Development of Otam – Molibagu TL 150 kV Transmission Design which is Environmentally Friendly

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ABSTRACT

Population growth is increasing every yearrequires more and more energy requirements, especially on the electrical energy side, namely the increasing demand for electric power.Although the technology for the construction of power plants and their transmission systems has been pursued with more sophisticated, effective, efficient and safe technologies, the obstacles still exist, one of which is the increasing difficulty of placing high-voltage transmission lines that are free from settlements and the influence of electric field radiation. and magnetic fields on human health has become an environmental problem for PT. PLN (Persero). This study aims to determine how much safe voltage is for people who pass through the High Voltage Air Lines and develop construction designs. The data analysis technique used by the author is descriptive qualitative analysis. The results of monitoring the magnetic field on the 150kV SUTT transmission is 0.5 mT while the electric field strength is 70 V/m. in Bolaang Mangandow Selatan is safe for human health based on standards.

Keywords: SUTT Network; community; behavior; social conditions.

INTRODUCTION

Electrical energy is very necessary for today's modern society. Along with advances in technology, problems in the world of electricity often go wrong

the other is the need for electrical energy. The increase in electrical energy demand is not only influenced by the large population in an area but also by the economic activity of the population which continues to increase to meet their daily needs. The higher the economic activity, the greater the need for electrical energy. It is certain that as a modern society grows, the need for electrical energy will generally increase in proportion to the level of economic activity and also the population in the area.

The availability of adequate and well-targeted electrical energy will spur the development of regional development such as the industrial sector, business, public services and even the quality of life of the community as more and more residents enjoy electrical energy. Then, directly or indirectly, this will affect economic growth and social welfare.

The presence of magnetic fields and electric fields in human life cannot be felt by the human senses, unless the intensity is large enough and only felt by hypersensitive people. Electric fields and magnetic fields belong to the group of non-ionizing radiation. This radiation is relatively harmless, completely different from ionizing radiation such as nuclear radiation or x-ray radiation. Various kinds of concerns have emerged regarding the impact of SUTT, with very firm statements stating that SUTT is indeed dangerous from cancer, leukemia, mental retardation, psychological disorders to the health of some residents who live in areas where the SUTT route passes.

Several previous studies indicate that people who live under transmission lines are at risk of developing health problems. According to laboratory research on the influence of electric fields carried out by Hauf and friends who observed an electric field of 1 -20 kV/m on a group of 25 people who were under the influence of an electric field for 45 minutes to 5 hours, it generally did not cause pathological effects on organs. -organs. Likewise, no stress symptoms were found. electrolyte eifecs

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or abnormalities in the body's enzyme balance. A current of 200 µA with a frequency of 50 Hz was applied through the group's body. also did not show any abnormalities or changes in the control group. Similar research was also carried out by Kuhne and friends. With an electric field strength of 10-20 kV/m for 6 to 22 hours, every day over several weeks, it also shows that there is no effect of the electric field on humans. The results of the research above show that electric field strengths of up to 20 kV/m do not pose a health risk.

The aim of this research is to determine the effect of magnetic fields and electric fields on humans. Based on IRPA guidelines, the electric field strength = 5 kV/m and the electric field density = 100 µT for residential areas. This IRPA/INIRC recommendation is also the same as SNI 04-6950-2003, National Standardization Body regarding High Voltage Air Lines (SUTT) and Extra High Voltage Air Lines (SUTET) - Threshold Values for Electric Fields and Magnetic Fields while the magnitude of the magnetic field strength and The electric field required by WHO 1990 and SNI 04-6950-2003 requires an electric field strength = 5 kV/m and a magnetic field density = 0.1 mT for residential areas. Meanwhile, for noise, according to Minister of Manpower Decree No: KEP-51/MEN/1999, the Thereshold Limited Value (NAB Threshold Value) is set at 85 desi Bell (dBA).

Based on the background above, the problem of this research can be formulated to determine the safety of high voltage lines (SUTT) that pass through residential routes.

RESEARCH METHODS

The research method that will be used in this paper, namely quantitative descriptive, aims to determine the safety of magnetic and electric fields as well as noise that passes through high voltage overhead lines (SUTT). Sources and types of data collection, namely using primary data sources obtained from direct observations or measurements in the field. The data analysis technique used by the author is qualitative descriptive analysis.

RESULTS AND DISCUSSION

The results of measurements or observations made can be displayed in table form
Measurements based on the field

Measurement and Reading of Energize / Voltage Application

Retrieval of 150 kV Otam – Molibagu circuit 1 (OPGW) transmission data from Tower 01 – Tower 211 (total 211 towers) with a channel length of 75.135 Kms. Energize/voltage has been implemented. The following is data on the 150 kV Otam – Molibagu transmission. The details are as follows :

For installation:
“SUTT 150 kV Otam – Molibagu Circuit 2 (GSW)”
With Good & Safe results

Table 1. Bay Voltage Measurement for 150/20 kV 30 MVA Power Transformer No.1

Phasa	Side 150 kV	Side 20 kV	Tension angle	Information
R-N	89,22	11,95	0	Ok
S-N	89,64	11,99	-120	Ok
T-N	89,25	11,94	120	Ok
R-S	155,04	20,76	30	Ok
S-T	155,02	20,74	-90	Ok
T-R	154,31	20,65	150	Ok

Source: PT PLN (Persero) UPP Sulbagut

Table 2. Voltage Measurement in Otam No.1 Direction

Phasa	Voltage	Tension angle	Information
R-N	89,27	0	Ok
S-N	89,67	-120	Ok
T-N	89,29	120	Ok
R-S	155,12	30	Ok

Phasa	Voltage	Tension angle	Information
S-T	155,08	-90	Ok
T-R	155,02	150	Ok

Source: PT PLN (Persero) UPP Sulbagut

Table 3. Voltage Readings in Otam No.2 Direction

Phasa	Voltage	Tension angle	Information
R-N	89,08	0	Ok
S-N	89,46	-120	Ok
T-N	89,08	120	Ok
R-S	155,23	30	Ok
S-T	155,19	-90	Ok
T-R	155,13	150	Ok

Source: PT PLN (Persero) UPP Sulbagut

Description:
R : Phase R (Top Cable)
S : Phase S (Middle Cable)
T : Phase T (Bottom Cable)
N : Neutral
From the table of voltage test results above, the average value of the variation is obtained

Measurement of Electromagnetic Field Level TL 150 kV GI Otam – GI Molibagu

Standardization of Electric Field and Magnetic Field Threshold Values IRPA and WHO 1990 and SNI 04-6950-2003 require electric field strength = 5 kV/m and electric field density = 0.1 mT for residential areas.
Based on the results of measurements of the electromagnetic field level, SUTT 150 kV GI Otam - GI Molibagu Line I (OPGW) on tower numbers T.001 to T.211 with a distribution length of 75,135 kms.
Measurements were carried out across populated areas, and have been declared Safe and Good

Table 4. Measurement of Electromagnetic Field and Electric Field Levels

No.	Tower	Magnetic field mT (Effective)	Electric Field Strength V/m	Location	Information
1.	T.22 – T.23	0.5	70	Village Road, House	Good
2.	T.60 – T.61	0.6	50	Village Road, House	Good
3.	T.68 – T.69	0.7	50	Village Road, House	Good

Source: TL 150 kV Otam - Molibagu measurement results

Environmental Impact Inspection Noise Level Measurement

According to Minister of Manpower Decree No: KEP-51/MEN/1999, the Thereshold Limited Value (Threshold Value, NAB) is set at 85 desi Bell (dBA).
Based on the results of noise level measurements carried out on transmission lines that cross residential areas using an environment meter (Krisbow KW06-291). From the measurement results, the following data was obtained:
The noise level on the TL 150 kV GI Otam – GI Molibagu transmission line which passes through residential areas is:

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Table 5. Noise Level Measurement

No	Tower	Threshold Value (NAV)	Information
1	15 – 16	52,9 dB dan 54,8 dB	Good
2	22 – 23	45,4 dB dan 43,5 dB	Good
3	37 – 38	55,5 dB dan 54,8 dB	Good
4	63 - 64	46,2 dB dan 45,1 dB	Good

Source: TL 150 kV Otam - Molibagu measurement results

Table 1-3 is the result of measuring the transformer bay voltage with a voltage of 150/20 kV – 30 MVA for providing voltage.

Table 4. Represents the results of magnetic field and electric field measurements. This assessment is the standardization of IRPA, WHO 1990 and SNI 04-6950-2003.

Table 5. Represents the results of environmental impact inspections measuring noise levels. Minister of Manpower Decree No: KEP-51/MEN/1999.

CONCLUSION

Based on the results of magnetic field and electric field measurements carried out on transmission lines that cross residential areas using the ETS tool. From the measurement results, the following data is obtained: the magnetic field in the 150kV SUTT transmission is 0.5 mT while the electric field strength is 70 V/m. in South Bolaang Mangandow is safe for human health based on standards. Thus the results of magnetic field and electric field measurements are categorized as SAFE. Test results Based on the results of noise level measurements carried out on transmission lines that cross residential areas using an environment meter (Krisbow KW06-291). From the measurement results, the following data were obtained: The noise level on the TL 150 kV GI Otam – GI Molibagu transmission line which crosses residential areas is: 52.9 dB and 54.8 dB, 45.4 dB and 43.5 dB, 55 .5 dB and 54.8 dB, 46.2 dB and 45.1 dB. Thus the noise measurement results are categorized as GOOD.

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