

Bhutan Power Corporation Limited

Bhutan Power System Operator

Thimphu: Bhutan



Transmission System Performance Report

Third Quarterly Report – July to September, 2019



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1. Introduction

The electricity transmission network in Bhutan is solely owned by Bhutan Power Corporation limited (BPC) and electricity generation is solely owned by Druk Green Power Corporation Limited (DGPC). Bhutan Power System Operator (BPSO) under BPC is responsible for safe, secure and efficient operation of Bhutan transmission network and generation.

This quarterly report is prepared in compliance to the Grid Code Regulation (GCR) 2008, clause 6.14.1, “System Operator has to submit a quarterly report covering the performance of the Transmission System to all Licensees, Authority and Ministry”. This transmission performance report contains summary of growth of peak demand, performance of generating stations (power and energy generation), energy availability and requirement for the country, export and import of electricity to/ from India, frequency profile of selected substation and voltage profile of few important substations.

All the index and other calculations in this report have been executed based on the data received from substations and generating plants.

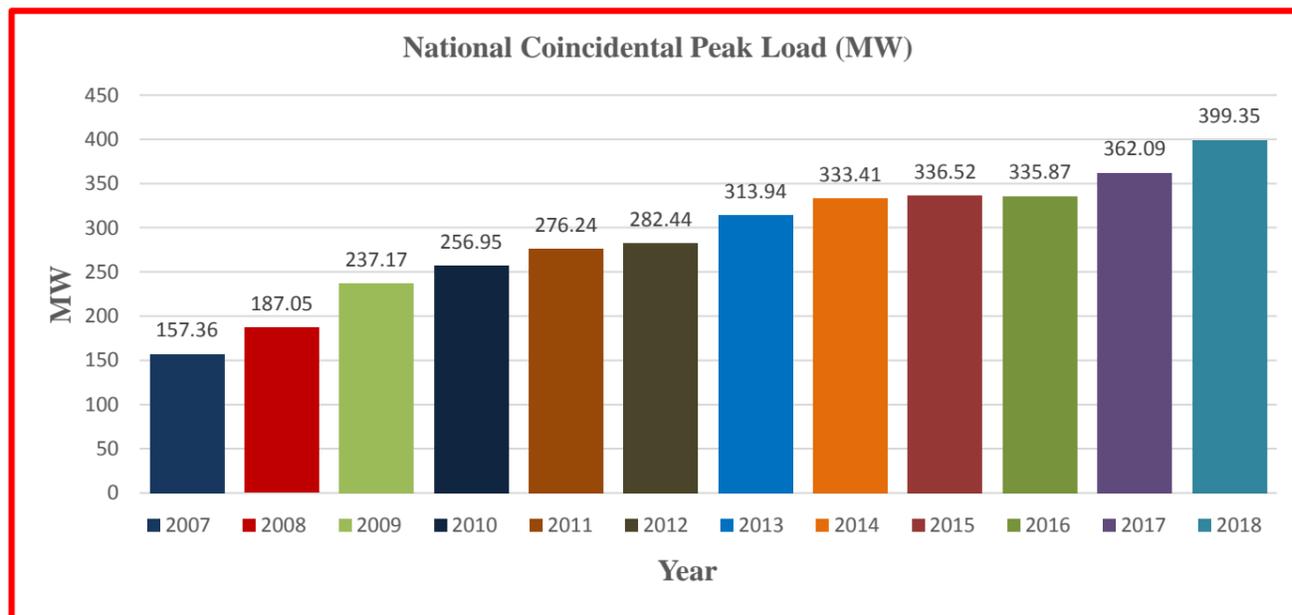
2. National Peak Demand

The national peak demand till now is recorded at **399.35MW** which was occurred on 27th December, 2018 at 18:18 hours. This is calculated by summation of Feeder Loading at Plants minus Export.

Table 2.1. The National Peak Demand since 2007

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Peak Load (MW)	157.36	187.05	237.17	256.95	276.24	282.44	313.94	333.41	336.52	335.87	362.09	399.35
% Growth over previous Year	-	18.87	26.79	8.34	7.51	2.24	11.15	6.20	0.93	-0.19	7.81	10.29

Graph 2.1. The growth in National Peak Demand since 2007



2.1. Power (MW) consumed by country

Following methods are used to calculate peak demand for the Eastern Grid, Western Grid and National demand.

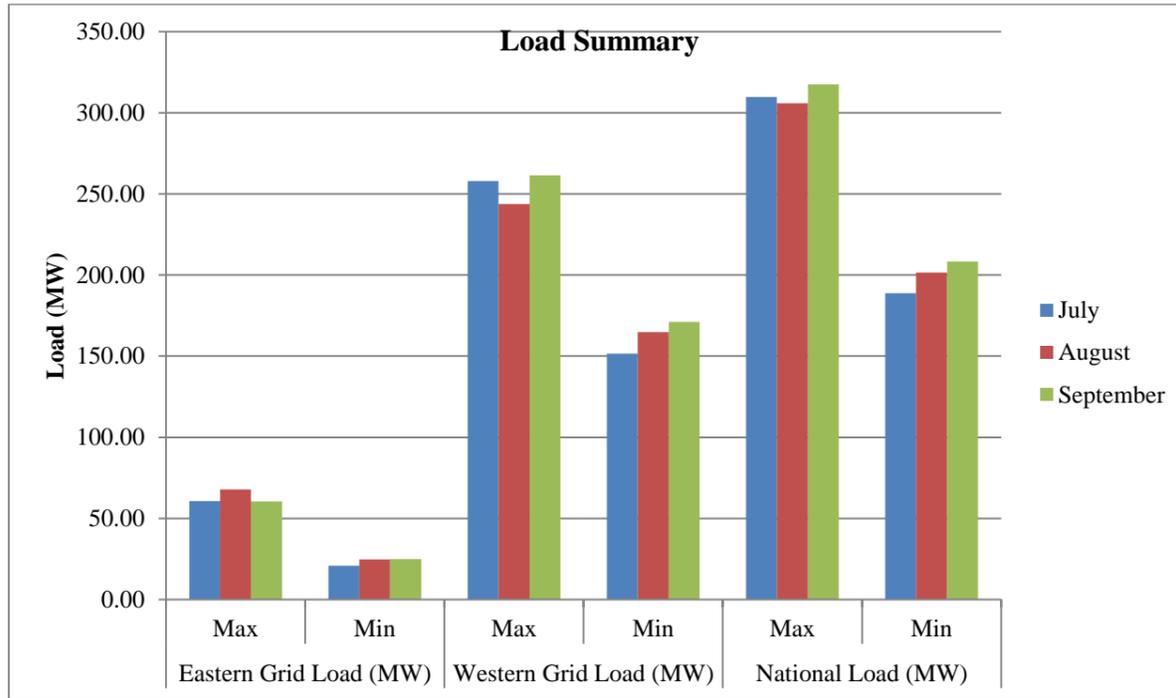
1. **National Demand** = (Sum of all total generation)-(Sum of all Export of Import)
2. **National Demand** = (Sum of all feeders loading at hydropower station) – (Sum of all Export/Import)
3. **National Demand** = (Sum of all substation loading)

For this report, the National Demand was calculated using method-3.

Table 2.1.2. Domestic demand for Eastern Grid, Western Grid and National using method- 3

Grid	Eastern Grid Load (MW)		Western Grid Load (MW)		National Load (MW)	
	Max	Min	Max	Min	Max	Min
July	60.68	20.84	258.01	151.54	309.72	188.83
August	67.87	24.64	243.70	164.81	305.90	201.54
September	60.42	24.95	261.47	171.15	317.42	208.40

Graph 2.1.2. Domestic demand for Eastern Grid, Western Grid and National using method- 3



The national load pattern for the month of July to September, 2019 calculated using method-3 is attached as **Annexure-II**

3. Energy Availability and Requirement for the country

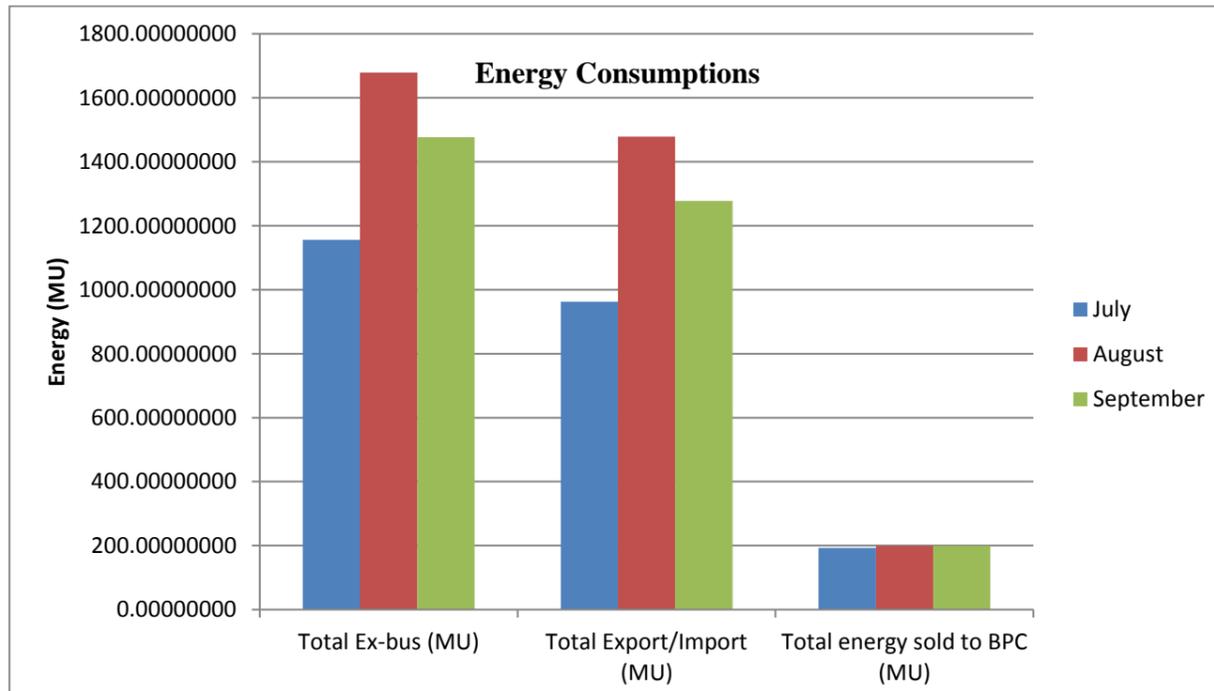
3.1. Energy (MU) consumed by Country

The total energy consumed within Bhutan is computed from the total energy DGPC had sold to BPC including the royalty energy.

Table 3.1.1. Energy (MU) consumed

Month	Total Ex-bus (MU)	Total Export/Import (MU)	Total energy sold to BPC (MU)
July	1155.51144026	962.77368300	192.73775726
August	1678.19162887	1478.89168600	199.29994287
September	1476.74218606	1277.68238500	199.05980106

Graph 3.1.1. Energy (MU) consumed



4. Performance of generating plants

4.1. Power and Energy Generation

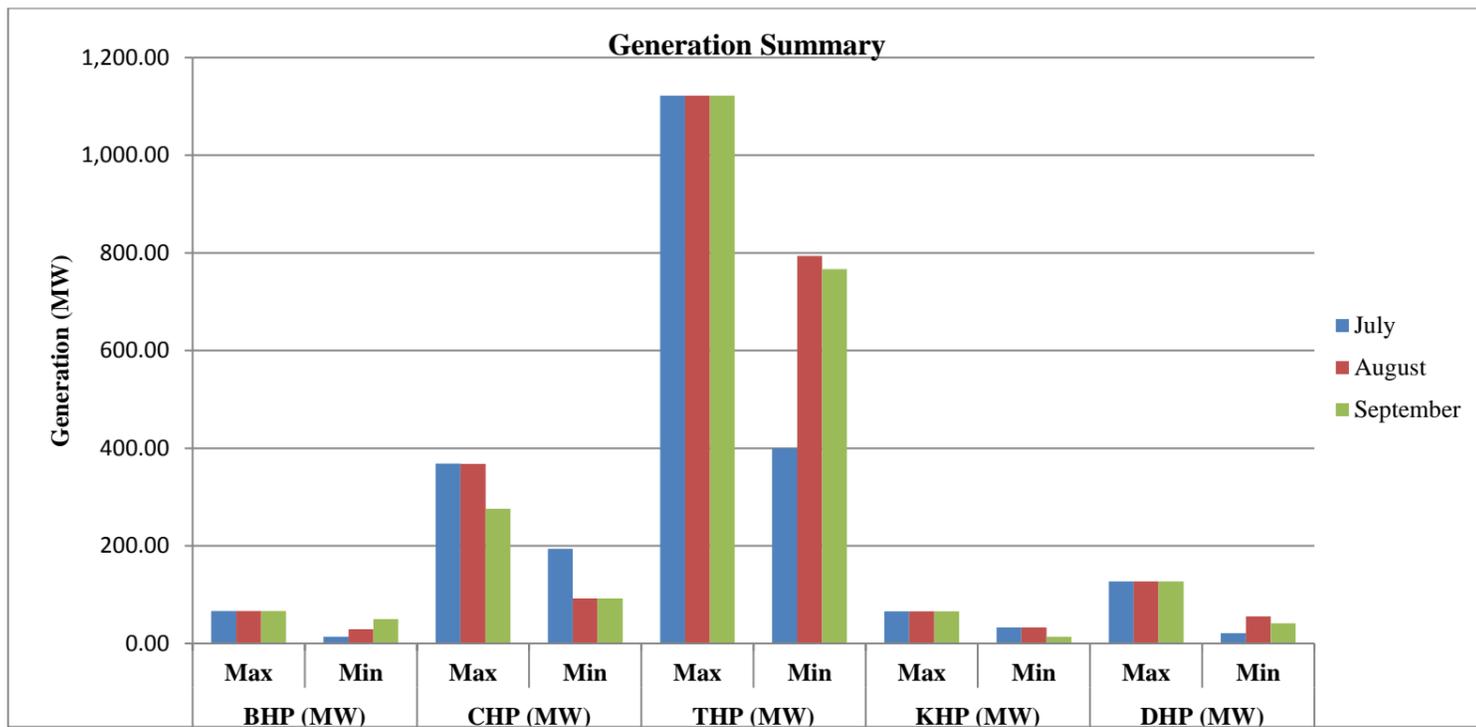
The maximum total generation for the Third quarter of year 2019 was 1750.43 MW in month of July and minimum generation was 661.36 MW in the same month.

Table: 4.1.1 Summary of maximum and minimum generation by various hydropower plant

Generation By	BHP (MW)		CHP (MW)		THP (MW)		KHP (MW)		DHP (MW)		TOTAL (MW)	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
July	66.60	13.96	368.78	193.70	1,122.00	400.00	66.00	32.70	127.05	21.00	1,750.43	661.36
August	66.40	29.00	368.00	17.00	1,122.00	794.00	66.00	33.00	127.01	55.44	1,749.41	928.44
September	66.30	49.70	276.00	92.00	1,122.00	767.00	66.00	14.10	126.91	41.44	1,657.21	964.24

Source: Hydropower Plants (DGPC)

Graph: 4.1.1 Summary of maximum and minimum generation by various hydropower plant



Daily maximum, minimum and average generation by each generating plant for the month of July to September, 2019 is attached as **Annexure-I**.

4.2.Plant Capacity Factor

The capacity factor of each generating plant was calculated as below:

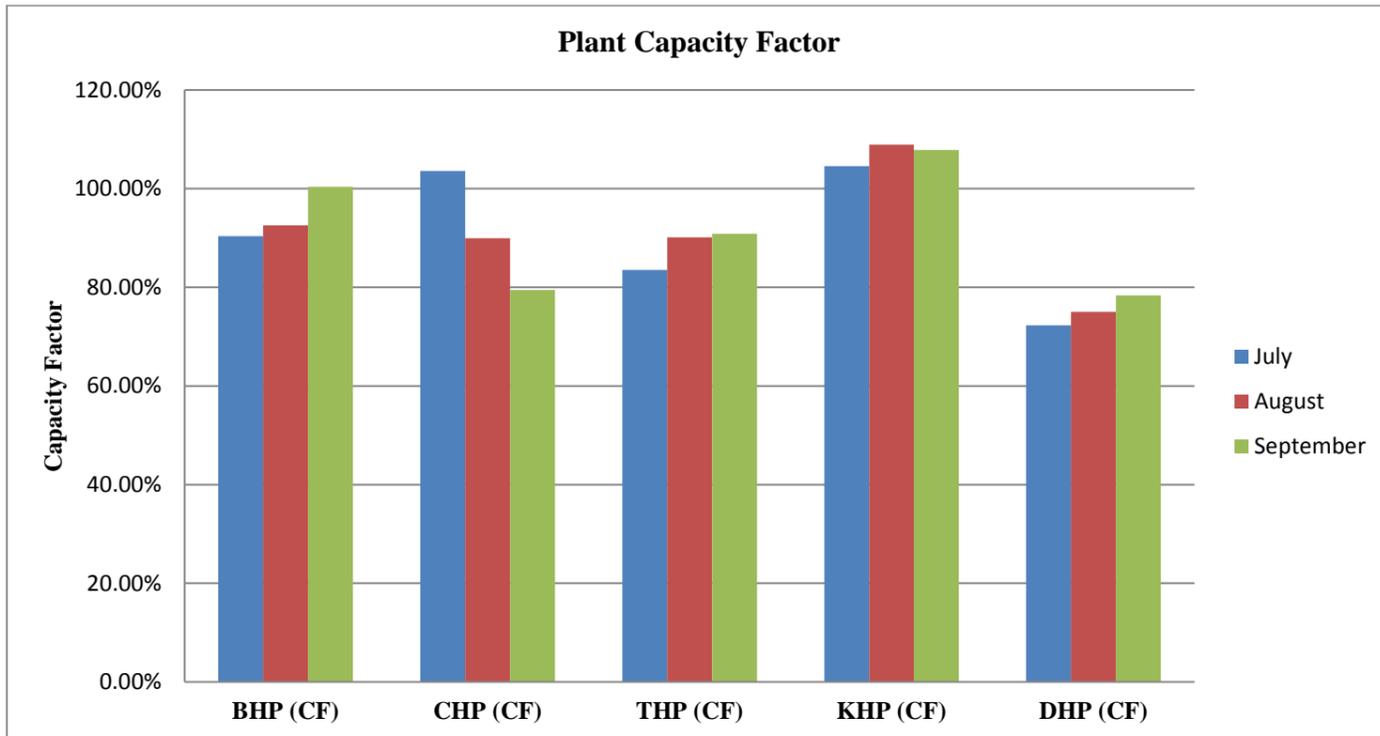
$$Capacity\ factor = \frac{Total\ energy\ plant\ has\ produce\ over\ a\ period}{Total\ energy\ plant\ would\ produce\ when\ operated\ at\ full\ capacity}$$

Table 4.2.1: Total generation and capacity factor of various hydropower plants

Month	BHP (MU)	BHP (CF)	CHP (MU)	CHP (CF)	THP (MU)	THP (CF)	KHP (MU)	KHP (CF)	DHP (MU)	DHP (CF)
July	43.02340	90.35%	258.93700	103.58%	739.116000	83.48%	46.661000	104.53%	67.771	72.29%
August	44.05900	92.53%	224.77600	89.92%	797.72000	90.10%	48.620000	108.92%	70.335	75.03%
September	46.23800	100.34%	192.16300	79.43%	778.29100	90.84%	46.587000	107.84%	71.083	78.35%

Source: TD, BPC

Graph 4.2.1: Capacity factor of various hydropower plants



5. Export and Import of Electricity

Maximum export for the Third quarter of year 2019 was 1254.0 MW in the month of September to Binaguri substation in India. The minimum export was 16.92 MW to Salakoti and Rangia substation in India during the month of September.

Table 5.1. Export of electricity to India

Export To	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)	
	Max	Min	Max	Min	Max	Min
July	1,078.00	277.00	452.00	88.50	133.33	23.10
August	1,237.00	679.00	356.00	1.00	148.21	24.90
September	1,254.00	163.00	287.00	83.00	117.11	16.92

Graph 5.1. Export of electricity to India

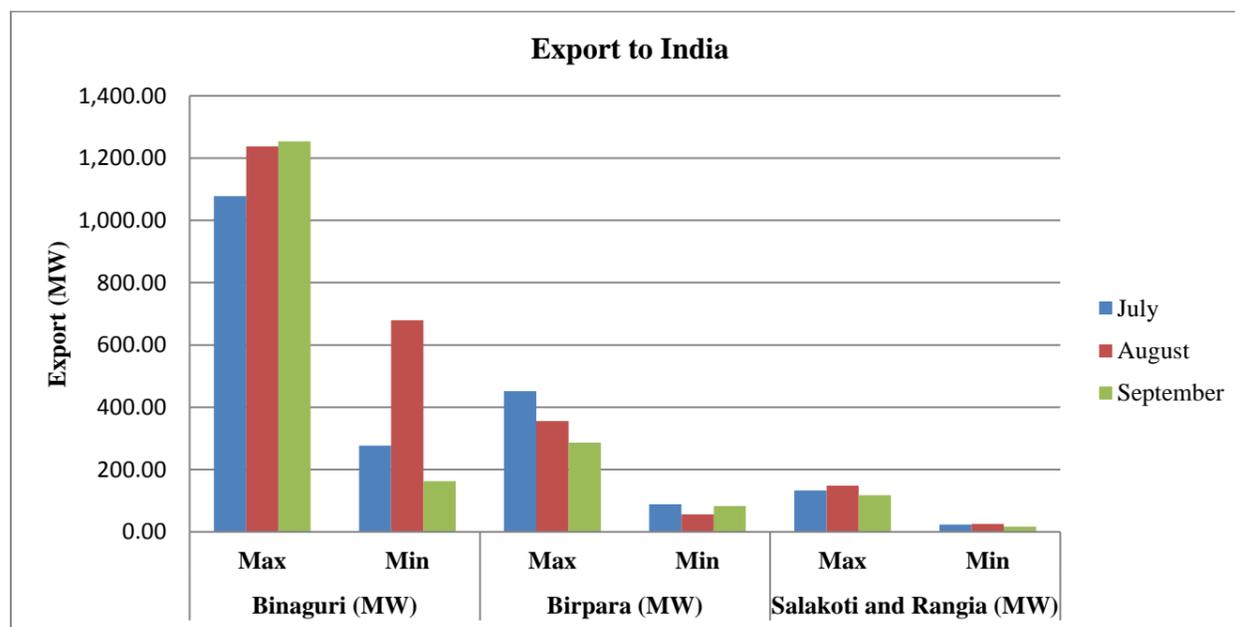


Table 5.2. Import of electricity from India.

Import From	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)	
	Max	Min	Max	Min	Max	Min
July	0.00	0.00	0.00	0.00	0.00	0.00
August	0.00	0.00	0.00	0.00	0.00	0.00
September	0.00	0.00	0.00	0.00	0.00	0.00

6. Frequency profile

The nominal allowed frequency range shall be 50Hz ± 1% in Bhutan. The system is normally managed such that frequency is maintained within operational limit of 49.5 Hz to 50.5 Hz. However, frequency may move outside these limit under faulty condition.

As per the Grid Code 2008, clause 6.4.1 the frequency is classified into three different bands as follows:

- a. Normal state
The transmission System frequency is within the limit of 49.5Hz to 50.5Hz.
- b. Alert state
The Transmission System frequency is beyond the normal operating limit but within 49.0Hz to 50.0Hz.
- c. Emergency state
There is generation deficiency and frequency is below 49.0Hz.

The frequency at 220kV Bus at 220/66/11kV Semtokha substation in the western grid and 132kV Bus at 60MW Kurichhu Hydropower Plant in the eastern grid is considered.

6.1.Frequency for the month of July, 2019

Table 6.1.1. Bus Frequency profile of Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage
1	Normal State	99.33%
2	Alert State	0.00%
3	Emergency State	0.00%
4	Blackout/Other	0.67%

Graph 6.1.1. Bus Frequency of Semtokha Substation

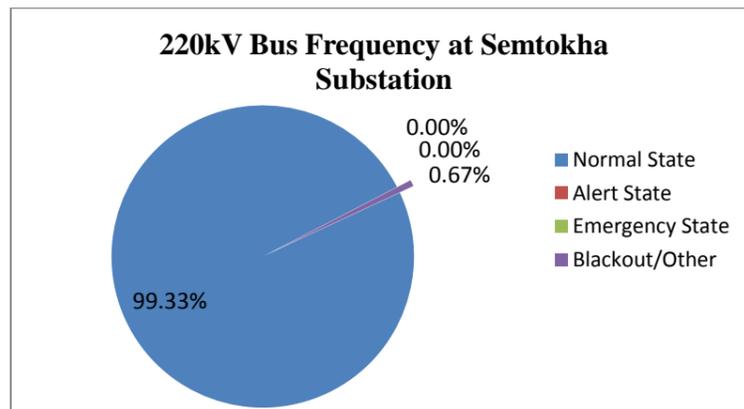
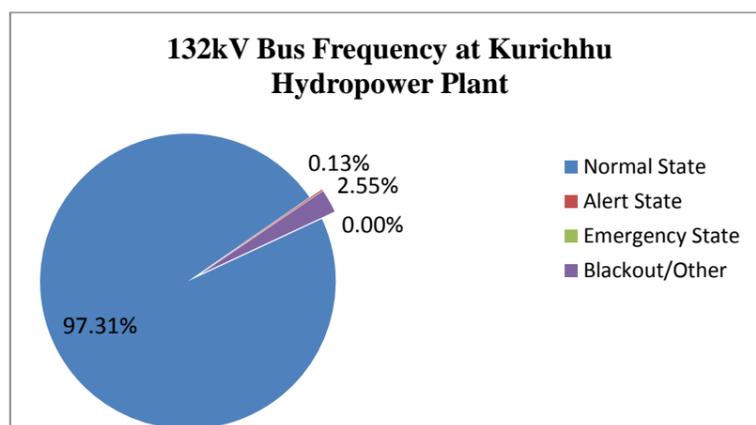


Table 6.1.2. Bus frequency of Kurichhu Hydro Power Plant

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	97.31%
2	Alert State	0.13%
3	Emergency State	0.00%
4	Blackout/Other	2.55%

Graph 6.1.2. Bus frequency of Kurichhu Hydro Power Plant



In the month of July, 2019, the Western grid was maintained within the normal operating limit of 99.33% and deviated remaining on blackout or due to other events. Eastern grid have operated 97.31% in operating limit and deviated 0.13% and 2.55% to alert state and blackout/others respectively.

6.2.Frequency for the month of August, 2019

Table 6.2.1. Bus frequency of Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage
1	Normal State	99.60%
2	Alert State	0.00%
3	Emergency State	0.00%
4	Blackout/Other	0.40%

Graph 6.2.1. Bus frequency of Semtokha Substation

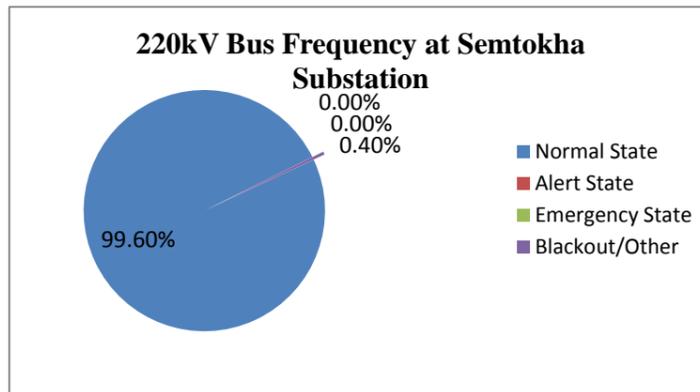
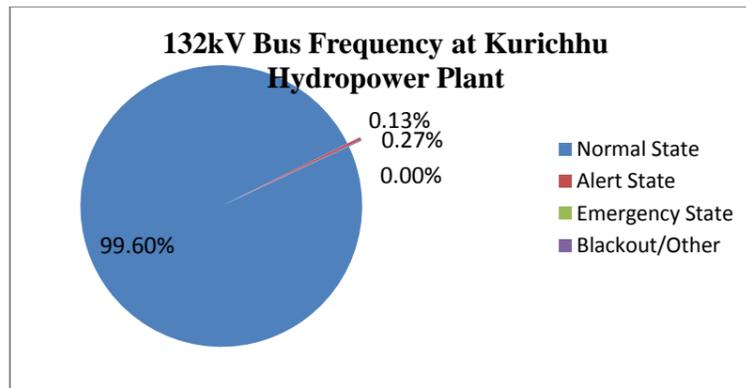


Table 6.2.2. Bus frequency of Kurichhu Hydro Power Plant

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	99.60%
2	Alert State	0.27%
3	Emergency State	0.00%
4	Blackout/Other	0.13%

Graph 6.2.2. Bus frequency of Kurichhu Hydro Power Plant



In the month of August, 2019, the western grid frequency was maintained almost all the time within the normal operating range of 99.6% and 0.27% deviated within alert state.

6.3.Frequency for the month of September, 2019

Table 6.3.1. Bus frequency of Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage
1	Normal State	96.77%
2	Alert State	0.00%
3	Emergency State	0.00%
4	Blackout/Other	3.23%

Graph 6.3.1. Bus frequency of Semtokha Substation

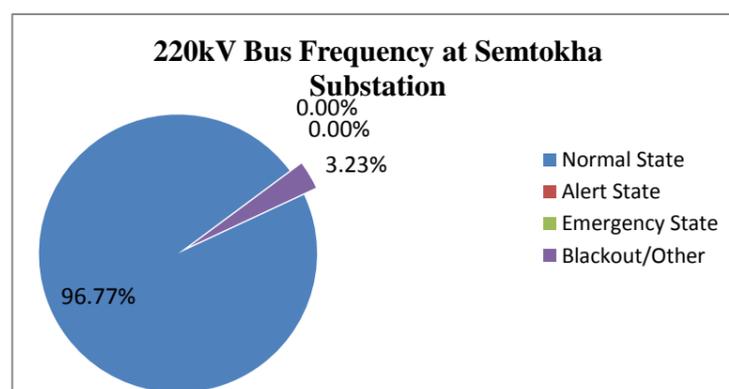
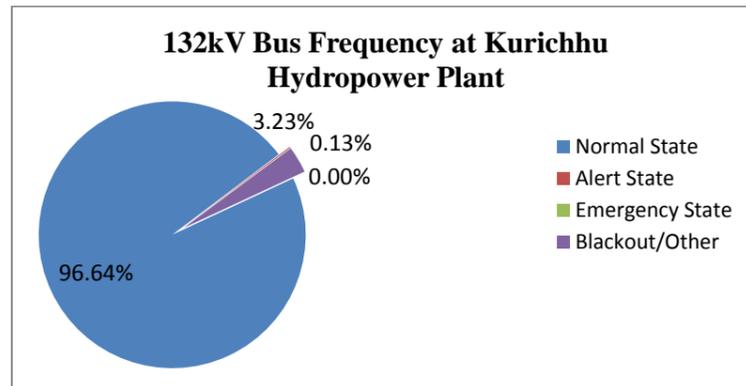


Table 6.3.2. Bus frequency of Kurichhu Hydro Power Plant

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	96.64%
2	Alert State	0.13%
3	Emergency State	0.00%
4	Blackout/Other	3.23%

Graph 6.3.2. Bus frequency of Kurichhu Hydro Power Plant



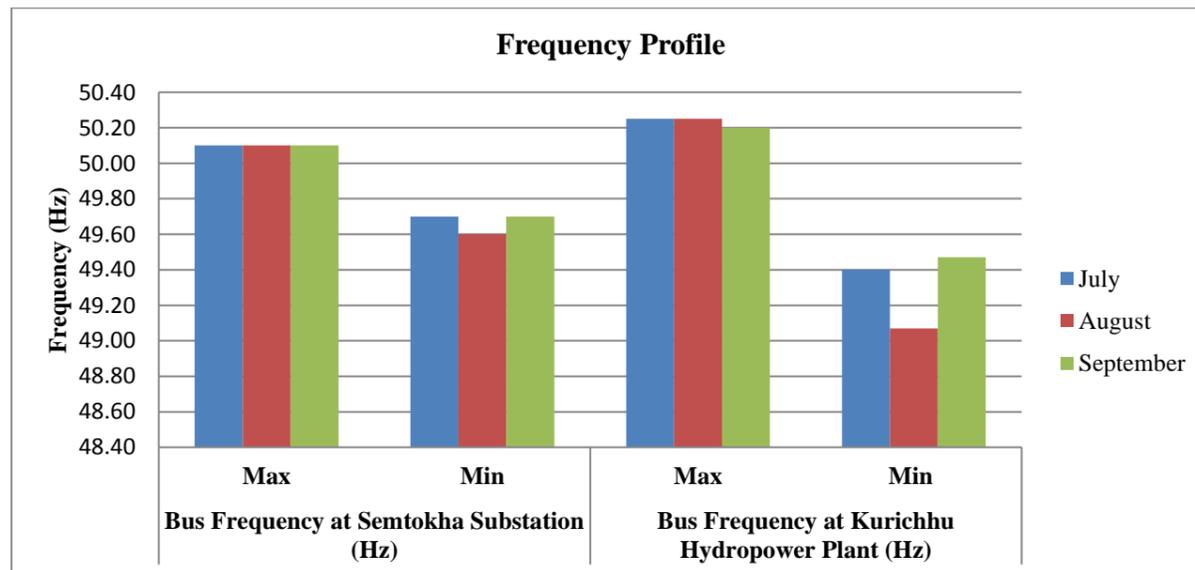
In the month of September, 2019, the Western grid frequency was maintained 96.77% within the normal operating range and deviated 3.23% was blackout/others. Eastern grid frequency was maintained within normal operating range of 96.64% and system frequency was deviated 0.13% and 3.23% to alert and blackout/other state respectively.

6.4.Frequency Summary for the month of July to September, 2019

Table 6.4.1. Frequency summary for the month of July to September, 2019

Substation/Plant	Bus Frequency at Semtokha Substation (Hz)		Bus Frequency at Kurichhu Hydropower Plant (Hz)	
	Max	Min	Max	Min
July	50.10	49.70	50.25	49.40
August	50.10	49.60	50.25	49.07
September	50.10	49.70	50.20	49.47

Graph 6.4.1. Frequency summary for the month of July to September, 2019



Daily maximum, minimum and average Frequency of Semtokha substation in western grid and Kurichhu Hydro Power Plant in eastern grid for the month of July to September, 2019 is attached as **Annexure-III**

7. Voltage Profile of selected substation

As per the Grid Code 2008, clause 6.4.1 the voltage at all connection point is classified into three different bands as follows:

1. *Normal State*
The voltage at all connection points are within the limits of 0.95 times and 1.05 times of the normal values
2. *Alert State*
The voltage at all connection points are outside the normal limit but within the limits of 0.9 times and 1.1 times of the nominal values.
3. *Emergency State*
Transmission system voltages are outside the limit of 0.9 times and 1.1 times of nominal values.

Due to the location of 400/22/66/11kV Malbase substation in western grid and 132/33/11kV Nangkhor substation in the eastern grid, the voltage profile of these substations are considered.

7.1.Voltage profile for the month of July, 2019

Table 7.1.1. Voltage Profile for 400/220/66kV Malbase Substation

Sl. No.	Operating State	400kV Bus Voltage	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	100.00%	100.00%	99.87%
2	Alert State	0.00%	0.00%	0.13%
3	Emergency State	0.00%	0.00%	0.00%
4	Blackout/Other	0.00%	0.00%	0.00%

Graph 7.1.1. Voltage Profile for 400/220/66kV Malbase Substation

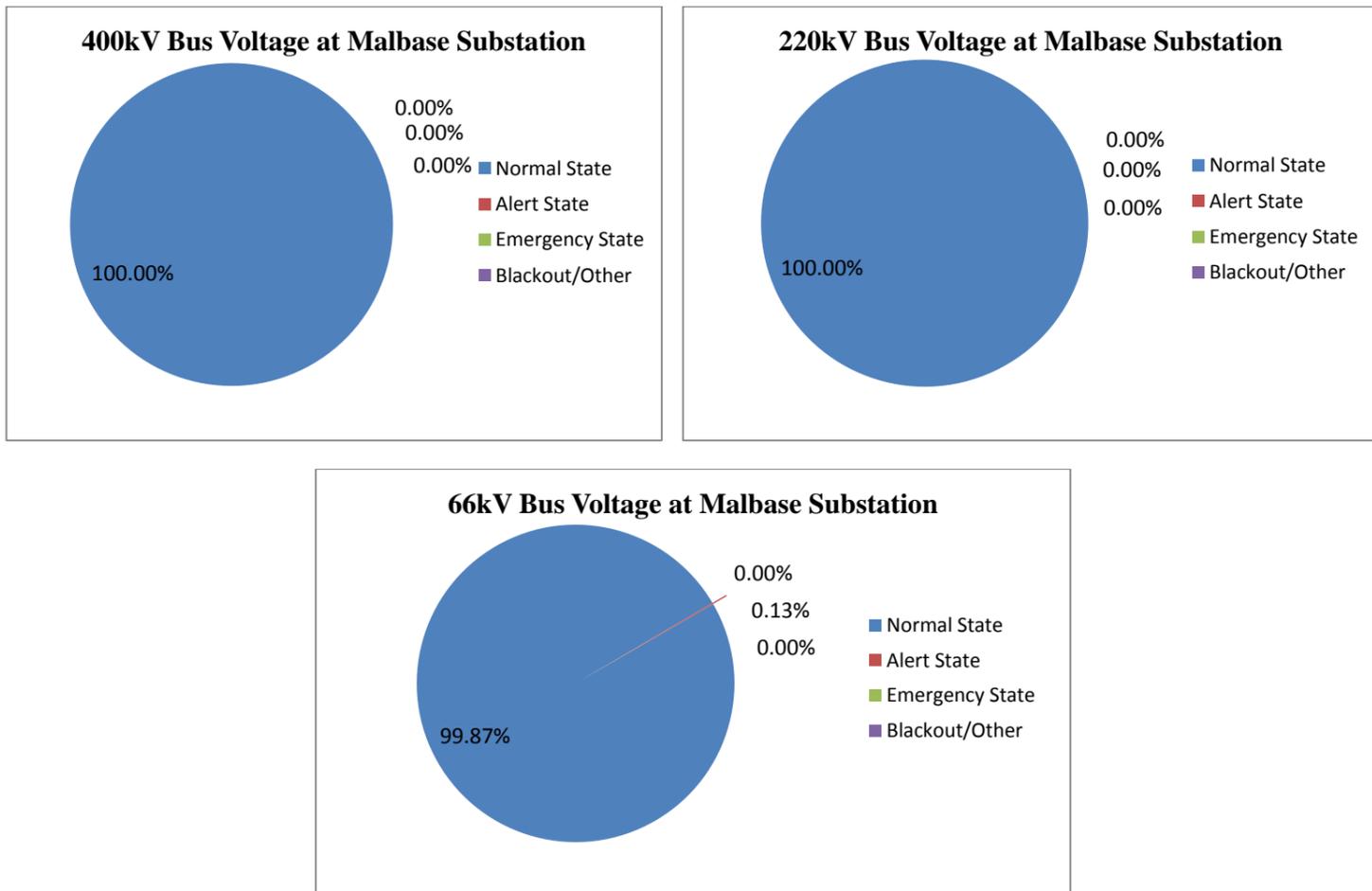


Table 7.1.2. Voltage Profile of 220/66/11kV Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	99.73%	99.87%
2	Alert State	0.00%	0.00%
3	Emergency State	0.27%	0.13%
4	Blackout/Other	0.00%	0.00%

Graph 7.1.2. Voltage Profile of 220/66/11kV Semtokha Substation

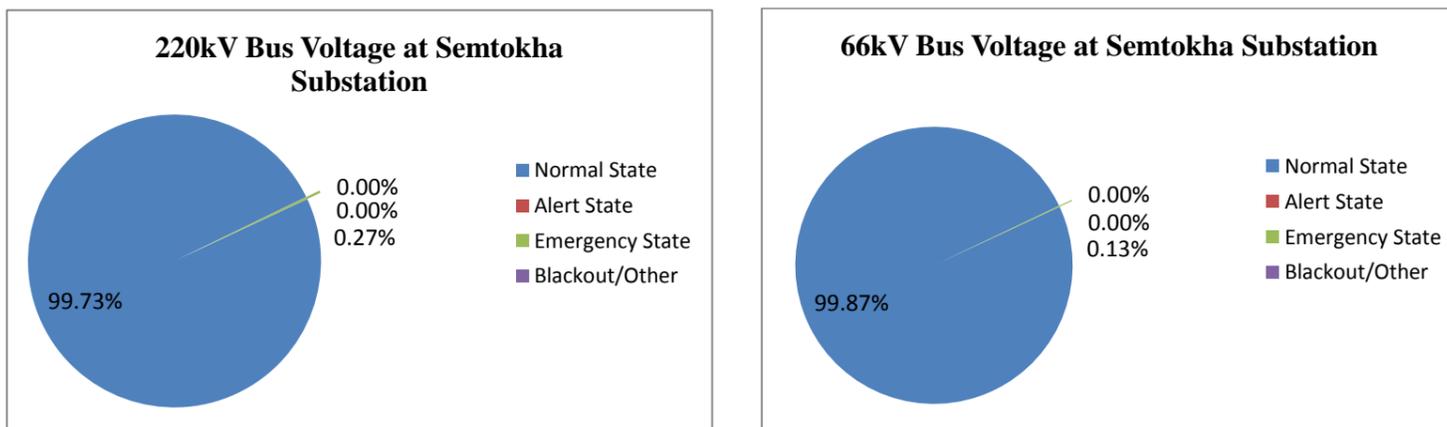
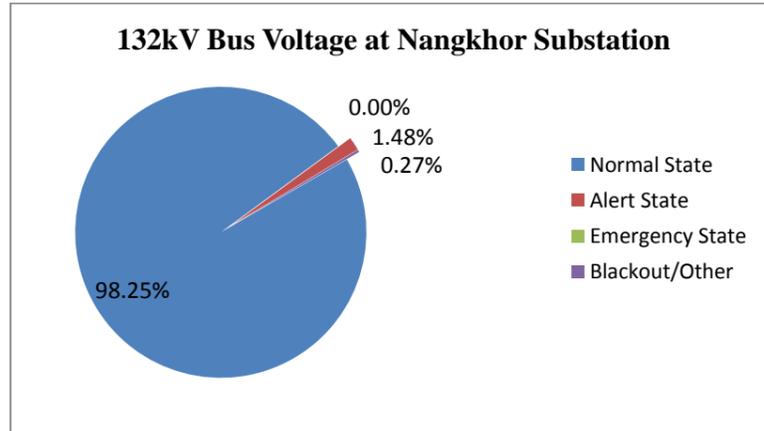


Table 7.1.3. Voltage Profile of 132/33/11kV Nangkhor Substation

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	98.25%
2	Alert State	1.48%
3	Emergency State	0.00%
4	Blackout/Other	0.27%

Graph 7.1.3. Voltage Profile of 132/33/11kV Nangkhor Substation



It had been observed that the eastern region is experiencing high voltage issue as clearly depicted in the above voltage profile. In order to control the issue, it is recommended to use the available voltage control measures such as reactor available at Jigmeling and KHP.

7.2. Voltage Profile for month of August, 2019

Table 7.2.1. Voltage Profile for 400/220/66kV Malbase Substation

Sl. No.	Operating State	400kV Bus Voltage	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	100.00%	100.00%	100.00%
2	Alert State	0.00%	0.00%	0.00%
3	Emergency State	0.00%	0.00%	0.00%
4	Blackout/Other	0.00%	0.00%	0.00%

Graph 7.2.1. Voltage Profile for 400/220/66kV Malbase Substation

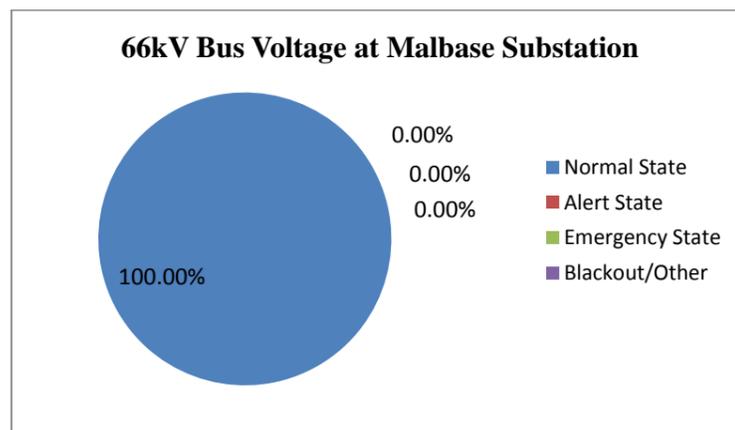
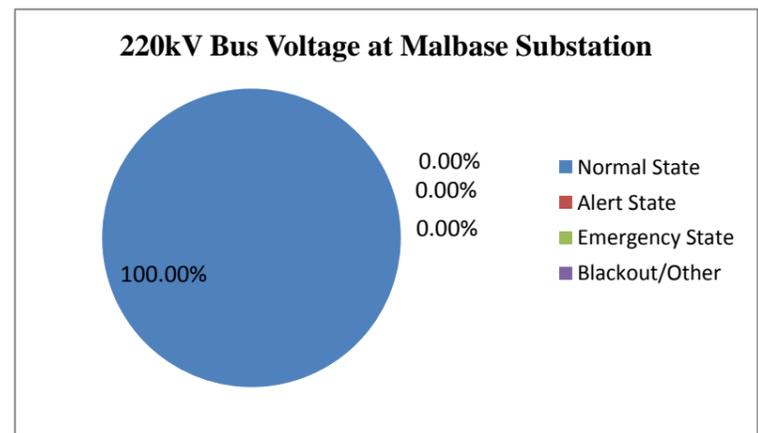
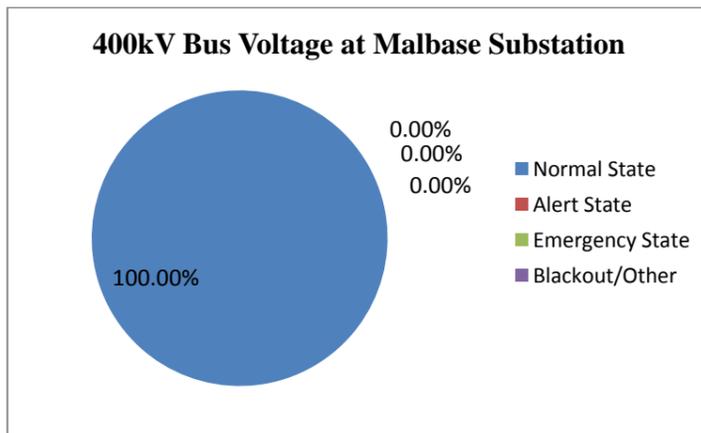


Table 7.2.2. Voltage Profile of 220/66/11kV Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	100.00%	100.00%
2	Alert State	0.00%	0.00%
3	Emergency State	0.00%	0.00%
4	Blackout/Other	0.00%	0.00%

Graph 7.2.2. Voltage Profile of 220/66/11kV Semtokha Substation

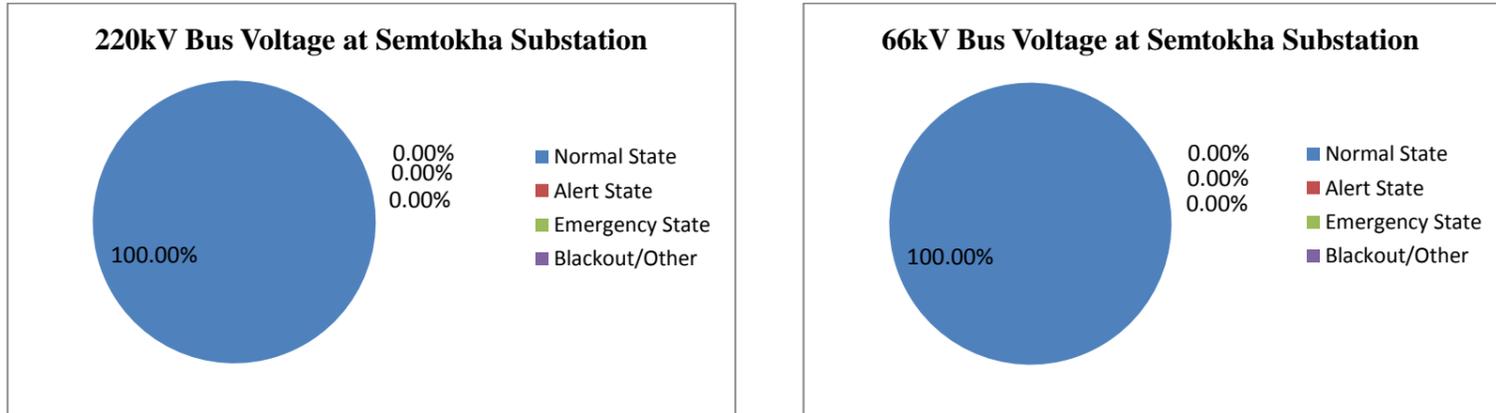
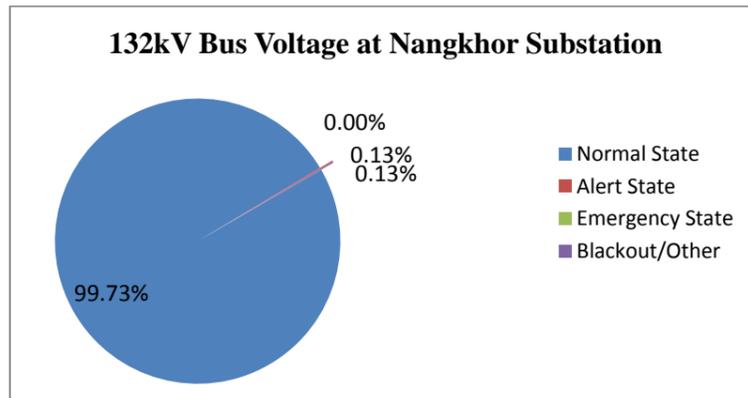


Table 7.2.3. Voltage Profile of 132/33/11kV Nangkhor Substation

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	99.73%
2	Alert State	0.13%
3	Emergency State	0.00%
4	Blackout/Other	0.13%

Graph 7.2.3. Voltage Profile of 132/33/11kV Nangkhor Substation



7.3. Voltage Profile for the month of September, 2019

Table 7.3.1. Voltage Profile for 400/220/66kV Malbase Substation

Sl. No.	Operating State	400kV Bus Voltage	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	96.77%	96.77%	96.77%
2	Alert State	0.00%	0.00%	0.00%
3	Emergency State	0.00%	0.00%	0.00%
4	Blackout/Other	3.23%	3.23%	3.23%

Graph 7.3.1. Voltage Profile for 400/220/66kV Malbase Substation

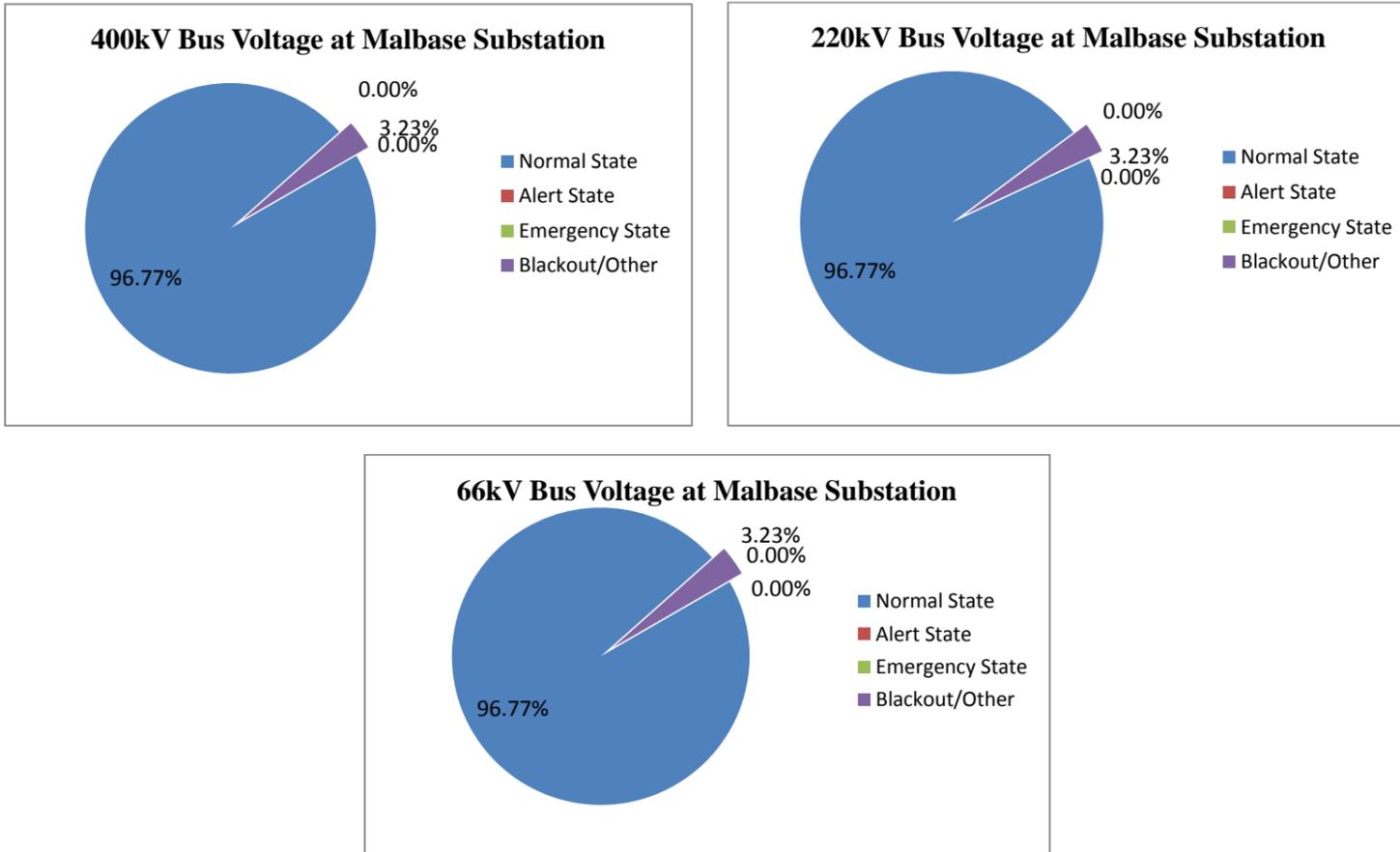


Table 7.3.2. Voltage Profile of 220/66/11kV Semtokha Substation

Sl. No.	Operating State	220kV Bus Voltage	66kV Bus Voltage
1	Normal State	96.77%	96.77%
2	Alert State	0.00%	0.00%
3	Emergency State	0.00%	0.00%
4	Blackout/Other	3.23%	3.23%

Graph 7.3.2. Voltage Profile of 220/66/11kV Semtokha Substation

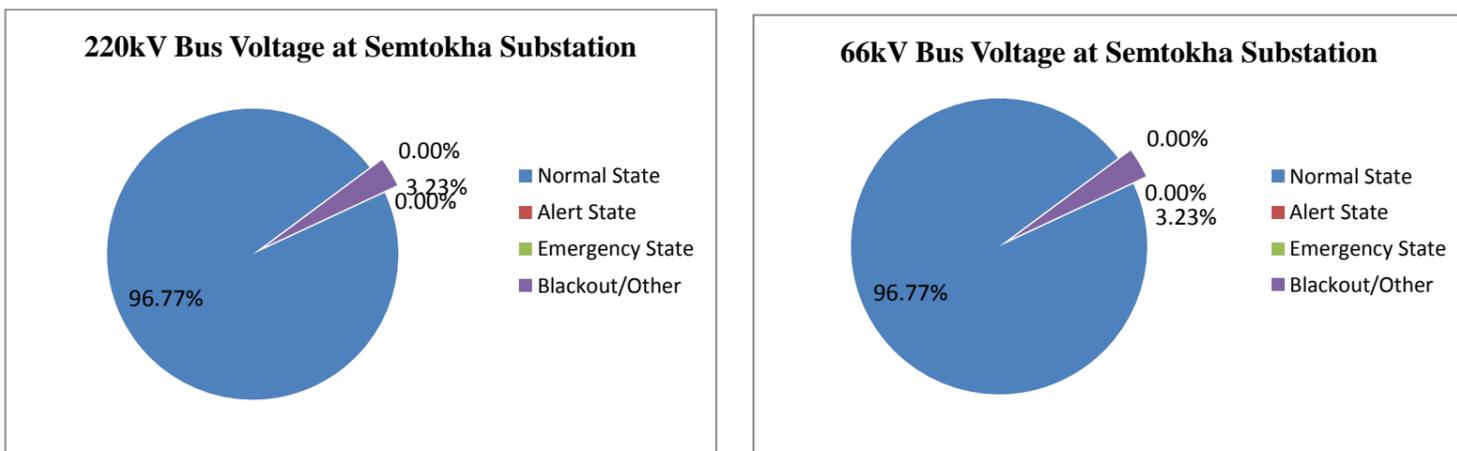
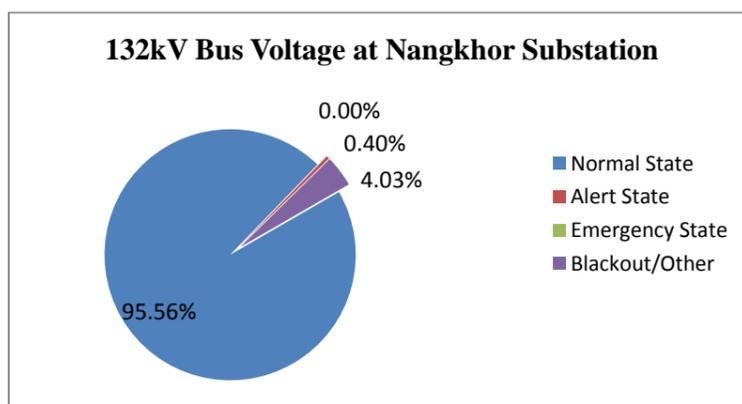


Table 7.3.3. Voltage Profile of 132/33/11kV Nangkhor Substation

Sl. No.	Operating State	132kV Bus Voltage
1	Normal State	95.56%
2	Alert State	0.40%
3	Emergency State	0.00%
4	Blackout/Other	4.03%

Graph 7.3.3. Voltage Profile of 132/33/11kV Nangkhor Substation

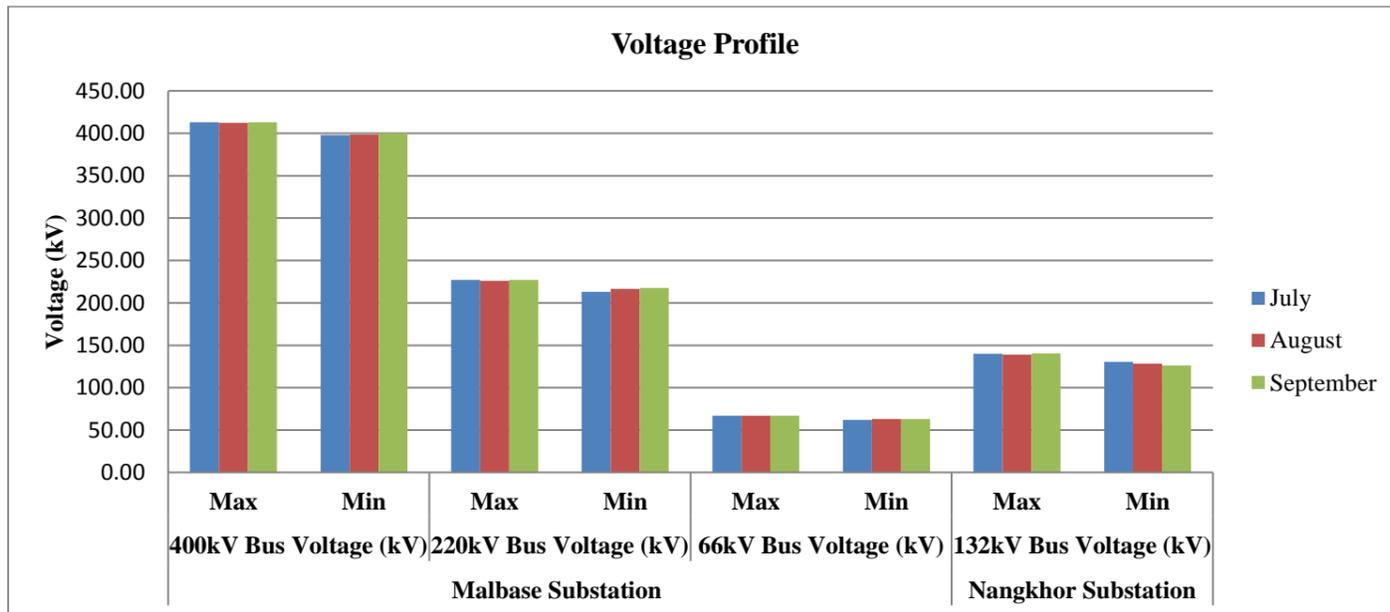


7.4.Voltage Summary for the Month of July to September, 2019

Table 7.4.1. Voltage Summary for the month of July to September, 2019

Substation	Malbase Substation						Nangkhor Substation	
	400kV Bus Voltage (kV)		220kV Bus Voltage (kV)		66kV Bus Voltage (kV)		132kV Bus Voltage (kV)	
Month	Max	Min	Max	Min	Max	Min	Max	Min
July	413.00	398.00	227.00	213.00	67.00	62.00	140.00	130.40
August	412.50	398.50	226.00	216.50	67.00	63.00	138.80	128.42
September	413.00	400.00	227.00	217.50	67.00	63.00	140.47	126.10

Graph 7.4.1. Voltage Summary for the month of July to September, 2019



Daily maximum, minimum and average bus voltage of Malbase substation in western grid and Nangkhor substation in eastern grid for the month of July to September, 2019 is attached as **Annexure-IV**

8. Major Outages of Feeders and Equipment

The transmission lines and equipment which were shut down for annual maintenance are not considered in the report.

8.1.Major Outages in Eastern Grid

During the Third quarter of 2019, there was no multiple prolong outages observed although number of tripping occurred. Almost all the fault in the transmission line recorded are of transient fault in nature. Therefore, it is highly recommended for auto reclose to be implement in HV transmission lines.

The longest outage recorded for the third quarter in the eastern grid was 400 kV Jigmeling-Alipurduar circuit -1 with the outage duration of almost three days. The main reason for such a long duration was due to severe weather condition at the area where they couldn't attain the fault.

The feeders and equipment outages for the Eastern grid is attached as **Annexure-V**.

8.2.Major Outages in Western Grid

As usual, it had been observed that, several tripping had occurred in the western grid and it was mainly due to the bad weather condition. Due to temporary and transient fault, major outage and blackout haven't experience in the third quarter of the year. The longest tripping duration observed during third quarter in western region was 220 kV Dhamdum-Malbase line for more than three hours.

The feeders and equipment outages for the Western grid is attached as **Annexure-VI**.



9. Annexures

Annexure-I

Table: Generation of July, 2019

Jul-19 Date	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	24.13	20.65	22.03	252.08	198.07	224.78	580.00	400.00	452.50	66.00	66.00	66.00	28.31	23.26	25.19
2	23.59	13.96	19.90	262.25	193.70	238.56	620.00	430.00	515.00	66.00	66.00	66.00	27.29	23.26	25.58
3	19.45	18.45	18.97	368.78	217.26	293.57	800.00	400.00	606.25	66.00	49.50	65.31	24.00	23.00	23.63
4	65.60	18.82	23.19	247.70	209.81	237.74	540.00	460.00	478.33	66.00	66.00	66.00	26.00	21.00	23.29
5	65.50	25.33	36.96	313.38	210.91	265.00	640.00	430.00	535.83	66.00	66.00	66.00	28.00	22.00	24.10
6	63.30	26.83	36.22	368.00	292.64	355.40	810.00	620.00	744.58	66.00	66.00	66.00	49.00	26.00	37.33
7	66.10	30.50	37.92	368.00	365.46	367.57	920.00	730.00	802.92	66.00	33.00	64.63	126.79	42.00	90.81
8	66.31	65.17	66.14	368.00	356.00	367.25	1,122.00	780.00	1,081.25	66.00	64.60	65.57	127.05	85.54	121.31
9	66.32	55.28	64.28	368.00	276.00	347.46	1,122.00	1,122.00	1,122.00	66.00	33.00	64.55	123.32	71.61	91.23
10	66.40	65.52	66.25	368.00	276.00	344.83	1,122.00	1,122.00	1,122.00	66.00	65.07	65.83	126.89	91.23	115.45
11	66.47	66.20	66.29	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	65.92	64.36	65.58	126.93	120.39	126.23
12	66.40	66.20	66.28	368.00	243.00	353.13	1,122.00	1,122.00	1,122.00	66.00	49.40	64.75	126.88	120.35	125.76
13	66.55	66.20	66.28	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	65.89	65.99	126.79	94.24	104.25
14	66.40	66.10	66.29	368.30	367.00	367.85	1,122.00	1,122.00	1,122.00	66.00	60.98	63.94	126.97	93.57	121.12
15	66.37	61.90	66.05	368.00	368.00	368.00	1,122.00	935.00	1,114.21	65.65	49.38	63.05	126.96	126.55	126.80
16	66.40	66.20	66.28	368.00	367.00	367.92	1,122.00	1,122.00	1,122.00	65.50	64.83	65.22	126.87	108.49	122.74
17	66.30	66.20	66.21	368.00	276.00	350.88	1,122.00	935.00	1,044.08	66.00	33.00	63.18	105.47	86.08	94.57
18	66.30	62.50	64.82	368.00	368.00	368.00	1,122.00	935.00	1,083.04	66.00	66.00	66.00	98.93	70.11	80.14
19	66.20	61.20	64.77	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	65.59	65.90	126.05	63.03	80.43
20	66.20	61.20	64.77	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	49.03	64.88	126.03	76.69	95.36
21	66.60	65.20	66.26	368.00	368.00	368.00	1,122.00	948.00	1,068.96	65.60	32.70	62.37	101.94	68.17	81.52
22	66.40	62.50	65.71	368.00	368.00	368.00	1,122.00	935.00	1,042.25	66.00	33.00	62.61	126.08	71.84	88.17
23	66.41	57.59	65.87	368.00	368.00	368.00	1,122.00	935.00	1,114.21	66.00	63.46	65.56	101.74	71.96	83.68
24	66.50	66.15	66.30	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	65.34	63.63	64.66	126.96	80.52	113.86
25	66.40	66.20	66.30	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	60.00	33.00	49.92	126.95	126.66	126.81
26	66.50	66.20	66.32	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	64.45	65.42	126.94	120.32	125.94
27	66.40	66.20	66.32	368.00	354.03	367.25	1,122.00	935.00	1,098.63	66.00	60.21	63.64	126.94	126.27	126.75
28	66.40	65.32	66.07	368.00	366.53	367.80	1,122.00	1,122.00	1,122.00	66.00	65.49	65.94	126.94	104.48	117.32
29	66.30	64.70	65.19	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	116.53	85.53	99.61
30	66.30	64.70	65.19	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	108.46	86.53	96.83
31	65.60	64.80	65.39	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	64.78	65.85	124.05	81.65	91.24
Max	66.60			368.78			1,122.00			66.00			127.05		
Min		13.96			193.70			400.00			32.70			21.00	

Source: THP, CHP, BHP, KHP (DGPC)

Graph: Generation for the month of July, 2019

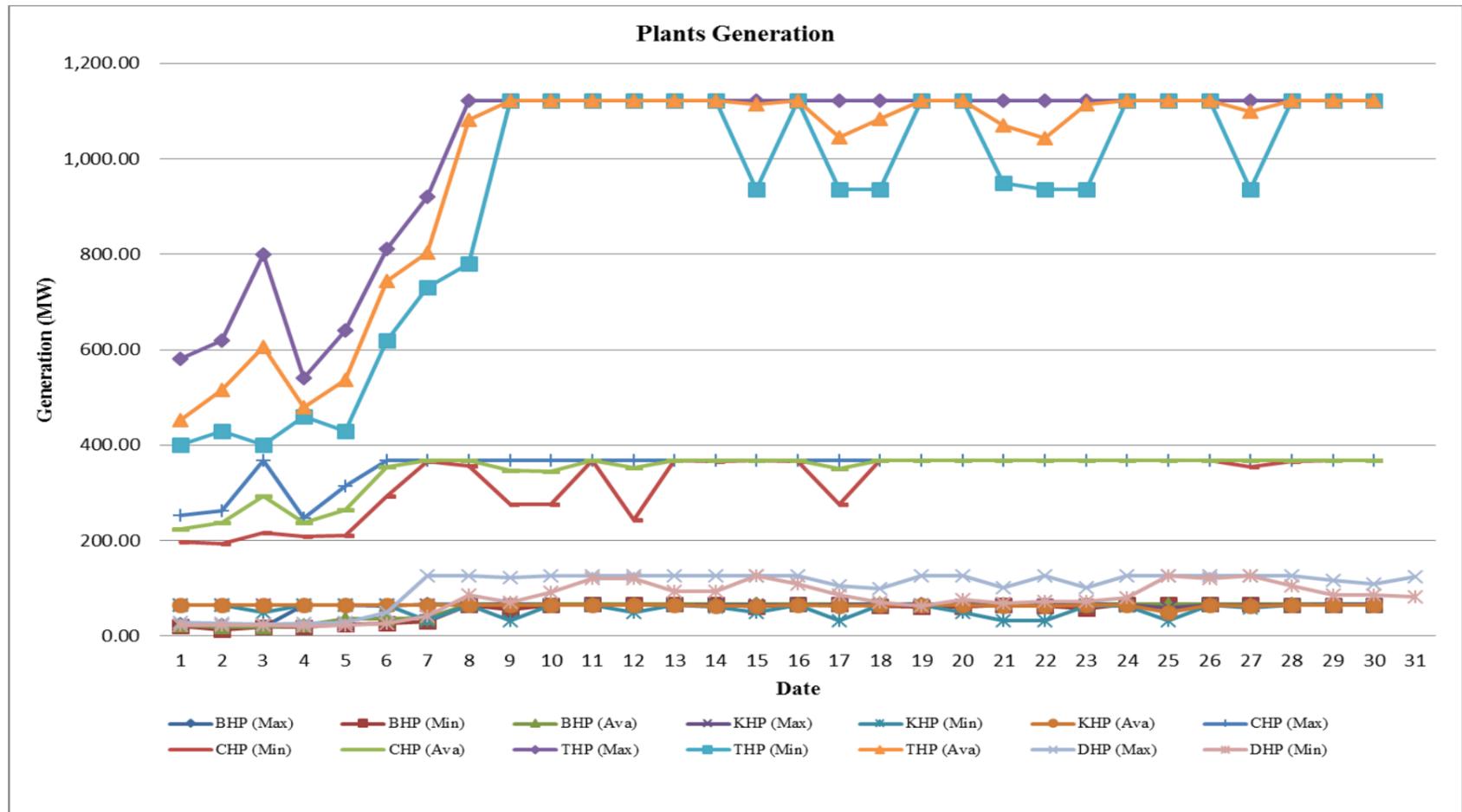




Table: Generation for the month of August, 2019

Jul-19 Date	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	66.30	65.10	65.73	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	62.68	65.57	126.92	88.34	104.30
2	66.40	66.10	66.26	368.00	368.00	368.00	1,122.00	935.00	1,114.21	66.00	65.66	65.91	126.92	106.43	121.82
3	66.40	66.10	66.27	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	65.82	65.99	126.85	100.50	114.55
4	66.30	65.80	66.13	291.00	276.00	279.54	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	104.62	82.69	93.69
5	66.30	66.10	66.19	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	62.93	64.91	126.86	95.02	114.47
6	66.30	65.30	65.93	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	64.89	65.60	110.25	80.42	93.93
7	66.20	52.70	64.74	276.00	17.00	220.05	1,122.00	1,122.00	1,122.00	66.00	64.67	65.70	126.91	88.60	123.02
8	66.20	65.80	66.11	276.00	276.00	276.00	1,122.00	935.00	1,090.83	66.00	33.00	64.63	126.94	126.56	126.79
9	65.90	65.10	65.46	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	127.01	114.24	122.46
10	65.40	64.50	65.11	276.00	276.00	276.00	1,122.00	935.00	1,084.42	66.00	33.00	64.63	126.76	95.54	108.43
11	65.30	63.70	64.68	276.00	276.00	276.00	935.00	935.00	935.00	66.00	66.00	66.00	126.84	98.21	112.26
12	63.32	62.30	62.86	276.00	276.00	276.00	1,122.00	935.00	1,059.67	66.00	66.00	66.00	103.50	89.21	95.66
13	63.20	59.60	61.05	276.00	184.00	235.83	1,122.00	935.00	1,106.42	66.00	66.00	66.00	101.58	86.25	93.38
14	65.00	58.90	61.33	276.00	276.00	276.00	1,122.00	935.00	1,114.21	66.00	66.00	66.00	126.90	100.05	116.67
15	66.20	59.00	63.06	368.00	276.00	315.50	1,122.00	935.00	1,079.13	66.00	66.00	66.00	124.38	97.42	108.61
16	66.30	62.80	65.71	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.83	95.53	112.39
17	66.20	66.00	66.19	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.99	101.33	115.42
18	66.20	62.10	65.34	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	105.52	88.33	94.75
19	66.20	62.10	65.09	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	89.39	78.37	84.99
20	59.10	55.40	57.02	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	86.44	79.26	81.83
21	59.70	29.00	51.47	368.00	368.00	368.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	83.27	72.18	76.48
22	57.80	30.00	48.81	368.00	368.00	368.00	1,122.00	968.00	1,058.67	66.00	66.00	66.00	75.39	69.45	72.75
23	51.00	49.20	50.27	368.00	276.00	335.42	1,122.00	794.00	951.83	66.00	65.74	65.97	75.32	68.40	70.27
24	62.20	49.80	54.87	276.00	274.00	275.92	1,122.00	1,004.00	1,087.58	66.00	33.00	62.91	101.54	70.29	88.54
25	65.40	50.80	55.61	276.00	276.00	276.00	1,122.00	935.00	1,114.21	66.00	66.00	66.00	93.40	73.30	84.10
26	50.90	48.30	49.50	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	74.50	67.41	70.66
27	50.80	39.40	47.35	276.00	276.00	276.00	1,122.00	935.00	1,067.46	66.00	66.00	66.00	67.45	60.45	65.21
28	49.50	45.80	46.72	276.00	276.00	276.00	1,008.00	884.00	940.75	66.00	66.00	66.00	65.17	59.46	62.38
29	49.00	44.50	45.84	276.00	276.00	276.00	1,122.00	884.00	1,049.04	66.00	33.00	64.63	67.58	59.43	62.93
30	57.90	43.50	46.00	276.00	214.65	273.03	1,035.00	834.00	941.71	66.00	49.50	65.31	72.42	55.44	59.91
31	66.20	48.90	63.05	276.00	276.00	276.00	1,122.00	954.00	1,062.75	66.00	66.00	66.00	126.92	75.46	116.31
Max	66.40			368.00			1,122.00			66.00			127.01		
Min		29.00			17.00			794.00			33.00			55.44	

Source: THP, CHP, BHP, KHP (DGPC)

Graph: Generation for the month of August, 2019

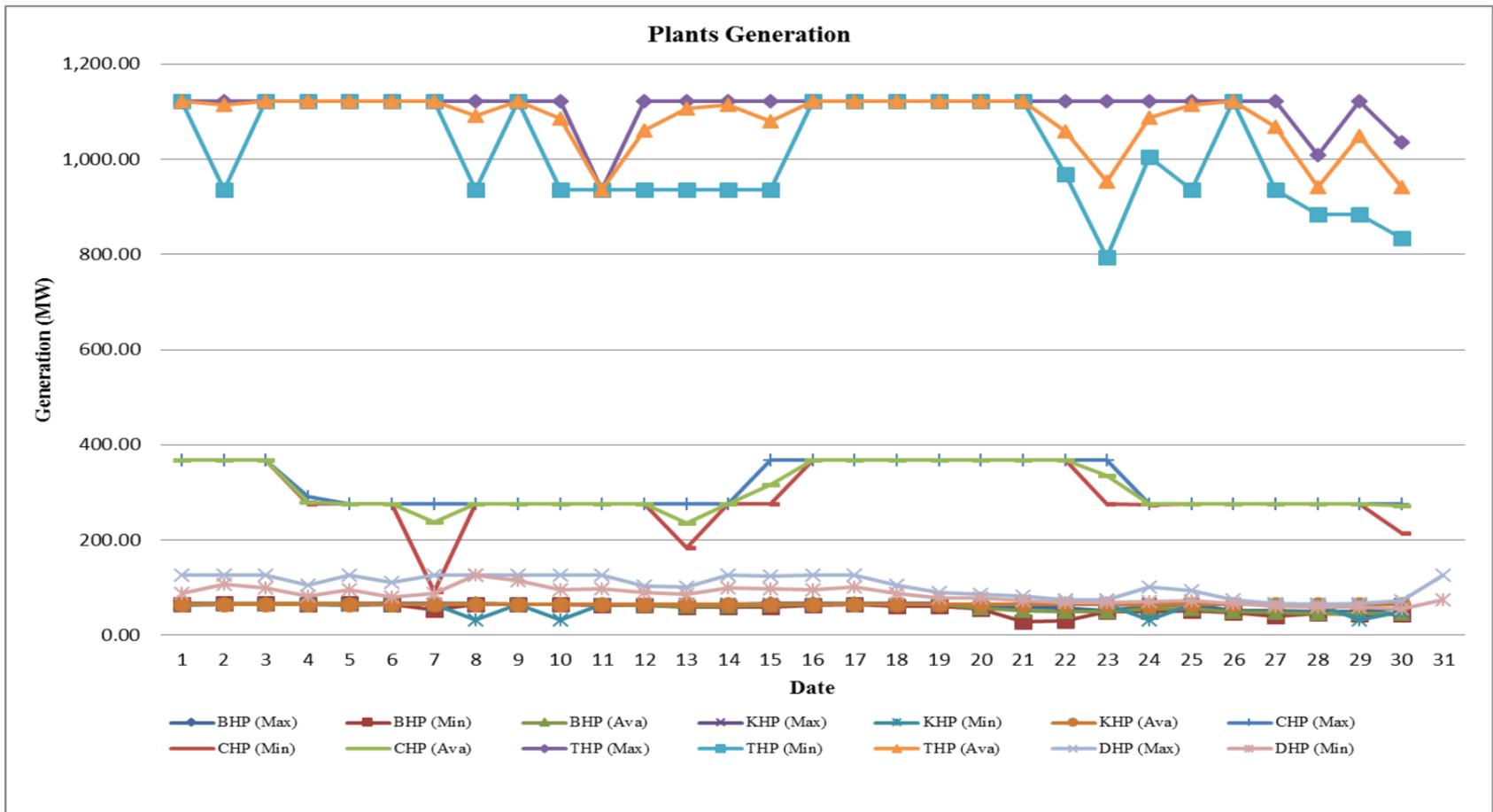




Table: Generation for the month of September, 2019

Sep-19 Date	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	66.20	57.20	62.25	276.00	276.00	276.00	1,122.00	861.00	1,065.67	66.00	66.00	66.00	105.44	71.41	82.71
2	57.10	51.00	53.78	276.00	276.00	276.00	1,075.00	901.00	961.04	66.00	66.00	66.00	72.47	64.45	67.25
3	56.60	50.00	52.18	276.00	276.00	276.00	1,088.00	848.00	1,025.71	66.00	66.00	66.00	92.45	65.45	76.83
4	55.90	49.70	51.95	276.00	276.00	276.00	1,122.00	927.00	1,030.71	66.00	66.00	66.00	76.44	64.40	68.51
5	66.20	53.40	58.11	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	109.43	64.20	69.67
6	66.20	65.70	66.05	276.00	276.00	276.00	1,122.00	935.00	1,098.63	66.00	66.00	66.00	126.76	84.35	111.46
7	66.20	66.10	66.10	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.78	68.39	100.85
8	66.10	66.10	66.10	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	84.38	72.40	76.37
9	66.10	65.90	66.08	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	91.51	60.56	77.48
10	66.30	65.90	66.09	276.00	184.00	222.54	1,122.00	767.00	1,035.67	66.00	66.00	66.00	91.41	41.44	76.51
11	66.20	65.30	66.06	184.00	184.00	184.00	1,122.00	867.00	996.75	66.00	66.00	66.00	126.61	72.40	90.61
12	66.20	65.30	66.06	276.00	184.00	259.17	1,122.00	1,075.00	1,120.04	66.00	33.00	63.91	126.91	83.34	98.76
13	66.10	66.00	66.10	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.79	116.75	126.27
14	66.30	66.00	66.12	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.86	110.55	122.68
15	66.30	66.00	66.13	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	65.80	65.90	126.85	103.48	115.87
16	66.10	66.10	66.10	276.00	276.00	276.00	1,122.00	935.00	1,098.63	66.00	65.37	65.79	126.82	106.44	121.02
17	66.30	65.90	66.11	276.00	184.00	265.42	1,122.00	1,122.00	1,122.00	65.80	65.16	65.51	126.77	111.73	121.78
18	66.30	65.80	66.08	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	65.60	65.25	65.46	113.12	94.69	101.63
19	66.20	65.30	66.07	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	65.51	65.13	65.35	95.57	85.71	90.68
20	66.10	65.70	66.08	276.00	92.00	206.54	1,122.00	1,122.00	1,122.00	66.00	14.10	55.72	94.69	81.93	86.25
21	66.30	66.00	66.10	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	110.50	89.06	98.94
22	66.20	66.00	66.10	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	109.65	85.37	93.73
23	66.20	66.00	66.04	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	90.44	78.40	83.27
24	66.10	65.80	66.07	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.77	88.41	106.51
25	66.10	66.00	66.07	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.80	116.44	125.52
26	66.10	66.10	66.10	276.00	276.00	276.00	1,122.00	968.00	1,089.92	66.00	33.00	64.63	126.90	100.94	116.12
27	66.10	65.70	66.05	276.00	276.00	276.00	978.00	911.00	963.08	66.00	63.40	65.85	126.84	92.00	103.92
28	66.10	65.90	66.05	276.00	276.00	276.00	1,122.00	911.00	1,071.04	66.00	63.38	65.49	126.86	109.45	119.53
29	66.10	65.60	66.02	276.00	276.00	276.00	1,122.00	1,085.00	1,120.46	66.00	66.00	66.00	126.89	110.49	123.43
30	66.20	65.80	66.08	276.00	276.00	276.00	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	126.86	117.18	123.84
31	0.00	No Generation	Error	0.00	No Generation	Error	0.00	No Generation	Error	0.00	No Generation	Error	0.00	No Generation	Error
Max	66.30			276.00			1,122.00			66.00			126.91		
Min		49.70			92.00			767.00			14.10			41.44	

Source: THP, CHP, BHP, KHP (DGPC)

Graph: Generation for the month of September, 2019

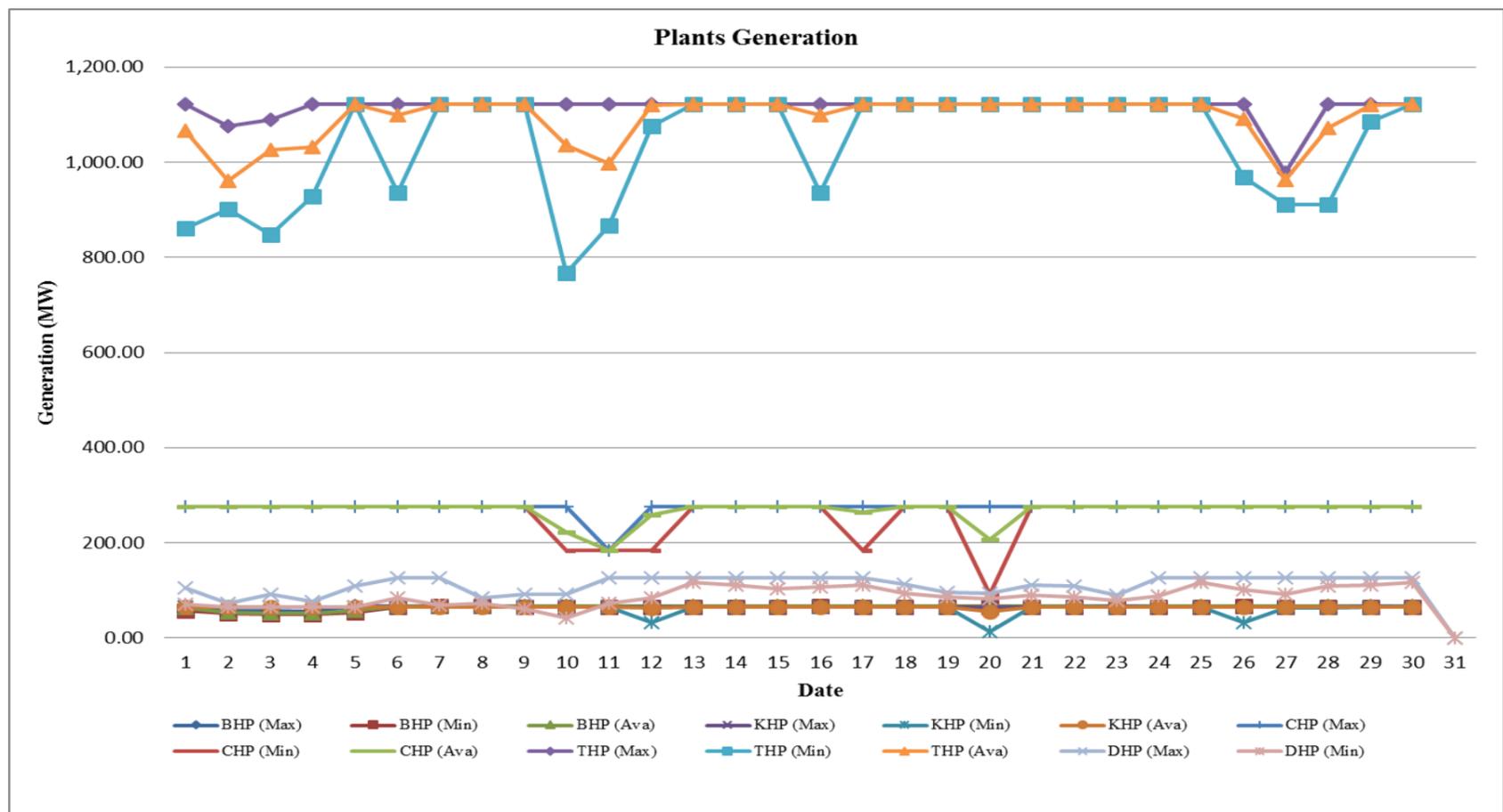




Table: National demand for July, 2019

Graph: National Demand for July, 2019

Annexure-II

Jul-19	Max	Min	Ava
0:00	259.65	195.86	237.26
1:00	255.86	188.83	232.62
2:00	249.06	198.96	230.72
3:00	249.35	198.36	229.90
4:00	249.67	205.72	232.67
5:00	251.25	202.85	235.51
6:00	269.58	214.63	250.26
7:00	277.28	218.09	260.68
8:00	277.99	223.57	255.46
9:00	281.52	223.64	254.88
10:00	282.47	203.71	251.96
11:00	282.62	204.85	248.29
12:00	288.41	216.59	250.48
13:00	275.73	207.90	244.10
14:00	266.80	190.09	238.68
15:00	267.58	195.00	237.74
16:00	269.29	200.74	238.86
17:00	274.98	205.90	242.52
18:00	281.42	228.41	255.07
19:00	303.52	248.16	272.79
20:00	309.72	259.06	287.41
21:00	292.04	249.30	273.50
22:00	279.67	224.07	255.09
23:00	265.77	208.83	241.72
	309.72		
		188.83	

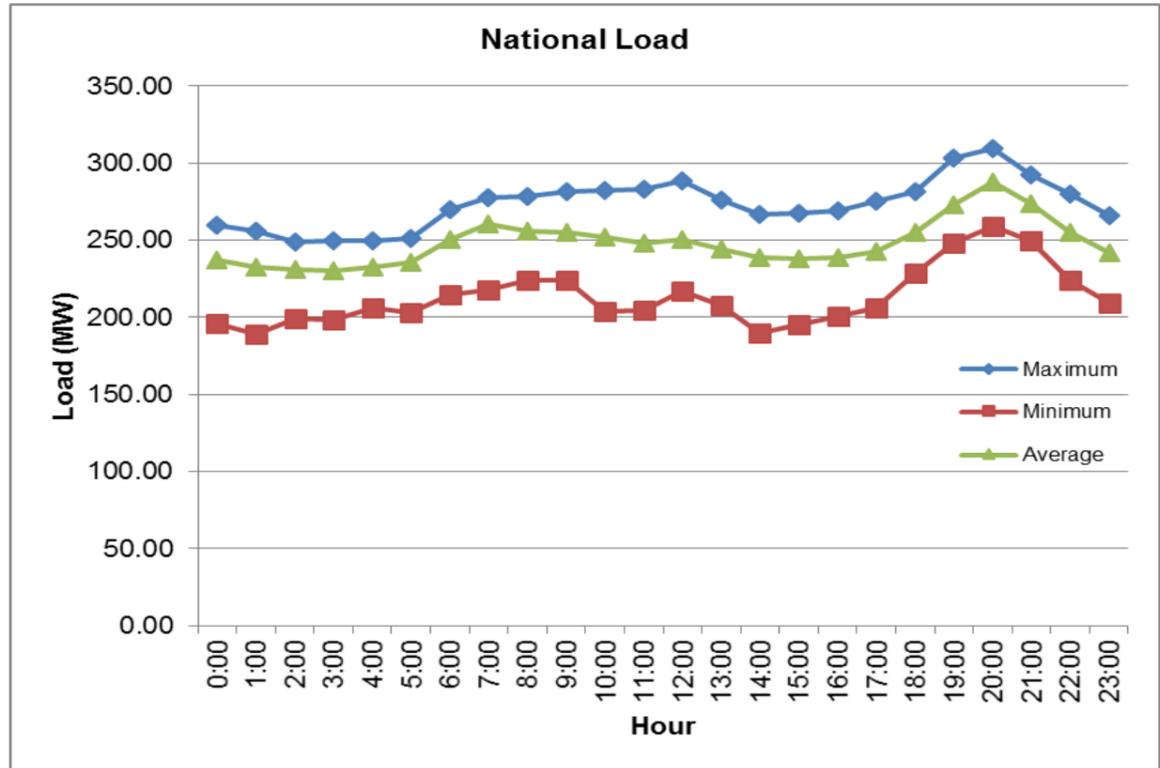


Table: National Demand for August, 2019

Graph: National Demand for August, 2019

Aug-19	Max	Min	Ava
0:00	258.27	209.73	231.85
1:00	255.53	207.22	228.78
2:00	258.20	201.54	228.88
3:00	256.70	201.89	227.59
4:00	249.85	204.91	228.87
5:00	254.94	213.32	233.33
6:00	276.42	229.54	255.45
7:00	288.26	241.52	265.97
8:00	273.01	225.37	253.96
9:00	274.61	230.74	253.28
10:00	271.47	217.81	249.32
11:00	265.44	220.10	246.63
12:00	274.59	228.34	251.75
13:00	262.67	211.62	245.96
14:00	259.39	211.42	239.10
15:00	261.54	209.57	240.43
16:00	270.15	207.08	240.63
17:00	274.84	214.21	244.21
18:00	277.47	233.40	256.12
19:00	305.90	252.28	280.70
20:00	302.22	250.29	279.92
21:00	285.39	237.84	265.56
22:00	283.77	226.66	249.23
23:00	271.29	204.31	236.02
	305.90		
		201.54	

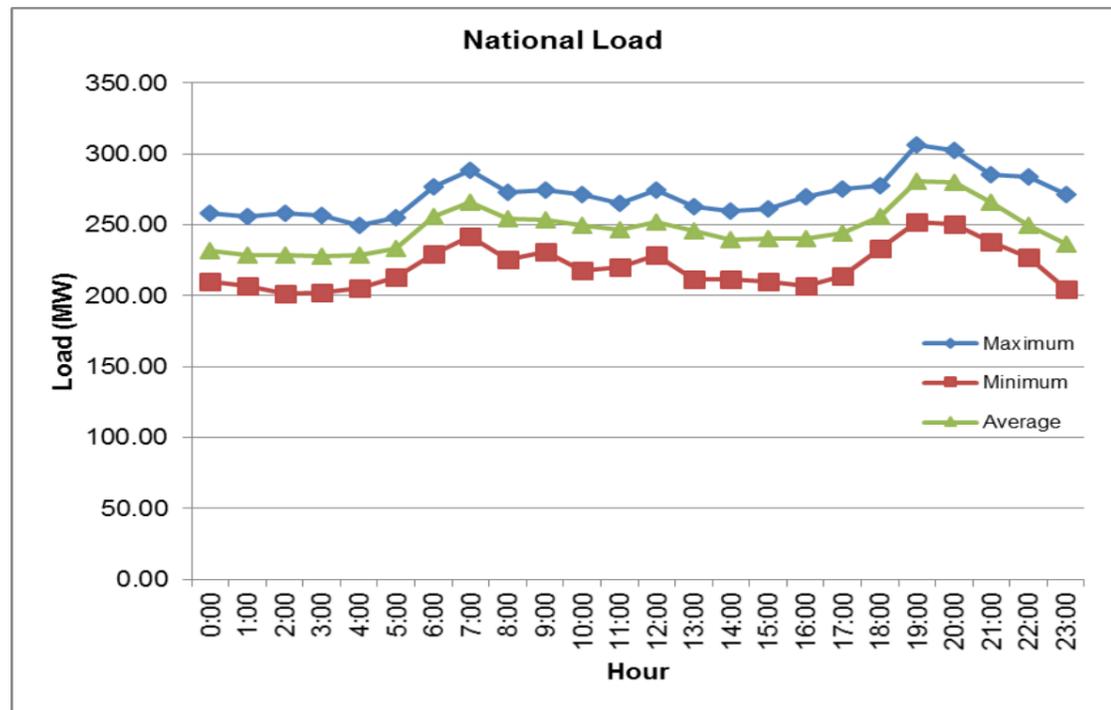
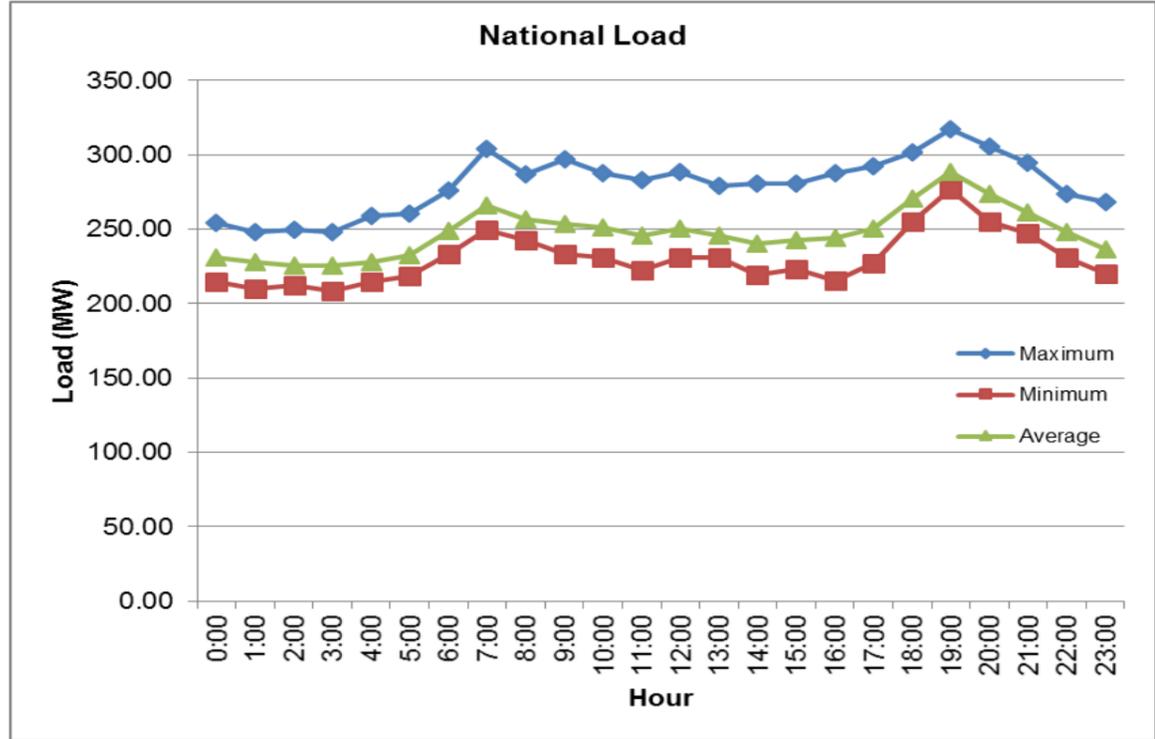




Table: National Demand for September, 2019

Graph: National Demand for September, 2019

Sep-19	Max	Min	Ava
0:00	253.95	214.51	230.81
1:00	248.05	210.07	227.76
2:00	249.79	212.05	225.75
3:00	247.79	208.40	225.22
4:00	258.80	214.45	228.03
5:00	260.30	218.16	232.25
6:00	276.16	233.65	248.47
7:00	303.75	249.70	265.93
8:00	286.92	242.88	256.89
9:00	296.88	233.39	253.45
10:00	287.83	230.94	250.96
11:00	282.67	222.17	245.62
12:00	288.18	230.56	250.35
13:00	278.80	230.61	245.90
14:00	280.95	218.99	240.14
15:00	281.03	222.96	242.74
16:00	287.86	215.22	244.03
17:00	292.49	227.12	250.39
18:00	301.54	255.23	270.36
19:00	317.42	276.78	288.08
20:00	305.81	255.39	273.97
21:00	295.00	247.09	261.36
22:00	273.46	230.88	247.88
23:00	268.46	219.78	236.44
	317.42		
		208.40	





Annexure-III

Table: Daily maximum, minimum and average frequency for the month of July, 2019

Date	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
	Max	Min	Ava	Max	Min	Ava
1	50.00	49.80	49.93	50.11	49.88	50.00
2	50.00	49.80	49.95	50.07	49.88	50.00
3	50.00	49.90	49.93	50.08	49.85	49.99
4	50.00	49.80	49.94	50.11	49.90	50.01
5	50.00	49.80	49.90	50.07	49.90	50.01
6	50.00	49.80	49.91	50.11	49.83	50.02
7	50.00	49.70	49.90	50.25	49.93	50.03
8	50.00	49.70	49.88	50.13	49.87	50.01
9	50.00	49.70	49.87	50.15	49.94	50.03
10	50.00	49.80	49.91	50.11	49.50	50.02
11	50.00	49.80	49.91	50.14	49.82	50.01
12	50.00	49.80	49.90	50.11	49.88	50.00
13	50.00	49.80	49.93	50.10	49.91	50.03
14	50.00	49.80	49.93	50.18	49.92	50.02
15	50.00	49.80	49.92	50.10	49.82	50.02
16	50.00	49.80	49.93	50.07	49.90	50.01
17	50.00	49.80	49.95	50.09	49.40	49.95
18	50.00	49.90	49.94	50.08	49.85	49.99
19	50.10	49.80	49.93	50.09	49.95	50.03
20	50.00	49.80	49.94	50.11	49.94	50.03
21	50.00	49.80	49.93	50.08	49.78	49.99
22	50.00	49.80	49.91	50.06	49.86	49.98
23	50.00	49.90	49.93	50.10	49.80	49.98
24	50.00	49.80	49.91	50.13	49.92	50.03
25	50.00	49.90	49.94	50.12	49.96	50.04
26	50.00	49.80	49.90	50.10	49.87	50.02
27	50.00	49.80	49.91	50.10	49.90	50.02
28	50.00	49.70	49.89	50.11	49.98	50.03
29	50.00	49.70	49.88	50.10	49.85	50.02
30	50.00	49.80	49.93	50.08	49.82	49.98
31	50.00	49.90	49.95	50.14	49.84	50.02
Max	50.10			50.25		
Min		49.70			49.40	

Source: TD (BPC), KHP (DGPC)

Graph: Daily maximum, minimum and average frequency for the month of July, 2019

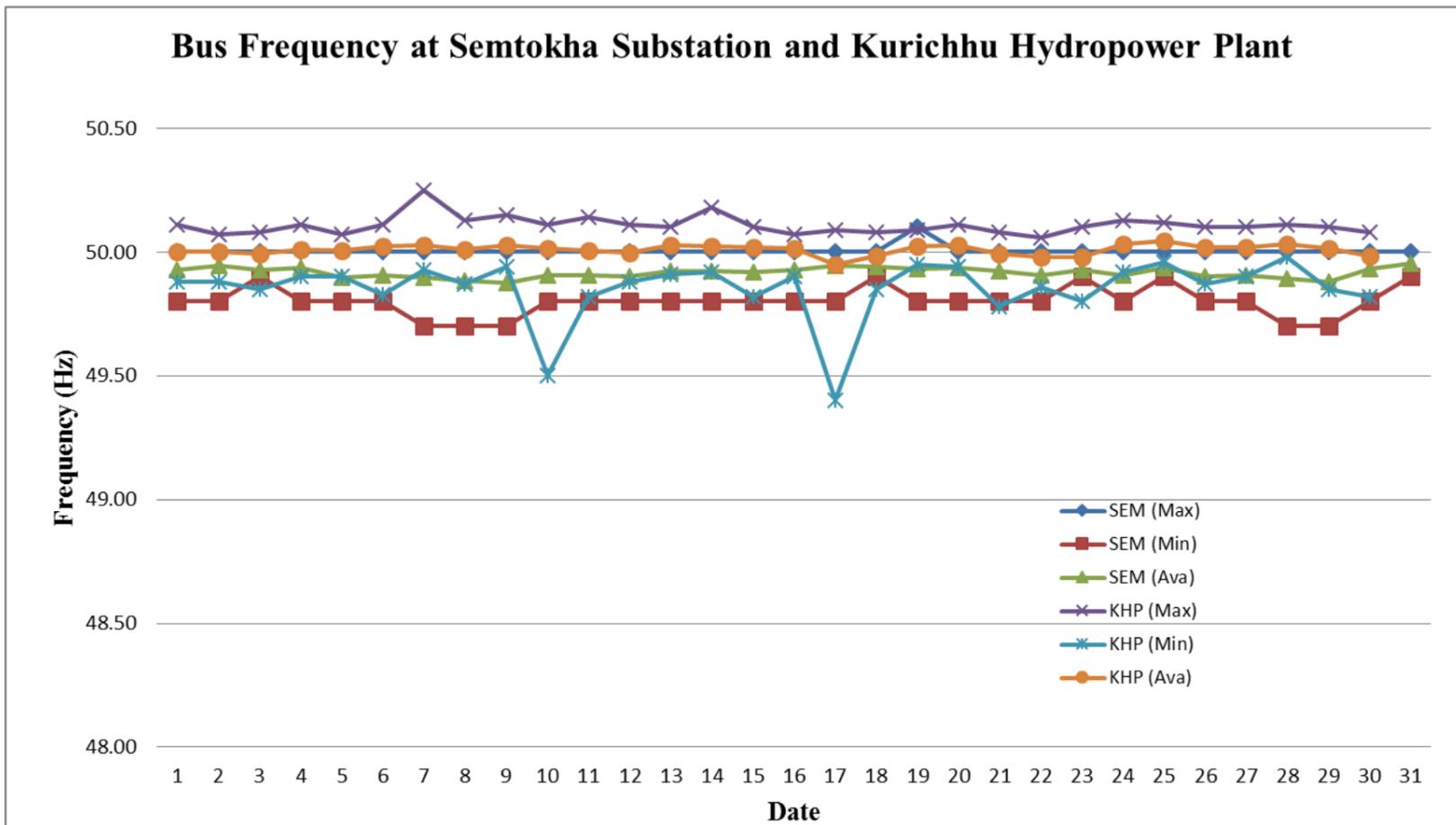




Table: Daily maximum, minimum and average frequency for the month of August, 2019

Date	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
	Max	Min	Ava	Max	Min	Ava
1	50.10	49.80	49.95	50.13	49.82	49.99
2	50.10	49.80	49.93	50.14	49.80	49.99
3	50.00	49.80	49.97	50.09	49.93	50.02
4	50.10	49.80	49.95	50.10	49.91	50.02
5	50.10	49.80	49.96	50.13	49.85	50.01
6	50.10	49.90	49.98	50.10	49.93	50.04
7	50.10	49.80	49.98	50.15	49.90	50.02
8	50.00	49.80	49.94	50.09	49.81	49.99
9	50.10	49.80	49.93	50.07	49.87	50.00
10	50.10	49.80	49.93	50.10	49.74	49.99
11	50.00	49.70	49.90	50.07	49.07	49.93
12	50.00	49.60	49.95	50.07	49.77	50.00
13	50.00	49.80	49.98	50.08	49.95	50.03
14	50.00	49.80	49.96	50.12	49.86	50.03
15	50.10	49.80	49.99	50.25	49.88	50.06
16	50.10	49.90	49.98	50.11	49.95	50.03
17	50.00	49.80	49.95	50.06	49.91	50.00
18	50.10	49.70	49.93	50.08	49.77	49.98
19	50.10	49.80	49.95	50.10	49.83	49.99
20	50.00	49.80	49.93	50.05	49.83	49.97
21	50.10	49.80	49.95	50.09	49.86	50.00
22	50.00	49.80	49.95	50.10	49.82	49.99
23	50.00	49.80	49.95	50.10	49.93	50.01
24	50.00	49.90	49.96	50.09	49.88	50.01
25	50.00	49.80	49.95	50.05	49.91	50.01
26	50.00	49.80	49.96	50.06	49.88	50.00
27	50.00	49.70	49.93	50.07	49.20	49.96
28	50.00	49.80	49.95	50.09	49.89	50.01
29	50.00	49.80	49.93	50.11	49.87	50.00
30	50.00	49.80	49.95	50.08	49.94	50.01
31	50.00	49.90	49.95	50.10	49.90	50.01
Max	50.10			50.25		
Min		49.60			49.07	

Source: TD (BPC), KHP (DGPC)

Graph: Daily maximum, minimum and average frequency for the month of August, 2019

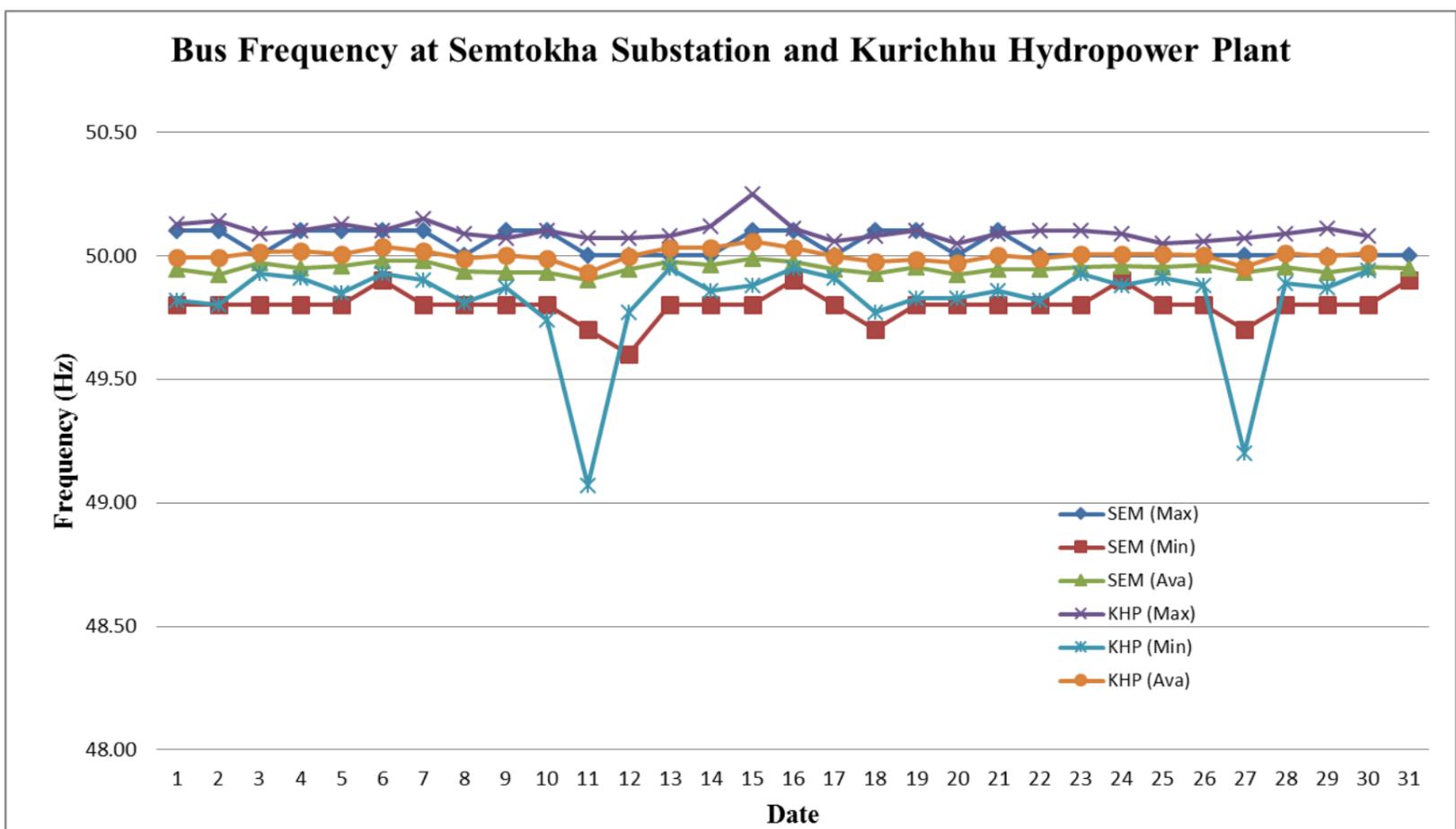




Table: Daily maximum, minimum and average frequency for the month of September, 2019

Date	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
	Max	Min	Ava	Max	Min	Ava
1	50.10	49.90	50.00	50.15	49.98	50.04
2	50.00	49.90	49.97	50.11	49.92	50.02
3	50.00	49.80	49.95	50.08	49.82	50.01
4	50.00	49.90	49.97	50.08	49.92	50.01
5	50.00	49.80	49.95	50.09	49.87	50.00
6	50.10	49.90	49.98	50.09	49.91	50.02
7	50.00	49.80	49.95	50.08	49.90	50.01
8	50.00	49.90	49.99	50.08	49.88	50.03
9	50.00	49.80	49.91	50.06	49.80	49.97
10	50.00	49.80	49.95	50.07	49.87	50.00
11	50.00	49.80	49.96	50.11	49.60	49.98
12	50.00	49.80	49.95	50.07	49.83	50.00
13	50.00	49.90	49.98	50.09	49.47	50.01
14	50.00	49.90	49.98	50.09	49.91	50.02
15	50.00	49.90	49.97	50.06	49.90	50.02
16	50.00	49.90	49.95	50.07	49.94	50.02
17	50.00	49.90	49.98	50.08	49.95	50.03
18	50.00	49.80	49.94	50.08	49.85	50.00
19	50.00	49.90	49.97	50.06	49.89	50.00
20	50.00	49.80	49.95	50.07	49.81	49.99
21	50.00	49.70	49.95	50.08	49.71	50.00
22	50.00	49.70	49.96	50.08	49.81	50.01
23	50.00	49.80	49.96	50.06	49.88	50.00
24	50.00	49.80	49.97	50.08	49.70	50.01
25	50.00	49.80	49.95	50.13	49.91	50.02
26	50.10	49.80	49.99	50.12	49.84	50.02
27	50.00	49.90	49.99	50.08	49.94	50.03
28	50.00	49.90	49.98	50.08	49.90	50.03
29	50.10	49.80	50.00	50.20	49.85	50.05
30	50.00	49.80	49.96	50.08	49.88	50.01
31	0.00	Error	Error	0.00	Error	Error
Max	50.10			50.20		
Min		49.70			49.47	

Source: TD (BPC), KHP (DGPC)

Graph: Daily maximum, minimum and average frequency for the month of September, 2019

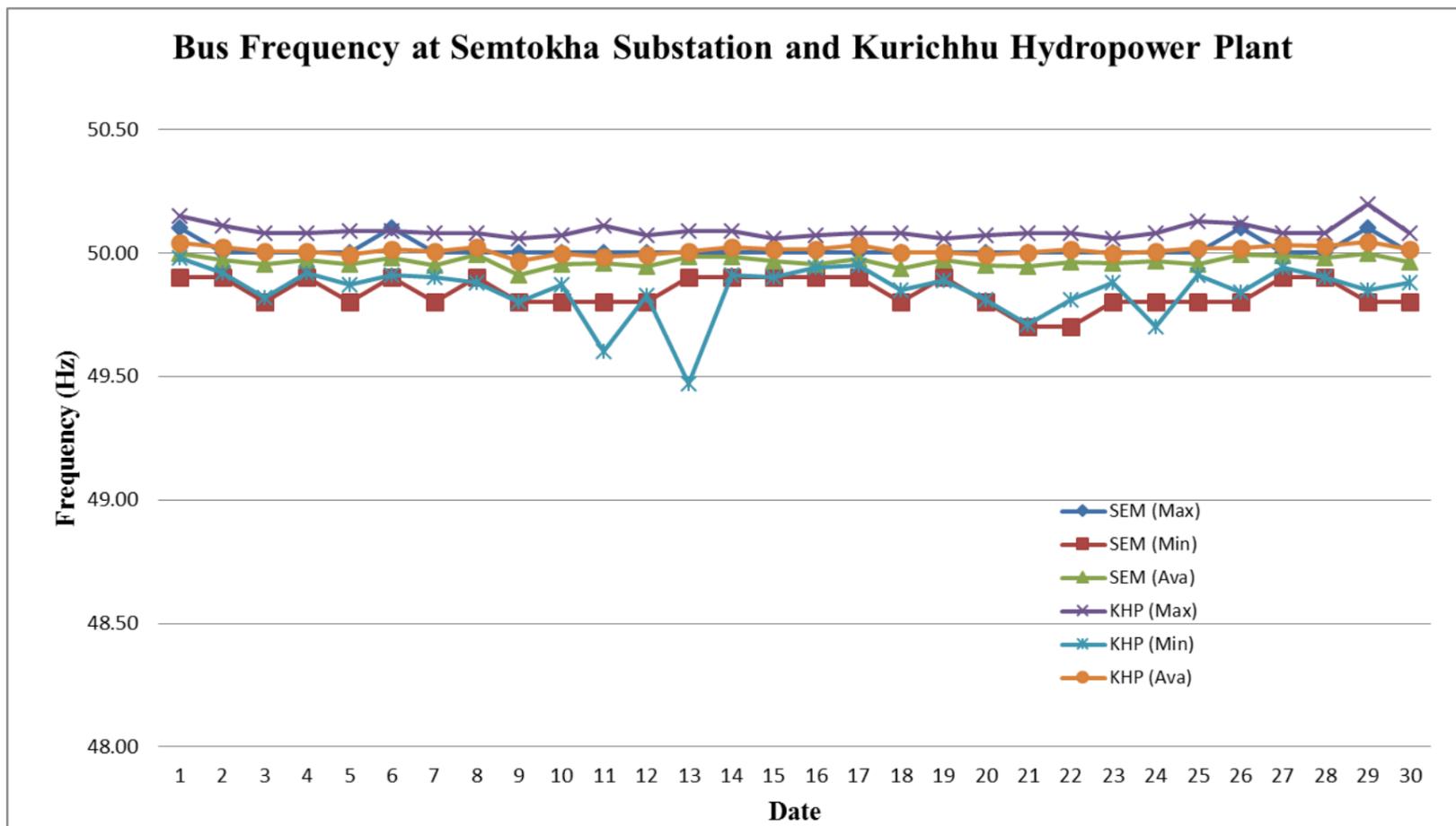




Table: Daily maximum, minimum and average Voltage for the month of July, 2019

Jul-19 Date	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	413.00	404.00	408.13	226.50	220.00	223.06	67.00	65.00	65.83	139.00	132.10	135.43
2	412.50	403.00	407.60	226.00	218.50	222.46	66.00	65.00	65.58	138.60	130.71	134.98
3	412.50	404.00	408.33	226.00	220.00	223.10	67.00	64.00	65.92	138.60	132.37	134.94
4	411.50	404.00	407.35	227.00	220.00	222.85	67.00	65.00	65.71	138.30	131.33	134.87
5	411.00	403.00	407.04	225.00	220.00	222.52	66.00	64.00	65.33	137.77	131.12	134.03
6	411.00	404.00	407.19	226.50	219.50	223.21	66.00	65.00	65.75	136.30	132.50	134.83
7	411.00	402.00	406.33	225.50	219.00	223.21	67.00	65.00	65.83	139.20	133.60	136.14
8	408.00	398.50	403.00	223.50	217.50	220.63	66.00	64.00	64.92	138.60	132.70	135.92
9	404.50	401.00	402.98	222.50	219.00	220.79	66.00	64.00	64.92	137.70	133.40	135.66
10	405.00	400.50	402.77	222.00	219.00	220.54	65.00	64.00	64.83	137.70	132.99	135.41
11	404.00	400.00	402.75	222.00	217.00	220.08	65.00	64.00	64.58	138.80	132.90	135.59
12	406.00	402.50	403.58	222.00	217.00	220.08	67.00	65.00	65.17	140.00	132.50	136.02
13	410.00	402.00	405.50	226.00	219.50	222.04	67.00	64.50	65.29	139.22	133.60	136.31
14	411.00	404.00	408.25	226.50	221.00	224.15	67.00	65.00	66.00	137.90	133.60	135.99
15	409.00	401.50	405.46	223.00	219.00	221.63	66.00	64.00	65.58	137.70	132.58	135.37
16	408.00	401.50	404.81	224.00	217.50	221.08	66.00	64.00	65.33	136.90	131.54	134.39
17	406.00	400.00	403.56	222.50	217.50	220.17	66.00	64.00	64.96	137.50	132.78	134.97
18	407.50	398.50	402.29	222.50	215.00	218.63	66.00	63.00	64.38	137.30	130.71	134.86
19	410.50	399.00	405.08	224.00	217.50	220.75	66.00	64.00	64.83	135.90	132.10	133.84
20	410.50	399.00	402.58	222.00	216.00	218.10	66.00	64.00	64.54	137.56	130.40	134.14
21	406.50	401.00	403.63	223.00	219.00	220.92	66.00	64.00	65.08	136.40	132.70	135.00
22	405.50	401.50	403.56	221.50	218.50	220.17	65.00	64.00	64.83	136.94	131.70	134.81
23	406.00	402.00	404.44	222.00	218.50	220.71	65.00	64.00	64.88	136.70	131.50	134.38
24	409.00	401.50	405.46	226.00	219.00	221.46	66.00	64.00	64.92	137.10	130.91	134.18
25	408.50	400.50	404.75	223.50	213.00	221.10	66.00	64.00	65.00	138.60	132.16	135.83
26	407.50	401.00	404.48	224.00	218.50	220.63	66.00	64.00	64.88	137.50	131.50	134.39
27	408.50	401.50	405.15	225.00	218.00	221.02	66.00	62.00	64.50	138.18	132.99	135.31
28	407.00	399.50	404.73	222.50	218.00	220.83	66.00	64.00	64.83	137.50	132.70	135.07
29	408.00	400.50	404.77	223.00	219.00	221.19	66.00	64.00	64.92	136.90	132.10	134.17
30	406.50	398.00	402.58	222.00	217.50	220.06	65.00	64.00	64.46	136.70	132.57	134.41
31	408.00	401.00	404.13	224.50	218.00	221.06	65.00	64.00	64.83	136.50	132.00	134.26
Max	413.00			227.00			67.00			140.00		
Min		398.00			213.00			62.00			130.40	

Source: TD, BPC

Graph: Daily maximum, minimum and average Voltage for the month of July, 2019

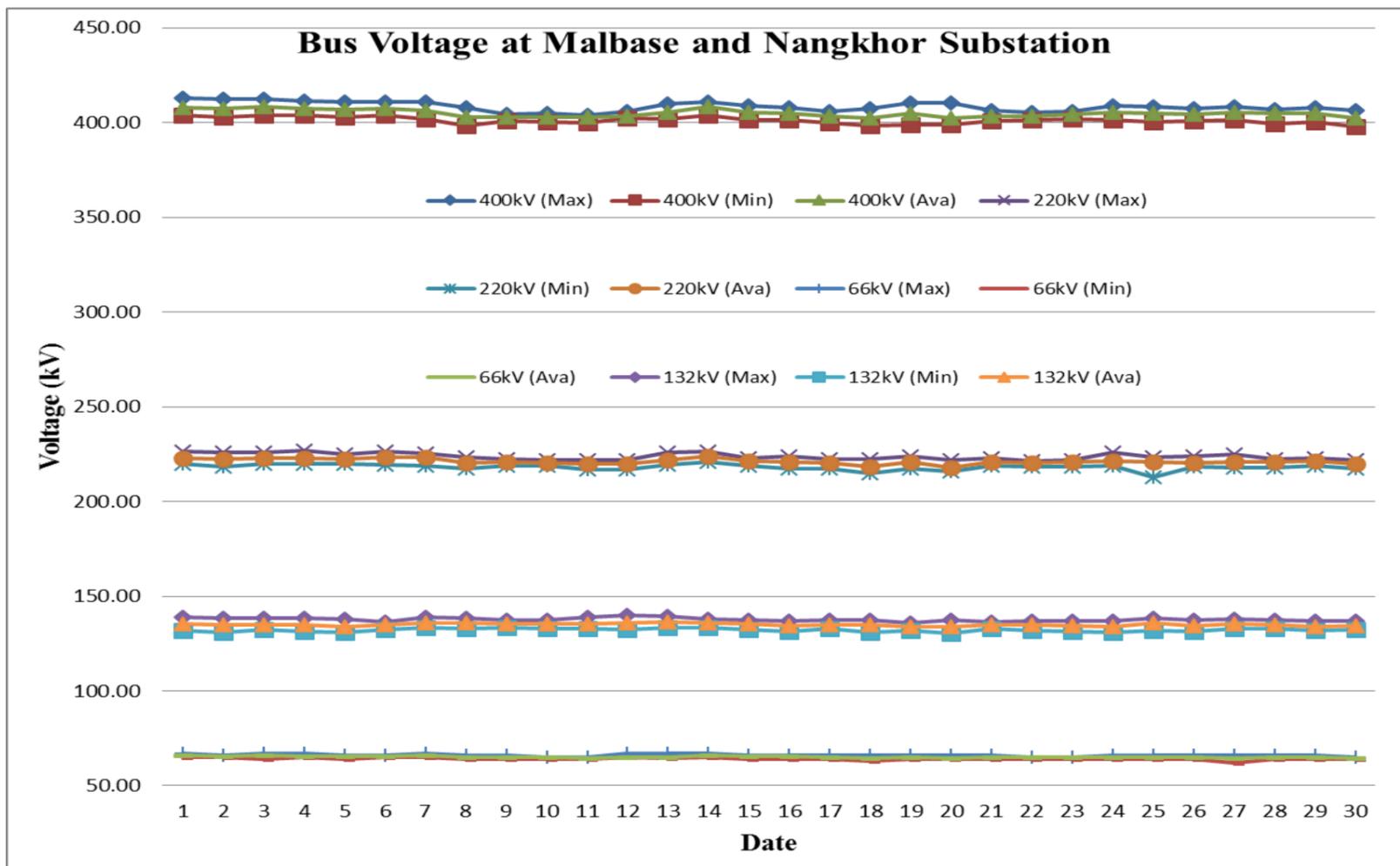




Table: Daily maximum, minimum and average Voltage for the month of August, 2019

Aug-19 Date	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	412.50	398.50	405.21	226.00	217.50	221.58	67.00	64.00	65.17	138.30	132.20	135.03
2	412.50	398.50	404.85	226.00	216.50	220.69	67.00	63.00	64.88	137.50	131.54	134.20
3	409.50	401.50	404.38	224.00	219.00	220.54	65.00	64.00	64.58	136.90	131.70	134.17
4	410.00	402.00	405.88	224.00	220.00	222.08	66.00	64.00	65.17	137.10	132.50	134.36
5	409.00	401.50	405.19	224.50	219.50	221.96	66.00	65.00	65.50	136.70	131.10	134.36
6	408.50	402.00	404.44	224.50	219.00	221.38	66.00	64.00	65.21	136.10	129.88	133.28
7	407.00	402.00	404.60	225.00	219.00	221.94	66.00	64.00	64.83	136.50	132.00	133.97
8	409.50	402.00	405.92	225.00	220.00	222.21	66.00	65.00	65.42	138.60	129.80	133.91
9	407.50	398.50	403.96	223.50	218.00	221.10	66.00	64.00	65.00	137.10	130.40	133.25
10	407.50	400.00	403.42	223.50	218.50	221.25	65.00	64.00	64.67	135.20	129.46	132.72
11	409.00	402.00	405.92	224.00	219.50	221.88	66.00	64.00	65.13	137.50	130.40	134.40
12	409.00	399.00	403.54	224.50	218.50	221.27	67.00	64.00	65.50	138.60	133.20	135.67
13	408.00	401.00	403.75	223.50	220.00	221.58	67.00	65.00	65.46	138.80	131.30	134.83
14	409.00	401.00	405.94	224.50	220.00	222.58	67.00	65.00	65.63	135.90	131.90	133.61
15	412.00	402.00	407.38	225.50	220.00	223.33	67.00	65.00	66.04	137.50	134.10	135.94
16	407.00	399.00	402.71	225.00	219.00	221.46	67.00	65.00	66.04	137.30	130.90	134.54
17	408.50	401.00	404.67	224.00	219.00	221.92	66.00	65.00	65.42	135.60	129.46	132.95
18	410.00	400.50	404.46	225.50	219.00	222.25	67.00	64.00	65.63	135.60	130.70	133.19
19	409.00	400.50	404.13	225.50	219.00	221.40	67.00	64.00	65.33	136.10	130.00	133.04
20	407.00	401.00	403.90	222.00	219.00	220.71	66.00	64.00	65.21	135.90	130.08	133.11
21	410.00	401.00	405.17	225.00	219.00	221.65	67.00	65.00	65.29	135.90	129.80	132.36
22	408.00	401.00	404.71	225.00	219.00	221.83	67.00	64.00	65.50	136.30	129.40	132.97
23	409.00	402.00	404.50	225.00	217.50	221.06	66.00	64.00	65.25	136.50	129.40	133.67
24	411.00	400.00	405.77	226.00	218.00	221.60	66.00	65.00	65.38	136.20	131.10	133.60
25	408.00	401.00	405.02	224.00	220.00	221.69	66.00	65.00	65.29	135.50	130.00	132.69
26	407.00	401.00	404.00	223.50	219.50	221.15	66.00	64.00	64.96	135.48	130.40	132.65
27	408.00	402.00	404.50	222.00	217.50	219.31	66.00	64.00	65.13	135.40	128.63	132.05
28	409.00	402.00	405.00	224.00	219.00	221.15	66.00	64.00	64.83	134.60	129.60	132.18
29	410.00	402.00	405.46	226.00	218.50	221.50	67.00	64.00	65.42	136.70	128.83	131.91
30	411.00	400.50	405.77	226.00	219.00	221.96	67.00	64.00	65.58	134.80	130.50	132.71
31	408.50	400.50	404.79	224.50	217.00	220.75	66.00	64.00	65.00	135.60	128.42	132.38
Max	412.50			226.00			67.00			138.80		
Min		398.50			216.50			63.00			128.42	

Source: TD, BPC

Graph: Daily maximum, minimum and average Voltage for the month of August, 2019

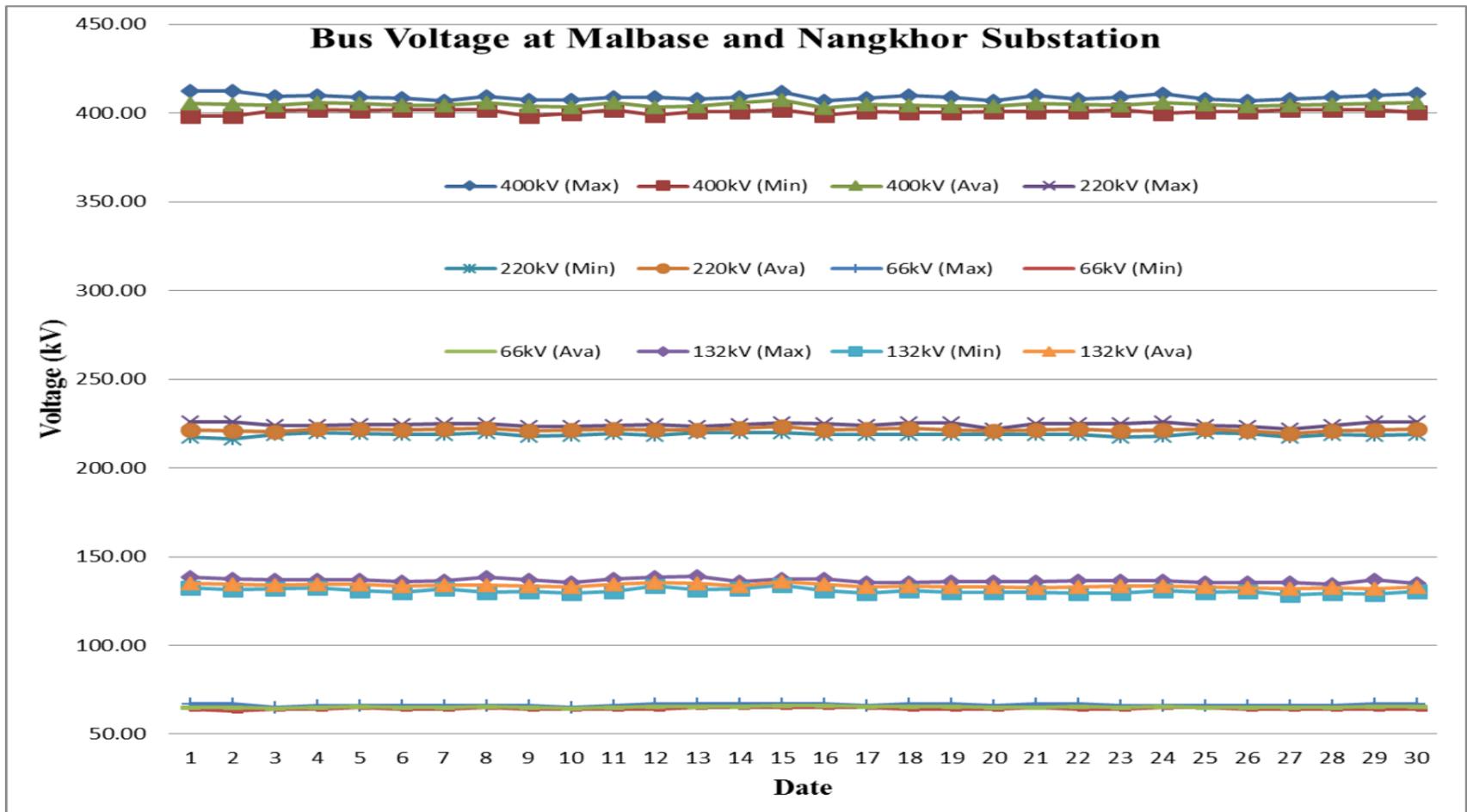


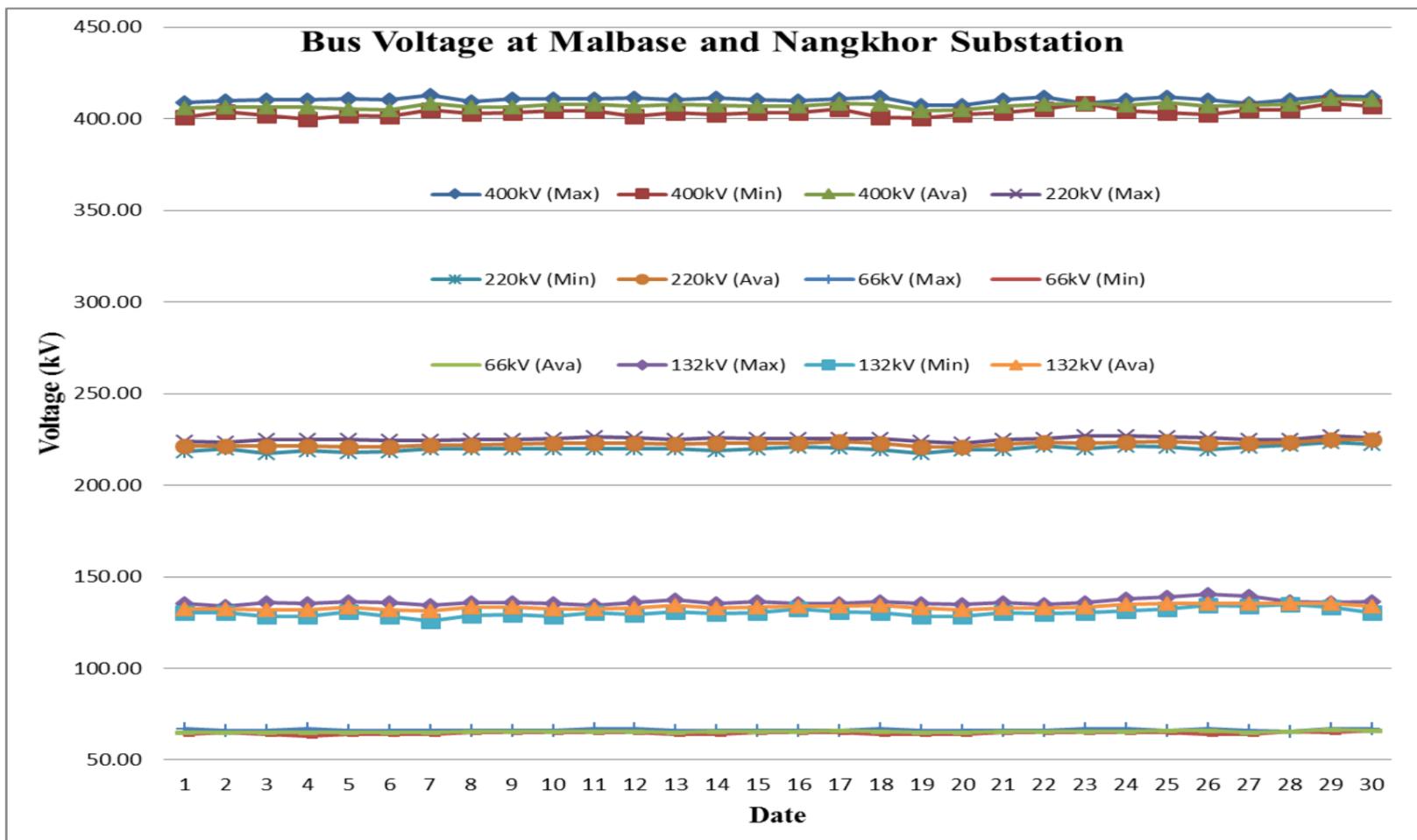


Table: Daily maximum, minimum and average Voltage for the month of September, 2019

Sep-19 Date	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	409.00	401.00	405.85	224.00	218.50	221.65	67.00	64.00	65.17	135.20	130.29	132.52
2	410.00	404.00	406.44	223.50	220.00	221.54	66.00	65.00	65.25	134.03	130.40	132.21
3	410.50	402.00	406.19	225.00	217.50	221.25	66.00	64.00	65.00	135.90	128.60	131.90
4	410.50	400.00	406.25	225.00	219.00	221.44	67.00	63.00	65.21	135.20	128.40	132.14
5	411.00	402.00	405.25	225.00	218.00	221.13	66.00	64.00	65.17	136.50	130.71	133.44
6	410.50	401.50	404.85	224.50	218.50	221.10	66.00	64.00	64.92	136.11	128.60	131.80
7	413.00	405.00	408.25	224.50	220.00	221.67	66.00	64.00	64.92	134.20	126.10	131.60
8	409.50	403.00	406.19	225.00	220.00	222.15	66.00	65.00	65.63	136.10	129.04	133.47
9	411.00	403.50	406.63	225.00	220.00	222.17	66.00	65.00	65.33	135.90	129.40	133.43
10	411.00	404.50	408.15	225.50	220.00	223.15	66.00	65.00	65.42	135.60	128.40	132.26
11	411.00	404.50	407.96	226.50	220.00	223.04	67.00	65.00	65.75	134.60	130.40	132.24
12	411.50	401.50	406.67	226.00	220.00	222.75	67.00	65.00	65.63	136.10	129.40	132.88
13	410.50	403.50	407.79	225.00	220.00	222.38	66.00	64.00	65.25	137.70	131.12	134.50
14	411.50	402.50	407.50	226.00	219.00	222.79	66.00	64.00	65.33	135.69	129.80	133.15
15	410.50	403.50	406.69	225.50	220.00	223.00	66.00	65.00	65.75	136.30	130.20	133.33
16	410.00	403.50	406.92	225.50	221.00	223.08	66.00	65.00	65.58	135.69	132.50	134.16
17	411.00	405.50	408.42	225.50	220.50	223.88	66.00	65.00	65.92	135.20	130.71	133.86
18	412.00	401.00	407.67	225.50	219.50	223.04	67.00	64.00	65.58	136.31	130.40	134.41
19	407.50	400.50	404.25	224.00	217.50	221.04	66.00	64.00	64.92	135.20	128.42	132.68
20	407.50	402.50	404.83	223.00	219.50	221.13	66.00	64.00	65.13	134.86	128.20	131.94
21	410.50	403.50	406.79	225.00	219.50	222.44	66.00	65.00	65.54	136.10	130.20	133.07
22	412.00	405.50	407.90	225.50	221.50	223.35	66.00	65.00	65.46	135.07	129.80	133.02
23	408.50	408.50	408.50	227.00	220.00	223.04	67.00	65.00	65.75	135.80	130.29	133.23
24	410.50	404.50	407.42	227.00	221.50	223.54	67.00	65.00	65.75	137.90	131.30	134.75
25	412.00	403.50	408.92	226.50	221.00	224.08	66.00	65.00	65.83	138.80	132.20	135.55
26	410.50	402.50	406.83	226.00	219.50	222.88	67.00	64.00	65.92	140.47	134.40	135.47
27	408.50	405.00	407.19	225.00	221.00	222.94	66.00	64.00	65.21	139.64	134.00	135.37
28	410.50	405.00	407.94	225.00	222.00	223.48	65.50	65.50	65.50	136.31	134.80	135.65
29	412.50	408.50	410.83	227.00	223.50	225.00	67.00	65.00	66.33	136.10	133.41	135.39
30	412.00	407.00	410.23	226.00	222.50	224.69	67.00	66.00	66.17	136.50	130.40	134.13
31	0.00	Error	Error	0.00	Error	Error	0.00	Error	Error	0.00	Error	Error
Max	413.00			227.00			67.00			140.47		
Min		400.00			217.50			63.00			126.10	

Source: TD, BPC

Graph: Daily maximum, minimum and average Voltage for the month of September, 2019





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Annexure-V

Eastern Grid Outages

July, 2019												
132/33/11kV, Kilikhar substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.07.2019	11:26	03.07.2019	11:35	0:09	4.06	132kV Kurichu incomer	All Feeders	Tripped on fault	Nil	Kurichu end	Supply failed from Kurichu end.
2	08.07.2019	13:55	08.07.2019	13:57	0:02	3.38	132kV Kurichu incomer	All Feeders	Tripped on Fault	Nil	Kurichu end	Supply failed from Kurichu end.
3	10.07.2019	16:06	10.07.2019	16:08	0:02	2.73	132kV Kurichu incomer	All Feeders	Tripped on Fault	Nil	Kurichu end	Supply failed from Kurichu end.
4	12.07.2019	0:09	12.07.2019	0:16	0:07	2.34	132kV Kurichu incomer	All Feeders	Tripped on Fault	Nil	Kurichu end	Supply failed from Kurichu end.
5	14.07.2019	17:19	14.07.2019	17:26	0:07	4.78	132kV Kurichu incomer	All Feeders	Tripped on Fault	Nil	Kurichu end	Supply failed from Kurichu end.
6	25.07.2019	10:59	25.07.2019	11:06	0:07	2.07	132kV Kurichu incomer	All O/G fdr.	Tripped on fault	-	Tingtibi s/s	Grid failed from Tingtibi s/s.
132/33/11kV, Kanglung substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	3.07.2019	11:26	3.07.2019	11:35	0:09	2.16	132kV Incomer	All O/G fdr.	Tripped on fault	-	Kurichu end	Supply failed from Kurichu.
2	8.07.2019	13:55	8.07.2019	13:57	0:02	1.56	132kV Incomer	All O/G fdr.	Tripped on fault	-	Kurichu end	Supply failed from Kurichu.
3	10.07.2019	16:06	10.07.2019	16:08	0:02	0.87	132kV Incomer	All O/G fdr.	Tripped on fault	-	Kurichu end	Supply failed from Kurichu.
4	12.07.2019	0:09	12.07.2019	2:10	0:01	1.14	132kV Incomer	All O/G fdr.	due to bad weather condition	E/F - 51N	Kanglung ss	Supply tripped on E/F due to bad weather condition after that could not charge the incomer breaker, supply feed via transfer bus
5	12.07.2019	3:30	12.07.2019	8:23	0:53	1.45	132kV Incomer	All O/G fdr.	NA	Nil	Kurichu end	Due to R phase conductor got burned at Kurichu and shutdown taken for maintenance.
6	14.07.2019	12:42	14.07.2019	12:47	0:05	2.15	132kV Incomer	All O/G fdr.	Tripped on fault	Nil	Kurichu end	Supply failed from Kurichu.
7	14.07.2019	17:16	14.07.2019	17:22	0:06	2.71	132kV Incomer	All O/G fdr.	Tripped on fault	Nil	Kurichu end	Supply failed from Kurichu.
8	25.07.2019	10:59	25.07.2019	11:06	0:07	2.07	132kV Incomer	All O/G fdr.	Tripped on fault	-	Tingtibi s/s	Grid failed from Tingtibi s/s.
132/33/11kV, Nangkhor substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	11.07.2019	05:20 hrs	11.07.2019	05:25 hrs	0:00	0.36	132/33kV Transformer-II	All 33kV & 11kV feeders	Tripped on fault	Tripping relay 86 operated.	33kV Wamrong Feeder	Tripped due to fault on 33kV wamrong feeder.
2	25.07.2019	10:58 hrs	25.07.2019	11:05 hrs	7	-40.68	Main Grid	All Feeders	Tripped on fault	-	Tintibi Substation & Deothang Substation	Supply failed from Tintibi Substation & Deothang Substation
3	25.07.2019	16:58 hrs	25.07.2019	17:03 hrs	5	-18.64	Main Grid	All Feeders	Tripped on fault	-	Tintibi Substation	Supply failed from Tintibi Substation.
132/33/11kV, Deothang substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	18.07.2019	14:46	18.07.2019	14:54	0:08	-71.39	132kV Deothang-Nangkhor	Deothang to Nangkhor line	Over Current on B Phase	Zone I, 86 opt & 50N	Rangia substation	
2	18.07.2019	14:46	18.07.2019	15:11	0:25	68.76	132kV Deothang-Rangia/Silicon factory	Deothang-Rangia/Silicon factory line	Over Current on B Phase and Earthfault	Distance protection, directional E/F protection, over voltage protection and carrier protection operated nat Rangia substation	Rangia substation	
3	25.07.2019	10:59	25.07.2019	11:07	0:08	-34.34	132kV Deothang-Nangkhor	Deothang to Nangkhor line	Tripped on fault	-	Tingtibi end	
4	25.07.2019	10:59	25.07.2019	11:09	0:10	31.86	132kV Deothang-Rangia/Silicon factory	Deothang-Rangia/Silicon factory line	Over Current on Y & B Phase	RYB Phase tripped & Z3 operated, Fault distance: - 1km Fault loop: L2-L3	Tingtibi end	
5	25.07.2019	16:58	25.07.2019	17:03	0:05	-17.06	132kV Deothang-Nangkhor	Deothang to Nangkhor line	Tripped on fault	Nil	Tingtibi end	Grid failed from Tingtibi Substation
6	28.07.2019	13:00	28.07.2019	13:05	0:05	-69.48	132kV Deothang-Nangkhor	Deothang to Nangkhor line	Tripped on fault	86 relay & Non Dir O/C & E/F Pro 50N opt.	Deothang-Nangkhor	



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132/33/11kV, Nganglam substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.07.2019	03:51	03.07.2019	04:02	0:11	13.42	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Tripped on fault	86opted.	Nganglam-Tingtibi Line	
2	17.07.2019	21:35	17.07.2019	21:56	0:21	25.95	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Tripped on fault	86opted.	Nganglam-Tingtibi Line	
3	20.07.2019	05:39	20.07.2019	06:01	0:22	18.9	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Tripped on fault	86opted.	Nganglam-Tingtibi Line	
4	25.07.2019	11:00	25.07.2019	11:07	0:07	47.65	132kV Nganglam-Tingtibi/Nangkhor-Nganglam	Nganglam SS	Tripped on fault	-	Tingtibi end	Grid failed from both Sources.
5	27.07.2019	16:57	27.07.2019	17:03	0:06	22.53	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Due to heavy Rainfall	Nil	Nganglam-Tingtibi Line	Fdr. Tripped from Tingtibi end.No CB operated at our end.

132kV, Motanga substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
Motanga Substation is bypassed through ERS tower												

220/132/33kV, Jigmeling substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	17.07.2019	10:37hrs	17.07.2019	22:30	11:53	-173.070	400kV Jigmeling-MHPA LINE I(B417)	400kV Jigmeling- MHPA line	Earth fault	R,Y and b phase pickup , DTT trip	line Segment	
2	18.07.2019	11.26hrs	18.07.2019	18.55hrs	7:29	-178.160	400kV Jigmeling-MHPA LINE 1	400kV Jigmeling- MHPA line	RY&B phase picked up	Received DTT trip.	line Segment	
3	18.07.2019	11.26hrs	18.07.2019	12.23hrs	0:57	-178.160	MHPA LINE 2	400kV Jigmeling- MHPA line	RY&B phase picked up	Received DTT trip.	line Segment	
4	19.07.2019	9.21hrs	20.07.2019	15:23hrs	30:02	365.050	400kV Interim Alipurdaur ckt.1	400kV Jigmeling- Allipurdaur line	phase to earth fault	phase to earth fault	line Segment	
5	21.07.2019	20:39hrs	24.07.2019	10:16hrs	62:37	-184.710	400kV Jigmeling-MHPA line 2	400kV Jigmeling- MHPA line	phase to ground fault	main1 and main 2 optd. Y-phase tripped	main 1=13.7 km main 2=13.9km	mhpa line 1 charged at 21:39 (22.07.19), power evacuated from the line 1.
6	28.07.2019	4:09hrs	28.07.2019	12:57hrs	8:48	370.870	400kV Jigmeling-MHPA line 1	Mangdichu power plant	Line fault at 400kv Jigmeling Alipurdaur line	Main1 R&B phase picked up. Main2 R,Y & B phase Picked up. Received DTT.	line Segment	
7	05.07.2019	11:49	05.07.2019	12:10hrs	0:29	0.900	Dagachu	220kV Dagachu line	DT received, VT fuse fail	Main-I & II tripped, 86.1 & 86.2 tripped,VT fuse fail, R,Y & B phase tripped, DTT received.	line Segment	
8	05.07.2019	14:49hrs	05.07.2019	15:02hrs	0:13	-48.960	Tsirang	220kV Tsirang Line	O/C .	Main-1 optd, Z1/Z1B- tripped, B ph tripped. Main-1 fault dist	21.2km	
9	05.07.2020	14:49hrs	05.07.2020	15:13 hrs	0:24	-1.040	Dagachu	220kV Dagachu line	R,Y,B ph tripped	Main 1 optd. R,Y,B ph trip. Z1/Z1B opt. Main-II Z1 & Bph trip.	main I= 36.6km Main II= 29.9	
10	05.07.2021	14:49hrs	05.07.2021	15:04	0:15	-29.910	220/132kV, ICT1&ICT II both	Jigmeling Substation	51N-LV SEF optd.	51N-LV SEF optd. 86.1&86.2 optd		
11	20.07.2019	00:48hrs	20.07.2019	00:54hrs	0:06	31.830	132kV Tingtibi line	132kV Tingtibi line	EarthFault	Zone-1, Yph Trip	Mian=14.9km Main2= 13.46km	
12	20.07.2019	00:56hrs	20.07.2019	01:56hrs	1:00	33.000	132kV Tingtibi line	132kV Tingtibi line	RYBph Trip	Zone-1,RYB Trip, Relay General Trip	main1= 16.6km, Main2= 20.12km	
13	21.07.2019	18:45hrs	21.07.2019	18:48hrs	0:03	47.070	132kV Gelephu line	Gelephu ss & 132kV gelephu line	phase to phase fault	main1 R7Y phase tripped. Main2 R,yY & B phase tripped.	main1= 14.2 km main2= 7 km	
14	21.07.2019	18:45hrs	21.07.2019	18:58	0:13	-26.720	132kV Tingtibi line	132kV Tingtibi Substtion	phase to ground fault	Main1 R&B phase tripped. Main 2 R,Y & Bphae tripped	main1= 3km Main2= 3.86km	

220/66/33kV, Dhajay substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	05.07.2019	14:48hrs	05.07.2019	15:01hrs	0:13	49.50	220kV Tsirang-Jigmeling	Dhajay Substation	OC at B-Phase	Distance relay Main-I and	Line segment	

132/66/33/11kV, Gelephu substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	04.07.2019	20.28	04.07.2019	21.35	1:07	6.6	Gelephu-Salakati	Non	Heavy lightning & Rainfall	General Trip,R Y B phase,Zone 1,dist .81km,REL 670 & master relay operated.	Salakati line	
2	04.07.2019	21.52	04.07.2019	8.22	10:30	6.6	Gelephu-Salakati	Non	contineous spark on B-phase CB clamp	Hand trip	Gelephu Substation	
3	23.07.2019	5.13	23.07.2019	5.55	0:42	47.8	Gelephu-Salakati	25MVA 1 was tripped along with it.	Heavy lightning & Rainfall	Rel 670,R&Y-phase,Zone 1,distance 40.69km.	Salakati line	



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132/33/11kV, Tingtibi substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	7/3/2019	03:53 Hrs	7/3/2019	04:03Hrs	0:10	10.250	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Bad weather	(Micom P442) distance relay Optd:Zone-2,Fault location:78.77KM & (Micom P14D)Non directional OC/EF	132kV Tingtibi - Nanglam Feeder	
2	7/3/2019	03:53 Hrs	7/3/2019	04:06Hrs	0:13	-14.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad weather	(Micom P442) distance relay Optd	132kV Tingtibi - Jigmeling Feeder	
3	7/17/2019	21:35 Hrs	7/17/2019	21:42 Hrs	0:07	-32.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad weather	(Micom P442) distance relay Optd	132kV Tingtibi - Jigmeling Feeder	
4	7/17/2019	21:35 Hrs	7/17/2019	21:55 Hrs	0:20	26.920	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Bad weather	(Micom P442) Distance protection relay optd.Tripped phase ABCN,Fault Location:68.92KM,Zone-I.(Micom P14D) Directional OC/EF optd	132kV Tingtibi - Nanglam Feeder	
5	7/20/2019	00:55Hrs	7/20/2019	02:45Hrs	0:49	28.660	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad weather	(Micom P442) Distance protection relay optd. FaultZone-1.Fault Location:XY 34.33KM.& (Micom P14D) Directional OC/Efoptd.Phase ABC,O/C	132kV Tingtibi - Jigmeling Feeder	At same Time 132kV Tingtibi-Jigmeling supply failed from Jigmeling Substation.
6	7/20/2019	05:39 Hrs	7/20/2019	06:03Hrs	0:24	22.410	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Bad weather	(Micom P442) Distance protection relay optd.Start phase ACN,Fault Location:71KM, Fault Zone-I.(Micom P14D) Directional OC/EF optd.	132kV Tingtibi - Nanglam Feeder	
7	7/20/2019	05:39 Hrs	7/20/2019	05:55Hrs	0:16	25.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad weather	(Micom P442) Distance protection relay optd. Start pahse ACN, Fault Zone-None	132kV Tingtibi - Jigmeling Feeder	
8	7/21/2019	18:45 Hrs	21/76/2019	18:57Hrs	0:12	27.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad weather	(Micom P442) Distance protection relay optd. Start pahse ABCN, Fault Zone-2.Fault Location:55.41 KM.& (Micom P14D) Directional OC/EF	132kV Tingtibi - Jigmeling Feeder	
9	7/25/2019	11:00Hrs	7/25/2019	11:08Hrs	0:08	57.500	132kV Tingtibi-Nanglam Fdr.	132kV Ting-Nanglam Feeder	Transient Fault	(Micom P442) Distance protection relay optd. Start phase BCN,Trip Phase:ABC,Fault Zone-1.Fault Location:XY 41 KM.& (Micom P14D) Directional OC/EF	132kV Tingtibi - Nanglam Feeder	
10	7/25/2019	16:57Hrs	7/25/2019	17:03Hrs	0:06	22.600	132kV Tingtibi-Nanglam Fdr.	132kV Ting-Nanglam Feeder	Transient Fault	(Micom P442) Distance protection relay optd. Fault Zone-2.Fault Location:88.33 KM.	132kV Tingtibi - Nanglam Feeder	

132/33kV, Yurmoo substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.07.2019	03:51hrs	03.07.2019	4:00hrs	0:08	-2.50	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail	Nil	Tingtibi Ss	Supply was fail from Tingtibi S/s
2	17.07.2019	21:37hrs	17.07.2019	21:42hrs	0:05	-5.20	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail	Nil	Tingtibi Ss	Supply was fail from Tingtibi S/s
3	20.07.2019	05:39hrs	20.07.2019	05:50hrs	0:11	-2.80	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail			Supply was fail from Tingtibi S/s

August, 2019

132/33/11kV, Kilikhar substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	07.08.19	23:02	07.08.19	23:50	0:48	3.20	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	Deothang &Tingtibi end	
2	10.08.19	12:04	10.08.19	12:10	0:06	3.74	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	Grid fail from Tingtibi end.	
3	10.08.19	12:10	10.08.19	12:23	0:13	3.74	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	Grid fail from Tingtibi end.	
4	14.08.19	8:06	14.08.19	8:12	0:06	4.06	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	kurichu end	
5	24.08.19	21:40	24.08.19	22:11	0:31	5.00	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	Nganglam end	
6	25.08.19	18:34	25.08.19	18:40	0:06	4.57	132kV Kurichu I/C	All Feeders	Tripped on fault	Nil	Tingtibe end	

132/33/11kV, Kanglung substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	07.08.19	23:02	07.08.19	23:50	0:48	3.20	132kV Incomer	All Feeders	Tripped on fault	Nil	Deothang end and Tingtibi end	
2	10.08.2019	12:05	10.08.2019	12:10	0:05	1.56	132kV Incomer	All Feeders	Tripped on fault	Nil	Tingtibi s/s	
3	10.08.2019	12:13	10.08.2019	12:21	0:08	1.56	132kV Incomer	All Feeders	Tripped on fault	Nil	Tingtibi s/s	
4	14.08.2019	8:06	14.08.2019	8:12	0:06	2.26	132kV Incomer	All Feeders	Tripped on fault	Nil	KHPC end	
5	24.08.2019	21:40	24.08.2019	22:11	0:31	2.73	132kV Incomer	All Feeders	Tripped on fault	Nil	Nganglam	
6	25.08.2019	18:35	25.08.2019	18:47	0:12	2	132kV Incomer	All Feeders	Tripped on fault	Nil	Tingtibi s/s	



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132/33/11kV, Nangkor substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	07.08.2019	22:57 hrs	07.08.2019	23:52 hrs	55	81.32	132kV Nangkor-Deothang	All 33kV & 11kV feeders	Heavy rainfall	Distance Relay	Tintibi -Nganglam line & Nangkor-Deothang Line	
2	10.08.2019	12:05 hrs	10.08.2019	12:11 hrs	6	-14.18	Main Grid	All Feeders	Tripped on fault	-	Tintibi -Nganglam line & Rangia Substation	
3	10.08.2019	12:16 hrs	10.08.2019	12:25 hrs	9	-14.18	Main Grid	All Feeders	Tripped on fault	-	Tintibi -Nganglam line & Rangia Substation	
4	16.08.2019	07:45 hrs	16.08.2019	14:14 hrs	29	-1.26	132/33 kV 5MVA Transformer-II	All 33kV & 11kV feeders	Tripped on fault/Buchloz problem	30E Buch/PRV trip relay & tripping relay 86 operated	Nangkor Substation	
5	24.08.2019	21:41 hrs	24.08.2019	21:43 hrs	2	-13.24	Main Grid	All Feeders	Tripped on fault	-	Tintibi -Nganglam line & Rangia Substation	
6	24.08.2019	21:43 hrs	24.08.2019	21:45 hrs	2	-13.24	Main Grid	All Feeders	Tripped on fault	-	Nangkor-Nganglam Line & Rangia Substation	
7	24.08.2019	21:43 hrs	24.08.2019	21:52 hrs	9	71.6	132kV Nangkor-Deothang	All Feeders	Tripped on fault	Distance Relay	Nangkor-Deothang Line	
8	24.08.2019	21:43 hrs	24.08.2019	21:57 hrs	14	-13.24	132kV Nangkor-Nganglam	All Feeders	Tripped on fault	Distance Relay	Nangkor-Nganglam Line	
9	25.08.2019	18:33 hrs	25.08.2019	18:37 hrs	4	-0.36	Main Grid	All Feeders	Tripped on fault	-	Tintibi-Nganglam line & Rangia Substation	
10	25.08.2019	18:33 hrs	25.08.2019	18:45 hrs	12	-59.5	132kV Kurichu-Nangkor	All Feeders	Tripped on fault	Distance Relay	Kurichu-Nangkor line	
11	29.08.2019	05:22 hrs	29.08.2019	05:39 hrs	17	-7.84	132kV Nangkor-Nganglam	Nangkor-Nganglam line	Tripped on fault	Distance Relay	Nangkor-Nganglam line	

132/33/11kV, Deothang substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.08.2019	14:38	03.08.2019	14:39	1	-82.4	132kV Deothang-Silicon Factory/Rangia	Deothang ss	Tripped on fault	Nil	132kV Deothang (Tripped at Rangia substation)	
2	06.08.2019	11:35	06.08.2019	11:43	8	-79.2	132kV Deothang-Nangkhkor	Deothang to Nangkor line	Tripped on fault	Nil	132kV Deothang (Tripped at Rangia substation)	
3	06.08.2019	11:35	06.08.2019	11:46	11	67.72	132kV Deothang-Rangia/Silicon factory	Deothang S/s	Tripped on fault	E/F (50N) and Tripping Relay (86)	unknown	
4	06.08.2019	12:01	06.08.2019	12:14	13	67.75	132kV Deothang-Nangkhkor	Deothang to Nangkor line	Tripped on fault	86 relay opt, Zone 3 opt. & Distance: 67.86km	unknown	
5	06.08.2019	12:01	06.08.2019	12:14	13	66.75	132kV Deothang-Rangia/Silicon factory	Deothang S/s	Tripped on fault	NA	unknown	
6	07.08.2019	3:20	07.08.2019	3:22	2	-71.86	132kV Incomer Nangkhkor-Deothang	Deothang-Nangkhkor line	Tripped on fault	E/F (50N) and 86 Relay opt.	132kV Deothang	
7	07.08.2019	22:56	08.08.2019	0:03	7	-80.5	132kV Incomer Nangkhkor-Deothang	Deothang-Nangkhkor line	Tripped on fault	Nil	Tingtibi and Rangia (Same time)	
8	07.08.2019	22:56	08.08.2019	0:03	7	77.22	132kV Deothang-Silicon factory/Rangia	Deothang	Overcurrent on all phase	Distance protn rely, Z1,Z2,Z3 & CRS operated at Deothang end with a distance of 8.8079km, Fault loop: L1-L2	Tingtibi and Rangia (Same time)	
9	10.08.2019	12:05	10.08.2019	12:11	6	-74.81	132kV Deothang-Nangkhkor & Deothang-Silicon Factory/Rangia	Deothang S/S	Tripped on fault	Nil	KHPC	
10	10.08.2020	12:14	10.08.2020	12:21	7	-74.81	132kV Deothang-Nangkhkor & Deothang-Silicon factory/Rangia	Deothang S/S	Tripped on fault	Nil	Tingtibi	
11	14.08.2019	16:52	14.08.2019	16:57	6	-63.4	132kV Deothang-Nangkhkor & Deothang-Silicon factory/Rangia	Deothang S/S	Tripped on fault	Zone III, 86 relay opt., Fault distance: 59.14km.	unknown	
12	14.08.2019	17:16	14.08.2019	17:26	10	2.52	132kV Deothang-Nangkhkor & Deothang-Silicon factory/Rangia	Deothang S/S	unknown	86 relay & E/F (50 N)	unknown	
13	24.08.2019	21:39	24.08.2019	21:44	5	-70.7	132kV Deothang-Nangkhkor & Deothang-Silicon factory/Rangia	Deothang S/S	Tripped on fault	Nil	Tingtibi and Rangia (Same time)	
14	25.08.2019	18:35	25.08.2019	18:37	2	-57.71	132kV Deothang-Nangkhkor	Deothang S/S	Tripped on fault	Nil	Tingtibi end	
15	25.08.2019	18:35	25.08.2019	19:11	36	54.72	132kV Deothang-Silicon factory/Rangia	Deothang S/S	Tripped on fault	Zone-1,2,3 opte. & R,Y,B trip	Fault dist.42.302km	
16	26.08.2019	23:25	26.08.2019	23:32	7	-70.78	132kV Deothang-Nangkhkor	Deothang to Nangkor line	Tripped on fault	O/C 51A & 86 relay opt.	Deothang	



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132/33/11kV, Nganglam substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	04.08.2019	06:56	04.08.2019	07:04	8	0.837	5MVA Tr-II	Nganglam SS	33kV Y-Phase Bus Transfer Disc Insulator Punctured	Earth Fault relay & 86.opted.	Nganglam SS	
2	07.08.2019	22:59	07.08.2019	23:50	51	23.5	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Bad weather	Distance relay	Nganglam-Tingtibi Line	
3	10.08.2019	12:08	10.08.2019	12:11	3	15	132kV Nganglam-Tingtibi	Nganglam SS	Tripped on fault	Nil	Nganglam-Tingtibi Line	
4	10.08.2019	12:30	10.08.2019	13:28	58	15	132kV Nangkhor-Nganglam	Nangkhor-Nganglam	NA	Nil	Nangkhor-Nganglam	
5	10.08.2019	13:14	10.08.2019	13:22	8	15	132kV Nganglam-Tingtibi	Nganglam SS	Bad weather	Nil	Nganglam-Tingtibi Line	
6	11.08.2019	10:07	11.08.2019	10:14	7	0.561	5MVA Tr-I	Nganglam SS	33kV Panbang feeder Disc Insulator Punctured	Earth Fault relay & 86.opted.	Nganglam SS	
7	24.08.2019	21:41	24.08.2019	22:05	24	13.68	132kV Nangkhor-Nganglam	Nangkhor-Nganglam	Tripped on fault	O/C & 86opted.	Nangkhor-Nganglam	
8	25.08.2019	18:36	25.08.2019	18:38	2	0.14	132kV Nangkhor-Nganglam	Nganglam SS	Grid Fail	Nil	Tintibi & KHP End	
9	25.08.2020	19:36	25.08.2020	19:38	2	14.9	132kV Nganglam-Tingtibi	Nganglam SS	Grid Fail	Nil	Tintibi & KHP End	
10	29.08.2019	05:22	29.08.2019	05:29	7	7.73	132kV Nangkhor-Nganglam	Nangkhor-Nganglam	5MVA Tr-II Y-phase suspension Disc Insulator punctured	O/C & 86opted.	Nganglam SS	
11	29.08.2019	05:22	29.08.2019	05:29	7	0.75	5MVA Tr-II	Nganglam SS	Y-phase suspension Disc Insulator punctured	O/C & 86opted.	Nganglam SS	
12	30.08.2019	13:09	30.08.2019	13:20	11	31.56	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Tripped on fault	O/C & 86opted.	Nganglam-Tingtibi	
13	30.08.2019	14:18	30.08.2019	14:29	11	26.35	132kV Nganglam-Tingtibi	Nganglam-Tingtibi	Tripped on fault	O/C & 86opted.	Nganglam-Tingtibi	

132kV, Motanga substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
Motanga Substation is bypassed through ERS tower												

132/33kV, Yurmoo substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	30.08.2019	14:20hrs	30.08.2019	14:32hrs	0:12	-3.30	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail	Nil	Tingtibi Ss	Supply was fail from Tingtibi S/s

220/132/33kV, Jigmeling substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	12.08.2019	18:44	12.08.2019	20:50	2:06	-90.170	400kV Interim Alipurduar Ckt.1 and Ckt.2	400kV Interim Alipurduar Ckt.1 and Ckt.2	Earth fault	Main-1 and Main-2 optd. R,Y,B phase tripped	Main-1=76.5km Main-2=88km	
2	30.08.2019	14:16	30.08.2019	14:36	0:20	29.310	132kV Tingtibi line	line segment	line to line fault	Main-1 and Main-2 optd. R,Y,B phase tripped	main1=22.km main2=22.53km	
3	30.08.2019	16:23	30.08.2019	16:35	0:12	25.520	132kV Tingtibi line	line segment	line to line fault	Main-1 and Main-2 optd. R,Y,B phase tripped	Main1=18.3km main2=13.98km	

220/66/33kV, Dhajay substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												

132/66/33/11kV, Gelephu substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												



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132/33/11kV, Tingtibi substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	8/7/2019	23:02 Hrs	8/7/2019	23:10Hrs	0:08	21.250	132kV Tingtibi-Jigmeling Fdr.	132kV Tingtibi-Jigmeling Fdr.	Lightning/Thundering	(Micom P442) distance relay Optd: Start Phase-ABCN,Zone-2,Fault location:78.65KM	132kV Tingtibi - Jigmeling Feeder	
2	8/7/2019	23:12 Hrs	8/7/2019	23:50Hrs	0:38	21.250	132kV Tingtibi-Jigmeling Fdr.	132kV Tingtibi - Jigmeling Feeder	Lightning/Thundering	(Micom P442) distance relay Optd: Start Phase-ABCN,Zone-2,Fault location:70.60KM	132kV Tingtibi - Jigmeling Feeder	
3	8/10/2019	12:06 Hrs	8/10/2019	12:10 Hrs	0:04	29.650	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Lightning/Thundering	(Micom P14D) Directional O/C & E/F relay Optd:Start phaseAB,IN measured:13.56A,IN derived:13.45A.	132kV Tingtibi - Nanglam Feeder	
4	8/10/2019	12:14 Hrs	8/10/2019	12:32 Hrs	0:18	29.650	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Lightning/Thundering	(Micom P14D) Directional O/C & E/F relay Optd:Triped phase C,IN measured:6.132A,IN derived:6.073A.	132kV Tingtibi - Nanglam Feeder	
5	8/24/2019	21:40Hrs	8/24/2019	21:42Hrs	0:02	30.990	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Lightning/Thundering	(Micom P14D) Directional O/C & E/F relay Optd:Triped phase C,IN measured:6.132A,IN derived:6.073A.	132kV Tingtibi - Jigmeling Feeder	At same Time 132kV Tingtibi-Jigmeling supply failed from Jigmeling Substation.
6	8/25/2019	18:36 Hrs	8/25/2019	18:38Hrs	0:02	14.940	132kV Tingtibi-Nanglam Fdr.	132kV Tingtibi-Nanglam Feeder	Lightning/Thundering	(Micom P14D) Directional O/C & E/F relay Optd:O/C start I>I,IN measured:49.42A,IN derived:49.27A.	132kV Tingtibi - Nanglam Feeder	
7	8/29/2019	05:23Hrs	8/29/2019	05:26Hrs	0:03	24.690	132kV Tingtibi-Nangalm Fdr.	132kV Tingtibi-Nanglam Feeder		(Micom P442) Distance protection relay optd. Trip phase ABC, SOFT TOR Trip,Auto reclose Lock out shot,Fault Location:73.76KM,Fault Zone-2	132kV Tingtibi - Nanglam Feeder	
8	8/30/2019	13:11 Hrs	8/30/2019	13:20 Hrs	0:09	31.460	132kV Tingtibi-Nanglam Fdr.	132kV Ting-Nanglam Feeder		(Micom P442) Distance protection relay optd. Start phase BCN,Trip Phase:ABC,Fault Zone-1.Fault Loaction:XY 65.24 KM.	132kV Tingtibi - Nanglam Feeder	
9	8/30/2019	14:14 Hrs	8/30/2019	14:36Hrs	0:22	31.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder		(Micom P442) Distance protection relay optd:Fault Zone-1.Fault Loaction:34.46 KM,Trip phase:ABC.	132kV Tingtibi - Jigmeling Feeder	
10	8/30/2019	14:20Hrs	8/30/2019	14:32 Hrs	0:12	26.490	132kV Tingtibi-Nanglam Fdr.	132kV Ting-Nanglam Feeder		(Micom P442) Distance protection relay optd. Start phase:ABCN,Trip Phase:ABC,Fault Zone-1.Fault Loaction:XY 129.3KM.	132kV Tingtibi - Nanglam Feeder	
11	8/30/2019	16:22 Hrs	8/30/2019	16:35Hrs	0:13	25.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder		(Micom P442) Distance protection relay optd:Fault Zone-1.Fault Loaction:39.39 KM,Trip phase:ABC.	132kV Tingtibi - Jigmeling Feeder	

132/33kV, Yurmoo substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	30.08.2019	14:20hrs	30.08.2019	14:32hrs	0:12	-3.30	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail	Nil	Tingtibi Ss	Supply was fail from Tingtibi S/s

September, 2019

132/33/11kV, Kilikhar substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												

132/33/11kV, Kanglung substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	16.09.2019	23:16	16.09.2019	23:20	0:04	1.050	132KV,Incomer	All	Source fail	NA	NA	Source failed.
2	21.09.2019	17:58	21.09.2019	18:01	0:03	3.330	132KV,Incomer	All	Source fail	NA	NA	Grid failed.
3	26.09.2019	22:25	26.09.2019	22:35	0:10	2.620	132KV,Incomer	All	Source fail	NA	Kurichu	Grid failed from Kurichu.



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132/33/11kV, Nangkhor substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												

132/33/11kV, Deothang substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	3.9.2019	3:18	3.9.2019	3:24	6	-67.32	132kV Nangkhor I/C	Deothang to Nangkhor line	Breaker open I/C our end.	E/F (50N) and Tripping Relay (86)	132kV Deothang	
2	8.09.2019	7:46	8.09.2019	7:52	6	-52.09	132kV Nangkhor I/C	Deothang to Nangkhor line	Breaker open I/C our end.	E/F (50N) and Tripping Relay (86)	132kV deothang	
3	26.09.2019	22:24	26.09.2019	22:35	11	-1.98	132kV Nangkhor I/C	Deothang to Nangkhor line	unknown	Nil	Tingtibi S/S	

132/33/11kV, Nganglam substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	12.09.2019	09:13	12.09.2019	16:18	5	14.52	Nganglam-DCP Line	Dungsum Cement Factory	Potential Transformer punctured	O/C & E/F (50/51) optd.	Dungsum Cement Factory	
2	26.09.2019	22:24	26.09.2019	22:36	12	44.58	Nganglam-Tingtibi	Nganglam Substation	Grid fail from Tingtibi End	NA	Tingtibi	
3	27.09.2019	0:34	27.09.2019	0:55	21	7.36	Nganglam-DCP	Dungsum Cement Factory	Over Current	50A & 50C optd.	Dungsum Cement Factory	

132kV, Motanga substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
Motanga Substation is bypassed through ERS tower												

220/132/33kV, Jigmeling substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	26.09.2019	22:30	26.09.2019	22:33	3	70	132kVGelephu Line	Gelephu Substation	Earth fault, Lightning and raining	distance relay main I optd. Zone 2 tripped. 86.1 & 86.2 optd. R Y B phase tripped.	main I= 27.8km	

220/66/33kV, Dhajay substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												

132/66/33/11kV, Gelephu substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	07.09.2019	18.37hrs	07.09.2019	18.55	18	32.8	Gelephu - Sakati	Non	Heavy Thunder & lightning.	General trip, B-phase, Zone - I, Distance: 38.57km towards sakati.	sakati line	Heavy lightning & thundering.

132/33/11kV, Tingtibi substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	9/19/2019	23:30Hrs	9/19/2019	23:40Hrs	10	33.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder	Bad Weather	Distance protection relay optd. Zone-1, Fault location: 29.84km, Trip phase: ABC. IA-814.7A, IB-900.3A, IC-888A	132kV Tingtibi - Jigmeling Feeder	
2	9/26/2019	22:24 Hrs	9/26/2019	22:36Hrs	12	38.000	132kV Tingtibi-Jigmeling Fdr.	132kV Ting-Jigmeling Feeder		Distance protection relay optd. Start Phase: ABC, Over voltage start: V>I, IA-56.41A, IB-64.57A, IC-63.64A, VAN: 78.27kV, VBN: 82.35kV, VCN: 82.11kV.	132kV Tingtibi - Jigmeling Feeder	

132/33kV, Yurmoo substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	26.09.2019	22:24hrs	26.09.2019	22:36hrs	12	-3.80	132kV Tingtibi I/C	132/33kV Yurmoo Ss	Grid fail	Nil	Tingtibi Ss	Supply was fail from Tingtibi S/s



Western grid Outages

July, 2019												
400/220/66/11kV Malbase substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	01.07.2019	18:49	01.07.2019	18:54	0:05	8	220kV Malbase -	220kV Malbase -	Tripped	Main -1 Trip, Zone -1 trip, Zone -1 trip		
2	01.07.2019	18:49	01.07.2019	19:14	0:25	25	50/63MVA Transformer III	50/63MVA Transformer III	Tripped	OLTC BUCH TRIP,DIFF RESTRAIN,DIFF TRIP,DIFF WAVV BLK.		
3	17.07.2019	15:58	17.07.2019	16:04	0:06	67	200MVA ICT	200MVA ICT	Tripped	86 tripping relay optd.		
4	17.07.2019	15:58	17.07.2019	16:05	0:07	8	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	M1 trip,Zone 2 trip		
5	17.07.2019	15:58	17.07.2019	17:50	0:52	29	50/63MVA Transformer III	50/63MVA Transformer III	Tripped	DIFF TRIP		
6	17.07.2019	16:15	17.07.2019	18:14	0:59	8	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	Carrier Fail, B/U Trip		
7	23.07.2019	1:58	23.07.2019	2:24	0:26	-267	400kV Tala - Malbase Feeder.	400kV Tala - Malbase Feeder.	Tripped	Zone 1 tripped, tripped A.B.C., A.R lockout shot.	Dist=16.51km	
8	23.07.2019	1:58	23.07.2019	2:26	0:28	67	200MVA ICT	200MVA ICT	Tripped	M CB open & Tie CB open		
220/66/11kV Singhigaon substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	01.07.2019	16:49	01.07.2019	16:55	0:06	2.3	220kV Singhigaon - Samtse Feeder.	220kV Singhigaon - Samtse Feeder.	Tripped			No tripping report available.
2	17.07.2019	15:58	17.07.2019	18:04	0:06	1.1	220kV Singhigaon - Samtse Feeder.	220kV Singhigaon - Samtse Feeder.	Tripped	Over current relay optd, over current on B phase		
3	17.07.2019	15:58	17.07.2019	16:07	0:09	8	66kV Bhutan Concast Feeder.	66kV Bhutan Concast Feeder.	Tripped	Directional time overcurrent trip,IEp directional trip on.		
4	17.07.2019	15:58	17.07.2019	16:06	0:08	-	66kV Bus Coupler	66kV Bus Coupler	Tripped	Directional time overcurrent trip,IEp directional trip on.		
66/33/11kV Phuntsholing substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	17.07.2019	15:58	17.07.2019	16:12	0:14	0.9	66kV Pling-Gomtu	66kV Pling-Gomtu	Earth fault	In>>, IA- 22.37, IB- 32.58A, IC- 332.2A, In Measured- 381.1A In Derived - 381.4A VAB- 63.16kV, VBC-50.20kV, VCA- 48.29kV. 86 & 186	Line	
66/33/11kV Gomtu substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	15.07.2019	8:37	15.07.2019	8:39	0:02	0.5	33kV 5MVA Transformer	33kV Samtse feeder	Over current	IDMT O/C 50R	33kV Samtse line	
2	17.07.2019	15:58	17.07.2019	16:06	0:08	-7.99	66kV Dhamdhum feeder	Whole Gomtu	Grid failed	NA	Malbase	Tripped from Dhamdhum end
3	18.07.2019	14:02	18.07.2019	14:11	0:09	-8.143	66kV Dhamdhum feeder	Nil	NA	General trip, Zone-I trip, Z-COM Trip & R PH Fault operated at Gomtu end.	Dhamdhum substation	Tripped from Dhamdhum end
220/66/33kV Dhamdhum substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	17.07.2019	15:57	17.07.2019	16:05	0:08	-8.38	220kV Malbase line		NA	REL670. (Distance relay operated) Indication in Realy: : B Phase fault	NA	
2	17.07.2019	16:14	17.07.2019	18:18	3:04	-8.38	220kV Malbase line		NA	REL670 (Distance relay operated) Zone -1 (B Phase fault)	Distance: 15.19 KM (37.96 % Of 40 KM)	
3	17.07.2019	17:43	17.07.2019	18:04	0:21	-1.48	220 kV Singhigaon line		NA	NA	NA	
4	18.07.2019	14:05	18.07.2019	14:07	0:02	8.49	66 kV Gomtu feeder		NA	REL 670(Distance Relay) Zone 1 trip (B Phase Trip)	Distance: 10.79 km (71.96 % Of 14 km)	
66/33/11kV Gedu substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	06.07.2019	11:00	06.07.2019	11:49	0:49		8MVA 66/33kV transformer.	8MVA 66/33kV transformer only	Changing of bus supporting insulator.		Substation	
2	10.07.2019	16:07	10.07.2019	17:40	0:33	0.98	66kV Gedu-Phuntsholing section	Black out			Substation.	
3	22.07.2019	9:41	25.07.2019	16:54	0:13	1.30	66kV Gedu-Phuntsholing section		For replacement of decap insulator at PC 25.		Line segment	
4	22.07.2019	9:41	25.07.2019	16:54	0:13	1.30	66kV Gedu-Phuntsholing section		For replacement of decap insulator at PC 25.		Line segment	
5	23.07.2019	2:20	23.07.2019	2:22	0:02	0.320	8MVA 66/33kV Transformer	33kV Gurungdara feeder-I only.	Over current	Over current on Y phase (ints.)	Line segment	
6	28.07.2019	17:46	28.07.2019	17:47	0:01	0.270	8MVA 66/33kV Transformer	33kV Gurungdara feeder-I only.		Differential relay on R&B phase	Line segment	



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66/33/11kV Lobeysa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												
220/66/11kV Semtokha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	7/21/2019	1644hrs	7/21/2019	1649hrs	0:05	7.20	220/66kV, 50/63MVA-II transformer	Nil feed from 66kV feeders		HV & LV backup relay operated.	At Dechencholing substation end	
66/33/11kV Dechencholing substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												
66/33kV Olakha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	7/9/2019	23:35	7/9/2019	23:38	0:03	2.3	66/33kV 20MVA, TX I	33kV Incomer I & DPH - I	Due to tripping of 33kV DPH - I	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,3,4 & 5. 1. Device Trip , 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Transformer problem at DPH	
2	17/7/2019	5:27	17/7/2019	5:29	0:02	2.4	66/33kV 20MVA, TX I	33kV Incomer I & 33kV O/G feeder IV, Chubachu.	Due to tripping of 33kV Chubachu	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,2,3,4 & 5. 1. Device Trip ,2.R-Phase Differential trip 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Line segment	
3	18/7/2019	7:15	18/7/2019	7:18	0:03	5.8	66/33kV 20MVA, TX I	33kV Incomer I & 33kV O/G feeder IV, Chubachu.	Due to tripping of 33kV Chubachu	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,3,4 & 5. 1. Device Trip ,2.R-Phase Differential trip 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Line segment	
4	20/7/2019	2:45	20/7/2019	2:47	0:02	2.5	66/33kV 20MVA, TX I	33kV Incomer I & 33kV O/G feeder IV, Chubachu.	Due to tripping of 33kV Chubachu	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,3,4 & 5. 1. Device Trip ,2.R-Phase Differential trip 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Line segment	
5	20/7/2019	2:56	20/7/2019	2:58	0:02	2.5	66/33kV 20MVA, TX I	33kV Incomer I & 33kV O/G feeder IV, Chubachu.	Due to tripping of 33kV Chubachu	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,3,4 & 5. 1. Device Trip ,2.R-Phase Differential trip 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Line segment	
66/33/11kV Jemina substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66kV Chumdo switching station												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66/33/11kV Paro substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66/11kV Haa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.07.2019	14:51	02.07.2019	14:57	0:06	-0.78	66kV Incomer	11kV Dumchu feeder	all the feeders	E/F relay operated	Chumdo switching station	66kV incomer failed from Chumdo substation. The same was normalised further.
66/33kV Watsa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	7/9/2019	2:32hrs	7/9/2019	2:48hrs	0:16	.160MW	66kV SF6 breaker	Feeder I and II	Earth fault and over current	Earth fault and over current relay operated	Fdr. I and II	
2	7/16/2019	8:52hrs	7/16/2019	10:15hrs	2:25	.277MW	66kV SF6 breaker	Feeder I and II	Earth fault and over current	Earth fault and over current relay operated	Fdr. I Jashina	
3	7/16/2019	14:02hrs	7/16/2019	14:06hrs	0:04	.080MW	66kV SF6 breaker	Feeder I and II	Over current on BC phase	Over current relay operated	Fdr. I papali	



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August, 2019												
400/220/66/11kV Malbase substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.08.2019	13:13	02.08.2019	13:25	0:12	6	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	Main-I trip,Zone-3 trip		
2	02.08.2019	13:13	02.08.2019	13:30	0:17	61	200MVA ICT	200MVA ICT	Tripped	67/67N Operated. IL3=170.9A. IL4=14.60A		
3	06.08.2019	11:02	07.08.2019	1:53	2:51	-117	220kV Chhukha - Malbase Feeder	220kV Chhukha - Malbase Feeder	Tripped	General Trip, Trip R,Y,B phase	Distance =44.14km	Feeder took time to restore as R-Phase CT of Bus I at Chhukha failed.
4	23.08.2019	14:29	23.08.2019	14:38	0:09	99	200MVA ICT	200MVA ICT	Tripped	RET 521		Light rainfall at the time of tripping
5	23.08.2019	14:29	23.08.2019	14:50	0:21	7	220 kV Malbase - Samtse Feeder	220 kV Malbase - Samtse Feeder	Tripped	Main-I Trip		
6	30.08.2019	11:28	30.08.2019	11:40	0:12	187	400kV Malbase - Siliguri Feeder.	400kV Malbase - Siliguri Feeder.	Tripped	CAR-RCV-MI, Main 1 trip, main 2 CAR - RCV, TIE CB OPEN -R, ZM3- Trip,General trip		
7	30.08.2019	14:53	30.08.2019	15:25	0:32	11	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	M-1 Tripped, Tripped on R-Y-B Phases,Carrier fail, 67/67N opt.	Fault loop L2-L3 @ Distance=5.5KM	The feeders got tripped at the same time. Heavy rainfall with thunder and lightning at the time of event.
8	30.08.2019	14:53	30.08.2019	15:05	0:12	108	200MVA ICT	200MVA ICT	Tripped	Main & Tie CB open, Buchholz trip, 67/67N Trip		
9	30.08.2019	14:53	30.08.2019	15:12	0:19	24	50/63MVA Transformer III	50/63MVA Transformer III	Tripped	86OPT, Diff. start L1,27 Ttrip IL3=61.36A-73.27deg, IL4= 272.55<-42.42deg.		
10	30.08.2019	15:30	30.08.2019	17:18	0:48	11	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	M-1 Tripped, Tripped on R-Y-B Phases, Zone 1 trip.	Fault loop L1-L2 @ Distance =4.8KM.	
11	30.08.2019	15:30	30.08.2019	15:45	0:15	109	200MVA ICT	200MVA ICT	Tripped	M & Tie CB open, Buchholz trip alarm. 67/67N Trip		
12	30.08.2019	15:30	30.08.2019	15:46	0:16	24	50/63MVA Transformer III	50/63MVA Transformer III	Tripped	86OPT, Diff. start L1,27 Ttrip IL3=11.99A<92.81deg, IL4= 299.56A<75.46deg.		
13	31.08.2019	11:24	31.08.2019	11:30	0:06	10	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	M1-Trip, Trip R,Y & B Phase. Start Y & B Phase. Zone3-Sart, Zone 3Trip.		
220/66/11kV Singhigaon substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.08.2019	13:11	02.08.2019	14:15	0:04	1.4	220kV Singhigaon - Samtse Feeder.	220kV Singhigaon - Samtse Feeder.	Tripped	General trip, Trip,86 optd.	Fault Loop=L1-L2. Dist.=1.7 km.	
2	06.08.2019	11:02	06.08.2019	11:10	0:08	15	66kV Bhutan Concast Feeder.	66kV Bhutan Concast Feeder.		General Trip,Directional Time O/C trip, IEp Directional trip		
3	23.08.2019	14:29	23.08.2019	15:34	0:05	2.1	220kV Singhigaon - Samtse Feeder.	220kV Singhigaon - Samtse Feeder.	Tripped	O/C onY Phase and E/F		
4	30.08.2019	11:28	30.08.2019	16:43	0:15	2.2	220kV Singhigaon - Samtse Feeder.	220kV Singhigaon - Samtse Feeder.	Tripped	General trip, Zone I trip	Fault Loop, L2-N, Distance = 0.00KM	
66/33/11kV Phuentsholing substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	12.08.2019	18:32	12.08.2019	18:53	0:21	-2.88	66kV Pling-Gomtu	66kV Pling-Gomtu	Tripped	Dist Opt, 86	Substation	
2	30.08.2019	15:30	30.08.2019	15:39	0:09	5.23	66kV Pling-Gomtu	66kV Pling-Gomtu	Earthfault	IN>>, IA-269.6A, IB-262.4A, IC-38.30A, VAB-14.16kV, VBC-42.15kV, VCA-43.54kV, INM-202.5A, IND-202.6A, VAN-16.03kV, VBN-15.43kV, VCN-28.24kV, 186&86	Tripped	
3	30.08.2019	16:44	30.08.2019	17:01	0:17		66kV Pling-Chukha	66kV Pling-Chukha			Tripped at Chukha end	
4	30.08.2019	17:00	30.08.2019	17:15	0:15	5.32	66kV Pling-Gomtu	66kV Pling-Gomtu	Overcurrent & Earthfault	I>> & IN>>, IA-401.0A, IB-1.512kA, IC-373.8A, VAB-60.6kV, VBC-49.99kV, VCA-63.69kV, INM-2745.9A, IND-745.3A, VAN-37.42kV, VBN-32.84kV, VCN-30.87kV, 186&86	Tripped	
66/33/11kV Gomtu substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.08.2019	13:15	02.08.2019	13:30	0:15	-5.549	66kV Dhamdhum feeder	Nil	Y-phase fault & B-phase fault	ZoneIII , Y- phase fault & B-phase fault	Line segment	
2	12.08.2019	18:33	12.08.2019	18:48	0:15	-7.84	66kV Dhamdhum feeder	Gomtu substation	Y-phase fault & B-phase fault	General trip,Zone I, Y-phase fault & B-phase fault	Line segment	
3	25.08.2019	12:50	25.08.2019	14:00	0:10	1.11	66/11kV 5MVA Tr.	Nil	Instalation of OTI meter	NA	Gomtu Substation	
4	30.08.2019	15:30	30.08.2019	15:39	0:09	5.71	66kV P/ling feeder	Gomtu & Dhamdhum Sub Station	Earth fault	NA	P/ling Sub Station	
5	30.08.2019	16:44	30.08.2019	16:51	0:07	6.28	66kV P/ling feeder	Gomtu & Dhamdhum Sub Station	Grid failed	NA	Chukha	
6	30.08.2019	17:00	30.08.2019	17:15	0:15	6.28	66kV P/ling feeder	Gomtu & Dhamdhum Sub Station	Over current & Earth fault	NA	P/ling Sub Station	
7	31.08.2019	11:24	31.08.2019	11:37	0:13	-8.59	66kV Dhamdhum feeder	Nil	R-phase & B phase fault	ZoneIII , R- phase fault & B phase fault	Line segment	
66/33/11kV Lobeysa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												



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220/66/33kV Dhamdum substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.08.2019	13:11	02.08.2019	13:25	0:14	6.01	66kV Gomtu feeder	No supply interruption for Gomtu substation. Gomtu substation load is fed from P/ling.	NA	(REL 670) General trip. R&Y phase fault.		
2	12.08.2019	18:33	12.08.2019	18:41	0:08	7.52	66kV Gomtu feeder	Gomtu substation	NA	Tripped on directional E/F. General trip, R&Y phase.	Gomtu line	
3	23.08.2019	14:29	23.08.2019	14:56	0:27	-7.5	220kV Malbase feeder	220kV Damdum substation	Tripped from Malbase end	REL670 (Distance relay) Zone 1 tripped, 12.2km, Y to N fault. General tripped.	Malbase substation	
4	23.08.2019	14:29	23.08.2019	15:34	0:05	-0.54	220kV Singeygoan feeder	220kV Damdum substation	Tripped from Malbase end	REL670 (Distance relay) Zone 1 tripped, 19.9km, Y to N fault. General tripped.	Malbase substation	
5	30.08.2019	13:15	30.08.2019	17:18	0:03	-10.36	220kV Malbase feeder	220kV Damdum substation	Tripped from Malbase end	REL670 (Distance relay) Zone 1 tripped, 35.4km, Y to B fault. General tripped.	Malbase end	
6	31.08.2019	11:24	31.08.2019	11:33	0:09	8.53	66kV Gomtu feeder	Gomtu substation	NA	REL 670. General trip, Y&B phase.	Gomtu line	
66/33/11kV Gedu substation												
Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	12.08.2019	18:33	12.08.2019	18:43	0:10		66kV Chukha-Phuntsholing line	Gedu Substation		General Zone-1, distance pickup, line-12E and distance 39.9km (Chukha end)	Line segment	
2	19.08.2019	6:05	19.08.2019	6:15	0:10	0.26	5MVA 66/33kV Transformer	33kV Gurungdara feeder-II	O/C & E/F on R & B phase 86	O/C & E/F on R & B phase 86	Line segment	
3	30.08.2019	16:45	30.08.2019	17:00	0:15	1.05	66kV Chukha feeder	All feeders	Tripped from Chukha end.		Line segment	
220/66/11kV Semtokha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	8/6/2019	2259hrs	8/6/2019	0204hrs	0:05	35.63	220kV Semtokha-Chukha feeder	Nil, feed from 220kV Rurichu feeder	220kV buscoupler R-phase CT blast at Chukha	Main-I&II relay operated trip on Zone-II	Chukha end	
2	8/7/2019	1450hrs	8/7/2019	1457hrs	0:07	13.87	66kV Semtokha-Olakh feeder	Nil, feed from 220kV Rurichu feeder	Transient fault on 66kV line	Back-up overcurrent&earth fault relay operated	Transient line fault	
66/33/11kV Dechenchholing substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	27.08.19	6:35	27.08.19	6:37	0:02	2.092	10 MVA II	Black out	O/C & E/F	50 A,B,C, 50 N , 51 N & 86 relay	S/yard	
2	27.08.19	6:35	28.08.19	19:43	0:08	2.096	10 MVA I	None	O/C & E/F	50 A,B,C, 50 N , 51 N & 86 relay	C/ Room	
3	30.08.19	9:20	30.08.19	12:10	0:50	1.950	10 MVA II	None	O/C & E/F	None	S/yard	
66/33kV Olakha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	8/4/2019	18:37	8/4/2019	18:39	0:02	3.4	20 MVA Trf. I	33kV Incomer I & DPH - I	Due to tripping of 33kV DPH - II	TRAFO.DIFFL.PROTN.RELAY -87	Line fault	
2	8/7/2019	14:30	8/7/2019	14:32	0:02	3.4	20 MVA Trf. I	Chubachu Line only	Due to tripping of 33kV Chubachu fdr.	TRAFO.DIFFL.PROTN.RELAY -87	Line fault	
66/33/11kV Jemina substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66kV Chumdo switching station												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	06.08.2019	2303hrs	06.08.2019	2310hrs	0:07	(-)6.69MW	66KV Jemina Feeder	Fed from 66KV Chukha Fdr	Transient fault	3Ph,General Trip	Chumdo	
2	07.08.2019	1449hrs	07.08.2019	1510hrs	0:16	(-)7.88MW	66KV Pangbasa Feeder	Paro,Pangbasa Chukha		General Trip, E/F		
3	16.08.2019	1239hrs	16.08.2019	1245hrs	0:06	1.35MW	66KV Pangbasa Feeder	66KV Pangbasa & Haa substation		O/C		
4	19.08.2019	1227hrs	19.08.2019	1234hrs	0:07	1.27MW	66KV Pangbasa Feeder	66KV Pangbasa & Haa substation				
66/33/11kV Paro substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	8/6/2019	23.03	8/6/2019	23.10	0:07	4.14	66kV Chumdo-Paro Line	66kV Paro Substation and it's 33kV outgoing feeders	Tripped from Generation unit, Chukha	Tripped from Generation unit	Chukha Power House	
66/11kV Haa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												
66/33kV Watsa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	8/6/2019	11:03hrs	8/6/2019	11:09hrs	0:06	.200MW	66KV IC	Feeder I and II	66KV Incommer failed from chukha	66KV Incommer failed from chukha	66KV Incommer failed from chukha	
2	8/7/2019	14:46hrs	8/7/2019	15:03hrs	0:17	.190MW	66KV IC	Feeder I and II	66KV Incommer failed from chukha	66KV Incommer failed from chukha	66KV Incommer failed from chukha	



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400/220/66/11kV Malbase substation

Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.09.2019	16:50	03.09.2019	16:54	4	11	220kV Malbase - Samtse Feeder.	220kV Malbase - Samtse Feeder.	Tripped	Main -1 Trip. Zone -3 trip		The feeder got tripped while test charging the 220kV Singyegoan-Samtse feeder.
2	11.09.2019	7:31	11.09.2019	7:56	25	-328	220kV Tala - Malbase Feeder.	220kV Tala - Malbase Feeder.	Tripped	Tripped Phase R,Y,B, Tripped zone 1, AR Lockout shot.	Location XY = 18.98KM	Tripped at the same time. Light rainfall at the time of tripping.
3	11.09.2019	7:31	11.09.2019	7:45	14	114	200MVA ICT	200MVA ICT	Tripped	RET 521		Rainfall with thunder and
4	16.09.2019	11:38	16.09.2019	11:55	17	-307	400kV Tala - Malbase	400kV Tala -	Tripped	Main-1 Trip, Zone I Trip, Fault loop L1-N. A/R	Fault Distance =	
5	20.09.2019	14:16	20.09.2019	14:18	2	137	200MVA ICT	200MVA ICT	Tripped	67/67N Opt.		Tripped at the same time.
6	20.09.2019	14:16	20.09.2019	14:21	5	-89	220kV Malbase - Chhukha Feeder	220kV Malbase - Chhukha Feeder	Tripped	zone 1 trip	Fault loop = L2-N, Distance = 9.1 KM.	
7	20.09.2019	14:16	20.09.2019	14:18	2	137	200MVA ICT	200MVA ICT	Tripped	67/67N Opt.		
8	20.09.2019	14:16	20.09.2019	14:21	5	-89	220kV Malbase - Chhukha Feeder	220kV Malbase - Chhukha Feeder	Tripped	zone 1 trip	Fault loop = L2-N, Distance = 9.1 KM.	
9	20.09.2019	14:16	20.09.2019	14:21	5	-89	220kV Malbase - Chhukha Feeder	220kV Malbase - Chhukha Feeder	Tripped	zone 1 trip	Fault loop = L2-N, Distance = 9.1 KM.	

220/66/11kV Singhigaon substation

Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												

66/33/11kV Phuentsholing substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	21.09.2019	15:13	21.09.2019	15:19	6	-6.08	66kV Pling-Chukha & 66kV Pling-Gomtu fdr	66kV Pling-Chukha & 66kV Pling-Gomtu fdr	Tripped at their end	Nil	Substation	

66/33/11kV Gomtu substation

Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.09.2019	16:50	03.09.2019	17:07	17	-8.22	66kV Dhamdhum feeder	Dhamdhum substation	R phase & B phase fault	Distance protection Operated, R-phase fault and B phase fault	Line segment	
2	21.09.2019	15:13	21.09.2019	15:23	10	-8.572	66kV Dhamdhum feeder	Gomtu substation	B phase fault	Distance protection optd, general trip, Zone-4 trip and B phase fault	Line segment	
3	21.09.2019	15:13	21.09.2019	15:24	11	0.92	66kV p/ling fdr	66kV Pling line	E/fault	IDMTL 57NX optd	Line segment	
4	21.09.2019	15:55	21.09.2019	16:01	6	-8.22	66kV Dhamdhum feeder	Gomtu substation	B phase fault	Distance protection optd, general trip, Zone-4 trip and R phase fault	Line segment	
5	21.09.2019	15:55	21.09.2019	16:03	8	0.92	66kV p/ling fdr	66kV Pling line	E/fault	IDMTL 57NX optd	Line segment	

220/66/33kV Dhamdhum substation

Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	03.09.2019	16:49	03.09.2019	17:07	18	8.09	66 kV Gomtu Feeder		it was tripped while test charging the 220 kV Singhigaon line	REL670 (Distance relay) Y to B fault. General tripped.	NA	
2	09.09.2019	2:55	09.09.2019	3:01	6	5.81	66kV Gomtu feeder	No power interruption at Gomtu ss, supply is fed from 66kV P/ling feeder.	NA	General tripped, zone 1. R,Y and B phase fault	NA	
3	21.09.2019	15:17	21.09.2019	15:24	7	7.83	66kV Gomtu feeder	Gomtu substation	NA	General trip, zone II, Y-phase	NA	
4	21.09.2019	15:54	21.09.2019	15:59	5	7.83	66kV Gomtu feeder	Gomtu substation	NA	General trip, zone II, B-phase	NA	

66/33/11kV Gedu substation

Sl. No	Date of Tripping	Time of Outage (Hrs)	Date of Normalization	Time of Fault cleared (Hrs)	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	02.09.2019	17:19	04.09.2019	9:33	14	0.280	8MVA 66/33kV transformer	33kV Gurungdrara Fdr I only		Differential relay on R & B phase, Master trip relay and tripping relay 86.	Line segment	
2	21.09.2019	15:14	21.09.2019	15:33	19		66kV Chukha- P/ling fdr.	Whole Gedu black out.	Tripped from Chukha	1. Disc pickup- L2-E. 2. Mastre tripping relay 86. 3. General Zone-1 4. PU time- 79ms 5. Trip time- 4ms 6. Distance -35.9Km.	Line segment	
3	21.09.2019	15:54	21.09.2019	16:09	15		66kV Chukha- P/ling fdr.	Whole Gedu black out.	Tripped from Chukha	1. Disc pickup- L3-E. 2. Mastre tripping relay 86. 3. General Zone-1 4. PU time- 79ms 5. Trip time- 4ms 6. Distance -35.9Km.	Line segment	
4	25.09.2019	9:46	25.09.2019	9:47	1	0.270	8MVA 66/33kV Transformer	33kV Gurungdara feeder-I		Diff. relay on R&B phase, tripping relay 86.	Line segment	



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66/33/11kV Lobeysa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No tripping												
220/66/11kV Semtokha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66/33/11kV Dechenchholing substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	04.09.19	11:46	04.09.19	11:50	4	1.901	10 MVA (I+II)	Black out	E/F	E/F	Kabesa	
2	05.09.19	10:00	05.09.19	17:10	10	3.804	66 kV Incomer at the Substation side	None	None	None	None	Testing of new Gas bay bus isolator & termination of new
3	05.09.19	10:00	05.09.19	17:12	12	1.902	10 MVA (I+II)					
4	06.09.19	8:08	06.09.19	8:11	3	2.475	10 MVA (I+II)	Black out	O/C	O/C	Kabesa	Over current fault in the 33 kV OG II Kabesa feeder.
66/33kV Olakha substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	17/9/2019	15:56	17/9/2019	15:58	2	3.40	20 MVA Trf I	33kV DPH line only	Due to tripping of 33kV DPH - I	TRAF0.DIFFL.PROTN.RELAY -87 , Trip Relay -86 & Indication : 1,3,4 & 5. 1. Device Trip , 3.Y-Phase Differential trip. 4. B- Phase Differential trip. 5. Differential trip.	Line fault on 33kV DPH-I	
66/33/11kV Jemina substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66kV Chumdo switching station												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	25.09.2019	0714hrs	25.09.2019	0720hrs	6min	2.03MW	66KV O/G Pangbasa feeder	Pangbasa s/s	Transient fault	CB open	Chumdo	
66/33/11kV Paro substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
No Tripping												
66/11kV Haa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	25.09.2019	7:09	25.09.2019	9:15	6minutes	-2.16	66kV Incomer	All feeders	delayed from Pangbasa Substation	Unknown	Chumdo switching station.	
66/33kV Watsa substation												
Sl. No	Date of Tripping	Time of Outage	Date of Normalization	Time of Fault cleared	Duration of Outages (hh:mm)	Load before Outage (MW)	Name of Feeders/Equipment Tripped	Name of Substations/Line affected by fault	Reason of Fault	Relay indication and operation	Exact location of fault (Line segment/substation)	Remarks
1	9/15/2019	7:35hrs	9/15/2019	7:40hrs	5min	.540MW	66kv SF6 breaker	Feeder I and II	O/C and E/F	Over current and Earth fault relay operated	Feeder I wanakha	