

CHAPTER – IV

Management of Planned and Forced Outages

One of the main objectives of Hydro CPSEs is to operate and maintain power station with maximum efficiency. This can be achieved through effective preventive maintenance and minimisation of downtime of generating units in the event of any outage.

4.1 Classification of outages in hydro power stations

Outages in a hydro power station take place due to three reasons: (i) Planned¹⁸, (ii) Forced¹⁹ and (iii) Miscellaneous²⁰. Of these, miscellaneous outages do not affect availability of machines.

4.2 Planned outages

Planned outages of generating units are taken for annual/capital maintenance or monthly, weekly routine checks by hydro CPSEs. Audit observed following inadequacies in the annual planned/ capital maintenance carried out by power stations of NHPC:

- (i) known defects in various systems of power stations continued to remain unsolved during regular annual planned maintenance of units resulting in subsequent forced outages and loss of power generation;
- (ii) delayed receipt of new or repaired parts during scheduled annual maintenance period resulted in a subsequent additional outage for replacement of parts.

Power stations suffered loss of 35.97 million units of power generation during 2006 to 2014 due to subsequent avoidable forced outages on account of above reasons.

NHPC stated (August 2015) that all power stations had been advised to ensure availability of spares before annual maintenance and rectify the defects noticed during annual planned maintenance. Detailed audit observations along with management's reply and further remarks of audit thereon are indicated in *Annexure 4.1*.

4.2.1 Contracts for maintenance works

Power station-wise observations on audit of contracts awarded for maintenance works are detailed below:

4.2.1.1 Dhauliganga Power Station of NHPC

A review of records relating to maintenance works in Dhauliganga Power Station (DGPS) revealed deficiencies in procurement planning leading to awards being made in 7 out of 26 selected cases (details in *Annexure 4.2*) either at the fag-end of the financial year or after close

¹⁸ For annual/capital maintenance or monthly, weekly routine checks as per O&M manual.

¹⁹ Due to sudden breakdown of machine on account of improper operation of equipment.

²⁰ Outages due to other factors when the machine is otherwise operational but cannot be operated due to factors like low reservoir level/poor inflow, Transmission line faults/constraints, Excess weeding/silting, No/reduced system demand, Low head/too high tail water level, No irrigation demand, Grid disturbance/failure, Reserve shutdown/spinning reserve, etc.

of financial year in which equipment/spares were originally planned to be procured. In two out of seven cases (Items at sl. no. 2 and 3 of *Annexure 4.2*) procurement was delayed by 10.5 months and five months respectively from the respective scheduled supply date, mainly due to absence of follow up with suppliers and delay in pre-dispatch inspection by Management thereby defeating the very purpose for which these insurance spares (critical spares) were being procured.

NHPC attributed (November 2014) delay in procurement to (i) late receipt of approval to Revised Budget Estimates (RBE) and (ii) poor response of supplier/manufacturers due to extreme remote location of DGPS for which tender had to be extended on many occasions.

Reply is to be viewed against the fact that delay due to late receipt of RBE approval was NHPC's internal matter, and was therefore, controllable. Further, out of seven cases pointed out in *Annexure -4.2*, only in one case (at sl. no. 7 of *Annexure 4.2*) tender submission had to be extended due to less response.

NHPC, however, assured (August 2015) that efforts shall be made to avoid procedural delays.

4.2.1.2 Tanakpur Power station of NHPC

Delays in procurement of materials by Tanakpur Power station (TPS) in 8 out of 29 selected cases (Details in *Annexure 4.3*) had arisen mainly due to delays in initiation of proposals (two cases viz. SI No. 2 and 6 of *Annexure 4.3*) and processing of award (six cases at SI No 1 to 6 of *Annexure 4.3*), which were possible to have been controlled by the Management. TPS took 12 to 30 months in processing of work award against four to seven months prescribed in NHPC Procurement Manual.

NHPC noted the audit observations and assured (August 2015) that efforts shall be made to avoid procedural delays.

4.3 Forced outages

4.3.1 As per principle laid down by CERC in December 2000 in the matter of 'Operational Norms for Hydro Power Stations',

- (i) during the monsoon period all machines were required to be available 24 hours for all types of plants, and
- (ii) during dry season, run of the river plant (without pondage) is required to the extent that no water is spilled. In plants with pondage facilities all machines are required to provide maximum capacity for at least three hours per day.

The above norms imply that there should be no outage during monsoon period and there should be no spillage of water due to forced outages.

Audit, however, observed that

- (i) machines of power stations of CPSEs suffered forced outages aggregating 9871 hours during monsoon seasons of 2009-14 as detailed in the Table 4.1.

Table 4.1

Power station-wise forced outages during monsoon season

Power station	Forced outage (hours) during monsoon season of respective year					
	2009-10	2010-11	2011-12	2012-13	2013-14	Total
NHPC						
Bairasiul	523	372	274	353	0	1522
Tanakpur	279	93	213	19	461	1065
Chamera I	533	60	1	349	27	970
Uri I	0	41	9	79	989	1118
Dhauliganga	174	489	205	199	17	1084
Teesta V	49	117	34	226	23	449
Chamera III	-	-	-	356	108	464
Chutak	-	-	-	0	2085	2085
SJVN						
Nathpa-Jhakri	147	10	8	0	140	305
THDC						
Tehri Hydro	12	27	193	14	47	293
NHDC						
Indira Sagar	0	0	8	469	39	516
Total						9871

A review of machine outage data of power stations selected for performance audit revealed that forced outages during monsoon season in these power stations during last five years ended 31 March 2014 ranged between 293 hours (in Tehri hydro power station of THDC) to 2085 hours (in Chutak power station of NHPC). It was observed that due to forced outages in monsoon periods of 2009-14, power stations of CPSEs suffered generation loss of 341.99 MUs valuing ₹ 27.36 crore (calculated at the rate of ₹0.80 per unit).

(ii) during dry season also power stations suffered forced outages resulting in spillage of 6165.86 cumecs water and consequent generation loss of 160.22 MUs valuing ₹12.82 crore (calculated at the rate of ₹0.80 per unit) as detailed in Table 4.2.

Table 4.2

Power station-wise forced outages in lean season, quantity of water spilled due to such outages and estimated generation loss

Name of Power Station	Outage in hours	Generation loss(in MUs)	Amount (₹ in crore)	Water spilled due to forced outage in cumecs
Bairasiul	8:53	0.44	0.04	8.881
Tanakpur	256:48	2.02	0.16	505.804
Tessta V	1199:47	120.02	9.60	2753.285
Uri-I	93:05	5.56	0.45	228.742
Chutak	2929:11	20.89	1.67	1906.730
NJHPS	1167:32	11.30	0.90	762.413
Total	5655:16	160.22	12.82	6165.86

While NHPC did not offer any comment, THDC stated (December 2014) that it could only reduce the occurrence of outages and not eliminate them totally. Water was discharged in order to maintain the reservoir level permitted by the Government.

Reply of THDC is to be viewed against the fact that the cases pointed out above only relate to forced outages which coincided with water spillage. Though water had to be discharged to maintain the reservoir level permitted by Government the water spilled could also have been used for generation if there were no outages at that point of time.

SJVN stated (August 2015) that during the audit period of 60 months, out of total 262800 Machine Hours, forced outages in NJHPS were only 2736 machine hours, which worked out to 1.041 per cent.

While Audit appreciates the performance of SJVN in relation to forced outages, the fact remains that out of 1472.32 hours of forced outages, 305 hours was during the monsoon period. As per principle laid down by CERC, all machines were required to be available 24 hours for all types of plants during the monsoon period.

CEA stated (August 2015) that the utilities need to follow recommended Operation and Maintenance (O&M) practices and take preventive maintenance measures for better performance of the power stations in order to reduce forced outages as well as consequent loss of generation on this account, especially during monsoon season.

4.3.2 Audit further analysed the forced outages of more than six hours and observed that plant and machines of power stations selected for performance audit suffered outage due to long unresolved and recurrent faults which were possible to have been controlled through timely maintenance. Power stations suffered loss of generation of 438.66 MUs due to such avoidable forced outages during the period 2006 to 2014. Details of significant cases observed in Audit along with Management response are indicated in *Annexure 4.4*.