MAHARASHTRA STATE TRANSMISSION COMPANY LTD.

PHONE : OFFICER 022-26598589 C.E.(P)
GEN.STAFF 26598595 26598588
FAX. : 022-2659 8587
GRAM. : MUMBAIGRID.

TRANS. PLANNING DEPT.
PLOT No.C-19, PPRAKASHGANGA,
BANDRA – KURLA COMPLEX,
BANDRA (EAST),
MUMBAI – 400 051.

Ref.No.PP/WM-I/OCCURRENCE/20970 Date : 23.06.05

To

Shri A.M.Khan,
Secretary, MERC,
Mumbai.

Sub : Disruption of power supply in parts of Mumbai on 16.6.2005
- Submission of investigation & analysis report thereof :
Ref : Fax message no.MERC/Grid Failures/2005/1224 dtd.17.6.2005
From Shri A.M.Khan, Secretary, MERC.

==========

Sir,

We are in receipt of your above mentioned letter dtd.17.6.2005 regarding submission of our "Detailed say" about the occurrence on 16.6.2005 at 6.11 Hrs. leading to disruption of power supply in parts of Mumbai.

We are enclosing our investigation & analysis report on the occurrence of 17.6.2005 at 6.11 Hrs. as our "Detailed say" in this regard.

Thanking you,

Yours faithfully,
Sd/-
Director (Operations)

End. As above.

Copy f.w.cs to :
1. Dr.S.L.Patil,
   TBIA Plot no. P-40, MIDC,
   Rabale Village, P.O. Ghansoli,
   Navi-Mumbai-400 701.

2. Vidharbha Industries Association,
   Ist Floor, Udyog Bhavan,
   Civil Lines, Nagpur-440 001.

3. Mumbai Grahak Panchayat,
   Grahak Bhavan,
   Sant Dnyaneshwar Marg,
   Vile Parle(W), Mumbai-400 056.

4. Prayas,
   Amita Clinic,
   Athavale Corner,
   Deccan Gymkhana,
   Karve Road,
   Pune-411 004.

5. The General Manager,
   The Tata Power Company Ltd.,
   GIS Building,
   34 Sant Tukaram Road,
   Carnac Bunder,
   Mumbai-400 009.

Copy to :

1. The Tech.Director (EHVP-COMM-TRC), MSTCL, Mumbai.

2. The S.E.(TRC), MSTCL, HO, Mumbai.

INVESTIGATION AND ANALYSIS REPORT OF OCCURRENCE ON 16.6.2005 AT 06=11 HRS.

1.0 A disturbance took place in Tata Power Company (TPC)- Maharashtra State Transmission Company Ltd. (MSTCL) network on 16.06.2005 at 06=11 hrs. leading to disruption of power supply in parts of Mumbai. During this occurrence following feeders alongwith TPC unit No. 4,5,6 & 7 tripped.

220KV Trombay - Kalwa Line (At Kalwa end only)
220KV Trombay - Nerul Line (At Nerul end only)
220KV Trombay -TIFIL Line (At TIFIL end only)
220KV Trombay - Mulund Line (At Mulund end only)
220KV Tie -I Line (At TPC end only)
220KV Tie-II Line (At TPC end only)

The detailed window & relay indications are enclosed at Annexure-I. A sketch showing SLD and occurrence details is enclosed at Annexure-II.

The 100KV interconnection at Borivali (MSTCL)- Borivali (Tata) and 220KV Kalwa-Salsette Double ckt. lines remained in service. The flow on 220KV MSTCL-TPCL tie lines at Trombay was 300MW (towards MSTCL system) before the occurrence. Tripping of the TPC generating units caused shortage of about 1200 MW generation & supply to southern parts of Mumbai city way affected.

The loss of generation in TPC system caused heavy overdrawal (of about 500MW) from MSTCL system over Borivali & Kalwa lines. The timely action of SLDC saved the grid from wide spread collapse.

2.0 System condition at the time of occurrence: Normal

Load on lines before occurrence at Trombay (MSTCL) S/S.

Nerul line - 200 Amp	Kalwa Line- 170 Amp.
Mulund line- 230 Amp.	Tie -I line - 430 Amp.
TIFIL line - 170 Amp.	Tie -II line - 430 Amp.

3.0 Analysis of occurrence:

The Window & relay indications at different stations as well as event log generated at SLDC, Kalwa were studied in detail. It is observed that all the 220KV Lines connected to 220KV Trombay (MSTCL) substation tripped at remote end in Zone-2, Distance protection. There was neither any tripping nor any indications at

Trombay (MSTCL) substation. The switchyard at Trombay (MSTCL) was thoroughly inspected for any fault/problem, however, nothing abnormal was observed. As all the 220KV lines tripped at remote end in Zone 2, it appears that the fault may be beyond Trombay (MSTCL) bus i.e, towards TPC system.

A meeting was also held between MSTCL & TPCL authorities at "Prakashgad" on 20.06.2005 to discuss this occurrence in detail and pinpoint the cause of occurrence. After detailed discussions on this issue, no concrete conclusion about the location and type of fault could be drawn. The fault, however, seems to be of phase to phase transient nature as all the lines stood OK after energisation.

4.0 Observations/investigations:

i) The event log (Annexure-III) at SLDC Kalwa indicates export of about 932 MW power to TPC system through TIE-I at 06.10.03 hrs. indicating tripping of TPC generators before tripping of the tie-lines.

ii) The built-in fault locator of numerical relay (7SA52) provided on 220KV Trombay TIFIL line at TIFIL end has indicated the distance to fault as 30.2 kms. The line length of TIFIL - Trombay is 28.6 kms. and length of Tie lines is 0.86 kms. This thus, indicates fault beyond Trombay bus of MSTCL (i.e.towards TPC system).

This fact is also substantiated by remote end tripping of all other feeders connected to Trombay (MSTCL) bus in Zone-II.

(iii) The timings recorded at SLDC Kalwa & TPC are not matching as time synchronization through GPS is not available at TPC end & hence exact co-relation of events is not possible.

(iv) Incidentally it is seen that the event address of Trombay-B FDR-7 is given as "DT6 HT G O D flashover". This needs to be looked into and explained by TPC particularly in view of tripping of TPC unit - 6 on differential protection. Copy of the DR is enclosed as Annexure IV.

(v) As can be seen from the relay indications (Annexure-V) funished by Tata Power Company (TPC) that distance protection on 220KV Trombay-Salsette circuits 1 + 2 operated at Trombay end (TPC) only. This needs to be clarified by TPC.

WINDOW AND RELAY INDICATION AT TROMBAY SUBSTATION **Annexure-I**

1)**220KV Trombay-Kalwa line:**

Trombay end	**Kalwa end**
W.I - Nil R.I- Nil	W.I.- 1) Distance protection trip 2) Auto reclose unsuccessful 3) Circuit Br.low pr.alarm R.I.- 1) U (Definite trip) SN (Y- Phase to earth) 2Ph (phase to phase) TK-2 (Zone-2) Z-2 2) Trip relay RXME-18 operated
Line charged on 16.06.05 at 0.7.55 hrs	**On 16.6.05 at 07.56. hrs.**

2) 220KV Trombay-Nerul line

Trombay end	**Nerul end**
W.I - R,S,T,E,Z3 R.I- PAR (R- phase start) PAS (Y- phase start) PAT (B- phase start) PE (Earth fault) PS II (Zone- 2) PS III (Zone- 3)	W.I- Nil R.I. 1) Lockout operated, Z-3 2) Protection operated 3) TJM- 12 relay (R-phase O/C) 4) Master trip- 86.1
Line charged on 16.06.05 at 13.31 hrs	**On 16.6.05 at 13.32. hrs.**

3) 220KV Trombay-Tifil line

Trombay end	**Tifill end**
W.I - Nil R.I - Nil	W.I- Breaker fail EXT-PU R.I. 1)Distance relay-21E R-ph, Y ph & N Pickup time 448 ms Trip time-401 ms Distance-30.2 km.
Line charged on 17.06.05 at 15.15 hrs	**On 16.6.05 at 17.15 hrs.**

4) 220KV Trombay-Mulund line

Trombay end	**Mulund end**
W.I - Nil	W.I- 1) Distance protection operated 2) Auto reclose lockout R.I.- 1) Distance protection -21 P/F Zone-2,RY,YB, earth- R,Y 2) 3 Ph auto reclose relay -43.2 3) Auxiliary relay to main CB supervision 52S ABDEF 4) Auxiliary relay fault for centre CB supervision 52S DEF
Line charged on 16.06.05 at 08.05 hrs	**On 16.6.05 at 08.07 hrs.**

5) 220KV Tie -I

Trombay end	**TATA end**
W.I - 1) Tie -1 breaker trouble 2) Tie pilot channel fails R.I.- 1) PAR, PAS,PAT,PE,PS -II	R.I.- 1) Pilot wire prot.opetd. 2) Directional earth fault operated.
Line charging time- 16.06.05 at 08.17 hrs	

6) 220KV Tie -II

Trombay end	**TATA end**
R.I.- PAR, PAS,PAT,PE,PS -II	R.I.- 1) Pilot wire prot.opetd. 2) Directional earth fault operated.
Line charging time- 16.06.05 at 08.20 hrs	