts had been displayed in the power house area. Mock drills related to Fire Protection / Flood Protection / any other natural calamity Protection had been arranged annually in & around power house area to ensure preparedness for such exigencies.

The project had been arranging medical camps for benefit of the PPPL employees & the local villagers. It is helpful in spreading health awareness among the employees & local villagers.

## 11. Social Development Activities

The Project had undertaken various Social Development activities like Community Development, Infrastructure Up-gradation, Sanitation and Water Supply, Education & Training, Environment Protection, Medical Assistance and Health Care, Employment to the Local People etc on regular basis in various Panchayats in Project area.

## 12. HR Issues and Employees Welfare Measures

The manpower list deputed in the project area is given below.

| S. No | Emp Code | Company Name | Status | Name of the Employee      | Designation       | Department     |
|-------|----------|--------------|--------|---------------------------|-------------------|----------------|
| 1     | 410026   | PPPL         | Staff  | Shyam Lal                 | Assistant Manager | Electrical     |
| 2     | 110361   | EIPL         | Staff  | Sushil Kumar Singh        | Senior Engineer   | Mechanical     |
| 3     | 410027   | PPPL         | Staff  | Kotikalapudi Phani Kishan | Executive         | Administration |
| 4     | 410028   | PPPL         | Staff  | Saurajit Samantaray       | Senior Engineer   | Electrical     |
| 5     | 410029   | PPPL         | Staff  | Gurdev Singh Thakur       | Junior Engineer   | Electrical     |
| 6     | 410030   | PPPL         | Staff  | Kuldeep Kumar             | Supervisor        | Civil          |
| 7     | 410033   | PPPL         | Staff  | Abdul Khan                | Shift Operator    | Mechanical     |
| 8     | 410035   | PPPL         | Staff  | Ravi Kumar                | Junior Engineer   | Mechanical     |
| 9     | 410036   | PPPL         | Staff  | Prahlad                   | Junior Engineer   | Mechanical     |

ANNUAL PROJECT O&M REPORT

|    |        |      |         |                     |                     |                |
|----|--------|------|---------|---------------------|---------------------|----------------|
| 10 | 410037 | PPPL | Staff   | Deepak Sharma       | Junior Engineer     | Electrical     |
| 11 | 460004 | PPPL | Workman | Narinder Kumar      | Driver              | Administration |
| 12 | 460006 | PPPL | Workman | Pushpraj            | Assistant           | Administration |
| 13 | 460007 | PPPL | Workman | Khem Singh          | Magazine Supervisor | Civil          |
| 14 | 460008 | PPPL | Workman | Kasmer Singh        | Survey Assistant    | Survey         |
| 15 | 460009 | PPPL | Workman | Jeevanand           | Survey Assistant    | Survey         |
| 16 | 460011 | PPPL | Workman | Sanjay Kumar        | Guage reader        | Survey         |
| 17 | 460012 | PPPL | Workman | Ravinder Kumar      | Electrician         | Electrical     |
| 18 | 460013 | PPPL | Workman | Dinesh Vavillapalli | Operator            | Mechanical     |
| 19 | 460014 | PPPL | Workman | Ram Pal             | Mechanic            | Mechanical     |
| 20 | 460015 | PPPL | Workman | Krishan Chand       | Electrician         | Electrical     |
| 21 | 460016 | PPPL | Workman | Biharilal           | Watchman            | Administration |
| 22 | 460017 | PPPL | Workman | Labh Singh          | Supervisor          | Store          |
| 23 | 460018 | PPPL | Workman | Kishan Chand        | Helper              |                |
| 24 | 460019 | PPPL | Workman | Manohar Lal         | Helper              |                |
| 25 | 460020 | PPPL | Workman | Nanak Chand         | Meson               | Civil          |
| 26 | 460021 | PPPL | Workman | Het Ram             | Operator            |                |
| 27 | 460022 | PPPL | Workman | Chint Ram           | Helper              |                |
| 28 | 460023 | PPPL | Workman | Viraj Kumar         | Helper              |                |

Various issues related to HR & Employees Welfare which under consideration of the Company Management are as under:

- ✓ Construction of permanent hostel as well as residential family accommodation near Power Station for O&M Staff
- ✓ Regularization of the services of some land losers.

---

***The End***

---