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TECHNICAL AUDIT REPORT

NOKHAR 500KV GRID STATION

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NOKHAR 500KV GRID STATION

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Introduction:

This report covers the technical audit of Nokhar 500kV Grid Station (GS) located at Gujranwala Hafizabad road, near Nokhar Village, Punjab. This GS was commissioned on April 11, 2009. It has 1200MVA transformation capacity connected to the grid, feeding Gujranwala and its surrounding areas.

There are two (02) 600MVA-500/220kV, three (03) 160MVA-220/132kV autotransformers and one (01) 13MVA-132/11kV power transformer installed at this GS that are owned and maintained NTDC. Four (04) 500kV, two (02) 220kV and six (06) 132kV circuits link this station to others. The GS is connected to Rawat 500kV GS and Lahore Sheikhupura 500kV GS through 500kV circuits and to Mangla hydropower station and Gakkar 220kV GS through 220kV circuits. For 500kV and 220kV switchyard one and a half breaker scheme whereas for 132kV switchyard double bus single breaker scheme is used. Single line diagram is attached (Annex-A).

EPP audit team comprising of technical experts visited this GS from February 11, 2014 to February 25, 2014 to perform technical audit. This report reflects their findings and prioritized fixes.

Findings:

Observations of technical experts are below:

1) One battery bank of 48V for Power Line Carrier (PLC) is completely damaged and the other is also out of service due to damage of top covers of their cells. At present 48V DC is being supplied by the charger only for the communication purpose. If battery charger goes out due to failure of supply, there will be no DC supply for PLC which will affect PLC communication with NPCC and other connected GSs.

2) One battery bank of 220V for 500kV is in healthy condition whereas top covers of a number of cells of the second bank are damaged due to improper initial charging. The performance of one battery bank is not reliable and its replacement is very essential for healthiness of protection system, control and signaling circuitry etc.

3) One (01) distance protection has software problem and nine (09) relays are not installed at this GS (For details see Annex-B).

4) Provision of cross trip scheme is not implemented. It is essential to avoid total or major collapse of the system. Under fault conditions or due to overloading, some transmission circuits and transformers may trip due to lack of contingency cover creating a possibility of cascaded outages of other circuits. This may lead to system collapse.

5) Tele-protection, direct transfer trip (DTT) and tie line protection (a feature available in distance protection relay) is out of circuit on all 220kV circuits. The DTT is required for

remote end tripping on “Breaker Failure Scheme” when there is no guarantee that relaying at remote line terminals will actuate quickly enough to minimize consequential damage. This DTT order requires the missing tele-protection facility.

6) Auto-reclosers installed on all 220kV and 132kV transmission lines are healthy but blocked. Auto-reclosers can significantly reduce the outage time, reduce transmission line damage and thus provide higher service continuity.

7) Spare parts are not available for eleven (11) 500kV CBs, eleven (11) 220kV CBs and eleven (11) 132kV CBs for future overhauling (For details see Annex-B).

Recommendations:

Transmission and Grid			
Sr. No.	**Findings**	**Recommendations**	**Remarks**
1	Both battery banks of 48V PLC are damaged.	Immediate replacement of both 48V battery banks is required.	
2	Top covers of a number of cells of one battery bank of 220V for 500kV are damaged due to improper initial charging.	One battery bank needs complete replacement and its healthy cells may be used to replace the damaged cells of the other bank.	
3	Spare parts for thirty three (33) CBs are not available for future overhaul.	Spare parts for eleven (11) CBs of 500kV, eleven (11) CBs of 220kV and eleven (11) CBs of 132kV should be arranged for future major overhaul.	

Protection			
Sr. No.	**Findings**	**Recommendations**	**Remarks**
1	One (01) defective distance protection relay due to software problem and nine (09) relays are not installed.	Recommended to be replaced. All missing relays are recommended to be installed (for details see Annex-B and D)	
2	Provision of cross trip scheme is not implemented	Recommended to be implemented in consultation with system protection department of NTDC	
3	In-operative tele-protection and direct transfer trip (DTT) on 220kV system.	“System Protection and telecommunication departments of NTDC” should re-visit and make concerted efforts to enable “carrier aided facility” at either ends of the transmission lines in order to clear faults rapidly.	
4	Blocked auto-reclosers on all 220kV and 132kV transmission lines.	"System Protection" and "System Operations" departments should review and take appropriate action for restoration of auto-reclosers.	

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