

ELECTRICITY MANAGEMENT SERVICES LIMITED

4, Dar Es Salem Crescent, Off Aminu Kano Crescent, Wuse II, Abuja, FCT

INSPECTION REPORT OF UGWUAJI-MAKURDI 330KV DC OVERHEAD TRANSMISSION LINE

Please be informed that the Inspection/Test of Ugwuaji-Makurdi 330KV (DC) OHTL was carried out between 20th and 22nd May, 2015. The following persons were present for the exercise;

a. Electricity Management Services Limited (EMSL) Officials:

- i. Engr. T.T Aliyu Head (TS & IS)
- ii. Engr Williaam C. Metieh SA (Technical)- MD's Office
- iii. Engr. Gideon Nanjwan AIE (Jos)
- iv. Engr. Usman Momoh Ag AIE (Abuja)

b. Consultant (Colenco Consulting Limited):

- i. Engr. Ibe Odo Uma COLENCO Representative

c. TCN Officials:

- i. Eketé Valentine Officer I
- ii. Anselem Onyekelu Officer II

d. Contractor (Dextron) Officials:

- i. Furtos Dinu
- ii. Chris Ogbohe

2. Project Details and Objective

2.1. Contract Details

Client	NDPHC
Consultant	Colenco Consulting Limited
Contractor	Dextron

2.2. Project Description

2.2.2 Aliade - Makurdi 330kV DC OHTL

Total length	46KM
No of Circuit	Two (2)
No of Conductor per Phase	Two (2)
No of Spacers per Phase/Span	6/7
No of Dampers per Phase/Span	None
Conductor Type	ACSR
Conductor Size	350mm ²
Phase Configuration	Vertical
Earth Wire Type	Galvanized Steel (Earth Shielding System)
OPGW	Galvanized Steel with embedded Optic Fibres
Type of Support	Lattice Galvanized Steel Towers
Type of Foundation	Grillage/Concrete Pad & Chimney
Rated Voltage	330KV
Insulator Type	Composite (Polymer)
Span length	100/200m

2.3 Project Objective

2.4 Summary of Observations & Recommendation

S/NO.	PROJECT AREA	OBSERVATION	PICTORIAL ILLUSTRATIONS	RECOMMENDATIONS
1.	Tower structures and Foundations	<p>The 330KV DC Ugwuaji - Makurdi OHTL were seen supported on towers made of galvanized steel lattice construction. Each of the tower legs were firmly erected on rectangular concrete foundation (bases). Anti-vandals (specially made) bolts and nuts were seen used for fixing some of the tower members. They were used mostly for the tower legs while for the upper parts of the tower regular nuts and bolts were used.</p> <p>Also the step bolts used for the erection of the tower were still in position at the time of our inspection visit</p>		<ol style="list-style-type: none">i. In order to prevent easy climbing access by vandals, all the step bolts below the anti-climbing devices should be removed from positionii. All tower location within visible erosion prone areas along the entire transmission

i. Some chimneys were observed completely buried and there was also indication of water retention at the tower legs and thick shrubs and climbing plants were also seen growing around the chimneys (T395)

route length, should be provided with erosion control measures and the shrubs and climbing plants properly cleared

2. Materials of line conductors, Earth conductors and other fittings

The materials employed for the line conductors are aluminum re-enforced with steel (ACSR) of code name "Bison" having a cross-sectional area of 350mm². The earth conductor for the towers were of the type galvanized steel, with the cross-sectional area of 104mm²

The following were also observed;

i. Some nuts and bolts used for the earth conductor were seen corroded (T369, T370) etc

Replace all corroded bolts and nuts with galvanized ones

-
- ii. A lot of insulators were observed cracked (T421, T368, T450, T458, T466, T470) etc

3. Anti-climbing Devices, Danger notices/Plates, Anti-vandals etc.	Danger plates have been fitted on all the towers. However, it was noticed that a lot of the towers don't have anti climbing devices. Other observations are; <ul style="list-style-type: none">i. Disparity of phase identification observed on tower (T421) where on circuit U1A has blue and yellow colours representation instead of Red, Yellow and Blueii. A birds nest was seen on the cross	<ul style="list-style-type: none">i. Anti climbing devices should be provided for all towers.ii. on all The phase indication should be corrected to indicate R,Y,B rather than B,Y,Biii. The bird nest should be
---	---	--

arm of the OPGW
on tower T470 and
T421

removed.

4.	OHTL Stabilization Facilities	From thorough inspections and checks, insulators, spacers, and corona rings were provided and properly erected. Stabilization dampers were not provided.	The dampers should be provided.
-----------	-------------------------------------	--	---------------------------------

5.	330KV OHTL Status	The tensioning of the 330KV OHTL at some sections were observed not uniformly executed as can be seen from conductor's imbalance (mismatch) per phase in a lot of places along the OHTL. (T367-368,456-457,etc)	These conductors mismatch should be corrected to achieve the required tensioning uniformity.
-----------	----------------------	---	--

6.	Line Trace and Access Road	The terrain traversed by the 330KV DC OHTL is a difficult one with abundant visible gulleys, heavy vegetation, swampy areas, hills and mountains, built-up areas; refer to areas between towers (T450, 454, T457, 458, T469,	The line trace should be properly and adequately maintained and secured. Appropriate procedures need to be put in place by the Contractor to ensure
-----------	-------------------------------	--	---

T470, 471, 472, etc)

Contrary to the contractors claim on provision of motorable access earth road along the OHTL route, it was discovered that the access road has been overtaken by shrubs, cultivated farm lands, vegetation encroachments etc.

clear access along the entire route.

All erosion prone areas should be adequately backfilled and compacted.

- 7.** 330KV OHTL Crossings Observations also revealed that there were no railway lines crossings along the trace of the 330KV DC OHTL. However, the line crosses 132KV DC OHTL (T368 – T369) and 0.415KV OH lines (T457 – T458) at some locations. At these crossings, statutory safety clearances were maintained throughout the lines route.

- 8.** Earthing System/Earth Tests Carried out Two methods of earthing system in addition to the grounding sky wire were adopted. Namely;

The contractor should carry out further earthing improvements for all

-
- Counterpoise earthing
 - Individual tower legs earthing

earthing resistance above 10Ω.

In both cases, physical earth connection to the tower legs was seen and visible. The results of the random earth resistance measurement tests for the tower legs were as recorded in appendix 1

9.

The Ugwuaji 330KV DC OHTL
Was seen crossing over the
substation

- i. The running of ugwuaji 330KV DC lines over the substation is unsafe. A diversion to clear the substation is recommended
-

APPENDIX I

UGWUAJI-MAKURDI OHTL TOWER LEGS EARTH RESISTANCE READINGS IN OHMS

TOWER NUMBER	Ohms (Ω)	Ohms (Ω)	Ohms (Ω)
T367	1.30	0.80	0.90
T368	1.21	4.27	4.29
T369	2.69	0.76	
T372	5.15	3.55	3.54
T374	7.90	3.52	7.90
T376	1.92	1.57	1.62
T381	3.40	1.70	1.70
T387	1.00	6.90	1.00
T395	0.63	3.27	0.65
T398	1.90	3.80	1.90
T407	2.10	3.88	3.90
T413	1.08	1.44	1.10
T421	2.89	5.25	
T424	7.40	3.30	
T431	0.60	5.55	
T439	3.43	2.90	
T446	1.90	1.60	
T450	2.29	0.90	2.30
T457	5.20	6.11	6.08
T458	5.48	10.1	
T461	2.40	1.01	
T462	6.70	7.43	7.42
T466	1.33	0.84	0.88
T470	0.41		
T471	0.53	0.43	

T473	0.60	0.68	
T475	3.00	2.32	
T474	0.60	0.35	