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Mapping of Electromagnetic Field Radiation Intensity in the JL Base Transceiver Station (BTS) Area. Kenangan 05 and the Impact of Health in Society

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ABSTRACT

Electromagnetic waves are a type of wave phenomenon. Electromagnetic waves are transverse waves that arise due to changes in electric fields and magnetic fields that oscillate with each other. Electromagnetic waves can be generated, one of the ways, from BTS towers so that they can produce intense electromagnetic field radiation. Health problems resulting from exposure to electromagnetic wave radiation cannot be felt directly. However, the longer you are exposed to electromagnetic wave radiation, the more dangerous it will be to your body's health. The aim of this research is to carry out mapping from measuring the intensity of electromagnetic field radiation in the BTS area and to determine the health impact of large electromagnetic field radiation on the surrounding community. Data processing in this research was carried out using quantitative techniques and qualitative techniques, namely by measuring the intensity of the electric field and magnetic field of electromagnetic waves and evaluating the results of the intensity of electromagnetic field radiation as well as conducting interviews as a public health survey. The data obtained in this research was processed using ArcGis and Surfer software for mapping results. Based on the evaluation and mapping results, it shows that the intensity of electromagnetic field radiation is still below the threshold value according to the 2020 ICNIRP standards. Based on the results of this research, there are no significant health effects occurring in the surrounding community.

I. Introduction

At present telecommunications has a very rapid development. One of the devices in the cellular communication network is the Base Transceiver Station (BTS). The BTS Tower is a place for devices that are directly related to the customer's cellphone (mobile station) that functions as the sender and receiver of the signal [1].

The results of the Nielsen Company Indonesia survey show that within a period of 5 years (2005 to 2010), cellular telephone users in Indonesia increased almost 3 times. This gives the consequences of the rise of tower infrastructure development (BTS) to facilitate the communication. The rapid development of BTS raises concerns in the community on the possibility of accidents due to the collapse of the tower and the influence of radiation it causes [2].

Research/ study of radiation exposure and health impacts due to electromagnetic field exposure originating from the BTS tower is still very limited. The results of research abroad still give results that are not consistent, but experts suggest to continue to do the research given the impact of chronic

such as can interfere with the body's nerve tissue and other effects can be easily dizzy and tired, so that it requires a long time to the emergence of these impacts [3].

II. Method

A. Materials

The materials used in this study are Electromagnetic Field (EMF), data collection table forms, Arcgis and surfer software, and questionnaire sheets, as well as using BTS tower as research objects.

B. Procedures

The steps in conducting this research are, a literature study is conducted and then prepared tools and materials, making field observations for the distance that can be reached to carry out the measurement of the intensity of electromagnetic field radiation in BTS in the Samarinda region, measuring the intensity of electromagnetic field radiation in the area around the BTS And made a questionnaire to find out public health complaints, then

III. Results and Discussion

The data obtained from the measurement of the intensity of the electromagnetic field radiation in the BTS tower as in Table 1 below:

Table 1. Electromagnetic Radiation Intensity Measurement Data

Num	Distance (m)	Tower Height (m)	Intensity	
			Measured Magnetic Field Strength (A/m)	Measured Electric Field strength (V/m)
1	10	42	0,0045	0,45
2	15	42	0,0007	0,68
3	20	42	0,0099	1,12
4	40	42	0,0095	0,62
5	60	42	0,0029	0,69
6	80	42	0,0073	0,69
7	20	42	0,0078	1,02
8	40	42	0,0078	0,80
9	60	42	0,0061	0,68
10	80	42	0,0045	1,13

Calculation of the strength of the electric field and strength of the magnetic field based on the ICNIRP standard:

$$NAB = 1{,}375 f^{0,5}\ V/m$$
$$= 1{,}375(1800)^{0,5}\ V/m$$
$$= 58{,}43\ V/m$$
$$NAB = 0{,}0037 f^{0,5}\ A/m$$
$$= 0{,}0037(1800)^{0,5}\ A/m$$
$$= 0{,}16\ A/m$$

Evaluation of the results of measuring the intensity of the electromagnetic field radiation in the BTS tower on the Street of Memories based on ICNIRP

Table 2. Evaluation of the results of measuring the intensity of the electromagnetic field radiation

No	Distance (m)	Measured Magnetic Field Strength (A/m)	NAB Magnetic Field Strength (A/m)	Measured Electric Field strength (V/m)	NAB Electric Field strength (V/m)	Details
1	10	0,0045	0,16	0,45	58,34	<NAB
2	15	0,0007	0,16	0,68	58,34	<NAB
3	20	0,0099	0,16	1,12	58,34	<NAB
4	40	0,0095	0,16	0,62	58,34	<NAB
5	60	0,0029	0,16	0,69	58,34	<NAB
6	80	0,0073	0,16	0,69	58,34	<NAB
7	20	0,0078	0,16	1,02	58,34	<NAB
8	40	0,0078	0,16	0,80	58,34	<NAB
9	60	0,0061	0,16	0,68	58,34	<NAB
10	80	0,0045	0,16	1,13	58,34	<NAB

Based on the evaluation table above it can be seen that the magnitude of the electric field and the magnetic field that is measured in the area is still below the threshold.

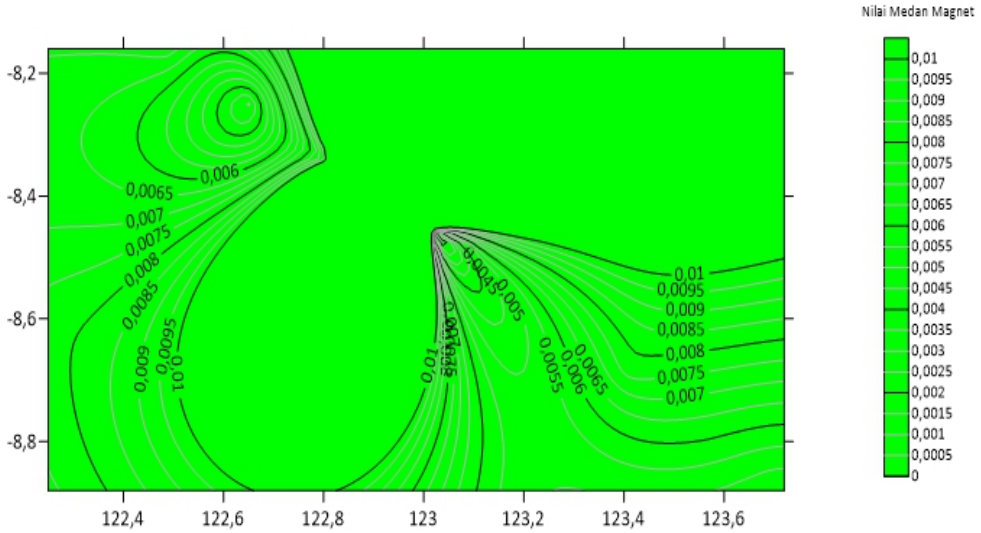

Fig. 1. Magnetic field radiation contour results

Based on data analysis and evaluation of measurement results on the intensity of the radiation of the magnetic field of ICNIRP, it was found that the intensity of the radiation of the electromagnetic field had a value below the boundary value. Based on this and the contour produced, it can be stated that the potential danger of the radiation effect of the magnetic field emitted by the BTS tower is still at a safe limit.

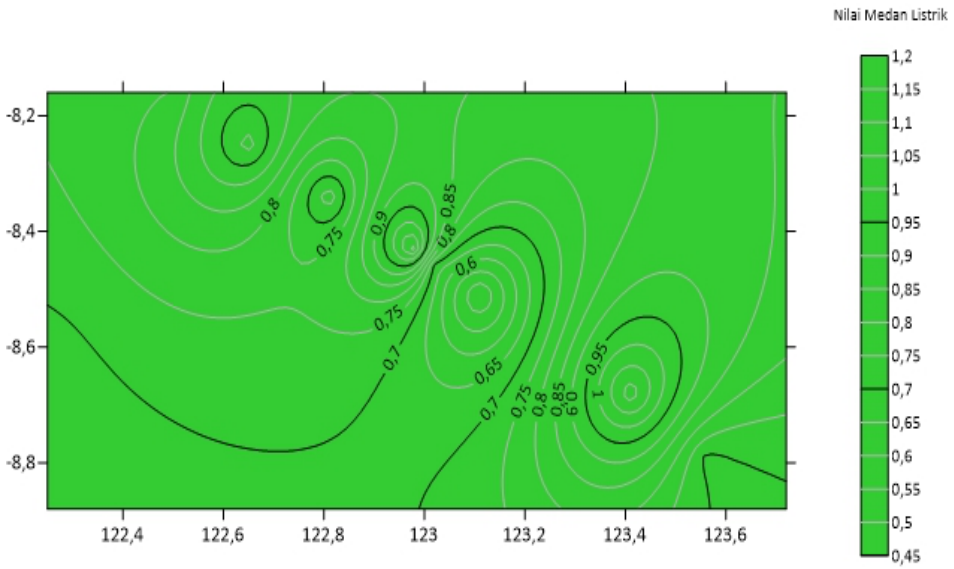

Fig. 2. Electric field radiation contour results

Based on data analysis and evaluation of the results of measurement results on the intensity of the radiation of the electric field, it is found that the intensity of the radiation of the electromagnetic field has a value that is in the language of the boundary value. Based on this and the contour produced, it can be stated that the potential danger of the effects of the radiation of the electric field that is picked up by the BTS tower is still at a safe limit.

Table 3. The results of the public health questionnaire

Num	Age (Year)	Distance (m)	Time at home (Hour)	Length of stay (Year)	Effects	Jobs	complaints
1	6	10	15	6	dizzines,fever	students	rare
2	23	15	12	23	nausea	baristas	moderate
3	17	20	15	17	Dizzines, fever, nausea	students	moderate
4	35	40	12	35	dizzines, aches, cough	traders	rare
5	31	60	12	6	Dizzines, aches, cough	teacher	rare
6	19	80	11	19	dizzines, cough, nausea, fever	students	rare
7	10	20	18	10	dizzines, fever, cough	students	rare
8	40	40	20	10	dizzines, fever, cough, aches	housewives	rare
9	53	60	16	20	dizzines, aches	Self-employed	rare
10	21	80	12	4	dizzines, nauseous, aches, cough	student	moderate

The survey based on health results in the community shows the following results, where many people experience fever, coughing, and dizziness. The age surveyed ranged from children, and adolescents to adults. Judging from the measurement of electromagnetic radiation still below the standard value, the effect of electromagnetic radiation is not permitted. Thus, effects such as fever, coughing, and dizziness felt by the community can be caused by other factors such as weather and loss of endurance. In addition, the length of time to stay and the length of time at home also does not affect the effects of electromagnetic radiation

IV. Conclusion

Based on the results of the study and measurement of the intensity of the electromagnetic field radiation in the BTS tower it can be concluded that:
The results of the mapping of the measurement of the intensity of the electromagnetic field radiation at the 10 points of the research distance found that the magnitude of the electric and magnetic fields was still below the standard value of the Icnirpa contour map from the Electromagnetic contour. No problem or effect on empowering public health from the amount of electromagnetic field radiation produced by the BTS tower.

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