sn

by Sukri D

Submission date: 29-Jul-2022 09:57AM (UTC+0800)
Submission ID: 1876379466
File name: lysis_of_Water_Well_Quality_Drilling_Around_Waste_Disposal_S.pdf (1.52M)
Word count: 7228
Character count: 36240

Analysis of Water Well Quality Drilling Around Waste Disposal Site in Makassar City Indonesia

IOP Conf. Series: Journal of Physics: Conf. Series **954** (2018) 012025 doi:10.1088/1742-6596/954/1/012025

Analysis of Water Well Quality Drilling Around Waste Disposal Site in Makassar City Indonesia

R. Maru, I. I. Baharuddin, N. Badwi, S. Nyompa, and Sudarso

Department of Geography, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia

rosminimaru@unm.ac.id

Abstract. Clean water is one of human need which is very important in carrying out its life. Therefore, this article analyzes the quality of the well water dug around the landfill. The method used is a well water well sample taken from 4 wells around a landfill taken by a purposive sampling at a different distance. The parameters measured are physical, chemical, and biological properties. The results of the analysis were then compared with the standard of drinking water quality criteria allowed under The Regulation of Health Minister of Indonesia No. 416 year 1990 on the Terms and Supervision of Water Quality of the Minister of Health of the Republic of Indonesia. The result of the research shows that there are two wells whose water quality does not meet the physical requirement i.e Location of Points II and III, based on the construction of wells also does not meet the requirements of the wells in general. While at the well Locations Point I and IV the quality of water physically, chemically and biologically as well as well construction qualify. From the result of this research, the researcher give suggestion of the need to improve the physical condition of dug wells, it is necessary to do the extension to the well water user community for drinking water about the physical condition of the dug well, the need to monitor and supervise the quality of drinking water, and should involve the community to independently meet the needs absolute i.e clean water to drink.

Keywords: water quality, well water, dug well, coli bacteria, Makassar city, clean water.

1 Introduction

Water is a major need for life processes on earth. There would be no life if there is no water on this earth. Clean water is highly coveted by human beings both for daily living purposes, for industrial purposes, for urban sanitation, and for agricultural purposes and so on [1].

The need for clean water is arranged in one of the government programs, namely the provision of clean water. The issue of water supply is one of the priorities in improving the health status of the community. Given the existence of water is vital needed by living things. Life on earth can only take place in the presence of water [2].

Many residents are forced to take advantage of water that is not good quality. Of course this will result in less good for public health in the short term, poor quality can lead to Vomitting, Diarrhea, Cholera, Typhoid, or Dysentery. This can occur in an environment of poor sanitation. If ground water and surface water are contaminated by dirt, germs are automatically spread to water sources used for house-hold use. In the long run, less quality water can lead to bone loss, dental corrosion, anemia, and kidney damage. This occurs because of the presence of heavy metal metals that are much toxic (toxic) and deposition in the kidneys [3].

Clean water coverage program in Makassar city In 2004 was 82,55%, while drinking water coverage in 2004 was 80,85% for physical, clean water quality coverage was 87,02% was increase compared to 2003 that was 83,43 % based on Regulation of the Ministry of Health of the Republic of Indonesia [4].

The Garbage Final Disposal Site (TPA) located at RT 04 RW 11 Parang Tambung Village Tamalate Subdistrict, Makassar City, utilizes 900 square meters (m^2) of land, and utilization by the community as a garbage dump for 20 years. To be evenly distributed so that it does not accumulate at one point, the local community usually burns the garbage, the people living around the landfill (TPA) of garbage still use dug well water as the source of clean water of the family in daily life (TPA RT 04 RW 11). The existence of dug wells (SGL) around the landfill both from the water quality and construction aspects of dug must meet the health requirements.

1. Basic Theory

Dug wells are one of the most common wells used to collect ground water for small communities and individual houses for clean water and drinking water with a depth of 7-10 meters from the ground. Dug wells provide water derived from a layer of soil relatively close to the surface of the soil, therefore easily exposed to contamination through seepage. Generally, seepage comes from human waste disposal (latrine/latrine), animal waste, well waste itself, either because of its floors or sewerage that is not water-resistant [26].

2.1. Water Quality

2.1.1. Water Quality Standards. Water Quality is a quality characteristic that is required for the specific utilization of water sources. With the water quality standard, people can measure the quality of the various kinds of water. Each type of water can be measured the concentration of elements contained in the standard of quality, thus can be known quality terms, in other words quality standards can be used as a benchmark. The standard of clean water quality can be defined as the provisions based on Regulation of the Ministry of Health of the Republic of Indonesia [5] which is usually set forth in the form of statement or number indicating the requirements that must be fulfilled so that water does not cause health problems , diseases, technical disturbances, as well as disturbances in aesthetic terms.

This regulation is made with the intention that drinking water that meets health requirements has an important role in the maintenance, protection and heightening of public health. With this regulation has been obtained legal basis and technical foundation in terms of water quality control. Similarly, the water used as daily water needs, the water should be colorless, tasteless, odorless, clear, and has a temperature in accordance with the standards set so as to create a sense of comfort.

2.1.2. Physical requirements. Regulation of the Minister of Health [5] on drinking water quality requirements states that water that is consumed and used in everyday life is water that has good quality as a source of drinking water and raw water (clean water), among others must meet the requirements physically , odorless, tasteless, not cloudy, and colorless. The physical properties of water can be affected by various factors including the following:

a) Temperature

Water temperatures will affect people's acceptance of the water and may also affect chemical reactions in the treatment especially if the temperature is very high. The desired temperature is 20ºC-30°C surrounding air temperature which can provide a sense of freshness, but the local climate or type of source of water will affect the water temperature. In addition, the temperature of the water directly affects the toxicity of many pollutant chemicals, the growth of microorganisms, and viruses. Temperature or water temperature is measured using a water thermometer.

b) Odor and taste

Odor and taste usually occur simultaneously and are usually caused by decaying organic materials, certain types of microscopic organisms, and chemical compounds such as phenol. The ingredients that cause these odors and flavors come from various sources. The intensity of odor and taste can be increased when there is chlorination. Since the measurement of odor and taste is dependent on individual reactions the reported results are not absolute. For drinking water standards and clean water is expected water does not smell and does not taste.

The color in the water is divided into two, apparent colors are the colors caused by the turbidity particles (soil, sand, etc.), fine particles 3 iron, manganese, microorganism particles, industrial colors, etc. The second is true color is a color derived from the decomposition of natural organic substances, namely humus 3 ignin, tannins and other organic acid.

Technical color removal can be done in various ways. Among them: coagulation, flocculation, sedimentation, filtration, oxidation, reduction, bioremoval, applied electro, etc. The degree of water dye can be known through laboratory examination by photometric method. For the color of clean water standard is 25 TCU and maximum standard for drinking water is 15 TCU.

c) Turbidity

Water is said to be turbid when the water contains so many suspended material particles that it gives a muddy and dirty color. The materials that cause this turbidity include clay, mud, organic materials dispersed from small particles that are suspended. Turbidity in water is one thing that should be considered in the provision of water to the public, given that the turbidity will diminish the aesthetic aspect, make it difficult in screening efforts, and will reduce the effectiveness of the disinfection effort.

The level of turbidity of water can be known through laboratory examination with Turbidimeter method. For a maximum permissible water turbidity standard of 25 NTU and 5 NTU for drinking water standards.

2.1.3. Chemical Requirements. Good clean water is water that is not contaminated with excessive chemical substances t 1 t are harmful to health such as iron (Fe), degree of acidity (pH), chloride and other chemicals. The content of chemicals in clean water used daily should not exceed the maximum levels allowed for drinking water quality standards and clean water.

a) 1 Iron (Fe)

Iron is one of the more important elements in surface water and groundwater. Iron-containing waters are highly undesirable for domestic use, as they may cause rust marks on clothing, porcelain and other tools and cause unpleasant taste in drinking water at co 1 entrations above about 0.31 mg / l. The aquatic chemical properties of iron are redox properties, complex formation, metabolism by microorganisms, and exchange of iron between phases and solid phases containing iron carbonate, hydroxide and sulfide.

b) Degree of acidity (pH) 4

The degree of acidity (pH) is a term used to express the intensity of the acid or base state of a solution. It is also a way of expressing the concentration of H + ions. In water supply, pH is a factor affecting the processing activity to be performed [6].

As a measure of the acidity and alk 4 inity nature of water is expressed by pH value, which is defined as the logarithm of the return of hydrogen ion concentration in r 4 les per liter. The pure water at 24 is weighed with respect to the OH ions - each having a content of 10-7 moles per liter. Thus the pH of pure water is 7 [7].

c) Chloride (C1)

Chloride levels generally increase with increasing cadminerality. High chloride levels, followed by high levels of calcium and magnesium, can improve the corrosivity of water. This resulted in the occurrence of metal appliances. Chloride levels> 250 mg / l can give a salty taste in water because the value is a chloride limit for water supply, which is 250 mg / l.

d) Biological Requirements

In bacteriological parameters used indicator bacteria or sanitary indicator pollution indicators. Bacterial indicator sanitation is a bacteria that can be used as an indication of faecal pollution from humans and from animals, because the organism is an organism contained in the gastrointestinal tract of humans and animals. Water contaminated by human feces cannot be used for drinking, washing food or cooking because it is considered to contain pathogenic microorganisms that are harmful to health, especially pathogen-causing gastrointestinal infections.

3. Method and Data

Sample in this research is a part of all digging wells which have distance less than 50 meter from garbage dump RT 04 RW 11 Parang Tambung village Tamalate Subdistrict, Makassar city, that is as much 4 dug wells. The sampling method is done by purposive sampling with the following criteria: a) The owner of the dug well that still uses the well water as the clean water daily (bathing and washing), b) the location of the well from other pollutant sources, and c) The well owner is willing to have the well to be sampled.

Water samples are taken on dug wells that have been determined location or place. The water sample will then be under a laboratory to test the physics, chemical and biological parameters. Parameters analyzed in the laboratory are color, turbidity, pH, iron, chloride and total coliform. For temperature parameters, taste and odor are directly determined at each location of the dug well water sampling.

3.1. Physical Parameters

- Temperature (temperature) is measured in the field using a water thermometer.
- Flavors and odors are determined directly in the field using taste and olfactory senses.
- Color is measured in laboratory by using test method / technique SNI 06-6989.24-2005 [22]
- Turbidity is measured in collaboration by using SNI 06-6989.25-2005 test method

3.2. Chemical Parameters

- pH was measured in laboratory using test method/technique SNI 06-6989.11-2004 [23]
- Iron (Fe) is measured in laboratory using test method/technique SNI 6989.4-2009 [24]
- Chloride (CI) was measured in laboratory using test method/technique SNI 06-6989.19-2004 [25]

3.3. Biological Parameters

- Total coliform was measured in laboratory using standard total coliform fermentation technique.

Further data is analyzed in the laboratory to determine the nature of physics, chemistry, and biology. Furthermore, in comparison with the standards of water quality criteria in accordance with Regulation of The Minister of Health of the Republic of Indonesia [5] for water quality parameters. And for the construction of dug wells compared to the requirements of wells in general according to Suripin [7].

4. Result

4.1. Construction of Dug well

Field observation results can be explained about the construction of dug wells around the landfill of RT 04 RW 11 Parang Tambung Village Tamalate Sub District, Makassar City as follows. The drawing construction of wells dug around waste disposal site can be seen in the table 1.

Table 1. Drawing Construction of Wells Dug around Waste Disposal Site RT 04 RW 11 Parang Tambung Village, Tamalate Sub District, Makassar City, 2017.

No	Requirements of Construction of Dug Well	Analysis Construction Dug Well Result			
		Point I	Point II	Point III	Point IV
1	Have Waterproof Wall 3 Meters Go Down (Yes /No)	Yes	Yes	Yes	Yes
2	Have Lips Well (Yes/No)	Yes	No	Yes	Yes
3	Distance of Well From Source of Pollution More Than 11 Meters (Yes /No)	Yes	No	No	Yes
	Explanation	Q	NE	NE	NE

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Based on Table 1. it is known that all dug wells have a waterproof wall 3 meters down, and one digging well does not have well lips and two wells spaced from pollution less than 11 meters. Based on the observation of dug wells examined, overall after the analysis of the allocation of two wells that do not meet the health requirements that have been set the wells at the location of points II and III because it has no well lips and well distances from pollution sources less than 11 meters.

Table 2. Results of Analysis of Physical Parameter

No	Physic Parameters (Unit)	Water Quality Criteria (Regulation of The Minister of Health of the Republic of Indonesia	Sample Analysis Results			
			Point I	Point II	Point III	Point IV
1	Smell	No smell	No smell	No smell	Smell of soil	No smell
2	Flavors	no taste	no taste	Feels brackish	no taste	no taste
3	Temperature (° C)	30°C	30°C	31°C	29°C	29°C
4	Color (TCU)	50	2,5	2,5	2,5	2,5
5	Turbidity (NTU)	25	6,14	0,04	3,32	1,98
	Explanation		Q	NE	NE	NE

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

4.2. Physical parameters

Physical parameters in this study are odor, taste, temperature, color and turbidity. The results of the analysis can be seen in the Table 2. Based on Table 2 it is known that from the four wells taken by water samples, there are two wells whose water quality physically does not meet the water quality requirements as determined by Minister of Health of the Republic of Indonesia [5].

4.2.1. Temperature

Based on the measurements at the four sample sites, the sample well water temperature ranges from 29 ° C - 31 ° C. The results of the analysis can be seen in the Figure 1.

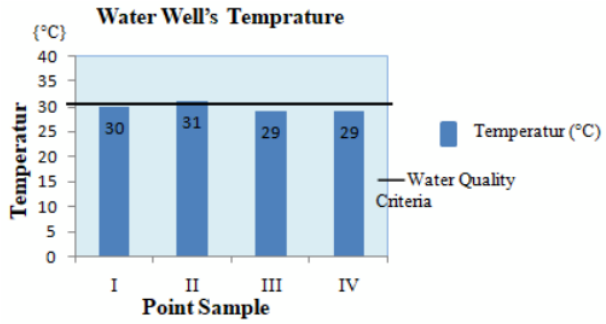

Figure 1. Histogram of Water Well's Temperature RT 04 RW 11 Parang Tambung Village, Tamalate Sub District, Makassar City, 2017

Based on the histogram or Figure 1 above, the observation of the temperature or temperature of the well water in the field samples I at 30 ° C, the second location of the well water temperature is 31 ° C and is the highest water temperature whereas at locations III and IV the water temperature is the most low is 29 ° C.

4.2.2. Color

Based on the results of the analysis in the laboratory showed that the color parameters for well water samples all locations meet the criteria of water quality criteria. The results of the analysis can be seen in the Figure 2.

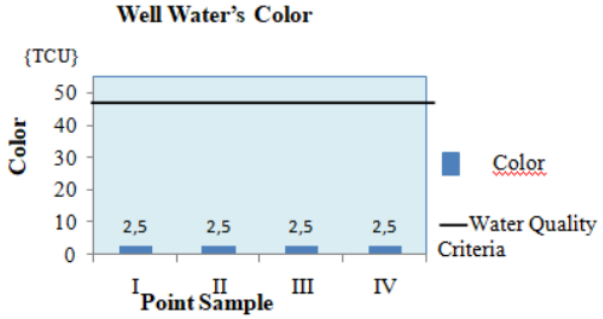

Figure 2. Histogram of Well Water's Color Parang Tambung Village, Tamalate Subdistrict, Makassar City, 2017. The results obtained in the color of well water samples at all locations are 2.5 Pt-Co color Unit.

4.2. Turbidity

Based on the results of the sample analysis in the laboratory, the turbidity parameters of all sampling points all meet clean water quality standards of 25 NTU. The results of the analysis can be seen in the Figure 3.

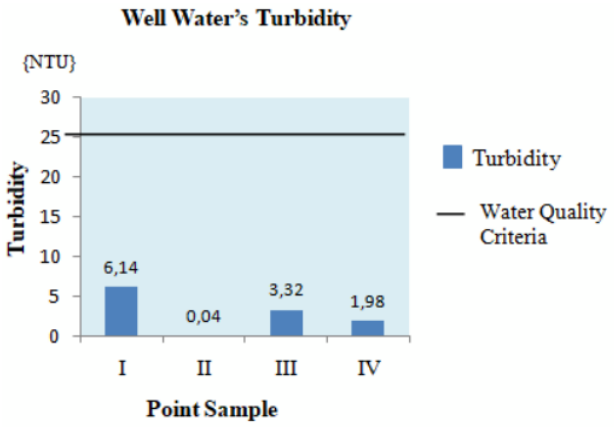

Figure 3. Histogram of Well Water's Turbidity RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

Based on Figure 3 above shows that the highest turbidity value is located at location I that is 6.14 NTU, but it does not pass the water quality feasibility standard. While the lowest turbidity value is at location II that is 0.04 NTU.

4.3. Chemical Parameters

Chemical parameters here are pH, iron (Fe), chloride (CI), where if one of these variables is not eligible, it can be said that the water does not meet the water quality requirements determined in accordance with Regulation of the Minister of Health of the Republic of Indonesia [5]. The analysis of sample can be seen in the
Table 3.

Table 3. Analysis of Sampel Chemical Parameters Result

No	Chemistry Parameters (Unit)	Maximum of Water Quality Criteria Regulation of the Minister of Health of the Republic of Indonesia	Analysis Sample Result Point I	Point II	Point III	Point IV
1	pH	6,5-9,0	6,678	6,747	6,757	6,690
2	Iron/Fe (mg/L)	1,0	0,1039	0,1340	0,0838	0,1178
3	Chlorida/CI (mg/L)	600	27,2256	34,7410	45,0924	36,4426
	Explanation		Q	Q	Q	Q

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Based on Table 3 it is known that from the four wells taken by water samples, all meet the criteria of clean water quality standards established in accordance with Regulation of the Ministry of Health [5].

4.3.1. pH

pH is a term used to express the intensity of the acid or base state of a solution. The results of the analysis can be seen in the Figure 4.

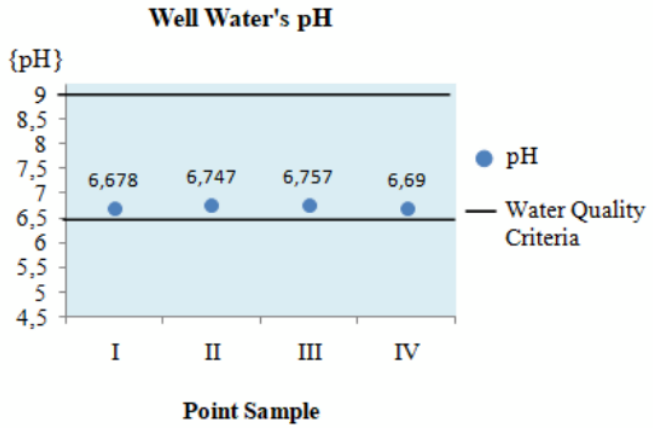

Figure 4. Histogram of Well Water's pH RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

Based on the histogram above the highest parameter value of pH is location III that is 6.757 whereas the lowest pH value is location I that is 6,678.

4.3.2. Iron (Fe)

The permitted level of iron content (Fe) for clean water quality is 1.0 mg/L. The results of the analysis can be seen in the Figure 5.

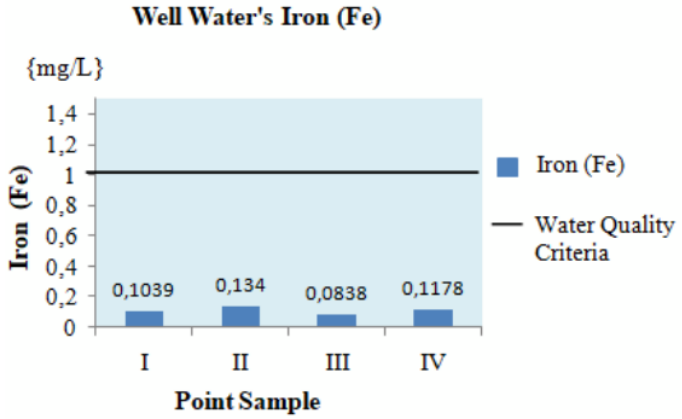

Figure 5. Histogram of Well Water's Iron (Fe) RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

When viewed from the iron content of the highest value that is at the location II is 0.1340 mg / L while the lowest iron content value is the third location of 0.0838 mg / L. According to Cole, in [9], iron is only found in waters that are in anaerobic condition (anoxic). Iron compounds are generally soluble and quite abundant in the soil. Groundwater typically has a relatively large amount of carbon dioxide, presumably with low dissolved oxygen or even anaerobic atmosphere.

4.3.3. Chloride (Cl)

The content of chloride (CI) allowed for clean water quality is 600 mg / L. The results of the analysis can be seen in the Figure 6.

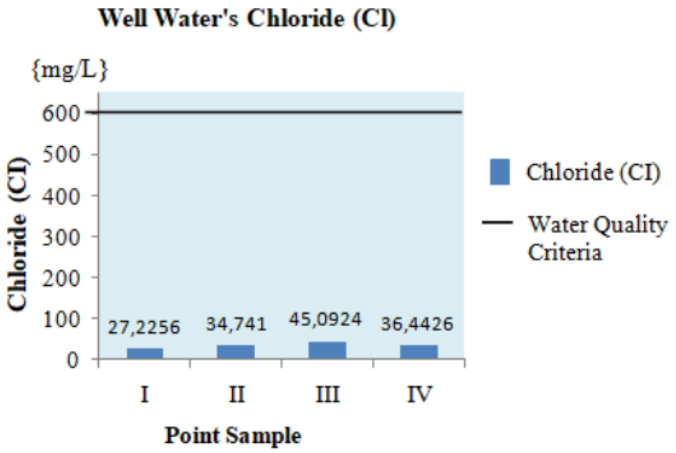

Figure 6. Histogram of Well Water's Chlorida (CI) RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City.

When seen from Figure 6. The highest content of chloride that is at location III that is 45,0924 mg / L while the value of chloride content is lowest is location I that is 27,2256 mg / L.

4.4. Biology Parameter

The biological parameters are total coliform (E-coli). The results of the sample analysis can be seen in Table 4.

Table 4. Analysis Biological Parameters Result

No	Biological Parameters (Satuan)	Water Quality Criteria (Regulation of the Minister of Health of the Republic of Indonesia)	Analysis Sample Result			
			Point I	Point II	Point III	Point IV
1	Biology/Total Coliform (Total/100 ml)	50	48	< 1,8	47	24
	Explanation		Q	Q	Q	Q

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Based on Table 4. above it is known that from the four wells taken in water samples, all meet the criteria of water quality standards established in accordance with Minister of Health of the Republic of Indonesia [5]. Comparison of the total number of coliform can be seen in Figure 7.

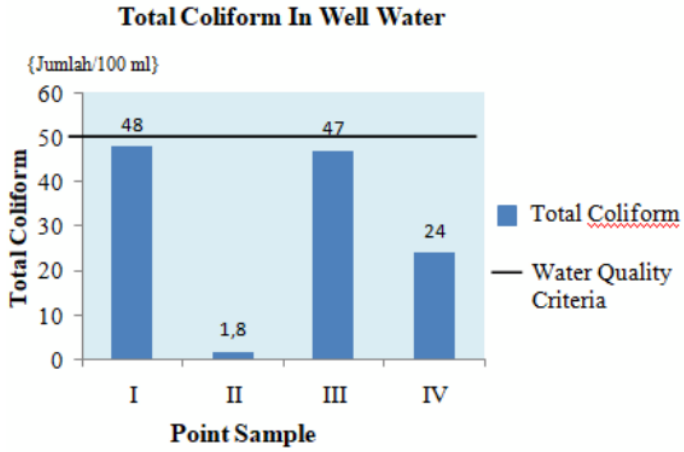

Figure 7. Histogram of Total Coliform In Well Water RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City.

Based on Figure 7 above it is known that the highest total coliform value is at location I that is 48 colony / 100 ml and the lowest at location II that is <1,8 colony / 100 ml.

5. Discussion

From the results of the research, it is known that dug wells are located around the garbage dump RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City, from four dug wells that have been checked the water quality physically there are two digging wells that the physical quality of the water does not meet the standard of clean water quality criteria in accordance with the decision of Regulation of the Minister of Health of the Republic of Indonesia [5], the location of Point II and location of Point III, where the physical condition of the well water at the Point II location, the taste in the well water feels slightly brackish and the temperature water exceeds the water quality standards set. While at the location of Point III the physical state of the well water smells the soil.

The odor of dug well water at the location of Point III, which smells of soil, may be caused by water derived from various sources such as waste material or caused by the process of organic compounds by bacteria and carcasses of animals suspended in well water so that water wells at the location of Point III smelled of soil.

According to Effendi [9], water is good and safe for consumption is water that has characteristic odorless when kissed from far or near. Groundwater is caused by water derived from various sources such as waste material or caused by the process of organic compounds by bacteria and animal carcasses.

The flavor of the well water in point II, which is slightly brackish, whereas at the location of Point I, III, and IV the taste of the water is not felt or in accordance with the water quality requirements in general. According to Hadipurwo and Danayanto [10], groundwater flavor is determined by the presence of salt or substances contained in the water, either suspended or dissolved. The slightly brackish water flavor at the site of Point II, the possibility of any salt or substances contained in the water, either suspended or dissolved.

Based on the temperature measurements of the four sampling sites, one well (Location of Point II) whose water temperature exceeds the threshold with the water temperature of 31° C. While the desired temperature in clean water is 20 ° C - 30 ° C. The high temperature is due to the local climate and the type of water source that will affect the temperature [7]. The state of well water temperature depends on the local climate including the temperature and rainfall conditions [11][12]. This is not much different from the results of the study by Maru, et. al. the average daytime temperature in Makassar is 31.29 °C [13],[15]. Even some other big cities have experienced similar things, as the study in Jakarta by Maru and Ahmad, that the average temperature during the day is 33.32°C [15]. Among the causes of rising air temperatures are reduced forest areas or green open spaces [16], and increasing anthropogenic activity [17].

From the water test of the four digging wells as clean water that has been done by the Center of Production of Makassar Plantation Industry is 2.5 TCU (Eligible) in accordance with the decision of Minister of Health of the Republic of Indonesia [5] is 50 TCU.

The color of the water is due to the presence of natural tannins and humic acid. This substance when exposed to chlorine can form toxic choloroform compounds [18].

From the fourth well water turbidity test, the turbidity level ranged from 0.04 - 6.14 NTU. The standard of turbidity parameter based on the Regulation of the Minister of Health of the Republic of Indonesia [5] is maximum 25 NTU, so it can be concluded that all four wells taken by water samples are all eligible according to Regulation of the Minister of Health of the Republic of Indonesia [5].

According to Hadipurwo [10], turbidity of water caused by the presence of not soluble substances contained. An example is the presence of clay particles, silt, as well as organic substances or microorganisms.

From the result of the research, it is known that the dug wells around the landfill of RT 04 RW 11 Parang Tambung Village Tamalate Subdistrict of Makassar City, from the four digging wells that have been checked the water quality chemically include pH, Iron (Fe), and Chloride (CI), the four wells all meet the water quality criteria criteria in accordance with the Regulation of the Minister of Health of the Republic of Indonesia [5].

From pH test on dug well water as clean water which has been done by Indonesian Center for Plantation Product of Makassar City is 6,690 - 6,757 (Normal) and feasible according to standard quality value from Decree of Minister of Health of the Republic of Indonesia [5] is 6, 5 - 9.0. The pH content in water does not exceed the maximum quality standard. Water should be neutral, not acidic or alkaline, to prevent the occurrence of heavy metal dissolution and corrosion of water distribution networks. Water is a very good solvent, so it is helped by a non-neutral pH to dissolve the various chemical elements it passes through [17].

From Iron (Fe) test on well water dug as clean water that has been done by Center of Production Industry of Makassar City is 0,0838 mg / L - 0,1340 mg / L (Eligible) as per standard value of Regulation of the Minister of Health of the Republic of Indonesia [5] is 1.0 mg / L. Iron is soluble at low pH and can cause yellowish water, cause stains on clothing and breeding place of creonothrinx bacteria, therefore iron content should not exceed 1.0 mg / L, because it can accelerate the growth of bacteria and can cause taste and smell [18].

From Chloride (CI) test on well water as clean water that has been done by Center of Production Industry of Makassar City is 27, 2256 mg / L - 45,0924 mg / L (Eligible) according to standard quality value of Minister of Health of the Republic of Indonesia [5] is 600 mg / L. What if the content of chloride (CI) in well water exceeds the quality standard in large amounts of chloride will cause saltiness, corrosion in the water supply system pipeline [17].

From the examination of Total Coliform in digging well water as clean water which has been done by Central of Makassar Plantation Product Industry is <1,8 - 48 per 100 ml of sample and (Eligible) according to value of clean water quality standard from Regulation of the Minister of Health of the Republic of Indonesia [5] is 50 Mg / L. According to Fardiaz [20], [21] the high amount of Coliform Total can occur due to the high contamination of pathogenic bacteria from human or animal digestive tract and other pathogenic agents.

6. Conclusion

Based on the research objectives and discussion, it can be concluded and suggestions as follows: Physical quality of well water around the landfill of RT 04 RW 11 Parang Tambung Village, Tamalate Sub-District, Makassar City, at location I and IV meet the criteria of clean water quality in accordance with Regulation of the Minister of Health of the Republic of Indonesia [5], based on the construction of dug wells meet the requirements. While on location II and III the physical quality of the water does not meet the criteria of clean water quality in accordance with Minister of Health of the Republic of Indonesia [5] based on the construction of dug wells do not meet the requirements. Description of the chemical quality of well water dug around the landfill of RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City, from 4 wells taken by water samples all meet the criteria of clean water quality in accordance with Regulation of the Minister of Health of the Republic of Indonesia [5], based on the construction of the dug wells at sites II and III although not eligible but the water quality does not exceed the threshold for the chemical quality of the water. The description of bacteriological quality (Total Coliform) of well water dug around garbage dump RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City, from 4 wells taken by water samples all meet the criteria of clean water quality in accordance with Regulation of the Minister of Health of the Republic of Indonesia [5], based on the construction of dug wells at sites II and III although not eligible but the water quality does not exceed the threshold of the biological quality of its water.

Acknowledgments

We would like to express our gratitude to the Head of Universitas Negeri Makassar and the Makassar City Government for their permission and support in completing this research.

References

[1] Wardhana, 2004. *Impact of Environmental Pollution*. Yogyakarta:Andi Offset.
[2] Ratna, S., 2006. Study of Dug Well Water Quality in Paria Village, Duampanua Subdistrict, Pinrang Regency, Unpublished Thesis, Faculty of Public Health Unhas.
[3] Kusnaedi, 2002. *Managing Water For Drinking Water*. Jakarta: Rineka Cipta.
[4] Ministry of Health of the Republic of Indonesia. 2004. Decree of the Minister of Health No. 128 / MENKES / SK / II / 2004 on the Basic Policy of the Center for Public Health. Jakarta
[5] Regulation of Health Minister of Indonesia No. 416 year 1990, *Terms and Supervision of drinking water quality*.
[6] Sutrisno, Totok C, 2006. *Water Supply Technology*. Rineka Cipta, Jakarta.
[7] Suripin, 2002. *Preservation of Soil and Water Resources*. Yogyakarta: Andi Off Set.
[8] Harter, T. 2003. Water Well Design and Construction. appropriate quality, drillers and groundwater consultants rely on their prior knowlPUBLICATION 8086 FWQP REFERENCE SHEET 11.3. by the Regents of the University of California, Division of Agriculture and Natural.
[9] Effendi, H, 2003. Water Quality Study for Resource Management and Water Environment. Yogyakarta: Kanisius.
[10] Hadipurwo, S and Danaryanto, 2006. *Conservation as a Ground Rescue Efforts in Indonesia*. Presented at: National Seminar of World Water Day 2006. Directorate of Geothermal Operations and Ground Water Management Directorate General Mineral Coal andGeothermal Department of Energy and Mineral Resources.
[11] Sanusi, W., Jemain, A. A., & Zin, W. Z. W. (2014). Fuzzy Clustering for Regionalization of Drought Proneness in Peninsular Malaysia. *Sains Malaysiana*, *43*(11), 1791-1800.
[12] Sanusi, W., Jemain, A. A., Zin, W. Z. W., & Zahari, M. (2015). The drought characteristics using the first-order homogeneous Markov chain of monthly rainfall data in peninsular Malaysia. *Water Resources Management*, *29*(5), 1523-1539
[13] Maru, R., Baharuddin, I.I., Umar, R., Rasyid., R., Uca, Sanusi, W., and Bayudin. 2015. Analysis of The Heat Island Phenomenon in Makassar, South Sulawesi, Indonesia. *American Journal of Applied Sciences*. 12 (9): 616.626. ISSN online 1554-3641. DOI: 10.3844/ajassp.2015.

[14] Maru, R. and Ahmad, S. 2015. The relationship between land use changes and the urban heat island phenomenon in Jakarta, Indonesia. *Journal of Advanced Science Letters*. Vol. 21, No. 2, pp. 150–152(3). ISSN 1936-6612 (Print)
[15] Maru, R. and Ahmad, S. 2015. The Relationship between Temperature Patterns and Urban Morfometri in the Jakarta City, Indonesia. *Asian Journal of Atmospheric Environment*. Vol. 9-2, pp. 128-136, June 2015. ISSN (Online) 2287-1160. ISSN (Print) 1976-6912. DOI: http://dx.doi.org/10.5572/ajae.2015.9.2.128.
[16] Maru, R., Abidin, M.R., Arfan, A., Nyompa, S., Sideng, U., and Hasja, S. 2016. Mapping of Protected Forests and Cultivated Area in North Luwu South Sulawesi, Indonesia. *Asian Journal of Applied Science*. Vol 9, issue 4, pp 189-195, 2016. ISSN1996-3343.
[17] Maru, R., & Ahmad, S. (2014). Daytime temperature trend analysis in the city of Jakarta, Indonesia. *World Applied Sciences Journal*, *32*(9), 1808-1813.
[18] Slamet, S, J, 1994. *Environmental Health*, Gadjah Mada University Press.
[19] Sutapa, I.D.A, 2000. Correlation Test of Effect of Tapioca Waste on Well Water Quality. Journal of Development Studies, Society & Environment, Vol. 2, Vo1; 47-65.
[20] Fardiaz, S. (1992). *Polusi air dan udara*. Kanisius.
[21] Fardiaz, Srikandi. 1992. *Food Microbiology I*. Jakarta: PT. Gramedia Pustaka Utama
[22] National Standarization Agency, SNI 06-6989.24-2005: *water and wastes: color test procedure by visual comparative*, National standarization Agency, Jakarta, 2005.
[23] National Standarization Agency, SNI 06-6989.11-2004: *Ph test procedure,* National standarization Agency, Jakarta, 2009.
[24] National Standarization Agency, SNI 06-6989.19-2009: *Iron (Fe) test procedure,* National standarization Agency, Jakarta, 2009.
[25] National Standarization Agency, SNI 06-6989.19-2004: *chloride test procedure by argentometry methode* , National standarization Agency, Jakarta, 2004.
[26] Adelekan B A. 2010. *International Journal of Water Resources and Environmental Engineering*, 2010, 2 (6): 137-147

Corrigendum: Analysis of Water Well Quality Drilling Around Waste Disposal Site in Makassar City Indonesia.

J. Phys. Conf. Ser **954** (2017) 012025

R. Maru, I. I. Baharuddin, N. Badwi, S. Nyompa, and Sudarso
[1]Department of Geography, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Indonesia

Description of corrigendum e,g,

Page 2:

In the Introduction section, the following text appears:

"*Clean water coverage program in Makassar city In 2004 was 82,55%, while drinking water coverage in 2004 was 80,85% for physical, clean water quality coverage was 87,02% was increase compared to 2003 that was 83,43 % based on Regulation of the Ministry of Health of the Republic of Indonesia [4].*"

This should read:

"Clean water coverage program in Makassar city In 2004 was 82.55%, while drinking water coverage in 2004 was 80.85% for physical, clean water quality coverage was 87.02% was increase compared to 2003 that was 83.43% based on Regulation of the Ministry of Health of the Republic of Indonesia [4]."

Page 5:

In the Result section, the following text appears:

Table 2. Results of Analysis of Physical Parameter

No	Physic Parameters (Unit)	Water Quality Criteria (Regulation of The Minister of Health of the Republic of Indonesia	Sample Analysis Results			
			Point I	Point II	Point III	Point IV
1	Smell	No smell	No smell	No smell	Smell of soil	No smell
2	Flavors	Does not taste	Does not taste	Feels brackish	Does not taste	Does not taste
3	Temperature (° C)	30°C	30°C	31°C	29°C	29°C
4	Color (TCU)	50	2,5	2,5	2,5	2,5
5	Turbidity (NTU)	25	6,14	0,04	3,32	1,98
Explanation			Q	NE	NE	NE

(Data Processing Result, 2017)
Explanation: Q : Qualify; NE : Not Eligible

This should read:

Table 2. Results of Analysis of Physical Parameter

No	Physic Parameters (Unit)	Water Quality Criteria (Regulation of The Minister of Health of the Republic of Indonesia	Sample Analysis Results			
			Point I	Point II	Point III	Point IV
1	Smell	No smell	No smell	No smell	Smell of soil	No smell
2	Flavors	no taste	no taste	Feels brackish	no taste	no taste
3	Temperature (° C)	30°C	30°C	31°C	29°C	29°C
4	Color (TCU)	50	2.5	2.5	2.5	2.5
5	Turbidity (NTU)	25	6.14	0.04	3.32	1.98
Explanation			Q	NE	NE	NE

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Page 6:

In the Result section, the following text appears:

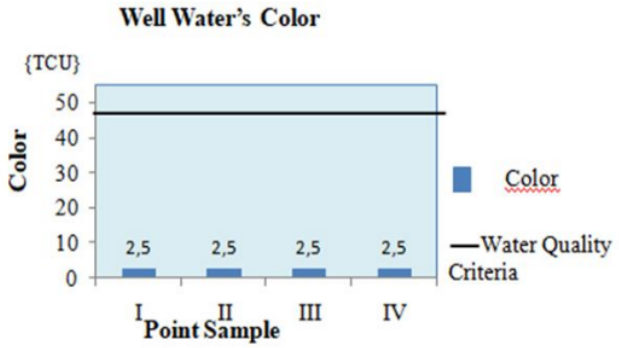

Figure 2. Histogram of Well Water's Color RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017. The results obtained in the color of well water samples at all locations are 2.5 units PtCo/color.

This should read:

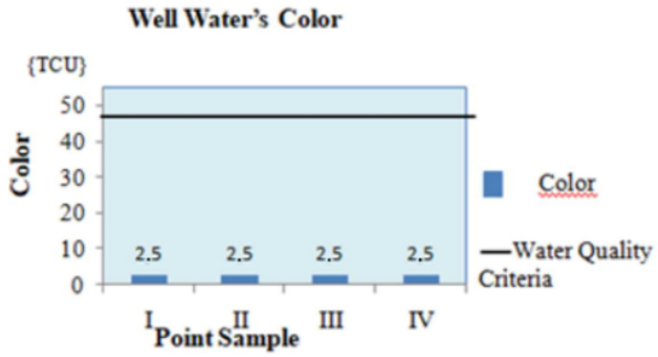

Figure 2. Histogram of Well Water's Color Parang Tambung Village, Tamalate Subdistrict, Makassar City, 2017. The results obtained in the color of well water samples at all locations are 2.5 Pt-Co color Unit.

Page 7:

In the Result section, the following text appears:

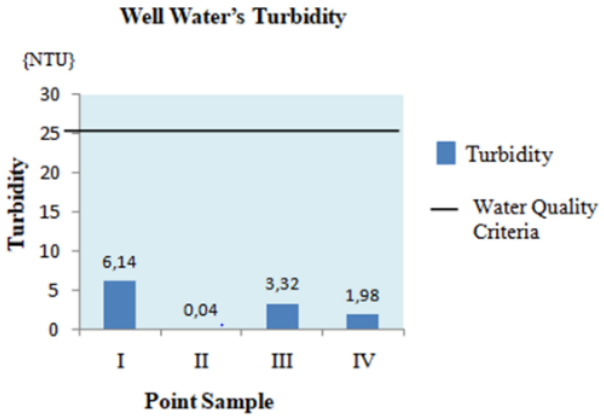

Figure 3. Histogram of Well Water's Turbidity RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017.

This should read:

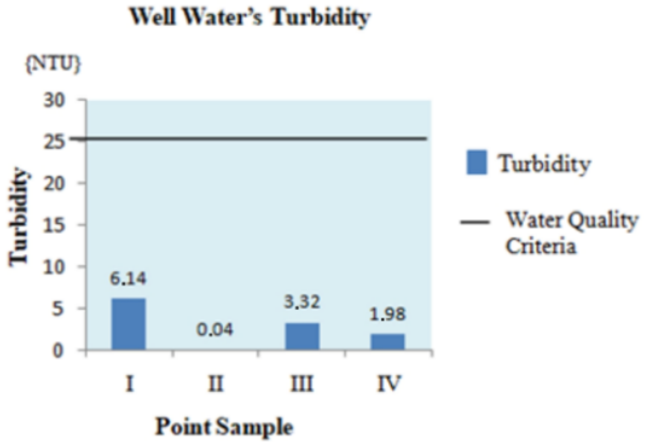

Figure 3. Histogram of Well Water's Turbidity RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

Page 7:

In the Result section, the following text appears:

Table 3. Analysis of Sampel Chemical Parameters Result

No	Chemistry Parameters (Unit)	Water Quality Criteria Regulation of the Minister of Health of the Republic of Indonesia	Analysis Sample Result Point I	Point II	Point III	Point IV
1	pH	6,5-9,0	6,678	6,747	6,757	6,690
2	Iron/Fe (mg/L)	1,0	0,1039	0,1340	0,0838	0,1178
3	Chlorida/Cl (mg/L)	600	27,2256	54,7410	45,0924	36,4426
	Explanation		MS	MS	MS	MS

(Data Processing Result, 2017)
Explanation: Q : Qualify; NE : Not Eligible

This should read:

Table 3. Analysis of Sampel Chemical Parameters Result

No	Chemistry Parameters (Unit)	Maximum of Water Quality Criteria Regulation of the Minister of Health of the Republic of Indonesia	Analysis Sample Result Point I	Point II	Point III	Point IV
1	pH	6.5-9.0	6.678	6.747	6.757	6.690
2	Iron/Fe (mg/L)	1.0	0.1039	0.1340	0.0838	0.1178
3	Chlorida/Cl (mg/L)	600	27.2256	34.7410	45.0924	36.4426
	Explanation		Q	Q	Q	Q

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Page 8:

In the Result section, the following text appears:

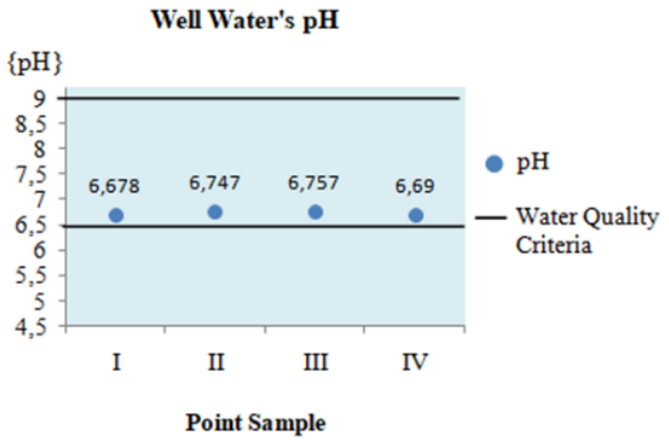

Figure 4. Histogram of Well Water's pH RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017.

"Based on the histogram above the highest parameter value of pH is location III that is 6.757 whereas the lowest pH value is location I that is 6,678."

This should read:

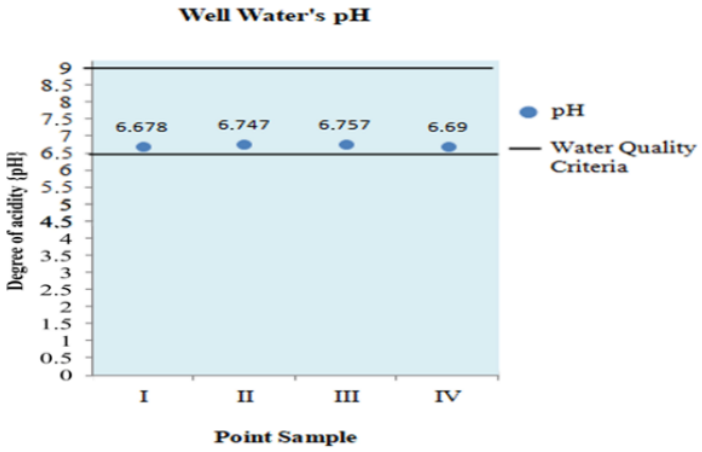

Figure 4. Histogram of Well Water's pH RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

"Based on the histogram above the highest parameter value of pH is location III that is 6.757 whereas the lowest pH value is location I that is 6.678."

Page 8:

In the Result section, the following text appears:

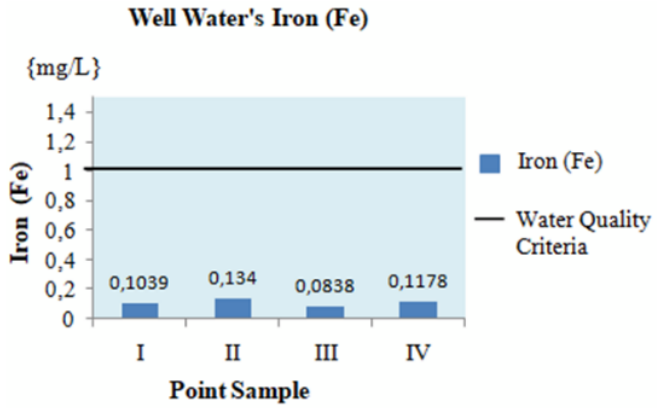

Figure 5. Histogram of Well Water's Iron (Fe) RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017.

This should read:

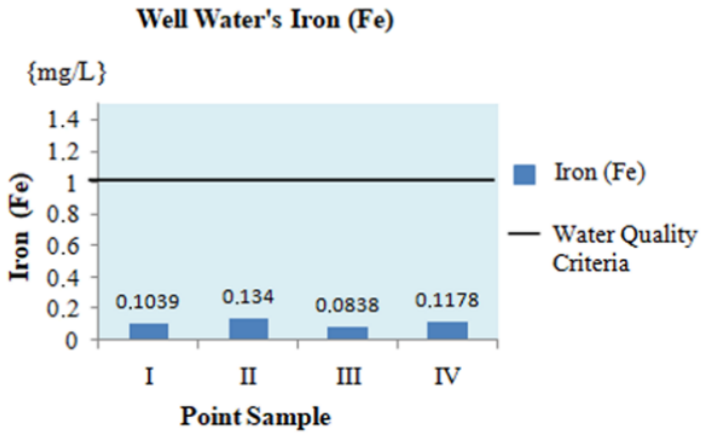

Figure 5. Histogram of Well Water's Iron (Fe) RT 04 RW 11 Parang Tambung village, Tamalate subdistrict Makassar City, 2017.

Page 9:

In the Result section, the following text appears:

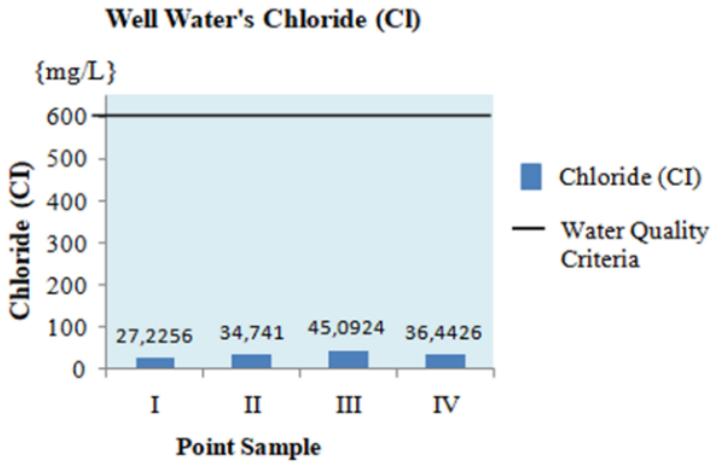

Figure 6. Histogram of Well Water's Chlorida (Cl) RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017.

"When seen from Figure 6. The highest content of chloride that is at location III that is 45,0924 mg / L while the value of chloride content is lowest is location I that is 27,2256 mg / L."

This should read:

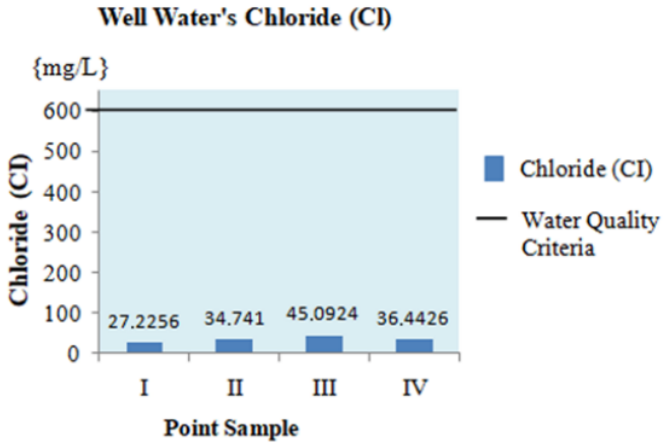

Figure 6. Histogram of Well Water's Chlorida (CI) RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City.

"When seen from Figure 6. The highest content of chloride that is at location III that is 45.0924 mg/L while the value of chloride content is lowest is location I that is 27.2256 mg/L."

Page 9:

In the Result section, the following text appears:

Table 4. Analysis Biological Parameters Result

No	Biological Parameters (Satuan)	Water Quality Criteria (Regulation of the Minister of Health of the Republic of Indonesia)	Analysis Sample Result			
			Point I	Point II	Point III	Point IV
1	Biology/Total Coliform (Total/100 ml)	50	48	< 1,8	47	24
Explanation			Q	Q	Q	Q

(Data Processing Result, 2017)
Explanation: Q: Qualify; NE: Not Eligible

This should read:

Table 4. Analysis Biological Parameters Result

No	Biological Parameters (Satuan)	Water Quality Criteria (Regulation of the Minister of Health of the Republic of Indonesia)	Analysis Sample Result			
			Point I	Point II	Point III	Point IV
1	Biology/Total Coliform (Total/100 ml)	50	48	< 1.8	47	24
Explanation			Q	Q	Q	Q

(Data Processing Result, 2017)
note: Q (Qualify); NE (Not Eligible)

Page 10:

In the Result section, the following text appears:

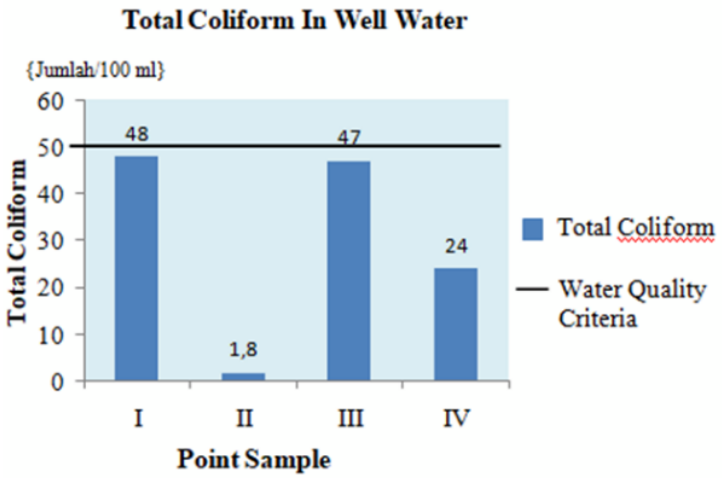

Figure 7. Histogram of Total Coliform In Well Water Air RT 04 RW 11 Parang Tambung Sub-District Tamalate District Makassar City Tahun 2017.

"Based on Figure 7 above it is known that the highest total coliform value is at location I that is 48 colony / 100 ml and the lowest at location II that is <1,8 colony / 100 ml."

This should read:

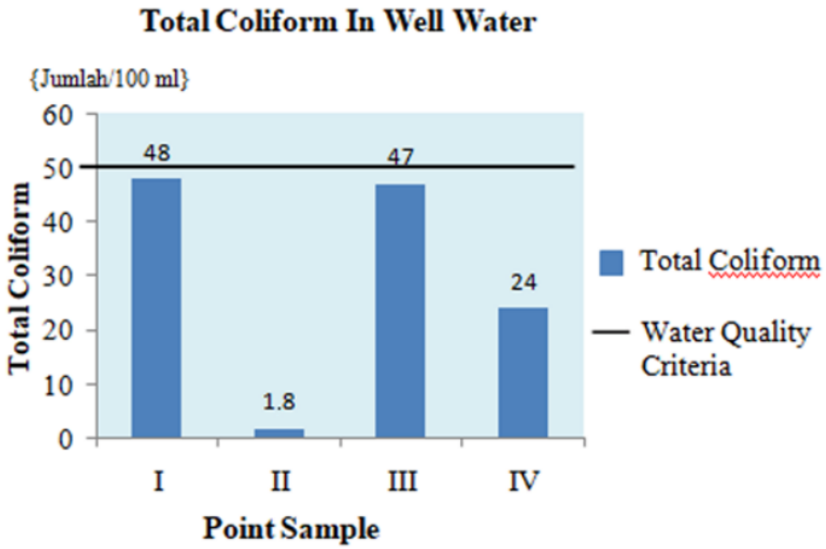

Figure 7. Histogram of Total Coliform In Well Water RT 04 RW 11 Parang Tambung Village, Tamalate Subdistrict, Makassar City.

"Based on Figure 7 above it is known that the highest total coliform value is at location I that is 48 colony/100 ml and the lowest at location II that is <1.8 colony/100 ml."

Page 11:

In the discussion section, the following text appears:

"From pH test on dug well water as clean water which has been one by Indonesian Center for Plantation Product of Makassar City is 6,690 - 6,757 (Normal) and feasible according to standard quality value from Decree of Minister of Health of the Republic of Indonesia [5] is 6, 5 - 9.0. The pH content in water does not exceed the maximum quality standard. Water should be neutral, not acidic or alkaline, to prevent the occurrence of heavy metal dissolution and corrosion of water distribution networks. Water is a very good solvent, so it is helped by a non-neutral pH to dissolve the various chemical elements it passes through [17]."

"From Chloride (CI) test on well water as clean water that has been done by Center of Production Industry of Makassar City is 27, 2256 mg / L - 45,0924 mg / L (Eligible) according to standard quality value of Minister of Health of the Republic of Indonesia [5] is 600 mg / L. What if the content of chloride (CI) in well water exceeds the quality standard in large amounts of chloride will cause saltiness, corrosion in the water supply system pipeline [17].

From the examination of Total Coliform in digging well water as clean water which has been done by Central of Makassar Plantation Product Industry is <1,8 - 48 per 100 ml of sample and (Eligible)
according to value of clean water quality standard from Regulation of the Minister of Health of the Republic of Indonesia [5] is 50 Mg / L. According to Fardiaz, the high amount of Coliform Total can

occur due to the high contamination of pathogenic bacteria from human or animal digestive tract and other pathogenic agents [19].”

This should read:

“From pH test on dug well water as clean water which has been done by Indonesian Center for Plantation Product of Makassar City is 6.690 – 6.757 (Normal) and feasible according to standard quality value from Decree of Minister of Health of the Republic of Indonesia [5] is 6.5 - 9.0. The pH content in water does not exceed the maximum quality standard. Water should be neutral, not acidic or alkaline, to prevent the occurrence of heavy metal dissolution and corrosion of water distribution networks. Water is a very good solvent, so it is helped by a non-neutral pH to dissolve the various chemical elements it passes through [17] “

“From Chloride (CI) test on well water as clean water that has been done by Center of Production Industry of Makassar City is 27.2256 mg/L – 45.0924 mg/L (Eligible) according to standard quality value of Minister of Health of the Republic of Indonesia [5] is 600 mg/L. What if the content of chloride (CI) in well water exceeds the quality standard in large amounts of chloride will cause saltiness, corrosion in the water supply system pipeline [17].

From the examination of Total Coliform in digging well water as clean water which has been done by Central of Makassar Plantation Product Industry is <1,8 - 48 per 100 ml of sample and (Eligible) according to value of clean water quality standard from Regulation of the Minister of Health of the Republic of Indonesia [5] is 50 Mg/L. According to Fardiaz [20][21] the high amount of Coliform Total can occur due to the high contamination of pathogenic bacteria from human or animal digestive tract and other pathogenic agents.”

sn

ORIGINALITY REPORT

6%	3%	5%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.gssrr.org Internet Source	1%
2	Sukri Nyompa, Rosmini Maru, Muhammad Nur Zakariah Leo, Uca, Amal Arfan, Erman Syarif, Nuf Fatimah Basram, Fika Gusdwitri Idris. "Geography study of furniture industry business in Makassar city, Indonesia", AIP Publishing, 2018 Publication	1%
3	F Ali, D L Lestari, M D Putri. "Application of Ozone Plasma Technology for Treating Peat Water into Drinking Water", IOP Conference Series: Earth and Environmental Science, 2019 Publication	1%
4	Muhammad Satya Raihanto, Melinska Ayu Febrianti, Gisya Amanda Yudhistira, Qurtubi. "The Prototype Design of Water pH and TDS Indicator Device based on Microcontroller Arduino", 2021 Third International Sustainability and Resilience Conference: Climate Change, 2021 Publication	1%

5	Harjito, Suntoro, T Gunawan, M Maskuri. "Leachate pollution management to overcome global climate change impact in Piyungan Landfill, Indonesia", IOP Conference Series: Earth and Environmental Science, 2018 Publication	1 %
6	repository.poltekkes-tjk.ac.id Internet Source	1 %

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		

sn

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

Instructor

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20