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TECHNICAL AUDIT REPORT

ROHRI 220KV GRID STATION

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ROHRI 220KV GRID STATION

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House 4, Street 88, Sector G-6/3
Ataturk Avenue, Islamabad, Pakistan
Tel: +92 (51) 835 7072, Fax: +92 (51) 835 7071
Email: jhicks@aeai.net

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Introduction:

This report covers the technical audit of Rohri 220kV Grid Station (GS), located in Rohri, Sindh. The GS was commissioned on October, 20 2014. It has a total of 500 MVA transformation capacity connected to the grid.

There are two (02) 250MVA-220/132kV autotransformers and one (01) 13MVA-132/11kV transformer that are owned and maintained by NTDC. Four (04) 220kV and four (04) 132kV transmission lines link this station to others. This GS is connected to Engro thermal power station and Shikarpur 220kV GS through 220kV circuits. For 220kV switchyard one and half breaker scheme whereas for 132kV switchyard double bus single breaker scheme is used. Single line diagram is attached (Annex-A).

EPP technical audit team comprising transmission and protection experts visited this station from December 11, 2014 to December 18, 2014. The report reflects their findings and prioritized fixes.

Findings:

Observations of technical experts are given below:

1) Loading condition of the transformers is as below:

Transformer No.	Rating			Max. Load Current Recorded (A)	Max. Percentage Loading of transformers (%)
	Voltage Ratio (kV/kV/kV)	Power (MVA)	HV/LV Current (A)		
T-1	220/132/11	250	656/1093	66	6.00
T-2	220/132/11	250	656/1093	276	25.25
T-3	132/11.5	13	57/653	15	2.3

As tabulated above, all transformers are operating well below their name plate ratings. One (01) 160MVA 220/132kV transformer is also lying redundant at the GS.

2) Spares for nine (09) 220kV and ten (10) 132kV Circuit Breakers (CB) are needed for internal inspection and major maintenance in future. (for details see Annex-B)

3) The gravel has not been provided in 220kV and 132kV switchyards till to date.

4) Optic Fiber Ground Wire (OPGW) of 220kV double circuit Rohri- shikarpur line is missing from tower Nos. 38 to 84, 121 to 135, 154 to 174 and 192 to 206 while peaks at tower Nos. 68 to 77 have not been provided.

5) The facility for direct transfer trip (DTT) is not available. This DTT order requires the missing tele-protection facility. Tie line (stub) protection is also not available on all 220kV transmission circuits.

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

7) Cross trip protection facility is not available at grid station. Cross trip scheme is implemented in some sections of the system to avoid total or partial collapse.

8) Sequential event recorders (SER), Fault/disturbance recorders (FDR), voltage and power recorders are also not installed. This data helps engineers to check proper functioning of the protection system and identify components that failed to operate during faults.

9) Bus differential protection is not installed on 132kV bus-1 and bus-2.

10) Breaker failure scheme for 132kV system is not installed.

Recommendations:

Transmission and Grid			
Sr. No.	**Findings**	**Recommendations**	**Remarks**
1	Gravel has not been provided for 220kV and 132kV Switchyards.	Needful should be done on priority basis after proper cleaning and leveling of switchyards.	
2	Unavailability of Spare parts for Nine (09) 220kV and ten (10) 132kV CBs for future overhauling.	Spares are needed to be arranged.	
3	OPGW of 220kV double circuit Shikarpur-Rohri line from tower No. 38 to 84, 121 to 135, 154 to 174 and 192 to 206 is missing while peaks at tower Nos. 68 to 77 have not been provided	Missing OPGW and peaks of 220kV double circuit Shikarpur-Rohri line needs to be provided.	

Protection			
Sr. No.	**Findings**	**Recommendations**	**Remarks**
1	In-operative tele-protection on all 220kV circuits and direct transfer trip (DTT) of 220kV system.	System Protection and telecommunication departments of NTDC should look into the matter to enable “Carrier aided facility” at	

		either ends of the transmission lines for quick clearing of the faults.	
2	Absence of sequential event recorders and fault recorders and voltage/power recorders for 220kV system.	Needs to be installed.	
3	Differential protection for 132kV bus-1 and bus-2 is not installed.	Recommended to be installed for rapid isolation of bus bar faults.	
4	Unavailability of breaker failure scheme on 132kV System.	Recommended to be installed.	
5	Absence of cross trip scheme on all 220kV transmission lines and 220/132kV transformers.	Recommended to be installed for protecting the system from total collapse due to overloading. NTDC needs to look into the issue for system stability.	
6	Blocked auto-reclosers on all 220kV and 132kV transmission lines.	"System Protection" and "System Operations" departments have to review the matter and take appropriate action for restoration of auto-reclosers. This can significantly reduce the outage time, reduction in transmission line damages and thus providing higher service continuity.	

General			
Sr. No.	**Findings**	**Recommendations**	**Remarks**
1	Thermovision survey of all transmission lines and GS has not been done.	Thermovision survey needs to be done.	

www.ep-ep.com.pk
info@ep-ep.com.pk