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Water Losses Management in Water Supply Company of Tabalong Regency

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ABSTRACT

Water supply system becomes particular concern to every urban area in Indonesia including Tanjung and Murung Pudak Subdistrict as the Capital Regency of Tabalong, South Kalimantan Province. In water distribution system, water losses is one of serious problem to be overcome. The first step in reducing water losses is by developing an understanding of the big concept about water system including the preparation of a water balance. This process helps to understand the quantity, source and charge of water losses. The water balance calculation in this study uses the WB-Easy Calc program *version* 4.05. Based on the analysis, the percentage of water losses is 28.24% with the composition of real losses 23.86% and apparent losses of 4.38%. Distribution data components of water losses used in determining the effort leakage control in water supply company of Tabalong Regency. The effort is Establishment of Water Losses Team, commitment support, build a district meter area (DMA), routinely water balance with monitoring and evaluation of activities that have been done.

KEYWORDS: Water Losses, distribution, *WB-EasyCalc version* 4.05, Water Supply Company

1. INTRODUCTION

Drinking water is a basic need that can't be separated from human life. Drinking water services are a very important component of public services. The provision of drinking water is of particular concern to every urban area in Indonesia is no exception in Tabalong Regency, South Kalimantan Province. In 2016, water supply company of Tabalong Regency has been serving 10,771 costumers and 210 public hydrants equivalent to 55,684 or 67.78% of the total population in the Capital Regency of Tabalong [1]. In water distribution system, water losses is one of serious problem to be overcome. This results is significant losses for company income [2]. Non revenue water is the difference between the amount of water supplied with the water consumed [3]. In fact, the water losses in a drinking water distribution system will always be present. This water loss can be technical, such as water losses on the pipe itself, while non-technical for example illegal consumer [4]. Based on the data water supply company of Tabalong Regency, from 107.44 l/s water distribution, 29.1% is lost from the distribution system but the company doesn't know components cause of water losses [5]. Ministry of public work has set maximum limits of water losses as 20%, water supply company of Tabalong Regency not meet the standards [6]. To reduce water losses in distribution system is must be aware the cause of the water losses, one of them by using the water balance. International Water Association (IWA) has developed a structure and standard terminology for international water balance which has been adopted by national associations in many countries [7]. Water balance calculation in this study using the program *WB-EasyCalc version* 4.05. This software is very helpful in preparing the water balance and can show the level of accuracy of non revenue water calculation. Water balance is very important to know components causing water losses in order to determine future efforts to reduce water losses in water supply company of Tabalong Regency.

2. METHODS

The location of this research is urban water distribution network in water supply company of Tabalong Regency. In this research, Research methods will be done by quantitative research method through survey and interview. Technical analysis in this study using descriptive analysis techniques to identify the distribution of the causes of water losses in water supply company of Tabalong Regency. Required data to identify the components of the cause of water losses is annual system input volume, billed meters consumption, billed unmetered consumption, unbilled metered consumption, unbilled unmetered consumption, unauthorized consumption, costumer meter inaccuracies and data handling errors, length of distribution and transmission pipe, service pipe, average pressure, intermittent supply data and financial data. The data is inputted to the *WB-Easy Calc version* 4.05 program and analyzed the component of the cause of water losses in the water

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distribution system of water supply company of Tabalong Regency [7]. After that determined efforts to reduce water losses based on the water balance.

3. RESULTS AND DISCUSSION

In 2016 water supply company of Tabalong Regency has distributed water as 3,388,419 m^3, with water losses in distribution system as 956,916 m^3 or 28.24%. With the composition of real losses 808,445 m^3 and apparent losses of 148,472 m^3. Water balance calculation results in urban areas water supply company of Tabalong Regency are shown in figure 1.

Water balance in water supply company of Tabalong Regency can be described as:

1. Non revenue water as annual system input volume which is reduced by revenue water. So the calculation for non revenue water in 2016 is 3,388,419 – 2,425,228 = 963,191 m^3/year.
2. Unbilled metered consumption is water for customers with installed meters but the company don't charge for water usage. Compensation given by water supply company of Tabalong Regency in 2016 is 4,766 m^3/year
3. Unbilled unmetered consumption is all official consumption which is not billed or not metered. This component is generally used for water supply company operations such as washing pipe, pipe test, road cleaning, etc. Calculation of unbilled unmetered consumption in 2016 as 1,509 m^3/year.
4. Unauthorized consumption is an illegal water use, caused by illegal connection, bypass on the meter, unauthorized use of hydrants, etc. Unauthorized consumption in 2016 water supply company of Tabalong Regency is 2,767 m^3/year.

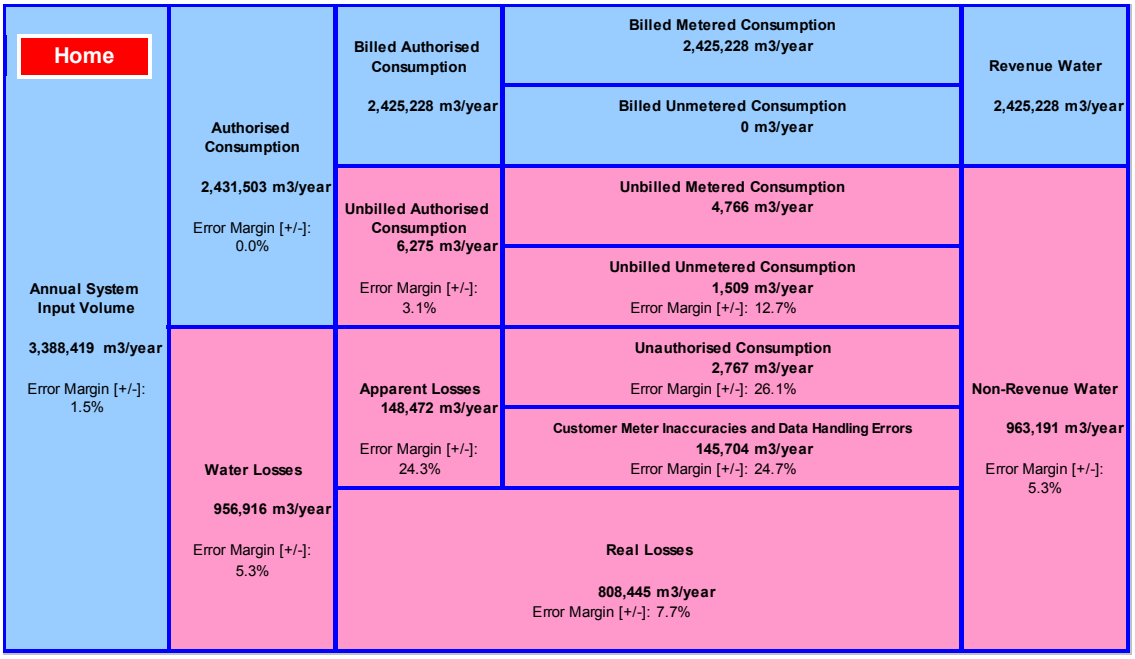

Figure 1. Water Balance Water Supply Company of Tabalong Regency

5. Customer metering inaccuracies and data handling errors is an apparent losses effect of costumer metering innacuracies and error in meter reading. In 2016 its value is 145,704 m^3/year.
6. Commersial losses as unauthorised consumption plus costumer meter inaccuracies and data handling errors. So the calculation for commercial losses in 2016 as 2,767 + 145,704 = 148,472 m^3/year. When changed in percentage is 4.38%.
7. Physical losses is the volume of water losses through all types of leakage, pipeline explosion, overflow on pipes, reservoir, etc. So in 2016, the calculation for physical losses water supply company of Tabalong Regency as 808,445 m^3/year or 12.8%.

Based on data from the water balance analysis, percentage of water losses is 28.24% with the composition of real losses 23.86% and apparent losses of 4.38%. The results of this water balance analysis are used to determine effort to be performed for the control of water losses.

Efforts to Control Water Losses

Water losses in distribution system effect a significant loss in the company. Like the illustrated in the water balance, on outline water losses can happen due two factors, that is real losses and apparent losses. Control of water losses in water supply company of Tabalong Regency not enough just to research how much is the value of water losses and the causes, but there is a real effort to implement the control of water losses [8]. So the strategy needs to be formulated to reduce water losses, is as follows:

a. Establishment of Water Losses Team
   The first step in the effort to lower Non Revenue Water/NRW is to establish a team for NRW. Team building if possible through volunteerism, then set with a decision of the Board of Directors and has the support of all directors. Preferably the team composition consists of the members of each operational section, including production, distribution, and customer service. The team can also be made up of members from the finance department, procurement and human resources. Job description of this team is to formulate goals and risk NRW reduce, formulate action plan to implementation NRW reduce (including site handling priorities), monitoring and evaluation of planned activities.
b. Commitment Support
   Resolve NRW effectively requires a joint effort of all water supply company employees and public/customer. Commitment of top decision makers, including the board of directors, the mayor or political figures is very important. Which means to change the old paradigm about water losses.
c. Establishment of service zone
   Active NRW management only possible using service zones, where the system overall divided into smaller subsystems to be able to calculate each NRW subsystem separately. These smaller subsystems often referred as District Meter Area (DMA). DMA must be hydraulically isolated so the company can to calculate the volume of water lost in the DMA. When one supply system is divided into smaller area and manageable, companies can set better NRW reduction activity.
d. Routinely Water Balance
   In reducing NRW, the company should develop an understanding about "big concept" including the preparation of a water balance. This process helps managers to understand the component, source and cost of NRW. The preparation of this water balance should be routine every month, and every will do DMA testing. Update data piping network, accessories attached should always do in order to get the closest water balance results to reality.
e. Monitoring and Evaluation
   Handling the reduction of water losses is a long-term job, even as long as the company still exists. The losses of water can't be eliminated at all, but can be lowered to the lowest possible level. This long-term work need handling such as monitoring and evaluation, consists of planning stage, implementation stage, monitoring and evaluation, and corrective action. All these stages are a continuous cycle until the target of water losses is achieved, as shown in Figure 2.

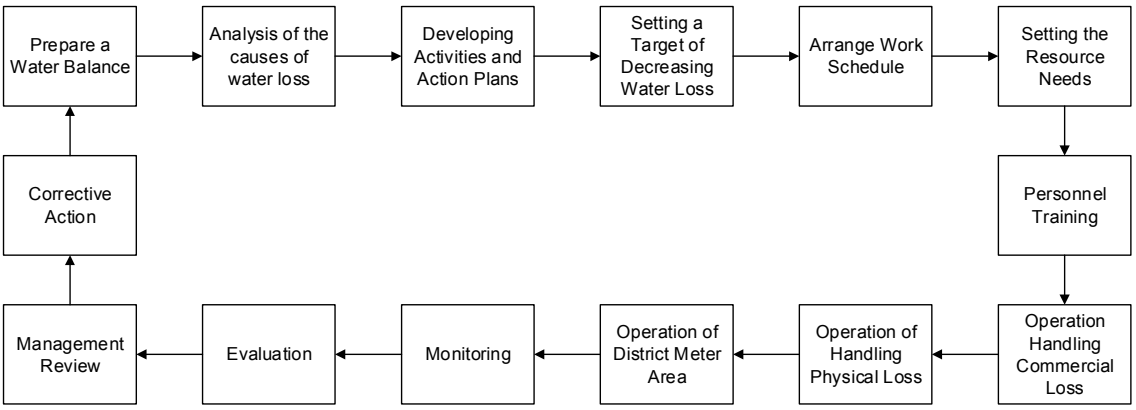

Figure 2. Reduced Water Losses Handling Cycle

4. CONCLUSION

High water losses rate 28.24% is above the water losses level set by the government is 20%. This resulted in significant losses of water supply company income. From water balance calculations, composition of real losses as 23.86% and apparent losses of 4.38%. Leakage control planned by management is establishment

of water losses team, commitment support, establishment of service zone, preparation of a routine water balance and monitoring and evaluation for the activities that have been done.

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