West Bengal State Electricity Transmission Company Ltd.

Capacity Building Assignment

Steps to Pinnacle*

Standard Operating Procedure - Final

December 23, 2008

*connectedthinking

PRICEWATERHOUSECOOPERS

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ABBREVIATIONS

Sl. No.	Abbreviation	Expansion
1.	ABT	AVAILABILITY BASED TARIFF
2.	CESC	CALCUTTA ELECTRIC SUPPLY COMPANY LIMITED
3.	CPP	CAPTIVE POWER PLANT
4.	DISCOM	DISTRIBUTION COMPANY
5.	DPL	DURGAPUR PROJECTS LIMITED
6.	DPSCL	DISHERGARH POWER SUPPLY COMPANY LIMITED
7.	ER	EASTERN REGION
8.	ERLDC	EASTERN REGIONAL LOAD DESPATCH CENTRE
9.	ERPC	EASTERN REGION POWER COMMITTEE
10.	GSP	GRID SUPPLY POINTS (T-D INTERFACE POINTS)
11.	GSS	GRID SUB STATION
12.	ICT	INTER CONNECTING TRANSFORMER
13.	IEGC	INDIAN ELECTRICITY GRID CODE
14.	IPP	INDEPENDENT POWER PRODUCER
15.	ISGS	INTER STATE GENERATING STATIONS (CENTRAL SECTOR GENERATORS)
16.	ISTS	INTER STATE TRANSMISSION SYSTEM
17.	LD	LOAD DESPATCH
18.	MF	MULTIPLYING FACTOR
19.	MU	MILLION UNITS
20.	O&M	OPERATION & MAINTENANCE
21.	OD	OVER DRAWAL
22.	PPA	POWER PURCHASE AGREMENT
23.	PTW	PERMISSION TO WORK
24.	RLSS	ROTATIONAL LOAD SHEDDING SCHEME
25.	SCADA	SUPERVISORY CONTROL & DATA ACQUISITION
26.	SEB	STATE ELECTRICITY BOARD
27.	SLDC	STATE LOAD DESPATCH CENTRE
28.	SOP	SYSTEM OPERATION PROCEDURE
29.	SS	SUB STATION
30.	SSGS	STATE SECTOR GENERATING STATIONS
31.	STS	STATE TRANSMISSION SYSTEM

Sl. No.	Abbreviation	Expansion
32.	TA	TECHNICAL ASSISTANT
33.	UD	UNDER DRAWAL
34.	UFR	UNDER FREQUENCY RELAY
35.	UI	UNSCHEDULED INTERCHANGE
36.	ULDC	UNIFIED LOAD DESPATCH & COMMUNICATION SCHEME
37.	WB	WEST BENGAL
38.	WBOP	WEST BENGAL OPERATING PROCEDURE
39.	WBPDCL	WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED
40.	WBSEB	WEST BENGAL STATE ELECTRICITY BOARD
41.	WBSEDCL	WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED
42.	WBSETCL	WEST BENGAL STATE ELECTRICITY TRANSMISSION COMPANY LIMITED

101 GRID CODE COMPLIANCE MONITORING PROCEDURE

101.1 INTRODUCTION

101.1.1 This document defines the procedure developed in line with the rules & regulations as laid out by WBERC for maintaining the Grid Code and specifies the reporting requirement to State Level Power Committee on the implementation and compliance to State Grid Code.

101.1.2 Through rigorous implementation of the procedure, **SLDC** and **WBSETCL** will be fully aware of the deficiencies for which the necessary remedial action needs to be taken with respect to the mandatory requirements of the Grid Code.

101.2 OBJECTIVES

101.2.1 The objective of this procedure is to produce following reports:

- A monthly report in the format prescribed in WBSOP 101 F01, section-wise listing of non-compliance together with action needed to rectify identifying the User / **WBSETCL** Officer responsible for rectification and timeframe for rectification.
- A statement in the format prescribed in WBSOP 101 F02, listing priority of rectification and the likely changes to the Grid Code.

101.3 RESPONSIBILITY

101.3.1 Chief Engineer (**SLDC**) is responsible for implementation and compliance of this procedure. He shall be responsible for submission of consolidated reports for the meetings of the State Level Power Committee.

101.4 METHODOLOGY

101.4.1 **Assigning responsibility for detail:**

101.4.2 A Task Force needs to be developed at SLCF level with due consultation between Chief Engineer (**O&M**) & Chief Engineer (**SLDC**). Each chapter of the Grid Code would be assigned to appropriate **SLDC** and **WBSETCL** Officer(s) for compilation of reports in format WBSOP 101 F01 and WBSOP 101 F02 for that chapter. These officers shall constitute Grid Code Compliance Task Force. Each officer will be responsible to have a current, detailed knowledge of compliance in the field for his/her chapter, and send the completed forms to Chief Engineer (**SLDC**) at the end of each month.

101.4.3 **Monthly Task Force meetings may be held:**

101.4.4 **Chief Engineer (SLDC)** shall chair monthly meetings of the Task Force. Discussion shall include

- Review of form WBSOP 101 F01. Each officer to present a brief report on his chapter.
- Sections of Grid Code that needs amendment, is to be captured in WBSOP 101 F02 for placing before the Regulatory Commission after detail discussion at SLCF.

101.4.5 Relevant extracts of minutes of the meetings of Task Force shall be circulated to all members of State Level Power Committee and to the members of functional committees for appropriate action within 5 days of the date of meeting of task force.

WBSOP 101 F01

Monthly Report of Cases where Grid Code could not be complied by Users

(To be maintained in Operator's Diary on **SLDC** system)

Name of Reporting Officer

Name of Office / Section of SLDC / WBSETCL

Month: **Date submitted:**

S No	Grid Code Chapter	Specific Provision where Non-Compliance Noticed	Action to Avert Non-Compliance	User to take Remedial Action

WBSOP 101 F02

Monthly Report of Action for Grid Code Modification

Name of Reporting Officer

Name of Office / Section of SLDC / WBSETCL

Month: **Date submitted:**

S No	Grid Code Chapter	Provisions Requiring Change	Changes Required	Action to be Taken	Expected Time

Note: Non-compliance of Grid Code requiring revision only to be included

102 TRANSMISSION OUTAGE PLANNING PROCEDURE FOR OPERATIONAL PURPOSES

102.1 INTRODUCTION

102.1.1 This document sets out the procedure for planning the outage in the State Transmission System in coordination with generation outage of State Sector Generating Stations (SSGS), outage of inter-state lines and outage of Inter State Generating Stations (ISGS) in Eastern Regional Grid.

102.1.2 The outage in the State Transmission System is to be planned taking into consideration the system security standards specified in the Grid Code and generation availability to be matched with estimated demand. The outputs of this procedure serve as input for monthly demand estimation purposes.

102.2 OBJECTIVE

102.2.1 The objective of this procedure is to optimize the state transmission outage without adversely affecting the grid operations but taking into consideration the Generation Outage Schedules, Outage in Discoms' System and maintaining the system security standards as specified.

102.2.2 Rigorous implementation of this procedure will result in preparing more accurate demand estimation and generation scheduling. It will also provide information to ensure that the transmission system may be planned for secure operation and to check viability of Outage Plan for month ahead basis.

102.3 SCOPE

102.3.1 This procedure applies to all SSGS, **WBSETCL** and each Discom connected to State Transmission System.

102.4 RESPONSIBILITY

102.4.1 Chief Engineer (**SLDC**) is responsible for analysing the outage schedule given by SSGS, Transmission Circles / Zones of **WBSETCL** and Discoms, preparing a draft annual outage schedule and finalisation of the annual outage plan for State Transmission System in coordination with Eastern Region Power Committee (ERPC) for financial year by February 15th each year.

102.5 METHODOLOGY

102.5.1 Chief Engineer (**SLDC**) shall ensure that each SSGS furnish their proposed Outage programme in writing for the next Financial Year by 1st August of each year. SSGS Outage programme shall be furnished in Format WBSOP 102 F01 containing details like identification of unit, reason for outage, generation availability affected due to such outage, outage start date and duration of outage. Chief Engineer (**SLDC**) will review the outage programme received from SSGS on monthly basis to chalk out the outage of state transmission system.

102.5.2 Chief Engineer (**SLDC**) shall also obtain outage programme from CPPs in writing for the next Financial Year by 1st August of each year in Format WBSOP 102 F02 containing details like generation availability affected due to such outage, outage start date and duration of outage. If the Year Ahead Outage Programme has not been furnished by any SSGS/CPP, it would be assumed that they require no schedule outage in the ensuing year.

102.5.3 Chief Engineer (**SLDC**) shall also obtain scheduled outage programme from each Discom for the next Financial Year by 1st August each year in the Format WBSOP 102 F03 which shall contain details like identification of lines / substations, reason for outage, demand affected due to such outage, outage start date and duration of outage.

102.5.4 Discoms shall also provide to **SLDC** estimates of load that may be shed when required, in discrete blocks with the details of the arrangements of such load shedding. If the Year Ahead Outage Programme has not been furnished by any Discom, it would be assumed that they require no schedule outage in the ensuing year.

102.5.5 Chief Engineer (**SLDC**) shall also obtain from in-charge of each Transmission Circle / Zone of **WBSETCL**, the proposed outage programme for Transmission lines, equipments and sub-stations, etc. in the Format WBSOP 102 F04 for next financial year by 1st August each year. **WBSETCL** outage programmes shall contain identification of lines / substations, reason for outage, outage start date and duration of outage. If the Year Ahead Outage Programme has not been furnished by any Chief Engineer of Transmission Circle / Zone, it would be assumed that they require no schedule outage in the ensuing year.

102.5.6 Chief Engineer (**SLDC**) shall prepare the proposed outage plan of State Transmission System based on the outage programme received from SSGS, **WBSETCL** Transmission Circle / Zone and Discoms for the next financial year and shall be finalized in concurrence with Chief Engineer (**O&M**). The finalized Outage Programme shall be submitted to ERPC by 30th November each year in the prescribed format.

102.5.7 Chief Engineer (**SLDC**) shall discuss the State Outage Plan in the meeting of the ERPC Operating Committee Meeting to be held for finalisation of ERPC Outage Plan.

102.5.8 Based on deliberation in Operating Committee Meeting, the ERPC Secretariat shall issue draft outage programme for the next financial year by 31st December each year for the Regional Grid.

102.5.9 Chief Engineer (**SLDC**) shall interact with Chief Engineer (**O&M**) to review and optimize the outage plan & arrive at some rescheduled programme if required.

102.5.10 While finalizing Outage Program the Chief Engineer (**SLDC**) shall take into account adequate balance between generation and load requirement. The **SLDC** shall carry out system studies, if necessary for ensuring security standards.

102.5.11 Chief Engineer (**SLDC**) shall prepare the final Year ahead Outage Plan for SSGS, **WBSETCL** and Discoms, latest by February 15th each year in format WBSOP 102 F05. Month-wise outage programme for the entire West Bengal State Transmission System shall be charted out in Format WBSOP 102 F06.

102.5.12 State Outage Plan shall also include load generation balance and shortage along with schedules for load shedding, as may be required. Generating Unit Outage shall be drawn on Gantt Chart for monitoring the actual outage vis-à-vis planned outage.

102.5.13 Any change in the agreed Outage Programme by the concerned User shall be promptly informed to **SLDC**. Change in Outage Programme of major generators, transmission lines or ICTs shall also be reported to ERLDC.

102.5.14 Chief Engineer (**SLDC**) shall finally release the year ahead outage plan by 1st March of each year to all stakeholders.

102.6 QUARTERLY & MONTHLY REVIEW OF OUTAGE PLAN

102.6.1 Annual State outage plan shall be reviewed by the **SLDC** on quarterly and monthly basis in co-ordination with Users concerned and ERLDC and adjustments / reschedule made wherever found to be necessary.

102.6.2 **SLDC** shall notify any change made in schedule outage to the SSGS, Transmission Circle / Zone & Discom immediately after review.

102.7 RELEASE OF CIRCUITS & GENERATOR UNITS INCLUDED IN OUTAGE PLAN

102.7.1 **SLDC** is authorized to defer the planned outage in case of any of the following events:

i) Major grid disturbance

ii) System Isolation

iii) Black out in the State

iv) Any other event in the system that may have an adverse impact on system security by the proposed outage

102.7.2 Each User shall obtain approval of **SLDC** on a day-ahead basis & mandatorily on real-time basis.

102.7.3 **SLDC** while releasing any circuit for outage shall issue specific code. Similarly no cross boundary circuits shall be connected back to the State Transmission System without specific code / approval by **SLDC**.

102.7.4 This restriction shall however not be applicable to individual Generating Unit of a CPP.

102.8 APPENDICES

Format WBSOP 102 F01 – SSGS Outage Program

Format WBSOP 102 F02 – CPP Outage Program

Format WBSOP 102 F03 – Distribution Companies Outage Program

Format WBSOP 102 F04 – Transmission Outage Programme

Format WBSOP 102 F05 – Year ahead Outage Program for State

Format WBSOP 102 F06 – Month-wise Outage Program for State

WBSOP 102 F01

Year Ahead Outage Programme

(For State Sector Generating Station)
(To be submitted by 1st August each year)

Financial Year:

Name of SSGS

Rated Capacity of Station

Identification of Generating Unit	Rating (MW)	Preferred Start Date or Range of Start Date and Start Time	Outage Duration (Hours)	If Outages are Required to Meet Statutory Requirements, Latest Date to start Outage	Remarks

Name: _____

Designation: _____

Date:_____

Note:

If any SSGS does not furnish its Year Ahead Outage Program by specified date, **SLDC** is not obliged to allow any schedule outage in the ensuing year.

WBSOP 102 F02

Year Ahead Outage Programme

(For IPP/ CPP)

(To be submitted by 1st August each year)

Financial Year:

Name of CPP

Rated Capacity in MW

Unit Rating (MW)	Preferred Start Date or Range of Start Date and Start Time	Outage Duration (Hours)	MW which may not be available as a result of Outage	MU which may not be Exported as a result of Outage

Name: _____

Designation: _____

Date:_____

Note:

If any IPP/CPP does not furnish its Year Ahead Outage Program by specified date, **SLDC** is not obliged to allow any schedule outage in the ensuing year.

WBSOP 102 F03

Year Ahead Outage Programme

(For Discom System)

(To be submitted by 1st August each year**)**

Financial Year:

Name of Discom:

Identification of **WBSETCL** Interconnection Point and EHV GSS at which Outage is Required	Name of Line / Equipment on which the Work is to be Carried Out	Preferred Start Date and Start Time	Outage Duration (Hours)	Demand in MW to be Affected by Outage and Arrangement for Alternative Power Supply if any	If no Alternative for Power Supply, the Load Shedding to be Applied

Name: _____

Designation: _____

Date: _____

Note:

If any Discom does not furnish its Year Ahead Outage Program by specified date, **SLDC** is not obliged to allow any schedule outage in the ensuing year.

WBSOP 102 F04

Year Ahead Outage Programme

(For WBSETCL Transmission Network)

(To be submitted by 1st August each year**)**

Financial Year:

Name of Transmission Circle / Zone:

Name of Line / Equipment for which Outage Required	Name of sub-station	Preferred Start Date and Start Time	Outage Duration (Hours)

Name: _____

Designation: _____

Date:_____

Note:

If any **Transmission Circle / Zone** does not furnish its Year Ahead Outage Program by specified date, **SLDC** is not obliged to allow any schedule outage in the ensuing year.

WBSOP 102 F05

West Bengal State Transmission System

Year Ahead Outage Program

To be prepared by Chief Engineer (**SLDC**)

Financial Year:

Name of Generating Station / Line Transformer	Identification of Generating Unit / Line Transformer and MW Rating	Start Date and Start Time	Outage Duration (Hours)

Name: _____

Designation: _____

Date: _____

WBSOP 102 F06

Year Ahead Month-wise Outage Programme for State

(To be prepared & submitted by Chief Engineer (**SLDC**) by 1st March of each year)

Financial Year:

Station	Unit No (Cap) & Start Date	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Generating Station													
Transmission Lines / SS													
Distribution Lines / SS													

103 DEMAND ESTIMATION PROCEDURE FOR OPERATIONAL PURPOSES

103.1 INTRODUCTION

103.1.1 This Section describes the **WBSETCL** procedure and responsibilities for preparing State demand estimation on short-term basis for use in:

(i) the planning of generation, transmission and Discom outages for construction, maintenance and repair.
(ii) for operational planning purposes with respect to demand control.
(iii) for determination of the day ahead schedules for SSGS and drawal from CSGS.

103.1.2 It is written to be compatible with and in support of West Bengal Grid Code.

103.1.3 In this procedure, "short-term" is defined as up to one year ahead. Demand estimation for operational purposes is therefore concerned with the time frame including the current financial year (Year 0) and the financial Year Ahead (Year 1).

103.1.4 Demand estimation for more than one year ahead is included in the System Planning Procedure, which is the responsibility of the **WBSETCL** department concerned with long term transmission system planning.

103.1.5 The process by which **SLDC** receives demand estimates from the Discoms is defined in this procedure. It further defines the process by which **SLDC** carries out its own demand estimate taking account of the estimates furnished by the Discoms and historical data.

103.2 OBJECTIVES

103.2.1 The objective of this procedure is to enable **SLDC** to produce accurate estimates of State demand over time scales from One Year Ahead to the Day Ahead.

103.2.2 The various outputs from this procedure are used for:

(i) the planning of transmission and generation outages for maintenance, construction and repair (Outage Planning)
(ii) planning of Demand Control
(iii) preparing the day ahead Generation and Drawal schedules

103.3 SCOPE

103.3.1 This procedure applies to the **SLDC** and each User of the State Transmission System.

103.4 RESPONSIBILITY

103.4.1 Chief Engineer (**SLDC**) is responsible for the implementation and maintenance of this procedure.

103.4.2 Chief Engineer (**SLDC**) is responsible for collection, examination and compilation of Demand estimates in prescribed manner and at the prescribed time.

103.5 DEMAND ESTIMATES FROM DISCOMS

103.5.1 Annual Month-Wise Estimated Data

103.5.2 Each Discom shall provide to Chief Engineer (**SLDC**) its month-wise estimate of peak and lean demand for Active Power (MW), Reactive Power (MVAR) and Energy Consumption (MU) at each connection point for the period 1st April to 31st March of the Year 1 by 1st August of Year 0. Each Discom shall intimate to Chief Engineer (**SLDC**) the methodology used in producing its forecasts.

103.5.3 Such month-wise demand estimation for the next financial year shall be prepared by each Discom in Format WBSOP 103 F01 and shall be furnished in Hard Copy as well as Soft copy in Excel Spreadsheet.

103.5.4 Chief Engineer (**SLDC**) shall examine latest by 30th November, the demand estimates furnished by the Discoms for accuracy, consistency and will compare the same with the historical data available with it and shall request the concerned Discom for review of any inconsistency and/or large variation detected from the historical data and past trends.

103.5.5 The concerned Discom shall review its demand estimate and will furnish clarification and/or revised demand estimates latest by 10th December.

103.5.6 Monthly Day-wise Estimated Data

103.5.7 Each Discom shall provide by 20th of each month to the Chief Engineer (**SLDC**) the estimated 15-minute block demand profile for Active Power (MW) and Reactive Power (MVAR) along with the Energy Consumption (MU) at each inter-connection point for each day of the next month.

103.5.8 Such daily demand estimation shall be prepared in Format WBSOP 103 F02 and shall be furnished in Hard Copy as well as Softcopy in Excel Spreadsheet.

103.5.9 Chief Engineer (**SLDC**) shall examine latest by 25th each month, daily demand estimate furnished by the Discoms for accuracy, consistency and will compare the same with the month-wise demand estimate furnished by the concerned Discom on annual basis and shall request the concerned Discom for review of any inconsistency and/or large variation from the annual month-wise demand estimates.

103.5.10 The concerned Discom shall review its demand estimate and will furnish clarification and/or revised demand estimates within two days.

103.5.11 *Note: Estimated consumption of energy in MU at each connection point on daily basis for month ahead and 15 minute block averaged demand estimates in MW & MVAR at each connection point for each day of the month ahead.(31 data items for MU for each connection point, 31 x 96 data items for MW and 31 x 96 data items for MVAR for each connection point).*

103.5.12 **Daily 15 minute block -wise Estimated Data**

103.5.13 At the regular meetings with each Discom, realistic 15-minute block demand for their respective companies shall be furnished to Chief Engineer (**SLDC**) in the Format WBSOP 103 F03. This data from each Discom shall include:

(i) Details of essential loads
(ii) Hours of supply to be maintained in rural areas
(iii) Details of power cuts imposed or to be imposed
(iv) Any specific requirements

103.5.14 By 10.00 hrs each day, Discoms shall supply the data to Shift In-charge **SLDC** Control Room:

103.5.15 [15-minute block averaged demand estimates in MW & MVAR at each connection point for the day ahead. (96 data items for MW and 96 data items for MVAR at each connection point.]

103.6 DEMAND ESTIMATION BY SLDC

103.6.1 Annual Month-Wise Estimated Data

103.6.2 Chief Engineer (**SLDC**) shall aggregate the Demand Estimates furnished by Discoms in Format WBSOP 103 F04. In working out aggregate demand for the state, **SLDC** shall use methodology as prescribed and apply diversity and load factors.

103.6.3 The demand estimate for the State Transmission System shall also indicate peak and lean demand for each month.

103.6.4 Monthly Day-wise Estimated Data

103.6.5 Chief Engineer (**SLDC**) shall aggregate the Demand Estimates furnished by Discoms in Format WBSOP 103 F05 In working out aggregate demand **SLDC** shall use methodology as prescribed and apply diversity and load factors.

103.6.6 The daily demand estimate for the State Transmission System shall also indicate peak and lean demand for each day.

103.6.7 **Day-Ahead 15-minute block Demand Estimates**

103.6.8 **System demand for the Previous-day**

103.6.9 Chief Engineer (**SLDC**) shall obtain 15 minute block basis actual State generation summation figure, 15 minute block basis Import / Export figures by summating all inter-State lines and generation by captive plant for the previous day shall be obtained from the Shift Incharge of **SLDC** each day by 12.00 noon.

103.6.10 15 minute block basis System frequency and major events such as forced outage and any other system disturbances, if any, which causes loss of load shall be collected from the Control room on each day by 12.00 noon.

103.6.11 Adjustment for the following shall be made to obtain the potential demand for the previous day.

1. Statement from Discoms relating to local / area load shed for the previous day.
2. Statement from **SLDC** relating to Planned and Forced outage of Extra High Tension lines and equipment.
3. Adjustment for High / Low system frequency shall be made.
4. Adjustment for Holidays / Weekends shall be made.
5. Drawl by CPPs and connected Industries.

103.6.12 **System demand for the next-day**

103.6.13 Based on actual 15 minute block demand for the previous day and adjusted 15 minute block demand taking into consideration of above factors, the 15 minute block demand schedule for the subsequent day shall be worked out in format similar to Format WBSOP 103 F05.

103.6.14 **SLDC** shall use the 15-minute block demand schedule for the following operational activities:

i) To assist in preparation of Generation Schedule for next day (WBSOP 109)
ii) To determine the most difficult / worst condition affecting constraints.
iii) For Frequency Control (WBSOP 107) and Voltage control for the next day (WBSOP 108)
iv) For planning Load Shedding and Load restrictions.
v) To the extent possible affecting economic load dispatch.
vi) To check Outage Plan viability for peak and lean periods for next day (WBSOP 102)

103.7 OUTPUT

103.7.1 Chief Engineer (**SLDC**) shall generate following outputs from daily, monthly and year demand estimates prepared as per this procedure:

1. Day-ahead load curve.
2. Comparison of load curve for previous day's actual and predicted.
3. Comparison of yearly month-wise & monthly day-wise demand estimates with actual.

WBSOP 103 F01

MONTHWISE YEAR AHEAD DEMAND ESTIMATION

(Each Discom to furnish latest by 1st August for ensuing year)

Financial Year: **From:** **To:** **Date:**

DISCOM:														
GSS Code	**Grid Sub-Station**	**Parameter**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
	GSS Name													
		MW												
		MW Max												
		MW Min												
		MVAR Max												
		MVAR Min												

Date : _____

Time: _____

Designation: _____

WBSOP 103 F02

DAILY MONTH AHEAD
DEMAND ESTIMATION FOR EACH MONTH

(Each Discom to furnish latest by 25th of each month for next month**)**

From: To: Date:

DISCOM:					**From**				**To**							**Date:**																	
GSS Code	**GSS**	**Parameter**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
	GSS Name																																
		MW																															
		MW_{Max}																															
		MW_{Min}																															
		$MVAR_{Max}$																															
		$MVAR_{Min}$																															

Date : _____

Time: _____

Designation: _____

WBSOP 103 F03

DAY AHEAD ON 15-MINUTE BLOCK BASIS DEMAND ESTIMATION

(Each Discom to furnish latest by 12 noon of each day for next day)

DISCOM: **From 00.00 Hrs** **To 24.00 Hrs** For Date:

GSS Code	GSS	Parameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	GSS Name																									
		MW																								
		MW Max																								
		MW Min																								
		MVAR Max																								
		MVAR Min																								

DISCOM: **From 00.00 Hrs To 24.00 Hrs** Date :

GSS Code	GSS	Parameter	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	GSS Name																									
		MW																								
		MW Max																								
		MW Min																								
		MVAR Max																								
		MVAR Min																								

DISCOM: **From** **00.00 Hrs** **To** **24.00 Hrs** Date:

GSS Code	GSS	Parameter	49	50	51	52	53	54	55	56	57	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	GSS Name																								
		MW																							
		MW Max																							
		MW Min																							
		MVAR Max																							
		MVAR Min																							

DISCOM: **From 00.00 Hrs To 24.00 Hrs** Date:

GSS Code	GSS	Parameter	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
	GSS Name																									
		MW																								
		MW Max																								
		MW Min																								
		MVAR Max																								
		MVAR Min																								

WBSOP 103 F04

DAILY MONTH AHEAD DISCOMWISE DEMAND SCHEDULE

DEMAND ESTIMATION FOR EACH MONTH

(**SLDC** to aggregate Discoms' Demand Estimation)

All Fig in MW			**From**				**To**							**Date:**																
DISCOM	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
WBSEDCL																															
CESC																															
DPL																															
DPSCL																															
West Bengal Total																															

WBSOP 103 F05

DAILY DISCOM-WISE DAY AHEAD DEMAND AGGREGATE

(**SLDC** to Compile the Demand)

All Fig in MW **From** **00.00 Hrs** **To** **24.00 Hrs** Date:

DISCOM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
West Bengal Total																								

All Fig in MW **From 00.00 Hrs To 24.00 Hrs** Date :

DISCOM	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
West Bengal Total																								

All Fig in MW							**From**	**00.00 Hrs**			**To**	**24.00 Hrs**				Date:						
DISCOM	49	50	51	52	53	54	55	56	57	59	60	61	62	63	64	65	66	67	68	69	70	71	72
WBSEDCL																							
CESC																							
DPL																							
DPSCL																							
West Bengal Total																							

All Fig in MW **From 00.00 Hrs To 24.00 Hrs** Date:

DISCOM	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
West Bengal Total																								

104 DEMAND CONTROL PROCEDURE

104.1 INTRODUCTION

104.1.1 This Section describes the methods of Demand Control, which are in place by pre-arrangement between **WBSETCL** and the Discoms, to meet the obligations of the West Bengal Grid Code. The application of these methods is defined in System Operation Procedure 107 (Frequency Control).

104.1.2 The procedures to be followed by **SLDC** in arranging for provision of Demand Control are defined. These are required to ensure that there is a balance between energy availability from generation (SSGS and ISGS) and the total Discoms demand plus losses allowing for any reserve requirement. They are also required when **WBSETCL** transmission system constraints are violated, such as when lines and transformers are subject to thermal overload, or voltages are outside of limits.

104.1.3 The need to apply demand control arises on account of the following system conditions:

(i) Increase in Discoms' demand from estimated values, causing deviation in system frequency outside the acceptable limits or causing network congestion
(ii) Unplanned outages of generation / transmission within the State and/or Regional system causing fall in system frequency beyond acceptable limits.
(iii) SSGS and/or Drawal from ISGS being less than schedule, causing deviation in system frequency outside of acceptable limits.
(iv) Excessive reactive power demand of Discoms, causing unacceptably low system voltages.
(v) Thermal overloads occurring in lines / transformers.

104.1.4 Various types of Demand Control to be applied by **SLDC** are described in this procedure and the application of each type is dependent on the rate of frequency change in response to the conditions described above.

104.1.5 The types and quantum of demand are to be shed ensuring no undue discrimination between Discoms.

104.2 OBJECTIVES

104.2.1 To identify and make available the type and quantum of demand control required for frequency control purposes and to be applied in the relief of thermal overloads.

104.3 SCOPE

104.3.1 This procedure applies to the **SLDC** and each Discom within the State Transmission System.

104.4 RESPONSIBILITIES

104.4.1 Chief Engineer (**SLDC**) is responsible for the implementation and maintenance of this procedure.

104.4.2 The Shift In-charge **SLDC** Control Room shall be responsible for exercise of demand control on real time basis.

104.5 TYPES OF DEMAND CONTROL

104.5.1 Automatic Control

(i) Tripping of line for supply to any part of the **WBSETCL** Transmission System where system security is weak
(ii) Disconnection of load blocks by operation of automatic under frequency load shedding relays

104.6 CUSTOMER DEMAND MANAGEMENT BY DISCOMS

104.6.1 Discoms would try to limit its actual drawal to the schedule given to **SLDC** through judicious customer demand management.

104.7 PLANNED LOAD SHEDDING ARRANGEMENTS

104.7.1 Primarily the need for unforeseen demand control would arise on account of the following conditions:

1. Variation in demand from the demand estimated / forecasted which cannot be absorbed by the STS.
2. Unforeseen outage of generation capacity resulting in reduced power availability that is insufficient to meet the demand.
3. Unforeseen outage of transmission lines / equipment resulting in transmission constraints.
4. Heavy reactive power demand causing low voltages.

104.7.2 **SLDC** will implement Planned Disconnection and/or Emergency Manual Disconnection, when it considers it necessary either at its own instance or when ERLDC demands for the same.

104.7.3 Demand control shall be exercised under these conditions by the **SLDC** through the following procedure:

a) Planned Disconnection is the procedure adopted when forecastable energy availability from all sources falls short or due to transmission constraint Demand Control for a prolonged period is required. Under such situation Manual Rotational Load Shedding Scheme may be required to ensure equitable treatment for all Customers as far as practicable.
b) Emergency Manual Disconnection is utilised when loss of Generation / mismatch of Generation output and Demand or Transmission Line Constraint is such that there is a problem requiring shedding of Load at short notice or no notice to maintain a regulating margin to deal with unacceptable voltage levels, thermal overloads, etc.
c) Load Blocks shed under Planned Disconnection and/or Emergency Manual Disconnection will be separate in addition to load blocks covered for shedding under Automatic load Shedding Scheme.
d) During the demand control by manual disconnection of loads by staggering in different group shall carry out the changeover from one group to another in a gradual scientific manner so as to avoid excursions in the system parameters.

104.7.4 **Manual Disconnection by SLDC**

a) The quantum and duration of the manual load shedding by the **SLDC** shall be such that no un-due discrimination is made between the Discoms.
b) The order for manual disconnection by the **SLDC** would be based on extent of over drawal by the Discoms / Sub-Stations.
c) The Shift In-charge **SLDC** Control Room would identify feeders drawing heavy quantum of reactive power and disconnect the same under low voltage conditions.

104.7.5 **Load Crash**

104.7.6 In the event of load crash in the system due to weather disturbance or any other reasons, the situation would be controlled by the Shift In-charge **SLDC** Control Room by the following methods:

a) Backing down or closing down of generating units of SSGS preferably by merit order despatch. The **SLDC** in such event issue certificate (WBSOP 104 F04) for backing down giving unit number, the capacity and time of backed down.
b) Lifting load restrictions, if any.
c) Exporting power to neighbouring states / regions.

104.8 UNDER FREQUENCY RELAY (UFR) LOAD SHEDDING ARRANGEMENTS

104.8.1 For the safety of the system, **WBSETCL** have provided some Under Frequency Relays (UFR) with frequency settings at 220kV / 132kV Grid Sub-Stations on different 33kV / 11kV feeders for automatic load shedding for taking care of contingencies, like sudden loss of bulk generation feeders. The detail of the UFRs is provided in format WBSOP 104 F01.

104.8.2 The frequency settings have multiple stages.

104.8.3 The UFR relays are intended to prevent frequency falling to a level which endangers system security. UFR schemes operate as per ERPC decision and change of UFR settings shall be done in consultation with ERPC.

104.8.4 All Grid Sub-Stations shall furnish a monthly report on availability and condition of UFRs as per format WBSOP 104 F02 and **SLDC** will review the same.

104.8.5 The tripping of feeders by UFRs shall be logged at the respective Grid Sub-Stations and a monthly report of the same in the format WBSOP 107 F02 shall be sent to **SLDC**.

104.8.6 **UNDER FREQUENCY LOAD SHEDDING SCHEME**

104.8.7 To prevent the frequency to drop to a level which is dangerous from system point of view Under Frequency Relays (UFRs) have been installed in the system to disconnect the identified feeders at pre-determined frequency settings to reduce the connected load in the system. The feeders so disconnected are subsequently restored as when the system frequency recovers to desired safe level and with concurrence with **SLDC**.

104.8.8 ERPC has approved the following Scheme to shed quantum of loads at different stages of UFR by each constituent of Eastern Region as per details given below:

State	**Relief to be provided**		
	48.5 Hz (0.3 sec time delay) **Stage - I**	**48.2 Hz (Instantaneous)** **Stage - II**	**48 Hz (Instantaneous)** **Stage - III**
BSEB	**30 MW**	**36 MW**	**43 MW**

JSEB	**17 MW**	**12 MW**	**22 MW**
DVC	**56 MW**	**55 MW**	**76 MW**
GRIDCO	**77 MW**	**77 MW**	**105 MW**
WBSEB	**120 MW**	**120 MW**	**164 MW**
Total	**300 MW**	**300 MW**	**410 MW**

104.8.9 **UFR LOAD SHEDDING IN WEST BENGAL STATE ELECTRICITY TRANSMISSION COMPANY LIMITED**

104.8.10 Under Frequency Relays on various feeders have been installed by **WBSETCL** for safety of the system by providing the required load relief under low frequency conditions. Load shedding scheme through under frequency relays have multiple settings for getting the relief of required MW when frequency drops to pre-determined values.

104.8.11 WBSOP 104 F01 gives the details of UFR relays provided at EHV Grid Sub-Stations on outgoing 33kV & 11kV feeders, frequency settings and maximum and minimum load recorded on such outgoing feeders during previous year.

104.8.12 WBSOP 104 F03 prescribes the format for monthly report on availability and condition of UFRs and **SLDC** will review the same.

104.8.13 Chief Engineer (**O&M**) & Chief Engineer (**SLDC**) will review the load shedding through under frequency relays at each six monthly interval for adjusting the load relief based on the seasonal variation in system demands and the load pattern.

WBSOP 104 F01

UFR DEMAND SHEDDING DETAILS

(To be maintained by Chief Engineer (**SLDC**)

AS ON Date:

STAGE-I

Sl. No.	Frequency Setting (Hz)	Name of Sub-Station	Name of Feeder	Estimated Maximum Demand (MW)	Estimated Minimum Demand (MW)	Remarks

Total Quantum =

STAGE-II

Sl. No.	Frequency Setting (Hz)	Name of Sub-Station	Name of Feeder	Estimated Maximum Demand (MW)	Estimated Minimum Demand (MW)	Remarks

Total Quantum =

STAGE-III

Sl. No.	Frequency Setting (Hz)	Name of Sub-Station	Name of Feeder	Estimated Maximum Demand (MW)	Estimated Minimum Demand (MW)	Remarks

Total Quantum =

WBSOP 104 F02

MONTHLY REPORT ON AVAILABILITY OF UFR

(To be furnished by respective GSS to **SLDC** on **5th** of each month)

Name of Grid Sub-Station

Reporting month:

Name of GSS	Name of Feeder	Voltage (kV)	Frequency Setting	Status

WBSOP 104 F03

UFR TRIPPING LOG

(To be furnished by respective GSS to **SLDC** on **5th** of each month)

Name of Grid Sub-Station

Reporting month:

Name of GSS	Name of Feeder	Voltage (kV)	Relay Details	Date	Time of Tripping	Time of Reset

WBSOP 104 F04

SLDC CERTIFICATE FOR "DEEMED GENERATION" DUE TO BACKING DOWN OF GENERATORS

(Issued by **SLDC** in terms of provisions of relevant PPA & sent to SSGS & Commercial Department)

For Month:

Date of Issue:

Name of SSGS	Unit No.	MW Generation Prior to Backing Down	MW Generation Asked to Back Down	Actual MW Backed Down	Deemed Generation MW	Date From- To	Time From - To

105 SCHEDULING PROCEDURE

105.1 INTRODUCTION

105.1.1 This document describes the methodology for determination of day-ahead generation scheduling for SSGS and drawal schedule in ISGS for West Bengal. The outputs of this procedure serve as basis for the Generation and Drawal Monitoring. This procedure also explains the process for revision in generation and drawal schedules on real time basis.

105.2 OBJECTIVES

105.2.1 To identify at the day-ahead time scale any deficit or surplus generation requirement in line with day-ahead demand estimates.

105.2.2 This procedure will enable **SLDC** to produce the following:

a. A day-ahead availability schedule
b. A day ahead generation & drawal schedule
c. A load shedding schedule when required

105.3 SCOPE

105.3.1 This procedure applies to the **SLDC** and each SSGS of the State Transmission System and ISGS through ERLDC.

105.4 RESPONSIBILITY

105.4.1 Chief Engineer (**SLDC**), shall be responsible for Scheduling procedure.

105.4.2 Shift In-Charge, **SLDC** Control room shall be responsible for revision of drawal schedule on real time basis.

105.5 METHODOLOGY

105.5.1 Superintending Engineer (**SLDC**) shall observe the following steps for Scheduling procedure for ISGS and SSGS.

105.5.2 **Generation Scheduling**

a. State Sector Generating Stations (SSGS)

i. For the purpose of scheduling each day starting from **00.00** hrs shall be divided into 96 blocks of 15 minutes interval each.

ii. Each SSGS shall furnish to **Chief Engineer (SLDC)**, before **11.00** hrs. each day, an advance declaration of MW availability of its Generating Units for each 15 minutes blocks for the next day starting from **00.00** hrs.

iii. SSGS shall furnish this generation schedule in Format WBSOP 105 F01 through Fax or E-mail.

iv. Each SSGS shall indicate the MVARs, which they shall provide / absorb to/from the grid to maximum possible extent based on the system voltage at each 15 minutes block in the Format WBSOP 105 F01.

v. In declaring the MW availability, Hydro Power Stations shall indicate their respective reservoir levels and any other restrictions and shall report the same to the **SLDC** with their schedule. For Hydro generating station, the declaration shall be made for a period of time not less than 3 hours within a 24 hours period for pondage and storage type of stations and for the entire day for purely run-of-river type stations. At the time of declaration of generation for injection, the pumped storage hydro-generating station shall also declare its drawal schedule along with the sources from where power will be drawn for its pumping mode operation.

vi. Each CPP and IPP having firm obligation for import / export from State Transmission System shall provide through Fax or E-mail to the **Chief Engineer (SLDC)**, before **11.00** hrs. each day, an advance declaration of their MW import / export for each 15 minutes blocks for the next day starting from 00.00 hrs in Format WBSOP 105 F02.

b. Inter State Generating Stations (ISGS)

i. ERLDC at **10.00** hrs each day shall intimate through Fax / E-mail to **SLDC Chief Engineer (SLDC)**, anticipated ex-power plant MW and MWh entitlement in each 15 minutes blocks starting from **00.00** hrs from each ISGS in ERLDC form.

ii. **Chief Engineer (SLDC)** shall check the entitlement in ISGS with reference to allocation of the State in such ISGS and any deviations shall be reported to ERLDC.

iii. By **15.00** hrs the **Chief Engineer (SLDC)** would advise the ERLDC the requisition in each of the ISGS along-with bilateral exchange agreement for power purchase entered into by **WBSETCL**. ERLDC shall incorporate the same in the final generation and drawal scheduling.

iv. While indicating the station wise requisitions **SLDC** should ensure that the step increase is not more than 1% of the previous requisition.

v. While finalizing the requisitions at ex-periphery point the **SLDC** would consider the loss figures that would be deducted from ex-power plant in ISGS stations.

vi. By **17.00** hrs ERLDC shall convey the net drawal schedule at the periphery of the state (after deducting the apportioned estimated transmission losses)

vii. **Chief Engineer (SLDC)** shall verify the net drawal schedule received from ERLDC with reference to requisitions sent at **15.00** hrs and any deviations reported to ERLDC.

viii. **Chief Engineer (SLDC)** shall inform the modifications/changes to be made in ISGS schedule by **22.00** hrs.

105.5.3 **Day ahead 15 minutes block Drawal Scheduling**

i. **Chief Engineer (SLDC)**, shall prepare Day ahead 15 minutes block-wise drawal and generation scheduling.

ii. The drawal schedule of any 15 minute block shall be determined taking into consideration the following:

(a) If the demand estimate for any 15-minute time block exceeds to the generation availability in that block, the drawal schedule shall be equal to generation availability of that block.

(b) Planned load shedding schedule for the day ahead shall be prepared by the **Chief Engineer (SLDC)**, for such 15 minute time block, where the aggregate demand estimate exceeds the generation availability as per methodology given in Para 105.5.4

(c) If the generation availability for any 15 minute block exceeds the demand estimate the drawal schedule shall be prepared to avail the generation according to the following priorities:

1. Generation against firm commitments against bi-lateral contracts;
2. Generation from partnership projects;
3. Generation from Hydel / Thermal / Gas / Nuclear stations of State Sector and ISGS according to their variable cost;
4. Generation from CPPs according to variable cost.

iii. While framing generation/drawal schedule for hydel stations the factors to be considered shall be:

(a) Irrigation / drinking water requirements must be met and spillage of water is minimized

(b) Priority must be given to reservoir-based hydro stations during peak hours

(c) Optimum utilisation of water is as per the allotment of water share for the power generation decided by respective standing committee

iv. **Chief Engineer (SLDC)**, shall prepare a day-ahead generation Schedule for SSGS in the format specified WBSOP 105 F03.

v. **Chief Engineer (SLDC)**, shall prepare a day-ahead load 15 minute block basis Drawal Schedule for each Discom in the format specified WBSOP 105 F04.

105.5.4 **Revision of Schedules**

i. In case of forced outage of a unit, ERLDC will revise the schedules on the basis of revised declared capability. The revised schedule will become effective from the 4th time block, counting the time block in which the revision is advised by the generator to be the first one.

ii. In the event of a situation arising due to bottleneck in evacuation of power due to transmission constraint, ERLDC shall revise the schedule which shall become effective from the 4th time block. During the first three time blocks also the schedule shall deemed to have been revised to be equal to the actual generation by the ISGS and drawal by the states.

iii. In case of any grid disturbance, the scheduled generation of all the generating stations and scheduled drawal of all the beneficiaries shall be deemed to have been revised to be equal to their actual generation / drawal for all the time blocks affected by the grid disturbance. The exact duration of such grid disturbance would be declared by ERLDC.

iv. ERLDC shall permit the revision of declared capability by ISGS and requisitions by any state for the remaining period of the day / block with advance notice of 6 time block. Revised schedules / declared capability in such cases shall become effective from the 6th time block, counting the time block in which the request for revision has been received in ERLDC to be the first one.

v. In case any constituent seeks a revision in the bilateral schedules, the same would have to be confirmed by the other partner within a period of one hour. The revised schedules in such event would come in to effect from 6th time block.

vi. If, at any point of time, the ERLDC observes that there is need for revision of the schedules in the interest of better system operation, it may do so on its own and in such cases, the revised schedules shall become effective from the 4th time block.

vii. ERLDC shall put all such revised schedule on its website and **Divisional Engineer (Shift In-charge)** shall consider every revision by ERLDC and if need be modify /

revise the drawal schedule of SSGS or revise the Discom drawal schedule and load shedding plan based on the circumstances at that moment.

viii. The Generation schedules and drawal schedules issued / revised by ERLDC shall become effective from designated time block irrespective of communication successes to inform all such revisions. The Shift In-charge **SLDC** is expected to be utmost vigilant and updated with all revisions and developments in power supply position from time to time.

ix. In the event of outage of a SSGS unit the **Divisional Engineer (Shift In-charge)** of the **SLDC** shall attempt to avail the un-requisitioned ISGS schedules from ERLDC to the extent possible. The un-requisitioned schedules are displayed by ERLDC on its web site considering the large volume of information needed to be exchanged.

105.5.5 Time frame for day ahead hourly Generation & Scheduling

105.5.6 Chief Engineer (**SLDC**) shall ensure that following time frame for generation and drawal scheduling is strictly adhered to:

10.00 hrs	ERLDC sends MW and MWh entitlement schedule in each 15 minutes block from ISGS and power share against bilateral agreement(s) for West Bengal and other States.
11.00 hrs	SSGS to furnish declaration of MW availability and MVAR drawal / supply of its Generating Units for each 15 minute time block for the next day starting from **00.00** hrs. Hydel stations to intimate the reservoir levels and discharge restrictions if any. CPPs and IPPs to indicate import / export obligations on 15 minutes time block basis.
15.00 hrs	**Chief Engineer (SLDC)**, intimates the Generation availability and Drawal Schedule to ERLDC.
17.00 hrs	ERLDC intimate drawal schedule in each 15 minutes blocks from ISGS and power share against bilateral agreement(s) for West Bengal.
19.00 hrs	**Chief Engineer (SLDC)**, to intimate the Generation Schedule to SSGS and Drawal Schedule to Discoms.
21.00 hrs	SSGS to intimate un-schedule outage of their generating units if any and consequent changes in their Generation/availability.
22.00 hrs	**Chief Engineer (SLDC)**, shall inform the ERLDC for change of drawal schedule from ISGS and bi-lateral trading for any valid reasons like un-

	schedule outage of any SSGS generating unit, critical transmission lines / major ICTs.
23.00 hrs	ERLDC shall issue Final Drawal Schedule to **SLDC**.
23.30 hrs	**Chief Engineer (SLDC)**, intimate final drawal schedule to SSGS and Discoms.

WBSOP F01

GENERATION SCHEDULE FOR SSGS

(To be issued by SSGS to **SLDC** each day for day-ahead basis)

Name of Power Station:

Date of issue: **Time of Issue:**

Date for Schedule:

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								
59								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								
81								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
82								
83								
84								
85								
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								

WBSOP 105 F02

GENERATION SCHEDULE FOR IPP / CPP

(To be issued by IPP / CPP to **SLDC** each day for day-ahead basis)

Name of IPP / CPP:

Date of submission:

Time of Submission:

Block No.	Block Time	Import	Export	Net
		MW	MW	MW
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Block No.	Block Time	Import	Export	Net
		MW	MW	MW
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				

Block No.	Block Time	Import	Export	Net
		MW	MW	MW
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				

Block No.	Block Time	Import	Export	Net
		MW	MW	MW
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				

Block No.	Block Time	Import	Export	Net
		MW	MW	MW
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				

WBSOP 105 F03

GENERATION SCHEDULE FOR SSGS

(To be issued by **SLDC** to SSGS each day for day-ahead basis)

Name of Power Station:

Date of Issue:

Time of Issue:

Date of Drawal Schedule

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								
32								
33								
34								
35								
36								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
37								
38								
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								
71								
72								
73								
74								
75								
76								
77								
78								
79								
80								

Block No.	Block Time	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Total
		MW	MW	MW	MW	MW	MW	MW
81								
82								
83								
84								
85								
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								
96								

WBLDOP 105 F 04

Planned 15 Minute Discom wise Drawal Schedule

Date: (Fig in MW)

BLOCK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Hourly Block Generation Availability																								
Aggregate Hourly Demand																								
Hourly Excess / Shortage																								
DISCOM WISE LOAD SHEDDING																								
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
CESC																								
Kolkata & Howrah																								
DPL																								

BLOCK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Durgapur																								
DPSCL																								
Asansol-Raniganj																								
WEST BENGAL TOTAL																								

BLOCK	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Hourly Block Generation Availability																								
Aggregate Hourly Demand																								
Hourly Excess / Shortage																								
DISCOM WISE LOAD SHEDDING																								
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
CESC																								
Kolkata & Howrah																								
DPL																								
Durgapur																								
DPSCL																								

Asansol-Raniganj																							
WEST BENGAL TOTAL																							

BLOCK	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Hourly Block Generation Availability																								
Aggregate Hourly Demand																								
Hourly Excess / Shortage																								
DISCOM WISE Load Shedding																								
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
CESC																								
Kolkata & Howrah																								
DPL																								
Durgapur																								

DPSCL																								
Asansol-Raniganj																								
WEST BENGAL TOTAL																								

BLOCK	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Hourly Block Generation Availability																								
Aggregate Hourly Demand																								
Hourly Excess / Shortage																								
DISCOM WISE Load Shedding																								
WBSEDCL																								
CESC																								
DPL																								
DPSCL																								
CESC																								
Kolkata & Howrah																								

DPL																								
Durgapur																								
DPSCL																								
Asansol-Raniganj																								
WEST BENGAL TOTAL																								

106 DESPATCH PROCEDURE

106.1 INTRODUCTION

106.1.1 This document describes the methodology for regulating the drawal from SSGS / ISGS. This procedure also explains the process for revision in generation and drawal schedules on real time basis.

106.2 OBJECTIVES

106.2.1 To identify on the day-ahead time scale any deficit or surplus generation requirement in line with day-ahead demand estimates.

106.2.2 This procedure will enable the **SLDC** to regulate the drawal from SSGS and ISGS on real time basis, wherever possible, taking into consideration Availability Based Tariff system in ERPC in a coordinated manner.

106.3 SCOPE

106.3.1 This procedure applies to the **SLDC** and each SSGS of the State Transmission System and ISGS.

106.4 RESPONSIBILITY

106.4.1 Chief Engineer (**SLDC**) is responsible for the implementation and maintenance of this procedure.

106.4.2 Shift In-Charge, **SLDC** Control room shall be responsible for revision of drawal schedule and operation of drawal schedules on real time basis.

106.5 METHODOLOGY

106.5.1 **SLDC** shall observe the following procedure for monitoring despatch from ISGS and SSGS.

106.5.2 **Despatch on real time basis**

106.5.3 Shift In-charge shall follow the schedule finalized on the previous day and shall monitor the same for any variations.

106.5.4 **Revision of drawal schedule on real time basis**

106.5.5 During the day of operation, the drawal schedule may be revised under following conditions:

i. In case of forced outage of a unit, **SLDC** will revise the schedules on the basis of revised declared capability. The revised schedule will become effective from the 4th time block, counting the time block in which the revision is advised by the generator to be the first one.

ii. In the event of a situation arising due to bottleneck in evacuation of power due to transmission constraint, **SLDC** shall revise the schedule which shall become effective from the 4th time block. During the first three time blocks also the schedule shall deemed to have been revised to be equal to the actual generation by the ISGS and drawal by the states.

iii. In case of any grid disturbance or force majure, the scheduled generation of all the generating stations and scheduled drawal of all the beneficiaries shall be deemed to have been revised to be equal to their actual generation / drawal for all the time blocks affected by the grid disturbance. The exact duration of such grid disturbance would be declared by **SLDC**.

iv. **SLDC** shall permit the revision of declared capability by SSGS and requisitions by any state for the remaining period of the day / block with advance notice of 6 time block. Revised schedules / declared capability in such cases shall become effective from the 6th time block, counting the time block in which the request for revision has been received in **SLDC** to be the first one.

v. In case any constituent seeks a revision in the bilateral schedules, the same would have to be confirmed by the other partner within a period of one hour. The revised schedules in such event would come in to effect from 6th time block.

vi. If, at any point of time, the **SLDC** observes that there is need for revision of the schedules in the interest of better system operation, it may do so on its own and in such cases, the revised schedules shall become effective from the 4th time block.

vii. **SLDC** shall put all such revised schedule on its website and **Shift In-charge** shall consider every revision by **SLDC** and if needed modify / revise the drawal schedule of SSGS or revise the Discom drawal schedule and load shedding plan based on the circumstances at that moment.

viii. The Generation schedules and drawal schedules issued/revised by **SLDC** shall become effective from designated time block irrespective of communication successes to inform all such revisions. The Shift In-charge **SLDC** is expected to be utmost vigilant and be

updated with all revisions and developments in power supply position from time to time.

ix. In the event of outage of a SSGS unit the **Shift In-charge** of the **SLDC** shall attempt to avail the un-requisitioned ISGS schedules from **SLDC** to the extent possible. The un-requisitioned schedules are displayed by **SLDC** on its web site.

106.5.6 **Frequency Based UI under ABT**

106.5.7 The Availability Based Tariff Order becomes effective in the Eastern Region from 1st April, 2003.

106.5.8 Under ABT, the variation in actual generation/drawal and scheduled generation/ drawal is termed as Unscheduled Interchange (UI). UI for generating station shall be equal to its actual generation minus its scheduled generation. UI for beneficiary shall be equal to its total actual drawal minus its total scheduled drawal. UI shall be worked out for each 15 minute time block. UI charges shall be based on average frequency of the time block as per the following rates effective from 7th January, 2008:

Average Frequency of Time Block	UI Rate (Paise per kwh)
50.50 Hz and above	0.0
50.50 Hz - 50.48 Hz	8.0
50.48 Hz – 50.46 Hz	16.0
50.46 Hz – 50.44 Hz	24.0
50.44 Hz – 50.42 Hz	32.0
50.42 Hz – 50.40 Hz	40.0
50.40 Hz – 50.38 Hz	48.0
50.38 Hz – 50.36 Hz	56.0
50.36 Hz – 50.34 Hz	64.0
50.34 Hz – 50.32 Hz	72.0
50.32 Hz – 50.30 Hz	80.0

Average Frequency of Time Block	UI Rate (Paise per kwh)
50.30 Hz – 50.28 Hz	88.0
50.28 Hz – 50.26 Hz	96.0
50.26 Hz – 50.24 Hz	104.0
50.24 Hz – 50.22 Hz	112.0
50.22 Hz – 50.20 Hz	120.0
50.20 Hz – 50.18 Hz	128.0
50.18 Hz – 50.16 Hz	136.0
50.16 Hz – 50.14 Hz	144.0
50.14 Hz – 50.12 Hz	152.0
50.12 Hz – 50.10 Hz	160.0
50.10 Hz – 50.08 Hz	168.0
50.08 Hz – 50.06 Hz	176.0
50.06 Hz – 50.04 Hz	184.0
50.04 Hz – 50.02 Hz	192.0
50.02 Hz – 50.00 Hz	200.0
50.00 Hz – 49.98 Hz	208.0
49.98 Hz – 49.96 Hz	216.0
49.96 Hz – 49.94 Hz	224.0
49.94 Hz – 49.92 Hz	232.0
49.92 Hz – 49.90 Hz	240.0
49.90 Hz – 49.88 Hz	248.0
49.88 Hz – 49.86 Hz	256.0
49.86 Hz – 49.84 Hz	264.0

Average Frequency of Time Block	UI Rate (Paise per kwh)
49.84 Hz – 49.82 Hz	272.0
49.82 Hz – 49.80 Hz	280.0
49.80 Hz – 49.78 Hz	298.0
49.78 Hz – 49.76 Hz	316.0
49.76 Hz – 49.74 Hz	334.0
49.74 Hz – 49.72 Hz	352.0
49.72 Hz – 49.70 Hz	370.0
49.70 Hz – 49.68 Hz	388.0
49.68 Hz – 49.66 Hz	406.0
49.66 Hz – 49.64 Hz	424.0
49.64 Hz – 49.62 Hz	442.0
49.62 Hz – 49.60 Hz	460.0
49.60 Hz – 49.58 Hz	478.0
49.58 Hz – 49.56 Hz	496.0
49.56 Hz – 49. 54 Hz	514.0
49.54 Hz – 49.52 Hz	532.0
49.52 Hz – 49.50 Hz	550.0
49.50 Hz – 49.48 Hz	568.0
49.48 Hz – 49.46 Hz	586.0
49.46 Hz – 49.44 Hz	604.0
49.44 Hz – 49.42 Hz	622.0
49.42 Hz – 49. 40 Hz	640.0
49.40 Hz – 49.38 Hz	658.0

Average Frequency of Time Block	UI Rate (Paise per kwh)
49.38 Hz – 49.36 Hz	676.0
49.36 Hz – 49.34 Hz	694.0
49.34 Hz – 49.32 Hz	712.0
49.32 Hz – 49.30 Hz	730.0
49.30 Hz – 49.28 Hz	748.0
49.28 Hz – 49.26 Hz	766.0
49.26 Hz – 49.24 Hz	784.0
49.24 Hz – 49.22 Hz	802.0
49.22 Hz – 49.20 Hz	820.0
49.20 Hz – 49.18 Hz	838.0
49.18 Hz – 49.16 Hz	856.0
49.16 Hz – 49.14 Hz	874.0
49.14 Hz – 49.12 Hz	892.0
49.12 Hz – 49.10 Hz	910.0
49.10 Hz – 49.08 Hz	928.0
49.08 Hz – 49.06 Hz	946.0
49.06 Hz – 49.04 Hz	964.0
49.04 Hz – 49.02 Hz	982.0
49.02 Hz – 49.00 Hz	1000.0

106.5.9 The **SLDC** will have following information available at all time in Control Room for real time operations under ABT:

i. A generating station wise list indicating their respective energy charge rate (p/kWh) arranged in ascending order

ii. UI rate (p/kWh) tabulated against frequency in Hz.

106.5.10 The aim shall be to optimize the pooled cost of generation by continuously replacing costlier generation with that of lower cost vis-à-vis the frequency based UI rate. Action depends on prevailing frequency and whether West Bengal is over-drawing or under drawing.

106.5.11 The **SLDC** shall continuously monitor grid frequency and will take following actions:

106.5.12 **Case –1 - When frequency is good or high and the state is overdrawing:**

106.5.13 No action required as long as frequency is high such that the UI rate is lower than the variable cost of SSGS. Such frequency shall be named as "Break-even frequency". Further enhanced optimization action should be taken as under:

a) Restore consumer load that had been shed, if the tariff / realization rate for such loads is higher than current UI rate. This will increase over-drawal.
b) Reduce own generation to the extent possible and increase over-drawal so long as frequency is above "Break-even frequency".

106.5.14 **Case –2 - When frequency is good or high and the state is under-drawing**:

a) Restore consumer load that had been shed if the tariff / realization rate for such loads is higher than current UI rate. This will reduce over drawal.
b) Reduce own generation to the extent possible if the frequency is above "Break-even frequency". This would reduce under drawal.

106.5.15 **Case 3 - When frequency is low and the state is overdrawing:**

a) Increase ISGS requisitions if full entitlement not availed earlier
b) Increase own generation to the maximum possible extent
c) Try bilateral purchase from another SEB at the trade-off rate below UI rate
d) Curtail consumer load. Load shedding to be graded balancing between UI rate and consumer category

106.5.16 **Case 4 - When frequency is low and the state is under-drawing:**

106.5.17 No action required so long as frequency is low such that the UI rate is higher than the variable cost of SSGS.

106.5.18 Further enhanced optimization action should be taken as under:

a) Increase own generation to the extent possible. Compare variable cost with current UI rate.
b) Increase other SEB requisitions, if full entitlement not availed earlier and earn UI to the maximum extent

106.5.19 Thus when average frequency in the block is high such that UI rate is lower than variable rate of SSGS

a. The Shift In-Charge **SLDC** Control Room shall issue despatch instructions to state sector generating stations for backing down generation according to descending order of cost.
b. This will result in automatic overdrawals from ISGS to avail the advantage UI incentive.

106.5.20 And when average frequency in the block is low such that UI rate is higher than variable rate of SSGS.

a. The Shift In-Charge **SLDC** Control Room shall issue despatch instructions to state sector generating stations to pick-up additional generation to the extent of their operating reserve.

b. This will result in automatic reduction of over drawal from ISGS to avoid UI penalties for over drawal.

107 FREQUENCY CONTROL/AREA-ERROR CONTROL PROCEDURE

107.1 INTRODUCTION

107.1.1 This procedure describes the steps to be followed by **SLDC** to assist in keeping the Regional system frequency in the normal range as defined in West Bengal Grid Code.

107.1.2 All users within Eastern Region must fulfil their responsibilities to frequency control as agreed by ERPC and attempt to follow instructions of ERLDC in backing down of State generation, regulating loads and holding where possible spinning reserves within the capabilities of State generation.

107.1.3 It is accepted that **SLDC**, when acting alone, is unable to control regional frequency unless the State Transmission System is separated from the rest of the Eastern Regional Grid. Nevertheless, **WBSETCL** is able to contribute to regional frequency control by regulating generation in the State and by adhering to the daily drawal / generation schedule as agreed with ERLDC in order to reduce area error.

107.1.4 The process by which **SLDC** assists in regulating frequency within the Eastern Regional Grid is defined in this procedure.

107.1.5 Information supplied by Discoms on Demand Estimation (identified in WBSOP 103) together with information from State generators on backing down capability is utilised in the implementation of this procedure.

107.1.6 To comply with Grid Code, particular attention must be paid to System Security Aspects, particularly with operation of Governor in Free Mode for generating units over fifty (50) MW for frequency sensitive operation.

107.1.7 Other requirements from Generating Units are:

(i) Operation at **105% of MCR** when frequency falls below and ramping back to the previous MW level not faster than **1% per minute**.

(ii) Turbine speed governor fitted and always-in service, having overall droop characteristic within the range **3% to 6%**.

107.2 OBJECTIVES

107.2.1 To define the responsibilities of SSGS and Discoms in contributing to frequency management / area-error management.

107.2.2 To define the actions to be taken by **SLDC** in order to assist in maintaining regional system frequency within acceptable limits as set down in the West Bengal Grid Code and in accordance with the performance standards

107.3 SCOPE

107.3.1 This procedure applies to the **SLDC** and each User of the State Transmission System.

107.4 RESPONSIBILITIES

107.4.1 Chief Engineer (**SLDC**) is responsible for the implementation and maintenance of this procedure.

107.4.2 Shift In-charge, **SLDC** shall monitor actual Drawal against scheduled Drawal and regulates SSGS and demand to maintain schedule.

107.4.3 Shift In-charge **SLDC** shall continuously monitor regional system frequency for management of Unscheduled Interchange.

107.4.4 SSGS shall follow the despatch instructions issued by **SLDC**.

107.4.5 Discoms shall cooperate with **SLDC** in the management of demand on instruction from **SLDC**.

107.5 DAY-AHEAD ARRANGEMENTS

107.5.1 At 10.00 hrs Shift In-charge **SLDC** shall obtain from each SSGS the MW spinning reserve for each unit (i.e. unit already synchronised), the MW capacity reserve for each unit (units that can be synchronised), and each unit backing down capability.

107.5.2 Shift In-charge **SLDC** shall provide details of MW spinning reserve when requested by ERLDC pursuant to the ERPC policy.

107.6 FALLING FREQUENCY

107.6.1 If Drawal is less than allocated, Shift In-charge **SLDC** should request ERLDC to explore possibility of increasing the generation of ISGS or any other Constituents.

107.6.2 If Drawal is more than allocated, Shift In-charge **SLDC** should correct immediately, by increasing generation from SSGS. This means using spinning reserve, and ordering synchronisation of more units. First increase hydro-generation, then CPP generation, then thermal generation. Simultaneously ERLDC may be requested for action to assist in boosting the low frequency.

107.6.3 Should frequency fall below 48.5Hz, and **WBSETCL** Drawal is not higher than the schedule, this may be intimated to **SLDC** and to be communicated to ERLDC by telephone and then by fax for corrective action.

107.6.4 Should frequency continue to fall again, this may be intimated to Chief Engineer (**SLDC**). If ERLDC requests and after the highest-set Under Frequency Relay (UFR) gets operated, manual load shedding may be done for the same amount of load, using the schedule prescribed in WBSOP 104 (Demand Control), in some other area to allow the frequency to rise above the highest-set UFR (48.20 Hz) so that the UFRs can be re-set. In case any other fault occurs with the outage of any Generator, then by this method the system can be saved.

107.6.5 **WBSETCL** should import less power than the allocation and if possible export power to the system during low frequency for commercial benefits. The generation from SSGS should be maximized for such periods.

107.7 RISING FREQUENCY

107.7.1 If drawal is less than allocated, Shift In-charge **SLDC** should correct it immediately, if possible by increasing demand if there is any load disconnected at the time, or if not, then check whether the SSGS are as per their hourly generation schedule. If generation is more, then bring them to schedule by reducing the generation. First reduce hydro (provided this does not cause water spillage), then reduce CPP generation, then reduce thermal generation (down to the pre-identified oil support level or agreed minimum level). Simultaneously discuss with ERLDC for any other action that ERLDC may be able to take to assist for reducing high frequency.

107.7.2 In case system frequency continues to rise above 51.00 Hz after taking the above actions; this may be intimated to **SLDC**. If ERLDC requests shut down of additional hydro units, the same shall be taken up with WBSEDCL.

107.7.3 If the allocated Drawal is reached and despite the above measures, frequency continues to rise to 51.5Hz and above, Shift In-charge **SLDC** may contact ERLDC by both telephone and fax for corrective action.

107.8 REVIEW

107.8.1 Shift In-charge **SLDC** shall maintain logging of average frequency for 15 minutes time blocks. Highest frequency / lowest frequency and % frequency in the range of 49.0 – 50.5 Hz etc shall be computed based on 15 minutes time block data.

107.8.2 Shift In-charge **SLDC** should ascertain whether there is any Under Frequency Relay (UFR) Load Shedding and submit a report to Chief Engineer (**SLDC**) as well as ERPC on a monthly basis. If any UFR doesn't operate as per requirement **SLDC** will intimate to CE(**O&M**) for taking corrective action.

WBSOP 107 F01

Existing frequency Limits as per IEGC / West Bengal Grid Code / Electricity Rules

Target range (IEGC)	
Upper Limit	**50.5 Hz**
Lower Limit	**49.0 Hz**
Statutory acceptable limit (Electricity Rules)	
Upper Limit	**51.5 Hz**
Lower Limit	**48.5 Hz**

108 VOLTAGE CONTROL PROCEDURE

108.1 INTRODUCTION

108.1.1 This document describes the policy and procedure to be followed for maintaining system voltages within the acceptable limits of West Bengal Grid Code / IEGC.

108.1.2 This procedure defines the responsibilities of **SLDC** and all other users of State Transmission System to meet the requirement of the Grid Code for Voltage Management.

108.1.3 The procedure for Voltage Management needs to be applied in conjunction with the System Operating Procedure for Frequency Management (WBSOP 107), since the high voltages generally occur during high frequency conditions & vice versa. The frequency regulation therefore must be recognized as an important method of voltage control.

108.1.4 The voltage levels of State Transmission System are influenced by regional operations and constituents of the region who are required to follow the instructions of ERLDC for backing down generation, regulating loads, MVAR drawal, etc.

108.1.5 **SLDC** may request SSGS to hold MVAR reserves within their declared parameters & may then use MVAR reserves to restore voltages to statutory levels. This procedure also covers Discom load regulation as may be necessary for Voltage Control and reactive drawal management.

108.2 OBJECTIVES

108.2.1 The objective of this procedure is to enable **SLDC** to maintain the voltage of State Transmission System within the acceptable range as provided in the Grid Code.

108.2.2 This procedure will ensure that control staff of the users of State Transmission System are aware of voltage control methods available to them.

108.3 SCOPE

108.3.1 This procedure applies to the **SLDC**, all EHV Sub Stations of **WBSETCL** and all Discoms and SSGS operating within the State Transmission System.

108.4 RESPONSIBILITY

108.4.1 Shift Engineer (**SLDC**) is responsible for the implementation and maintenance of this procedure.

108.5 METHODOLOGY

108.5.1 Key inputs to satisfactory voltage control are regular monitoring of voltages, satisfactory regulation of MVAR by Generators including having AVRs and Power System Stabilizers in service at all times and finally improved frequency control.

108.5.2 Voltage is affected by both frequency & reactive demand. In order to regulate system voltage, all possible measures should be adopted to regulate frequency as a fist step in maintaining voltages.

108.5.3 Generators with voltage control capability should be instructed to change their MVAR generation appropriately i.e. to increase their MVAR generation upto the limit shown on their capability curve, in order to increase local system voltage. To reduce local system voltage, generators should be instructed to decrease MVAR generation upto the limit shown on their capability curve.

108.5.4 **WBSETCL** and/or **SLDC** shall carry out load flow studies based on operational data from time to time to predict where voltage problems may be encountered and to identify appropriate measures to ensure that voltages remain within the defined limits.

108.5.5 All 220kV Sub Station voltages shall be monitored continuously, either by automatic SCADA monitoring or by manual methods by Shift In-charge **SLDC** and **SLDC** shall further ensure that Shift Engineers at **WBSETCL** Sub Stations monitor voltage levels at all 132kV Grid Sub Stations.

108.5.6 Sub Stations where facilities for automatic monitoring through existing SCADA and ULDC are listed in Appendix 4.

108.5.7 Long distance transfer of MVAR should be avoided wherever possible.

108.5.8 Liaison with ERLDC & other users should be continuous in order that MVAR transfer through Inter Connecting Transformers (ICTs) is minimized.

108.5.9 Discoms shall participate in voltage management by providing local VAR compensation (as far as possible in low voltage system close to load points) such that they do not depend upon EHV Grid for reactive support.

108.5.10 At interchange point the VAR drawal / injection shall be minimum when voltage at that point is below 97% or above 103%.

108.6 TAP CHANGING & CAPACITOR SWITCHING GUIDELINES

108.6.1 The Shift Engineer (**SLDC**) shall ensure that guidelines as detailed below for changing tap position and shunt capacitor switching of transformers are duly implemented & maintained by the Shift In-charge of respective Grid Sub Stations for voltage control.

i. If there is a tendency of voltage increase on higher taps, then the same may be regulated by OLTC. If the power factor goes above 0.98 lagging or the voltage exceeds the normal voltage even after reducing the tap position of the transformer, the capacitor bank is to be switched 'OFF'. This will enable the optimum use of capacitor banks.

ii. The capacitor should be kept 'ON' only when inductive load current exceeds the amperage of capacitors i.e. net power factor does not go on leading side. Also, the capacitor bank is to be kept in service, if the power factor is below 0.88 lagging & voltage is also below the normal value.

iii. The load of GSS and capacity of capacitor bank should match as per following table:

Normal Voltage	Minimum Load Current (Amps)	MVAR to be Switched 'ON'
33kV	50/60 Amp	2.5/3.3 MVAR
33kV	100/120 Amp	5.0/5.43 MVAR
11kV	120/150 Amp	2.0/2.5 MVAR
11kV	250/300 Amp	4.0/5.0 MVAR

iv. When the LV side voltage i.e. 33kV or 11kV is higher than normal voltage but HV side voltage is lower than the normal voltage, the capacitor(s) should be invariably switched 'ON' & LV voltage should be adjusted through OLTC so that reactive flow from the system on primary side is minimized.

v. Wherever there are two or more capacitor banks of the same voltage rating on the same bus but controlled by separate breakers then two or more of them can be switched 'ON' unless they are provided with series reactor. At Sub Station when two or more separate capacitor banks are installed and one of them is not provided with reactor, then the capacitor bank without reactor is to be switched 'ON' first and capacitor bank(s) with reactor are to be switched 'ON' thereafter.

vi. When capacitor bank trips on fault or switched 'OFF' manually its isolator should cut 'OFF' after five minutes of tripping and nobody should be allowed to touch the capacitor bank until it has been completely discharged / short circuited and grounded.

108.7 LOW SYSTEM VOLTAGE

108.7.1 When any unacceptable voltage level, which is not within limits as prescribed in Annexure WBSOP 108 F01, occurs due to low frequency, Shift In-charge **SLDC** should request ERLDC by telephone to control any low frequency problem, with follow up in writing through fax. Shift In-charge **SLDC** can take any/all of the following steps to control the system voltage within prescribed limits:

i. Any circuits which are available to use but switched out should be switched back into service to increase MVAR gain of the system.
ii. Bus capacitors should be switched 'ON' wherever possible. The list of switchable bus capacitors is given in Annexure WBSOP 108 F03
iii. Bus reactors should be switched 'OFF' wherever possible. The list of switchable bus reactors is given in Annexure WBSOP 108 F02
iv. Tap changing of 400kV/220kV and 220kV/132kV ICTs should be carried out in consultation with ERLDC.
v. SSGS should be requested to increase MVAR output to the limit shown on their capability curves.
vi. SSGS should be instructed to perform on load tap changing at sites where these are provided.
vii. Any synchronous condensers which are available should be utilized.

108.8 HIGH SYSTEM VOLTAGE

108.8.1 In case of system voltage exceeding the limits prescribed in Annexure WBSOP 108 F01, any/all of the following steps should be taken by the Shift In-charge **SLDC** to bring the voltage back to acceptable limits:

i. Any synchronous condensers which may be running should be shut down.
ii. Bus capacitors should be switched 'OFF' wherever possible.
iii. Bus reactors should be switched 'ON' wherever possible.
iv. Where regional frequency is high, ERLDC should be requested to control system high frequency.
v. Tap changing of 400kV/220kV and 220kV/132kV ICTs should be carried out after discussions with ERLDC.
vi. SSGS should be instructed to perform on load tap changing at sites where these are provided.

vii. Any circuits which can be switched out of service without affecting the security of the system should be switched out to reduce MVAR gain.
viii. SSGS should be requested to increase MVAR absorption to the limit shown on their capability curves, bearing in mind the requirement to have the Power System Stabilizer in service at all times.

108.9 LOGGING OF PLANT STATUS DATA

108.9.1 Satisfactory logging of plant status data is important in maintaining system voltages within statutory limits. This logging should include:

i. A record of any of Generators or AVRs or Power System Stabilizers which are out of service, together with the reason & the expected restart time.
ii. A record of all Sub Stations at which the voltage has deviated from the normal range, together with the length of time and the reason for that deviation.
iii. A record of any SSGS which are carrying MVAR reserves.
iv. Accurate logging of all operational messages into and out of the **SLDC** control room.
v. Logging of all switching times for capacitor banks and/or reactors into or out of service.

108.10 APPENDICES

1. WBSOP 108 F01 – The prescribed acceptable limits for different voltage levels as per IEGC / West Bengal Grid Code.
2. WBSOP 108 F02 – The list of Sub Stations with switchable bus reactors.
3. WBSOP 108 F03 – The list of Sub Stations with switchable bus capacitors.
4. WBSOP 108 F04 – Sub Stations where facilities for automatic monitoring through existing SCADA and **ULDC** provided are listed in Appendix 4.
5. Log of daily maximum and minimum voltage levels at every **220kV** Grid Sub Stations during the day to be maintained by respective GSS (This may be manual from site or automatic later).
6. Log of switching times at which all of reactors, capacitors, cables, lines, Generators are switched in or out, etc. to be maintained by respective GSS.

WBSOP 108 F01

ACCEPTABLE VOLTAGE LIMITS AS PER IEGC / WEST BENGAL GRID CODE

Voltage kV (rms)		
Nominal	**Maximum**	**Minimum**
400	420	360
220	245	200
132	145	120
66	72.6	59.4

WBSOP 108 F02

SUB-STATIONS WITH SWITCHABLE BUS REACTORS AS ON 1.12.08

SUB STATION NAME	REACTOR RATING MVAR CAPACITY	VOLTAGE (kV)
Jeerat	1x63+2x50	400 KV
Arambagh	1x50	400 KV

WBSOP 108 F03

SUB-STATIONS WITH SWITCHABLE BUS CAPACITORS AS ON 1.12.08

SUB STATION NAME	CAPACITOR RATING MVAR CAPACITY	VOLTAGE (kV)
Adisaptagram	lx10.6	33KV
Bankura	lx10.6	33KV
Barasat	lx10.6	33KV
Behala	lx10	33KV
Berhampur	2x10	33KV
C.K. Road	lx10	33KV
Debogram	2x10	33KV
Dharampur	lx10	33KV
Egra	lx10	33KV
Falta	2x10	33KV
Gokarna	lx10	33KV
Gangarampur	1x14.4	33KV
Krishnanagar	2x14.4	33KV
Katwa	2x10	33KV
Kalyani	lx10	33KV
Kolaghat	lx10	33KV
Lilloah	2x10.8	33KV
Midnapur	lx10	33KV
Rishra	2x10.8+lxl0	33KV
Raghunathganj	lx10	33KV
Sainthia	2x10	33KV
Salt Lake	2x10.8+2x12.5	33KV
Satgachia	2x10	33KV
Samsi	1x14.4	33KV
Titagarh	2x12.5	33KV

WBSOP 108 F04

SUB STATIONS WITH FACILITIES FOR AUTOMATIC VOLTAGE MONITORING THROUGH SCADA & ULDC SCHEME AS ON 1.12.08

Sl. No.	SUB STATION NAME
1.	Joka 132 KV S/Stn.
2.	Laxmikantopur 220 KV S/Stn.
3.	Liluah 132 KV S/Stn.
4.	Bandel TPS (BTPS)
5.	Adisaptagram 132 KV S/Stn.
6.	Kolaghat TPS (BTPS)
7.	Kolaghat 132 KV S/Stn.
8.	Haldia 132 KV S/Stn.
9.	New Haldia 220 KV S/Stn.
10.	Jeerat 400 KV S/Stn.
11.	Ashoknagar 132 KV S/Stn.
12.	Salt Lake 132 KV S/Stn.
13.	Kasba 220 KV S/Stn.
14.	Purulia Pump Storage Plant HPS
15.	Dharampur 132 KV S/Stn.
16.	Titagarh 132 KV S/Stn.
17.	Bongaon 132 KV S/Stn.
18.	Rishra 220 KV S/Stn.
19.	Durgapur 220 KV S/Stn.
20.	DPL TPS
21.	Santaldih TPS
22.	Purulia 132 KV S/Stn.
23.	Bakreshwar TPS
24.	Bishnupur 132 KV S/Stn.
25.	Kharagpur 132 KV S/Stn.
26.	Satgachia 220 KV S/Stn.
27.	Debogram 132 KV S/Stn.
28.	Sainthia 132 KV S/Stn.
29.	Gokarna 220 KV S/Stn.

Sl. No.	SUB STATION NAME
30.	Arambagh 400 KV S/Stn.
31.	Midnapur 220 KV S/Stn.
32.	Asansol 220 KV S/Stn
33.	Barasat 132 KV S/Stn.
34.	Domjur 220 KV S/Stn.
35.	Rammam Stage-II TPS
36.	Birpara 132 KV S/Stn.
37.	Alipurduar 132 KV S/Stn.
38.	Raiganj 132 KV S/Stn.
39.	Malda 132 KV S/Stn.
40.	Chalsa 66 KV S/Stn.
41.	TCF-I HPS
42.	TCF-II HPS
43.	TCF-III HPS
44.	N.J.P. 220KV S/Stn.
45.	Gangarampur 132 KV S/Stn
46.	Howrah 220 KV S/Stn.
47.	N.B.U. 132 KV S/Stn.

109 GENERATION AND DRAWAL MONITORING PROCEDURE

109.1 INTRODUCTION

109.1.1 This document explains the procedure to be undertaken by **SLDC** for monitoring of actual output of SSGS against their schedules, CPP import / export, capacity reserves and trippings and Central Sector drawal against share allocations.

109.1.2 Such monitoring will provide improvement in the level of accuracy of generator outputs against scheduled outputs, leading to improved Regional frequency performance and grid discipline in accordance with West Bengal Grid Code and IEGC.

109.1.3 The monitoring of SSGS output by **SLDC** and active / reactive reserve capacity against its declared availability is important in the evaluation of plant performance.

109.2 OBJECTIVES

109.2.1 The objective of this procedure is to enable **SLDC** to have monitoring and control over following:

1. Generation violation by SSGS and CPP import-export against schedules.
2. Drawal from ISGS against allocations.
3. Monitoring of generator capability against declared capability and governor response and AVR characteristics.

109.3 OUTPUT

109.3.1 **SLDC** produce output as under to exercise control and monitoring of performance: Position previous-day generation and drawal and unscheduled interchange (in the format specified in the Appendix WBSOP 109 F01).

109.3.2 Status of automatic voltage regulator and governor and any tripping associated with each generating unit (in the format specified in the Appendix WBSOP 109 F02).

109.3.3 Any unscheduled tripping time of State, Central Sector and CPP generators shall be maintained as per format provided in WBSOP 109 F03.

109.4 RESPONSIBILITIES

109.4.1 The Shift In-charge, **SLDC** shall be responsible for implementation and maintain this procedure continuously.

109.5 METHODOLOGY

109.5.1 The **SLDC** shall continuously monitor Generating Unit outputs, MW & MVAR and Bus voltages through SCADA. Generation and Drawal Violation shall be complied by comparison of the schedule generation of SSGS and import / export of CPPs using online ULDC logged data.

109.5.2 If the system requirement permits, a particular generator may be asked by **SLDC** to hold spinning reserve for the specified duration. The generator may be held at a part-loaded MW level or backed down, if necessary at the request of **SLDC** to give a desired output compatible with the State drawal schedule at the time. The instruction to pick up output to maximum declared capability shall be issued by **SLDC** and the actual response may be monitored to ensure that the pick-up rate compares favorably with the published generator pick-up rate.

109.5.3 Should the results of continual monitoring compare unfavourably with the actual declared parameters, or if the actual output breaches its connection conditions, **WBSETCL** shall inform the generator in writing.

109.5.4 For effective operation of the State Transmission System, it is important that a SSGS declared availability is realistic and that any departure is continually fed back to the generator to help effect improvement.

109.5.5 More stringent monitoring may be performed at any time when there is reason to believe that a SSGS declared availability may not match the actual availability or declared output does not match the actual output.

109.5.6 **SLDC** can ask for putting a generating unit to test and instruct the generating station to come up to the declared availability within time specified by generators.

109.5.7 The **SLDC** shall inform SSGS, in writing, if the continual monitoring demonstrates an apparent persistent or material mismatch between the dispatch instructions and the Generating Unit output or breach of the connection conditions.

109.5.8 Continued discrepancies shall be resolved in the Grid Code Review Panel with a view to either improve performance in future, providing more realistic declarations or initiate appropriate actions for any breach of connectivity conditions as provided in Grid Code.

109.6 LOGGING OF PLANT STATUS DATA

109.6.1 Generators shall provide the following information to Shift In-charge **SLDC** on daily basis, which shall be logged at **SLDC** on the daily log-sheet:

- Times of synchronising generators to the State Transmission System.
- Times of de-synchronising generators from the State transmission system.
- Times of unscheduled tripping of generators, together with the reason for the trip.
- Times when generator Automatic Voltage Regulators were switched out of service, together with the reason, and an expected return-to-service time.

109.7 APPENDICES

i. WBSOP 109 F01: Daily Generation and Drawal Violation.
ii. WBSOP 109 F02: Daily Generator Capability Status.
iii. WBSOP 109 F03: Un-scheduled Tripping times of State, Central Sector and CPP Generators.

WBSOP 109 F01

Daily Generation and Drawal Violation Report

(To be prepared through on-line ULDC data**)**

Generator Unit No…….

SSGS / CPP Name……

Block	Schedule Generation	Actual Generation
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Block	Schedule Generation	Actual Generation
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		

Block	Schedule Generation	Actual Generation
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		

Block	Schedule Generation	Actual Generation
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		

Block	Schedule Generation	Actual Generation
88		
89		
90		
91		
92		
93		
94		
95		
96		

WBSOP 109 F02

Daily Generator Capability Status

(To be furnished by each State Sector Generating Station)

Generator Unit No SSGS / CPP Name

Block	MW Capability	MVAR Capability (+/-)	Status of AVR	Status of Governor

WBSOP 109 F03

UNSCHEDULED TRIPPING OF SSGS/ISGS

(To be complied by **SLDC** through Online ULDC Data**)**

Generator Unit No.	Name of SSGS / ISGS	Unit Tripping Time	Unit Restoration Time	Reasons for Outage

110 Contingency Planning & System Restoration PROCEDURE

110.1 INTRODUCTION

110.1.1 This document aims to provide the general guidelines and macro level sequencing of the various operations to be performed during system restoration. However, in real time situation, depending upon the actual system conditions certain deviations may be essential to achieve the ultimate objective of speedy recovery and normalisation. Therefore, during system revival, the **SLDC** control Staff shall have to act judiciously and any such deviations, which are required for achieving the speedy revival, shall be carried out in consultation and as per instructions of the ERLDC.

110.1.2 Since the generating stations with black start facility, inter-state / inter-regional ties, synchronising points and essential loads to be restored on priority determine the system restoration sequence, the procedure shall be reviewed every subsequent year with the objective to achieve fastest possible recovery of the grid.

110.2 OBJECTIVES

110.2.1 To achieve restoration of total system in shortest possible time taking into account the generator capabilities and the operational constraints of Regional and State Transmission System.

110.2.2 To achieve re-synchronisation of State System, which has come out of synchronism.

110.2.3 To ensure that all users are aware of the steps to be taken during a major grid disturbance.

110.3 SCOPE

110.3.1 This procedure applies to State as well as Regional Grid System and affects all users of State Transmission System.

110.4 DEFINITIONS

110.4.1 **Total System Blackout:** The system is said to be under total blackout when all generation is ceased in the system and there is no supply from external inter-connections to the State Transmission System. It is not possible for the total system to function again without black start procedure.

110.4.2 **Partial System Blackout:** A situation when a part of the State Transmission System is under blackout when all the generation within that part ceased to function and there is no external interconnections, so as to possible for that part of State Transmission System / Inter State Generating Station to function again without agreed procedures.

110.4.3 **Black Start:** Procedure necessary for restoration of system to normal from a total / partial system blackout. The procedure for a partial system blackout is same as that for a total system blackout except that it applies only to the affected portion of the State Transmission System.

110.4.4 **Grid Disturbance:** Grid Disturbance is the situation where disintegration and collapse of grid either in part or full take place in an unplanned and abrupt manner, affecting the power supply in a large area of the region.

110.4.5 **System Island:** In case a part of the system is separated from the main Regional Grid System due to intentional application of under frequency relay schemes and operates independently is called System Islanding. Normal operation of the total system will require power islands to be re-synchronised at some appropriate time.

110.4.6 **System Split:** In case part or whole of State Transmission System is separated on operation of protective relays and operate independently with different frequency excursion is called system split.

110.5 RESPONSIBILITY

110.5.1 Shift In-charge, **SLDC** in coordination with ERLDC Control Room will be responsible for System Restoration.

110.6 EASTERN REGION GRID – SYSTEM RESTORATION PROCEDURE OVERVIEW

110.6.1 **Refer Appendix - WBSOP 110 F04**

110.7 GENERAL GUIDELINES & PRECAUTIONS IN SYSTEM RESTORATION

110.7.1 The general guidelines and precautions to be followed during system revival are indicated below:

(a) **SLDC** shall at all time have the latest amended copy of this document available in the Control Room.

(b) The Shift In-charge, **SLDC** shall inform the Head of **SLDC** about the situation and request assistance in the restoration process.

(c) During revival of the system, only authorized personnel would be present in control rooms of Sub-Stations / Power Stations / **SLDC** / ERLDC so as to expedite restoration of the system.

(d) In order to maintain a balance between load - generation at the time of grid contingency the list of generating stations with black start facility, inter-state / inter-regional ties, synchronising points and essential loads to be restored on priority, should be prepared and updated regularly and must be available at all times in **SLDC**.

(e) While building up the system, it would be ensured that the voltage at the charging end remains within limits. A small amount of essential load should be connected at each Sub-Station before extending the network. However, the ultimate objective viz. building up of the network should not be lost sight of, while connecting the loads.

(f) Security of the network being built up would be strengthened at the earliest by closing the parallel lines available in the restoration path.

(g) Priority would be accorded for extending supplies to installations where safety is of paramount importance such as nuclear power stations. The list of Priority Load is given at Appendix – WBSOP 110 F02.

(h) All switching instructions for a particular system have to emanate from a single agency viz. **SLDC** as the case may be. For synchronization of two systems, ERLDC would be the co-ordination agency. Wherever a communication problem is foreseen, proper standing instructions would be issued to the Sub-Station engineers for implementation.

(i) All communication channels required for restoration process shall be used for operational communication only, till grid normalcy is restored.

(j) All generating units of 50 MW and above ratings would be on free governor operation as per relevant requirement of WBEGC and their excitation will be controlled to maintain proper voltage profile

(k) Synchronising facility should be available at major grid Sub-Stations so as to have maximum flexibility in choosing the point of synchronisation.

110.7.2 Despite the urgency of the situation, careful and complete logging of all messages and all operations is essential to facilitate subsequent investigation into the incident and the efficiency of the restoration process.

110.8 INTER REGIONAL SUPPORT

110.8.1 In case of disturbance or any other contingency in the Eastern region or any other neighbouring region, ERLDC shall permit exchange of such power with the neighbouring region/s needed to meet the essential load, start-up-power and other such emergent requirements for the duration of such contingencies.

110.9 SYSTEM SECURITY ASPECTS

110.9.1 While restoring the system, load generation balance is to be maintained in each subsystem and all efforts to be carried out by all the constituents to maintain the parameters within the subsystem near nominal values for security of operation of the restored subsystem as well for ease of synchronisation.

110.10 APPENDICES

WBSOP 110 F01: List of Power Stations and Sub-Stations in Eastern Region with Synchronising Facility

WBSOP 110 F02: List of Essential Loads and Priority of Restoration

WBSOP 110 F03: List of Power Stations in Eastern Region with Black Start Facilities

WBSOP 110 F04: Eastern Region Grid Restoration Procedure by ERLDC

WBSOP 110 F01

LIST OF POWER STATIONS AND SUB-STATIONS IN EASTERN REGION WITH SYNCHRONISING FACILITY AS ON 1.4.08

Sr. No.	Name of Sub-Station
1.	Muzaffarpur (BSEB)
2.	Barauni (BSEB)
3.	Barhi (BSEB)
4.	Tenughat (TVNL)
5.	Patratu SHPS (JSEB)
6.	Bokaro 'A' (DVC)
7.	Bokaro 'B' (DVC)
8.	Chandrapura (DVC)
9.	Waria (DVC)
10.	Mejia (DVC)
11.	Maithon (DVC)
12.	Panchet (DVC)
12.	Maithon GT (DVC)
14.	Tilaiya (DVC)
15.	Jamshedpur (DVC)
16.	Bandel (WBPDCL)
17.	Santaldih (WBPDCL)
18.	Kolaghat (WBPDCL)
19.	Bakreswar (WBPDCL)
20.	Haldia (WBSEB)

Sr. No.	Name of Sub-Station
21.	Siliguri (WBSEB)
22.	Jaldhaka (WBSEB)
23.	Rammam (WBSEB)
24.	TCF (WBSEB)
25.	DPL (DPL)
26.	Bhanjnagar (GRIDCO)
27.	Theruvali (GRIDCO)
28.	Jaynagar (GRIDCO)
29.	Joda (GRIDCO)
30.	Indravati (OHPC)
31.	Burla (OHPC)
32.	Upper Kolab (OHPC)
33.	Balimela (OHPC)
34.	IBTPS (OPGC)
35.	Budge-Budge (CESC)
36.	Titagarh (CESC)
37.	Belur/Liluah (CESC)
38.	Southern Howrah (Andul) (CESC)
39.	FSTPP (Central Sector)
40.	Malda (Central Sector)
41.	Lalmatia (Central Sectro)
42.	Dalkhola (Central Sector)
43.	Siliguri (Central Sector)

Sr. No.	Name of Sub-Station
44.	Birpara (Central Sector)
45.	Rengali (Central Sector)
46.	KhSTPP (Central Sector)
47.	Maithon (Central Sector)
48.	Biharshariff (Central Sector)
49.	Jeypore (Central Sector)
50.	TSTPP (Central Sector)
51.	Durgapur (Central Sector)
52.	Rourkela (Central Sector)
53.	Jamshedpur (Central Sector)

WBSOP 110 F02

LIST OF ESSENTIAL LOADS AND PRIORITY OF RESTORATION AS ON 1.4.08

Sr. No.	Application	Type of Load	Priority
1	Start up Power	Generating Station Start Up	First
2	Generating Station Lighting and Auxiliary	Essential Supply	Second
3	Important Grid Sub-Station Lighting and Auxiliary	Essential Supply	Third
4	Railway Traction & Coal Mines	Railway Traction	Fourth
5	Water Supply	Water Works	Fifth
6	Medical Services	Commercial	Sixth
7	Defence	Commercial	Seventh
8	Important Installations	Commercial	Eighth

WBSOP 110 F03

LIST OF POWER STATIONS IN EASTERN REGION WITH BLACK START FACILITIES AS ON DATE. THIS LIST NEEDS TO BE ANNUALLY UPDATED. ALSO, A MERIT ORDER OF THE LIST BELOW NEEDS TO BE DEVELOPED

Sr. No.	Name of Power Station	Black Start Capability (MW)
1	Subarnarekha (JSEB)	**65**
2	Maithon HPS (DVC)	**20**
3	Maithon GT (DVC)	**27.5**
4	Burla (OHPC)	**49.5**
5	Rengali (OHPC)	**50**
6	Indravati (OHPC)	**150**
7	Jaldhaka (WBSEB)	**9**
8	Rammam (WBSEB)	**12.5**
9	TCF (WBSEB)	**7.5**
10	Rangit (NHPC)	**20**
11	Chukka (CHPC)	**90**
12	PPSP (WBSEDCL)	**900**

WBSOP 110 F04

EASTERN REGION GRID RESTORATION PROCEDURE BY ERLDC

1. **SLDC**/RLDC should inform the power stations who have black start facilities to take immediate action.

2. **SLDC**/RLDC should inform the Chief of system operation and Chief of communication about the severity of collapse.

3. While choosing the path for start-up power, 220kV and above lines are to be avoided as far as possible.

4. For extending start up power 132kV path should be chosen as far as possible to avoid over voltage.

5. Minimum number of sections in 132kV are to be chosen to avoid coordination and switching problem.

6. If required, load is to be released in a co-ordinate manner as far as possible at intermediate sub-stations to arrest over-voltage, if any.

7. To avoid unbalancing, phase balancing should be kept in view if traction load is released.

8. Generator loading which is supplying start-up power should be checked and total loading should not cross 80% of its capacity. Efforts should be made to keep the generator operating to lagging side, if not possible at least to near unity power factor.

9. Thermal stations should be provided survival power as early as possible to avoid damage to the equipment in case of DC failure. (e.g. Barring gear, lub oil, seal oil, compressor for circuit breakers, etc.).

   Operator should be able to distinguish between start-up and survival power.

10. Auxiliary power should be released in steps so that all the running units could be started gradually.

11. No of islands formed to be checked to avoid any mis-synchronisation.

12. Check the sub-stations which have synchronising facilities in proper working order / capabilities (it is apprehended that due to continuous integrated operation, operating personnel have lost the experience of synchronising the lines in most of the sub-stations). Rough synchronisation should be avoided as small system may not be able to take the jerk.

13. Check how many units were running in each power station before collapse to assess the start-up power required.

14. In order to increase spinning reserve in healthy system, if required shedding should be done in islands which have survived.

15. Shift personnel should be retained till the restoration is completed before handing over charge to next shift.

16. Area Load Despatch concept should be adopted during start-up to avoid jamming of communication system as well as decision making.

17. The start-up procedure should be known to everyone and working level personnel should do it without referring or waiting for management's consent during the crisis.

18. Maximum time for which support should be provided to the collapsed system should be documented to avoid use of start-up power for other purpose.

19. While during normal time it is 400/220kV super grid which is monitored, during start-up phase it is 132kV network which needs to be known and hence the knowledge of 132kV network is essential and the information regarding the availability of particular section at that time be made known to **SLDC**.

20. Power plant should also be kept informed so that they can differentiate between :-

- full auxiliary power to start all the running machines;
- minimum auxiliary power to start minimum number of machines;
- survival power to avoid damage to the plant and do preparatory work for start.

21. If possible Gas Turbine plants should be run to provide start-up power and to control voltage, if required by reducing MW loading and sharing MVAR depending on voltage.

22. Constituent wise priorities of load which is to be connected in steps should be documented and while releasing loads for example Traction loads, underground coal mines / deep gassy mines / AIR / TV / Telephone exchange, hospital, pumping station, etc. should be given priority depending on available generation.

23. Prior coordination with Railways is to be done to co-ordinate shifting of loads by Railways between two Railway feeding points.

24. All the measuring instruments will show below scale. MW should be understood by everyone by seeing current only. For 132kV lines where CT ratio is low it may not always be possible to note current.

25. One-day appreciation course for start-up procedure should be organised at regional level for the following : -

i) Top Management

ii) Chief Load Despatcher

iii) Load Despatch Personnel

iv) Power Station Operator

v) Sub-Station Operator

26. Tap position of station transformers, bus voltage, frequency, etc. in the power station should be carefully monitored to see that over fluxing do not occur when efforts are on to bring the unit back.

27. The manual should be updated after every addition of power system elements and should be thoroughly revised after every collapse.

28. To control over-voltage, following may be considered as per requirement of situation.

- start synchronous condenser wherever available
- keep GTs running
- Back charging from 132kV side of transformer without loading the same

i) 132/33kV transformer

ii) 132/220kV auto transformer

iii) 220/400kV auto transformer

iv) 400kV bus reactor; if required by tap changing

29. The following 132kV lines which are normally kept off may be required to be used during start-up procedure. The lines, therefore, should be tested once in a month for its healthiness. The communication between the concerned stations should be kept healthy.

♦ Joda-Kendposi 132kV S/C (GRIDCO/BSEB)

♦ Purulia-Purulia 132kV S/C (DVC/WBSEB)

♦ Maithon-Deoghar 132kV S/C (DVC/BSEB)

♦ Rourkela-Goelkera 132kV S/C (GRIDCO/BSEB)

♦ Rihand-Garwa 132kV S/C (UPSEB/BSEB)

- ♦ Rihand-Sonenagar 132kV S/C (UPSEB/BSEB)
- ♦ Sahupuri-Karmnasa 132kV D/C (UPSEB/BSEB)
- ♦ Ramgarh- Patratu 132kV S/C (DVC/BSEB)
- ♦ Purnea-Dalkhola 132kV S/C (WBSEB/BSEB)
- ♦ Waria-DPL 132kV D/C (DVC/DPL)

30. A list of DOT telephone nos. of all the sub-stations with STD code should be available at plant and at **SLDC**/RLDC as communication is the essential requirement during the restoration process.

31. Before asking power station to draw start-up power, the capacity of island to sustain the starting current of biggest Induction Motor (generally BFP) should be checked. Approximate fault level may be recalculated for the purpose.

Generator size	Typical largest motor size
500 MW Thermal	10000 kW
210 MW Thermal	4000 kW
140 MW Thermal	2370 HP
120 MW Thermal	2475 HP
110 MW Thermal	2145 HP
60 MW Thermal	1020 kW
80 MW Hydel	250 HP Cooling Water

32. Priority should be attached to provide support power to captive units in case they so request and vice-versa.

33. The restoration process is easier to utilities which are centrally situated with large number of interconnection, but requires more coordination with neighbouring utilities & RLDC. Such organisation has to be specially prepared during start-up procedure.

34. Power stations like Chukha, Balimela which are situated on the periphery have very little option of availing start-up power unless neighbouring region assists e.g. NEREB/ASEB (if WBSEB supply is not available) & SREB/APSEB.

35. At the early stage of restoration (in case of black start) when the islands are being established, the role of RLDC/**SLDC** is only advisory and coordinating. Control of the island will be from the power station or a nominated S/S or an area load despatcher but **SLDC**/RLDC should know about the islands and its generation.

The RLDC/**SLDC** will tend to assume its normal role when significant islands are to be reparalled.

36. It is felt that there is a need for a strategy of restoration to be available rather than detail. Details with 1st, 2nd & 3rd alternative may be drawn up by each constituent under intimation to EREB and ERLDC.

37. Training should be an integral part of operator's duty.

- A basic control room operator course for new entrants
- Routine discussion e.g. OCC
- Yearly talk by specialists on protection & restoration

38. It should be an established practice in black start situation to open circuit breakers so as to establish a well defined starting point for restoration.

39. Condition of DC supply source Battery/DG set should be checked at least once in a month.

40. In the power station and sub-station where it is possible to regulate the voltage a chart may be kept indicating the frequency and corresponding maximum voltage to cause overfluxing.

41. For extending start-up power from one constituent to another, clear authority should be given to **SLDC** indicating clearly the line through which such start-up power is to be extended, quantum of such power and the normal time period. Concerned **SLDC** should be empowered to resort to load shedding or to bring up generation wherever possible to extend start-up power to neighbouring constituents during any crisis. If there is provision to extend start up power to other constituents through more than one tie line, priority should be decided. If there is possibility of extending start-up power from one specific station to two or more constituents priority and quantum should be specified (e.g. Joda-Jamshedpur (DVC), Joda-Ramchandrpur (BSEB), Joda-Kendposi (JSEB).

42. RLDC/**SLDC** should assume bigger role and provide guidelines for proper utilisation of available resources.

Following General principle followed while formulating the restoration plans for individual power stations:

Case (A): Total collapse of the constituent system in which the power station is located – Priority wise sources identified in neighbouring systems, from which power can be extended to the concerned power station.

Case (B): Total black out of the individual power station only – The first priority of availing assistance should be from the other part of the constituent in which the station is located. In case this is not possible, assistance should be availed from neighbouring system.

However, the above priority may change, depending upon station specific factors / advantages.

Case (C): Total collapse of the Eastern Regional Grid – Assistance from outside regions has also been considered for BSEB, JSEB and GRIDCO systems, by virtue of their geographical positions.

43. Some Don'ts

a) Do not load lines beyond 80% capacity.

b) Do not hastily connect loads and do not allow frequency to come below 50 Hz in any case. The case of any surviving island or even unit with house-load should be informed to all.

c) Once power is extended to a power station / constituents, it should not be disconnected except emergency as all actions taken by the power station have to be redone.

d) Till the restoration process is over, **SLDC**/RLDC should not be disturbed in any way for working as Management Information System.

e) No commercial problem should be brought up for extending power during restoration process.

f) Communication links should not be made unnecessarily busy during Start-up process. During any crisis **SLDC**/RLDC are expected to be busy.

RESTORATION PLAN FOR WBSEB, WBPDCL & DPL POWER STATIONS

POWER STN.	PRIORITY: I	PRIORITY:II	PRIORITY:III	PRIORITY:IV
WBPDCL				
BANDEL	DHARAMPUR	RISHRA	B'NAGAR	ADISAPTAGRAM
SANTALDIH	ARAMBAGH	B' NAGAR	PURULIA	
KOLAGHAT	HOWRAH (WBSEB)	KOLAGHAT (DVC)	BIDHANNAGAR OR JEERAT	HALDIA (GT)
BAKRESWAR	B'NAGAR	GOKORNO	SATGACHHIA	JEERAT
WBSEB RAMMAM	OWN SOURCE	NBU	RANGIT	
HALDIA GT	KTPS	IOC CAPTIVE		
KASBA GT	KASBA (WBSEB)	KASBA (CESC)	BLACK START	
DPL (DPPS)	B'NAGAR (WBSEB)	WARIA (DVC)		
JALDHAKA HPS	CHALSA	BIRPARA		

CASE	PRIORITY WISE RESTORATION PATH
1. BANDEL TPS (WBPDCL)	
A. Total collapse of WBSEB system but power available from neighbouring system including CESC.	i) 132 kV Bandel- Dharampur-Titagarh(CESC) ii) 132 kV Bandel- Rishra- Liluah- Belur(CESC) iii) 132 kV Bandel- Howrah- Southern(CESC) iv) 132 kV Bandel -Dharampur- Jeerat - Kasba WBSEB- (CESC) v) 132 kV Bandel Dharampur-Jeerat- Jeerat 400 kV-Farakka vi) 132kV Bandel B'Nagar- 220kVB'Nagar-Parulia (POWERGRID) vii) 132 kV Bandel- B'nagar- 220 kV Bidhannagar-Waria (DVC)
D. Outage of all running units only.	i) 132 kV Bandel -Satgachhia ii) 132 kV Bandel- Dharampur-Titagarh iii) 132 kV Bandel- Rishra- Liluah Howrah- 220 kV Howrah -K'ghat iv) 132 kV Bandel- Satgachia- Mankar-Bihannagar
2. SANTALDIH TPS (WBPDCL)	
A. Total collapse of WBSEB system but power available from neighbouring system including CESC.	i) 132 kV Santaldih –Purulia (WBSEB)- Purulia (DVC) ii) 220 kV Santaldih- Bidhannagar-Parulia (PG) iii) 220 kV Santaldih- Chandil (JSEB)

	iv) 220 kV Santaldih- B'nagar- Parulia- 400 kV Parulia (PG)
D. Outage of all running units only	i) 220 kV Santaldih- Bidhannagar ii) 220 kV Santaldih Domjur- Howrah –Kolaghat iii) 220 kV Santaldih -Chandil
3. KOLAGHAT TPS (WBPDCL)	
A. Total collapse of WBSEB system but power available from neighbouring system including CESC.	i) 220 kV Kolaghat Howrah and 132 kV Howrah – Southern(CESC) ii) 220 kV Kolaghat -Howrah & 132 kV Howrah(WB) -Liluah- Belur(CESC) iii) 220 kV Kolaghat- Howrah &132 kV Howrah- BTPS – Dharampur- Titagarh(CESC) iv) 220 kV Kolaghat- Bidhannagar Waria(DVC) v) 132 kV K'ghat(W)- K'ghat(D) -Howrah- Belmuri- - Burdwan - Waria vi) 220 kV Kolaghat- Bidhannagar-Parulia (PG) vii) 400 kV Kolaghat- Jeerat-Farakka viii) 132 kV Kolaghat(W) Kolaghat(D)- Kharagpur- Mosabani- Jamshedpur ix) 400 kV KTPS- Rengali & 220 kV Rengali (PG)

B. Outage of all running units only.	i) 220 kV Kolaghat- Howrah ii) 220 kV Kolaghat-Bidhannagar iii) 400 kV Kolaghat –Jeerat- Farakka
4. BAKRESWAR TPP (WBPDCL)	
A. Total collapse of WBSEB but power available from neighbouring system including CESC.	i) 220 kV BkTPP- Bidhannagar- Waria(DVC) i) 220 kV BkTPP Gokorna-132 kV Gokorna-Khejuriaghat- Malda-Malda(PG) ii) 220 kV BkTPP- B'nagar –Parulia(PG) iii) 220 kV BkTPP- Gokarno- 132 kV Gokarno- Sainthia- B'nagar- 220 kV B'nagar -Parulia (PG) iv) 220 kV BkTPP- Satgachia and 132 kV Satgachia-Bandel- Dharampur- Titagarh-(CESC) v) 220 kV BKTPP- Satgachia and 132 kV Satgachia-Bandel- Howrah –Southern -(CESC)

B. Outage of all running units only.	i) 220 kV BkTPP- Bidhannagar ii) 220 kV BkTPP- Gokorna iii) 220 kV BkTPP- Satgachhia iv) 400 kV BkTPP- Jeerat
5. DPL's PLAN FOR RESTORATION	
A. Total collapse of DPL but power available from neighbouring system.	i) 220 kV DPL- Bidhannaga-Parulia(PG) ii) 132 kV DPL –Waria(DVC)
B. Outage of all running units only.	i) 132 kV Bidhannagar-DPL ii) 220 kV Bidhannagar-DPL

RESTORATION PLAN FOR CESC POWER STATIONS

POWER STN.	PRIORITY: I	PRIORITY:II	PRIORITY:III	PRIORITY :IV	PRIORITY:V
TITAGARH	CESC (OWN SOURCE)	TITAGARH (WBSEB)	LILUAH (WBSEB)	KASBA (WBSEB)	HOWRAH (WBSEB)
N.COSSIPORE	CESC (OWN SOURCE)	LILUAH (WBSEB)	KASBA (WBSEB)	HOWRAH (WBSEB)	TITAGARH (WBSEB)
SOUTHERN	CESC (OWN SOURCE)	HOWRAH (WBSEB)	LILUAH (WBSEB)	KASBA (WBSEB)	HOWRAH (DVC)
BUDGE-BUDGE	MAJERHAT	HOWRAH (WBSEB)			

CASE	PRIORITY WISE RESTORATION PATH
1. TITAGARH	
A. Total collapse of CESC but power available from neighbouring system.	i) 132 kV Titagarh -Titagarh (WBSEB) ii) 132 kV Titagarh- BT Road- Princep street- Kasba-Kasba (WB)
B. Outage of all running units only.	i) 132 kV Titagarh -New Cossipore ii) 132 kV Titagarh -Titagarh (WBSEB) iii) 132 kV Titagarh- BT Road- Princep street- Kasba
2. SOUTHERN	
A. Total collapse of CESC but power available from neighbouring system.	i) 132 kV Southern RS -Howrah (WBSEB)
B. Outage of all running units only.	i) 132 kV Southern RS -Howrah (WBSEB)
3. NEW COSSIPORE	
B. Total collapse of CESC but power available from neighbouring system.	i) 132 kV N. Cossipore- Belur RS- Liluah (WBSEB) ii) 132 kV New Cossipore -Titagarh-Titagarh(WBSEB)
A. Outage of all running units only.	i) 132 kV New Cossipore- Titagarh iii) 132 kV New Cossipore - Belur RS
4. BUDGE-BUDGE	
A. Total collapse of CESC but power available from neighbouring system.	i) 132 kV Budge Budge - Chakmir -Majerhat-Southern-Howrah (WBSEB)
B. . Outage of all running units only.	ii) 132 kV Budge Budge- Chakmir-Majerhat

111 OPERATIONAL EVENT REPORTING PROCEDURE

111.1 INTRODUCTION

111.1.1 This document describes the **WBSETCL** procedure for reporting operational events to the appropriate authorities. Through proper implementation of this procedure, accurate and consistent reports will be made.

111.2 OBJECTIVE

111.2.1 The objective of this procedure is to define the events to be reported, the procedure to be followed and the information to be given to ensure a consistent approach to the reporting of events in the State Transmission System.

111.3 SCOPE

111.3.1 This procedure applies to **SLDC** and all SSGS, **WBSETCL** and each Discom connected to the West Bengal State Transmission System.

111.4 RESPONSIBILITY

111.4.1 Shift Engineer, **SLDC** is responsible for monitoring and observing the reporting actions relating to system operation. The In-charge of respective grid Sub-Station / generating station control room shall be responsible for reporting of significant reportable incidents occurred at their respective GSS / Generating Station. However it should be noted that the first priority during a system incident is the safeguarding of the system and rescue operation and report writing may follow thereafter.

111.5 REPORTABLE EVENTS

111.5.1 A reportable event is an event, which has a serious effect on the operation of the Eastern Regional Grid or the State Transmission System. Any fatal and non-fatal accident resulting in death or injury to a person shall be a reportable event covered under Accident Reporting Procedure (System Operation Procedure WBSOP 112).

111.5.2 Typical examples of reportable events that could affect the Eastern Grid and/or State Transmission System are the following:

i. Exceptionally high / low system voltage or frequency (outside statutory limits).

ii. Serious equipment problem i.e. major circuit breaker, transformer or bus bar.

iii. Loss of major Generating Unit (say >100MW and >15 minutes).

iv. System split, State Transmission System breakaway or Black Start.

v. Tripping of Trunk Transmission Line, Tie-Lines, ICTs (Inter connecting transformers) and capacitor banks.

vi. Major fire incidents.

vii. Major failure of protection.

viii. Equipment and transmission line overloading.

ix. Load Crash / Loss of Load.

x. Excessive Drawal deviations.

xi. Major equipment alarms.

111.6 METHODOLOGY

111.6.1 Brief written report and communication

111.6.2 The Shift In-charge of respective grid Sub-Station (33kV and above) / generating station will promptly intimate the significant event to Shift In-charge **SLDC** Control room through PLCC/ hot line/ Telephone. If required, **SLDC** will within one hour of being informed by Shift In-charge GSS / Generating Station ask for a written report. If the incident is not minor, Shift In-charge **SLDC** control room will request Shift In-charge of respective grid Sub-Station / generating station to submit a preliminary written report within one hour of this request.

111.6.3 **Final written report and communication**

111.6.4 After restoration of the system, the In-charge of respective grid Sub-Station will furnish the final report related to the occurrence, if the incident is not classed as minor, in the prescribed format to **SLDC** for analysis. Preliminary report shall be submitted within 48 hours and detailed report shall be submitted within 7 days. In the case of an event occurring in EHV system and generating equipment which was initially reported by a constituent, the constituent shall give a written report within a week. Chief Engineer (**SLDC**), after detailed analysis, will furnish the report to Chief Engineer (**O&M**), which will be reviewed and forwarded to ERLDC, **WBSETCL** authorities, Commission and all affected Users as may be appropriate.

111.6.5 **Reporting of events**

111.6.6 The Shift In-charge of respective grid Sub-Station shall submit the final report, if incident is not classed as minor, to Shift In-charge **SLDC** Control Room with a copy to the Chief Engineer (**SLDC**) & Chief Engineer (**O&M**).

111.6.7 **Reporting of minor incidents**

111.6.8 In other cases, where **SLDC** has requested a report but the incident is minor the

111.6.9 Shift In-charge of respective Grid Sub-Station will submit a report within 5 working days to **SLDC**.

111.6.10 **Reporting to Commission**

111.6.11 All reportable incidents occurring in lines and equipment of 33 kV and above at grid sub-stations and generating stations shall be considered as major reportable incidents to the Commission. Chief Engineer (**SLDC**) shall submit preliminary report of these events to Commission within 48 hours, followed by detailed enquiry report after due analysis as may be desired by the Commission.

1. Exceptionally high / low system voltage or frequency (outside statutory limits).
2. Loss of major Generating Unit.
3. System split, State Transmission System breakaway or Black Start.

111.6.12 Chief Engineer (**O&M**) shall submit preliminary report of these events to Commission within 48 hours, followed by detailed enquiry report after due analysis as may be desired by the Commission.

1. Major fire incidents.
2. Accidents resulting in death or injury to a person.

111.6.13 Incidents not reported

111.6.14 In case of any reportable incident affecting the State Transmission System, which has not been reported, **SLDC** may at its discretion ask for a report from the User whose equipment may have caused the reportable incident.

111.7 APPENDIX

1. Format of incident reporting – WBSOP 111 F01

WBSOP 111 F01

INCIDENT REPORTING

Date of Report: _____

Time of Report: _____

1. Date and time of incident
2. Location of incident
3. Type of incident
4. System parameters before the incident (Voltage, Frequency, Flows, Generation, etc)
5. System parameters after the incident
6. Network configuration before the incident
7. Relay indications received and performance protection
8. Damage to equipment
9. Supplies interrupted and duration, if applicable
10. Amount of generation lost, if applicable
11. Estimate of time to return service
12. Cause of incident
13. Any other relevant information and remedial action taken
14. Recommendations for future improvement / repeat incident
15. Name of the organization

Name of Reporting Officer

Designation

Grid Sub-Station / Generating Station Name

112 ACCIDENT REPORTING PROCEDURE

112.1 INTRODUCTION

112.1.1 This document describes the **WBSETCL** procedure for reporting accidents causing serious injury or death of an employee or member of the public or any animal to the appropriate authorities.

112.2 OBJECTIVE

112.2.1 The implementation of this procedure will result in a clear, consistent, unambiguous communication throughout **WBSETCL** of each and every accident, so that lessons can be learned from the accident to avert recurrence of the accidents in future and observing legal requirement of intimation in prescribed manner to the Chief Electrical Inspector or the Electrical Inspector in accordance with the Electricity Rules, 2005.

112.3 SCOPE

112.3.1 This procedure applies to all SSGS, **WBSETCL** and each Discom connected to the West Bengal State Transmission System.

112.4 RESPONSIBILITY

112.4.1 If any accident occurs in connection with the generation, transmission, distribution, supply or use of electricity in or in connection with, any part of the electric lines or electrical plant of any person and the accident results or is likely to have resulted in loss of human or animal life or in any injury to a human being or an animal, within the jurisdiction of a concerned **WBSETCL** sub-station/line, In-charge of the concerned Sub-Station / line where accident took place shall be responsible for sending the reports of accident to Electrical Inspector and other concerned authorities.

112.4.2 However it should be noted that the first priority in the event of an accident is to provide relief and rescue operations for affected persons rather than writing of reports.

112.5 METHODOLOGY

112.5.1 All accidents fatal or non-fatal which can't be resolved by first aid support, shall be promptly reported by the Shift In-Charge of the concerned **WBSETCL** Sub-Station / line where accident occurred.

112.5.2 It should be determined if the accident has resulted in serious injury: whether the injury is fatal or non-fatal, whether the injured includes animals and people, and the numbers of each in initial and final written reports as per the Appendices mentioned herein.

112.5.3 Intimation of accidents shall be in accordance with the Electricity Rules, 2005 to the Chief Electrical Inspector or the Electrical Inspector.

112.5.4 All accidents identified for intimation in Electricity Rules, 2005 shall be reported within 24 hours of the knowledge of the occurrence of the fatal accident.

112.5.5 The written report of fatal and non-fatal accidents shall be sent within 48 hours of the knowledge of the occurrence of the fatal accident in the prescribed Electricity Rules, 2005 Form A (Appendix- WBSOP 112 F02).

112.5.6 The relevant extract of the Electricity Rules, 2005 regarding Intimation of Accident is given in Appendix WBSOP 112 F01

112.6 APPENDICES

112.6.1 Relevant extract of the Electricity Rules, 2005 for Intimation of Accident - Appendix WBSOP 112 F01

112.6.2 Electricity Rules, 2005 Form A - Appendix- WBSOP 112 F02

WBSOP 112 F01

Electricity Rules, 2005

Intimation of Accident

(1) If any accident occurs in connection with the generation, transmission, supply or use of electricity in or in connection with any part of electric supply lines or other works of any person and the accident results in or is likely to have resulted in loss of human or animal life or in any injury to a human being or an animal, such person or any authorized person of the generating company or licensee, not below the rank of a Junior Engineer or equivalent shall send to the Inspector a telegraphic report within 24 hours of the knowledge of the occurrence of the fatal accident and a report in writing in Form A within 48 hours of the knowledge of the occurrence of fatal and all other accidents. Where possible a telephonic message should also be given to the Inspector immediately, if the accident comes to the knowledge of the Authorized Officer of the generating company / licensee or other person concerned.

(2) For the intimation of the accident, telephone numbers, fax numbers and addresses of Chief Electrical Inspector or Electrical Inspectors, District Magistrate, Police Station, fire brigade and nearest hospital shall be displayed at the conspicuous place in the generating station, sub-station, enclosed sub-station / switching station and maintained in the office of the in-charge / owner of the Medium Voltage (MV) / High Voltage (HV) / Extra High Voltage (EHV) installations.

WBSOP 112 F02

Electricity Rules, 2005

FORM A

FORM FOR REPORTING ELECTRICAL ACCIDENTS

(To be furnished by In-charge of the concerned **WBSETCL** Sub-Station / line where accident occurred)

1 Date and Time of accident

2 Place of accident

(Village/Town, Tehsil/Thana, District and State)

3 System and voltage of supply

(Whether EHV/HV/LV line, Sub-Station/generating station/consumer's installations/service lines/other installations)

4 Designation of the person in whose jurisdiction the accident occurred.

5 Name of owner / user of energy in whose premises the accident occurred.

6 Details of victim(s)

(a) Human

S.No.	Name	Father's Name	Sex of victim	Full Postal Address	Approx. Age	Fatal / Non-Fatal

(b) Animal

S.No.	Description of Animal(s)	Number(s)	Name(s) of Owner(s)	Address (es) of owner(s)	Fatal / Non-Fatal

7 In case the victim(s) is are employee(s) of supplier:

Designation of such person(s)

Brief description of the job undertaken, if any.

Whether such person/persons was/were allowed to work on the job.

8 In case the victim(s) is/are employee(s) of a licensed contractor:

Did the victim(s) possess any electric workman's permits(s), supervisor's certificate of competency? If yes give number and date of issue and the name of issuing authority.

Name and designation of the person who assigned the duties of the victim(s)

9 In case of accident in the system of the generating company / licensee, was the Permit To Work (PTW) taken?

10 Describe fully the nature and extent of injuries, e.g. fatal / disablement (permanent or temporary) of any portion of the body or burns or other injuries.

In case of fatal accident, was the post mortem performed?

11 Detailed causes leading to the accident.

(To be given in a separate sheet annexed to this form)

12 Action taken regarding first-aid, medical attendance, etc. immediately after the occurrence of the accident (Give details)

13 Whether the District Magistrate and Police Station concerned have been notified of the accident (if so, give details)

14 Steps taken to preserve the evidence in connection with accident to the extent possible.

15 Names and designation(s) of the person(s) assisting, supervising the person(s) killed or injured.

16 What safety equipments were given to or used by the person(s) who met with this accident (e.g. rubber gloves, rubber mats, safety belts and ladders, etc.)?

17 Whether isolating switches and other sectionalizing devices were employed to deaden the section for working on the same? Whether working section was earthed at the site of work?

18 Whether the work on live lines was undertaken by authorized person(s)?

If so, the name and the designation of such person(s) may be given.

19 Whether the artificial resuscitation treatment was given to the person(s) who met with the electric accident? If yes, how long was it continued before its abandonment?

20 Names and designations of persons present at and witnessed the accident.

21 Any other information remarks.

Place

Time

Date

Signature

Name

Designation

Address of the Person Reporting

Counter Signature

Name

Designation

In-charge of Grid sub-station

113 SAFETY COORDINATION PROCEDURE

113.1 INTRODUCTION

113.1.1 This document lays down the procedure to be followed when work is required to be carried out on the line / equipment connected to State Transmission System and defines the responsibility for the safety of persons working on the EHV network to be established and maintained.

113.2 OBJECTIVE

113.2.1 The objective of this **WBSETCL** procedure is to ensure that work on inter-departmental boundary (e.g. **WBSETCL**-PGCIL, **WBSETCL**-WBSEDCL, **WBSETCL**-WBPDCL) is carried out in safe and coordinated manner thus obviating any mis-happening / accident due to any misunderstanding in any form.

113.2.2 Through proper implementation of this procedure and **WBSETCL** safety code, the accidents to persons working on the inter-departmental boundary of State Transmission system will be reduced.

113.3 SCOPE

113.3.1 This procedure applies to all lines and Sub-Stations of SSGS, **WBSETCL** and each Discom connected to the State Transmission System.

113.4 RESPONSIBILITY

113.4.1 Shift-Incharge of SSGS, **WBSETCL** and Discom, as the case may be shall be responsible for coordination and issue of PTW (Permission To Work) to ensure safety precautions.

113.5 METHODOLOGY

113.5.1 Designated Officers

i. **WBSETCL**, SSGS and each Discom connected to the West Bengal State Transmission System shall nominate suitably authorized persons to be responsible for the co-ordination of safety across that company boundary before taking up the work involving inter-departmental boundary. These persons shall be referred to as Designated Officers.

ii. The names of Designated Officers shall be circulated to the other party / other affected user with his / her designations and telephone numbers for issue of PTW.

113.5.2 Work Authorization

i. Whenever work on any transmission line / equipment connected to the State Transmission System is to be carried out, the concerned person of **WBSETCL**, wishing to carry out the work shall personally contact the concerned Designated Officer for permission to work.

ii. If the permission to work cannot be obtained personally, the designated officers shall contact through telephone and exchange Code words to ensure correct identification of both parties.

iii. Should the work extend over more than one shift, the Designated Officer shall ensure that the Designated Officer of the new shift is fully briefed on the nature of the work and the code words for PTW return.

iv. The Designated Officers shall co-operate to establish and maintain the precautions necessary for the required work to be carried out in a safe manner.

v. The line under PTW should be earthed from both the ends.

vi. Work shall not commence until the concerned person of **WBSETCL** is satisfied that all the safety precautions have been established. This Designated Officer shall issue agreed safety documentation (PTW) to the working party to allow work to commence.

vii. The PTW in respect of ISTS and specified EHV lines / ICTs shall be issued with the consent of Shift In-charge **SLDC** Control Room in coordination with ERLDC if required.

viii. The Shift In-charge **SLDC** Control Room shall issue Code for 'switching in' and 'switching off' such lines / ICTs.

ix. After completion of work and safety precautions are no longer required, the Designated Officer who has been responsible for the work being carried out shall make direct contact with the other Designated Officer to return the PTW and removal of those safety precautions.

x. The line / equipment shall only be put back to service, when all safety precautions are confirmed, by direct communication using code word contact between the two Designated Officers, and on return of PTW (agreed safety documentation) from the working party has taken place.

xi. Shift In-charge **SLDC** Control Room shall make relevant entries as per data logging procedure in the Outage / Shut-down Register.

xii. Before initiating any shut-down activity, clearly laid out switching instructions need to be provided for outage as well as restoration of elements & such instructions should be strictly followed during execution.

114 DATA LOGGING PROCEDURE IN SLDC

114.1 INTRODUCTION

114.1.1 This procedure defines responsibilities and set down procedure to be followed for acquisition, exchange and management of the one time, annual, monthly, weekly, daily and real time data between Users of the State Transmission System and **SLDC**.

114.1.2 The effective compliance of this procedure will enable the **SLDC** to maintain the prescribed data base and various Registers / Systems in exercise of its functions as per provisions of the Grid Code.

114.1.3 Through the implementation of this procedure, any relevant query put to the **SLDC** can be answered by reference to accurately logged data.

114.2 OBJECTIVES

114.2.1 The objective of this procedure is management and acquisition of data for Outage Planning, Operational Planning and Contingency Planning.

114.2.2 The objective also includes collection of the real time data for Operation, Control and Monitoring of the State Transmission System and for the system studies purpose.

114.3 SCOPE

114.3.1 This procedure relates to **SLDC** and all Users of the State Transmission System.

114.4 RESPONSIBILITIES

114.4.1 Chief Engineer (**SLDC**) is responsible for implementation and maintenance of this procedure.

114.4.2 Chief Engineer (**SLDC**) is In-charge of all shifts of **SLDC** and responsible for management and acquisition of data for Outage Planning and Operational Planning as well as contingency planning, system study and analysis.

114.4.3 Shift In-charge of the **SLDC** Control Room is responsible for collection of the real time data for Operation, Control and Monitoring of the Power System.

114.5 METHODOLOGY

114.5.1 Operational & Outage Planning and System Analysis Data

(i) Ensure that data is correctly specified in Data Collection Formats.

(ii) Ensure that Data Collection Formats appended with Grid Code and System Operation Code and SOPs updated regularly to meet the changing need with approval from the appropriate authority / committees.

(iii) Ensure that all Users are aware of the data required from them.

(iv) Arrange for data to be received from all Users in the specified formats by agreed method of communication

(v) Ensure that all data received is checked against historical data available.

(vi) Ensure that data is stored properly and updated timely.

(vii) Ensure that data changes, other than normal updates, are incorporated.

(viii) In case of non-availability of data from any of the User, the **SLDC** shall make best estimation based on historical data. Such estimated data will be informed to the User concerned with consequent responsibility.

(ix) In case of large difference between data submitted by a User and the estimate based on historical data, the **SLDC** shall furnish the relevant details to the concerned User for review of submitted data.

(x) Concerned User should review the data, and consider the difference, and if no revision is necessary, give reason for the difference. **Chief Engineer (SLDC)** then decides which data to use, and inform the User of the decision. Persistent difference in data will be raised at the Operating Committee Meeting for review.

(xi) **Chief Engineer (SLDC)** will provide all Users a list of all the data and formats required.

(xii) If **Chief Engineer (SLDC)** requires additional data or new data, a separate written request to all Users will be made stating the reasons for the requirement.

114.5.2 Real Time Data

(i) **SLDC** is responsible for Data Management of Real Time data.

(ii) Ensure that the Real Time data at the specified interval is stored.

(iii) Ensure that snap shot of the Real Time Data at the time of significant and abnormal events are stored properly.

(iv) Use the appropriate Real Time Data in operational Studies.

(v) SCADA and Communication Sections in **WBSETCL** are responsible for Real time Data Acquisition facilities.

114.5.3 Data Records at **SLDC** Control Room

(Following registers to be maintained)

S. No.	Description of Contents	Register Name	Maintained By
1	Operations, tripping, breakdown, synchronisation, shutdown of generating units and important lines / ICTs.	*Log Sheet*	**SLDC** Control Room
2	Shutdown or trippings of Generating Units with reasons, expected time of bringing it to Bar and actual time.	Unit Outage Register	**SLDC** Control Room
3	Recording of Units availability with MW and MVAR generation as declared by Generators over Phone calls and fax messages by **9 AM** each morning.	Operation Register	**SLDC** Control Room
4	Recording of Unit Status at the end of each shift: (R: Running Units, SB: Stand By Units, SD: Shut Down Units, SY: Time of Synchronisation, SM: Short Maintenance, AM: Annual Maintenance)	Operation Register	**SLDC** Control Room
5	Record messages sent and received including name and designation of sender and receiver, time, date. Separate message books for: Shut Down, ERLDC, Load Restrictions, In, Out	Message Log Books	**SLDC** Control Room
6	Daily System Position Register giving snapshot of previous day: a. West Bengal Demand – Max / Min with Time b. Central Sector Drawal -Max / Min with Time c. Consumption in MU	Daily System Position File	**SLDC** Control Room

	d. Central Sector schedule MU e. Central Sector actual drawal MU f. Over-Drawal / Under-Drawal in MU g. Generating Unit wise energy availability in MU h. Tentative availability for the next day i. Machine availability position of each generating station j. Feeders disconnected - Shift wise position k. Frequency profile Hz & hours		

114.5.4 Maintaining the SCADA system and data logging continuously collate and display:

- Instantaneous value of MW, MVAR, kV, Hz for each Inter State Generating Stations, State Sector Generating Stations, 220 kV Sub-Stations, MW & MVAR flows on important and inter-state lines and logging its integrated values at 15 minutes, hourly and daily basis.

- Logging of schedules Vs actual drawal in MW, MVAR and corresponding frequency (Hz) from **ERLDC**, State Sector Generating Stations, Un-schedule inter-change with **ERLDC** system with implication of Over-Drawal / Under-Drawal in UI Charges and its integration at 15 minutes, hourly and daily interval.

- Logging of schedule and actual drawal in MW, MVAR at each **220 kV / 132 kV** Sub-Stations and its integration at 15 minutes, hourly and daily interval.

- Logging of Instantaneous values of MW & MVAR flow on important trunk lines and inter-state tie lines.

- Breaker on/off status and other digital signals for each Generating Unit and major Sub-Stations

- The SCADA system must deliver on request events list, system disturbance reports, trends & graphs and miscellaneous reports relating to MW, MVAR, kV and Hz.

114.5.5 Compilation of the data

- **SLDC** shall maintain complete continuous log of above system parameters to produce various system reports and curves, trends as may be prescribed from time to time on a 15 minutes block, hourly daily and monthly interval.

114.5.6 REGISTERS

(i) **SLDC** Log Sheet
(ii) Shut Down Register
(iii) Operation Register
(iv) Unit Outage Register
(v) Machine Position Register
(vi) Fax Message File for ERLDC, Load Restriction in/out, Shut down

114.5.7 Real Time Data Logging by **SLDC**

Sl. No.	Data to be logged	Periodicity			
1	System Frequency	Instantaneous	Average for 15 minutes block	Logging of Average for each 15 minutes block for 8 hrs shift.	Maintenance of Log on continuous basis to produce reports/charts and trends
2	For each SSGS generating unit Schedule and actual MW / MVAR (+/-)	Instantaneous	Average for 15 minutes block	Logging of Average for each 15 minutes block for 8 hrs shift.	Maintenance of Log on continuous basis to produce reports / charts and trends
3	For each ISGS generating unit Schedule and actual MW / MVAR (+/-)	Instantaneous	Average for 15 minutes block	Logging of Average for each 15 minutes block for 8 hrs shift.	Maintenance of Log on continuous basis to produce reports / charts and trends
4	For each **220 kV** GSS Schedule	Instantaneous	Average for 15 minutes block	Logging of Average for each 15	Maintenance of Log on continuous basis to produce

	and actual MW / MVAR (+/-)			minutes block for 8 hrs shift.	reports / charts and trends

115 EMERGENCY EVACUATION SYSTEM PROCEDURE

115.1 INTRODUCTION

115.1.1 This procedure defines the responsibilities of the Shift In-charge **SLDC** Control Room to ensure continued coordination of all activities in the event of any unforeseen happening that makes difficult to operate the **SLDC** function from existing location. This document also describes the procedure to be followed for the transfer of operational activities of the **SLDC** temporarily to a different location under emergency or extraordinary situations leading to the complete or partial destruction of the existing **SLDC** facilities at Howrah.

115.2 OBJECTIVES

115.2.1 The objective of having this procedure is to have a clearly defined plan for emergency or extraordinary situations, which lead to the complete or partial destruction of the existing **SLDC** facilities at Howrah and for transfer of operational activities of the **SLDC** temporarily to different location under such situations.

115.2.2 Documentation of these emergency plan enable to ensure continued co-ordination of all activities following any unforeseen happening to the **SLDC** and thus avoiding any chaos and misunderstanding following any emergency.

115.3 RESPONSIBILITY

115.3.1 Chief Engineer (**SLDC**) shall coordinate and liaison with all Users and ERLDC following any emergency in existing **SLDC**, which leads to the complete or partial destruction of the existing facilities.

115.3.2 All **SLDC** control staff and other staff whether on duty or otherwise shall coordinate for emergency evacuation from existing location and relocating the **SLDC** function to temporary place in safe and smooth manner.

115.3.3 Shift In-Charge for temporary **SLDC** shall be Shift in-charge of **SLDC** till normalcy is restored and activities are returned back to existing **SLDC**.

115.4 SCOPE

115.4.1 This procedure covers the operational activities, which are to be followed during emergency evacuation.

115.5 METHODOLOGY

115.5.1 Transfer of existing LD activity to emergency Load Despatch Control Centre

115.5.1.1 Following commissioning of the Unified Load Despatch System with communication facilities and SCADA system, the LD Control Centre can be shifted to new location in case of emergency.

115.5.1.2 In the event of any unforeseen happening leading to the complete or partial destruction of the ULDC facilities at Howrah, the emergency Load Despatch Control Centre shall be established at 220 kV Grid Sub-station near Howrah/Kolkata and system operation and load despatch function under emergency shall be carried out temporarily from that place.

115.5.2 **Emergency LD Operation**

115.5.2.1 In case of unforeseen events like occurrence of earthquake, fire or arson or such event leading to total non-functioning of facilities and control system from existing LD Centre Howrah, a temporary Load Despatch Control Centre shall be established at 220 kV Grid Sub-station near Howrah/Kolkata and system operation and load despatch function under emergency basis shall be carried out from there.

115.5.2.2 The In-charge, Control Room LD Howrah shall contact and report the incident to the nominated In-charge of Temporary Control Center, who will assume control of the system until restoration and normalization are effected in the existing **SLDC**.

115.5.2.3 The In-charge temporary Control Center will transmit the message about the emergency and establishment of temporary LD control room to all State Generating Units, IPPs, CPPs, Distribution Companies, ERLDC, CEA and other affected persons. All the messages verbally issued and exchanged between In-charge Temporary Control Center and various Users and affected persons will be clearly put down in writing and verified from the other end.

115.5.2.4 The temporary Control Center shall discharge the functions and responsibilities as performed by the existing **SLDC** as the circumstance require.

115.5.2.5 Chief Engineer (**SLDC**) will ensure that one set of Operating Procedures is always available in the Control Room of temporary LD Centre for their guidance. A duplicate set of all the LD Control Room operational registers, log sheets and technical information sheets shall be maintained at the temporary Control Centre. These shall be kept in a secure place and not used unless the temporary LD Control Centre is initiated.

115.5.2.6 After restoration of normal working conditions back at original **SLDC**, the In-charge temporary LD Control Centre shall inform to **SLDC** all major and minor instructions issued by temporary Control Centre and all data / message received from the constituents.

115.5.3 **Rescue & Rehabilitation**

115.5.3.1 In the event of the ULDC becoming unusable consequent to any unforeseen happening leading to the complete or partial destruction of the **SLDC** facilities, the Shift-in-charge, **SLDC** shall evacuate the staff to a safe place and inform the Chief Engineer (**SLDC**) or his representative.

115.5.3.2 Chief Engineer (**SLDC**) or his representative shall confer with the Shift In-charge to ascertain the extent of the damage to the **SLDC**.

115.5.3.3 When eventual clearance is obtained to re-occupy the LD Centre, the Chief Engineer (**SLDC**) or his representative shall arrange for the **SLDC** to be staffed and the staff at the temporary **SLDC** Control Centre to hand over control of the system back to the **SLDC**.

116 ENERGY ACCOUNTING PROCEDURE

116.1 INTRODUCTION

116.1.1 This document lays down the procedure for energy accounting and settlement amongst the constituents in the West Bengal State Transmission System.

116.1.2 The System Operation Code requires the **SLDC** to prepare every month an account of active & reactive power as well as energy exchange between the constituents of the West Bengal State Transmission System. Accordingly **SLDC** is required to have energy accounting on the monthly basis for billing purpose and facilitate commercial arrangements amongst the following:

(i) **WBSETCL** and **WBSEDCL, CESC, DPL, & DPSCL** Discoms or any other distribution licensees and
(ii) To **WBSETCL** from various sources
(iii) Energy sent out from generating stations of **WBPDCL, WBSEDCL, CESC, DPL** and **DPSCL** and
(iv) Energy sold outside the West Bengal state

116.1.3 The procedure also provides for levy and recovery of **SLDC** System Operation Charges from the constituents using the State Transmission System.

116.2 Objectives

116.2.1 To have a West Bengal system energy accounting and settlement amongst the constituents of the West Bengal State Transmission System for billing and facilitating commercial arrangements based on:

(i) Bulk Supply Agreements with Discoms / Distribution Licensees for supply of power and
(ii) Power purchase Agreements with SSGS, IPPs and CPPs and
(iii) Agreements for transmission & wheeling of power, bilateral agreements, short term and spot purchases effected by **SLDC** on behalf of any licensee, and
(iv) Policy guidelines or decisions of operation coordination committee, and
(v) Decisions / directives of WBERC, and
(vi) Components of tariff as approved by WBERC and
(vii) Monthly accounts by ERLDC

116.3 Scope

116.3.1 This procedure applies to all constituents of the West Bengal State Transmission System i.e. to SSGS, IPPs, CPPs, **WBSETCL** and each Discom within the State.

116.4 Responsibilities

116.4.1 Chief Engineer (**SLDC**) will be responsible for preparation and compilation of Monthly Energy Account and Settlement for the State Transmission System.

116.5 Methodology

116.5.1 **SLDC** shall observe the following procedure for preparation of monthly statement of account of energy in the State Transmission System.

116.5.2 **Monthly Statement of Energy Supplied & Received**

(i) Joint meter readings at the points of supply between **WBSETCL** and **WBPDCL** (or any state generating company or CPP) taken at **00.00 hrs on 1st of every month** as per the provisions of Power Purchase Agreement between **WBPDCL** / IPPs and **WBSETCL** shall be conveyed by **WBPDCL** / IPPs to **SLDC** in the Format WBLDOP 116 F01. The procedure for joint meter readings shall be as laid down in the respective Power Purchase Agreement and/or Metering Code.

(ii) Joint meter readings at the points of supply between **WBSETCL** and Discoms taken at **12.00 hrs on 1st of every month** shall be conveyed by **WBSETCL** to **SLDC** in the Format WBLDOP 116 F02. The procedure for the joint meter readings shall be as laid down in the respective Bulk Supply Agreement and/or Metering Code, a copy of which shall be provided to **SLDC**.

(iii) The procedure for computation of energy where the meters are stopped / defective or points where no readings could be taken for any reasons shall be as per respective PPA and/or metering code, a copy of which shall be provided to **SLDC**.

(iv) **SLDC** shall prepare every month a statement of account of energy supplied and received by the constituents of the West Bengal State Transmission System i.e. to SSGS, IPPs, CPPs, **WBSETCL** and each Discom within the State.

(v) Monthly statement of account of energy for State Transmission System shall be prepared by the **SLDC**.

(vi) Monthly statement of account of energy prepared by **SLDC** shall be conveyed to all concerned by **10th of every month** for raising bills.

(vii) Monthly statement of account of energy prepared by **SLDC** shall be binding for the purpose of monthly billing and payment by the respective parties.

116.5.3 Monthly Energy Reconciliation Account

(i) After receipt of provisional monthly regional energy account from ERLDC, metered drawal from shared projects, the **SLDC** shall prepare a Monthly Energy Reconciliation Account in the Format as may be finalised by the State Power Committee.

(ii) **SLDC** shall find out the loss in the transmission system within the State and outside the state after receipt of monthly regional energy account from ERLDC, metered drawal from shared projects.

(iii) The **SLDC** shall revise the monthly statement of account of energy, if required, based on reconciliation with monthly global accounts of **ERPC** and metered drawal from shared projects.

(iv) The revisions in the monthly statement of account shall be subject to inspection / verification / checking and raising any objection within 15 days of date of issue and shall be considered as final, if the affected parties raise no objection within stipulated 15 days period.

(v) In case, any objection is raised, same shall be deliberated in next State Load Co-ordination Forum (SLCF) committee and finalized as per their decision.

(vi) Supplementary bills / credit notes shall be raised accordingly based on revised statement account of energy.

116.5.4 SLDC System Operation Charges

(i) **SLDC** shall recover the fees and charges from the constituents of State Transmission System for undertaking the load despatch functions as may be determined by WBERC by notification from time to time in terms of section section 32 (3) of Electricity Act 2003.

(ii) **SLDC** shall recover system operation charges as above in such a manner and on such basis as may be notified by the WBERC.

(iii) **SLDC** shall serve to each constituent on **7th of every month** the bill of its fees and charges as above.

(iv) These charges shall be payable on **13th of every month** failing levy of late payment surcharge as determined by WBERC shall be applicable.

(v) **SLDC** not withstanding provision for levy of late payment surcharge may direct disconnection of the constituent from the Grid or regulate their supply / despatches and may approach competent authority for levy of fines.

(vi) **SLDC** shall maintain its account including the receipt of System Operation Charges separately from the accounts of **WBSETCL** for other functions.

WBSOP 116 F 01

Statement of Energy Received from Generator / Source

Name of Generator / Source:

Month & Year:

S No	Name of Generator / Source	Feeder		Voltage	Reading		Meter Reading		Meter	Meter Status	Energy		Net Generation
		Name	Code	kV	Date	Time	Current	Previous	MF		Export	Import	KWh

Signed By

Name

Designation

Date of Preparation

WBSOP 116 F 02

Statement of Energy Supplied to Discom / Distribution Licensee

Name of Discom:

Month & Year:

S No	Name of GSS	Feeder		Voltage	Reading		Meter Reading		Meter	Meter Status	Energy		Net Consumption
		Name	Code	kV	Date	Time	Current	Previous	MF		Export	Import	KWh

Signed By

Name

Designation

117 SOP AMENDMENT PROCEDURE

117.1 INTRODUCTION

117.1.1 This document explains the procedure for making amendments in the System Operation Procedures as and when the need arises.

117.1.2 Through proper implementation of this procedure, the SOPs will remain as a current working document for operational needs of staff and effectively communicate what is required them to do.

117.2 OBJECTIVES

117.2.1 The objective of this **WBSETCL** procedure is that the System Operational Procedures always remain consistent with the current regulations and practices, the organisational structures and the organisational learning of **WBSETCL**.

117.2.2 This procedure enables the **WBSETCL** to amend the SOPs as per prevailing trading and commercial mechanism in Eastern Region and to implement the WBERC directions and orders with regards to tariff and settlement amongst the various entities in the State.

117.3 RESPONSIBILITIES

117.3.1 Chief Engineer (**SLDC**) shall be responsible for implementation and maintain this procedure continuously.

117.4 METHODOLOGY

i) **Chief Engineer (O&M)/ Chief Engineer (SLDC)** shall nominate a Superintending Engineer (preferably his TA) to continuously monitor the SOPs for amendments.

ii) A master copy of the SOPs shall be kept in the office of the **Chief Engineer (O&M) / Chief Engineer (SLDC)**.

iii) The Superintending Engineer shall maintain the master copy of the SOPs and follow the procedure below to change or modify any of the SOPs:

iv) The Superintending Engineer shall be responsible for monitoring regulatory, organizational and technical developments for possible impacts on SOPs with other officers responsible for individual SOPs.

v) S/He shall examine and assess the need for revision in any SOP consequent to revision in **West Bengal Grid Code** by Review Panel, directions / orders of WBERC,

revision in IEGC, License, PPAs and other documents affecting the energy exchanges amongst the entities.

vi) Amendments to the appropriate SOP shall be drafted for circulation and discussion to appropriate officers.

vii) Comments, as appropriate, may be incorporated into the amendment.

viii) The amended System Operating Procedure shall have a brief note of the change that has been made and shall bear amendment number and effective date on front-page control sheet (WBSOP 117 F02).

ix) Record each amendment in SOPs shall be kept in Register as per format no. WBSOP 117 F03.

x) The amended SOP shall be issued there after keeping a master copy in record.

xi) An amended SOP shall be issued to all such departments that have received the previous version of that SOP. On receipt of this new version, the previous, out-of-date version should be marked “CANCELLED” across all pages and shall not be given / sent to any one.

WBSOP 117 F01

CONTROL SHEET FOR ISSUE OF INDIVIDUAL SYSTEM OPERATION PROCEDURE FOLLOWING CHANGES

SOP Number

Title of SOP

Sl. No.	Issue Date	Brief Description of Changes Made

Authorization Summery

Issue Number	
Prepared By	
Review By	
Responsible Officer / Department	
Approved By	
Effective Date	

WBSOP 117 F02

Register for Issue of Individual System Operation Procedure

Sl. No.	SOP No.	SOP Title	Issue No.	Effective Date