

पावर ग्रिड कारपोरेशन ऑफ इंडिया लिमिटेड

(भारत सरकार का उद्यम)

POWER GRID CORPORATION
OF INDIA LIMITED

(A Government of India Enterprise)



उत्तरी क्षेत्रीय भार प्रेषण केन्द्र

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NRLDC/ABT-NR/

Date: 18th March 2003

To,

As per mailing list

SUB : Three months of ABT in Northern Region-a feedback

Dear Sir,

Since 1st December 2002 when the ABT (Availability Based Tariff) was implemented in Northern Region, we have had an experience of more than three (3) months of grid operation under the ABT regime. In continuation to our report dated 12th December 2002 on the same issue, our observation on the different areas related to system operation is enumerated below.

- A. Frequency Profile:** During December 2002, January 2003 and February 2003, the frequency remained within the IEGC Band of 49.0 – 50.5 Hz band for 88.87%, 79.72% and 84.39% of the time respectively. The intense cold wave conditions in Northern India had resulted in a spurt in power demand in the region by nearly 25 MU / day (1000 MW average) between 6th – 23rd January 2003. Certain deficits caused out of generation outages and reduced inter-regional imports coupled with inadequate load management by states resulted in sustained low frequency operation during this period. Likewise, in February 2003, there was a 10,000 MW load crash following rains in the region on the 18th and 19th February 2003 resulting in sustained high frequency conditions on these days.

Annex-I indicates graphically the percentage of time frequency was outside the IEGC band of 49.0-50.5 Hz during the above months compared to similar period last year. Annex-II indicates the overdrawal by constituents during the low frequency period between 6th and 23rd January 2003. These have been worked out from the 15-minute average figures from the Special Energy Meter (SEM) data being collected and compiled by NRLDC. A violation index giving due weightage to the frequency and magnitude of overdrawals (both average and maximum values) has been defined and worked out accordingly for the state constituents. This had also been presented in the Operation Co-ordination Committee (OCC) meeting of NREB held in February 2003 where it was resolved that this could be a good criteria for reporting all future non-compliance of IEGC.

One of the essential components of the ABT mechanism is the feedback loop in the form of Unscheduled Interchange (UI) account and payments to / from the Pool Accounts by the constituents. The first set of correct UI accounts for the period starting 1st December 2002 were issued by the NREB Secreteriat on 20th January 2003 with due date of payment by constituents as 30th January 2003. Thus the seriousness that the actual payment/receipt of UI could have generated in the constituent's behaviour during the highest deficit period (6th – 23rd January 2003) was sacrificed. Payments into the pool account operated by NRLDC

started flowing in only in February 2003 and the amount so received are being paid out by NRLDC with in two working days. It needs to be understood and respected by the constituents that payment of the UI charges is the most important aspect of the ABT mechanism.

There were certain periods of high frequency during December 2002 (last week) and January 2003 (first two days and some days in last week). The ISGS stations under these conditions did back down although scope exists for further backing down by these stations under such conditions. One of the reasons for a less than optimum level of generation reduction is the fluctuating frequency, which does not provide a stable signal to the power houses to take any decision regarding reduction in generation. It is therefore important that the minute-to-minute variation in frequency is curbed by putting all generating units on free governor operation. This needs to be taken up earnestly by all constituents.

- B. Voltage Profile:** The voltage profile has generally been satisfactory during the first three months except during the period of severe load crash on the night of 18th /19th February 2003. Reactive energy accounts are yet to be issued by NREB Secretariat and it is necessary that these be issued at the earliest so that the constituents are encouraged to install shunt capacitors in their system.
- C. Network Loading & Security:** During winter conditions, the generation in the south-east part of the Northern Region (cheap thermal power from pit-head plants) has been at its maximum while the generation in the north-west pocket (low inflows into hydro station, costlier thermal power due to coal transport) has been at its minimum. The load centres are at the north-west & central portion of the grid. Due to this typical load / generation configuration, heavy power flow takes place on the transmission lines from east to central and central to west corridor (450 MW & above on each 400 kV long distance lines). The line loading problem gets further accentuated due to UP's reduced drawal from the grid (self-regulation).

Network security under such conditions assumes prime importance with the weather being a major contributing factor. Heavy fog coupled with high pollution (suspended particulate matter) results in flashovers on the 220kV & 400kV line insulators and transient earth faults. The timing of winter rain plays a crucial role as early precipitation results in cleaning of the line insulators and fewer flashovers. In the Northern Region, the first winter rains this season occurred around 25th / 26th December 2002. Till then, there were a large number of 400kV line trippings due to transient earth faults. This had resulted in a grid disturbance on 23rd December 2002. The situation was critical due to outage of Pole – 2 of Rihand – Dadri HVDC Bipole during the following period.

- 28th October 2002 to 19th December 2002.
- 4th January 2003 to 29th January 2003.

Import of power from Eastern Region (to the extent of 400 – 450 MW) had to be suspended during the above period (particularly during January 2003). Despite this, the line loadings remained high with 400kV Kanpur – Ballabgarh & 400kV Kanpur – Agra loading remaining in the range of 550 – 650 MW & 450-500 MW respectively on a sustained basis.

A disturbance was narrowly averted on 22nd January 2003 when the healthy Pole – I of Rihand – Dadri HVDC bipole carrying 750MW tripped. Prompt action by NRLDC in operation at reduced load generation balance averted a major grid disturbance as the 400kV Kanpur – Ballabgarh line loading had crossed 700 MW after this tripping. The good antecedent voltage conditions and the series compensation on 400kV Kanpur – Ballabgarh line contributed in averting cascade trippings.

- D. Scheduling:** The day-ahead schedules and revisions thereof are being carried out in line with the Indian Electricity Grid Code (IEGC) provisions and complete information is being made available at the NRLDC web site (www.nrldc.org) for access by constituents. With the cooperation of all the constituents, the changeover to a minimum paper regime in the area of scheduling has been a smooth affair although scope exists for further improvement in this area. Needless to mention, for such a vast and complex grid such as the Northern Region, there simply does not exist any option but to move towards a 'paperless' regime.

The state constituents have generally been requisitioning maximum power from the Inter State Generating Stations (ISGS) and the problem of low off-peak to peak requisition which occurred in respect of Dadri (Thermal) in the first week of December 2002 has not recurred.

The ABT mechanism provides for a state constituent to trade its surplus with other states. NRLDC is acting as a facilitator for such exchanges by displaying on its website the details of unrequisioned power from ISGS on day-to-day basis. This enables a state in need of power to identify states having a surplus against each ISGS. It has been observed that not many state-to-state short term bilaterals are being executed through this mode. The CERC's orders on ABT also provide that there could be a bilateral agreement between the states and the ISGS also for such unrequisioned power. However such ISGS to state bilaterals are not being struck on day-to-day basis due to various reasons despite a clear agreement in the NREB meeting held on 14th December 2002. In the absence of these bilaterals, the unrequisioned ISGS power is generally getting injected as Unscheduled Interchange (UI).

- E. Merit order operation:**

The coal pit head thermal power stations at Singrauli and Rihand are being scheduled to their full capability while the load centre based thermal station at Dadri is scheduled depending on the requirement of the beneficiary states. Scheduling of combined cycle power stations on liquid fuel firing is also as per the requirement. This would be evident from the schedules and actual generation indicated as a percentage of the Declared Capability (DC) at Annex-III. Further merit order would be possible if the issues indicated below in respect of capacity declaration by NTPC stations is also sorted out.

- F. Capacity declaration by NTPC stations:**

As per the CERC's orders on ABT, the NTPC stations can declare their capability up to the installed capacity in the day-ahead scheduling. For instance, Singrauli STPS with an installed capacity of 2000 MW can declare its ex-power plant capability right up to 2000 MW if all units are available. However Singrauli STPS has been consistently declaring a maximum of 1835 MW only (2000 MW less normative auxiliary consumption of 165 MW) and the plant is generally being scheduled the full capability declared.

In actual practice, either due to a lower name plate rating or the overload capability available and a better than normative consumption, the ex-power plant capability of Singrauli STPS would be more than 1835 MW. In the past (when ABT was not implemented in Northern Region), Singrauli had continuously generated over 1900 MW ex-power plant on a sustained basis and was being reimbursed the energy charges & incentive (@ 1 paise / KWh for every 1% rise in PLF above 68.5%) for the entire generation. However, during the last three months under ABT regime, the power station

has consciously not been generating above 1835-1845 MW. A similar phenomenon is being observed at other NTPC stations also. This is resulting in non-utilisation of certain possible generating capacity in the region whose energy is relatively cheaper as well.

G. Scheduling vis-à-vis billing of energy charges in respect of combined cycle gas power stations of NTPC

In line with CERC's orders on ABT, the capacity declaration and scheduling of gas power stations of NTPC is being done separately for gas firing and liquid firing and Unscheduled Interchange (UI) being worked out for the power station as a whole.

It has however been observed and reported by the constituents that the monthly billing in respect of energy charges is being done on a composite rate worked out by NTPC on the basis of the actual firing of gas and liquid fuels. Thus, for instance, a state which had not requisitioned for any power from liquid fuel firing in any month is still paying a higher energy charge on account of the composite rate. Considering that liquid firing is 3 to 4 times expensive as compared to gas firing (energy charge approx. 95 paise/unit), composite energy charge billing results in a serious distortion in the energy charge bills between the states while NTPC is not affected significantly.

A related development is that the prices of naphtha and High Speed Diesel (HSD) have increased over the last few months resulting in the energy charges going up to Rs. 4.00/kwh (for combined cycle mode operation of gas turbines) and expected to go up further. This would be higher for an Internal Combustion (IC) diesel engine. The UI rate at 49.00 Hz viz. Rs. 4.20/kwh had been decided by CERC based on Rs.2.67/kwh as the variable charge for diesel generation. Considering the increase in diesel prices, a re-examination of current UI rates appears important.

H. Allocation of power from Central Sector stations:

In the Northern region, there had been certain non-linearities in allocation of power from Central Sector stations such as fixed MW allocations and different allocation for different time blocks of the day. NRLDC as well as the CTU, while implementing ABT in the region, had taken up with MoP/CEA/NREB for removing these non-linearities. While the fixed MW allocations have been replaced by percentage allocations, the unallocated quota is still being allocated on time-slot basis.

Considering that the fixed charges for ISGS are being apportioned on the basis of percentage allocation, removal of the above inequity in allocation is required at the earliest as also resolved by the NREB in its meeting on 14th December 2002.

I. Transfer of data from Special Energy Meters (SEMs) to NRLDC:

In the Northern Region there are 158 locations where these SEMs are installed totalling to 818 nos. as on date. This is almost 50% of the total population of these meters in the country. Timely downloading and transfer of data from these meters on weekly basis from the 158 locations spread across the region presents a huge logistic problem.

In all the other regions, which are much smaller and less complex than the Northern Region, the responsibility of data transfer from these locations have been taken up by the constituents themselves. Considering the spread and complexity of Northern Region, NRLDC had therefore been pressing the constituents to take up this responsibility to ensure smooth implementation of ABT in the region. POWERGRID has also been made to

provide PCs at the state locations to facilitate such data transfer and these PCs are in the process of being installed/commissioned.

The ISGS constituents are taking up this responsibility themselves (barring Rihand STPS of NTPC, Tanakpur HEP of NHPC and RAPS-B of NPC). On the other hand, out of 126 meter locations belonging to States/BBMB, only 22 locations are currently taking up this responsibility themselves (10 from BBMB, 6 from PSEB, 3 from PDD J&K, 2 from HPSEB and 1 from RVPNL). There has been no response from DTL, UPPCL, UPCL, UT Chandigarh and HVPNL. The total lack of interest shown by some constituents in this area is a serious impediment to smooth run of ABT. Pending co-operation from these locations, POWERGRID is deputing its personnel for downloading and transfer of meter data. Obviously this arrangement can not go on for long and the constituents need to take up this responsibility themselves.

Further, NTPC is not forwarding to NRLDC/NREB the data from the standby meters installed on the high voltage side of Generator Transformers (GTs) and Station Transformers (STs) and other locations. This is despite the decisions taken in various meetings of the NREB in the past. This would result in problems in energy accounting if the main and check meter readings are incorrect due to any reason.

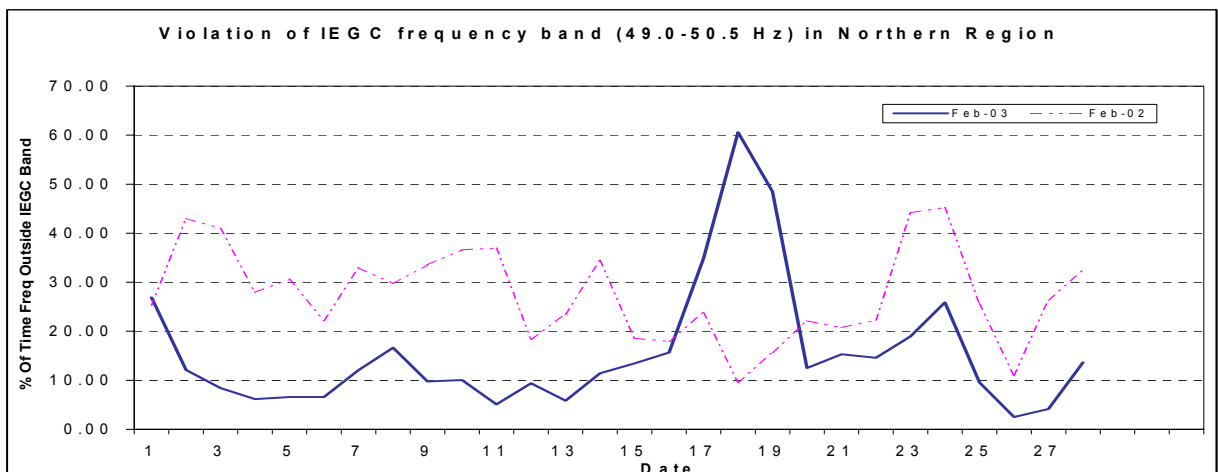
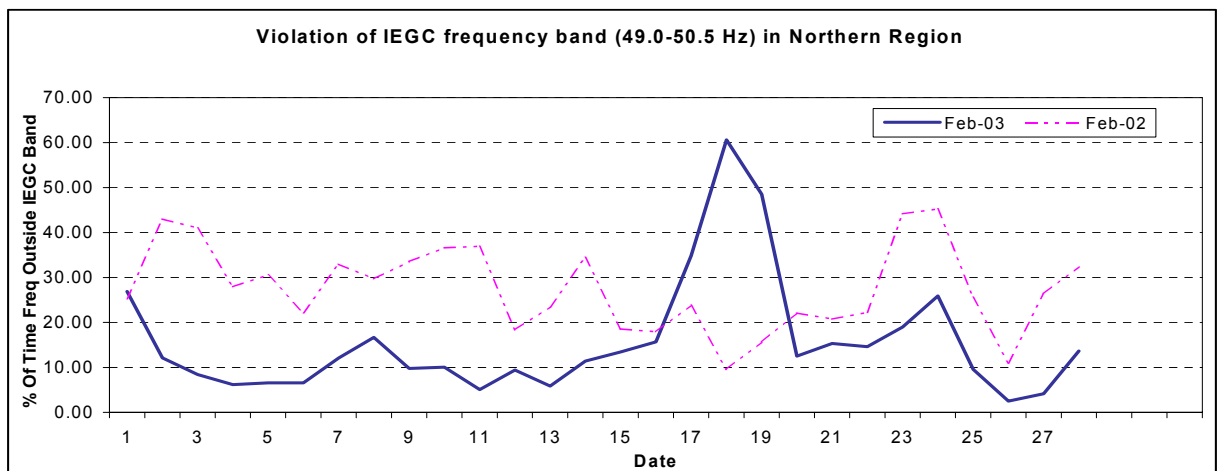
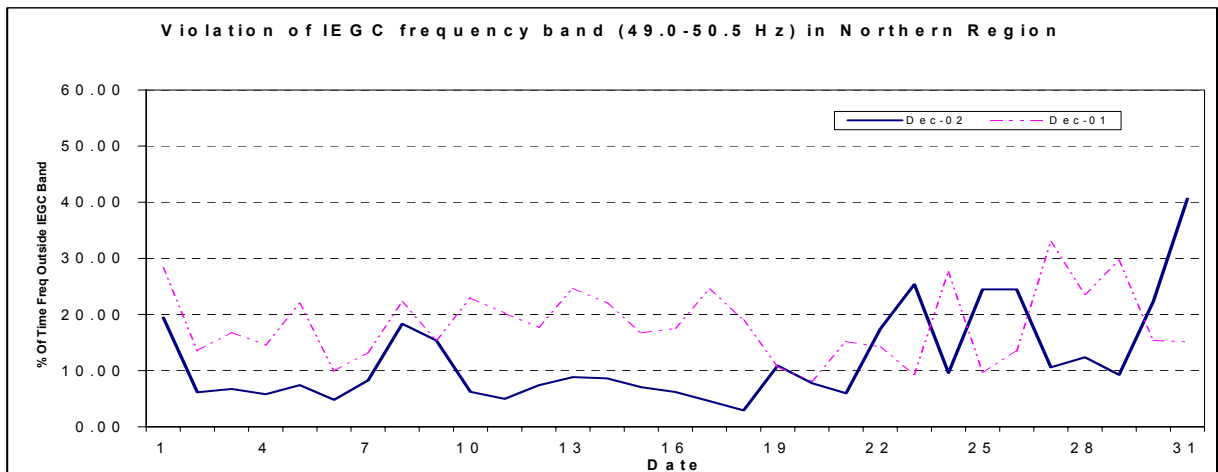
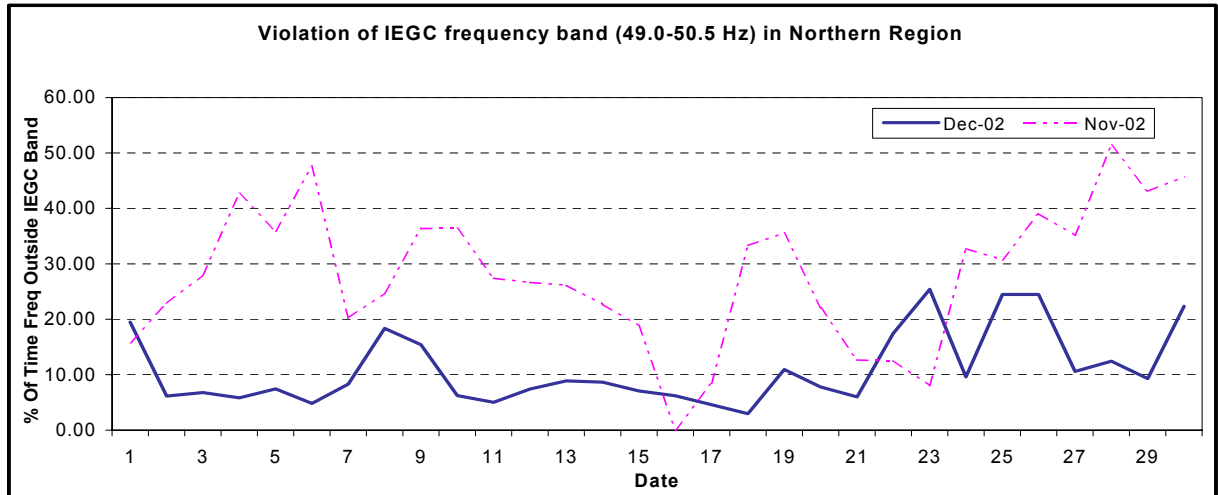
As also conveyed earlier, a smooth implementation and operation of ABT in the Northern Region has been possible only due to the co-operation of all the constituents of the region. However, as enumerated above, there are areas which need attention and action towards betterment in these areas. We are sure that these issues will receive the due importance they deserve to make ABT a further success in the region resulting in greater discipline.

Thanking you,

Yours faithfully,

Encl: as above

(ALOK ROY)
General Manager



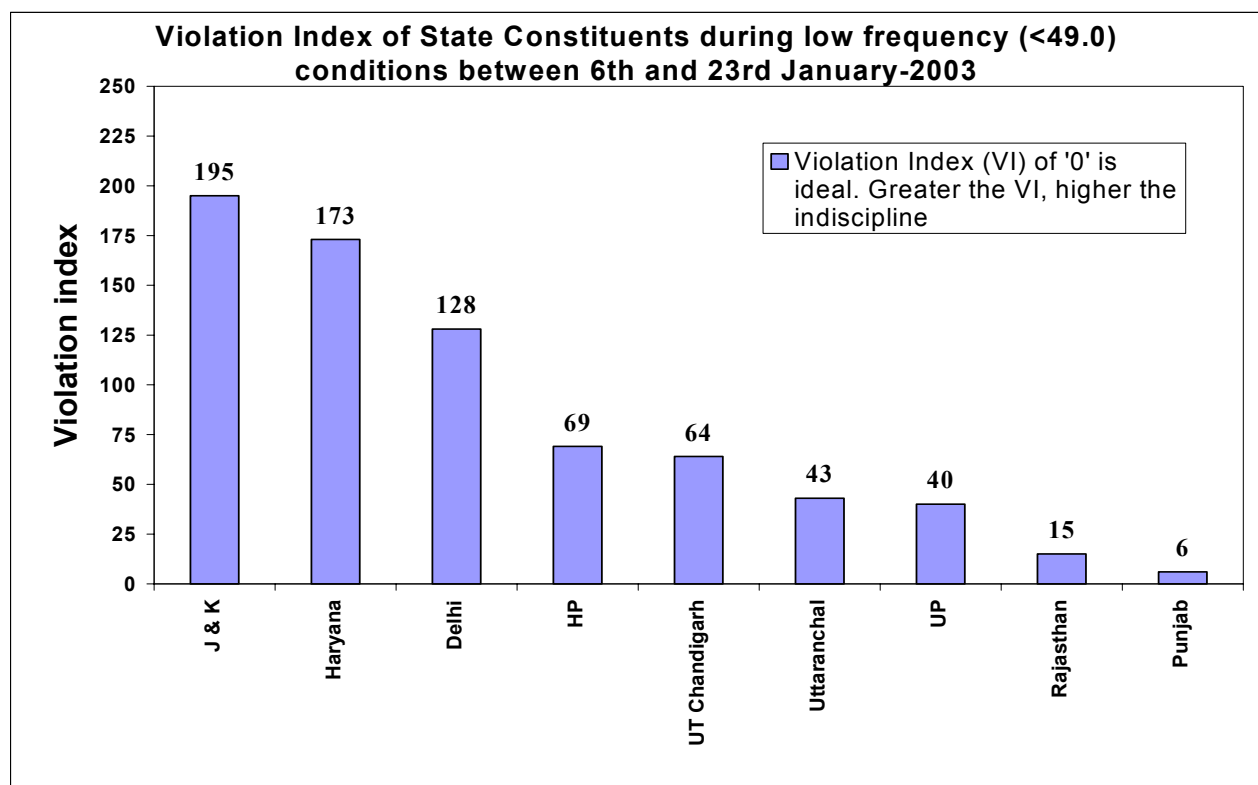
**Low Frequency conditions between 6th and 23rd January-2003 due to
violation of IEGC permitted frequency band**

The following figures relate to 15-minute time blocks under the ABT regime when the average frequency of the time block has been 49.0 Hz or below. The total percentage of these low frequency blocks between 6th and 23rd January-2003 has been 23.09 %.

State/UT	MWh overdrawal below 49.0 Hz	Percentage of time state contributed to this frequency violation A	Average overdrawal (MW) B	Maximum overdrawal (MW) C	Violation index (ideal value 0) $D = \text{SQRT}(BC) * A / 100$
J & K	15834	95	166	252	195
Haryana	11525	68	170	383	173
Delhi	8374	64	130	302	128
HP	5040	88	57	108	69
UT Chandigarh	5219	95	55	83	64
Uttaranchal	2925	73	40	86	43
UP	2932	33	90	163	40
Rajasthan	1176	20	60	91	15
Punjab	477	9	53	75	6

The above figures are based on the data obtained from Special Energy Meters (SEMs) installed in Northern Region.

These do not include the power flow on 66 kV and below feeders where SEMs are not installed and which would slightly alter the position in respect of Uttaranchal and UP.



Operation of NTPC stations since introduction of Availability Based Tariff (ABT) in Northern Region

S. no	Power station	Schedule as percentage of Declared Capability (DC)			Actual generation as percentage of Declared Capability (DC)		
		Dec-02	Jan-03	Feb-03	Dec-02	Jan-03	Feb-03
1	Singrauli	99.06	99.66	98.18	99.55	100.09	98.38
2	Rihand	98.81	99.44	97.92	99.00	99.74	98.12
3	Anta	96.58	95.74	87.09	97.03	97.19	88.43
4	Auraiya	93.62	90.95	77.43	92.73	91.86	78.25
5	Dadri GPS	91.32	85.97	73.36	91.78	89.76	77.52
6	Unchahar-1	95.46	94.70	87.35	96.71	97.33	91.03
7	Unchahar-2	90.81	92.41	87.64	94.06	95.99	90.57
8	Dadri (T)	84.57	94.09	84.32	86.16	94.98	85.58

Note: The figures in respect of Anta, Auraiya and Dadri GPS include both gas firing and liquid firing.