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भारत सरकार
उत्तर क्षेत्रीय विद्युत समिति
18-ए, श.जीत सिंह मार्ग, कटवारिया सराय,
नई दिल्ली- 110016
Government of India
Northern Regional Power Committee
18-A, S. Jeet Singh Marg, Katwaria Sarai,
New Delhi-110016

सं.- उक्षेविस/प्रचालन/106/01/2016/5892-5932 दिनांक: 28.06.2016

सेवा में : संलग्न सूची के अनुसार ।
To: As per list attached

Meeting Notice

In compliance to sub-regulation 6 of Regulation 6.3B of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016, a Detailed Operating Procedure for taking generating unit(s) under Reserve Shut down and identifying generating stations to be backed down up to Technical Minimum Schedule has been prepared by NLDC.

The draft procedure was included in the agenda of the 124th OCC meeting held on 20th June, 2016, wherein members suggested to discuss the matter in a separate meeting. Accordingly, in order to discuss and finalise the procedure, a meeting is scheduled on **04.07.2016 at 1100 hrs. at NRPC Secretariat, New Delhi.** The subject draft procedure is available on NRPC website.

Kindly make it convenient to attend the meeting.

Sd/-
(हेमन्त कुमार पाण्डेय)
(Hemant Kumar Pandey)
अधीक्षण अभियंता

List of the members

Adani PL.	(i) Sh. Nirmal Sharma, VP (O&M), Fax- 0141-2292065
	(ii) Sh. Sameer Ganju, Head-Northern Region, Fax No. 011-24115560
APCPL	(i) AGM (O&M)-I, IGSTPP, Fax No. 01251-266326
	(ii) AGM (EEMG), 01251-266326
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	(ii) Sh. S P.Singh, Chief Engineer (O&M), Faridabad – Fax-0129-2272413
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NTPC	(i) Head of OS/ Head of RCC, Fax No. 0120-2410082
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	(ii) Sh. Deepak Uppal, SE (PR& ALDC): Fax-0177-2837143
	(iii) Sh. Joginder Singh. Power Controller, Fax No. 0177-2837143.
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	Chief Engineer, NPC
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Annex

Detailed Operating Procedure for

taking unit (s) under

Reserve Shut down

and identifying generating stations to be backed down up to

Technical Minimum Schedule

Prepared in compliance to Section 6.3B.6 of
Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016

(Revision 0: Dated: __ /__ / 2016)

Power System Operation Corporation Ltd.

National Load Despatch Centre

New Delhi

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Detailed Operating Procedure for

Taking Unit (s) under Reserve Shut down and Identifying Generating Stations to be backed down up to Technical Minimum Schedule

1. Preamble

1.1. This Procedure is issued in compliance to Regulation 6.3B.6 of the Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016.

1.2. The Central Electricity Regulatory Commission (Indian Electricity Grid Code) (Fourth Amendment) Regulations, 2016 provide the option to Central Generating Stations (CGS) or Inter State Generating Stations (ISGS) to go for reserve shut down where the scheduled generation falls below technical minimum schedule. In addition to above these regulations have specified provisions for compensating the CGS or ISGS for additional fuel cost towards operating below normative plant availability factor & for multiple start / stop operations.

1.3. All the words and expression used in the Procedure shall have the same meaning assigned to them as defined in the Regulations.

1.4. This procedure will be implemented with effect from the date of approval by the Hon'ble Central Electricity Regulatory Commission or any other date as specified by the Commission.

2. Objective

2.1. The objective of the detailed operating procedure is to lay down the role of different agencies, data requirements, procedure for taking generating units under reserve shut down & methodology for identifying the generating stations or units thereof to be backed down up to technical minimum schedule in specific grid conditions such as low system demand, Regulation of Power Supply, incidence of high renewables etc., based on merit order stacking.

3. Scope

3.1. This procedure shall be applicable to RLDCs, SLDCs, CGS & ISGS whose tariff is either determined or adopted by the Central Commission (CERC). In case of a generating station whose tariff is neither determined nor adopted by the

Commission, the concerned generating company shall have to factor the provisions specified in the aforementioned CERC Regulations in their Power Purchase Agreements (PPAs) entered into it for sale of power or in order to claim compensation for operating at the technical minimum schedule.

4. Role of Different Agencies in implementing the Procedure

4.1. CGS/ISGS : Generating Agencies shall upload the following figures ex bus for each 15-minute time block on day ahead basis and for every revision on the day of operation

i. Declared Capability (DC) of CGS / ISGS in MW
ii. Online Declared Capability (DC) of CGS / ISGS in MW
iii. Ramp up /down rate unit wise and station wise

4.2. RLDCs: RLDCs shall upload on their webpage the following figures for each 15-minute time block on day ahead basis and for every revision on the day of operation.

i. Declared Capability (DC) of generating station in MW
ii. On-bar Declared Capability (DC) of generating station in MW
iii. Ex bus Technical Minimum schedule of the Plant in MW which shall be calculated as 55% of on bar DC of the generating station.
iv. Ramp-up/Ramp down rate unit-wise & station wise
v. Ex-bus Entitlement of the beneficiary computed from the on-bar DC in MW
vi. Ex-bus Entitlement of the beneficiary computed from 55% of on-bar DC in MW
vii. Ex-bus Requisition received from the beneficiaries in MW
viii. Cumulative Requisitions of all beneficiaries of the generating station in MW

4.3. SLDCs / Beneficiaries: SLDCs/Beneficiaries shall furnish requisition in the following manner as specified in IEGC.

i. SLDCs shall submit the anticipated demand to RLDCs for the next day as per IEGC.
ii. SLDCs/Beneficiaries shall furnish requisition to RLDC for the next day (D day) by 15:00 hours of current (D-1) day. SLDCs/Beneficiaries shall submit requisition as per their forecasted requirement.
iii. SLDCs/Beneficiaries shall check the ‘injection schedule’ (R0) issued at 1800 hours by RLDCs for compliance to the technical minimum norms.

iv. In case the injection schedule for a generating station is less than its technical minimum, the SLDC(s)/Beneficiary (ies) may raise their requisition up to 55% of entitlement if the original requisition submitted earlier is less than 55%.

v. The above procedure shall be followed by the SLDCs/Beneficiaries RLDCs for all subsequent revisions also.

vi. Any compensation computed as per Regulation 6.3B shall be borne by the entity, which has caused the plant to be operated at schedule lower than NPAF but at or above technical minimum schedule based on the compensation mechanism finalized by RPCs.

4.4. Generating stations:

i. The generating station shall coordinate with its beneficiaries for providing requisition for making the injection schedule more than or equal to technical minimum schedule.

ii. When the scheduled generation falls below the technical minimum schedule, the generating station shall have the option to go for reserve shut down under intimation to concerned RLDC & beneficiaries.

iii. Considering that the minimum economic shutdown hours for units are in the range of 2-8 hours depending on the unit (details at Annex-1), the generating stations need to take a pro-active approach in shut down and restart of units from the view point of merit order.

iv. The generating station shall submit the details of duration its operation below normative plant availability factor (NPAF) but above technical minimum schedule to the concerned RLDC/SLDC for verification on monthly basis.

v. The generating station shall submit the required data to RPC/RLDC/SLDCs as per regulation 6.3B.3.

5. Conditions under which RLDC may direct the generating stations to operate at a schedule below normative plant availability factor (NPAF) but at or above technical minimum.

The RLDC may direct a generating station under its scheduling jurisdiction to operate at a schedule below normative plant availability factor (NPAF) in any of the following conditions.

i. Threat to grid security

ii. To relieve transmission congestion

iii. Sudden Change in weather condition

iv. Natural calamities such as earth quake, flood etc ..

v. Prevailing or anticipated Low Demand conditions
vi. Due to less requisition received from the beneficiary states
vii. Suo-moto revision of schedules in the interest of better system operation (IEGC-6.5.20)
viii. high renewable generation
ix. Maintaining adequate reserves
x. Any other anticipated condition that is likely to affect reliable grid operation

SLDC shall follow the above procedure in case of CGS having 100% share to the state or any other eligible generator under its control area.

6. Methodology for taking generating station or unit(s) thereof under Reserve Shut down

6.1. The generating station shall submit its declared capability (DC) to RLDC.

6.2. The beneficiaries shall furnish their original requisition for the next day (D-day) to RLDC by 15:00 hrs. of the current (D-1) day..

6.3. Ex-Power Plant (Ex-PP) dispatch schedule of a generating station in a time block shall be computed by RLDCs by taking algebraic sum of requisitions of all beneficiaries of that generating station & same shall be uploaded on website as revision R0 for next day (D) by 18:00 hours of current day (D-1).

6.4. If the net EX-PP injection schedule for a generating station is less than 55% of the DC on bar the generating station shall intimate the same to all beneficiaries in the format (A-1) given at Annex-2, with copy to the concerned RLDC. A-1 has to be issued by the generators by 19:00 hrs of D-1.

6.5. The beneficiaries would then review their requisition & submit a revised requisition by 21:00 hrs to the concerned RLDC.

6.6. Based on the revised requisitions received up to 21:00 hrs, RLDC shall prepare revised injection schedule for concerned the generating station. If the scheduled generation is less than 55% of DC, the RLDC shall review the anticipated demand pattern based on the demand forecast given by states & grid conditions to decide whether technical minimum schedule is required to be provided to the generating station.

i. In case the grid conditions demand so in the interest of better grid operation, RLDC would suo-moto revise the schedule to operate it at or above technical minimum but below NPAF. While doing so, it is possible that some beneficary's requisition would go up to ensure technical minimum. RLDC shall issue R-1 schedule accordingly and this would be intimated to the concerned generating station, beneficiaries and the RPC in format A-2 given at Annex-3. RLDC may also intimate NLDC for

invocation of RRAS regulation (up regulation) in case of eligible stations for keeping the unit(s) on-bar for better grid operation if the grid conditions demand so. Such up regulation in real time can be triggered irrespective of prevailing frequency. (Beneficiaries shall not be allowed to revise the schedule down wards at a generating station where one or more unit(s) are running under technical minimum schedule with suo-moto revision by RLDC.

ii. If the grid conditions do not demand so, the RLDC shall issue R-1 schedule based on the requisitions received. Under such situation, the generating station shall have the option to go for RSD(Reserve shutdown) with intimation to beneficiaries, SLDCs, RLDC and RPC in format A-3 (given at Annex-4).

iii. In case of exigencies, RLDCs/NLDC could schedule power to the generating station through RRAS up instruction so as to ensure that the required units are available on bar and operating at the technical minimum level of 55%.

6.7. Before taking unit(s) under RSD the generating station whose injection schedule is less than technical minimum schedule, it

i. May offer an opportunity to the beneficiaries to review their requisitions particularly to the beneficiaries who had originally submitted requisition as per full entitlement and would be willing to avail the un-requisitioned power of other beneficiaries of that station.

ii. May like to sell the requisitioned power under STOA after taking no objection certificate from the concerned beneficiary/SLDC whose un-requisitioned power is intended to be sold under STOA.

6.8. Before taking unit(s) under RSD, the generating station shall bifurcate the DC in two parts – (i) DC for unit(s) to remain ON-bar & (ii) DC for unit(s) kept under RSD. The generator shall ensure that the DC for unit(s) kept under RSD shall not be more than MCR less Normative Auxiliary Consumption. The DC for unit(s) kept under RSD shall be frozen until its revival from RSD. The beneficiaries shall continue to bear the capacity charge corresponding to total DC including unit(s) kept under RSD.

6.9. The above procedure shall be followed for subsequent schedule revisions also.

6.10. Once a unit is taken out under reserve shut down (RSD), the period for which the unit will remain under RSD shall be 24 hours or less if so specified by the generating station.

6.11. A beneficiary having entitlement in a station more than or equal to the capacity of any unit in the generating station may surrender its entitlement for 24 hours or more in consultation with RLDC. In such situation, the RLDC may facilitate RSD of unit(s) of that station on account of the above beneficiary only. The drawal schedule of the beneficiary from that generating stating shall be restricted accordingly for the specified period as requested. The other beneficiaries shall continue to get their full allocation from the total DC in that station. This arrangement could also be extended for two or more beneficiaries in the same generating station.

6.12.

6.13. RLDC shall compute & upload entitlements corresponding to DC for unit(s) ON-bar and DC for unit(s) under RSD separately. The injection schedule in such case shall be restricted up to ON-bar DC based on the existing requisitions of beneficiaries.

6.14. One or more beneficiaries and the generating station may decide for revival for unit (s) under RSD with commitment for technical minimum schedule and mutually agreed 'minimum run time' of the unit (s) post revival. RLDC may also advise the generating stations to revive unit (s) under RSD for better system operation(IEGC 6.5.20).. In such cases RLDC shall ensure technical minimum schedule. Compensation shall be admissible towards start-up cost as per the provisions in the IEGC 4th Amendment.

6.15. Regulation of Power Supply: When injection schedule of a CGS/ISGS falls below technical minimum due to imposition of regulation of power supply under the CERC (Regulation of Power Supply) Regulations 2010 and/or CERC order dated 02.09.2015 in 142/MP/2012 by the CGS/ISGS or a transmission licensee, the generator shall try to schedule the surplus power through STOA or PX before opting for reserve shut down.

7. Review of the Procedure after 6 months

7.1. Based on the experience gained through operation for 6 months the Procedure may be reviewed & modified if felt necessary, in the interest of system operation.

8. Removal of Difficulties:

8.1. Notwithstanding anything contained in this Procedure, NLDC/RLDCs may take appropriate decisions in the interest of System Operation. Such decisions shall be taken and subsequently intimated to CERC (on monthly basis) and the procedure shall be modified /amended, if necessary.

8.2. In case of any difficulty in implementation of this procedure, this procedure shall be reviewed or revised by NLDC with the approval from the Commission.

***

Assessment of Minimum Economic Shutdown hours for coal fired stations

Annex-1

S no	Plant Name	Installed Capacity	Region	Variable Cost	Unit capacity	Normative Aux Consumption (NAC)	Heat Rate increase in % at 55% load as per IEGC	NAC increase at 55% load as per IEGC	Variable cost at 55% plf	Fuel cost for one(1) hour one unit operation at 55% load	Oil in kL required for cold start as per IEGC	Approx oil rate in Rs/MT	Approx light up cost for cold start up assuming density of oil as 1.0	Minimum economic shutdown hours
				paise/kWh	MW	%	%	%	paise/kWh	Rs. lakhs	kL	Rs/MT	Rs. lakhs	hours
	A	B	C	D	E	F	G	H	I = D*(100+G)*(100-F)/(100*(100-F-H))	J	K	L	M=K*L/100000	N = M/J
1	SIPAT-I	1980	WR	122	660	5.75	3	1	127	4.13	110	20000	22.00	5.3
2	SIPAT-II	1000	WR	125	500	5.75	6	1	134	3.21	90	20000	18.00	5.6
3	SINGRAULI	2000	NR	126	500	6.88	6	1	135	3.19	90	20000	18.00	5.6
4	SINGRAULI	2000	NR	126	200	6.88	6	1	135	1.28	50	20000	10.00	7.8
5	RIHAND3	1000	NR	127	500	5.75	6	1	136	3.26	90	20000	18.00	5.5
6	RIHAND2	1000	NR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
7	KSTPS-II	500	WR	129	500	5.75	6	1	138	3.31	90	20000	18.00	5.4
8	KSTPS	2100	WR	131	500	6.68	6	1	140	3.33	90	20000	18.00	5.4
9	KSTPS	2100	WR	131	200	6.68	6	1	140	1.33	50	20000	10.00	7.5
10	CGPL	4150	WR	135	800	5.00	3	1	141	5.58	130	20000	26.00	4.7
11	RIHAND1	1000	NR	144	500	7.75	6	1	154	3.61	90	20000	18.00	5.0
12	TALST2	2000	SR	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.8
13	TSTPP-I	1000	ER	146	500	5.75	6	1	156	3.74	90	20000	18.00	4.8
14	SASAN	3960	WR	153	660	6.00	3	1	159	5.17	110	20000	22.00	4.3
15	VSTPS-II	1000	WR	153	500	5.75	6	1	164	3.92	90	20000	18.00	4.6
16	VSTPS-V	500	WR	156	500	5.75	6	1	167	4.00	90	20000	18.00	4.5
17	VSTPS-IV	1000	WR	157	500	5.75	6	1	168	4.03	90	20000	18.00	4.5
18	VSTPS-II	1000	WR	162	500	5.75	6	1	174	4.15	90	20000	18.00	4.3
19	VSTPS-I	1260	WR	166	210	9.00	6	1	178	1.73	50	20000	10.00	5.8
20	KHSTPP-II	1500	ER	199	500	5.75	6	1	213	5.10	90	20000	18.00	3.5
21	VALLURNT	1500	SR	203	500	5.75	6	1	217	5.21	90	20000	18.00	3.5
22	NSPCL	500	WR	206	250	8.00	6	1	221	2.58	50	20000	10.00	3.9
23	RSTPS	2100	SR	207	500	6.68	6	1	222	5.26	90	20000	18.00	3.4
24	RSTPS	2100	SR	207	200	6.68	6	1	222	2.10	50	20000	10.00	4.8
25	KHSTPP-I	840	ER	208	210	9.00	6	1	223	2.16	50	20000	10.00	4.6
26	FSTPP	1600	ER	214	500	6.47	6	1	229	5.45	90	20000	18.00	3.3
27	FSTPP I	1600	ER	214	200	6.47	6	1	229	2.18	50	20000	10.00	4.6
28	RSTPSU7	500	SR	221	500	5.75	6	1	237	5.67	90	20000	18.00	3.2
29	NTPL	1000	SR	222	500	5.25	6	1	238	5.72	90	20000	18.00	3.1
30	FSTPP-II	500	ER	228	500	5.75	6	1	244	5.85	90	20000	18.00	3.1
31	SIMHST2	1000	SR	232	500	5.25	6	1	249	5.98	90	20000	18.00	3.0
32	NLC2EXP	500	SR	241	500	10.00	6	1	258	5.90	90	20000	18.00	3.1
33	NLCEXP	420	SR	253	210	8.50	6	1	271	2.64	50	20000	10.00	3.8
34	NLCIIST1	630	SR	260	210	10.00	6	1	279	2.67	50	20000	10.00	3.7
35	NLCIIST2	840	SR	260	210	10.00	6	1	279	2.67	50	20000	10.00	3.7
36	MOUDA-I	1000	WR	260	500	5.75	6	1	279	6.67	90	20000	18.00	2.7
37	UNCHAHAR	420	NR	271	210	9.00	6	1	290	2.82	50	20000	10.00	3.5
38	UNCHAHAR	210	NR	272	210	9.00	6	1	292	2.83	50	20000	10.00	3.5
39	BARH	1320	ER	276	660	5.75	3	1	287	9.34	110	20000	22.00	2.4
40	UNCHAHAR	420	NR	278	210	9.00	6	1	298	2.89	50	20000	10.00	3.5
41	DADRT2	980	NR	303	490	5.25	6	1	325	7.66	90	20000	18.00	2.4
42	JHAJJAR	1500	NR	307	500	5.25	6	1	329	7.91	90	20000	18.00	2.3
43	BGTPP	250	AR	308	250	8.50	6	1	330	3.83	50	20000	10.00	2.6
44	DADRIT	840	NR	323	210	8.50	6	1	346	3.38	50	20000	10.00	3.0

Notes:

1) https://bharatpetroleum.com/Our-Businesses/I&C/Petro-Prices.aspx Source for fuel oil prices
2) For CGPL Mundra, oil taken for cold start up is assumed as 130 kL by extrapolating the figures for 500 MW and 660 MW in the IEGC amendment
3) As per the CEA Technical Standards for construction of electrical plants and electrical lines,
   - Cold start > 72 hours after shutdown when turbine metal temperatures are below 40 % of full load values
   - Hot start <10 hours after shutdown when turbine metal temperatures are approximately 80% of full load values
   - Warm start between 10 and 72 hours when turbine metal temperature is between 40-80% of full load values
4) Fuel Oil requirement falls to 30% for hot start and 50% for warm start approximately as compared to cold start.

Format A1: Intimation for Technical Minimum Schedule

Date: dd/mm/yyyy

From: (Name of Generating Station) / (Name of Owner Organization)

To: SLDC/Beneficiary-B1 / B2 / B3 /…….
CC: ERLDC/NRLDC/NERLDC/SRLDC/WRLDC

Sub: Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,
As per R-0 schedule uploaded by _RLDC for (date) _____ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. Thus you are requested to review your requisition. If the net schedule remains below technical minimum schedule in R-1 schedule to be issued by RLDC for (date)_____, we shall be constrained to take out one/two/three unit(s) under Reserved Shut Down & the unit may remain under RSD for next 72 hours.

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

Format A2: RLDC direction for suo moto revision for Technical Minimum schedule

Date: dd/mm/yyyy

From: (Name of RLDC)

To: SLDC/Beneficiary-B1 / B2 / B3 /…….
CC: Name of the Generating Station

Sub: Technical Minimum Schedule of (XYZ) generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B of IEGC

Sir/Madam,

As per R-0 schedule uploaded by _RLDC for (date) _____ the injection schedule for XYZ generating station is less than technical minimum wrt 6.3B of IEGC in the following blocks. In view of the following grid conditions (at Table-1) this generating unit needs to be kept on bar. _RLDC hereby revises the schedule at this generating station by raising requisition of the surrendering beneficiaries in those time blocks up to 55% of entitlement in the interest of better operation of the grid in line with regulation 6.5.20 of IEGC. Ramp-up / ramp down adjustment has been done as per regulation 6.5.14 of IEGC.

Table-1

S.No.	Time blocks where schedule is moderated for Technical Minimum	Grid Condtitions
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Copy to:

Signature of Authorized Signatory (with Stamp)

Name:

Designation:

Format A3: Intimation of Reserve shut down by Generating Station

Date: dd/mm/yyyy

From: (Name of Generating Station) / (Name of Owner Organization)

To: SLDC/Beneficiary-B1 / B2 / B3 /…….
CC: ERLDC/NRLDC/NERLDC/SRLDC/WRLDC

Sub: Reserve shut down of XYZ generating Station for dt. dd/mm/yyyy wrt Regulation 6.3B.3(iii) of IEGC

Sir/Madam,
Please refer to our intimation (A-1) on less than technical minumum schedule at _____(CGS/ISGS) for date _____. The injection scheule still is less than technical minimum schedule in the following time blocks (ref. Table-1 below). Thus in line with IEGC section 6.3B.3(iii) we shall desynchronise unit#_____of _____(CGS/ISGS name) with effect from _____th block of date_____. This unit shall remain under shut down till _____hours of date_____ or further intimation from _RLDC which ever is later.

Table-1

S.No.	Time blocks when schedule is less than Technical Minimum	Remarks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

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