

Particulate Emission Distribution Prediction from Rsud Arifin Ahmad
Pekanbaru Incenerator Using Screenview

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ABSTRAK

Arifin Achmad Pekanbaru Public hospital is one of the largest hospital in Pekanbaru with medical waste generated an average of 320 Kg / day. Unperfect waste burning conditions instead become a new problem as a source of air pollutants. It's necessary to analyze the distribution of particulate matter from combustion products from Arifin Ahmad incinerator to know the quality of the surrounding air.

This research begins with a review of literature related. Then do the primary and secondary data collection including a location map research, waste generated data, data about the incinerator, the data of wind speed and direction, as well as other necessary data. The collected data is processed to be input ScreenView program. Outpun gained from the program ScreenView obtain the distribution pattern of particulate matter from Arifin Ahmad Hospital incinerator.

From this research it is known that the distribution of particulate tends toward the south and southeast with a maximum value of 12 ug / m³ at a distance of 200 m from the source of emission.

Keywords: *particulate matter, incineration, distribution pattern*

1. Introduction

Under Law No. 44 of 2008 mentioned hospital is a health care institution that organizes personal health services in plenary that provides inpatient, outpatient, and emergency department. Of the various activities that take place in hospitals, generate waste, one of which is medical waste. Where medical waste if not managed properly can become a source of new problems for hospitals (DEPKESRI, 2006).

Medical waste treatment process that is conducted in Arifin Ahmad is the way in fuel, which Arifin Ahmad Hospital itself has an incinerator operated ampir every day. From observations at the study site, known solid medical waste generation

Arifin Ahmad each day is equal to 300 kg / day. Which consists of sharp medical waste such as used syringes, medical waste such as blood and tissue from operating activities, and drugs of drugs that have expired. Based on observations in the field, also note that the Standard operational and Procedure (SOP) of medical waste incineration is done every two days, so that whenever the operation of incinerators burning medical smapah done is as much as 600 kg.

The large amount of medical waste burned will certainly affect the incinerator exhaust emissions, in this case the value of particulates. The combustion process is recommended for infectious medical waste incineration are minimal 800oC but in Arifin Ahmad Hospital, combustion temperatures occurred not at the value suggested for several reasons. Garbage is burned often still memiliki high humidity, because there is no pre-treatment (pre-treatment). Garbage is burned is still often mixed with non-medical garbage is quite humid as garden waste such as grass and leaves. Particulate itself is very dangerous, because it can mengendapap the human respiratory tract, so it can impair human health (Bunawas, 1999). Influence of particles on humans. Pollutant particles into the human body through the respiratory system, therefore any adverse effects occur in the respiratory system. Factors that affect the respiratory system is the particle size, since the particle size determines how far the penetration of particles into the respiratory system. (Ratnani, 2008)

Prediction particulate emissions from medical waste incineration activities in Arifin Ahmad need dilakukan remember Arifin Ahmad was at Pekanbaru city center and is close to population centers. From the results of these predictions will be obtained picture of the direction the distribution of pollutants from flue incenerasi based on wind direction, so that preventive measures can be carried out against the dangers of pollution that occurred.

2 Methodology

To achieve the objectives of this research, ie getting the prediction distribution map particulate emissions from the incinerator Arifin Ahmad Hospital, we perform it - the following

A. The data collection.

Data were collected in two forms, namely primary data and secondary data, where data-data that is input to the software used.

Primary data.

Primary data collected is the data obtained directly. Primary data needed, among others, is a data-intensive medical waste generation Arifin Ahmad Hospital. Waste generation data is obtained by calculating waste generation by SNI 19-

3964-1994, calculations are performed for 8 consecutive days - respectively. Another primary data is data combustion temperature and ambient air temperature data during combustion. Base map used is google earth map. Here is a map of the location study of google earth.

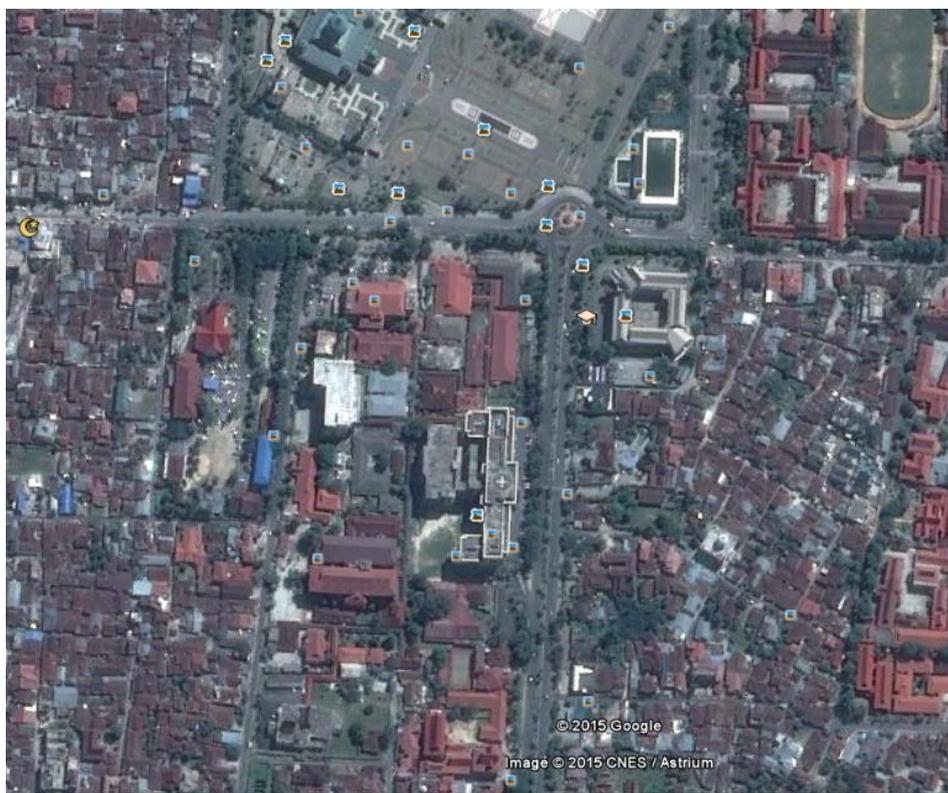


Figure 1. Location of Research

Secondary data

Secondary data were required, among others, is a specification data incinerator is used, such as high data chimney and the flow rate of combustion. Other data is data from Metroerologi and Geophysics Agency as wind speed data average - average and average wind direction -rata.

B. PROCESSING AND ANALYSIS OF DATA

After all necessary data has been collected, then analysis and verification of data. To ensure the correct data is collected and can be used. Then the data is used as input to software ScreenView. From the results obtained graphic software will ScreenView particulate concentration values.

3. RESULTS AND DISCUSSION

Medical waste generation

Medical waste generation to know Arifin Ahmad Hospital, performed the calculation of medical waste generated in accordance with SNI 19-3964-1994. The calculation is performed for 8 consecutive days - respectively. Dilakukuan calculation to determine -rata average waste generation per day.

From the results of sampling is known that the average medical smpah generation - daily average is 320 kg, while the burning is done only once every two days, so that every time the operation amount of medical waste burned is 640 kg. This data then becomes the basis of the amount of medical waste is burned. Of the amount of waste that is burned and then calculated the magnitude of the rate of emissions produced incinerator. The way it was calculated using the equation on the website USEPA <http://www.epa.state.il.us/air/aer/calculate/incinerator.html>.

Medical waste generation is calculated for one year, ie

Medical waste generation / year = 320 kg / day x 365 days = 116.8 tons / year
The rate of emissions produced / year = 0.2727 tons / year = 272 kg / year = 0.745 kg / day

CALCULATION OF CONCENTRATION

Calculation of the concentration using software ScreenView. Where this software using Gauss equation as the basis of mathematical models. The use of models gauss, because Gauss models predict one pollutant concentrations of dust. (Permatasari, 2014)

As input in ScreenView software requires the following data

1. The rate of emission = 0.745 kg / day
2. High chimney = 25 m
3. The diameter of the chimney = 1.8 m
4. The exit of flue gas velocity = 8.5 m / s
5. The temperature of the flue gas exit = 600 K
6. The temperature of the ambient temperature = 303 K
7. High-receptor = 1.5 m

Other necessary data is

Average wind speed - mean = 6.2 m / s

Atmospheric conditions when sampling is quite hot, 32 degrees Celsius, and there are no clouds, so atmospheric stability class is class D. (Colls, 2002)

topography of the study sites tend to be flat and there are no high-rise buildings in the surrounding mean wind direction - the annual average obtained from Metroerologi and Geophysics Agency showed that wind went to the southeast.

Once all the input is collected, then in use was that data in the software. Here are the results of the use of software in graphical form

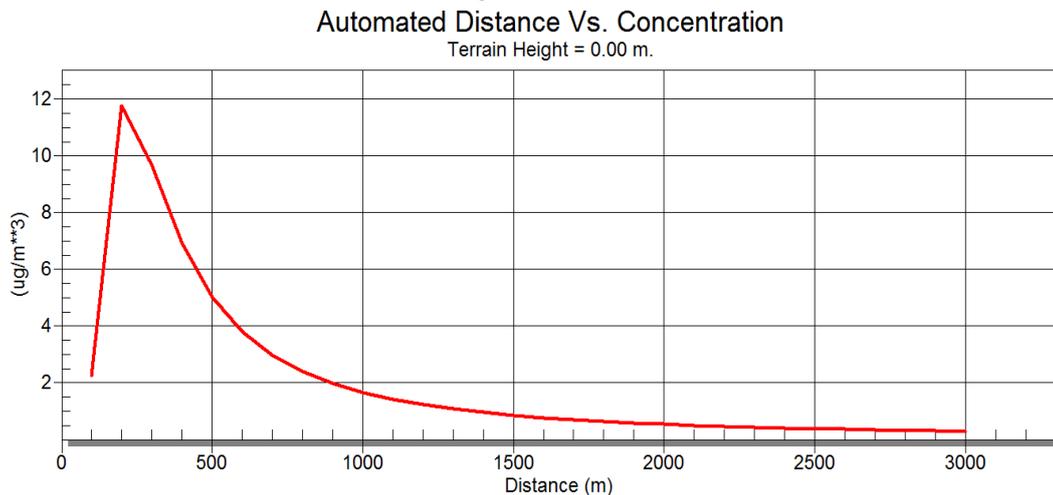


Figure 2. Graph distribution pattern of particulate

From the chart above shows that the concentration of particulate rising from 100 m 2 ug / m³ to the highest value is at a distance of 200 m from a source that is 12 ug / m³. Then the concentration of particulates down to a value of 0.

The concentration of particulate matter which is visible from the chart there is a rise and then the value goes down, this happens because of the influence of meteorological conditions that exist at the sites. This happens because the wind speed factor that carries particulate toward the environment. The influence of medical waste incineration is a part of the air quality management, which in addition to medical waste incineration, there are other factors that affect air quality in a city, yairu transportation, biomass burning, and road dust. This is consistent with research (Zannaria, 2009).

4. Conclusions

Based on the results of studies conducted, some conclusions can be obtained as follows:

1. The highest value of particulate concentration is at a distance of 200 m from a source that is equal to 12 ug / m³.
2. Direction of distribution of the particulate will follow the wind direction towards the southeast.

Thank-you note

The author would like to thank those who have helped the smooth settlement of this research

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